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Mapping Social, Ideological and Economic Transformations: Settlement and Landscape in the Early Medieval Kingdom of Brega, AD 400-1100

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0810887

This thesis is submitted to University College Dublin in fulfilment of the requirements for the degree of Doctor of Philosophy in the College of Social Sciences and Law.

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January 2022

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Abstract

Archaeology is a constantly evolving discipline, and geographic information system (GIS) software and theory as it relates to archaeology is evolving with it.

This project combines archaeology and GIS and has two main strands. The first is to examine settlement, landscape, transport and communications in the early medieval kingdom of Brega. Brega was one of the most economically wealthy and politically powerful kingdoms in the country at this time and had a long practice of prehistoric settlement. It also has substantial early medieval settlement remains and is the location of Tara, the seat of the High Kings of Ireland. It was also a kingdom riven with strife throughout the period. Annexed internally by the Southern Uí Néill, it was also a target of attack for the Anglo-Saxons, Vikings and latterly the Anglo-Normans, and all of these factors served to alter the political and often physical landscape of the kingdom. This is the first time an attempt has been made to model the transport, communications and settlement network of an early medieval kingdom in as complete a way as the evidence allows.

The second strand was to approach this subject through use of a GIS, using free and open source datasets, to assess their ability for use in an Irish context. The thesis uses a wide-ranging suite of GIS processes applied to these datasets to produce meaningful, substantial and original results. Some of the processes within the PhD have never before been applied to Irish material remains and these new techniques and approaches coupled with the power of the GIS to process large datasets can help untangle some of the complexity of settlement in Brega.

Statement of Original Authorship

I hereby certify that the submitted work is my own work, was completed while registered as a candidate for the degree stated on the Title Page, and I have not obtained a degree elsewhere on the basis of the research presented in this submitted work.

Acknowledgements

My sincere thanks must go to my supervisors Professor Aidan O'Sullivan and Dr Rob Sands, who helped and encouraged me through this process, and managed to cope with some of my more unrealistic ideas. Thanks also to school manager Angela McAteer, an organisational genius. Dr Edel Bhreathnach also made herself available for my DSP and my thanks go out to her.

It was very helpful starting the project to have the support of all the other PhD students who have gone on to bigger and better things – you know who you are! We spoke on many subjects with archaeology probably being the least of them. I have to make a special mention of Susan Curran who was always on hand to help or answer any questions I had and was always a reassuring presence.

Thanks also to Patrick Gleeson who was more than willing to share his work and trusted me with his unpublished papers, they were very helpful. In a similar vein Robert Chapple was also very willing to share his excellent work on radiocarbon dating. The database he has compiled is an admirable resource for archaeologists. It is a credit to Patrick and Robert that they are so willing to freely share their work.

I also have to thank my family for listening to me rabbit on about the project as a whole, but most of all a huge thanks have to go to my wife Marleen who had to put up with so much the whole way through this process. Her love and support has been unwavering from day one and I couldn't have done it without her.

Acronyms

ABM – Agent Based Modelling

ACS – Accumulated Cost Surface

AFM – Annals of the Four Masters

ALSF – Aggregates Levy Sustainability Fund

ASL – Above Sea Level

AU – Annals of Ulster

CEG – Cumulative Elevation Gain.

CELT – Corpus of Electronic Texts

CGIAR-CSI - Consultative Group on International Agricultural Research Consortium for Spatial Information

CRM - Cultural Resource Management

CRS - Coordinate Reference System

CSA – Cost Surface Analysis

CVA – Cumulative Viewshed Analysis

DCCEA - Department of Communications, Climate Action and Environment

DCHG - Department of Culture, Heritage and the Gaeltacht

DEM – Digital Elevation Model

DIAS – Dublin Institute for Advanced Studies

DP – Discovery Programme

DSM - Digital Surface Model

DTM - Digital Terrain Model

EMAP – Early Medieval Archaeology Project

EPA - Environmental Protection Agency

SREI - Environmental Systems Research Institute

EU – European Union

FOSS – Free and Open Source Software

GIS – Geographic Information Systems

GSI – Geological Survey of Ireland

HEV – Historic Environment Viewer

INSTAR - Irish National Strategic Archaeological Research

ITM – Irish Transverse Mercator

KDE – Kernel Density Estimates

KDS – Kernel Density Surface

LOS – Line of Sight

LCP – Least Cost Path

NASA - National Aeronautics and Space Administration

NG – National Grid

NMS – National Monuments Service

NNI – Nearest Neighbour Index

NRA – National Roads Authority

OPA - Observer Point Analysis

OTDV- Open Topographic Data Viewer

OSI – Ordnance Survey of Ireland

OSM – Open Street Map

QGIS – Quantum GIS

QUB – Queen's University Belfast

RIA - Royal Irish Academy

RMP – Record of Monuments and Places

RMSE - Root Mean Square Error

SCSI - Society of Chartered Surveyors Ireland

SRTM - Shuttle Radar Topographic Mission

TII -Transport Infrastructure Ireland

TRI - Terrain Ruggedness Index

UCD – University College Dublin

Chapter 1: Introduction

1.1 Introduction

The early medieval period in Ireland, AD 400-1100 was a period of significant change, politically, socially, and economically. The population was growing rapidly (O'Sullivan and Downey 2019; Rynne 2003), leading to an intensification of the settlement landscape, a conversion to Christianity bringing literacy and the church, as well as innovations in agriculture (e.g. dairying, crop cultivation. food processing) and industry (e.g. metalwork). It is clear that island-wide, the landscape was extensively and intensively managed, and dynasties, peoples and political territories contested for resources, power and prestige. A distinctive early medieval society emerged, in contact with the rest of Europe and even further afield, and broadly similar to those of northwestern Europe, but organised in its own subtle ways, politically, socially and economically, using its own traditions, resources and landscapes.

This society was formed of *túatha* or kingdoms, of which there are reputed to be around 150 (Byrne 1973) at the beginning of the period, with other scholars (Gleeson 2012; MacCotter 2014) estimating a higher figure. Conversely, Bolger (1997, 16) suggests that these *túatha* as political entities had started to decline in the 7th and 8th centuries and were an anachronism by the 11th. Each *túath* was controlled by a *rí* or petty king and they were often at odds with each other. Even though these kingdoms were ruled by different political dynasties and familial groups the laws applied to everyone and were rarely changed wholesale, instead just altered slightly and entered into the corpus of law with the use of glosses on the text. This shows a settled society allowing for change, but not on a wholesale basis and Byrne (1973, 8) suggests that "like ancient Greece, Pre-Norman Ireland was able to combine political fragmentation with cultural unity". While it has been proposed that these laws were often aspirational, nevertheless they still existed and were in force to some degree throughout the whole country.

Brega was an over kingdom made up of many *túath,* but was also distinguished from other *túath* by dint of also being the seat of the high kings of Ireland at Tara. Brega will be described in more detail below, but essentially it was formed from the geographic space that encompasses modern County Meath and parts of north County Dublin and south County Louth, an overview of which can be seen in figure 1.1 and 1.2. It is quite a large kingdom - approximately 3500 square kilometres, the boundaries of which are explored more fully in section 4.4.

How modern Irish political units altered from the *túath* system to the modern scheme, is based on a number of factors. MacCotter (2014) traces these changes from the *túath* of the 4th to 8th centuries to the *trícha cét* of the 12th century which he suggests are almost identical. The main divergence from these systems happens with the conquest and domination of Ireland by the Anglo-Normans beginning around 1169 with their system of cantreds and baronies, although some authors, for example Mulligan (2013, 257) suggest that the conquest "failed". Sposato (2009, 26–27) describes how the chroniclers Gerald of Wales and Morice Regan (Dermot of Leinster's secretary) advanced the idea that the Anglo-Normans felt it was almost a duty to impose their modern form of government, law and justice on the "barbaric" Irish and they set about doing this as soon as possible. How this "conquest" may have affected the settlement archaeology of Brega is discussed further in section 5.7 on trivallate ringforts.

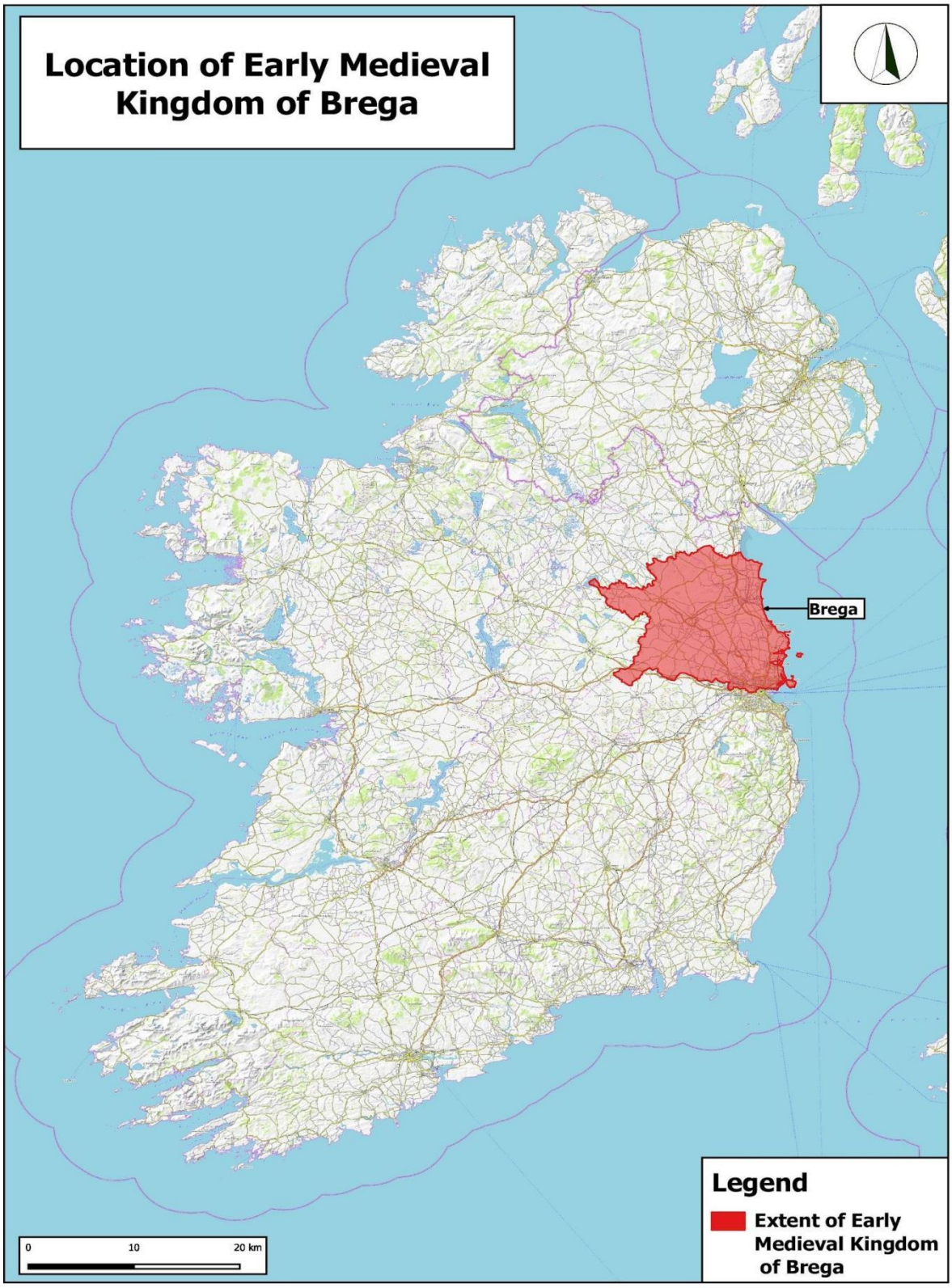


Figure: 1.1: Overview location and extent of Brega (after OSM with additions)

Figure 1.2: Location and extent of study area (after OSM with additions)

Early medieval Brega was physically situated on the east coast of Ireland, on the sea-routes of the Irish Sea, its topography was mostly low-lying, and its geology, soils and drainage were excellent in agricultural terms. It was an important area of settlement since the Neolithic, as attested to by the large passage tombs at Newgrange, Loughcrew and Fourknocks. In the early medieval period it was essentially one of the most economically prosperous and politically powerful regions on the island, and today it is still an area of high quality agricultural land and anchors many large towns such as Navan, Drogheda, Trim and Kells, however early medieval Ireland did not have villages and towns in the traditional sense. Kingdoms did, though, have *oenach* or assembly sites, used for "dynastic and political meetings and for seasonal rituals" (Fitzpatrick 2015, 52) and in Brega these were at Tara, Teltown and Tlachtga. There were also royal residences such as the ones at Knowth, *Rath Airthir* and Moynagh Lough crannog.

It is the intention of this PhD to analyse the social organisation, settlement, and communications of early medieval Brega, arguably *the* preeminent kingdom of Ireland at the time, using archaeological, historical and landscape data. This will be managed and analysed using geographic information systems (GIS). Through this analysis, the thesis will explore how people lived together in Brega, how they settled and occupied its spaces, moved around and interacted with each other.

Brega between the 6th and the 11th century was a dynamic, powerful, outward looking kingdom, oftentimes being the key socio-economic and political zone on the island. Although often studied by historians, because of the presence of Tara in its midst, its *early medieval* archaeological settlement evidence had rarely been properly accounted for by archaeological studies. This is changing though and decades of archaeological survey and excavation, augmented by the wealth of new excavation data produced by the former National Roads Authority (NRA), now Transport Infrastructure Ireland (TII), during the pre-development led explosion in archaeological excavation, provides an excellent foundation for new research in the area.

While Brega may be considered to have been “outward looking” (Eogan 2010, 17) to Britain and northwest Europe, Ireland in general was also insulated from some of the sweeping changes its nearest neighbour Britain underwent. Unlike Britain, Ireland did not suffer invasion and colonisation by the expanding Roman Empire (Raftery 1996) although there was definitely contact between the two islands (Cahill Wilson et al. 2014; Cahill Wilson and Standish 2016). This is evidenced by artefacts of Romano-British material found in archaeological excavations which include, amongst others, a hoard of 25 Roman coins found within Brega at Newgrange (Carson & O’Kelly 1977), and one of the largest assemblages of Romano-British material found to date associated with the Rath of the Synods at Tara (Grogan 2008). This view is opposed by Richard Warner (1995) although the arguments are weak at best.

In essence this allowed Ireland to retain its own native identity and culture to a large extent while recognising the fact that there were numerous points of contact between Ireland, Brega and the outside world. Throughout the early medieval period, there is plenty of evidence in Brega for trading contacts with northwest Europe, such as imported pottery from the 6th to the 8th century AD. It is likely that contacts with western Britain continued throughout the Anglo-Saxon period, and in particular there was still a strong trade in slaves (Pelteret 1980; Boyle 2004), although not all scholars agree that there was a slave trade before the Viking arrival (Ó Cróinín 1995). By the 9th and 10th century, Brega would also have experienced international connections fostered by Viking raiding, trading and settlement activity on its borders. There was undoubted and probably quite extensive contact between Brega and the Viking raiding settlements at Dublin and Annagassan in Louth, and thereafter with the Viking town of Dublin on its southern border. The native Irish population, however, managed to incorporate elements of Viking and Hiberno-Norse culture with their own and it was not until the influx of Anglo-Normans that the first large wave of immigrant population arrived into the territory.

Brega encompasses some of the most important and iconic archaeological and historical heritage sites on the island of Ireland. Assembly complexes such as those at Tara and Tailteann, and a range of important passage tomb complexes such as at Newgrange and Loughcrew ensures that there has long been an intense historical as well as archaeological interest in the area. However there is also a wealth of data from the more mundane settlement remains in the kingdom and it is the intention here to focus on the normal day to day settlements as well as on the higher status sites. While this PhD will essentially mine the archaeological data it will also combine elements of new historical insights to create a more rounded picture of the transformations which were occurring at this time.

One of the primary tools which is used to try to develop a more rounded picture of the kingdom is a Geographical Information System (GIS). While GIS were not initially introduced specifically for archaeology or Cultural Resource Management (CRM), they are increasingly being used as a focussed and targeted tool for the study of settlement and landscape archaeology. Methodologies, both technical and theoretical, are continually evolving and emerging and this thesis incorporates the latest updates on these as much as possible. It is the intention of this thesis to fully exploit these new technologies to investigate settlement practices in ways that were often impossible or impractical in the past. Much recent work has been carried out in relation to the scale and complexity of the datasets created for use in a GIS and this has also had an influence on emerging theoretical approaches (Bailey 2007; Escobar et al. 2020; Holdaway & Wandsnider 2006; Lock and Molyneaux 2006; McCoy & Ladefoged 2009; Peeples 2019; Seaman and Thomas 2020). This coupled with the increase in comparatively cheap computing power and the availability of larger datasets has engendered new theoretical approaches to their use, and these methods are also combined within the study.

1.2 Aims and Objectives

The main aim of this thesis is to study the settlement, communications and travel in the early medieval kingdom of Brega through its material remains and from historical sources. The material remains in particular will be viewed through the lens of a GIS, and a secondary aim of the thesis is to critically reflect on and refine how GIS software, available datasets and methodologies can be used to study aspects of settlement in an Irish context.

Working within a GIS framework, this project will build on the Early Medieval Archaeology Project's (EMAP) research in Ireland and by utilising multiple datasets and the power of the GIS, create better models of the settlement and landscape organisation of Brega. The examination of these models will also be carried out on a range of scales, in order to fully utilise the power of the GIS.

Early medieval settlement sites in Ireland were only rarely built, occupied for a short space of time and then abandoned. Most of them were occupied, altered, destroyed and rebuilt over long periods of time, certainly for generations and often for centuries. Monk (1998) suggests the majority of early medieval settlements in Ireland were occupied for approximately 200 years. O'Sullivan et al. (2014) also describe the tendency of many early medieval settlement enclosures to have long histories or biographies of construction, occupation and change across time. Houses are replaced, ditches re-dug, or new enclosing or boundary features created. In fact, every instance of an excavated site examined within this study was altered in some way from its initial building phase, and these alterations were often quite extensive. Early medieval settlements, such as the one at Raystown, Co, Meath excavated and reported on by Matthew Seaver (2005), have produced radiocarbon evidence, which provide accurate dating for an occupational spread of approximately 500 years, and cuts and recuts in the banks and ditches of the site show continual periods of change. Evidence of this evolution is shown not only in the archaeological remains but also from historical texts as

seen in one of the oft-quoted 8th century poems translated by Murphy (1956, xvi) in particular which translates as:

The fort opposite the oakwood
Once it was Bruidge's, it was Cathal's
It was Aed's, it was Ailill's,
It was Conaing's, it was Cuiline's
And it was Maelduin's –
The fort remains after each in his turn,
And the kings asleep in the ground.

Consequently, we can be confident that early medieval sites in Brega fall into several centuries of the early medieval period, but for the most part, activity will begin in the late 6th century, and likely continue up to the 10th/11th century.

Brega is a particularly suitable case study for this type of project as in addition to a wealth of existing information on topography, geology, soils, environments and previous archaeological and historical studies (e.g. the Hill of Tara, Lagore crannog), this region benefited in particular during the Celtic Tiger boom through the high quality excavation and reporting of numerous early medieval settlements in advance of the N2 and M3 roads. Its importance during the period in question also contributed to numerous mentions in the various historical sources which are mentioned throughout the thesis.

The Early Medieval Archaeology Project (EMAP) conducted by UCD and QUB, has pioneered the interpretation of this new settlement, economic and environmental data on a macro scale, nationally and island-wide, but focused regional landscape studies are now required, to fully understand how early Irish society dealt with change across time in local

and regional contexts, and especially in a kingdom with immense contrasts in wealth and power such as Brega.

In addition to EMAP and the individual archaeological site reports there have been some historical synthesis written on this area in the past (Byrne 1973; Charles-Edwards 2000) and others have written on specific aspects of this kingdom, (Bhreathnach 1999; Bhreathnach 2005a; Bhreathnach 2005b; Bhreathnach 2014; Gleeson 2012; Jaski 1995; Warntjes 2003/04) and the kingdom often features in more general texts. There is also much evidence from individual archaeological excavations such as the ones at the royal crannog at Lagore (Hencken et al. 1950) and at Moynagh Lough crannog (Bradley 1993). The corpus of modern NRA excavations which were in general carried out to an extremely high standard, using up to date excavation methodology as well as contemporary theoretical models constitutes a substantial body of evidence to add to the existing research. This thesis synthesises the existing research with the new raw data from the NRA excavations as well as data from the National Monuments Services (NMS) Historic Environment Viewer (HEV) and will integrate this data into a GIS and examine the extent to which new insights can emerge.

The thesis also endeavours to explore the uses GIS can be put to in the study of early medieval settlement and landscapes. New tools and methodology can be applied to existing knowledge to test theories and formulate new ones, and some of these mechanisms are used in the thesis. Originally intended as a geographic toolset there are many tools which explore the character of the landscape and which can be used to examine settlement distributions both visually and statistically. There are also toolsets which can provide a more anthropological character to the analysis such as cost surfaces, which in this case are used to portray the road network and catchment areas within Brega, and viewsheds which try to model what a person could actually see from a particular spatial position in the kingdom.

These toolsets will be explored in more detail as they arise in each chapter and it is often the combination of these different toolsets which can provide the best results. However it is recognised that the breadth of tools and processes which can be adapted for use in archaeology means that it is not possible to form an exhaustive list of them here.

1.3 Previous Studies:

There has been a long history of archaeological excavation in Brega, with George Eogan excavating at particular sites such as Knowth over 50 years ago. The major road building around Dublin and the construction of new motorways has seen an explosion of excavation in the area and has revealed a rich vein of early medieval archaeological sites and it could be argued that Brega contains the richest early medieval archaeological landscape in the country (see EMAP - O'Sullivan and McCormick 2013 for a summary of the impact of NRA/TII excavations). This road building along with other types of development has brought a wealth of new knowledge to the fore. The burst of development during the Celtic Tiger boom had many advantages and disadvantages. A wealth of new data was generated during this time, but a huge amount was also lost to us as the collapse which followed the boom resulted in many reports going unpublished and much data being lost, and these developments have been discussed in more detail by O'Sullivan (2011, 345-355).

This new data, mainly produced by the NRA/TII, is generally of very high quality and contains data across the breadth of archaeological excavation including environmental and dating evidence. The NRA is a government funded agency and so has made their data available, both in its original form of site reports and also as a series of monographs. In addition, the TII Digital Heritage Collections include papers from the organisation's seminar proceedings, as well as TII's downloadable audio books and short videos, in addition to the over 170 archaeo-geophysical survey reports. The TII Digital Heritage Collections can be accessed at https://repository.dri.ie/catalog/v6936m966. This provides a comprehensive corpus of data which can be mined in a thesis such as this.

Due however to the recency of these excavations and also their publication, they are often published in isolation from other excavations of the same type. This is understandable considering the almost frantic pace at which excavation was carried out during the Celtic Tiger boom which saw an “explosion of growth turn into a mad conflagration” (O’Toole 2009, 19). At its peak it has been estimated that there were approximately 1700 people working directly in the archaeological sector (McDermott and La Piscopia 2008), this has led to some data being lost and “one of the most striking legacies of this period is the large number of excavations that have not yet been brought to publication in any format” (Kador 2011, 111). Due to the almost total collapse of commercial archaeology in the post Celtic Tiger crash, it is almost certain to say that the bulk of this data is lost forever and will never be available for inclusion in this type of study.

While publication at site level was often excellent and carried much detail, integration of these excavation reports into a broader landscape study will enable us to create a more extensive and integrated picture of the kingdom of Brega. Where targeted and focussed monographs have been produced, they are not always allied to earlier research excavations carried out by other agencies or bodies. Having said this an excellent and comprehensive monograph has been produced by Neil Carlin, Linda Clarke and Fintan Walsh (2008) for the NRA entitled *The Archaeology of Life and Death in the Boyne Floodplain* which does study the topography, landscape and archaeology, mainly of the parts of Westmeath that the motorway passes through, but it also covers and discusses as least part of the kingdom of Brega.

It is not just NRA/TII data which is available though. Due to the number and status of so many iconic sites within the region, many research studies and excavations have been carried out in the area. Iconic and important sites such as at Tara, Newgrange, Knowth and Dowth have been studied due to their own intrinsic value and are not considered simply because they lie on the path of a major road, and the Discovery Programme (DP) has extensively studied the Tara region. Some, though not all, of the older studies and

excavations have been carried out at a lower standard than the newer NRA/TII excavations, and in particular are often missing environmental data that would help in the reconstruction of timelines for particular dwellings or settlements. This can be for a number of reasons including paucity of funding, older techniques and a lack of rigorous legislation at the time

As mentioned above, the iconic places within Brega are more than just sites or monuments, they are archaeological landscapes in and of themselves, and they are also important historical areas. Due to this there has been much recent historical work on the kingdom of Brega. However, the historical work tends to focus on the kingship and high-status aspects of the region and also spotlights the major ceremonial centres such as Tara. While these aspects are undoubtedly extremely important it must be remembered that the majority of the population were not of this social class and must be included in any major study of the area. As such this study does not just focus on the important ceremonial centres and bi- and multi-vallate ringforts, but also carries out an analysis of lower status dwellings as to their role in society.

There have been many general historical synthesis of the early medieval period (Edwards 1996; Mallory & MacNeill 1991; Mytum 1992; Ó Cróinín 1996; Richter 1983; Bhreathnach 2014). While these syntheses give an excellent overview of the period and Ireland as a whole, they are quite broad in scope. However throughout recent years more tightly focussed work has been carried out. Edel Bhreathnach of the Discovery Programme has published extensively on the historical aspects of Brega. While these publications have been mainly of a historical nature, they have also discussed the topography and internal divisions of Brega (Bhreathnach 1996, 1999, 2004, 2005a, 2005b, 2011, 2014; Gleeson 2013). These papers also lean towards research into kingship and the area around Tara and its interpretation which is a particular area of interest for the DP. This is an obvious and important avenue for research due to the unique nature of Tara and its status as one of the most iconic assembly sites in the country, particularly in light of the furore due to the construction of the N3 motorway in the nearby Skreen valley. While usually only containing elements of an

archaeological nature, this historical work is invaluable to build up the overall context of the region.

Similarly, another prolific archaeologist Patrick Gleeson (2012, 2015) has also focussed on Brega, and again mainly on the kingship aspects of the area and in particular on Tara. Gleeson is often concerned with ideas of polity, power and kingship in early medieval Ireland. As such he has extensively studied sites such as Tara to compose a nature of the rituals and kingship involved there and this often overlaps with Brega. This historical information lends weight and colour to the archaeological evidence and can help to flesh out the raw material culture.

From an archaeological perspective Brega is often studied and included to give context to particular site excavations. Examples of this were the Hencken excavations at Lagore in 1950 and the extensive excavations carried out at Knowth by George Eogan which have been liberally published (1967, 1973, 2010). Similarly, John Bradley (1991, 1993) carried out excavations at Moynagh Lough which also studied Brega in its wider context. In addition to this there has been one archaeology Masters' thesis written specifically on the topic of settlement in Brega, written by Theresa Bolger in 1997. As infrastructure continues to improve over time, so will the corpus of knowledge of this important kingdom be added to.

1.4 Research Questions

The project will ask these key research questions, one seeking a socio-economic understanding of early medieval people in their landscapes, the second practical and methodological - how do we understand this past in the present? The two research questions are:

1) How should we explain and interpret the geographic, spatial and chronological patterns of how people in early medieval Brega organised their settlement landscapes?

2) How can GIS be best used for the archaeological analysis of early medieval settlement within a kingdom or political territory, in an Irish context and using datasets that have emerged from Irish archaeological practices combined with other freely available datasets ?

1.5 Geographical and chronological scope of this thesis:

This thesis encompasses a range of archaeological evidence from settlement enclosures and other sites within the kingdom of Brega at a range of spatial and chronological scales. The construction, change, and eventual abandonment of dwellings and other structures and changes made to the landscape are all results of social and cultural change and can be used to determine changes in social and cultural attitudes. This is not a new concept and as far back as Wilson (1851, 486) antiquarians had an interest in the social structure and behaviour of ancient peoples. Building on this, the thrust of Taylors' (1948) argument was that rather than just constructing cultural chronologies, archaeologists need to study all aspects of a culture including the ideological and social constructs as well as simply material remains and advances in technology and typology, therefore this thesis combines historical evidence and modern digitally derived data to complement the archaeological record.

The advances in technology and typology just mentioned have left extant material remains, which Glassie (1996, 41) has termed "the tangible yield of human conduct". We can analyse and interpret the material remains of settlements as to their social and ideological roles and this has been termed "settlement archaeology" (Brück and Goodman 1999; Martens 2017; Trigger 1967), so in essence this thesis is a study of the settlement archaeology of Brega. While these theories have been in existence for a considerable number of years, this thesis incorporates newer, technological approaches and synthesises these with modern trains of thought and modern geographical and archaeological theory.

Having said this, the main focus of the thesis is secular settlement. The early medieval church in Ireland made a strong and notable impact on the physical, social and ideological landscape of Brega, but to study the archaeology of the church in any meaningful way would be far beyond the scope of this thesis, and indeed it would likely take many theses to even begin to encompass the subject properly.

Transport and communications is also a major factor in the development of Brega as a political and economic powerhouse. Movement of wealth including prestige goods from abroad, tributes to nobles and loans from them, movement of soldiers to battle, movement of outside influences such as merchants, raiders and churchmen, had a strong impact on the peoples of Brega, and the transport system which enables these is examined in more detail in chapter 6.

In the past there has been a lot of focus in this region on high status sites, and research carried out into kingship and the higher levels of this strictly stratified society within this district. This is hardly surprising due to the iconic nature and importance of many of the sites in the area such as Tara and Newgrange. This thesis, while including these high-status sites (Section 5.7), also attempts to focus on the settlements of ordinary, lower class people and tries to interpret the more common roles of these dwellings and the people who lived within them. There can be a tendency within archaeology to focus on the “glamorous” high status sites and artefacts, but it must be borne in mind that the majority of the population were not from the privileged classes and to portray an image of society which is as accurate as possible, all classes of people must be included, thereby making an effort to eliminate bias towards only the upper levels of society.

1.6 Thesis outline and structure:

This thesis is composed of one volume, comprising 8 chapters and the bibliography. Chapter 1 states the aims and objectives, the research questions and the scope of the thesis and also discusses previous work in this area. Chapter 2 examines the datasets available to Irish archaeologists and the technical processes which will use these datasets to produce meaningful results in the thesis. Chapter 3 discusses the geographical underpinnings of Brega in terms of its topography, geology and soils. Chapter 4 is a discussion of the political situation in Brega and how this affected the boundaries of the kingdom. The thesis then moves on to chapter 5 which uses the GIS to examine settlement patterns in the kingdom. A key element in any settlement study is the transport and communications networks which link these settlements, and this is discussed in detail in chapter 6. Chapter 7 is a reflective chapter, drawing together different strands of the thesis to make sense of the whole. Chapter 8 concludes the thesis and provides a summary of the findings and identifies some possibilities for further research.

Chapter 2: Methodology – GIS, Data Sources and Landscape Archaeology.

2.1 Introduction:

A comprehensive suite of GIS procedures and techniques is used within this thesis to analyse the settlements and landscapes created by early medieval Irish people through the lens of the early medieval kingdom of Brega. This chapter explores some of the technical and theoretical approaches used in this study to examine settlement, transport and communications within Brega and examines a selection of the datasets available to evaluate the relative strengths and weaknesses of this approach.

How people viewed, thought of and moved through their landscapes all contain spatial characteristics, and these characteristics can be analysed in many ways in a GIS, often using processes that would be difficult if not impossible to conduct manually. The archaeological record and indeed the landscape itself as it exists today is the result of spatial choices made by generations of people. The vast majority of those early people were completely dependent on farming for their livelihood, and indeed their very lives, as crop failures or bad weather could put those lives in danger. With this in mind it is no surprise that environmental factors were high in the consciousness of people deciding where to live and farm. While these environmental factors were heavily weighted, they were however not the only drivers of site choice and this bears further consideration and examination.

What the GIS does very well is to examine the results of these choices to enable the archaeologist to form a picture of the factors that were important to people of the day. It is undeniable that what the GIS cannot provide is the experience of being a person born in the early medieval period and standing in a space deciding on where to build a settlement, but it is argued here that no other facet of archaeology can fully provide this experience either, and that by at least understanding and sometimes modelling the underlying decisions, a closer

approximation can be obtained. In this way it is hoped to identify and create a new narrative relating to the use of landscapes and routeways used by people of the time.

This suite of processes allied with advances in computer hardware and software and developments in landscape archaeology gives this study a scope that would have been difficult heretofore. The GIS provides a “toolbox” of spatially enabled processes that can be used to “provide new ways of addressing the questions of landscape archaeology, testing old hypotheses and generating new ones” (Chapman 2009, 9) and is used to as full an extent as practicable. The thesis uses the early medieval kingdom of Brega as a vehicle with which to explore these techniques, the uses to which they can be put, and the results which can be obtained.

2.2 GIS Data, Investigative and Analytic methods:

Datasets are designed for a specific purpose and are not usually extensive enough to be a catch-all for every purpose. At time of writing Irish archaeology is making strides forward in the availability and use of government produced, free online data, but this data will usually need to be manipulated to suit the needs of a particular researcher or research question. Each dataset has its own strengths and weaknesses, so for example in the case of large datasets such as the archaeological record for Ireland, they are not compiled by one person, which can lead to inconsistency of collection, perception and description. However, these large datasets have the advantage of enabling us to “envision a new way to generate and understand knowledge” (Madhavan and Richey 2015, 7)

This project uses two core datasets. The first is a Digital Elevation Model (DEM) (Section 2.2.1) of the area and the second is a dataset from the National Monuments Service (Section 2.2.2) containing the location and attribute data relevant to the ringforts and other monuments under discussion and these are explored in more depth below. There are also

secondary datasets used such as river, lake, soil, geology and land cover data. The geology dataset used in the production of the geology maps of Brega was downloaded from the GSI website, and all of the environmental datasets have been downloaded from the EPA. Other datasets are also created and used during the project, such as slope, aspect and height data and these are addressed in turn in section 2.2.3. One of the advantages of using a GIS is that the software is designed to work with these datasets, which are collated from disparate sources, both individually and in combination.

Many government agencies offer free datasets. The foundation of these, in terms of basemaps and boundary data amongst others, is provided by the Ordnance Survey of Ireland (OSI). Each agency then builds on these with their own discipline specific dataset, for example geology data from the Geological Survey of Ireland (GSI) or environmental data from the Environmental Protection Agency (EPA).

There are many different factors which go into choosing which dataset to use. Availability, format and cost are all considerations which must be taken into account. As an example, in this particular case the barony boundary data is not available on the OSI Open Data portal, even though it is actually the OSI who provides the barony boundaries to other state agencies. The data is, however, available from the central statistics office as part of the 2011 census data. Some data is freely available and some needs to be paid for. Increasingly state agencies are moving towards a data model which is free, and this has huge benefits for archaeology, which is often under-funded. Data for this project has come from many sources, but the Irish government also has a central data repository which can be found at https://data.gov.ie/. All of the data used in this research were free and open source.

GIS data comes in many formats, and traditionally a format called a “shapefile” was used. A shapefile is actually a collection of files which store the location and attribute data of a geographic feature (ESRI 1998). File types have evolved since the shapefile was first used,

and there is a shift away from shapefiles towards other formats such as Geodatabases, but shapefiles are still arguably the most common format and have been around the longest, and as such are more familiar to the widest variety of users. Government datasets are often offered in multiple different formats, but they almost always include a shapefile format. Using shapefiles only can help to ensure consistency in the GIS and also facilitate sharing data from this project with other users if requested.

2.2.1 Digital Elevation Model (DEM)

DEM's are a raster-based data format. This allows each cell to contain multiple data, for example the spot height, slope and aspect of the cell and also enables its use in basic background and 3D mapping.

The dataset chosen was a high quality, processed DEM from the EU wide Copernicus program, titled EU_DEM Version 1.1 published in 2016, which at the time of this study was the latest available. This is a 25m x 25m DEM derived from the Shuttle Radar Topography Mission (SRTM) and the Aster Global Digital Elevation Map (Aster GDEM) datasets which were then processed and combined into a high quality elevation dataset.

The quality and resolution of the DEM is a key element in any spatial analysis and needs to be carefully chosen for the task at hand. It has been argued (Da Costa et al. 2019) that the intrinsic characteristics of free DEM's maybe a limiting factor in their use for analysis as their accuracy has not been verified and Elkhrachy (2018, 1807) also suggests that every DEM is "inevitably subject to errors" due to the processing they have undergone. In the case of the EU_DEM there an increasing number of published studies which attempt to validate the original SRTM and Aster GDEM datasets (Szabó et al, 2015) and the EU_DEM dataset itself (DeMarchi et al. 2020; Edina et al. 2014, Mouratidis et al 2017; Mouratidis and Ampatzidis

2019). Becker et al (2017, 4) have shown that the EU_DEM is more accurate than its component parts, especially in relation to its vertical accuracy, which is particularly important to the section of this study which looks at trends in the height at which ringforts were built. The DHI GRAS report (2014, 14) also shows that specifically in relation to Ireland the Residual Mean Square Error (RMSE) of the DEM is 1.75. Only 6 (13.95%) of the 43 countries and islands tested returned a lower RMSE than this, so overall it is likely to be the highest quality free dataset available.

The XY resolution of the EU_DEM is 25 meters x 25 meters which gives a good balance of resolution and accuracy versus processing time and coverage on a landscape scale such as this. However, this resolution would be completely inadequate in, for example, an analysis of flint debitage around a knapping site. Conversely a DEM with extremely high resolution adds greatly to the time and processing power required and is excessive in this type of study at a landscape scale, so as with many other aspects of this study the scale of any dataset in use is crucial.

Notwithstanding this and having mentioned the high quality of the DEM, it is still not without its limitations. As with any analysis on a landscape scale and bearing in mind the complexity mentioned earlier, data must be simplified or sampled in some fashion just as with other aspects of archaeology and this results in some loss of data. In this case the EU_DEM version 1.1 has better XY resolution and has removed more errors than version 1, but version 1 has better vertical (Z) accuracy (Becker et al. 2017). Overall, both the XY and Z accuracy are more than suitable for a study of this type.

Newer technologies such as LiDar have a much higher resolution and can provide far finer detail but is unavailable at a landscape level in this case, except in strips covering major

archaeological sites such as Tara and the megalithic complex at Newgrange, sites deemed so important that they are worth the expense of LiDar datasets. It is also far more computationally intensive and is only useful with reasonably high end computers.

The platform used for this project in the main is ArcGIS 10.6, although Quantum GIS (QGIS) and the R statistical package have also been used for specific purposes. ArcGIS is an industry leader in the field and is the most comprehensive GIS software available, and access and licensing were provided by UCD. It contains an extensive range of processes and functions which can be used to analyse data at different levels and for different purposes. Both the Historic Environment Viewer (HEV) and the Geological Survey of Ireland (GSI) viewer are built on ArcGIS platforms and this enables easy integration of the GIS and its relevant data.

2.2.2 National Monuments Service (NMS) Data

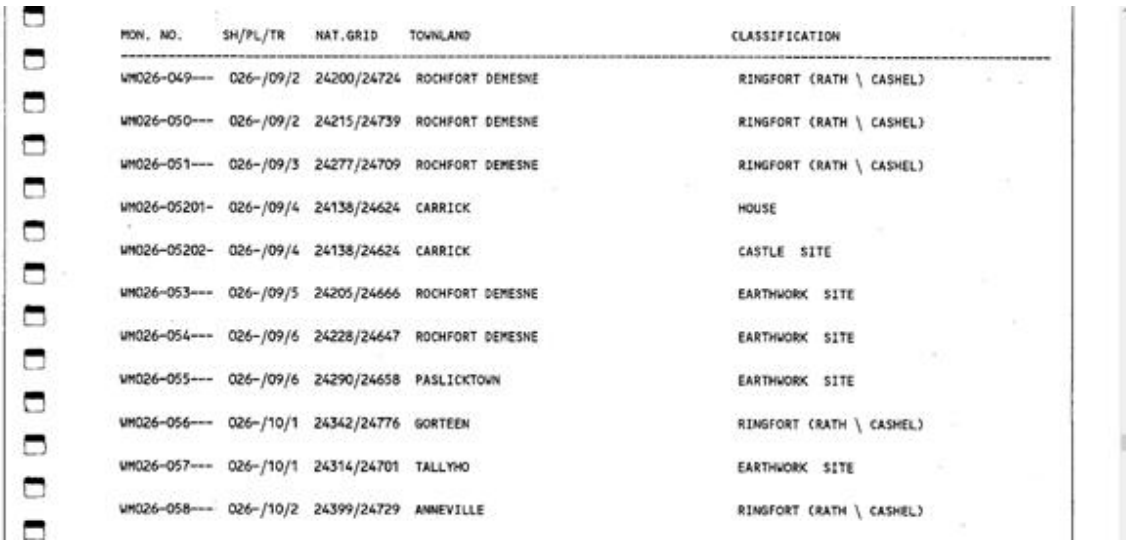
The other core dataset in tandem with the DEM is the data from the NMS. This data was downloaded from the HEV on the Archaeology.ie website of the National Monuments Service. The shapefiles are the basic building blocks used in the formation of the GIS database. To obtain our monuments dataset the shapefiles for Meath, Louth and Dublin were downloaded and merged, and the Brega data was stripped out. All of the downloaded GIS vector layers have associated data attributes that describe individual components of the layer. In the case of the data obtainable from the NMS each site is represented by a single point in space and each point has the following attributes attached to it:

- CO_ID: the county ID number used in the database
- Entity_ID: the unique record ID used in the database
- SMRS: the SMR record number (formerly known as the ‘Sites and Monuments Record’ number)

- ITM_E and ITM_N: Irish Transverse Mercator easting and northing coordinates
- NAT_GRID_E and NAT_GRID_N: Irish National Grid easting and northing coordinates
- CLASSCODE: the class code used in the database.
- CLASS_DESC: the expanded classification
- RMP_PROP: this is either 1 or 0. Where RMP_PROP = 1 this means that the record is scheduled for inclusion in the next revision of the Record of Monuments and Places (RMP).
- TLAND_NAME: the townland(s) names

This is a major advancement on the older system of books containing the archaeological inventory of each county, which are now hopelessly out of date and the county inventories also vary in data quality and description from county to county. The data is now held digitally on the HEV and can be accessed from anywhere with an internet connection. It is more difficult to access the paper inventories, especially when considering that there was never one produced for Dublin and the Meath inventory has been out of print since 1987.

An example of the paper classification method from Westmeath is below in Plate 1. The addition of 6 figure grid references in ITM instead of 5 in National Grid means they are expressed more precisely than the older paper records.



MON. NO.	SH/PL/TR	NAT.GRID	TOWNLAND	CLASSIFICATION
WM026-049---	026-/09/2	24200/24724	ROCHFORT DEMESNE	RINGFORT (RATH \ CASHEL)
WM026-050---	026-/09/2	24215/24739	ROCHFORT DEMESNE	RINGFORT (RATH \ CASHEL)
WM026-051---	026-/09/3	24277/24709	ROCHFORT DEMESNE	RINGFORT (RATH \ CASHEL)
WM026-05201-	026-/09/4	24138/24624	CARRICK	HOUSE
WM026-05202-	026-/09/4	24138/24624	CARRICK	CASTLE SITE
WM026-053---	026-/09/5	24205/24666	ROCHFORT DEMESNE	EARTHWORK SITE
WM026-054---	026-/09/6	24228/24647	ROCHFORT DEMESNE	EARTHWORK SITE
WM026-055---	026-/09/6	24290/24658	PASLICKTOWN	EARTHWORK SITE
WM026-056---	026-/10/1	24342/24776	GORTEEN	RINGFORT (RATH \ CASHEL)
WM026-057---	026-/10/1	24314/24701	TALLYHO	EARTHWORK SITE
WM026-058---	026-/10/2	24399/24729	ANNEVILLE	RINGFORT (RATH \ CASHEL)

Plate 1: Example of paper classification records

The “considerable qualitative difference” in the archaeological inventories of each county described by Bolger (1997, 8) has also been much reduced after almost 20 years of collating digital data in this fashion and the data has been streamlined across counties in order to fit the HEV which makes manipulation of the data more uniform. Archaeological inventories were not produced for all counties, and though they were produced for Louth (1986) and Meath (1987) there was none for Dublin, thereby reducing the possibilities of direct comparisons. It is a constraint of studying an area such as Brega at a landscape scale that data sources such as these have to be relied upon, as field survey and ground truthing of every monument included in the study would be unfeasible.

Having said this there are still many issues and limitations related to this data. For example at the beginning of this study there were no descriptions or “scope notes” included in the data on the HEV for Westmeath, making a comparison with sites on the border impossible, but this data was added near the end of the project which at least made inclusion possible and was invaluable in section 5.7 on trivallate ringforts. Data is continually being added as resources allow and the HEV itself is becoming a more comprehensive resource for archaeologists and the public in general.

The scope notes for each monument in the downloaded shapefiles were examined, most of which contained relevant data such as number of banks and ditches, diameter and shape. Not all of them contained this information and these records were discarded as their use was limited to a dot on a distribution map, which while being of some value in itself, did not have the contextualisation which this project tries to attain. These scope notes were invaluable and presented an opportunity to collate data and add it to the GIS, but also presented somewhat of a difficulty, especially in regards to the shape of the ringfort. In this context it can be difficult to know when an archaeologist describes a ringfort as sub circular, whether it might actually be closer to oval or D shaped as described by other archaeologists in different parts of the country and vice versa. It can also be difficult to know the accuracy of the instruments used to collect the data and if a location is given for a point - for example the location of a ringfort, how close to the centre of the ringfort the coordinates are - or in the case of irregularly shaped ringforts such as conjoined, D shaped or oval, where the measurement was taken. This can lead to issues later on. For example, if a point is located in a particular cell in a raster layer in the GIS it may contain information as to its height and slope. If the person taking the reading moves a couple of meters into the next cell that data may be different and affect the outcome of any analysis. There is rarely, if ever, metadata on the collection methods used in collating the results, and this metadata is infrequently available to Irish researchers.

This downloaded data was then examined and “cleaned” to remove any obviously inaccurate or problematic data such as records with missing spatial data or other important records such as the county ID. This is especially important for the spatial data as it can be problematic within the GIS. Having said this there can still be issues not immediately obvious. An example of this could be the person inputting data to the HEV itself entering incorrect data which may look superficially correct but in actual fact be erroneous and plot outside the study area. In an ideal world, each site would be ground truthed, but that is not possible on the landscape scale used here

This “clean” data was then integrated with basemaps imported from the Ordnance Survey of Ireland (OSI) through the MapGenie service supplied by UCD library. This facilitates the background mapping in the project and is a versatile way to do this with a number of basemaps readily available to download and integrate with the project within the GIS, and the historical mapping was of particular use in identifying fords and footstick river crossings in chapter 2.

For the purposes of this project the fields above are appended with new fields for the inclusion of a wider variety of data to enable a stronger hierarchy of query. These fields are listed below:

- Barony
- Internal Diameter
- Overall Diameter
- Length and Width for non-circular ringforts
- No. Banks
- No. Ditches
- Overall Shape (Circular, D shaped, Plectrum etc.)
- Slope
- Aspect
- Height
- Area
- Raised
- Scarped

These fields are also added in order to detect trends and patterning. This enables us to gain a clearer overall picture of where and how settlement enclosures were built and some of the underlying environmental associations that may have led to this. The GIS allows this with an

accuracy that would be extremely difficult, if not impossible to do manually and this is a recurring theme within the thesis.

While the digital data is an improvement on the paper records, it is also not without imperfections. As mentioned above these deficiencies make the spatial analysis of these sites more difficult. On the archaeology.ie website it divides ringforts into three different classes - ringforts-ringforts, ringforts-cashels and ringforts-unclassified. At time of writing, it is only possible to download data for 24,608 ringforts, 3348 cashels, 1422 crannogs and 2174 unclassified ringforts for the Republic of Ireland, leaving an astonishingly large number of settlements unable to be plotted. The data for these sites is taken from the National Monuments Service record but it must be borne in mind that these represent only the sites in the Republic of Ireland and that this was also a common monument type in Northern Ireland, so in actual fact the number of settlement enclosures on the island as a whole would be significantly higher. It is however possible to download similar data from the OpenDataNI website which allows these datasets to be queried on an island-wide basis.

In addition to the study of ringforts the other main forms of settlement – the crannog, cashel or caher are also mentioned here, but are not the main focus of the study. Caves were used in the early medieval period for short term settlement (Dowd 2018) and as such they have also not been included in the study. Adding to the confusion is a number of “new” settlement types such as settlement cemetaries, “new” being a misnomer for a settlement that was last used over a thousand years ago.

The core dataset after collation and cleaning consists of 494 ringforts, 8 Cashels, 14 Crannogs and 187 Souterrains. Souterrains are included here due to their general relevance to early medieval settlement and this makes a combined total of 703 currently known settlement related sites in Brega.

2.2.3 Secondary Datasets

The “secondary” datasets mentioned earlier come in two forms. The first is the environmental and topographical layers used to recreate the physical landscape of Brega and also in the sections relating to viewsheds and cost surface models. In effect, these are layers such as river, lake and land cover data from the EPA, and bedrock data from the GSI.

The second are datasets created within the GIS and derived from the DEM. These are data such as the slope, aspect and height of every individual raster cell in the DEM. The creation and use of these datasets reinforces the need for a DEM which is as accurate as possible, as inaccuracies can be magnified in the creation of these derivative datasets.

The combination of data sources mentioned above allied to the GIS allow us to analyse Brega in many ways. There are a large number of GIS processes which can be run to analyse settlement data, and both the GIS software and theory has changed over time to make this analysis more sophisticated and at a range of scales. Examples of this can be seen where once the creation of Thiessen Polygons were used to analyse “areas of influence”, whereas this is more commonly performed today using friction surfaces and viewsheds amongst other techniques. Friction surfaces, or Least Cost Path (LCP) analysis and Viewshed, or visibility analysis, is used to study how people moved through their landscape and what people could possibly actually see whilst doing so.

This issue of scale is a very important one, both in archaeology and in GIS. The project focuses on data available for a range of geographic scales and the GIS allows seamless movement between scales. Scale is another recurring theme throughout this project.

Having discussed the GIS and digital data above, it is not the intention of this thesis to focus solely on the archaeological data, but also to incorporate the historical data and interpretations, many of which have been carried out recently to extremely high scholarly

standards. This is a dramatic change from 1980 when Barrett suggested that the early medieval period is “characterised by a dearth of documentary materials relating to settlement but an abundance of field evidence in the form of enclosed homesteads known as ringforts". Much scholarly work has since been carried out in this area and it is hoped that the material culture and historical data will complement each other during this study. Due in part to the Celtic Tiger building boom the NRA/TII have published full, high quality excavation reports for many sites within the kingdom, but which includes 9 sites with significant evidence for early medieval settlement in the area. These nine sites are:

- Raystown
- Castlefarm 1
- Roestown 2
- Dowdstown 2
- Ross 1
- Boyerstown 3
- Ardbraccan 2
- Calliaghstown
- Ross 2

This data, allied with 5 previously excavated sites at Knowth, Moynagh Lough crannog, Lagore crannog and the Rath of the Synods significantly expand our knowledge of settlement in the area. The comprehensive nature of these excavations ally themselves to Stjernquist’s (1978, 251) contention that when “analysing the environment and human activities with inter-disciplinary methods, paleo-ecological field studies (biological and geological methods) play an important part”, and this study incorporates as many of these methods as possible.

2.3 Historical Data:

Much has been written on Brega and there are many historical as well as archaeological texts on the area, especially in recent years. This project uses mainly secondary sources due to the high quality of fresh research into the area recently but does also use translated primary sources such as the law tracts and annals on occasion. Combining this historical data with the archaeological writing on the subject has proven difficult on occasion. There are instances for example where the law tracts may say something that the archaeological evidence does not correspond with, and this has in the past led some to believe that the law tracts were aspirational rather than factual. The project does however endeavour to combine these to best effect.

Historic maps in the form of the 6-inch and 25-inch first edition maps were especially useful in collating the evidence for fords and footsticks seen in section 2.10.2.6. The 6-inch mapping was produced between 1829 and 1841 and the 25-inch maps were produced between 1897 and 1913 and are regarded as “amongst the finest ever produced” (OSI 2021) and were accessed online on the Geohive map viewer.

The historic evidence can help to provide key indicators as to what was happening at the time these settlements were being built and altered. Evidence for battles, famines and extreme weather conditions are all present in the annals and these have been widely examined to assess their effect on settlement in the area.

2.4 Theoretical frameworks:

This thesis uses common theoretical methods and approaches to regional landscape and settlement archaeology to examine people’s understandings of the entire worlds in which they lived and how these worlds changed (Brück and Goodman 1999; Brück 2000; Gerritsen 2003), combined with new theoretical methodologies for the use of GIS in archaeology. Clifford Geertz’s (1973) anthropological concept of ‘thick description’ in his *The Interpretation*

of Cultures is also incorporated into the thesis. These are used to explore past people's use and understanding of the various physical, social and ideological landscapes that they created and inhabited. High quality recent historical scholarship is also available relating to early Irish kingship such as Gleeson's (2012) work on kingship, power and place and extensive work has been done on the subject by Edel Bhreathnach (1995, 1996,1999, 2004, 2005a, 2014) placing it within the context of understanding the socio-political organisation of early kingdoms, in Ireland and beyond. Brega as the seat of the high kings of Ireland features extensively in these. This thesis synthesizes this new high-quality research with existing and newly discovered material remains and advanced spatial tools such as ArcMap to create a more complete picture of early medieval Brega.

2.5 GIS and Landscape Archaeology

There are inherent difficulties and advantages in using GIS modelling for archaeological settlement analysis and they are important to the discourse on the use of GIS in this type of analysis. It is impossible to consider every contributing factor when creating a model or carrying out an analysis. However, the same is also true for all archaeological practice and a "best fit" model to the available data is the achievable goal. It would be impossible to correctly model the true complexity of early medieval Irish life in all its forms, so the aim is to come as close as possible. Deciding which factors to include and exclude is one of the limiting factors in this type of analysis.

There are also difficulties with the data and how it is collated, curated and mined for use. For example, a royal site in Brega known as *Rath Airthir* is a ceremonial enclosure site, seen in Plate 2. This site used to be classified as an Anglo-Norman motte (Moore 1987, 159) when it was originally recorded in the Meath inventory. Further study, however, has led to its reclassification as a ceremonial enclosure, and in fact is the likely site of the fair at Tailtean (Herity 1993, 143; Bieler 1979, 132). This could skew the analysis in section 5.7, as if the

monument is included as a motte and bailey it would have a significant effect on the distribution patterns of the monuments and their associated statistics. As knowledge and research evolves classification within the material record will sometimes change with it.

Plate 2: *Rath Airthir* (After Navan Historical Society)

It has been argued that GIS is able to deal with “both the general and the particular” (Wright et al. 1997, 359) in that through formal algorithms and processes the particular is realised and the generality derives from the differences in data sets. Changes in cultural attitudes are important here. What is considered “good” agricultural land today, considering the enormous changes and improvements in agricultural technology and science, may be drastically different to what would have been considered good land in the early medieval period, so an approximation of land that is adequate for food production is used. Changing weather and land conditions are also a factor that could have been very different during the main ringfort building period, roughly the 6th to 9th century and in fact, there is good evidence for major weather events from the annals.

In the majority of possible sites excavated over the last number of years, not all have been fully excavated. Indeed, some have not been examined at all except for an initial classification and this reinforces the idea of sampling mentioned above. This also limits the amount of data available in any analysis, although the excavations which have been carried out in more recent times are generally regarded to have been of a high quality.

Having mentioned these restrictive issues, there are also lots of benefits. The GIS allows us to use large data sets and to manipulate and analyse them quite quickly compared to manual methods. The ability to combine and use different layers at the same time is a huge benefit to analysis and these layers are linked by a common coordinate system, which makes their manipulation more coherent, and this is arguably the real strength of the GIS. Using multiple spatial layers at different scales and in different ways would make some of the analysis carried out here unfeasible due to time and financial restrictions as it would simply be too onerous to conduct manually. Due to the nature of the storage of these layers and the way the raster and vector data types can be used together allows us to compute many different statistics to reinforce the analysis.

One of the dangers of the proliferation of archaeological GIS and its increasing ease of use is the ‘point and click’ adoption of powerful applications without the correct theoretical underpinnings which can lead to “abuse” (Kvamme 1999:185). A particular example of this is explored more fully in the case study of trivallate ringforts, section 5.7. The critical thinking in relation to archaeology in general must also be applied to GIS studies and the archaeologist needs to know when GIS is an appropriate research tool for the topic being examined. A key focus must be maintained on the questions being asked and how GIS might be used to solve them, rather than the GIS itself and what it can do driving the research. Towards this, Howey and Burg (2017) suggest as archaeologists we should “unbind” ourselves from restrictive ideas on how GIS can be used to examine the landscape. In almost all cases, we should be

asking what research question we need answered and can GIS help provide the answer to that question as opposed to what can the GIS tell me?

The work of the Early Medieval Archaeology Project (EMAP) has helped build on, and advance existing work and develop it even further in light of the results of new excavations, often carried out during the development-led Celtic Tiger boom. Brega benefited greatly from these excavations with large-scale improvements made to the M2 and M3 motorways with the resulting excavations often carried out to a high standard. It is important to be cognisant of the fact that as archaeologists we are trying to formulate a model of what society looked like in the past, regardless of the theories and methodologies used to achieve this goal. There has been a long struggle within geography to include both the vague and specific within analysis (Bunge 1962). This is an issue often brought up by the detractors of the use of GIS in archaeology as a computational model is often more stringent, with less allowance made for “messy” situations. Archaeologists and geographers involved in the theory of GIS have long been working to make these techniques more inclusive by trying to include “Fuzzy” decision making and datasets in their work, with researchers such as Pipkin (1978) publishing papers on the subject even before the widespread arrival of GIS software.

Early medieval settlement material remains are largely unchanging in the landscape unless actively damaged or destroyed, but the approaches and methods used to study them do change and evolve over time and this is similar to archaeological theory and method in general (Papantoniou & Vionis 2017, 3). Just as Stout (2000) uses statistics, this thesis proposes to analyse settlement using GIS techniques not in general evidence in an Irish context, but in use in the wider archaeological community. The study of catchment areas, particularly with resource exploitation in mind is a subject that has concerned many archaeologists and anthropologists and techniques such as hydrological modelling, the use of cost surfaces and viewsheds can help to develop the discussion in a way that was hitherto unavailable.

An interesting debate has sprung up as to how effective GIS and even archaeology itself is in attempting to describe how people lived and interacted with each other and the landscape. Attempting to scientifically create a model of society is now a fundamental tool of archaeological analysis (Chapman & Geary 2000; Geary & Chapman 2005) but this can only take us so far, and some archaeologists are not in favour of these particular scientific approaches (Hodder 1986; Shanks 2008) although Hodder seems to be softening his approach in later years. As with most debates the true reality probably lies somewhere between and it has been argued that incorporating both the scientific and humanistic aspects of archaeology shows the real strength of the discipline (Early-Spadoni and Harrower 2020).

Experimental archaeology can help take us a step further, although even this falls short of truly experiential archaeology. What did it smell like in an early medieval settlement enclosure? Smoke undoubtedly, but also animal and manure smells, possibly the scent of herbs from the garden, and body odour from hard physical labour. What did it sound like? Cows and fowl making noise, wood being chopped, grain being ground – these would all have been common noises in a ringfort. It is possible that these sounds and smells were so common they blended together to become unnoticeable, but it is difficult to put aside our modern perceptions and truly experience life as it was then. The New Technologies for Cultural and Scientific Heritage of the European Commission's report (Ross et al. 2003, 91) states that new advances in computing, and especially in Virtual Reality will lead to models being "impressive, immersive, interactive and involving". Eugene Ch'ng (2009) argues that these new technologies can help us get closer to reality as it was then, but can we ever truly experience scratching lice sitting around a fire in wintertime, stuck inside due to a deep snow and risking starvation, something which would have happened to our ancestors? The answer is probably no, but until time travel is invented archaeologists will try to get as close as possible. Towards that end, this thesis tries to combine aspects of differing theoretical approaches rather than adhere to one strict ideology. This enables the synthesis of cultural remains with historical documentation as well as topographical data.

What the above shows is that differing approaches can be used, and are sometimes problematic, but are also constantly evolving, and Codding & Bird (2015) have suggested that “progress in archaeology relies heavily on the development of methodological tools to help extract information from a fragmentary material record”. It is argued here that GIS and the mathematical and spatial theories which underpin it is just one more stage in this evolution.

Excavation is undoubtedly the most comprehensive source of data, but also the most destructive, expensive and time consuming. Other forms of information such as field, geophysical, aerial and paleoecological surveys also provide us with information on the settlement pattern but are not as comprehensive in their output. New developments in satellite imagery and its processing capabilities can help us to find new sites, and indeed the drought of summer 2018 brought to light a huge number of new discoveries through the perusal of satellite imagery, while it is thought that eventually even the stratigraphy of sites will be imaged using x-rays from satellites. All of these forms of data capture can also be complemented by historical information and Ireland has a particularly large corpus of historical manuscripts from this era, usually written down by monks in what Dillon (1954a, 7) has called “one of the most remarkable facts of Irish history”.

There is currently an increasing amount of research on how GIS and spatial statistics tools can be developed for archaeology in order to provide new insights into the past (Chapman 2006; Connolly & Lake 2006; Hritz 2014; Llobera 2012; Mehrer & Wescott 2006; Rajani 2021). A wealth of data is already in existence, often produced at a high cost, which can now be exploited more fully by improvements in theory and hardware and Westcott and Brandon (2000, 135) have described GIS as “the most powerful tool to be applied to archaeology since the invention of carbon dating”.

As far back as the strides taken by Mortimer Wheeler with his innovative system for excavations, archaeologists have been intensely interested in the spatial aspects of the sites they excavate. Tobler's (1970, 234) first "law" of geography states "Everything is related to everything else, but near things are more related than distant things". In the modern literature, Tobler's Law is now usually referred to as "spatial autocorrelation". This has been a common concept in archaeology since the early days of stratification, and if it is taken to be true then a modern, technologically based system to analyse these relationships would seem to make eminent sense.

Where GIS comes into its own is in the use of hardware and software to speed up the analysis of the examination of these relationships and to make the discovery of hitherto unknown relationships possible. The emergence of GIS has steered archaeologists to apply theories from other fields such as mathematics and geography to the field of archaeology. For example, Geostatistics is a very common tool in geography and is "used in many different disciplines to characterize spatial variation and for spatial prediction, spatial simulation and sampling design" (Lloyd & Atkinson 2004, 151). Until relatively recently these techniques were not very prevalent in archaeology and "extending the experiential/interpretive framework and the application of GIS to a wider range of landscapes remains an ongoing challenge" (Llobera 2012, 496). Having recognised this challenge however, this thesis is a step towards addressing these barriers against an Irish backdrop. It has been argued that "simple comparisons of the distribution of sites and features in a landscape often reveal significant correlations that help explain the settlement system" (Sadr & Rodier 2012, 1034) and these comparisons are made later in this thesis and become especially apparent when looking at the distribution of trivallate sites in section 5.7.

Archaeological GIS have been in use for approximately just over 30 years at time of writing, but this is a field which is expanding at a rapid rate, both in terms of the hardware and software involved and also in the theoretical approaches governing their use. While GIS has been used in archaeology for quite some time, it is only in recent years that it has come to

the fore, especially in the 1980's and 1990's when landscape archaeology itself was rethought and new methods and theories emerged, of which GIS seemed an integral part (Tilley 1994; Cummings 2008; Gillings 2011).

Funding for archaeological research is usually extremely limited and this has been the case in Ireland since the collapse of the Celtic Tiger economy. The cost of both the hardware and proprietary software may have been seen as prohibitive in the past, especially to smaller companies who may have had little formal training. Due to the lowering cost of increasingly powerful computer hardware, this may change in the future. The advent of larger suites of Free and Open Source (FOSS) software such as Quantum GIS (QGIS) and the powerful R statistics package and freely available and downloadable background data such as digital elevation models, allied with data from the NMS and other governmental agencies means that costs are continually reducing, and this may result in an upturn in the use of these resources. There is also a theoretical ethos to make the data used in a GIS to be more freely available, especially from government institutions which use taxpayer's money to carry out research. Almost all government departments now have web viewers where citizens can look up information on their area of interest, and if required, freely download data. The latest edition of this is the Open Topographic Data Viewer which makes LiDar data available on an ArcGIS platform, and combines data from different organisations to great effect, making an excellent resource for archaeologists interested in using this data, which is very expensive and time consuming to collect and process. The data management aspects of these cooperative ventures will make future use of them far more accessible and encourage wider usage.

While the software and methods behind GIS were not originally designed specifically for archaeology, much research has been invested in the archaeological use of these fields. There are a plethora of definitions as to what archaeological GIS is, and can be used for. It has been argued by Church et al. (2000) that the three main applications of GIS in archaeology are visualisation, spatial analysis and modelling and Connolly and Lake (2006)

as a software package for data acquisition, spatial data management, database management, data visualisation and spatial analysis. Just as the use of GIS itself evolves, so will the definitions applied to it. Visualisation and spatial analysis have long been strands of archaeological research and the computing power available now makes extensive modelling of large data sets possible too. These avenues have not been extensively used in Ireland yet however, and while there are a small number of papers which specifically use GIS for more than just basic distribution and background mapping (Curran 2020a; McNeary 2014; O'Brien and Bergh 2016; O'Driscoll 2019) these are not widespread, and often linked to other technologies such as LiDar.

One of the main tenets of archaeology is to disseminate the information that is so painstakingly collected, analysed and interpreted. As mentioned earlier, allied to the powerful geodatabase and mathematical and statistical processes, a GIS is a powerful visualisation tool. In particular the relatively easy production of maps which enable 'the human eye and brain to perform intuitive spatial analysis', (Goodchild and Janelle 2004, 6) is an underlying but important aspect of a GIS's outputs. In fact, detractors of GIS use the excellent quality of imagery produced against the use of GIS, labelling them as just a tool to produce "pretty pictures". While this is patently untrue, as with all aspects of GIS, some caution is needed and Hodder (1999) argues that the very nature of these maps can hide complexities and reinforce expectations. Again though, since Hodder wrote this the technology has advanced and techniques such as the production of "Story Maps" (for example see Sloat 2020) have added informative and interactive detail to maps on the web.

Having made the above points, the use of GIS is not a magic bullet for archaeologists, and as with any archaeological research, painstaking attention to detail needs to be maintained. One of the dangers in carrying out a project of this type is that the scope of the research is defined by what the GIS software can "do". Instead of the GIS being used as a tool to answer a specific research question, the temptation is to focus on the GIS outputs first, and care has to be taken "that the new techniques for seeing, do not cancel out our capacity to look" (Lull

1999, 379). While GIS can be an immensely powerful and effective tool, it is not a panacea but is simply that, a tool, and can in no way replace scholarly archaeological and historical research and scholarship. It is with hope and conscious thought that these issues have been avoided throughout this thesis.

The biggest drawback to the use of GIS is the synthesis of cultural and cognitive data with the physical and environmental data, and for this we still rely heavily on the experience and training of the archaeologist carrying out the work. It is difficult and often impossible to format social and cultural data in a way that is useful for a GIS. Care must be taken that the availability of data in relation to the physical environment does not push all GIS based research towards analysis of that environment only, to the detriment of other factors, and especially the social and cultural elements that informed settlement practices, and all efforts have been made to consider this within the thesis.

2.6 Spatial Statistics – Distribution and Clustering.

Distribution maps are a well-used and traditional form of representing archaeological data, and to many they are an outdated construct, but allied to spatial statistics they can still be powerful tools to represent data. These methods are used in Chapter 5 to present a visual aid to the study of distribution and clustering of ringforts within Brega using heat maps. Heat maps are becoming familiar to readers through their use in sports, so they can be a very effective visualisation tool when representing settlement densities.

2.7 “Sensory” Approaches – Viewsheds

Visibility in landscape archaeology is a much discussed and often divisive topic (see Gillings 2017 for an excellent critique of the arguments for and against). The arguments for and against the use of viewsheds in archaeology will be dealt with as they arise in this study. What is unequivocal is that they have become a very popular tool for archaeologists, and have been used in a large number of studies (Brughmans et al., 2014; Gillings 2012; Lake

and Ortega, 2013; Lake et al., 1998; Lake and Woodman, 2003; Llobera 2012; Llobera et al., 2010; Mayoral Herrera et al., 2017a; Paliou, 2013; Van Leusen, 1999; Wheatley and Gillings, 2000) and it is recognised that this is far from an exhaustive list.

However, viewsheds and Observer Point Analysis (OPA) are not a panacea (Wheatley & Gillings 2000) and have been, and sometimes still are, quite controversial. They are also open to inherent errors, such as initial errors within the original DEM itself (Lagner et al. 2018), through algorithmic flaws (De Floriani & Magillo 1999), and also the fact that binary functions such as these can never completely describe the true complexities of reality (Fisher 1992, 1993). Nonetheless it has been argued that viewshed analysis is a “powerful analytical tool” (Boaz & Uleberg 1995, 258) and is “central to the reconstruction of social landscapes” (Llobera 2007, 51). It is undeniable that there is also some level of inherent inaccuracy at all levels and with all methodologies throughout archaeological practice and, as in more traditional methodologies every effort is made to keep error to a minimum, bearing in mind the consideration that “real data is imperfect” (Witten and Frank 2005, xxiii). Llobera (2011, 205) has suggested that archaeological interpretation of past landscapes is based on “the ability to identify/define multiple relationships” and that visualisation techniques such as viewsheds are tools which are “ideally suited” to exploring these relationships. A GIS is also “ideally suited” to calculating these viewsheds, and this is an example of a form of analysis that would be almost impossible to conduct manually.

There are also many other considerations. Binary viewsheds such as these do not consider factors such as vegetation, which could obscure views to and from a site. This is a common issue and limitation in the use of viewsheds and it is almost impossible to know the height of vegetation in the area at this time. People were also of differing heights, which affects how much they can see from a given point. For example, a tall man will have a substantially different view to that of a small child. In this study, the average height of a man in early medieval Ireland is used - 157 centimeters. A smaller height would need to be added based

on the average height of a woman or child. This means that the “ray” will be adjusted to 157 cms above the height of the actual cell in the raster that the viewshed is calculated from. There is a caveat to this however, in that the DEM allows for Root Mean Square Error (RMSE) of 2.9 meters, which could affect the added height. Overall though it is felt that adding the extra height to the DEM is more realistic than the bare DEM itself.

It was decided not to add a second offset for the height of the ringforts as it is difficult to know what that height would be in general, for example a ringfort may just have a small bank 1 meter high and another could have a 2 meter high bank with a 2 meter palisade on top which changes the visibility in the landscape dramatically. People can also see different distances clearly depending on eyesight. For the purposes of this study a common maximum value of 20 kms was used, but even this figure has concerns, namely the curvature of the earth, which influences the elevation of the target and that effect reduces the height of the target by approximately 7.86m for every 10 kms from the viewing point (Connolly & Lake 2006, 222). While this is a relatively small amount over the distance, some GIS software can take this curvature into account, and this was integrated in the present case. The size and shape of the ringfort, the atmospheric conditions and whether the monument might be outlined against the sky are also factors which could influence visibility. It is these limiting factors which fuel the debate of the viability of viewsheds as a tool.

2.8 Topography & Hydrology

One of the difficulties in incorporating riverine and lacustrine analysis in relation to settlement, until the advent of GIS, has been one of sheer scale. With so many waterways and settlement sites in Brega, analysing these manually would be problematic. Even a relatively simple task to measure how close each settlement site is to its nearest water source would be practically unworkable.

Access to water sources formed a key component of settlement sites and have formed arguably *the* key component in any settlement site decision as to where to construct a settlement, particularly one so dependent on agriculture, and yet there are few studies relating to the aquatic facets of settlement in early medieval Ireland. This situation has not been replicated in Britain however, where hydrological analysis as well as elevation and farming soil quality have been carried out extensively (Baker & Brookes 2018; Brookes 2007a; 2012; Davies & Vierck 1974; Harrington & Welch 2014; Williamson 2008; 2010). Using GIS tools, we can assess the distance from ringforts to all water sources as seen in chapter 5.

2.8.1 Ridges and Prominence

Ridges were often used to alleviate the effects of weather, particularly strong winds, on a settlement and also provided a shield from unwanted visitors from certain angles. It has been argued that these types of landforms can be used to gain valuable insight into the factors driving settlement formation (Kvamme 1992; Llobera 2001; Vengalis 2016). ArcGIS contains some tools which can help examine this. It is difficult to actually test for this as wind directions shift at different times of the year and even different times of the day. Some general trends can be identified however. Winds in Ireland primarily prevail from the Southwest (Met Éireann 2018). The first task then is to identify the orientation of the ridges. There are two possible ways to do this. The first is to use the Linear Directional Mean tool which returns a bearing on a line running from 72 through 288 degrees and can be seen visually in figure 2.1.

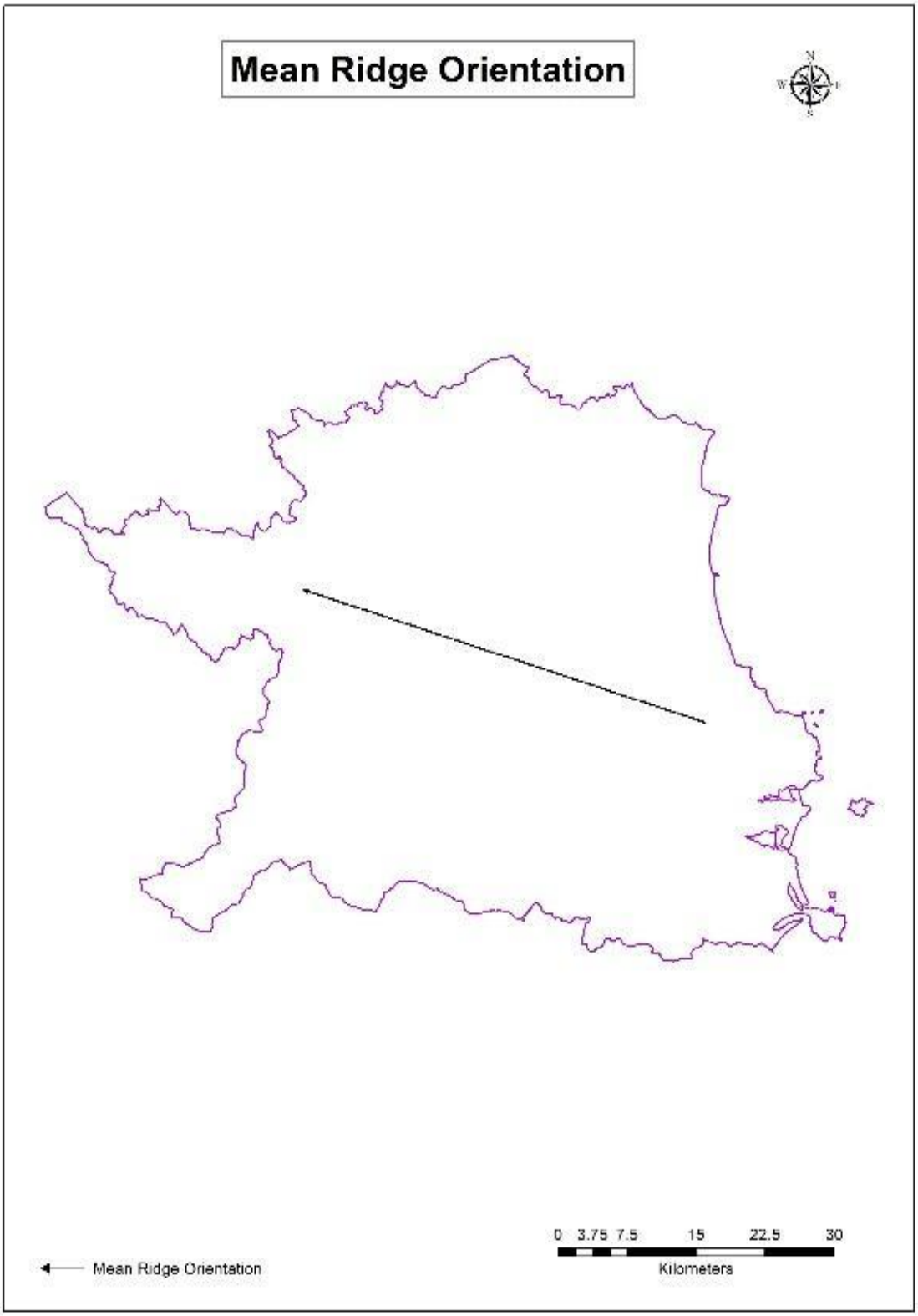


Figure 2.1: Mean Ridge Orientation in Brega (Figure by Author)

Unfortunately, this is quite a blunt instrument and so it is preferable to refine this a little, bearing in mind the earlier caveat in relation to generalisation. If we take a generalised bearing for South to West winds as any bearing between 180 degrees and 270 degrees, then

any ringfort built to the North (or right) of a ridge with an orientation of between 270 degrees and 180 degrees should be reasonably sheltered from the prevailing winds. For this example, the ridgelines created from the Value = 2500 were used for resolution. The Add Geometry attributes tool was then used to add the bearing for each individual ridgeline in the attribute table, of which there were 887. It was then possible to strip out all of the ridgelines with an orientation of 180 to 270 degrees, of which there were 615 or 69.33 % of the total. These ridgelines were then buffered with a 1 kilometre buffer on the right side only, to create an area with which to use the clip tool to only select ringforts to the north of the line. This returns a figure of 91 ringforts, 18.42% of the total number in Brega. Due to this it is unlikely that shelter from the prevailing winds was a strong reason for the siting of ringforts so close to the ridges.

While rivers flow downhill and eventually join with larger rivers and then run to the sea, they also form part of a drainage basin, and these basins can form catchment areas. Having identified the rivers in the kingdom is now important to define the ridges which differentiate drainage basins from each other.

As we have seen, defining the ridges on a landscape scale is made possible with the use of GIS and in particular the Hydrology toolset in ArcGIS and the derivative raster map can then be used in further analysis, such as examining the proximity of ringforts to these ridges. Unfortunately, it is particularly difficult to display these visually on an A4 page as at a range of scales there are a large number of ridges in such a large area as Brega. Also, the scale is important, and ridges can be defined at a number of different scales, making them easier to view at a coarse resolution, but more difficult in a refined view. However, from a scientific point of view measurements can still be made accurately in the database regardless of display issues.

While regarded as generally flat, Brega has a wealth of ridgelines.as we have seen above. These can be calculated using the hydrology tools in ArcMap, however as with all GIS data care must be taken, especially to eradicate imperfections or other issues in the data which could cause unrealistic results. The most common cause of issues here is the existence of sinks. As the name suggests these are “depressions” in the raster – a cell or cells in which flow direction cannot be assigned as the neighbouring cells are higher than the cell being processed. This problem occurs quite regularly due to the rounding of elevations to the nearest integer value, which creates an artificial hole into which water would flow in but not out again. This becomes important in other tools used in this analysis, namely Flow Direction and Flow Accumulation in which cells are assigned an integer value. These tools will not work if the original DEM has cell values other than integers. Tarboton et al. (1991) found that in USGS derived DEM’s sinks accounted for between 0.9 and 4.7 % of the cell coverage. In the DEM used for this project there are 14,455,092 cells which could mean that between approximately 130,096 and 679,389 cells are incorrect. In relation to actual ground area this translates to somewhere between 2.6 and 13.58 square kilometres of incorrect cells in the raster, and this is obviously too high a margin for error.

This problem is overcome in ArcGIS by the use of the Fill tool which will fill all of the sinks in the raster. The new DEM is now used in the Flow Direction and Flow Accumulation tools to produce derivative rasters. The filled DEM is inverted using the Raster calculator by multiplying all cells by -1. The Flow Direction tool is used next and the key here is to check the “Force all edge cells to flow outward” checkbox, as this allows the projected water to flow away from the ridge and in fact this is the opposite technique to the one used for calculating hydrology basins which will be seen later.

The Flow Accumulation tool is used, and the key issue here is to make the output data type an integer, which will reduce problems in the resulting raster. The next stage is to decide on the flow accumulation threshold, basically the resolution at which the archaeologist decides

to build the raster and what scale the required data is returned. The drainage network needs to be built using the Conditional tool or the Raster Calculator tool, but how coarse or refined the output will be will depend on the needs of the user. Having decided on the value the Create Stream order tool is used to convert the raster to a vector format and the resulting shapefile used in the Stream to Feature tool to return the ridges at the required resolution. The different scales, using a Value figure of 500, 1000, 2500 and 5000 can be seen in figure 5.32. The different resolutions can be seen clearly, and this process makes it easy to experiment for best results for the value chosen and the needs of the project.

Another point of note is the idea of “prominence” (Llobera 2001, 1007), which is experienced at a particular point in the landscape and can be used to address issues of hierarchy and significance within that landscape. It is noted that *ferta* were often constructed near ridges or other prominent locations (O’Brien 2009) to imbue these sites with an importance and dominance in the landscape and Higuchi (1989) has argued that these types of location are related to physical and visual control. Conversely Mark Gillings (2015) has carried out a GIS project to investigate *invisibility* in a group of small megalithic tombs on Exmoor and Bradley (2002) has studied stone circles in Britain and both have found that the monuments were difficult to see in the landscape, suggesting not being seen in some cases is just as important as its opposite.

2.9 Least Cost Paths

2.9.1 Introduction

The introduction of GIS and remote sensing tools and theoretical principles has advanced the study of how people moved through, and interacted with, their landscapes and other people within that landscape, and has opened new avenues of study, especially in the area of movement over large swathes of terrain (Llobera 2000; Posluschny 2010; Bevan 2011; Llobera et al. 2011; Murrieta-Flores 2012; Verhagen 2013; Güimil-Fariña & Parcero-Oubiña

2015). This is particularly applicable to LCP analysis and is one element of what Bevan (2011, 283) has termed “Computational Modelling”. A caveat to this however is that the models used to examine the roads in chapter 6 and in other forms of GIS are exactly that – models, and while they are as accurate a representation as possible they are in no way the complete picture, a truism which holds valid for of all forms of archaeological research. Notwithstanding this they can be a good starting point and often provide new insights into the human past (Batten 2007), and if nothing else it “forces vague conceptualisations to be transformed into a concrete form” (Chadwick 1979, 237). It has been argued that the use of LCP’s as a “form of exploratory data analysis is undeniable” (Brookes, 2007a, 33).

LCP analysis is a relatively new technique that has, however, been used extensively in archaeological research (Rahn 2005; Howey 2007; Fábrega-Álvarez & Parcero-Oubiña 2007; Newhard et al. 2008; Ruestes 2008; Lock & Pouncett 2010; Taliaferro et al. 2010; Herzog and Posluschny 2011; White & Barber 2012; White & Surface-Evans 2012; Herzog 2013; Güimil-Fárina & Parcero-Oubina 2015). However, there are few instances of its use in an Irish situation. While the above list is quite long it must be mentioned that it is far from exhaustive, showing that while these techniques were not originally designed for archaeology (Longley et al. 2015), they have now become more mainstream and an invaluable tool. However, care must be taken in defining a methodology for use. Modern GIS packages facilitate this type of analysis through software modules which only require a small number of mouse clicks, but which rely on underlying processes and algorithms which are often quite complex (Kantner 2012). This establishes a requirement for careful consideration in all aspects of the analysis as even small adjustments can distort the results at a magnified level. Detailing the methodology here ensures that the processes carried out within this thesis are replicable and applicable in other contexts.

The methodology used in the creation of an LCP is generally consistent, the variability arises from the choice of data used, in what combination and the different weightings applied to each layer. In this case, a raster layer consisting of a DEM is the basis for the analysis. Then

other layers such as slope or water barriers are reclassified and combined with the DEM to make the “cost” surface for use in the analysis, in other words the amount of energy or time expended to cover each cell in the raster. This is used specifically in chapter 6. The next stage is to create an “accumulated” cost surface. This is a function whereby a spreading algorithm is used from the destination back to the origin point (Herzog 2013) – often called the “backlink” raster. The Least Cost Path is produced from this. This is a key element of the process and ArcGIS performs this function using the “Cost Distance” function, which calculates the cost using Dijkstra's algorithm, generally accepted to be the preferred method of calculation (Herzog 2014). Nicke (2001) has plotted paths between two points using different algorithms which returned quite different results, but in general Dijkstra's algorithm is the one used most often.

Topography is undoubtedly the most influential factor in route choice, and agency decisions will usually be based on this. The decisions made when traversing the landscape contribute to the building up of paths over time, and these paths in turn often leave traces in the archaeological record. The information on the ground at the time would have come from what a person could see or from knowledge passed on by others. Detractors from the use of GIS in this way mention the “God's eye view”, in other words that we can see the landscape as a whole, something which wouldn’t have been possible for people of the time. Analysis of ancient movement through a landscape has continued to be refined in recent years (Hazell & Brodie 2012; Howey 2011; Leidwanger 2013; Supernant 2017; Gustas & Supernant 2017, 2019) and can take into account an increasing number of social and cultural as well as environmental factors.

Branting (2012, 214) has suggested that LCP’s will choose the optimum path, rather than one which merely fulfils the basic needs of travel, but that people, for differing reasons, often choose the less than optimum path. While decisions about destinations and the temporal aspects of travel are important, Tilley (1994, 31) has argued that the “act of moving” may be

as important as the arrival at the destination and the events that take place there. DeGruchy (2016, 430) makes the point that humans do optimise, but they optimize based on a number of variables rather than just one, and in a study by Kneidl and Borrman (2011, 5) variables such as travelling on main roads and roads with the least amount of turns were important decisions taken in choosing a route.

The landscape has many different energy expenditure or "cost" factors within it, and people will usually choose the least cost when deciding on their choice of route as evidenced by Zipf's "Principle of Least Effort" (Zipf 1949). For example, if a slope is very steep there will be a high-energy expenditure or "cost" involved to go straight up the slope – taking a more diagonal route would be more effective in the conservation of energy. Geissel (2006, ix) argues against this however when he says that in the USA "steep gradients would not have been serious obstacles prior to the beginning of stagecoach travel in the seventeenth century", however this argument is hardly credible, and this is discussed in more detail below. Similarly, the energy expenditure to walk across a bog or marshland would be much higher than through a grassy field used for grazing cattle.

There are some general rules which apply that can be instructive and people try to use the straightest routes due to the assumption that the lack of bends and curves makes the path shorter and faster (Bailenson et al., 2000), or requires the least amount of mental effort (Christenfeld 1995), but Pingel (2010b, 31) and Golledge (1995) argue that the shortest path is likely the single strongest selection criterion in route choice. This idea was tested by Zipf (1949) who studied many examples of different human activities in different fields and found that Man is basically lazy and displays rational behaviour in picking the easiest choices. Mention of route choice in Ireland can be found in the twelfth century Book of Leinster in "The violent death of Goll and Garb", deaths which are brought about by Cuchulainn, translated by Stokes (1893, and more recently published by Best et al. in 1967):

I give thee thy choice of two paths, O king of a fifth of Erin.

What are those two paths? asked Conor.

A path smooth but long, or a path short but rough.

The path short but rough, says Conor.

While this passage is obviously anecdotal and in no way intended to be a factual choice for a real person, it does still show that route choice was something which was within the consciousness of the author, and by extension the people of the time.

There are two general ways to assess this cost – energy expenditure and distance/time travelled. This chapter will mainly focus on the distance travelled algorithm used in the r.walk (Fontenari et al.2005) module of the Grass GIS package to assess the distances between nodes on the Brega transport network in terms of days walking. The r.walk algorithm has been found to be particularly suitable for this as it uses a formula based on Naismith's rule for walking times, formulated by Aitken (1977) and refined by Langmuir (1984). One of the reasons Grass GIS is particularly suitable for this technique is that it allows the "knights move", similar to how a knight on a chessboard moves, in the spreading algorithm, which returns better results than the normal rooks or queens move. The main difficulty in performing this type of analysis rests in the way the "accumulated cost surface" (ACS) or "friction surface" for use in the r.walk module is produced. Each individual cell in each layer used in the generation of the friction surface will have a "cost" assigned based on which layer type it is and combining these costs into one feasible friction surface is the most notionally and subjectively difficult aspect of the process. The creation of the friction surface has been carried out in ArcGIS 10.4 using the ModelBuilder function. This enables the basic form of the function to be iterative with new details such as start and stopping points added to the model each time.

Cost surfaces can also be isotropic or anisotropic. Isotropic surfaces are ones in which the cost of traversing the cell is the same in all directions, such as a flat piece of grassy ground. In isotropic surfaces, the cost is independent of the direction of travel, for example crossing a flat, grassy field in either direction will have no effect on the effort or energy expenditure it takes to cross it. Isotropic surfaces can sometimes become anisotropic due to external factors, such as a strong wind blowing in winter which makes crossing a field more difficult into the wind, or shallow dips and depressions in fields which may become waterlogged and effectively turn into ponds after heavy rain. These external features are particularly difficult to model and are not included here.

Anisotropic paths are direction dependent. Some cells will have less cost when travelled in one direction as opposed to another, for example, research from Llobera and Sluckin (2007, 211) shows that a gentle slope will consume less energy to walk down than walk up, and “it is more difficult to go steeply downhill than uphill”. The LCP achieved here makes full use of anisotropy. There is an issue here however in that when the software calculates the “back link” it can sometimes be stalled by “pits” in the raster. These were mentioned earlier and the methods used here attempts to obviate this by using a process similar to that suggested by Bellavia (2002). Having said it is more difficult to go steeply downhill, it has been argued that going slightly downhill has a lower energy expenditure than walking on the flat (Minetti et al., 1993). The r.walk module in Grass GIS takes this into account while some of the other software packages do not.

Herzog (2009) has argued that the higher the level of “technical accuracy” used in the algorithm the better the produced results, however Lock and Pouncett (2010) are not convinced that this technical accuracy is imperative. It can be argued that there is indeed a case of diminishing returns as walking times vary greatly owing to differences in age, height, sex and other factors (Pingel 2010a), so a close approximation is probably just as useful (Imhof 1950, 217). This enables us to avoid the use of Euclidean distances in the analysis,

as simple buffers with set radii are unlikely to produce any meaningful results. In a study of caravan routes Capot-Rey (1946, 45) showed that each succeeding caravan didn't exactly follow the line of the previous one, but could spread over a width of up to 1 km, meaning we should be looking for a "route corridor" rather than trying to find one exact line of a particular distance throughout a landscape.

2.9.2 Data:

The LCP's in chapter 6 use the work of Colm O'Lochlainn (1940) as their initial starting point. O'Lochlainn's work is still regarded as the seminal work in the area of ancient road transport within Ireland, followed up by O'Keeffe (2001) latterly. It is O'Lochlainns list of points along each road that is initially used to construct the LCP.

As mentioned above a number of data layers were used, reclassified, combined and weighted to produce the accumulated cost surface. The first is the elevation data in the form of the DEM mentioned earlier. This model was imported as a DEM and not interpolated from a contour model, which adds to the accuracy of the raster. This DEM is then used within the process to create derivative surfaces such as Slope which is in turn used as a factor in the Accumulated Cost Surface (ACS).

Using multiple variables in the algorithm is something that has developed since the early days of this type of analysis, as in the 1990's LCP was mainly carried out with slope as the only variable (Gaffney and Stancic 1991, Gaffney et al. 1993, Massagrande 1996, 1999, Bell & Lock 2000), a factor which was bemoaned by Rahn in 2005. This has now become a far more sophisticated technique and can give more realistic results than initial forms of the analysis by the ability to incorporate physiological factors and assign differential weights to individual variables in the algorithm. Kondo and Seino (2010) have argued that slope is the critical factor which accounts for the biggest physiological changes, but newer, practical

experiments by DeGrouchy, Caswell & Edwards (2016) have shown through experiments that land cover is the more critical factor in both speed and distance walked than slope.

2.9.2.1 Point Data

Point data needed to be created for the beginning and end points of each LCP, although the end point of one section is effectively the start point for the next. The points chosen were taken from O'Lochlainn's list. Due to this it was decided to create an individual shapefile for each point so they could be used more easily in a number of different LCP's. This was done by creating the point in excel and importing it to ArcGIS, adding the coordinate data and then converting it to a shapefile. This also creates a Feature Identifier field (FID) for each point, which is useful if the points ever need to be combined or used in further analysis. As an example of this, the *Slí Assail* started at the junction with the *Slí Mhidhluachra*, and continued on through Brega, so having the junction as an individual point meant it could be used in both LCP's and didn't have to be created each time. However, in his study O'Lochlainn only provided town names and this presents particular difficulties, as the town and the townland they are situated in are often quite large areas. As an example, Castleboy townland as shown in figure 2.2 is an area of 0.35 km², therefore the point could be placed anywhere within this polygon. Tara itself is shown as a point, but again this point could have been placed anywhere inside the Tara complex, and exact placement can make a substantial difference to the LCP. An effort has been made to place these points in the most realistic areas possible, but it was often a subjective choice. There are many options and a straightforward choice would be the townland centroid. However, an attempt has been made to place each of these points individually at what would seem the most appropriate point, for example in urban areas at the centre of the town or a major crossroads, or in rural areas like Donaghpatrick the point was located at the centerpoint of the *Rath Airthir* enclosure.

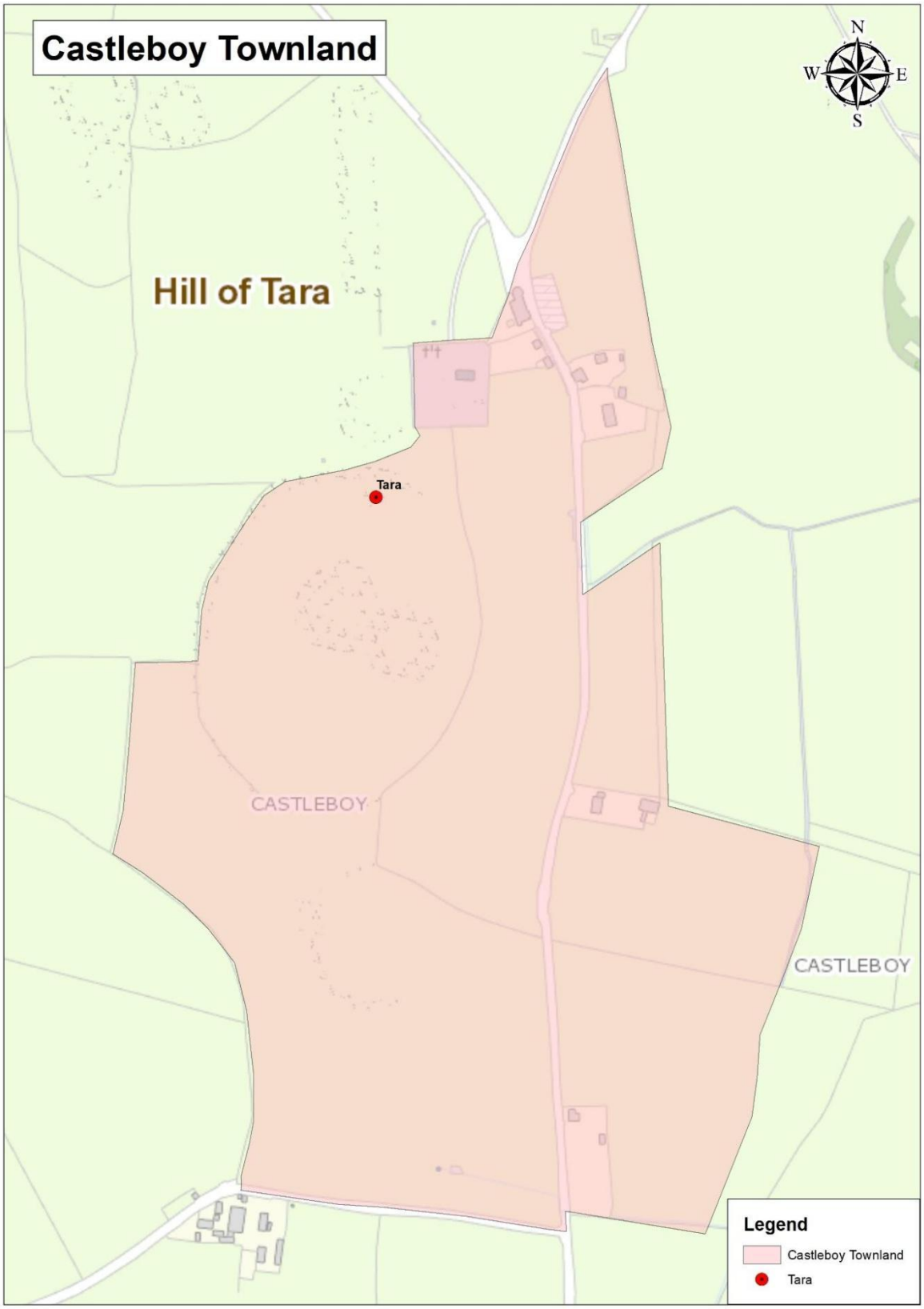


Fig 2.2: Difficulty of placing points in specific locations for LCP's (after OSM with additions)

2.9.2.2: Slope

In the early days of archaeological LCP analysis, the only cost surface in general use was that of Slope. More recently there has been an attempt to add other variables into the equation to produce a more developed friction surface for use in the analysis, usually in the form of adding land cover to the algorithm. It is only in the very recent past that others, and in particular Irmela Herzog (2014), have tried to expand this even further by adding more variables to the mix. Having said this, slope is still an integral factor in any LCP although a "perfect model for including effective slope in LCP calculations is not yet available" (Herzog 2014, 5.1.2). This chapter attempts to expand simple slope calculations a stage further and introduce other variables such as land cover and the river network – which can be a barrier to travel on foot but also an aid to travel if travelling downstream by boat. Conversely, rivers can be high cost if travelling upstream from, for example, a coastal port. It also has to be remembered that the LCP returns only one result, but this result would actually be different for many different travellers depending on age, size, load and many other factors. The variability of all of these factors combined with an almost infinite number of route possibilities mean it is impossible to model every possible disparity so a particular model must be chosen. While other features have been added to the cost surface, slope is still one of the major factors involved in its creation and is weighted in this way.

Weather conditions also play a major part in ancient route choices but are almost impossible to take account of. A steep slope will be difficult to climb, but this becomes even more difficult when it is covered by snow or ice, particularly in, for example, a chariot with wooden or iron rimmed wheels, although there are few examples of early medieval chariot wheels available (Karl 2003). Andrews (1997, 9) argues that due to bad weather conditions and poor visibility "the difficulty of land travel was therefore unlikely to be avoided by travelling by water". This was not always an easy option either due to the swelling of rivers and streams after heavy winter rains. The above all adds to the idea that travel, especially in winter, was not to be undertaken lightly.

2.9.2.3 Land cover

As mentioned above attempts have been made in the recent past to add other feature layers to the slope layer to make a more realistic cost surface, with land cover being the predominant feature, but there are admitted difficulties with this. Slope is less likely to have changed markedly in the intervening period between the early medieval period and when the DEM was produced. This is especially true in an area like Brega where the landscape is mainly made up of a flat, central plain. However, it is possible for land cover to have undergone substantial change (Bell et al 2002). In particular, a program of forestry clearances and large scale draining of the bogs by Bord na Mona can, and have, affected the land cover and indeed the lack of secure and detailed knowledge of the vegetation and forestry during the period both for LCP's and viewsheds is a common issue for detractors of the use of GIS in archaeology. Doherty (2015, 25) suggests that "the essential meaning of a slige is a road cut through a forest", and a road through dense forest would have a major impact on the analysis, especially in relation to viewsheds. The early medieval period underwent large scale changes in farming during the period and it has been argued that the pollen evidence shows that there was a substantial increase in grasses and weeds associated with arable farming during the period (Mitchell & Ryan 2003, 72; Stout and Stout 2011, 43), which by extension extrapolates into a large scale cutting back of forestry. Grasses and bracken present only a minimal impediment to walking for most healthy adults so the amount of afforestation or vegetation may not be a significant factor in determining the outcome of the LCP.

In this case the land cover data has been taken from the European wide Corine land cover dataset provided by the Environmental Protection Agency (EPA) which was updated in 2012 and is the most extensive dataset available for this type of project. This was downloaded in the form of polygon shapefiles from the EPA website. However, for use in this type of analysis raster layers are preferable to vector layers and so the Feature to Raster conversion tool was used to convert Corine polygons to the preferred raster format. Once converted the

raster is reclassified and each land cover type is given a new value based on cost of travel across a cell. These values are based on the Corine codes for the different land cover types and a condensed form is shown in Table 2.1 below. Each code has a number of sub codes but only the major headings are represented here for clarity.

Table 2.1: Reclassification of Corine land cover dataset

Land Cover Type	Corine Code	Reclassified Value
Artificial Surfaces	100's	1
Agricultural Land	200's	1
Forestry & Semi Rural	300's	3
Wetlands	400's	6
Streams/Rivers	510's	1
Sea	520's	No Data

These values are set to reflect the ease of travel across individual cells. Artificial surfaces are made up of modern urban areas which did not exist during the period in question, so they have been reclassified to the same value as open agricultural land. The forestry layer presents a major difficulty for the LCP. Modern forestry parcels probably bear very little correlation to the density of forest 1500 years ago. The decision was made to utilise the modern parcels as there was large-scale forestry in the EM period, but it is a subjective decision and they could just as easily have been reclassified to 1. A downside to the use of Corine data is that, as a European wide initiative, the resolution is quite coarse, making it

less than ideal for a small-scale study such as this. Having mentioned this, it is still the most reliable dataset available at the moment.

While modelling land cover and vegetation poses problems, the cultural and societal effects on the landscape are not to be underestimated. In relation to LCP's this is most often modelled as a viewshed (Bell and Lock 2000; Rahn 2005; Wheatley & Gillings 2002; Zakšek et al. 2008), and viewshed analysis of the two major *sli* within Brega are carried out in chapter 6. Travelling in Ireland in this period could be a hazardous undertaking, so the ability to see danger coming from as far away as possible was probably an important factor in route choice. It was also important to be able to navigate between obvious and easily identifiable landmarks as directions would usually have been given orally and needed to be as clear as possible.

2.9.2.4: Wetlands

The wetland/bog data is included with the downloaded Corine land cover data and was reclassified to a value of 6 to show the difficulty in traversing these areas and to force the LCP to travel around them, which is the more likely route. They were converted to raster data along with the rest of the land cover data. Bogs present a major barrier to travel in the midlands of Ireland and an Irish wit once suggested that when travelling over an Irish bog one's weight should be kept "on the foot in the air" (Mitchell 1990, 234). There are numerous examples of trackways crossing sections of bog such as the now famous Corlea trackway in County Longford. Connolly and Picard (1997, 6) take a quote from the Life of St. Brigit in which they tell us that "there is the story of the building of a road through a 'virtually impassable bog and in the sodden and marshy places through which a river ran'". Unfortunately, though, due to the requirements and restrictions placed on the Irish Archaeological Wetland Unit who carried out the largest study of these trackways, the data was collected in a way which is largely unsuited for use within a project such as this

(McDermott pers. comm. 2017). In general, the data format used for trackways are only recorded as a point for use in a GIS, when a spatially rectified line would be more suitable for use in an LCP. The spatial coordinates of the trackways were also generally taken at the centre point, with no known start and endpoints, so it was decided to omit these from the study. However, these points may be redundant as “Meath is relatively lacking in wetland deposits” (Deevey 2008, 72). In fact, according to the Corinne land cover data, there is only 57.06 square kilometres of bog throughout 35 different areas in Brega and these can be seen in figure 2.3 below, so they do not present a major barrier to travel.

This figure is made up of many small areas of bog and wetland, and mainly occurs towards the eastern side of the kingdom. This may have been because the large central plain was “the driest part of the country” (Aalen 2011, 16), which in turn meant there was unlikely to be any substantial need for bog trackways. Conversely, it may have been easier to use a trackway to cross one of these small sections instead of going around it.

Bog trackways were generally laid through short, narrow sections of the bog to enable transport from one section of drier ground to another or to drier “islands” within the bog. The existence of bog, coupled with hilly areas, served almost to canalise routeways, and “largely dictated the corridors followed by the principal roads” (O’Keeffe 2001, 9). With so little bog within the kingdom however, the effects of bogland were probably only felt on a very local scale. Where trackways were used in other parts of the country however, they could often be quite sizable and Catríona Moore (2008, 4) excavated 26 of these at Edercloon in County Longford, of which 7 were around 3.5 meters wide and would have needed constant upkeep and management to maintain their usefulness.

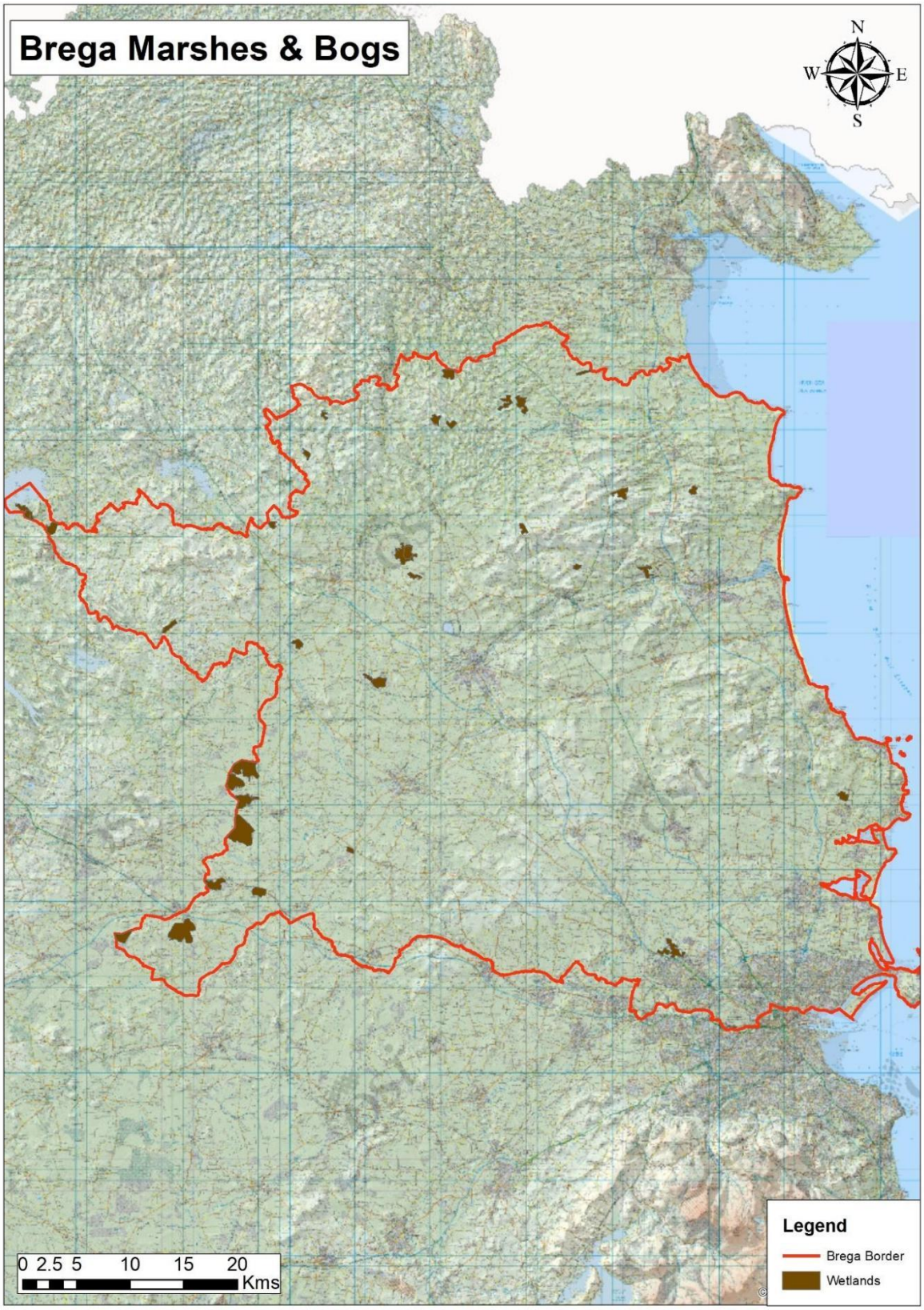


Figure 2.3: Bog and Marsh areas in Brega (after Google terrain with additions)

2.9.2.5: Rivers

River polyline data was also downloaded from the EPA website and mapped as seen in figure 2.4.

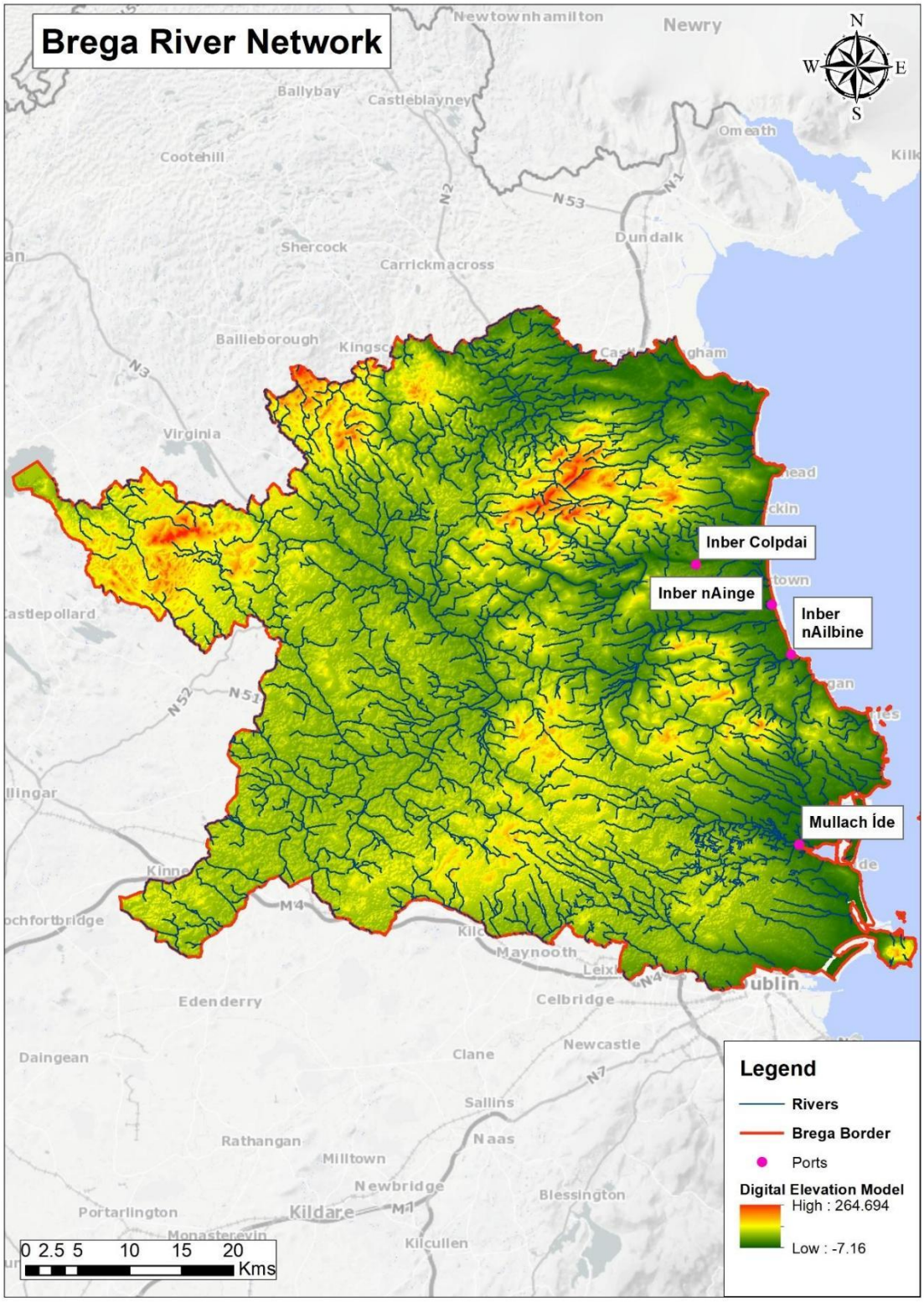


Figure 2.4: River Network of Brega (after OSM, EPA with additions)

This data was then prepared for use in the GIS. The first process was to strip out, using the "Select by Attributes" tool, those rivers which form a barrier to travel on foot. The EPA defines rivers with a stream order of less than 4 as "wadable" (Kelly et al., 2007), therefore a new layer was created of rivers which had a stream order of 5, 6 and 7 and these were converted to a raster format and termed "barrier" rivers by the author. The new raster layer was then reclassified, and all of the rivers in this layer classified as "NoData" to make it impossible for the LCP to cross at these points. These "unwadable" or "barrier" rivers are shown in figure 2.5.

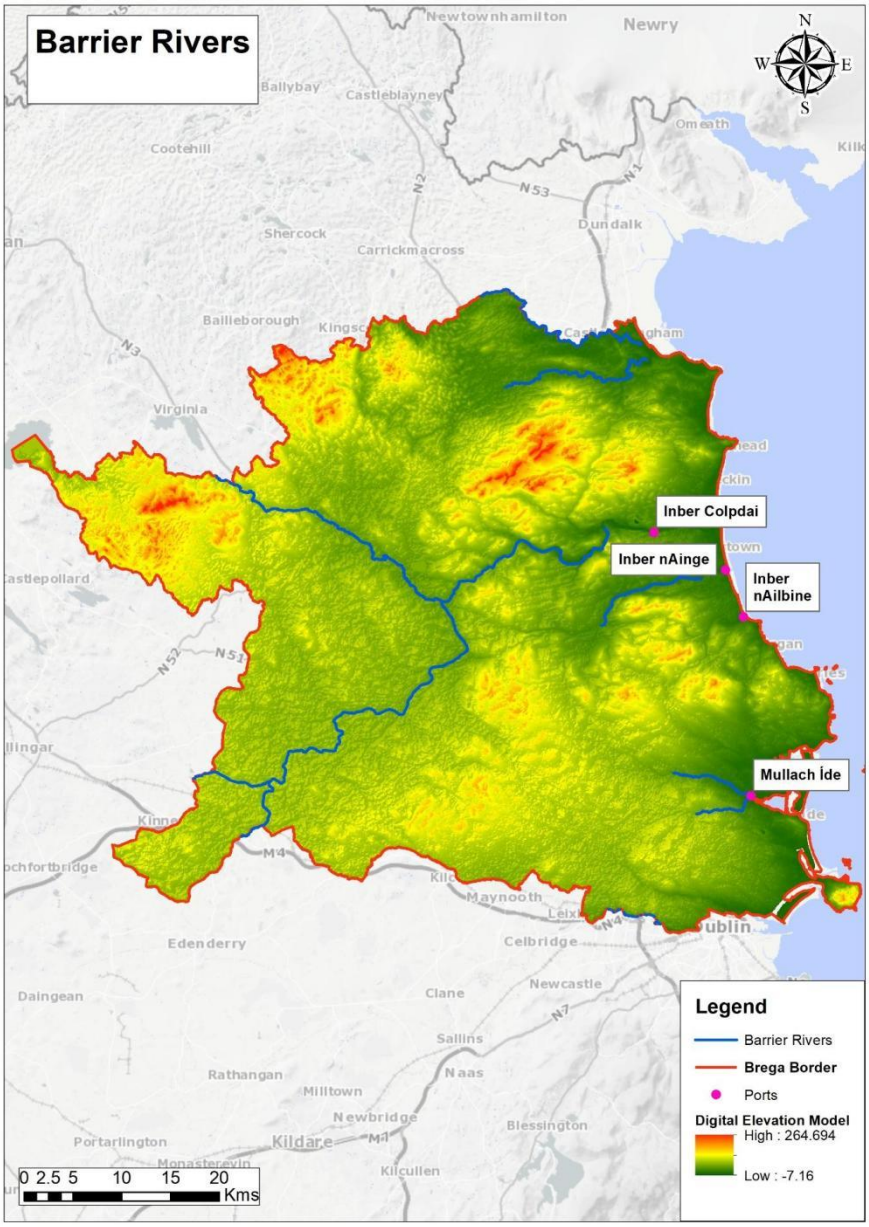


Figure 2.5: Brega "Barrier" Rivers (after OSM, EPA with additions)

Acknowledging the fact that rivers and streams can be both a barrier and paradoxically an aid to travel, they were more than likely avoided by foot traffic in general but the costs of crossing streams often play a significant role in the formation of the LCP. Notwithstanding this, they were not always avoided as they are also essential for travel over longer distances as both people and animals needed fresh drinking water. Animals in particular driven over relatively long distances needed to be fed and watered regularly in order to be presented in their best condition. River courses can change over time, some becoming deeper and wider and others becoming smaller and even drying up altogether, which can cause discrepancies in the LCP and large-scale drainage works in particular have modified the courses of many rivers. This is especially seen in the next section where we have fording places and place-names suggesting fords in places where large rivers no longer exist.

2.9.2.6: Fords

While incorporating the existence of fords into the friction surface complicates the analysis it is felt by the author that an effort should be made to incorporate what are sometimes the only reasonable way to cross major rivers which are barriers to travel. In this case, the Boyne and Blackwater bisect Brega, and in most places they are too deep and wide to wade. Fábrega-Álvarez and Oubiña (2007) assert that fords are points on the landscape that often compel a traveller to use them and Meaney (1997, 203) suggests that they are natural points for people to meet as well as being nodal points in the landscape.

Fording points can often change and even canalise movement throughout the landscape. This means that as the spreading algorithm used in the GIS gets closer to a known fording place that it will ensure the algorithm moves towards and through the ford, as a traveller in the landscape would normally do. As well as using fords and stepping stones to cross rivers, it has been suggested that, similarly to practices in Wales as told by Giraldus, that people sometimes carried currachs which were so small and light they could be carried from stream

to stream to enable crossing. This is extremely difficult to discern in the archaeological record and no examples of this have been found in Ireland to date (Joyce 1906). Table 2.2 below lists the major fords in the Brega area and figure 2.6 shows their distribution as closely as can possibly be obtained, although some are not geographically certain.

Table 2.2: Geographic coordinates of river fording places in Brega

Place Name	Easting (ITM)	Northing (ITM)	River
Annagassan	697241	791150	Dee
Ardee	680858	772258	Blackwater
Derver	671779	764169	Athboy
Ath na Laarg	699835	771979	Boyne
Athboy	711941	760686	Delvin
Kinnegad	694709	790392	Dee
Trim	663651	773577	Stoneyford
Assey	660065	745135	Kinnegad
Athlumney	666811	779244	Blackwater
Bray	680105	756929	Boyne
Oldbridge	687919	766697	Boyne
Athcarne	687165	767857	Boyne
Ardglasson	663168	774088	Athboy
Athronan	704429	744686	Pinkeen
Ballyboy	672614	761097	Knockshangan
Newtown/Ballyfallon	684732	794802	Carricknagoan
Ballyhoe	672757	762796	Athboy
Fordringfort	654930	778276	Millbrook Branch
Millbrook	703257	755736	Hurley
Curragha	706112	775589	Boyne
Rosnaree	703211	764757	Hurley

Ford of Fine	686650	761301	Boyne
Footstick	699304	794699	Glyde
Footstick	697936	795899	Glyde
Stepping Stone	695376	798074	Glyde
Footstick	703551	790844	Dee
Footstick	702429	791360	Dee
Footstick	700048	791479	Dee
Ford	703504	790910	Dee
Ford	701174	771858	Boyne
Footstick	664221	780708	Blackwater

There are 31 shallow or fordable places shown on the map and the data has been gathered from a number of sources including historical maps. O'Keeffe (2001, 143-145) includes a list of 124 fording places throughout the country, of which 10 are in Brega. Unfortunately, only the modern and proper names and some of the river names are listed and none of these have geographic coordinates which makes location more difficult. It is also suggested (ibid., 67) that large drainage schemes on the Boyne in the modern period altered the riverbed profile to the extent that it is difficult to be definitive in their placement.

Whilst the use of "barrier rivers" ensures that the LCP cannot cross the lines of the larger rivers, even these "barrier rivers" had fording places, footsticks and stepping-stones to enable crossing. A process was put in place to enable this. Gaps had to be created within the polyline river data to allow the LCP to cross at specific fording points.

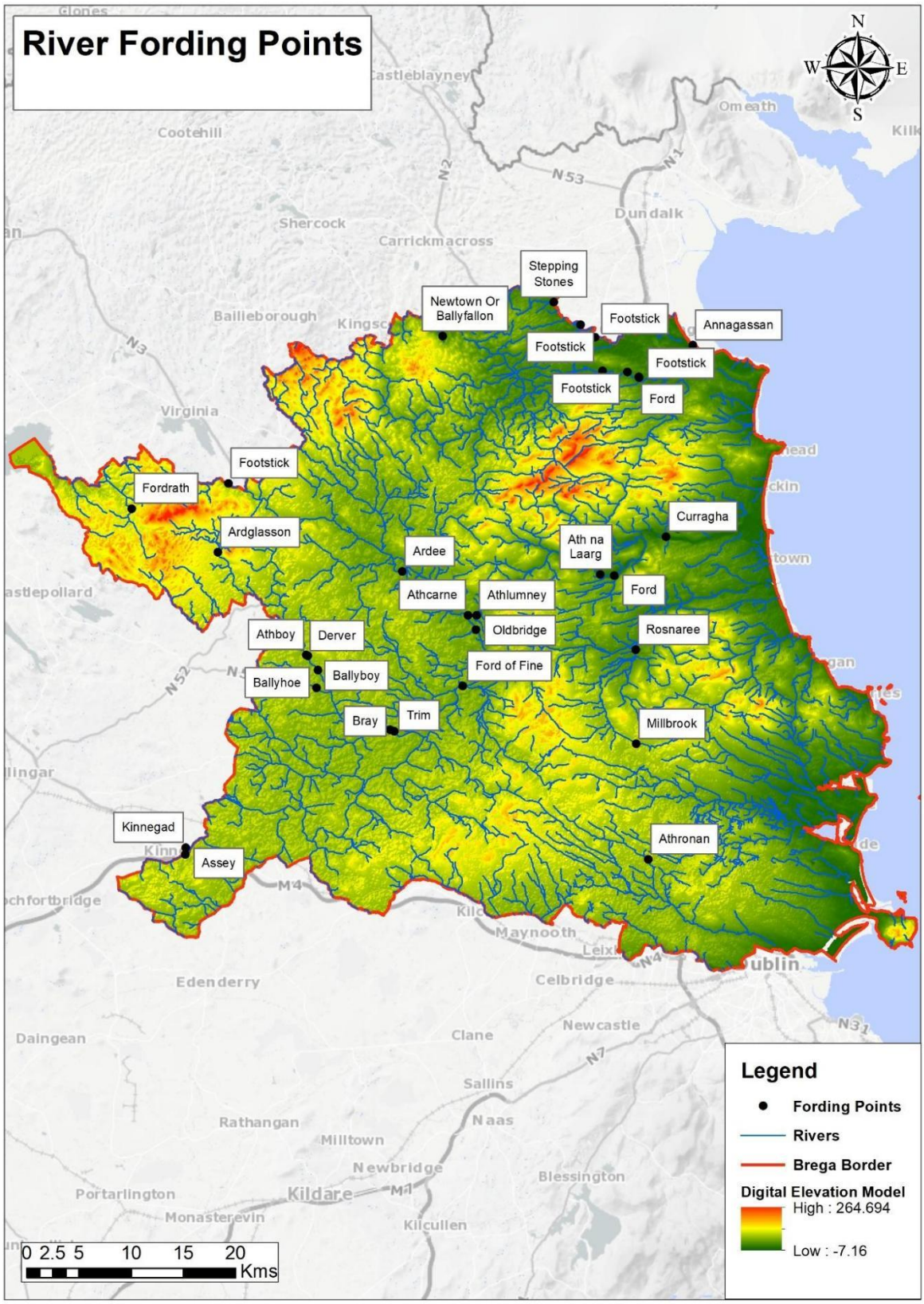


Figure 2.6: Known Fording Points within Brega (after OSM, EPA with additions)

The EPA river data for each river is made up of multiple sections combined to make one complete river. Once these places were identified by the methods described in more details below, that particular section of river was removed from the database, creating “gaps” in the barrier rivers which will allow the LCP to pass through them. Although this approach is reasonably common (Bruce 2016), it was found to be inefficient as it created many anomalies such as that in figure 2.7 which shows that the LCP passes through the narrowest point of the river which is usually correct, but it is approximately 3 kilometres from the initial fording point at Curragha, due to the complete EPA section being removed. Even allowing for the vagaries of inexact coordinates this was deemed to be too high an error factor.

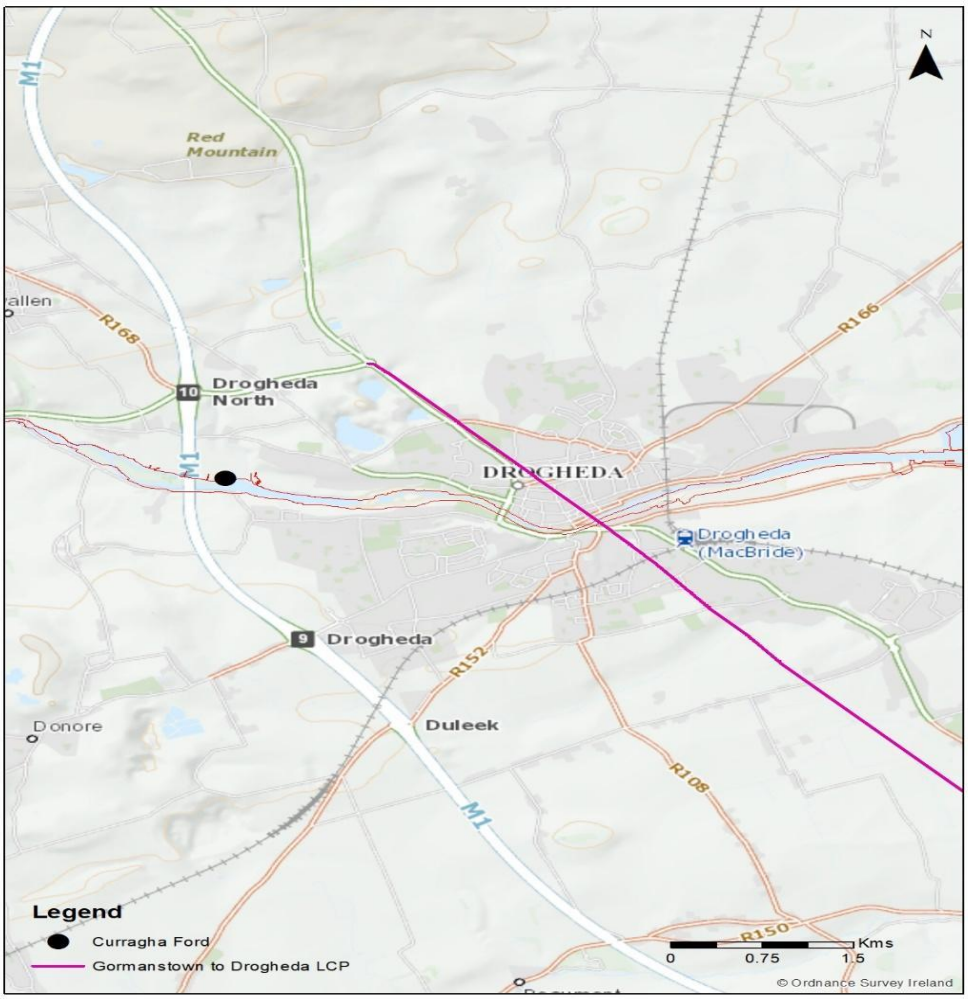


Figure 2.7: Section removal skewing LCP (after OSM with additions)

Figure 2.8 shows how the placement of a ford can dramatically skew the analysis. The fording place at Navan was originally assigned to a cell on the south side of the river, which

forces the LCP to parallel the Boyne all the way northwards and around a bend to reach Donaghpatrick. In actuality however, the cells chosen for the ford should cross the river completely in order to create a “channel” for the LCP to flow through. This produces a much shorter and more realistic route. This case proves that care must be taken in the placement of each element during the creation of the LCP.

To solve this problem, it was decided to manually split the sections of river to create a much smaller gap. This tightens the geographic spread of the channel to a much tighter and more realistic area than the initial approach of removing a section of the river – in this case to just 60 meters as opposed to three kilometres. This also meant that the model had to be adjusted to include the full length of each barrier river rather than the “gapped” ones used in the creation of the original friction surface.

Figure 2.9 shows the results of this process. The white cells are the NoData raster cells which make it impossible for the LCP to cross the river at those points. By manually changing the cells at the fording point (yellow dot) to a low value matching the surrounding cells, the LCP can now easily travel through the river at that point. The use of barrier rivers and fords adds difficulty to the LCP analysis. This is because far more data preparation and cleaning is required, and many new data layers need to be created. This is possibly one of the contributing factors as to why this method is not used with more frequency. The fact that no geographic coordinates exist for many of these places is also an added complication. Different methods have been used in the past. Fábrega-Álvarez and Parcero-Oubina (2007; 2015) suggest that water courses in general have a gentler slope than the surrounding landscape, and so assign them a lower value, but this approach is too broad to be used to its proper effect and so was discounted during this study.

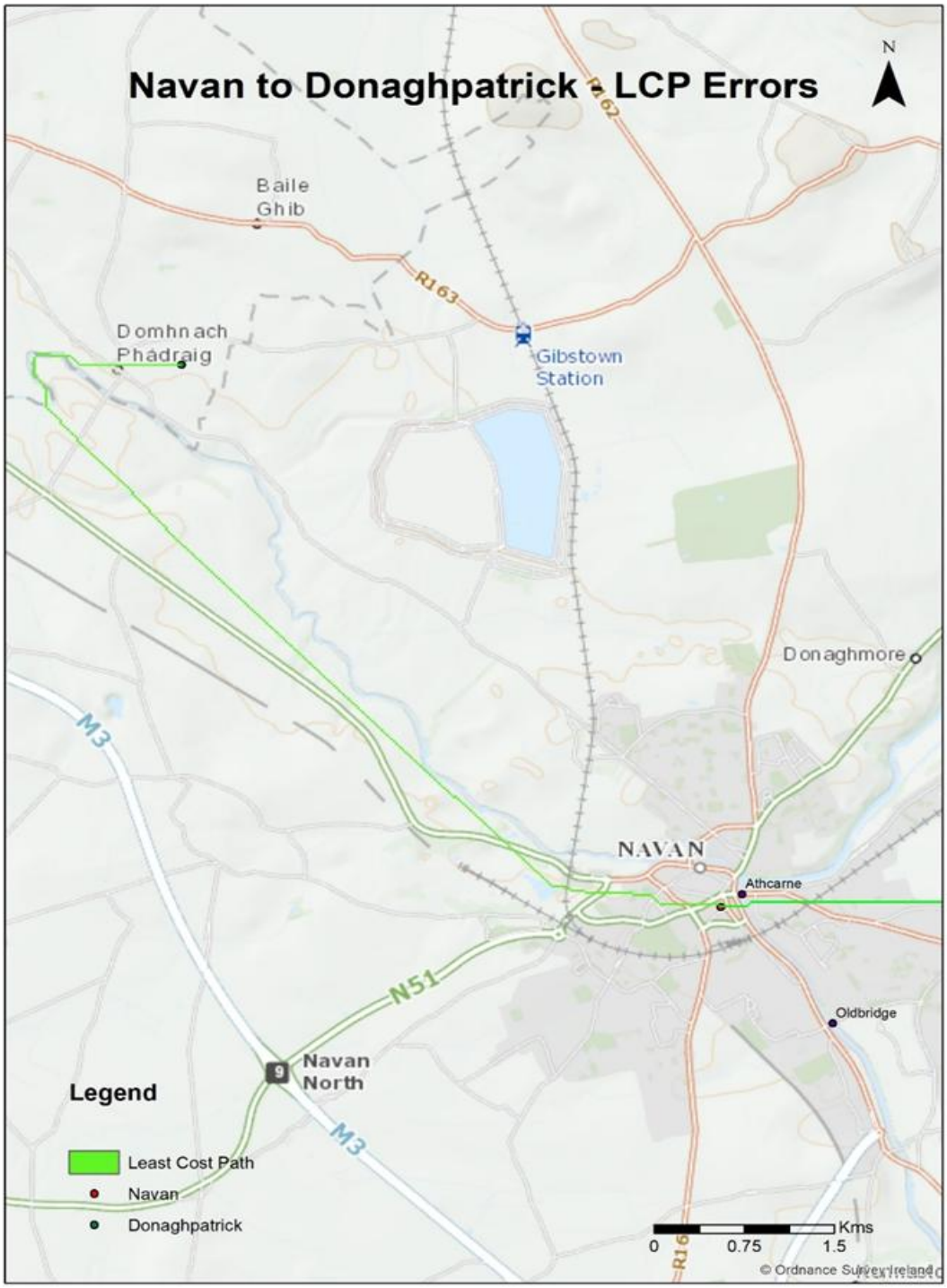


Figure 2.8: Placement of Fords in relation to LCP (after OSM with additions)

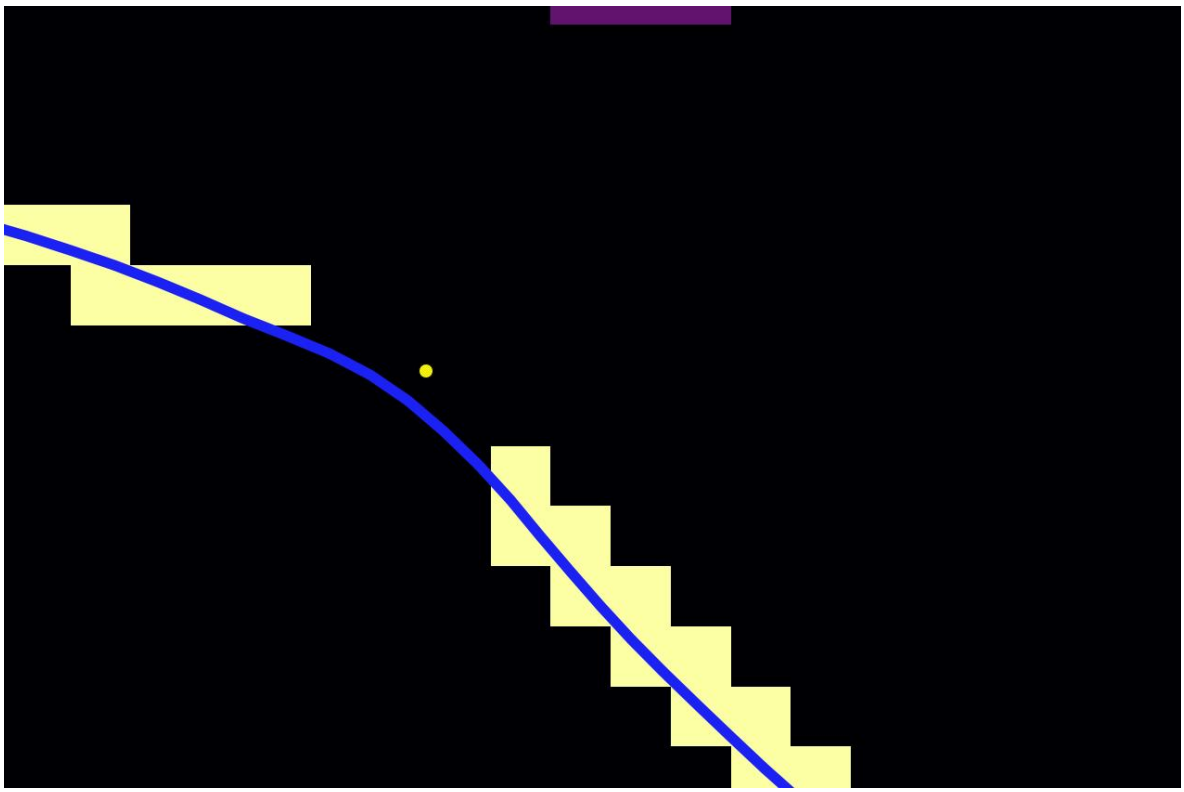


Figure 2.9: Creating a more realistic “gap” for the LCP to pass through (Figure by Author)

In addition to the fording places mentioned by O’Keefe (2001) there are also 7 fords listed on the HEV, but there are no stepping stones listed. These sites had the advantage of proper geographic coordinates which allowed them to be plotted more accurately than the others. These are mainly centred around Oldbridge and the Battle of the Boyne site, however there are no scope notes included with them. There is also one instance of stepping-stones on the historic maps. The historic maps used to search for references to fording places, footsticks and stepping stones were the first-edition 6-inch OS (1838) and the first-edition 25-inch OS (1914) mapping and are an example of how historic data can be combined with the archaeological record to produce new data.

The historic maps were only interrogated in relation to streams/rivers which had a stream order of 5, 6 and 7 as lower orders are considered wadeable as mentioned earlier. Obviously

“wadeable” is a generalised term – what may be wadeable in summertime may be completely different during the winter or after heavy rain, but as a rule of thumb it is useful.

Added to the 10 fords described by O’Keeffe (2001) and the 8 from the HEV are an additional 12 gleaned from Loganim.ie (2008), the database of Irish place names. The Irish word *Áth* was indicative of a ford and these places are listed on the database website. Again unfortunately, the geographic coordinates are not useful for addition to the GIS. The delineation of fording places is problematic from a number of perspectives. River depths may have changed considerably in the intervening period between the early medieval and now, and possibly even changed course in some instances meaning some fords would have disappeared and some new ones created. It is also possible that different locations were chosen depending on seasonal and prevailing political considerations (Jones 2009, 122).

Nonetheless, the fords included here are likely to have been fords in the early medieval period. It is possible to find an additional 6 fords from the historic mapping available from the Ordnance Survey of Ireland (OSI) MapViewer website: Annagasson, Ardee, Derver, Ath Na Laarg, Athboy and Kinnegad. The ford at Curragha is included on the NMS website (ME02414-). There is less exact detail for the other fords which appear on Logainm.ie. It is likely that the river in general would be slightly shallower where road bridges crossed them, as a high percentage of modern bridges are built on the site of earlier bridges, or where the river is easier to cross. The locations chosen therefore are close to the town or settlement centre where the road bridge crosses the river in each place. Davis (1973, 258) summed this up nicely in relation to Oxford when he stated that “The first condition for any proposed site must be a road which was genuinely important. The ford was not called after the town, but the town after the ford, and it must therefore be presumed that the town came into existence because of the ford and not vice-versa”. This theory has been applied to the fords at Trim, Assey, Athlumney, Bray, Oldbridge, Athcarne, Ardglasson, Athronan, Ballintry, Ballyboy, Newtown/Ballyfallon, Ballyhoe, Fordrath and Millbrook. There are two fords in rural areas,

Rosnaree and the Ford of Fine, which have no roads to help demarcate them, so the location of weirs has been chosen instead. There are likely to have been many more fording places which are lost to us now also some which are seasonal. Winter rains can swell even normally shallow places in rivers and make them impassable, and similarly even the normally deep waters of the Boyne can become quite shallow after a hot summer's drought. This can be seen in figure 2.6 above which shows some fording places substantial distances away from the barrier rivers. This is likely to mean that the smaller rivers they were placed on swelled substantially in the winter or were even much larger rivers then than they are in the modern day.

There are places on the historic maps marked as “foot sticks” which were also shallow areas which allowed crossings, and there are 6 of these within Brega. These have also been included in the GIS in the same way as the fords. In total, the 31 known fording places within Brega have been added to the GIS as a point layer.

Fords also create issues in that they are an impediment to travel by boat, but allow crossings on foot, horseback or chariot and enable animals to cross also. This possibly meant that boats had to be removed from the water and carried around the shallow places, or else the journey by boat ended at the ford. Fords had different characteristics and some had differing depths and widths that often “individual travellers and their mounts could frequently achieve a crossing where a wagon loaded with perishable goods could not” (Leighton 1972, 93). The word wagon has connotations not commensurate with early medieval Ireland, but instead can be taken for a cart later in the period. A combination of roads and boat travel is also possible and Leighton (1972, 153) suggests that “a combination of both was often necessary”. There has also been an argument that “stream flow was higher in medieval times than now” (Day 1907, 55), which means that crossing points marked on the more recent historical maps may not have been available then, although the evidence for this is quite loose. Unfortunately, it is impossible to ascertain when some of these fords came into being

archaeologically, and the best evidence we have is from early place names and references in early medieval literature.

2.9.2.7: Bridges

Bridges are problematical in that not many are mentioned in either the historical or archaeological record. The construction of the first bridge in Ireland dated to around AD 1000 (O'Keefe & Simington 1991) and the substantial structure at Clonmacnoise is mentioned in the Annals of Clonmacnoise around AD 1158. Dendrochronology carried out by Queen's University Belfast (QUB) as reported by Duke (1998, 480) suggests that the trees were actually felled in 804, almost 200 years before the annals mention construction. This would point to a much earlier date of construction for the bridge than would seem apparent from the annalistic evidence. If substantial bridges such as this were being built in the 9th century then it is not too much of a leap of the imagination to say that smaller structures were being built before this time, unfortunately many of these may have been removed and replaced with stone bridges later in the period or into the later medieval.

The bridge at Clonmacnoise was a large bridge crossing the Shannon which would have required extensive resources to build (O'Sullivan & Boland 2000). It is hardly surprising however that a site as large and significant as Clonmacnoise had both a network of roads and a large, imposing bridge to service its transport needs. Bridges were constructed of different materials including wicker and hurdles, but O'Sullivan and Downey (2015, 37) suggest that across early medieval Europe bridges were generally made of wood, with stone bridges appearing later, and the earliest types seem to have been the "Clapper" bridge (Cox & Gould 2003). While the Annals of Clonmacnoise mention the construction of a bridge in approximately AD 1000, the Annals of the Four Masters (1: 351) tell us that Saint Cilleni, the "maker of bridges" died in AD 757, which suggests that bridges in some form were in existence from a much earlier date. However, De Courcy (1990, 246) suggests that these

bridges could possibly have been simple mats staked out at low tide to enable people to cross, akin to the ones found at the Somerset Levels in the UK or at Corlea in Longford, and not necessarily the structures we consider as bridges today. As such, no bridges have been included in the analysis as attractor points for the LCP as there is very little reliable evidence for bridges in the area.

2.9.3 ACS Creation

As mentioned earlier the ArcGIS suite called ModelBuilder was used to create the ACS. The workflow is shown below in figure 2.10.

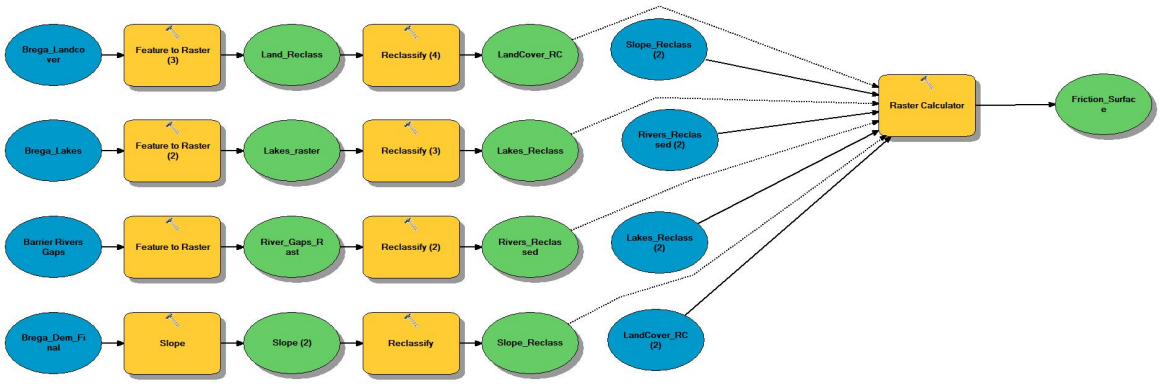


Figure 2.10: Workflow used to create Friction surface (Figure by Author)

This friction surface was then reduced by using the geoprocessing tool “Clip” to obtain a raster friction surface bounded by the outlines of the kingdom. This enabled much faster processing for the detailed road system within Brega without having to create backlink rasters which include every cell in the whole Ireland DEM. However, when calculating the LCP from a path outside of the kingdom boundaries to within it, incorrect values were obtained as every cell outside the kingdom was returning a 0 value. This meant that when calculating these routes, or indeed the LCP of the other three major *slí*, the whole country's friction surface must be used. This was created in the same way as the Brega cost surface

with one exception - the fording places on the rivers with a high stream order were not used as time restraints made this impossible for such a large area, and the focus of the chapter is on Brega in the first instance. In most cases the model will generally arrive at the borders of Brega in approximately the same place as it would have if every ford in the country as a whole was used in the model. The friction surface eventually produced for use in the LCP is seen in figure 2.11.

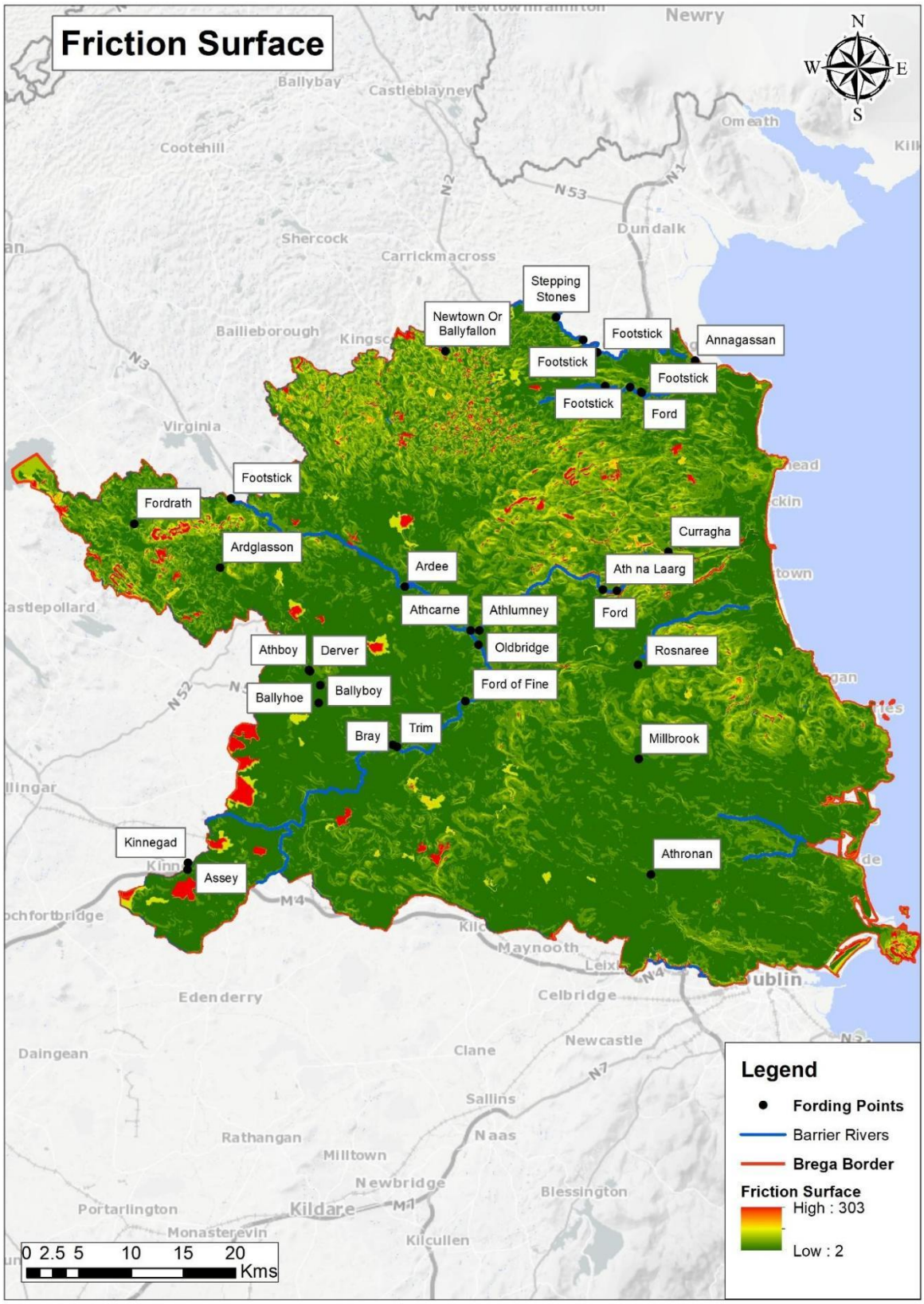


Figure 2.11: Brega Friction Surface showing barrier rivers and fords (after OSM, EU_DEM with additions)

Once the friction surface was created it can be then used to calculate the LCP. This was done by choosing start and end points and running the LCP process. The start and end points were taken from O'Lochlainn as detailed below. Once the LCP raster was calculated it was possible to then convert it to a polyline. While not essential, this makes the appearance of a line more acceptable on a map from a visual perspective. Whilst having each individual section was convenient, it was also convenient to use the "Merge" tool to combine all of the polylines into one line for ease of cartographic expression.

2.9.4 Topography

Topography directly influences route choices. Roads and paths are often built up of tens of years of trial and error in route choice and there is a random or agency element involved in each of these choices that change as new information is gathered and assimilated. (Saerens et al. 2009; Herzog 2013). This enables people to navigate to places they have never personally been before, using information passed on by other people and also by recognising the relationship between separate but related topographic elements of the landscape (DeGruchy 2016; Widlok 1997; Lewis 1996). It has been shown that this form of landscape recognition and use is not just confined to humans however and can also be seen in chimpanzees (Normand & Boesch 2009; Normand 2010).

The random elements in route definition reduce over time however, as the most advantageous routes coalesce and it this optimum path the LCP tries to define rather than the intermediate routes along the way.

It can be difficult in today's modern world of satellite imagery and high-quality paper maps to remember that the people of the time didn't have a bird's eye view of the landscape and the knowledge of the best routes to take would have been built up over time and passed on to others, creating a form of social interaction and trust between people. There have been

numerous studies of how these routes have been built up in the Mesolithic using Agent Based Modelling (ABM) such as that by Lake (2000; 2020) and there has also been one attempt to use a combined ABM and GIS to model Irish routes (O'Brien & Bergh 2016). There are issues in the way the routes were modelled in this case. The eskers were given a weighting of 1 while harder to traverse areas of bog or water were given weights of 10, thereby strongly forcing the GIS to choose the eskers as the least cost paths. Having said this, it is recognisable that the eskers in general are features which are amenable to travel, although Moloney (1998, 10) suggests that "some parts of the eskers may not have been suitable as communication routes". It is also notable here that the weightings given to the different layers is often a subjective choice and there are no hard and fast rules in this regard. This can be seen very easily in Husdal (2000, 11) where he contends that by 1979 there were 222 known LCP algorithms making the choice of algorithm to use particularly difficult, but the algorithm used in the Grass GIS module r.walk seems to be the most generally accepted at this point.

2.9.5 Known Route Locations

Since we have some known nodes on the two major *slí* which pass through Brega these will be compared to the "optimum" routes returned by the GIS in an effort to ascertain what some of these intermediate stops may have been and how other factors may have influenced route choices. It is not the intention here to recreate these routes to completion but rather to focus on the sections of them that fall within Brega. In essence, this means that if O'Lochlainn's routes are to be used, then only two of the five major roads are within Brega – the *Slí Assail* and the *Slí Mhidhluachra*. Additionally, the other routes within Brega, which O'Lochlainn has defined from historical and literary sources, have been modelled in order to tease out the transport structure within the kingdom. This also meant that the *Slí Chualann*, *Slí Mhór* and *Slí Dála* are only presented as an overview and the detail is omitted as they do not pass through Brega in any meaningful way. The overview of the main routes was constructed with just the known start and end points entered, and the intermediate points omitted. This is just

to create an overview of these routes through the country as a whole. Within Brega however, an LCP has been created for each individual intermediate known point along the route. This enables a more in-depth analysis of the area in this study. The known points along the routes which are taken as start and endpoints for each individual section have been taken directly from Colm O'Lochlainn's work in the 1940's. As well as the main *slí,* the other routes mentioned by O'Lochlainn are also constructed in this way to enable as comprehensive a picture of known routes as possible for the Brega area to be built.

2.10 Conclusions:

This chapter starts off with the specific - the main datasets such as the DEM and NMS data downloaded for use in the GIS and also the datasets created during its formulation. The relative strengths and weaknesses of these datasets as well as their uses and limitations were also examined. The focus then broadened into the use and incorporation of historical data and the theoretical frameworks underpinning GIS and landscape archaeology. The chapter narrows once more after this and focuses again on specific topics namely Spatial Statistics, Viewsheds, Topography and Hydrology and Least Cost Paths which are all techniques used in chapters 5 and 6. Chapter 3 "sets the stage", the physical landscape of Brega, in which these processes are used to investigate the settlement, transport and communications of the kingdom as a whole.

Chapter 3: Reconstructing the topographical landscapes of the early medieval territory of Brega

3.1 Introduction

In attempting to study settlement in Brega, the kingdom can be broadly divided into two categories, the physical landscape, defined by the topography of the landscape and the material remains left behind within it, and the social, cultural and political landscape in which the daily lives of people were enacted. The physical and social construct of Brega was formed far earlier than the early medieval period. In any attempt to understand the kingdom as it stands at the beginning of the period and progresses through, it is often useful to look at its foundations, at the physical underpinnings in the formation of the region and the cultural realities that were in place as the period began. In order to examine this in more detail this chapter will provide a multidisciplinary introduction to the real and imagined landscapes of Brega, its geology, topography, soils, drainage, prehistoric past and early medieval social, cultural and political present. It is against this reconstruction of an early medieval kingdom that any understanding of people's lives in this region must be built.

While early medieval Ireland may have been an island of Byrne's (1973) "patchwork" of kingdoms of varying size, strength and political and economic power, one of the pre-eminent polities was the kingdom of Brega, in eastern Ireland. The early Irish scribe Muirchú called Brega the "greatest kingdom" (Bieler 1979, 81) of Ireland and refers to Tara, one of the most important regnal seats within Brega and the country as a whole, as previously being the head of all paganism and idolatry, thus demonstrating the triumph of Christianity over an imagined Pagan past. Roughly relating to modern day Meath and parts of south Louth and north Dublin, early medieval Brega's location on the east coast, its good agricultural soils and its gentle topography ensured it was an economic, political and ecclesiastical powerhouse of its time and arguably *the* powerhouse of early medieval Ireland. In fact Bhreathnach (2014, 47) has called Brega "the most sought after kingdom in Ireland". While the area has been extensively studied from a historical viewpoint and there have been many individual

archaeological excavations, there is far less in the way of archaeological synthesis and this study will attempt to add to this.

It has been suggested that the peoples of early medieval Ireland “may have been outward looking” (Eogan 2012, 17) between the fifth and eleventh centuries AD, but what is unequivocal is that they witnessed a range of social, economic and political evolutions (O’Sullivan et al. 2014), and Brega itself experienced a raft of these changes. Some of this upheaval was immense and would change the landscape of Irish society forever. It included conversion from Paganism to Christianity (O’Brien 2021) encompassing everything that entails, such as physical changes to the landscape due to a massive raft of church building and changes to the performance of daily life as well as in high status areas such as the inauguration of kings and important political changes such as the emergence of powerful political kingdoms such as the Southern *Úi Néill* who went on to annex Brega (Connon 2007, 112).

There were also technological, economic and agricultural changes, all of which left their mark on the landscape. How much the landscape changed, and in what way, due to changing agricultural practices has become a matter of some debate. Environmental evidence has produced mixed results as to these changes, with some proxy evidence indicating increasing agricultural intensification and other evidence pointing towards a reduction in pastoral farming itself (Coyle-McClung 2012; Hannah and McLaughlin 2019). Hannah and McLaughlin (2019, 26) also use radiocarbon evidence to suggest that the population was decreasing from late in the seventh century, which would extrapolate to less intensive agricultural praxis. Extensive forestry clearance between the fifth and eighth centuries (O’Sullivan 1994, 80) would also have forced major changes on the landscape, allowing more space for agriculture and economic growth, and also causing changes to the landscape in some areas due to erosion. The improvements in agricultural technology such as corn drying kilns and watermills have also left an indelible impression on the material record with

relatively large numbers of these in operation between the eighth and eleventh centuries (O'Sullivan and Downey 2019).

Even though the introduction to chapter 1 stated that it was a time of immense change, there was strong continuity, if not almost a stagnation in some areas. For example, there was a strong homogeneity in settlement practices and an almost rigid adherence to a similitude of building practices. Simply put – people lived in ringforts. While it can be recognised that there are definite variations in morphology, there are also general trends in these practices which can be identified during this period. This is probably due to the fact that the construction and design of dwellings was laid down in early Irish law which described their "morphology, function and economy, their distribution and relationship with ecclesiastical settlement" (Stout 2000, 110). The laws relating to house morphology are "arguably more realistic" (O'Sullivan et al. 2017, 78) than some of the other areas of the laws, which are often regarded as aspirational. It is hardly surprising that the laws which, in theory, governed Irish society so minutely were also applied to settlement and that settlements retained a distinctly similar tone. The depth to which the laws at the time described the morphology of dwellings was extremely precise and so again it is hardly surprising that the majority of dwellings were so similar. It is interesting to note here that even though the laws prescribed the way houses were designed and built, there are other types of design not accounted for. There are many possible reasons for this, such as an attempt at individual expression, regional variations or simple environmental or resource constraints.

Having said that a synthesis is lacking for such an important kingdom however, the explosion of excavation during the Celtic Tiger boom of the late 1990's means that there are now a wealth of high quality excavations which provide the raw material for a study of this type. Due to extensive excavation carried out by the NRA on behalf of the Irish government along the routes of the N2 and N3 roads, numerous new sites were revealed which have provided an enormous amount of detailed information on topography, geology, soils, artefacts and morphology. This new data allied to previous archaeological and historical studies (e.g. the

Hill of Tara, Lagore crannog) create an excellent platform from which to study such an important kingdom in a focussed way. The Early Medieval Archaeology Project (EMAP) in University College Dublin (UCD) and Queen's University Belfast (QUB), has pioneered the interpretation of this new settlement, economic and environmental data nationally on an island-wide scale, but focused landscape studies are now required.

3.2 Topography

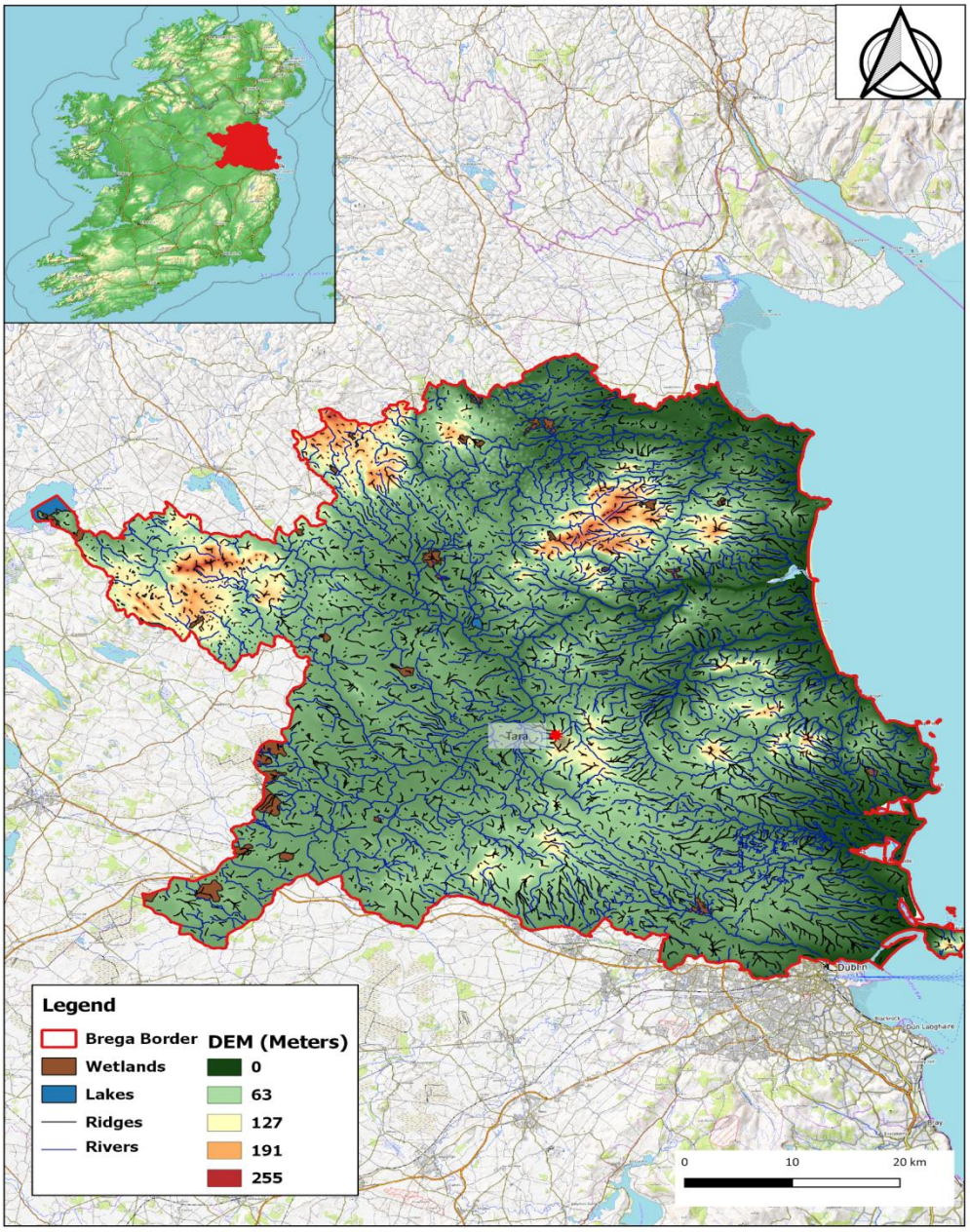


Fig 3.1: Topographic Map of Brega (after OSM, EU-DEM, EPA with additions)

The early medieval kingdom of Brega is traditionally defined as consisting of Meath and parts of North Dublin, approximately coterminous with the baronies of Balrothery East and West, Castleknock, Coolock and Nethercross and South Louth, approximately coterminous with the baronies of Ferrard, Duleek Lower, Ardee and Drogheda (Bhreathnach 2014, 45; Eogan 2010, 13; MacNeill 1935, 101). The defining feature of this kingdom is Mag Breg, the large arable plain at its core. Some scholars suggest that it is from this plain that the kingdom gets its name (Gleeson 2013) while others such as Bhreathnach (2005a, 410) suggests that it is "the plural of the feminine guttural noun *brí* 'hill' from Celtic *brig-, cognate with Germanic berg and Welsh *bre"*. Still others such as Thunder (1889, 509) have translated the name as "magnificent plain", which may be true in ideology if not in exact translation. The *Metrical Dindshenchas* (Lore of Places) translated and published by Gwynn between 1903 – 1935 tells us in poem 46 that

> "Brega cleared—a boast not to be hidden—this plain our horses drive round, so that his name, as each of the seven's, endures a while for an illustrious title of the land he seized".

However Brega, son of Breogán is likely to have been a mythical figure rather than an actual person.

In early medieval Ireland the economy was based around agriculture, essentially cattle and arable farming. Honour price was measured in cattle and tribute was made in cattle, although arable farming was also more important than may have been thought in the past. This "region encompassed some of the best land known in eastern Ireland" (Eogan 2010, 23), so it is hardly a surprise that a polity in a strong ascendency such as the *Úi Neill* wanted to subsume control of the area.

It is crucial to note here that the planar area of Brega is approximately 3300 sq. kms. but measured on a topographical relief basis the kingdom measures approximately 5235 sq. kms. The topographical relief is a measurement of the area in three dimensions and the figure is

almost 2,000 kms. sq. (59%) bigger than the planar value. This means that there is far more land available for settlement and use than might initially be thought from the smaller figure, but it is the planar figure that is used in general throughout the thesis when mentioning distances. Calculating these figures to form a picture of the real size of the kingdom is an advantage of the GIS, and is unlikely to be one carried out manually.

It is important to remember that it is not just the physical size of Brega which led to its economic power, but also the quality of its land. Status was based on personal wealth, and ownership of two parcels of land of equal size did not guarantee parity of value or personal status. Mac Niocaill (1971) translated an early law text entitled the *Tír Cumaile*, which describes six different grades of land, the top two being “Best Arable Land” and “Hilly Arable” and we will see here that Brega is mainly composed of these types of land.

The region was eventually divided up into the kingdoms of Northern Brega at 1200 sq. kms and Southern Brega at 2100 sq. kms. after the battle of Imlech Pich (Eogan 2010, 18). This is interesting in that Northern Brega, whilst being considerably smaller in size, nevertheless was more powerful both politically and economically after division, possibly due to being the location of Tara and all that that entails and has been called a “rich and innovative area” (ibid., 23). It has to be mentioned here that the defining lines between these two parts of the kingdom are approximate and fluid and were rarely static for any length of time. In his study of Knowth, George Eogan (1967, 394) suggested that “it is extremely difficult to draw exact tribal boundaries for any one century of early Irish history”. Today, it can be argued that this is still the case. Even though extensive historical and archaeological research has been carried out within this area, our ability to define exact boundaries which remain in place throughout the whole period is problematic. While general areas of occupation can most certainly be defined, a strict boundary cannot. As mentioned earlier the battles and changing political climate add to this difficulty. As such the boundaries used in the course of this thesis

are a “snapshot” in time and are as exact as is feasibly possible, but they exist within the constraints mentioned above and are examined in more detail in chapter 4. The baronial boundaries in use today are based on the Anglo-Norman baronial boundaries, so it is likely they are weighted towards the later part of the period and possibly less exact for the earlier part and this point is developed further in chapter 4.

In some respects the apparent physical boundaries of Brega are easily definable, a vast plain of excellent arable land and river valleys loosely ringed by low ridges, however Bhreathnach (2005a, 412) suggests that “territories ruled by population groups or dominated by dynasties were not necessarily restricted by physical boundaries”. In fact the boundaries did wax and wane along with the political fortunes of the population groups living there.

The borders of the kingdom were also defined by their natural topography with the rivers Glyde and Dee defining the northern boundary and the Liffey and Rye the southern. The whole kingdom in fact benefitted from the network of rivers and the drainage provided by these rivers was partly responsible for the land being of such high quality agriculture and it still remains so today.

The Boyne is thought to have been navigable as far as Trim and the Liffey was also largely navigable. These two important rivers bordered the plain itself and would have aided travel and trade. However, they, along with the Dee, Glyde, Delvin and Nanny all empty into the Irish Sea with an aspect facing towards Britain and migration and trade routes were already in existence. It is no surprise then that ports grew up along much of this section of coast especially at the mouth of the Boyne at *Inber Colpdai* where Muirchú tells us that St Patrick landed and travelled “to that aforesaid great plain” (Bieler 1979, 166), meaning Mag Breg, and the ports are mapped in figure 6.9. Archaeologically, while there is no direct evidence that Patrick did actually visit the kingdom, the historical evidence is very strong and the archaeology shows that Brega was a very important ecclesiastical area (Eogan 2010).

While the rivers defined the Northern and Southern Boundaries, the Irish Sea bounded Brega to the east. The estuaries of the Liffey, Delvin and Nanny as well as Malahide Bay were also trading ports and it is only a short distance from Malahide to the important trading site at Dalkey which has been termed a “gateway community” (Hodges 1989, 67; Mytum 1992, 262; Campbell & Lane 1993, 65) in the area. This bolsters Eogan’s (2010, 17) theory as mentioned earlier that this area of Ireland was “outward looking”. This concept is also reinforced by evidence for Romano-British artefacts being found on many Irish sites and in ever increasing quantities (Freeman 1995, 69; 2001) which bolsters Warner’s (1996, 6) rather far-fetched theory that the Romans actually did invade Ireland. Evidence of trading from farther afield is also found on multiple sites within the area. Sites like Raystown have unearthed artefacts such as sherds of E ware pottery and a glass cone beaker from the 6th/7th century which Seaver (2009, 134) suggests came from Gaul, possibly through ports like Dalkey Island or Inber Colpdai. There are issues with this idea however. While Dalkey Island’s use as a trading post is undisputed since its excavation by Liversage in 1967, the island was in Laigain territory who were bitter enemies of the ruling dynasty of Brega, the Síl nÁeda Sláine who they had been fighting “as early as 677” (Byrne & Francis 1994, 14). A strong question remains about whether access to exotic goods from Gaul would create enough leverage to overcome these traditional enmities. It is more likely that these trade goods would have come through the ports at Inber Colpdai directly into the heart of the kingdom by travelling up the Boyne, or at Inber nAinge or Inber nAilbine. Sea trading and travel by Irish kings and traders is an area where there has been relatively little substantial work carried out to date, with the focus mainly being on incoming trade goods and obviously the arrival of the Vikings. Most of the published work is centred on the period after the 9th century and this is a topic which would benefit from further research.

This network of rivers and ports, the easy travel through a flat plain, and relatively low hills all contribute to make Brega into what is often termed in the literature a “nodal” point for travel throughout Ireland. This wasn’t always a good thing however as the Anglo-Saxon raid on Brega in AD 684 shows. This was a “naval attack probably launched from the Isle of Man”

(Cronin 2011, 14) by the Anglo-Saxon king Ecgfrith and was possibly a contributing factor to the splitting of the kingdom into North and South Brega only two years later. In fact, O'Brien (2009) argues for a strong Anglo-Saxon presence in Ireland with Ratoath at its "heartland". This idea is partly based on the find of a 7th century neck ring similar to the one from the East Anglian cemetery at Bergh Apton in Norfolk, and some possible Anglo-Saxon burials in a small penannular enclosure at Colp, although these sites are approximately 30 kms from each other. This was far from the only incursive use of the rivers however, and Thunder (1889, 514) tells us of another of the many incursions made by other peoples, the Norwegians. In AD 837 they sent a fleet to Ireland where "60 of their ships entered the river Boyne, and 60 entered the Liffey" where, as reported in the Annals of Clonmacnoise, they "destroyed all the borders" surrounding the rivers.

It is probably due in part to the ease of use of the ports and navigability of the rivers that a group of Anglo-Saxons organised by a Northumbrian king were able to successfully wage war on Brega and "there was a general devastation of the region and its churches, and… goods and hostages were carried off by the Saxons in their ships" (Cronin 2011, 14). It is likely that this raid, allied to the 60 hostages that were taken, contributed to already fractious relationships within Brega. It is unlikely to be a coincidence that the hostages were returned with the help of Adomnan the Abbot of Iona and two years after that the kingdom had split into North and South Brega. It can be argued that evidence of how important Brega was ecclesiastically is shown in that no lesser a personage than Adomnan travelled to Northumbria to secure the hostages release and another famous cleric the venerable Bede denounced Ecgfrith for raiding Irish churches. In contrast to this it is not reported in the annals that anyone of particular note or status was taken hostage and no one is reported to have died while in captivity. It may have been possible that using high status clerics such as Adomnan to mediate in these issues was not entirely unknown, and the peoples on both sides were familiar enough with these high status clerics to trust them during negotiations. This also gives an indication of the relative ease and frequency of travel between Ireland and Britain at the time and the close contact between churches across the Irish Sea.

Ports and navigability of rivers were also a core influence in the establishment of the Hiberno-Norse town of Dublin or *Dyflin* as it was called then. The settlement of the Vikings in the area directly adjoining Brega introduced a new element of both cultural interaction and a possible new enemy to be watched and fought if necessary. However, the settlement of the Vikings in this area also opened up new avenues for trade routes to the Atlantic and Mediterranean, adding to even more economic, technological and ideological influences.

The western boundary of Brega is much harder to define and was probably relatively fluid throughout this period. Unlike in the other parts of the kingdom, the western boundary is not marked by an extrusive natural feature. In later centuries this boundary was complicated even further as the power of the Síl nÁeda Sláine waned and that of the Clann Chólmáin increased. Brega was gradually integrated with the neighbouring kingdom of Mide as the Clann Chólmáin grew in importance and came to claim hegemony over the Síl nÁeda Sláine after a “long internal feud” in which the two clans “had been busy killing each other” (Charles-Edwards 2002, 16). The battles which encompassed these killings often resulted in changes to the western boundary making it particularly difficult to resolve. The boundary was also contested on occasion as battles with neighbouring kingdoms such as the Laigain were fought many times and these may have ended in border adjustments to greater or lesser extents.

One of the primary battles to be fought which resulted in major boundary changes was the battle of *Imlech Pích* in AD 688 which divided the kingdom into Southern and Northern Brega. Southern Brega then established its royal residence at the crannog at Lagore, near modern day Ratoath and the royal site for Northern Brega was established at *Rath Airthir* in Donaghmore, County Meath, which is only approximately 100 meters from a patrician church and an excellent example of a highly carved high cross. It has been suggested that “three sites in particular are of seminal importance to any study of this area - Knowth (Eogan 1991), Lagore (Hencken 1950) and Moynagh Lough (Bradley 1995) due to the richness and high quality of the material produced by the excavations of each site, indicating the “undoubted

high status of their residents" (Bolger 1997). It can be argued that *Rath Airthir* should be added to this list as it was also a royal site and the seat of the *Fir Chul Breg*, a branch of the Síl nÁeda Sláine, the caveat to this being that while the others have been excavated *Rath Airthir* has not.

3.3 Geology

A landscape is a “structured” space and people developed a complex and interdependent relationship with it (Allen et al. 1990; Warren & Asch 2000; Canuel 1999; Punke & Davis 2004; Chapman 2009). Geologically it was created many millions of years ago and has transformed over time due to natural changes such as erosion and weathering and also due to anthropogenic factors. For example, erosion occurs more strongly on mountain peaks or on the banks of fast flowing rivers or in the case of Ireland along the Atlantic sea coast. A major aspect of this change is that resources are unequally distributed across a landscape, and especially in anthropogenic cases this unequal distribution forces structure on settlement. Conversely, settlement can also force structure on the landscape, for example by clearing trees which can cause soil erosion. This can seem quite obvious, but the necessity for drinking water and good farming land forces structure on settlement patterns in the landscape, especially in an agrarian society like Ireland was at the time.
Areas of poor quality land such as bogs are obviously not suitable for large-scale settlement. Similarly, high mountain peaks with no water resources and a high cost factor in time and energy for travel make them unsuitable for regular settlement. These settlement patterns also change temporally. People make settlement choices based on many factors such as quality of land, being close to families, regional centres, politically and religiously important places and distances to trade routes and marketplaces. GIS are designed to specifically analyse these structures in a number of ways and this project showcases a subset of these.

Having mentioned earlier that the landscape is the “stage” on which human interactions are performed, and to continue the theatre analogy, the geology of an area can be considered to

be the blank stage before dressing. It has been argued that “culture has never existed outside nature” and there is “no such thing as nature unaffected by human activity (Wilson 2011, 2).

Formed often hundreds of millions of years ago, the geology can still have an effect on the settlement choices of people from any period and can be an attractor or repellant to a specific area. Specifically in this example, geological factors are brought to the fore throughout this thesis in the mention of the plain at the centre of Brega, the slope and aspect of the hills, the formation of bogs and others. All of these factors can both constrain and enable settlement practices, route choices and resource exploitation. Using scarps to define ringforts, favouring particular degrees of slope over others, using particular metals and stones found within the geological deposits are all things that can inform us about the people inhabiting the landscape and are directly related to its geological formation. Moore (2006) in his study in Mayo, has discussed how in prehistory slabs of stone were used to define ancient pathways and gold and copper were extracted and those resources attracted people to settle there. In a society in which land suitable for growing crops and cattle was of the highest value, and with no large mountain ranges or bogs to impede travel it is easy to see what attracted people to settle in Brega.

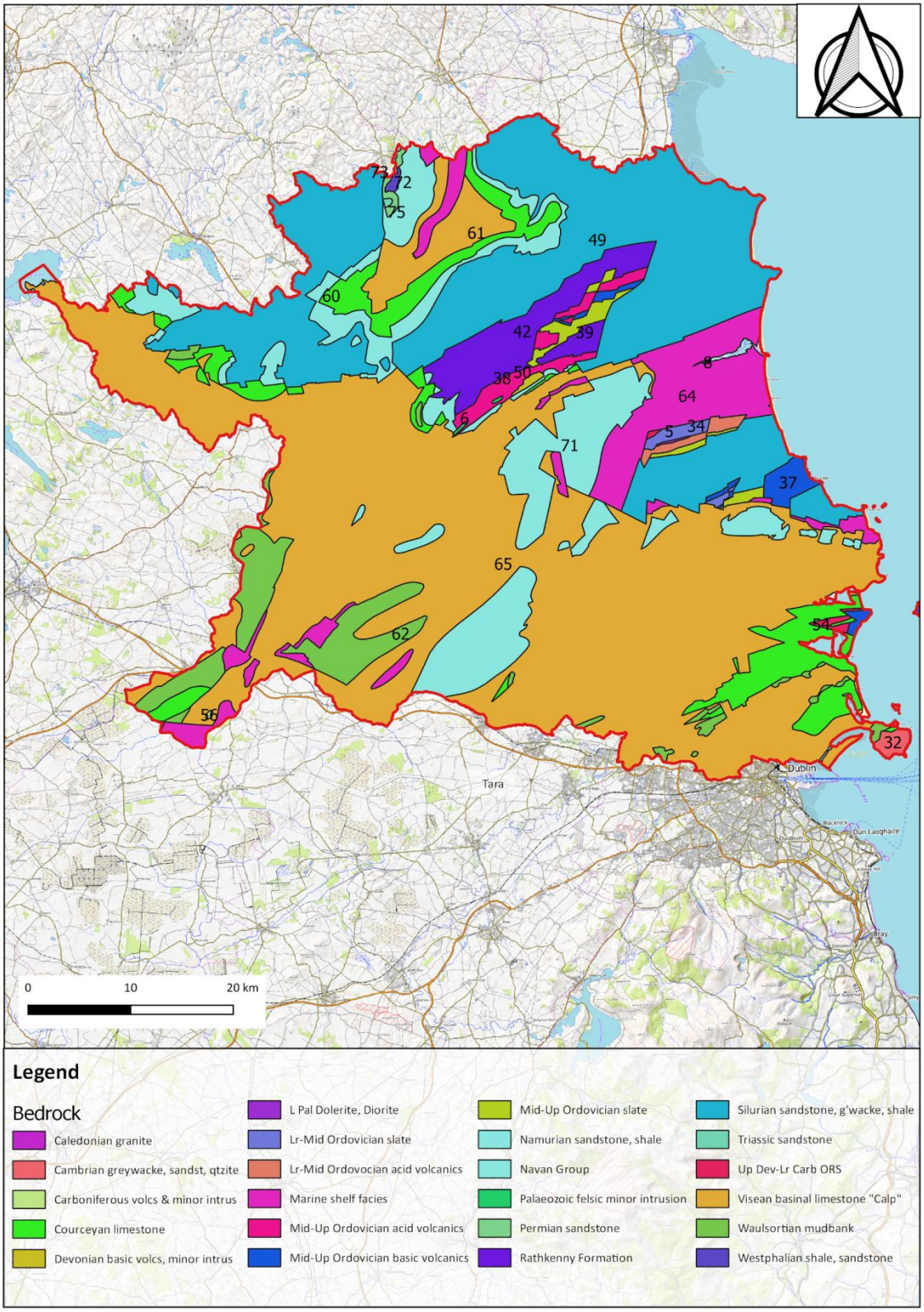


Fig 3.2: Bedrock Geology of Brega (after OSM, GSI with additions)

Brega, mainly made up of County Meath, is a place with “a subtle but distinctive landscape” (Clarke et al. 2007, 4). The ancient bedrock in this area was formed hundreds of millions of

years ago. This bedrock “stems from a time when Ireland was made up of two main ‘halves’” (Clarke et al. 2007, 16), “which were originally separated by an ocean that geologists call Iapetus” (Geoschol 2015). The area on which Brega sits forms “part of the great limestone field of Ireland” (Library Ireland 2015). This limestone is a Lower Carboniferous rock type and forms the bulk of the bedrock in the area. The Quaternary period saw glacial sediment deposition as the retreating ice sheets moved towards the sea. As the ice withdrew, it left behind a layer of gravel, clay and sand (also called glacial till) and finally formed the geological character of the area, leaving behind the “shallow well drained mineral soils which occur throughout the region” (Eastern & Midlands Waste Region 2015). The retreating glaciers were not the only factor in the formation of the geological landscape. This coupled with erosion from the extensive river catchments in the area created disparate formations throughout the region. In fact, it has been suggested by Newman (2005, 366) that “the rivers of central Meath impose the primary order on this landscape”.

The five main geological topographic divisions of Meath as described by Finch et al. (1983, 3) are as follows:

1) Silurian shale hills and surrounding lowlands:

   This is an area defined by a group of low gentle ridges, rarely rising above 250 meters. Specifically, these are the ridges at Slieve na Calliagh and the two north of the Boyne and in the Bellewstown area, both of which are oriented east/west. These ridges are moderately sloped, with steeper slopes rarely found. These gentle slopes give excellent drainage and in addition to the brown podzolic and brown earth soils create first-rate conditions for farming. Lower down towards the valleys however, the soil is less well drained and so of a lower quality.

2) Drumlin region:

Drumlins are long rounded or oval shaped hills and are usually quite narrow. The drumlin belt here is to the north of Kells and south of Kilmainhamwood. Due to their nature these drumlins are also moderately sloped and rarely rise above 250 meters. The drumlins are formed from two main types of rock – limestone and shale. The limestone drumlins allow good drainage for the soil, which again enables good farming while the shale does not have the same drainage characteristics. This in turn means some sections of soil are ill drained. Some of these drumlins extend into the Dee valley and the drainage this provides again creates good farming soil in these areas.

3) Limestone lowland with Namurian and Silurian shale hills

This region runs east of the river Boyne and as the name suggests contains elements of a plain and also the shale hills. Grey brown podzolic and gleys dominate the soil in the lower regions, while the upland areas are also mainly grey brown podzolics. There are also areas of brown earth where the till is lighter than in other areas.

4) Limestone lowland with Carboniferous shale ("Calp") influence

Calp is a “black muddy limestone” (Geoschol 2015) and it is from Calp that Christchurch cathedral was built. There are pervasive deposits of carboniferous shale within the region also. These shales may have come from Scotland as the glaciers moved down the Irish Sea or may have been left in glacial deposits after the surrounding limestone had been eroded away. As in the earlier sections, the soils are mainly grey brown podzolics with gley in the lower lying areas.

5. Limestone lowland with dead ice features

This type of topography is found in both the northwest and southwest of the region. It contains “dead ice” features such as kame and kettle topography. A kame “is one mound in a low-lying terrain of many hummocks, terraces, ridges and hollows” and “are amongst the most varied landforms resulting from deposition by glacial meltwater”. (Landforms.eu 2015)

Kettles are formed “by the melting of large chunks of ice below the surface” and manifest as depressions in the soil. (Arcticuoguelph.ca 2015) Coupled together, they form the “kame and kettle” topography of this region. Unlike the other areas in the region the soils are often shallow and conglomerated and there are some eskers, even though most of the area is actually lowland. As in the other areas however, grey brown podzolic soils are also found.

3.4 Soils

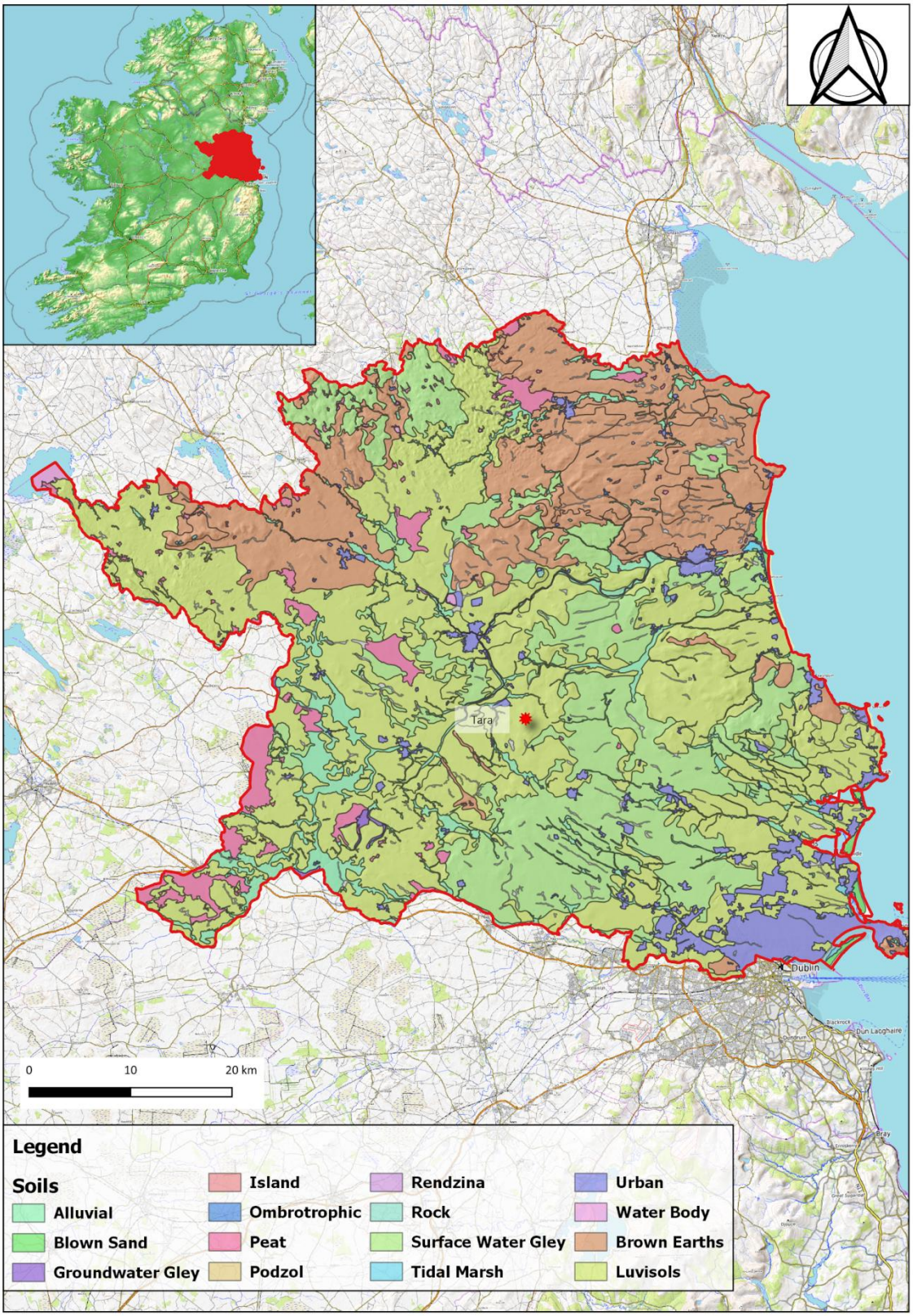


Fig 3.3: Brega Soils (after OSM, Teagasc with additions)

Soils are immensely important in the study of archaeology, both for the influence they had on the landscape at the time and as a repository for the material remains we study today. They

have influence over a number of factors related to farming, including the type of crops and animal husbandry and how well these crops grew, which contributed to the economic state of the farmer, neighbourhood and region. Brega is mainly made up of good quality soils which were a major contributing factor to its economic prominence, which in turn engendered the kingdom being coveted by other tribes. This section is not intended to be an exhaustive review of the soils of Brega and their uses, but rather an introduction to one of the major factors that contributed to the economy of Brega.

Table 3.1: Areas and percentages of different soil types

Soil Type	Area (Sq. Kms.)	% of Overall Area
Luvisol	1763.11	33.68
Brown Earth	1020.43	19.49
Peat	902.13	17.23
Surface Water Gley	897.29	17.14
Urban	304.12	5.80
River Alluvium	273.39	5.22
Water Bodies	24.99	0.47
Groundwater Gley	14.68	0.32
Blown Sand	11.02	0.21
Podzol	5.57	0.10
Tidal Marsh	5.43	0.10
Island	3.02	0.06
Lake Alluvium	2.59	0.05
Rendzina	2.52	0.05
Rock	2.3	0.04
Marine Alluvium	1.85	0.03

The breakdown of soils in Brega can be seen in Table 3.1. Finch et al. (1983, 67) state that approximately 77 % of the soil coverage in County Meath falls into category A and B which are designated as grassland cultivation, showing that the majority of the land in the area is suitable for high quality farming. Figure 3.4 shows that the underlying limestone and low lying nature of the topography and soil formations combine to form the four major soil types of Brega, the luvisol, brown earth, peat and surface water gleys, that make the area so suitable for

farming.

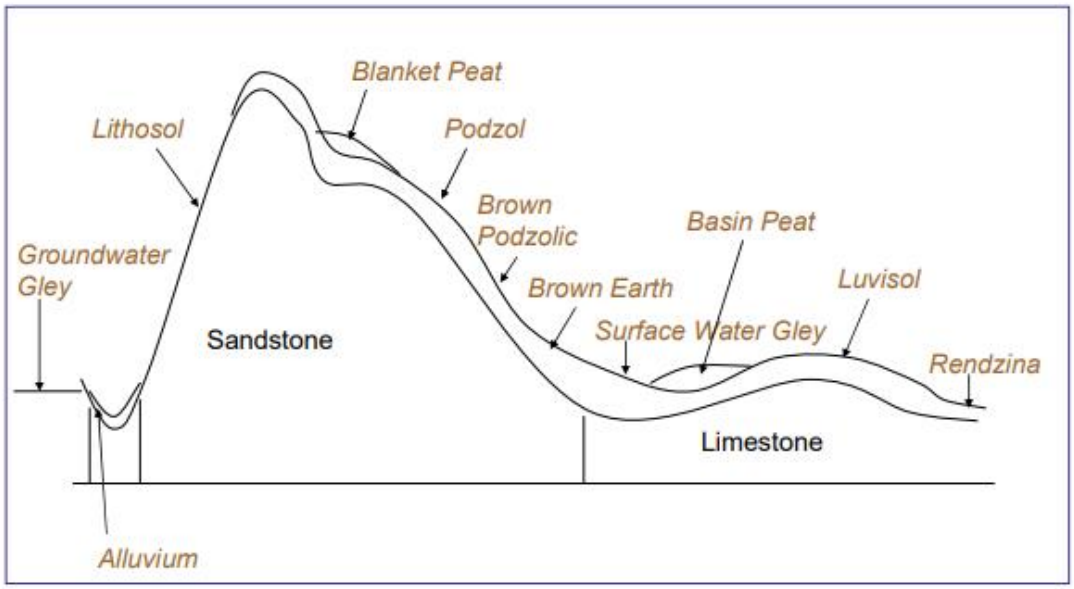


Fig 3.4: Soil groups across a landscape. (after EPA Strive Program)

A short description of each of the main soil types follows:

Luvisols are generally used for a wide range of agriculture, having a large clay element and generally formed by being eroded and washed down to lower levels. They have good drainage and a high nutrient content, and they are porous and well aerated. In flatter areas they are generally used to grow grains and fodder and in more sloped areas they are used for orchards or grazing.

Brown earth soils are mature, well-structured soils with a good, uniform profile. They are well drained, mineral based soils. They have a medium, friable texture and make excellent, high quality, low maintenance grass or tillage land, although they “are sometimes liable to drought” (Little & Bolger 1993, 192). These soils are formed from calcareous, compact, stony till, composed almost completely of limestone (Gardiner and Radford 1980).

Grey brown podzolics which make up a very small percentage of the area have a strong influence from the parent constituent, which in this case is limestone. This is more a “middle class” soil – heavier than the brown earth but not as heavy as the gley soils. The drainage properties of these soils are moderate to good and again are “middle class” when it comes to use, as they are suitable for most types of farming, although they need more management than brown earth soils.

Gley soils are of a much lower quality than the three above. The main problem with these types of soil is that they are quite heavy and sticky and they do not drain very well. This stickiness and bad drainage also means this soil is hard to cultivate and takes far more management than the ones above. It also means that growth starts later than the other soils in the spring, as they take longer to become less waterlogged. They have a weak structure which means they are more open to damage from livestock. The hooves of animals can compress the ground quite badly and also leave quite deep depressions which then fill with water and drain very slowly. This also retards the growth of grass and can lead to sickness in the animals. These soils can be used with a lot of management, but where they do quite well is as a forestry soil. The wetness in the soil allows most types of trees to flourish. The two types of gley soil present in Brega only make up about 17.5 % of the total area.

One other point to note is the “Urban” designation. As these models are modern constructs, a certain amount, 5.8 % in this case, of the land has now been built on and is made up of urban areas. It is impossible to tell with any degree of certainty what soil types are underneath these urban areas and in what mixtures, but the association has been included

anyway, recognising the fact that most ringforts that would have been in these areas have probably been destroyed and built on.

So, recognising the different soil types the question is whether early medieval people built their settlements with regards to the type of soil? And if so, were there differences in the soil types built on in relation to the status of the ringfort?

Table 3.2: Number of ringforts in relation to their underlying soils

Soil Type	No of Univallate ringforts	%	No of Bivallate ringforts	%	No of Trivallate ringforts	%
Luvisol	148	43.4	46	51.1	7	46.7
Brown Earth	90	26.4	26	28.9	1	6.7
Peat	7	2.05				
Surface Water Gley	85	24.9	13	14.4	7	46.7
Urban			1	1.1		
River Alluvium	8	2.3	3	3.3		
Water Bodies	1	0.29				
Groundwater Gley						
Blown Sand						

Podzol						
Tidal Marsh						
Island						
Lake Alluvium						
Rendzina						
Rock	2		1			
Marine Alluvium						

Table 3.2 highlights some interesting points. As would be expected almost all of the ringforts are built on a small number of soil types, as these types make up most of the land coverage. Trivallate ringforts are particularly interesting. Almost half (47.7%) are built on surface water gley soils, which are quite wet and sticky and not good for farming. Added to this almost 20% of Brega is covered by Brown earth, which is excellent soil for farming, but only 6.7% (1 ringfort) is built on this type of soil. Admittedly, the small sample size of 15 trivallate ringforts detracts from the statistics, but it is still an indicator that the primary purpose of trivallate ringforts was not crop production. The gley soils are also not very suited to pasture land as when wet it indents very badly from animal hooves. These indents then fill with water which doesn't drain away and so damages the soil and over time leaves it unusable for grass growth. These factors coupled together would lead to the idea that these high status ringforts were used for a purpose other than farming and this will be discussed in more detail in chapter 5.

Peat soils accounted for 17.23% of the area, and yet hardly anyone built on them, only 7 ringforts out of a total of 494. Initially it could be thought that this was because people did not want to build on wet ground, but then the table shows that approximately 105 ringforts (21.25%) were built on gley soils which are also quite wet. Whether this was due to peat areas being used for fuel is debatable. Fergus Kelly (2000, 396) tells us that in the 7th and 8th century law texts there are few entries in relation to turf cutting. The entries which do mention it are ambiguous. However, there are some references to be found, and also a reference in the annals to a king of Connacht being killed for stealing turf. It is also possible that the bogs were the property of the *fine* and used for fuel and that's why no one built there. In general, peat and bogs preserve material very well and it is interesting that so few sites have been found.

3.5 Conclusion

In summary, one of the key points made here is that people chose not to build their dwellings on land of the highest quality. It is quite possible that, recognising the significance of this land, both for its economic value and its crop/grass production value, that people didn't want to "waste" land of this distinction by building their dwellings on it, when land of lower value would suffice.

This chapter started by dividing Brega into two broad categories - the physical landscape and the social, cultural and political landscapes of the kingdom. The settlement and communications mentioned in chapters 5 and 6 were not immediately grafted onto a pristine physical landscape. They were mingled and meshed with an existing landscape rich in heritage and memories of ancestors, material remains in the form of prehistoric monuments and existing settlements, political and social constructs and economic wealth and potential in the form of high quality agricultural land.

This physical landscape was the space in which the social, cultural and political mores of this society were enacted. The annexing of Brega and domination of its indigenous peoples

caused discord within and without the kingdom. Movement of peoples into and out of an area can help to force structure on the landscape as sites are abandoned and sites are built and sites are reoccupied - all as the result of social, political and economic decisions and all resulting in material culture, which can be exploited today to inform us about the kingdom and its people. This chapter has “dressed” the stage, ready for the examination of settlement and communication and transport in chapters 5 and 6.

Chapter 4: Frontiers and Boundaries of Early Medieval Brega

4.1 Introduction

Early medieval frontiers and boundaries were interesting phenomena, often being places where dramatic things happened. They still are today. One can think for example of how 'Checkpoint Charlie' in Berlin during the Cold War came to symbolise the competing hegemonies of the Soviet Union and NATO/USA. In early medieval Ireland, one of the responsibilities of the king of a *túath* was the negotiation of treaties and agreements with neighbouring *túatha*, or the leading of military hostings or raids across territorial boundaries. The edge of the *túath* could be the place where royal residences were located to enable projection of power into neighbouring territories. Lords with military responsibilities had their forts at *túath* boundaries and *fertae* or burial mounds were often situated at boundaries. For ordinary folk, people who travelled outside their own *túath* had diminished legal protections, so crossing the boundary was not a thing to be done without consideration. Early medieval *túath* boundaries continually changed over time with the waning and waxing fortunes of different polities, and the complexities of regional or island-wide politics.

4.2 The Early Medieval Politics of Brega

The region examined here was also subject to politics and conflict from the outset of the early medieval period. One of the primary early Irish dynasties, the Southern Ui Néill were in a phase of aggressive expansion at approximately the beginning of the 5th century and their Síl nÁeda Sláine branch moved to settle in Brega, possibly in the Slane area. Although this has not been confirmed, Ó Corrráin (1971b, 99) advocates that the whole area "was an important centre of Úi Néill activity". The "whole area" suggested by Ó Corráin includes Mide – the other main over-kingdom of the midlands which was controlled by the Clann Chólmáin, another Southern Ui Néill dynasty which expanded from Connaught.

One of the reasons they chose to stay here has been suggested by Gleeson (2013) that "they were seeking to achieve a monopoly on the kingship of Tara", in other words the high

kingship of Ireland. Another possibility may be a more ephemeral one. Bhreathnach (1996, 71) has proposed that Brega was “presumed to have been ritually significant to those kings of Tara untouched by Christianity”. Could this have been one element of the Southern Úi Néill drive into this area? The dominance of significant passage tombs in the area would most definitely have been compelling for pagans in the region.

For a dynasty with such close ecclesiastical links as Síl nÁeda Sláine, it is possible that Christianising the high kingship may have been a factor – admittedly a minor one however or maybe even just an unintended consequence, although it must be remembered that Christianity was spreading through the country at a strong rate. While settlement at these prehistoric sites is undoubtedly significant, new centres of power and trade emerged within the kingdom. High status sites such as those at Moynagh Lough, Lagore and Knowth grew in prominence and importance throughout the period.

Indeed, while religion may have played a part, it is argued here that the annexation of Brega was due to a grasp for economic and political power. It is rare, even today, for political power to be attained without money, and in early medieval Ireland, money meant the products of the land, both cattle and crops. Brega encompassed some of the most fertile, abundant land in the country. The fruits of this meant a landowner, and by extension his *derbfine* could generate more goods to disperse to clients, which in turn meant the increase in his own wealth and status and increased his and his families reputation. This increase in power and reputation was enhanced even further by controlling the main trade routes in the country, explored more in chapter 6, and the control of the importation and distribution of prestige goods.

It must be remembered that the Síl nÁeda Sláine and the Clann Cholmáin who gained control of Mide*,* were not trying to surreptitiously settle in the area. Indeed this would have been difficult as Áed Sláine was the son of Diarmait Mac Cearbaill “who had been ordained, by God’s will, as the ruler of all Ireland” (Anderson and Anderson 1961, 8) and descended

from Niall of the Nine Hostages. This was not a stealthy encroachment into lands which were not theirs. These were powerful dynasties who were unstinting in their belief that they were entitled to take and hold this land, which until now had mainly been controlled by the Lagain of Leinster. In a society which was strictly hierarchical and governed by a strong corpus of laws this was problematical, as annexation of land belonging to other peoples “was not provided for in the law tracts” (Richter 1983, 35). While the law tracts as we understand them may have been an “overly schematic, idealised version of Irish society” (Gerriets 1984, 325), it did still create conflict.

The Lagain resisted this intrusion strongly and this contributed to many battles between the differing polities which in turn meant that the boundaries of Brega were constantly in flux and so more difficult to define for the modern archaeologist or historian. Once the Lagain were vanquished however, that was not the end of the matter as Síl nÁeda Sláine claimed hegemony over Brega. Battles were fought throughout this period with the Clann Cholmáin, Anglo-Saxons and the Vikings, until eventually the Síl nÁeda Sláine lost their dominance over this area and were gradually subsumed into the Clann Cholmáin kingdom of Mide in the later part of the period. This gradual incorporation of Brega into Mide was completed by the middle of the 11th century “when the kings of Mide begin to be called kings of Temair” (Mainistrech & MacNeill 1913, 38) heretofore mainly a title pertaining to the kings of Brega.

It has been suggested (Gleeson, 2013a) that the reign of Aéd Sláine was ignominious. This point is debatable and while arguably true on a personal level, MacCotter (2014, 204) disagrees to an extent, advocating that “several dynasties, some of which held the high kingship, descend from him”. These dynasties within Brega were the Uí Chonaig and the Uí Charnaig. There is an element of confusion here as the Uí Chonaig were variously kings of Brega, Knowth and Ciannachta and were descended from Congal mac Áeda. What makes the differentiation difficult is that the title *rí Brega* was used for the regional kingdom as well as the local one and it can sometimes be difficult to ascertain which one is being referenced. The Uí Charnaig styled themselves *rí Loch Gabor* and *rí Deisceirt Breg* and were directly

descended from Aéd's son Diarmuit. They also held the overlordship of Déisi Breg although MacCotter (2014, 206) tells us "they lost the overlordship…to the kingdom of Dublin". As well as siring dynasties, it must be remembered that Aéd Sláine reigned as high king of Ireland from AD 598 until his death in AD 604 and enjoyed suzerainty of Brega, particularly in the seventh century and Áed's son Congal was titled the first King of Brega.

The success of Aéd Sláine and his descendants waxed in the early part of the period and waned thereafter. Paul Walsh (1940, 509) states that "eight descendants of Áed Sláine, common ancestor to the kings of Brega, are shown to have been kings of Ireland", after which their fortunes deteriorated as Byrne (1973, 87) suggests that "after the death of Cináed mac Írgalaig in AD 728 all the high-kings of the Southern Ui Néill come from the Clann Chólmáin". Eogan (1990) also agrees with this and states that "the high-kingship of Tara was by no means the undisputed prerogative of the local ruler of Brega and after the early eighth century was never (with a sole exception provided by Congalach mac Maelmithig) held by him". This must have created political difficulties within Brega by having Clann Cholmáin kings exerting their power inside the kingdom of Brega. Having started the period as kings of Brega and high kings of Ireland, the descendants of Aéd Sláine lost their hold on the high kingship, and were eventually drawn into Mide, an ignominious end to their rule indeed.

So while it would seem the Southern Ui Néill achieved their aim of claiming their share of the high kingship, it changed dynasties and came mainly in the form of a Clann Cholmáin ruler. Just being king however did not remove all obstacles and Richter (2005, 35) suggests that "circumstances in Ireland made conversion of sovereignty into territorial control very difficult". The numerous battles fought in the area are testament to how difficult it really was. This internecine conflict – a "bitter rivalry" (Bhreathnach 2014, 46) occurred within Brega as well as external battles with the Lagain and later on the Vikings. This internal strife culminated in the battle of *Imlech Pich* in AD 688. This battle took place somewhere around Emlagh bog near Teltown and resulted in the kingdom being split into North and South Brega. After this

battle both kingdoms had periods where their power developed and deteriorated, but in general northern Brega fared better after the split.

The regular battles and shifts in power mentioned above also add to the difficulties in defining boundaries, as it meant that borders were in a constant state of transition. While there were four main population groups in the area – the Ciannachta, Gailenga, Saitne and the Luigne there were also tributary peoples such as the Déisi Breg and the Fir Cúl Breg and even intrusive groups like the Uí mac Uais Breg and the Mugdorna Breg from the Airgalla clan. Paul Walsh (1940) examined the twelfth century *Lebor na Cert*, the Book of Rights, for entries relating to County Meath. He lists two groups – one of free kingdoms and one of tributary kingdoms. These have been listed below and mapped in figure 4.1.

Free kingdoms:

- Brega: Barony of Skreen
- Laegaire: Barony of Navan
- Ardgal: Barony of Lune
- Fir Thethba: Area north of the river Inny
- Caille Fhallamain: Killallon, Co. Meath

Tributary Kingdoms:

- Mag Lacha: Barony of Moyfenringfort
- Ui Beccon: Barony of Fore
- Delbna Bel: Barony of Fore
- Dessi Breg: Area around Lagore crannog
- Ciannacht: Barony of Duleek
- Luigne: Barony of Lune
- Fir Arda: Barony of Ferrard around the Collon area.
- Saitne: Barony of Balrothery
- Gailenga: Barony of Morgallion

These are also added to by Edel Bhreathnach (2005a)

- Gailenga Becca: Centred on Navan.
- Gailenga Móra: North of the Boyne in the barony of Morgallion
- Ciannachta: Bhreatnach (2005a) adds the barony of Ferrard to Duleek above.
- Déisi Breg: Barony of Ratoath and Lower Deece
- Fir Cul Breg: Centered around Oristown
- Uí mac Uais Breg: Barony of Moyfenrath
- Mugdorna Breg: Barony of Moyfenrath

It is noteworthy that the Brega in this list is the minor kingdom, but Brega was also the term used for the over kingdom at different times.

Fig 4.1: Baronial population groups (after OSM, EU_DEM with additions)

Northern Brega became the more powerful and important of the two kingdoms although there is still a high level of uncertainty as to where its original royal settlement was. Evidence from

the dynastic name tends to point towards this being Slane, but what is known with more certainty is that by the 7th century it had moved to the impressive site at *Rath Airthir*. The royal site of Southern Brega was established at Lagore Crannog. While the crannog had been in use before this period Hencken et al. (1950, 3) suggest that "historical documents place it 'as the seat of local kings between 785 and 969' and references to the 'island of Lagore' leave no room for doubt that the crannog was their residence". It could be argued that this internal disunity left the Síl nÁeda Sláine weakened and more open to annexation by their Clann Cholmáin relatives and that although they battled mightily, the sundering of their resources was a significant factor in their eventually losing their dominance in the area.

4.3 Investigating the role of boundaries in early medieval Brega

Brega was in a state of flux throughout its history, with the Úi Neill annexing that part of the country and then the arrival of the Vikings and later the Anglo-Normans. This means that while current data is available it does not always match very well with historical data. In the initial phases of this project it was important to define a boundary for the kingdom, however the study of boundary lines has been generally underdeveloped (Curta 2005; Fitzpatrick & Hennessy 2017; Mullin 2011). The sources of boundary data for Brega are often clouded and sometimes even contradictory making this a difficult task. This chapter sets out to examine some of the available datasets and explore their strengths and weaknesses in a study of this kind, as well as examining the specific boundaries of Brega.

The data used to delineate the boundaries of the kingdom forced a choice: use an official Irish government dataset from one of the many portals, or the OpenStreetMap dataset, and the OpenStreetMap dataset was chosen, as it is a better fit with the historical data available and this is explored in more detail below. In a spatial data set, where almost all processes are carried out within the borders of the kingdom, defining the border as tightly as possible is a key issue and as we see, not one without challenges. It is only by using these datasets to

try to answer real world questions that we can gauge their suitability for use in archaeological analysis and identify areas for which they are most appropriate.

The next stage was the historical research into identifying which baronies made up the kingdom of Brega and should actually be incorporated into the analysis. This is an essential step as, just like the borders of the kingdom itself, the outline of the barony boundaries are used in a geoprocessing task akin to a “cookie” cutter with which to strip relevant data from larger, island wide datasets. However even the use of the baronies to make up the kingdom is not without its caveats. One area of issue is linking the Anglo-Norman administrative divisions to the early medieval ones. This thesis will use the barony boundaries for division of the kingdom overall based on existing work by leading scholars in the field including Edel Bhreathnach (2004, 2005a, 2005b) and Paul MacCotter (2014, 40) who suggests that “a consistent theme running throughout the history of the Anglo-Norman invasion and settlement is the establishment of the colonial feudal structures upon pre-existing indigenous models”. This builds upon the work of Binchy (1941) who also suggested this was the case with evidence taken from written sources. The Anglo-Normans also reformed the parish structure (MacCotter 2019), showing further imposition of their will on the existing native boundary placements, but these have not been used in this thesis. The primary reason for using the barony boundaries is MacCotters’ (2014) argument that barony boundaries in Ireland were closely related to the existing *túath* system, and this argument is generally well accepted.

The Anglo-Normans charted the formation of land ownership and records were generally well kept and it is within these baronial boundaries in which different familial groupings will be placed. Other datasets could have been chosen such as the townlands or the parishes mentioned above, but it was decided that the barony boundaries afforded the best blend of scale and detail. Unfortunately the level of detailed records normally kept by the Anglo-Normans seems to have been absent for the Meath area (MacCotter 2014) which adds to the

difficulties here. As barony boundaries followed this form in many other areas throughout the country however, it is likely that it can be extrapolated here also. Preceding the arrival of the Anglo-Normans, Irish people used many different methods of demarcating boundaries, and section 4.1 explores the use of *ferta* as boundary markers.

Table 4.1 below shows the internal baronies which are generally thought to make up the kingdom of Brega. However, the baronies which make up the kingdom are not always mapped and defined in the same way, depending on which data source is used, clouding the situation further. The table shows both the formation of these political units from the EPA and other Irish government websites and also the formation from the Open Street Map (OSM) data. The differences in these datasets are contrasted in more detail later in this chapter, but in general the OSM data is the one preferred for boundary formation within the GIS. This enables this project to mesh more cohesively with other Irish archaeological projects such as the Mapping Death project which also uses the OSM data.

As can be seen, while all the baronies of Meath are included, Brega did extend into south Louth and north Dublin also, but only the specific baronies which make up Brega are included here. This makes a total of 26 baronies in the EPA dataset and 25 in the OSM dataset.

Table 4.1: Barony names and counties in which they are situated which make up the early medieval kingdom of Brega

County	Barony Name EPA	Barony Name Open Street Map
Meath	Navan Upper	Navan Upper
Meath	Slane Upper	Slane Upper
Fingal	Balrothery East	Balrothery East
Fingal	Balrothery West	Balrothery West
Fingal	Castleknock	Castleknock
Fingal	Coolock	Coolock
Fingal	Nethercross	Nethercross
Meath	Ferrard	Ferrard
Meath	Dunboyne	Dunboyne
Meath/Louth	Duleek Lower	Duleek Lower
Meath	Fore	Fore
Meath	Deece Lower	Deece Lower
Meath	Kells Lower	Kells Lower
Meath	Moyfenrath Lower	Moyfenrath Lower
Meath	Navan Lower	Navan Lower
Meath	Slane Lower	Slane Lower
Meath	Lune	Lune
Meath	Morgallion	Morgallion
Meath	Ratoath	Ratoath
Meath	Skreen	Skreen
Meath	Deece Upper	Deece Upper
Meath	Duleek Upper	Duleek Upper
Meath	Kells Upper	Kells Upper
Meath	Moyfenrath Upper	Moyfenrath Upper
Louth	Ardee	Ardee
Louth	Drogheda	N/A

The exact make up and positioning of these barony boundaries can be of major importance in a project of this type. Due to the use of the kingdom boundary lines to extract data from other data sets, such as the number of ringforts in the kingdom, the difference between boundary sets can skew the numbers quite substantially. In this case the EPA lists a barony of Drogheda. This boundary line has been moved in the OSM data and the town of Drogheda is now in the barony of Ferrard and the barony of Drogheda does not exist. The barony of Fore, while being included in the EPA data, is actually made up of two baronies in the OSM data set. One of which is in Meath and one of which is in Westmeath.

However, the location of the territory of *Cúl Breg* as put forward by Bhreathnach (2005b, 410) suggests that the barony of Fore contained in Meath creates the *cúl* (nook, corner) of the people known as the *Fir Chúl Breg*. This would preclude the Westmeath barony of Fore as the “nook” would then cease to exist and this can be seen in figure 4.2. Due to this the Westmeath barony of Fore has not been included inside the boundaries of Brega.

Figure 4.2: Showing *Cúl Breg* and also the difference in EPA and OSM datasets (After Bing, OSM and EPA)

There are some minor and some major differences in the EPA and OSM datasets. Figure 4.2 above shows one of the minor ones. The purple line shows the outline of the barony in the OSM dataset and the blue one the EPA data. The OSM data is quite obviously bigger, but the majority of the extra space is actually Lough Sheelin, and this line tries to conform to the county boundary. This can create an issue in regard to a process such as calculating the number of ringforts per square kilometre, as if the OSM data is used the figure will be smaller, even though the extra area is made up of water. Another instance, and far more important one in the context of this study is the northern boundary line. Figure 4.3 shows the difference between the OSM (Pink) and EPA(Blue) barony lines, with the EPA line extending far further northwards. The OSM line follows the same line as the river Glyde from the EPA dataset which is just visible on the map, and it is generally accepted that this line was the northern boundary of Brega (Bhreathnach 2005a, 412).

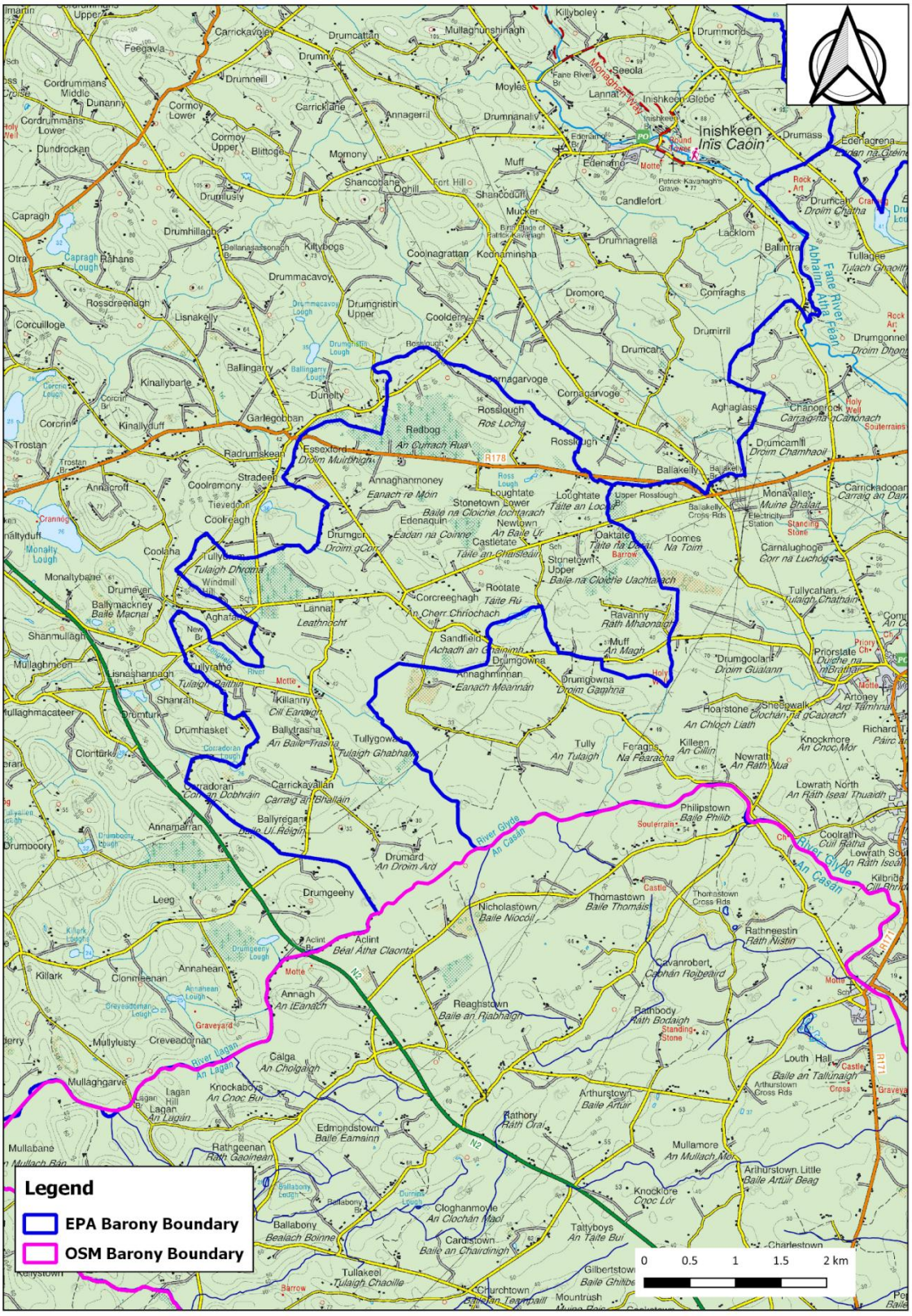


Figure 4.3: Difference in northern boundary between the EPA and OSM (after OSI, EPA and OSM)

The next major boundary difference between the EPA and OSM dataset is Castleknock barony which is plotted on the map in figure 4.4.

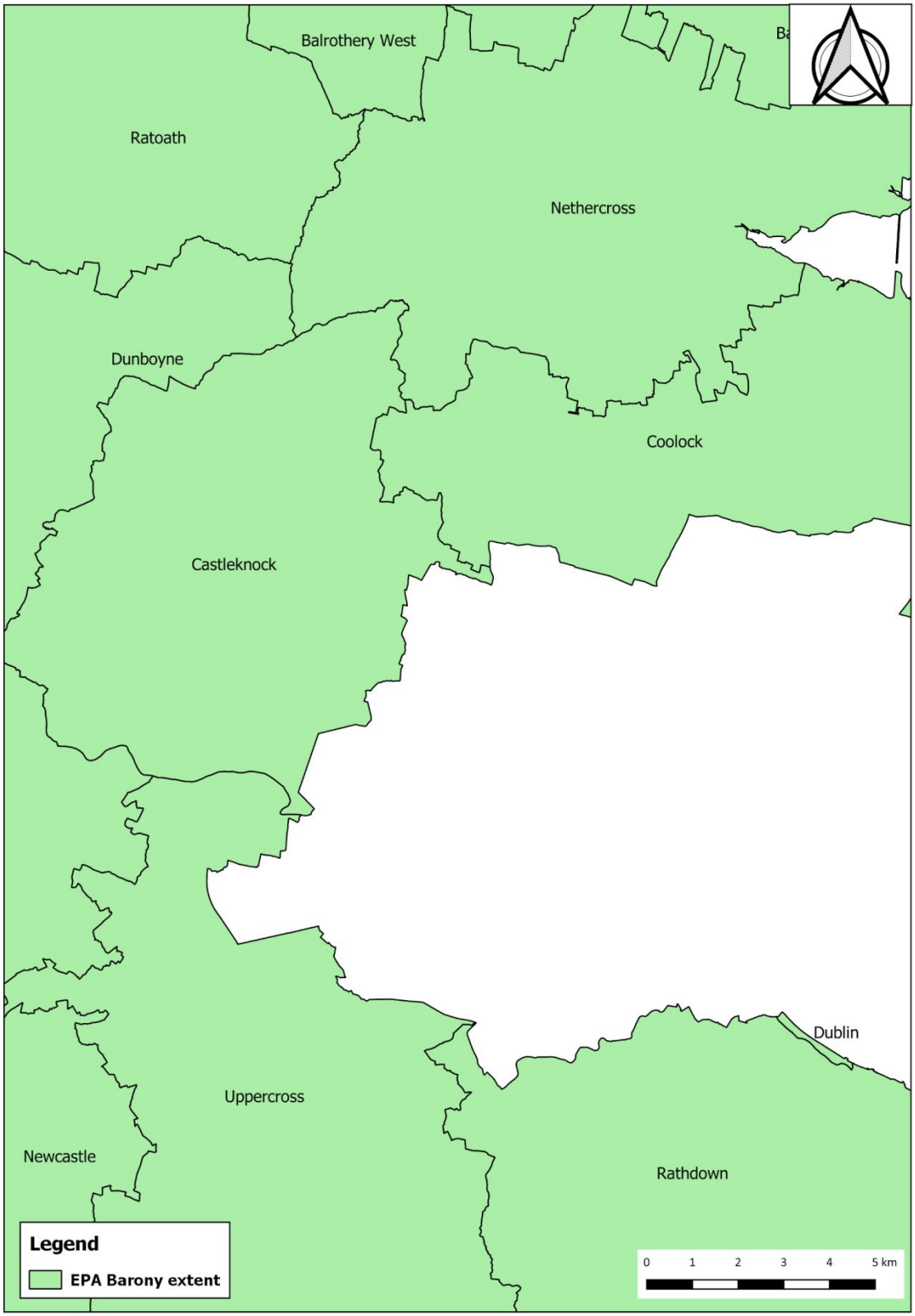


Figure 4.4: EPA Boundaries of the barony of Castleknock (after EPA)

This data has been downloaded from the EPA website and also cross-checked with other Irish governmental GIS download portals and they match with each other. As can be seen, adjacent to the baronies of Castleknock and Coolock there is a large white space which actually has no polygonal value and is not plotted as a polygon along with the rest of the layer, and we will look at Castleknock in more detail as a small case study. Figure 4.5 below shows the underlying area which is missing from the original EPA download by displaying the OSI 1:50,000 Discovery Series mapping under the EPA layer.

This shows that the missing space is actually a large part of Dublin city. To compound the issue, it would seem intuitive that the missing section, which covers most of Dublin, would be the barony of Dublin. However, there is a barony of Dublin within the dataset, and when this is plotted it corresponds to a very small sliver of coastline stretching from Trimleston Avenue in Booterstown to Blackrock shown and outlined in pink in Figure 4.6.

Figure 4.5: Showing underlying basemap for missing polygon (after OSI)

Figure 4.6: Barony of Dublin (After OSI with addition)

When all of the baronies included in the dataset for County Dublin, made up of the different county council areas of Fingal and South Dublin county council are plotted and outlined, they appear as in figure 4.7, and the white space is still showing.

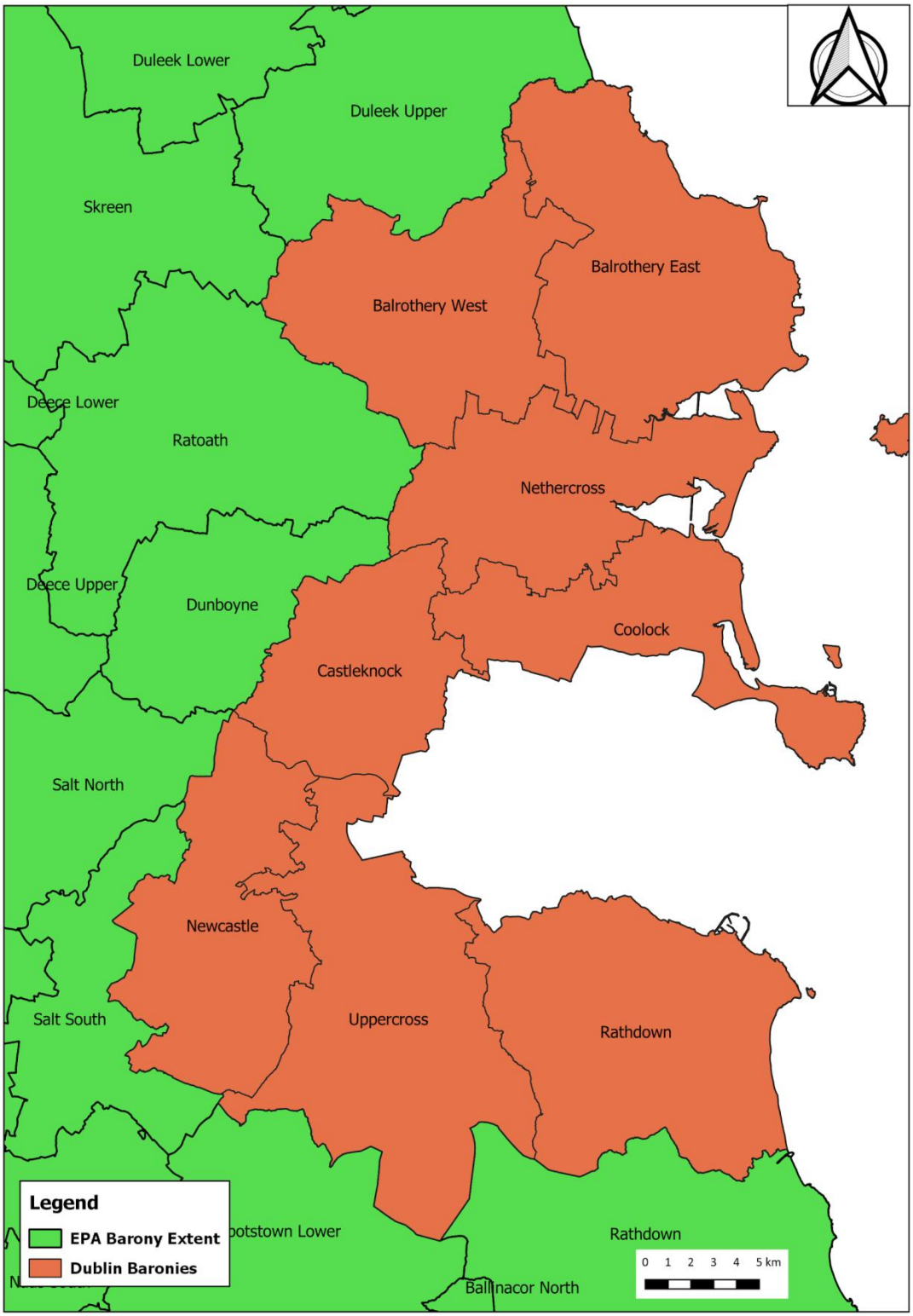


Figure 4.7: Outlines of Dublin baronies (after EPA)

While the barony of Castleknock does not cover all of the white space, it does stretch further than the western EPA boundary. This becomes a problem in this specific project as we will see in section 4.4 in relation to the reuse of ancestral graves, where *ferta* are plotted and

used within the GIS. The geographic coordinates of these sites were taken from the excellent "Mapping Death" project, and when they are plotted, they result in a *ferta* from Pelletstown in the barony of Castleknock actually being plotted outside the barony boundary as shown in figure 4.8.

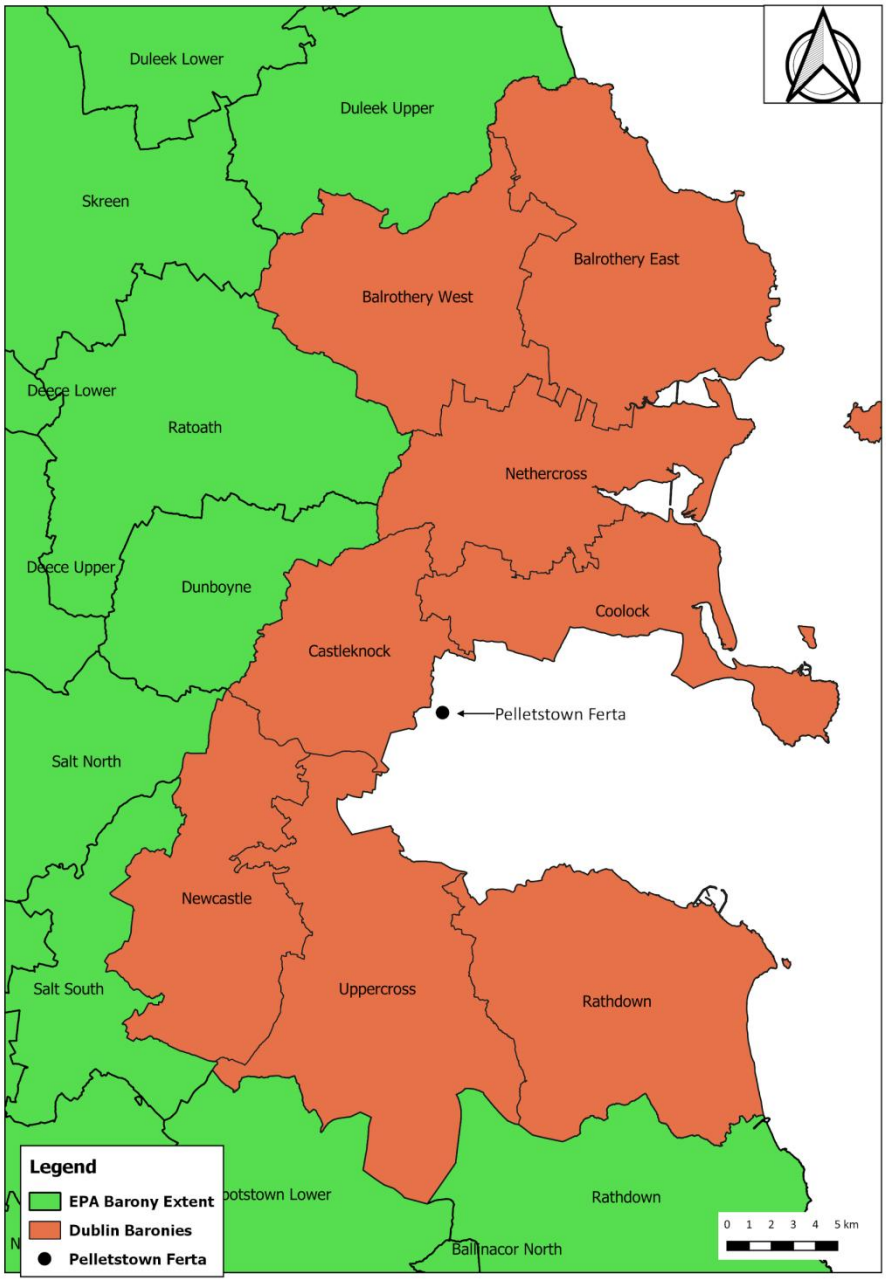


Figure 4.8: Pelletstown Ferta showing outside the barony of Castleknock (after EPA with additions)

This issue arises in part from the Mapping Death project using the OpenStreetMap dataset in their research. The Open Street map data has a much different boundary to the EPA data as shown in figure 4.9. This is a substantial area, just over 66 square kilometers, or just over 2%

of the total size of the kingdom as plotted here. This is a considerable figure, and would make a noticeable difference in figures such as density per square kilometre.

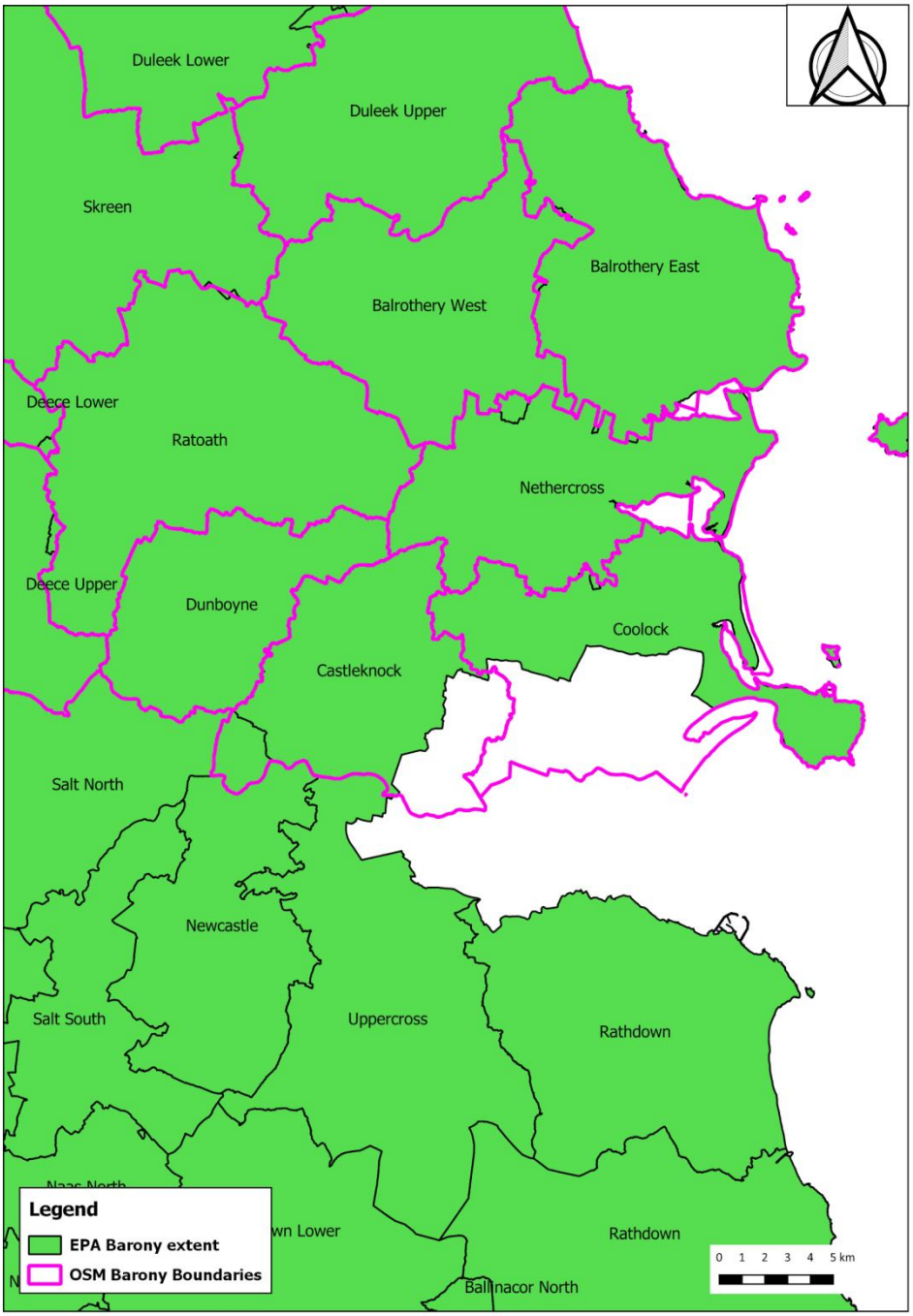


Figure 4.9: OSM versus EPA showing boundaries of the baronies of Castleknock and Coolock (after OSM and EPA).

This boundary includes all of the Phoenix Park and moves on down to Coolmine, which places Pelletstown ferta well inside it and by extension inside the boundaries of Brega. The

decision as to which dataset to use is complicated by the fact that the EPA dataset is an official Irish government dataset, whereas the OpenStreetMap dataset is an unofficial set which has been compiled by qualified members of the public. At the time of writing (March 2021) the website states that over 3,400 people have contributed to the data, thereby raising questions as to its accuracy. Having said this it would seem that the process is very tightly controlled, and membership has to be applied for and accepted. Other academically stringent projects such as Mapping Death have no hesitation using this data and due to this, it is deemed acceptable for use in this project.

These issues also highlight an ongoing problem within GIS and the old computer adage of “garbage in, garbage out”. Having stated on a number of occasions how advantageous a tool GIS can be in archaeological research, it is also a tool which must be used judiciously, and care must be taken to check the accuracy of data. Simply downloading GIS data and assuming their veracity is not enough, they must be researched thoroughly and meshed with existing archaeological and historical knowledge to form a valid argument. In this case, the difference in area between the datasets shows that the EPA data has an area of approximately 3228 sq. kms and the OSM data is larger at 3506 sq. kms, a difference of c. 276 sq. kms. This is quite a substantial area and could skew results in later sections of this project which is the reason it is highlighted here and also one of the reasons this project has used the OSM data. There were also issues found in the data on the Historic Environment Viewer such as missing coordinates for ringforts, which again can skew analysis, and records without coordinates were stripped out in advance as part of the data cleaning process.

As mentioned earlier boundary lines were constantly changing and evolving through time so while any historical or archaeological boundary can be mapped, it must be regarded as only a “snapshot” in time. These boundaries form the basis on which many of the GIS processes

are carried out, which makes accuracy insofar as possible to be immensely crucial, but they bear the forewarning that there will be slight imperfections when examined at different scales and time periods. With the decisions discussed above in mind the kingdom boundary can be plotted as seen in figure 4.10. While this boundary has been seen in earlier figures, it is still important to see how it was achieved.

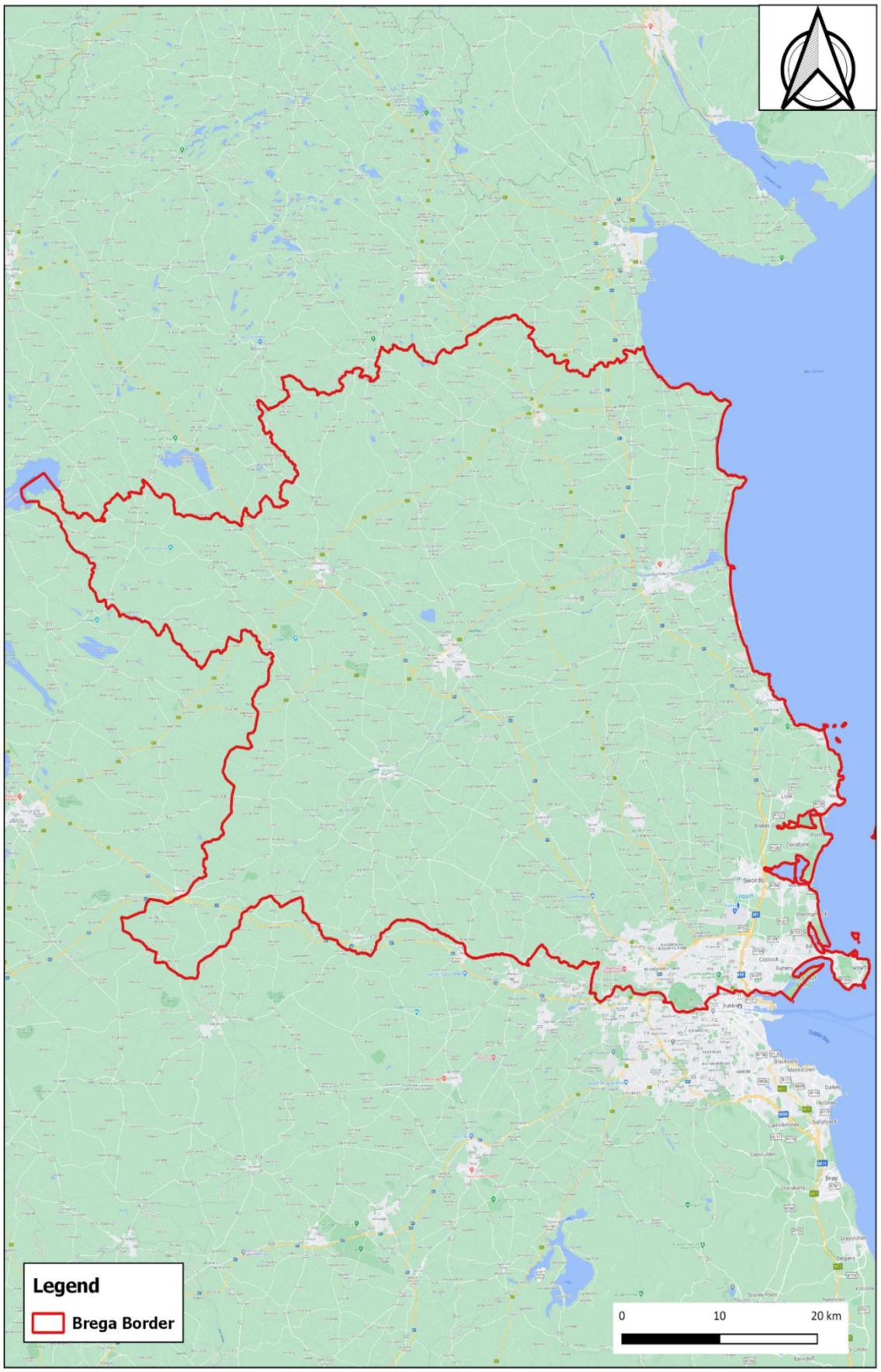


Figure 4.10: Brega Boundary (after OSI with addition)

In a world in which Google Maps, Google Earth and car satellite navigation systems are pervasive, there can be a tendency to forget a time when mapping was not so easy, and that borders and boundaries had to be marked in many different ways. Any marker is ineffectual by definition however, if it does not differentiate one place from another and many different types of boundary markers were used in the period. Often boundaries were topographical such as rivers and streams, but this was not always the case. Some of these non-topographical markers could possibly have demarcated some of the boundaries of Brega and presented a tangible as well as optical presence in the landscape (Higuchi, 1989). One particular type of monument with a strong presence in the landscape was the ancestral grave or *ferta* and their use as boundary markers is discussed below. These are analysed from the perspective of their visibility in the landscape, and as such their ability to demarcate territory, what has been described as “a showground for social negotiation” (Rebay-Salisbury 2012, 24).

4.4 Ferta as boundary markers

The use of *fertae* as a boundary marker is explicit in the law tracts. It has been argued by many (Charles-Edwards 1976; Kelly 2015, 186-187; O’Brien 2003, 67; 2009, 142-143; O’Brien & Bhreathnach 2011) that between the fifth and early eighth century, Irish people buried selected, high-ranking members of society in and around prehistoric monuments. These monuments, called *ferta*, were regarded as burial places of the ancestors. These *fertae* were a crucial element of Irish laws of land possession called *tellach*. This was a practice whereby a person could retake land which they were entitled to but was currently occupied by someone else. A formal procedure was in place for this, but one element was that the rightful owner “must cross the boundary mound (*ferta*) of the holding to which he is laying claim” (for the full procedure see Kelly 2015, 186-187). These burial mounds, together with upright ogham stones represent part of an ersatz boundary which conglomerate with the topographical boundaries to make an extensive network of both explicit and implicit boundary markers. The reuse of ancestral graves and the idea of “persistence of place” (Dubos 1972) is a common anthropological theme and can be found in many different parts of the world

including Britain during the same period (Brookes 2007a, 149-150). Lin (2015) suggests that persistence of place is still a theme in use in the modern day, and many societies continue to use and reuse places due to their historical context even though more efficient places are feasible. In fact, attachment to particular places is a factor in many different disciplines, stretching from archaeology to folklore, psychology, tourism, architecture and sociology amongst others (Altman & Low 1992).

A *ferta* is an ancestral burial place, usually a mound, which D.A. Binchy (1955, 83) has argued, based on linguistic evidence, as dating to the pre-Christian period due to the use of the term *fert* or *ferta* "as opposed to the Christian terms *relic*, *rúam*". It is a measure of how important these boundaries and the territory they encompassed were that people were willing to use the remains of their ancestors to mark them. How people bury their relatives is a core tenet of any belief system, and not something undertaken frivolously. Binford (1972, 226) believes that monumental burials such as these "vary directly with the relative rank" of the person being interred. That people have been concerned with these ideas since time immemorial is undisputed, the megalithic passage tombs of Ireland and elsewhere stand mute testimony to this fact. Boundary *ferta* were intended to be visible in the landscape precisely to demarcate territory, the difficulty we have today is in trying to decipher what that territory was and why people chose to mark it in this way.

Placing people in highly visible graves was not a new concept and Cooney (1997, 8) suggested that even during the time of the great passage tomb tradition "people attached great importance to the idea of visibility from a distance". Peatfield (2013, 481) has also argued that this is not even solely an Irish phenomenon and that there is a "pattern of similarities in the phenomenology of 'high places' and shrines across cultures". It was likely that the visibility of these graves in the landscape coupled with their importance to the groups who owned the territory, made them particularly suitable as boundary markers.

Reuse of existing burial places was a strongly established tradition in Ireland and Mount (2013, 184) has advocated that there are "53 megalithic tombs, mounds and cairns in Ireland

that are known to have been reused for burial in the early Bronze Age". Moving through the ages there have been strong arguments that "in the Irish Iron Age several prehistoric monuments, including Tara, were reused for the insertion of cremated burial". (O'Brien 1990, 37; 1992, 130-1; 1999a, 26-7; 1999b, 57-58; 2003, 63-65; 2009, 136; 2013, 240; McGarry 2013, 234). With this wealth of evidence, it is hardly surprising that these strong traditions continued throughout the early medieval era and deep into the later part of the period. Williams (1998) and O'Brien (2003) argue that in Britain and Ireland prehistoric sites and landscapes have been reoccupied during historic periods on an impressive scale, what O'Sullivan et al. (2014, 300) contends is an "active use of the past by early medieval people to link their dead in different ways with powerful stories of previous eras". Again, this was not just an Irish phenomenon and evidence of this can be found throughout Britain (Fleming 2016), North Western Europe (Petts 2011; Van de Noort 1993) and beyond. This is a point offered by Charles-Edwards (1976, 85) where he puts forward the idea that the law tracts seem to support the belief that "the dead do not merely survive but may take an active part in the affairs of the living". Somewhat regular use of *fertae* in boundary disputes in the law tracts mentioned above would seem to bear this out.

More specifically a *fert* "can be a mound, a ring barrow or a circular ditched enclosure" (O'Brien and Bhreathnach 2011, 55). It has been suggested (ibid.) that these *ferta* "when acting as territorial boundary markers, are located in prominent positions overlooking or close to natural boundaries", and this statement is examined in more detail specifically in relation to Brega through some of the processes in the GIS.

The main data source for this section is the INSTAR "Mapping Death" (2016) project, funded by the Heritage Council. This project is an excellent example of how archaeological research can be carried out with a particular objective in mind, but by making the data freely available on an open source platform, it expands the range of uses the data can be put to. The project website enables the download of georeferenced shapefiles for use in a GIS which dovetail seamlessly with most proprietary systems and other FOSS. The project database suggests

there are currently 47 known or suspected ancestral burial mounds with early medieval insertions in Ireland and within this Brega has fifteen, just under a third of the total. It is interesting to note that most of these are within Meath (12) and only one lies in Louth and two in Dublin. Table 4.2 below lists these sites:

Table 4.2: *Ferta* and surrounding Barony names

Name	Barony
Ardsallagh 1	Navan Lower
Ardsallagh 2	Navan Lower
Bettystown (Anchorage)	Duleek Lower
Collierstown	Skreen
Glebe South	Balrothery East
Johnstown	Moyfenrath Lower
Kilmainham	Kells Upper
Knowth	Slane Upper
Ninch 1	Duleek Lower
Ninch 3	Duleek Lower
Pelletstown	Castleknock
Ratoath	Ratoath
Rossnaree	Duleek Lower
Tara (Rath of the Synods)	Skreen
Tullyallen	Ferrard

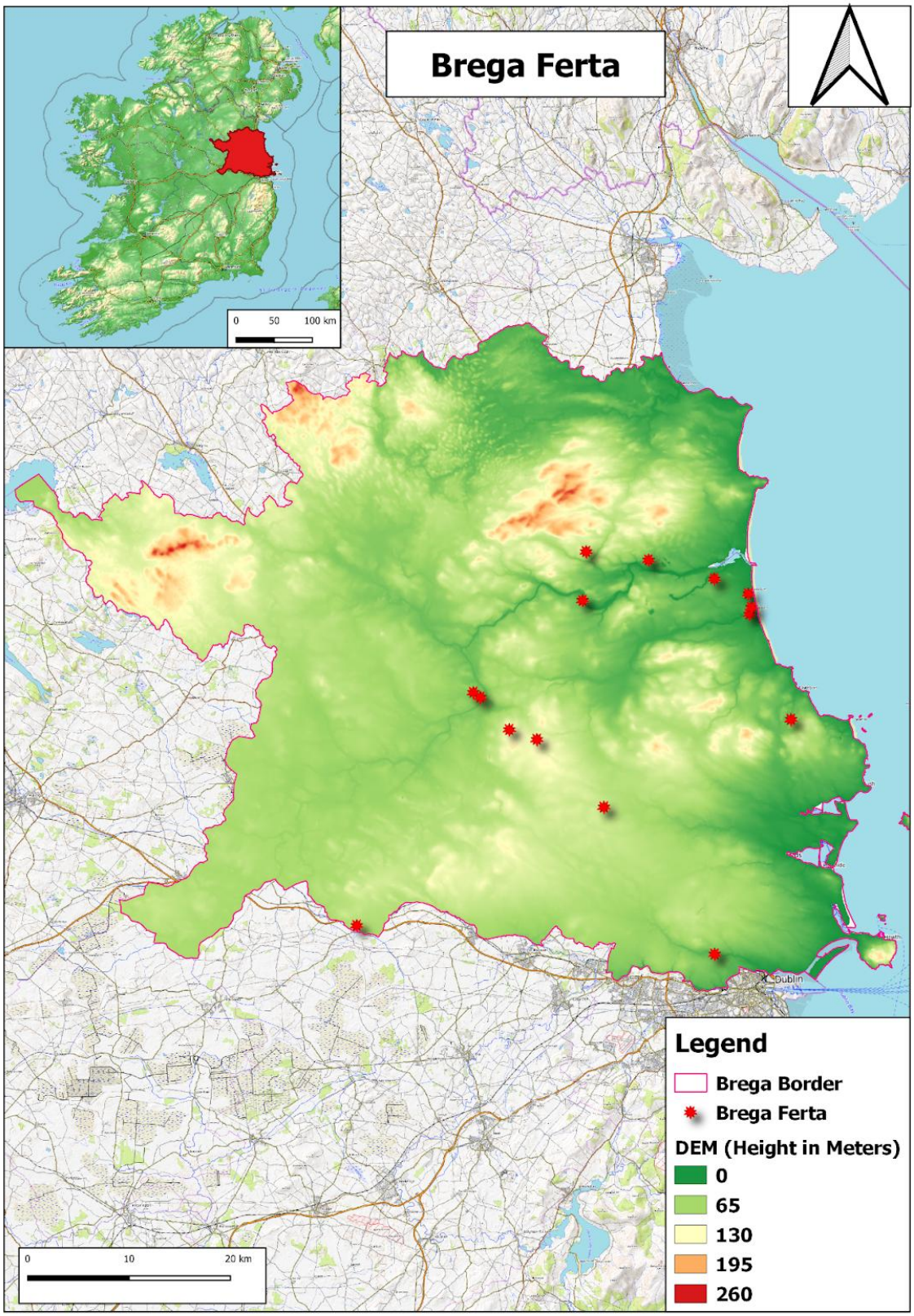


Figure 4.11: Early medieval Brega showing boundary *Ferta* (after OSM and EU-DEM)

Table 4.3 below shows the spread of date of interment for each *ferta*

Table 4.3: Date spread of interment in Brega *Ferta*

Name	Earliest Burial	Early Medieval Burial
Ardsallagh 1	1st to 3rd C	4th – 7th C
Ardsallagh 2	Bronze Age	7th/8th C
Bettystown (Anchorage)	Neolithic	5th/6th C
Collierstown	5th C	9th C
Glebe South	Iron Age	7th C
Johnstown	5th C	9th C
Kilmainham	Neolithic	5th/6th C
Knowth	Iron Age	9th C
Ninch 1	5th C	5th C
Ninch 3	Neolithic	5th/6th C
Pelletstown	5th C	8th C
Ratoath	Iron Age	9th C
Rossnaree	3rd-5th	3rd-5th
Tara (Rath of the Synods)	Bronze Age	9th C
Tullyallen	Bronze Age	Bronze Age

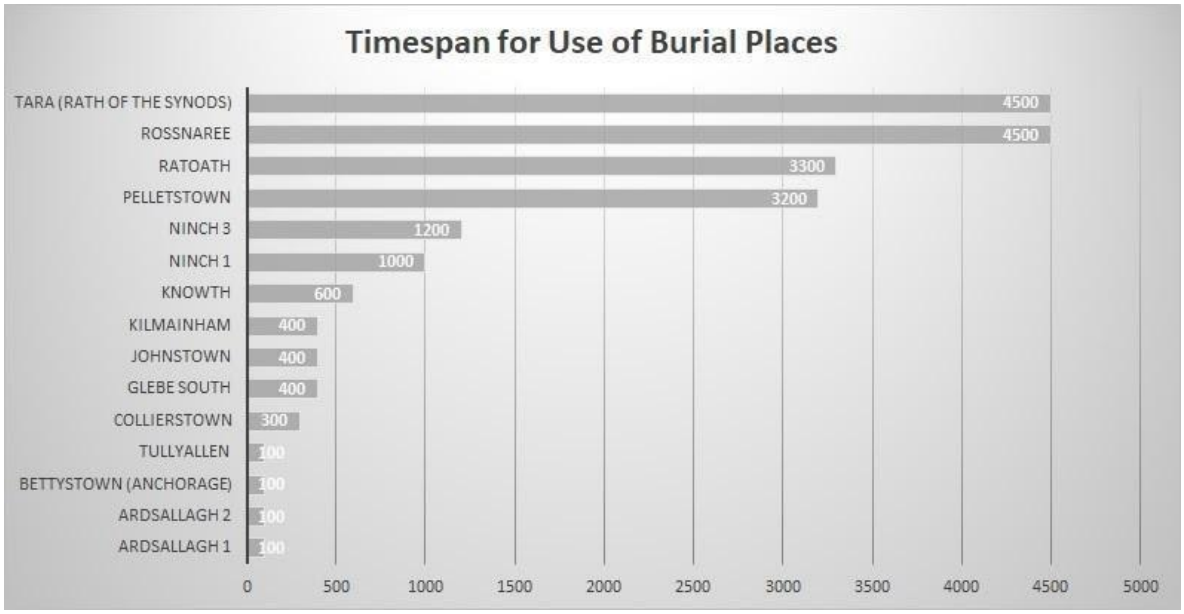


Plate 3: Time Span of Earliest to Latest Burials

Plate 3 is a visual representation of the time elapsed between the earliest interments in these graves and the latest. Exact dates are obviously not available in most of these cases and dates have been roughened to give an idea of the general spread of time.

It is difficult to make a definitive statement about these sites due to the wide spread of dates. Having said this, depending on which dates are chosen from within the spread, there would seem to be two general periods where interment in ancestral graves was most popular during the early medieval period. These could possibly be in the fifth and ninth centuries. 6 out of the 15 *ferta* in Brega had their latest interment date in the fifth century and almost a third (5) are dated to the ninth century. It is also around this time – the fifth to seventh centuries - that there was a lot of population movement in the Brega area with the expansion of the Southern Uí Neill, so it is no surprise that people felt the need to try to delineate their territory, and strengthen their claims on the land (Charles-Edwards 1976; Kelly 2015, 186-187; O'Brien 2003, 67; 2009, 142-143; O'Brien and Bhreathnach 2011). Unfortunately, it is impossible to tell if these interments were the existing people who lived there trying to cement their place, or the encroaching tribes trying to dominate the native population by dominating their ancestors. The ninth century and later also saw a lot of movement with the arrival of the Vikings, and Brega, being a nodal point in the landscape undoubtedly had strong contact

with these incoming peoples, culminating in a battle in AD 902 when the kings of Brega and Leinster defeated the Vikings of Dublin and destroyed their settlement, sending them back to sea. As Scandinavians also used burial mounds at the time, it would be interesting to know if the increase in reinterment in the 9th century was a response to Viking encroachment on lands, and if Irish people of the time realised that these mounds were recognizable to the Vikings and tried to use them as a deterrent, or even if Vikings interred their remains in Irish burial mounds in an attempt to dominate the people they has encroached on. There are no references to this in the historical sources, and only DNA analysis would be likely to provide an answer to this question.

There could be many reasons why people in the early medieval period and especially in the centuries mentioned above chose to bury their dead in ancestral graves. It is possible that these mounds were built, and ancestral remains interred, to both mark territory and venerate ancestors of high status. The reuse of these mounds and the interment of ancestors from the newly arriving peoples could also possibly be an intentional show of domination and subjugation over the existing inhabitants in a highly visible statement of their intention to fully annex their newly acquired lands, and this could have happened between the native Irish as well as the Vikings mentioned above.

Another possible solution is that during times of conflict people chose to bury their dead in ancestral graves in an effort to ensure that they would not be interfered with. This idea would mesh well with the preponderance of interments in the 5th and 9th centuries, a time when outsiders were encroaching on the lands of Brega. There is very little evidence to suggest that Viking raiders interfered with these mounds, even allowing for the fact that their own burial mounds often contained substantial wealth, and so it is possible that the more venerated members of society were placed here to keep them as safe as possible.
These burial places had an important impact on the landscape, carrying their own biographies and familial memories which paralleled the impact of places such as Tara which

“remained a sacred and symbolic landscape through *senchas,* memory and myth” (O’Sullivan & Kinsella 2013, 368). These *ferta* would have their own impact through *senchas*, and while nowhere near the scale of an iconic site such as Tara, would still have created an obvious effect. It must be remembered also that the peoples of early medieval Ireland experienced their landscapes on a predominantly local scale, and movement outside of the *túath,* particularly for people of lower status, was severely limited as mentioned earlier, so dominant features in the landscape such as a *ferta* was high in the consciousness of people living in the region. One of the possible outcomes of the importance of these ancestral graves was that in general people chose not to build dwellings near them. There are currently 494 recorded ringforts in Brega, situated in a kingdom with an area of approximately 3288 km^2. If there was an even spread throughout the kingdom and disallowing for cultural, environmental and topographical factors like slope, distance to water etc., this should mean that there are 0.15 ringforts in every square kilometre of Brega. However, if the burial at the Mound of the Hostages at Tara is disregarded, Tara being a special and sacred case and therefore it can be regarded as an outlier, then the nearest ringfort to a *ferta* is 672 meters away and the furthest is 8980 meters, almost 9 kilometres. The average distance to the nearest ringfort is 3.2 kilometres, so while these monuments were very important in the landscape, they were certainly quite removed from settlements.

Bhreathnach (2005a, 412) has argued that population groups were not necessarily restricted by physical boundaries. This would seem to be the case where natural boundaries such as rivers were often crossed, and battles or political alliances and manoeuvring could reshape territories. Charles-Edwards (1976, 85) also argued that burial on a boundary was a pagan rite and “was defined to defend inherited land from the claims of outsiders”. So in effect burial in *ferta* could have been an effort by a pagan to defend his land against the encroachment of foreign invaders, tribal or otherwise, or from the pervasiveness of Christianity, and ensure that his remains were buried with the remains of his pagan ancestors, thereby avoiding the possibility of being interred with Christians who would avoid pagan burial places. This is not

as outlandish as it might initially seem and *Tirechan* tells us a story about how St. Patrick moved a cross placed in error on a pagan grave to a Christian one (Bieler 1979). While it would be very interesting to know, it is impossible archaeologically to guess how a displaced tribal group would feel having to leave the remains of their ancestors behind, especially knowing that these new “invaders” then interred their own ancestral remains in the graves. What can be said unequivocally is that this would create a major impact in the minds of both parties but Charles Edwards (1976, 265) has suggested that the “burial was thought to repel outsiders not kinsmen”, so the former theory tends to carry more weight.

Bhreathnach (1995) has stated that in the fifth century the Lagain were among the dominant powers in the region and occasionally held the kingship of Tara as did the Ulaid, but by the seventh century the Ui Neill had become dominant. It could be argued that the movement and indeed encroachment of the Ui Neill on the Lagain and Ulaid restarted the traditions of reusing grave sites in the fifth century as mentioned above, and this practice, still being in the minds of people through *senchas*, was returned to with the arrival of the Vikings.

There are a number of possible reasons that these dynasties chose to bury their ancestors in these graves. The first as mentioned earlier could be simply the tradition of reusing graves. However, the prominence of the sites chosen within the landscape could lead to the belief that this process was intended to dominate the Lagain and Ulaid in the area, thereby cementing the claims of the Uí Néill to the land. While this case relates specifically to Brega, similar use of *ferta* in other parts of the country could also relate to internecine strife in those cases also.

Hertz (1907, 176) has suggested that death and burial reflect the relationships between three types of people “the corpse of the deceased, the soul of the deceased, and the remaining society of mourners”. It is argued here that in this specific case of burial in *fertae* there is also

a fourth type of relationship – that between the two groups mentioned above – the new arrivals and the displaced communities. It can only be imagined, albeit without any real evidence as mentioned above, that the second set of interments, unless they were consensual, could cause a great sense of triumph or domination among the incoming groups, and an immense sense of anguish in the people leaving ancestors behind.

The siting of *fertae,* usually in a prominent position on a bluff or overlooking a river would seem to be a critical factor in their construction, however it has been argued that as a single defining factor "elevation is still a poor predictor of visibility" (Kima et al. 2004, 1028). Studies have shown that the topographic location, particularly when sites are placed on peaks and ridges, are generally relatively more visible in relation to the surrounding landscape (Franklin and Ray 1994; Lee 1994; Rana 2003). It has been offered that *ferta* were often built on bluffs overlooking rivers, so a deciding factor on the siting of these graves could have been either the height, the general visibility, or the distance to rivers. As can be seen in Table 4.4 there is no direct correlation between *ferta* heights or their distance to rivers when taken as individual factors, however a combination of height, slope and distance to rivers does coalesce to make them far more visible in the landscape than just taking the height alone.

Viewshed and Observer Point Analysis (OPA) techniques have often been used to explore monument and settlement locations in similar situations to our Brega *ferta*e. (Fraser 1983; Jones 2009; Kvamme 1993; Llobera 2001; Lock and Harris 1996; Maschner 1996; Renfrew 1979; Wheatley 1995; Wheatley & Gillings 2002). Fraser (1983) and Renfrew (1979) particularly paralleled the current argument for burials to dominate sections of the landscape in their studies of Neolithic Orkney through GIS, where they argue strongly that visibility of stone cairns was used to delineate “territories” within the landscape.

Figure 4.12 below uses a cumulative viewshed technique within ArcGIS to show the areas of the landscape visible from the *ferta*.

Table 4.4: *Ferta* heights and distance to rivers

Site	Height (Meters)	Distance to Rivers (Meters)
Ninch 1	5.78	75.98
Bettystown (Anchorage)	6.18	79.9
Ninch 3	13.28	75.98
Rossnaree	15.90	14.48
Pelletstown	30.58	30.58
Tullyallen	35.51	32.51
Glebe South	44.56	44.56
Ardsallagh I	52.04	378.94
Ardsallagh I	54.54	363.43
Knowth	59.92	225.41
Kilmainham	66.38	66.38
Johnstown	75.8	622.77
Ratoath	90.25	315.51
Collierstown	119.8	71.53
Tara	154.70	503.16

Figure 4.13 uses the Observer Points function to show the areas of the landscape in which the *ferta* are visible from. This would seem to be the more important function relative to the current study as it is the area in which each *ferta* could be said to “dominate” the landscape. As usual, thought must be given here to the idea of scale. While a site may be visible within a local area, it might not be visible or as prominent on a broader scale. For example, when

assessing how visible a site may be in the landscape it is useful to consider what has been termed its relative topographic position (Gallant & Wilson 2000). This term refers to how elevated a site is in relation to its local surroundings. So a site that is located in a flat valley bottom may be quite visible to people in the valley, and even more visible to someone on the lip of the valley, but completely invisible to someone only a couple of meters back from a sharp valley edge or the other side of a ridge. OPA helps us to analyse how big an area the site can be seen from, and thereby indicating whether it is intended to hide the site from view or dominate the landscape around it. Also, a site may be considered high on a local scale but be quite low lying on a wider scale (Lindsay et al. 2015).

Having run the viewshed it is clear that there are widely differing values as to how much of the landscape can be seen from each *ferta* and this can be seen in Table 4.5. For example, there is only 3.44 sq. kms. of the landscape visible from the *fert* at Rosnaree while 32 sq. kms. visible from Tara. This would seem to be quite obvious due to the substantial difference in their height despite the caveats mentioned earlier. There also does not seem to be any correlation between the amount of land visible and the number of burials. So while Tara has by far the largest visibility in the landscape, it has a relatively small number of burials. In juxtaposition to this Johnstown has 358 burials but can only be seen from 13.25 kms of the landscape.

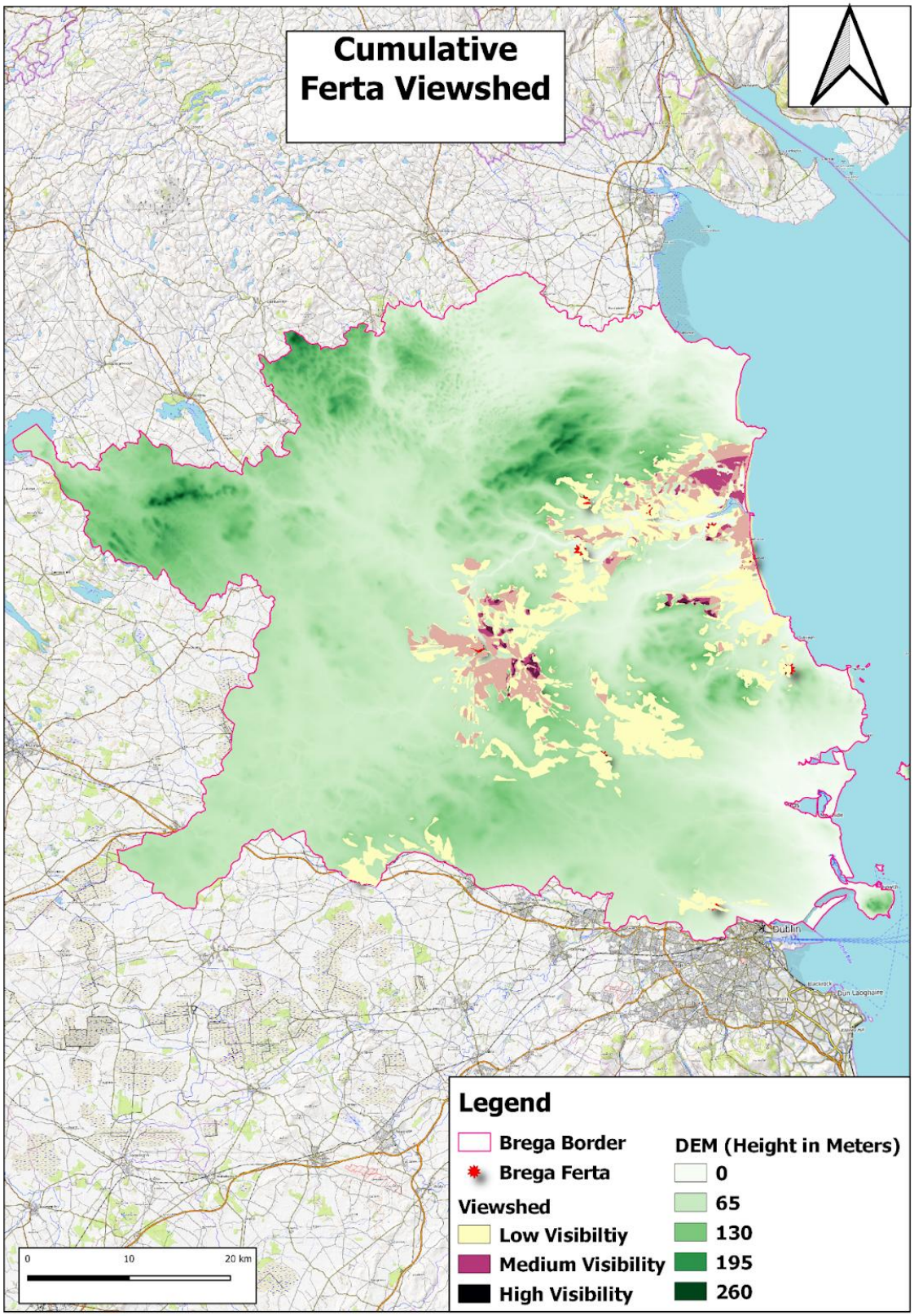


Figure 4.12: Landscape areas visible from one or more *ferta* (after OSM, EU-DEM with additions)

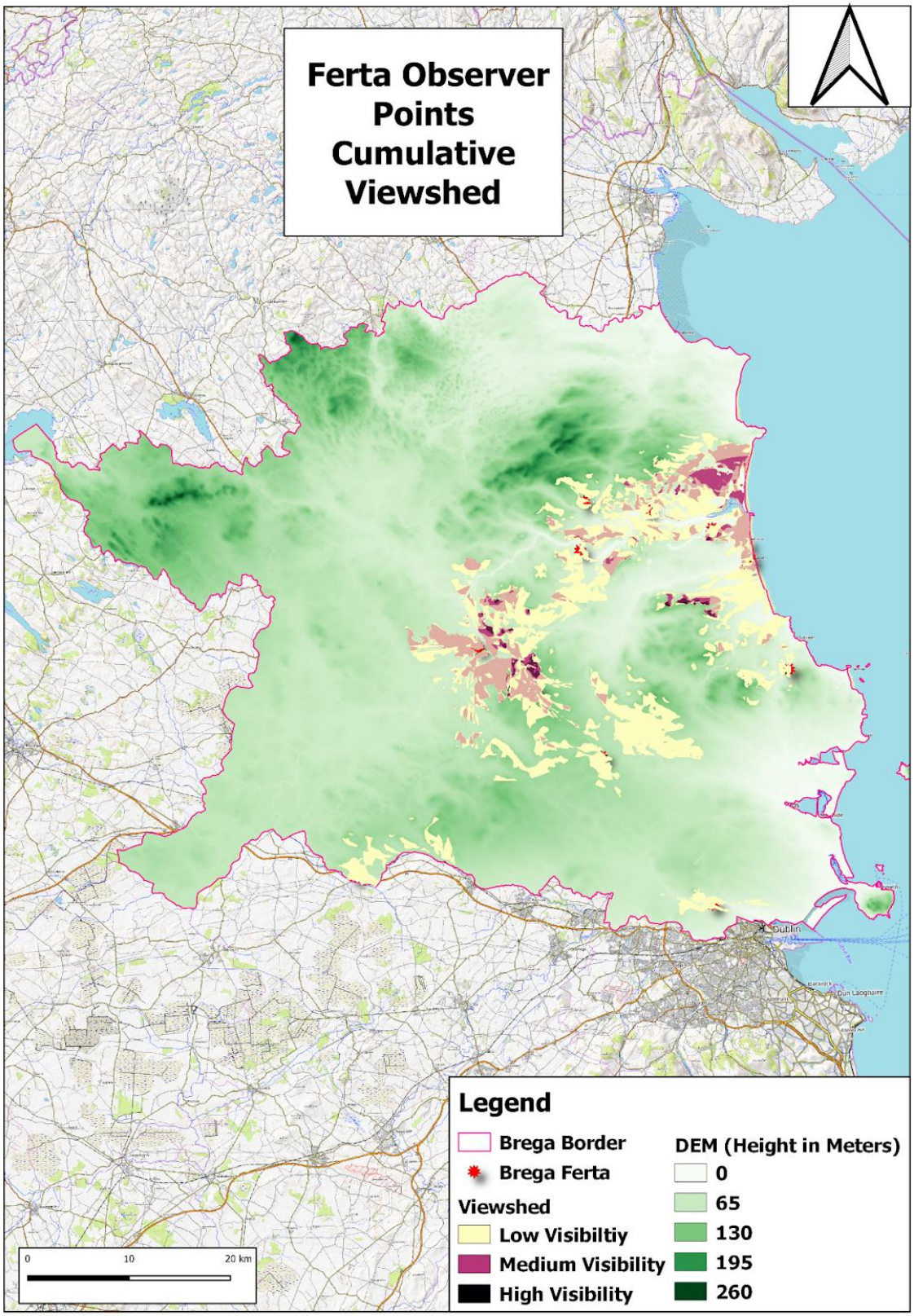


Fig 4.13: Areas from which *ferta* are visible in the landscape (after OSM, EU-DEM with additions)

Table 4.5: Number of burials and visibility per site

Site	Number of Burials	Sq. Kms Viewable	Sq. Kms Observable
Ardsallagh 1	31	45.26	34.61
Ardsallagh 2	1	49.59	32.02
Bettystown	61	51.74	43.56
Collierstown	61+	112.85	71
Johnstown	358	23.63	13.25
Knowth	36+	64.39	58.11
Ninch 1	12	3.58	2.64
Ratoath	57	60.53	45.31
Rosnaree	4	3.34	3.33
Tara	21	321.99	353.05
Tullyallen	7	22.58	22.57
Glebe South	29	7.13	7.03
Pelletstown	4	5.77	5.3
Ninch 3	37	70.83	70.92
Kilmainham	2	77.42	77.19

What table 4.5 does show is that there is no hierarchy between the visibility of these *ferta* in the landscape relative to the number of burials at the site. The question remains as to what boundaries these graves are actually marking. Traditionally thought to be barony markers, Table 4.6 shows the distance from each *ferta* to the nearest current barony boundary. It must be remembered however that these boundaries may have been moved and reshaped over time.

Table 4.6: Distance from Ferta to Barony Border

Site Name	Distance to Barony Border Meters
Ninch 1	0.96
Rossnaree	141.02
Ardsallagh II	354.58
Ardsallagh I	379.84
Johnstown	469.90
Ninch 3	523.15
Bettystown (Anchorage)	529.16
Tullyallen	821.09
Knowth	833.51
Colp West 1	1181.19
Pelletstown	1369.64
Tara (Rath of the Synods)	1543.84
Glebe South	1817.06
Raystown	2657.27
Collierstown 1	3673.99
Ratoath	4281.81

As mentioned earlier, *ferta* were generally built on bluffs overlooking rivers – possibly as a boundary marker or to make them more dominant the landscape. It is argued here that the river itself would be a strong topographical feature with which to mark a boundary and it is possible the *ferta* themselves were directly connected to a kin group or tribe and were

marked in some way to let a traveller know into whose lands they were arriving, unfortunately there is no evidence of this in the literature and it is difficult to ascertain archaeologically.

In relation to the siting of these mounds there is another metric we can use to ascertain if they were built in the optimum area of visibility, called a Terrain Ruggedness Index (TRI). This is an index developed by Riley et al. (1999) to identify the difference in elevation between adjacent cells in a raster and is a technique that has become increasingly commonplace (De Reu et al. 2013; Grohmann & Riccomini 2009; Ilia et al. 2013; Rigol-Sanches et al. 2015; Skentos & Ourania 2017; Tagil & Jeness 2008) and has been used in many different areas of analysis including archaeology (Verhagen & Dragut 2012). While the *ferta* are sited reasonably close to rivers and at the heights seen above – they are not in the optimum place for visibility in their local area as defined by their TRI and this can be seen in figure 4.14, which is a raster map with each cell based on its TRI value.

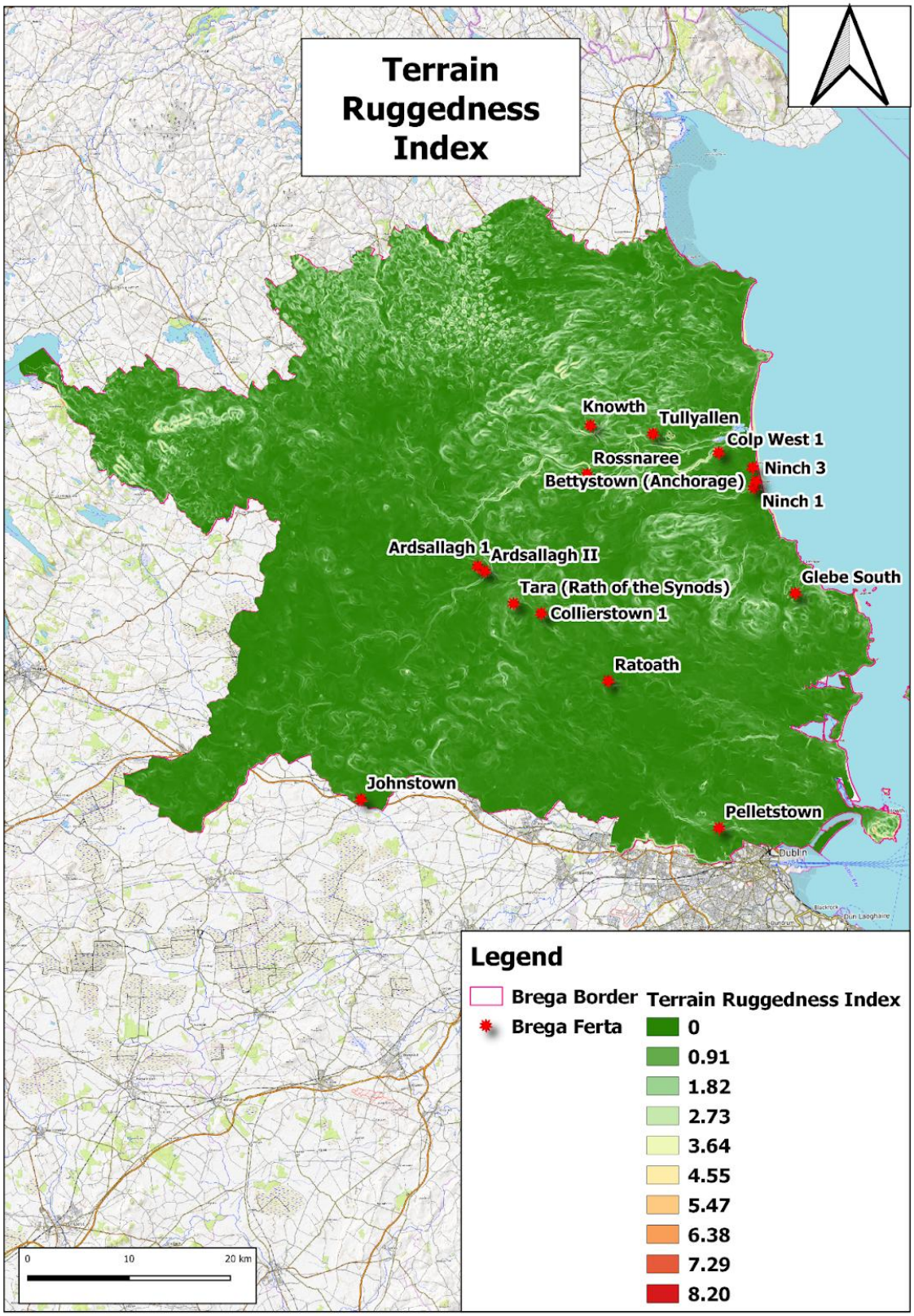


Figure 4.14: *Ferta* overlying Terrain Ruggedness Index raster (after OSM and EU-DEM with additions)

At the scale above it can be hard to identify if the ferta are in the optimum siting. Figure 4.15 below shows that Tullyallen and Colp West 1 are not, and the others continue in this vein.

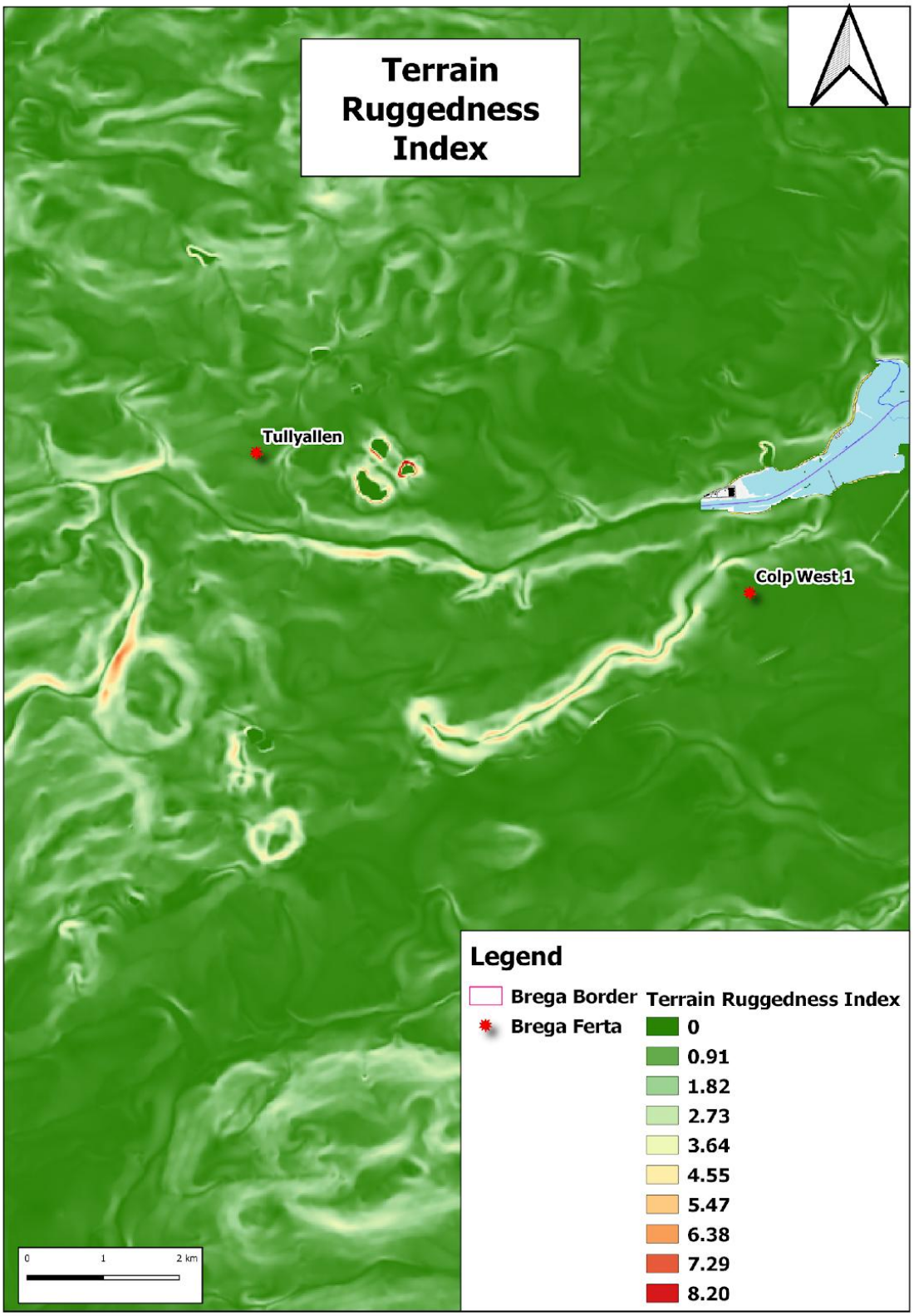


Figure 4.15: Zoomed in section of TRI raster (Figure by Author)

It can be seen from figure 4.15 above that the *ferta* at Tullyallen and Colp West 1 are decidedly not built for maximum impact in the local landscape. The areas in orange and

especially red along the banks of the Boyne have a much higher index than where the *ferta* were actually built. It is unlikely that the people of the time were unaware that these locations would stand out more clearly in the landscape, so this decision must have rested on other factors. Table 4.7 shows the TRI for each *ferta*.

Table 4.7: TRI of each *ferta*

Site Name	Terrain Ruggedness Index
Ratoath	0.091
Ninch 1	0.098
Ardsallagh II	0.108
Bettystown (Anchorage)	0.169
Ninch 3	0.179
Colp West 1	0.212
Tullyallen	0.348
Knowth	0.380
Ardsallagh I	0.383
Pelletstown	0.454
Johnstown	0.495
Collierstown 1	0.916
Glebe South	1.05
Rossnaree	1.42
Tara (Rath of the Synods)	1.54

These are very low numbers, especially when considering that the *ferta* at Tara, which has the highest index, is less than 20% as high as the cells with the highest index of 8.2, and the others are even less than this. This TRI coupled with the quite wide ranging viewsheds and

observer points shown above would seem to indicate that these *ferta* were designed to be external markers, delineating land to people other than the indigenous population, as they were more effective from a distance than they were up close.

4.5 Conclusion

People used many different boundary markers in early medieval Ireland. One of the most prominent, both from a physical and cultural view, was likely to be a ferta. Physically located on bluffs overlooking rivers and viewable from long distances away, people chose to inter and reinter their ancestors in these monuments and use their power and importance to mark their territory.

Marking these boundaries was important due to the shifting political and social situation in Brega. From the influx of the Síl nÁeda Sláine, to the arrival of Anglo-Saxon raiding parties, the Vikings and eventually the Anglo-Normans boundary positions illustrated the fortunes of the controlling polity, and the shift in these boundaries reflect the shift in the predominant powers of the day.

Chapter 5: Settlement in the kingdom of Brega

5.1 Introduction:

Ireland's early medieval settlement archaeology is amongst the richest and best preserved in Europe. There are at least 47,000 known ringforts, 2,000 crannogs and 2,500 church sites, as well as a wide range of other known early medieval dwellings and settlements (Stout 2000, 53; O'Sullivan et al. 2014). Ringforts (including earthen raths and stone-built cashels) are abundantly found in the Irish landscape, preserved down the centuries due to their large earthworks and the traditionally pastoral character of Irish farming (i.e. cattle herding destroys less archaeology than ploughing). Latterly, ringforts were also associated with the fairies in myth and folklore and damage to them was to be avoided and there are many examples of people refusing to damage or demolish them in any way (Hamilton 2015; Fortune 2017). The specific case of ringfort destruction in Brega is explored in section 5.2.1 below.

Although Stout (2000) suggested a figure of 45,000 for the number of ringforts still in existence, an exact total is difficult to ascertain, and changing constantly as finds are made. Totals estimated often vary between 40,000 and 60,000 (O'Sullivan et al 2014, 49), a large increase since Westropp's initial estimation in 1897 of 30,000 ringforts, published in *The Ancient Forts of Ireland*. There was an undoubted period of stagnation in relation to the study of ringforts and particularly into their overall numbers. For example, 85 years later in 1982, Barrett agreed with Westropp's figures and suggested approximately 30,000 ringforts were extant. However, research into ringforts was reignited and *The Irish Ringfort* originally published by Stout in 1997, suggested a figure of around 45,000. 21 years later, even after the almost frantic excavations of the Celtic Tiger boom, some archaeologists are still using this figure (Dowd 2018, 454) even after the publication of the EMAP book (O'Sullivan et al. 2014), which perhaps indicates the inertia that seems to surround the study of early medieval settlement. New research carried out by Susan Curran (2012; 2020a) for her doctoral thesis

uses LiDar to identify hitherto unknown ringforts in the landscape in Leitrim and Roscommon, and is showing that these numbers might be extremely conservative, especially in areas of high density settlement. GIS were created for the collation, analysis and visualisation of exactly these types of large datasets and can bring multiple new tools to the exploration of settlement and some of these tools are applied during this thesis.

These factors increase the difficulty in finding a concrete total number and this is acknowledged by Stout (2000, 53). In fact finding a total number is an impossible task, but what we do have is a substantial and comprehensive dataset which is more than sufficient for most research purposes. Having said this there are limitations and constraints in the data. As with most development-led archaeology, excavations are usually driven by the needs of infrastructure construction rather than pure research, creating an often unavoidable bias in the data. In this specific case, the data is constrained to a large extent in Southern Brega through the assumed destruction or removal of a large number of ringforts due to a combination of factors, such as destruction by the Anglo-Normans, later agricultural practices and urban expansion and this is discussed in more detail later in this chapter.

While possibly initially sparsely populated, Brega had an undoubtedly long history of settlement. That this settlement stretched from the prehistoric and continued into the early medieval period is without doubt, and often individual sites display long biographies of building, alteration, use and eventually abandonment. The sheer scale of prehistoric monuments such as Newgrange, Loughcrew and Fourknocks show what at the time was large-scale settlement in the area.

A settlement site is not a static object. These sites were built, altered, recut, abandoned and passed through many intermediate phases, so even on a site scale the settlement picture was constantly shifting and again we are only taking a snapshot in time. This problem is

exacerbated at a larger scale when whole kingdoms or landscapes are considered. Not all of the settlement sites in this study were built or even existed at the same time. In fact, Mytum (1992, 133–134) suggests that only one sixth of the total were occupied at any one time – which begs the question – which sixth? Unfortunately, temporal data is not available for the majority of settlement sites in Brega which somewhat hamstrings any distributional analysis.

Having said this there are many high-quality excavations which have been carried out in the kingdom and these have dating evidence available such as dendrochronology and radiocarbon dating. These sites enable us to at least gain a flavour of the life cycle of some of the sites as they were constructed, occupied and abandoned. It is hoped that approaching settlement in the same area from several different directions can reduce some of the complexity involved and highlight some of the issues in each approach while at the same time building a composite model of settlement in the area.

The term “ringfort” itself can be quite divisive and it has been suggested that the use of the term should be discontinued (Fitzpatrick 2009; Kinsella 2010; O’Neill 2010). Despite this, the term ringfort still pervades discussion on this issue. It has often been used interchangeably among several monument types including the ringfort, raised ringfort/rath, cashel or caher, *dún* and sometimes even crannog. The latest research produced by O’Sullivan et al. (2014, 47) prefers to use the term settlement enclosures “which were characterised by various types and sizes of enclosing banks, ditches, palisades and stone walls”, while this is undoubtedly a reasonably accurate general term, there does not seem to be a broad acceptance of it or any other generic term across the literature. Describing any type of architecture can lead to difficulties and discussions. In modern times we might define the most popular type of dwelling space a three-bedroom semi-detached house – but does that really sum up the variety of living spaces today? It should come as no surprise then that trying to sum up the totality of settlement in the early medieval period in one or two lines is a difficult task.

Another difficulty in analysing settlement over a large area such as Brega was that settlement itself was a gradual accretion over a long period of time, with many and varied contributing factors, often outside the control of the builders, such as the topography and environmental conditions and other physical factors. So, while we have such an abundance of material remains, it by no means implies that they all existed or were occupied at the same time. Added to this is the ever changing and evolving familial and political situation. All of these factors are complex in themselves and attempting to analyse them in exactly the right balance is a gargantuan task, but the same can be said for archaeology in general. It is important to remember however that these diverse and complex strands will not form an "established, uniform synthesis but various combinations of elements changing both temporally and areally" (McCourt 1971, 129).

While there is debate about the terms and morphology used to describe these settlement enclosures, whether it be ringfort, rath or the more generic settlement enclosure, what cannot be denied is that this type of dwelling was pervasive in the Irish landscape. Juxtaposed to the use of modern technology in the form of the GIS to study Brega, this chapter continues to use the traditional and less cumbersome term ringfort to describe enclosures usually defined by an earthen bank and ditch, and more specific terms for other types of settlement enclosures. Kelly (2000, 363–4) has described a ringfort as a living space called a *les* or *lios,* surrounded by "its principal enclosing feature, which was most commonly a rath - a perimeter earthen bank with an external ditch". The most common type of ringfort in Brega, as well as the rest of the country is the univallate ringfort, accounting for 68.88% of the total number. Next is bivallate ringforts with 18.38% trivallate ringforts at 3.03 % and the quadrivallate ringfort at Tlachtga at 0.2%. The remaining 9.51% are naturally scarped ringforts. The distribution of these is shown in Figure 5.1.

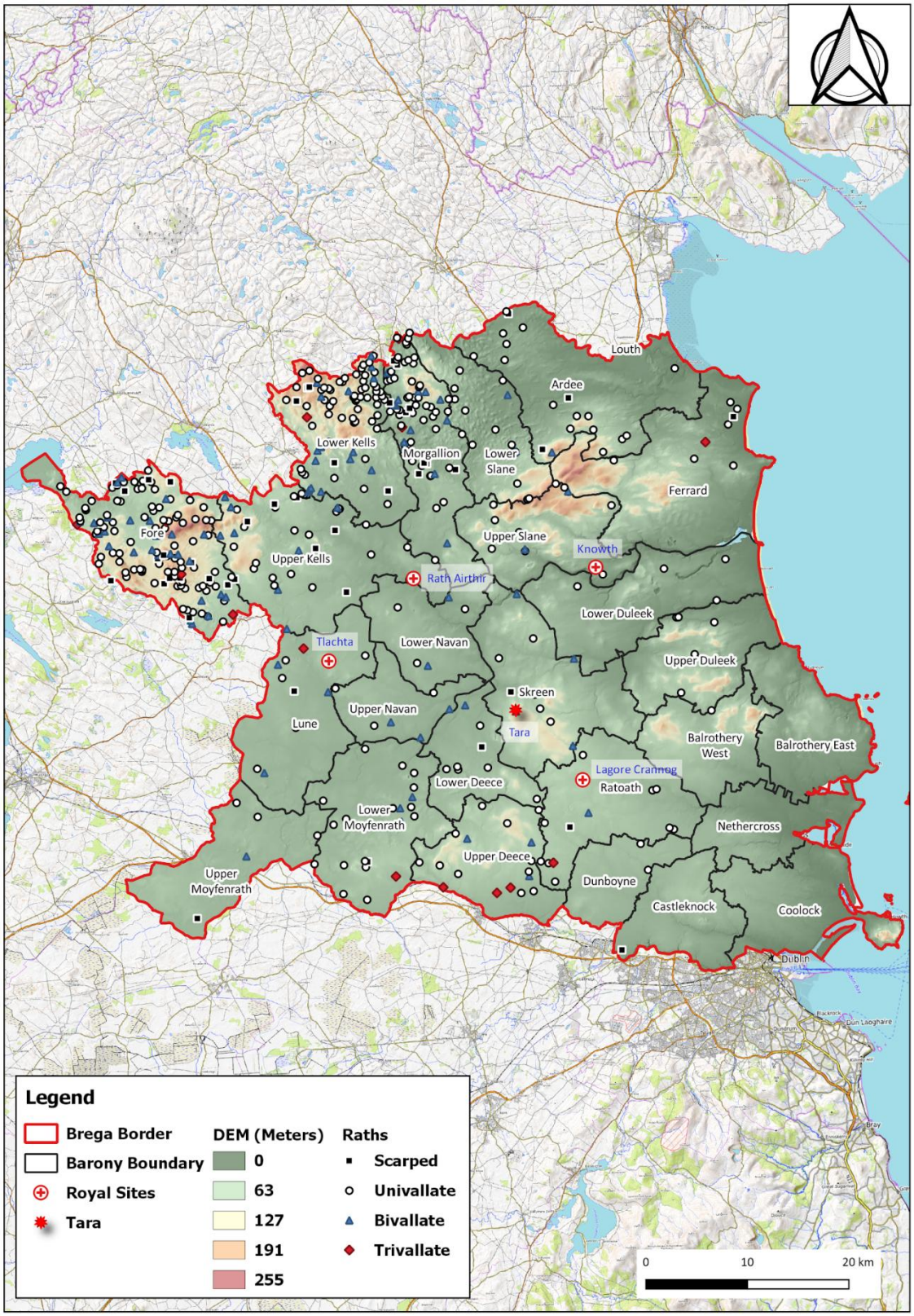


Figure 5.1: Distribution of ringforts in Brega (after OSM, EU-DEM, NMS with additions)

5.2 Settlement in Prehistory

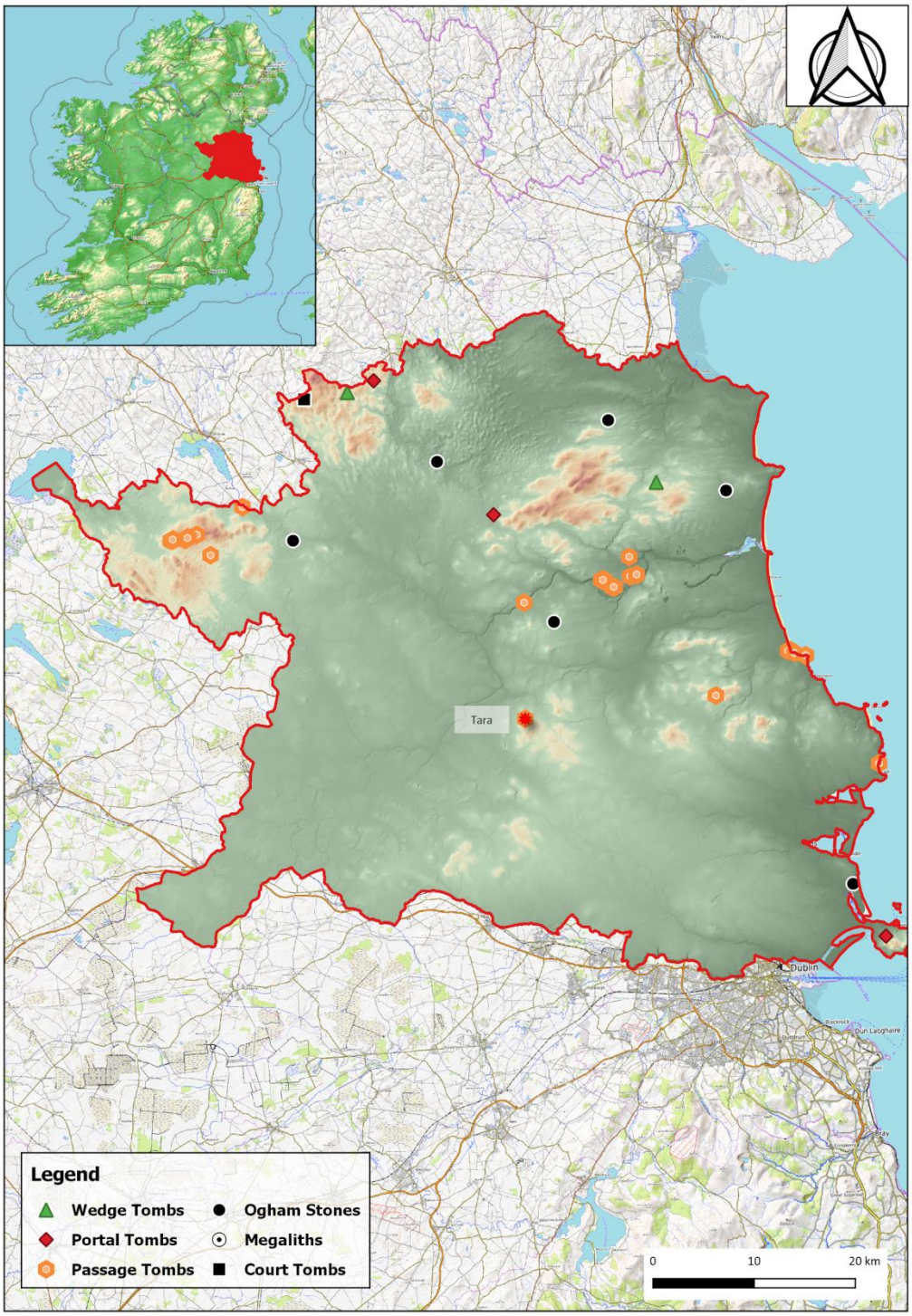


Figure 5.2: Selection of prehistoric monuments in Brega (after OSM, EU-DEM, NMS with additions)

A landscape is a “structured” space and people developed a complex and interdependent relationship with it (Allen et al. 1990; Warren & Asch 2000; Canuel 1999; Punke & Davis 2004; Chapman 2009). In any study of an area in a particular time period, it must be

remembered that there was a period before and a period after. Brega did not just appear fully formed at the start of the early medieval period, rather the landscape had been settled, used, altered and organised by people long before AD 400. Just as stated here that the topography sets the stage for the settlement, transport and communication aspects of Brega in the early medieval period, so the settlement, living, dying and burial can contextualise how people interacted with the landscape in the periods before the current analysis.

Obviously, in the prehistoric periods we do not have any written records, other than inscriptions on ogham stones, but much can be deduced from the Neolithic material remains within Brega. In particular the wealth of burial evidence as seen in figure 5.2 above. A cursory glance at this figure could mislead the viewer into thinking there was a paucity of burial monuments and therefore an absence of settlement. When looked at in more detail though the sheer scale of some of these monuments such as Newgrange, Loughcrew and Fourknocks is apparent. These monuments were massive undertakings, which consumed enormous amounts of resources, both in terms of manpower and natural resources such as stone and the economic resources of food and shelter for the builders. Eogan (2010, 13) suggests that Meath underwent an “industrial revolution” in the Bronze Age and this continued with evidence of bronze, glass and iron working into the Iron Age found at Tara (Roche 1997, 45; Schot 2018). So as the area we know as Brega transitioned from the prehistoric periods into the early medieval, it was already relatively highly settled, culturally prestigious and economically powerful.

This economic strength is probably one element which attracted the Southern Uí Néill to spread from Connacht in about the 5th century and settle in the area, although it was a “key area of settlement from early Neolithic times, circa 4000 B.C.” (Eogan 2010, 13). There were people in the area from even before the Neolithic however as evidenced by a struck flint flake estimated to be from the Palaeolithic period which was found in Mell, one kilometre north of Drogheda (Mitchell & Sieveking 1972).

Brega continued to be settled throughout prehistory and the historic periods (Stout and Stout 1997; Cooney and Grogan 1994), although it has been suggested that historical and archaeological evidence from the late Iron Age, which was the period immediately preceding the early medieval, “is relatively sparse” (Seaver 2009, 8). In fact, this area was without question a major focus for settlement in prehistory. It can be argued that the area was physically and psychologically dominated by passage tomb complexes like Newgrange, Loughcrew, Fourknocks and enclosure sites such as Knowth and Tara which all combine to create a link with the ancestors and constitute a “sacred landscape” (Bhreathnach 2014, 10).

The sheer scale of sites such as Newgrange and Loughcrew can be taken as evidence of considerable settlement in the area. Eogan (1973, 68) has proposed that “the passage grave builders landed on the east coast between north County Dublin and the mouth of the Boyne, and it was in this area they settled, creating their settlements and burying their dead, aided by the topography which made access and travel relatively easy”. Passage tombs at Newgrange and Knowth among others were of “enormous size and architectural sophistication” (Eogan 1997, 9) and were built by large numbers of people over a long period of time which made the area notable long before the period under study here.

These ancestral graves had a significant presence in the landscape (O’Brien & Bhreathnach 2011), and Carlin et al. (2008, 20) have advocated that “people in the late Iron age and early medieval period existed in a pre-established landscape with extant monuments that would have had a direct and meaningful impact on their land use”. That they had an impact is undoubted, though sometimes with different results, at times being avoided and at others being reused. Reuse is not unusual and Williams (1998, 145) argues that in “Britain and Ireland prehistoric sites and landscapes have been reoccupied during historic periods on an impressive scale” and O’Brien (2003) also makes the same point. The Mound of the Hostages at Tara is one example of continuous reuse over centuries and the use of ancestral graves or *ferta* as boundary markers is examined in section 4.4.

Creating links with the ancestors was important in a society consisting of “polysegmented agnatic lineage groups” (Ó Corráin 1971a, 8) vying for control of a multitude of small kingdoms, which would guarantee them status and the corresponding wealth. This was not a new cultural expression and the basic premise here is similar to the one put forward by George Eogan (1990, 20) on settlement at Newgrange “which might have been used by the Celts in later prehistoric times to legitimise their cultural expansion”. One of the issues in studying this area is the lack of strong settlement evidence from the Iron Age which might help trace the settlement patterns more satisfactorily. It has been suggested that these complexes were specifically used by the emerging Southern Uí Néill as “vehicles to legitimise social power and domination” (Thomas and Tilley 1993, 227) in these areas as they pushed north and eastwards. However, these new polities did more than just use these sites symbolically, they built dwellings, carried out rites of passage and assembly, died and buried their dead in these places.

Passage tombs and prehistoric monuments were not the only reason the Southern Uí Néill wanted to settle here. People were very aware of their histories and cultural events and the idea of *seanchas* or tradition was high in the consciousness of the people. It was so important that there existed a class of people, the *áes dána* or “men of art” whose primary function was “to transmit the *seanchas* or tradition” (Byrne 1973, 13). The *áes dána* were a group of learned, high status people made up of different groups such as jurists, bards and genealogists and possessed a status nearly as high as kings. They were also patronised by the nobility of the time and were one of the few classes of people who travelled extensively.

In a patrilineal, agrarian, highly structured society it was important that records were kept and transmitted and people of all classes, common and noble, were subject to the law, which allowed unnecessary conflict to be avoided. So much so that books of genealogies such as the Book of Glendalough were kept to record lineages, and this book is in the Bodleian

library today. Manuscripts in the book contain the names of approximately 12,000 individuals and covers 650 years and 21 generations of names, family connections and dynasties. Such an extensive record proves the importance of these details to people of the time. These familial connections could also be used as a tool to order and organise society along the lines of inheritance and status which were particularly important when it came to issues of land ownership.

Many more books were made such as the *Dindshenchas,* which was concerned with place names and traditions. The *Dindshenchas* was made up of 176 poems. This was not unusual as “verse was widely employed as a medium for encoding and transmitting historical knowledge” (Toner 2005, 59) and this type of poetical lore was an important aspect of the training of the learned classes at the time (Hughes 1987, 166). It is imperative to note here that this type of literature along with others such as hero tales like the *Táin* are not to be taken literally, but they are an imagined narrative, embellished and expanded with retelling and transmission.

In a tightly structured society such as this people felt a need to belong, especially to their kin group. Honour price was very important and tightly controlled. In a society governed by laws, stepping outside your kin group or *túath* was akin to stepping outside the law. Outside a person’s *túath* they had no honour price and so could be killed without any legal redress for their family. It is into this social context that the Southern Uí Néill forced themselves, subjugating kingdoms and family groups already in existence. In a society so concerned with lineage and heritage, it is hardly surprising that this created discord within the kingdom and contributed to the many battles across the region.

Complexes like Tara were not only already in use but were centres for production of crafts and precious metalwork (Schot 2018), important assembly places and places of burial, all elements of high status. They were also places of trade and most of these sites had

evidence of imported pottery and sometimes even Romano-British items. Establishing control of these places also helped to assimilate the “immigrants” from the Uí Néill into the fabric of everyday life, integrating them in a way that could not be achieved by isolated displays of power alone. This is still similar today and it has been argued that “immigrants assimilate as communities, not only as individuals” (Hatton & Leigh 2011, 389). This is even more important in early medieval Ireland where communities were in fact family groups.

5.3 The Social Context of Early Medieval Ireland

Most discussions on the social structure of this period begin with Binchy’s (1958, 54) definition of the country being “rural, hierarchical and familiar”. Those famous words written by Binchy “have inspired or tormented generations of university students” (Bartlett 2010, 13) and are still being quoted over 60 years later. These iconic words and this argument in general have been a topic of much discussion not just among students, but scholars of all persuasions who are interested in early Christian Ireland. Indeed, in many ways Binchy was correct – Ireland at the time was all of these things, but the problem lies in the simplistic nature of his overall portrait of Irish society – that of a ‘Golden Age’ of Ireland, an idyllic society filled with saints and scholars, which more developed research has shown as an inaccurate picture of the country at that time. It could even be argued that Binchy had fallen prey to the utopian propaganda of the Gaelic revival movement.

Brega in particular was far from a utopian society. Political strife, internal feuds, Viking raids, periods of harsh weather and the eventual splitting of the kingdom in two showed that all was not “golden” at the time.

However, aspects of Binchy’s theory on a broad scale are undoubtedly true, especially at the beginning of the period. The social context of Ireland was metamorphosing and evolving due to a number of important social changes on an island wide scale. The changes in religion

and the spread of Christianity. The changes in agriculture including the introduction of dairying. The improvements in arable technology and especially the ability to cope with larger quantities of crops through the use of mills. The shift in foreign trade from the Mediterranean to Gaul. Increases in the prevalence of literacy, which is often argued to be transformative (Johnston 2017b, 25) and towards the end of the period the increases in urban growth all had substantial effects on the social and economic constructs of society.

Binchy is not the only scholar who paints this “golden age” picture. Others have suggested that on the eve of the Viking raids Ireland was a “well populated landscape inhabited by a literate, Christian society with a complex political system but with no unified kingship’ (Clarke et al. 1998, 31). Over 40 years of research has led to a more modern, developed picture of early Ireland which describes Binchy’s view as “too rigid and narrow’ (O Cróinín 1996, 261)

Acknowledging that the economy of the country was almost entirely agricultural and rural, Ireland was also intensely hierarchical. The country was reputed to have been made up of 150 petty kingdoms or *túath* (Byrne 1973) although McCotter (2014, 92) disputes this and in his deeper study of the political divisions of the country has suggested that “the number of original local kingdoms in Ireland in the early historical period may have been as many as 200 or more”. This builds on an earlier debate, caused by differences in translation of the *Metrical Dindshenchas*, translated by Edward Glynn, which is summed up by Hogan (1929, 172–173) and provides differing figures based on the translation chosen. Regardless of the actual number, each *túath* was controlled by a petty king or *rí.*

There was in effect a system of clientage, the king extending cows, crops or other goods to his client, both other nobility and freemen, and receiving returns in excess of what was lent. Dáithí Ó Cróinín (1995, 141) suggests that this clientship system was “the basis of society”. It was a person’s status, imagined from his economic wealth, usually in the form of the amount of cattle he owned, which gave him his honour price. This was a persons’ value in all legal dealings and designated the amount of compensation he was due for wrongs done to him,

usually in the form of cattle or female slaves (*cumal)*. Compensation, for example for damage done to cattle or crops, was paid on a scale related to a persons' honour price, so a king would receive more than a free commoner for the same offence. A persons' status would have been well known with the community and been discernible from their clothing and dwelling spaces. Women also had an honour price, with their value usually being half that of their husbands (McLeod 1987, 58–59).

There were many different grades of status, for nobility, freemen and slaves, and these grades were originally translated by Binchy (1941) from the *Crith Gablach,* a law text dealing with hierarchy and status, which dates to AD 700 and so are likely to be reasonably accurate. There were "several separate status hierarchies" (Latvio 2005, 70) in existence at any one time, and people could increase or decrease their status based on their economic position. There were also differing grades within the church and also within the 'people of skill' or *áes dána* such as poets or craftsmen.

How accurate these law tracts were, which, when taken literally, seemed to govern even minute aspects of Irish daily life is a matter for debate. It has been argued that these laws were 'an ideal rather than a reality' (Edwards 1996, 8) and daily life would have been much different if all of the laws were strictly adhered to – much the same as today's laws are not always kept either but are at least an effort to indicate what is socially acceptable. It is difficult therefore to accurately gauge exactly how strictly the laws of status were adhered to.

The concept of honour price and clientship is an important one. In a society in which familial ties were extremely important, the dignity owing to each person was central. Aside from damage to belongings, damage done to a person's reputation or dignity, such as satire or refusal of hospitality, actually carried the same penalties as the murder of that person and offences such as satire were even thought to be able to cause physical harm to the person being offended (McCone 1990, 124).

It was this proprietary relationship over the grade below which gave kings and lords their status, and within each grade there was a number of sub grades. As such there were three grades of petty king – the *rí ruirech* or ‘king of great kings’, the *rí buiden* or ‘king of war bands’ and the *rí túaithe*, the ‘king of a people’ (Charles-Edwards 2007, 130). There is debate as to the names and translations here however and Byrne (1973, 42) writes that the titles are *rí bunaid cach cinn* or ‘king of every individual’, *rí buiden* or ‘king of bands’ and *rí benn* or ‘king of peaks (horns)’.

Clientship wasn’t purely economic however and clients also owed service to the grade above them and in the case of a king this meant military service as well as other social labours such as the building of roads. There were two types of clients, free clients or *sóerchéile* and base clients or *dóerchéile*. It has been argued by Brumfiel and Earle (1987, 3) that the elites in a society do this to "create and maintain social inequalities, strengthen political coalitions and fund new institutions of control”. While this is partially true, Ireland at the time did allow for movement between social grades, both upwards and downwards. Even kings could lose their status based on acts such as kin slaying, probably the worst act in Irish society at the time as it didn’t allow for familial reparations, or loss of limbs or other disfigurements (Kelly 2015, 19). Juxtaposed to this are people who can increase their social grade by financial means such as the *briugu* or hospitallers, or by becoming successful in a “trade” such as a poet or judge. Soderberg (1998/1999, 397) argues that elites act to enhance their own status, but that would seem to be a truism for all grades of society, from the earliest times until now.

Below this was a layer of nobility or lords called *flaith.* Again, there were different grades of lord, the highest being the *aire forgill* or ‘lord of superior testimony’ who must maintain 40 clients. Below him, and in a patrilineal and male dominated society such as Ireland at the time it was always a him, was the *aire tuíseo* or ‘lord of precedence or leadership’, with 27 clients, the *aire ard* or ‘high lord’ with 20 clients and finally the *aire déso* ‘lord of vassalry’ with 10 clients.

The next level down was the free commoners or *bóaire (airig*), and this was again split into a number of grades. These are suggested by Charles-Edwards (2007, 130) to be: *aire coisringor* '*airig* of constraint', *fer fothlai* or a 'man of withdrawal', *mruigfher* a 'land-man', *bóaire febsa* a 'cow-airig of excellence', *aithech aringfortreba* a *deich* 'a render-payer who farms with his tens', *ócaire* or 'a young-airig', and *fer midboth* or 'man of middle huts'.

Below this yet again were the semi-free classes, the *fuidir*, the *bothach* and the *senchléithe*, who were more dependent on their lord's largesse by dint of living on their land and farming it rather than owning their own (Charles-Edwards 1993). At the very bottom of the social hierarchy came slaves, which were often acquired during raids on Britain, Saint Patrick being the most famous one brought to Irish shores. A male slave was a *mug* and a female slave a *cumal*. *Cumals* were actually part of the currency system (Ó Corráin 1980, 10–11) and regardless of their value often had a harsh life (Bitel 1998, 114). There must have been some blurring of the lines however, as often different grades could have lived on the same settlement, particularly with relation to slaves living and sleeping in the same houses as their owners. Warner (1988, 49) has argued that these slaves are "archaeologically invisible" due to their lack of ownership of goods and in particular prestige goods. There is a lot of validity to the argument and creates a difficulty in identifying and understanding a large cohort of the resident population at the time which detracts from a more complete understanding of society.

Having looked at the hierarchical structure, focus now shifts to the familial structure which runs parallel to this. The *fine* or kin-group was the building block of the family structure and each *fine* had its own *fintiu* or kin-land, owned by the family in shares. While a person could own individual land and was entitled to sell or trade this as required, his share of the *fintiu* could not be sold or traded to people outside the *fine*, and on the death of the owner his share of the land reverted back to the *fine*. As with most aspects of Irish society the *fine* was also graded into the *derbfine* (who share a common great-grandfather) and the *gelfine* (who share a common grandfather), with the *derbfine* being the most prominent and important, particularly in the earlier centuries of the period. This appears to have changed as the period

progressed, possibly due to the explosion in population when there was a shift towards the *gelfine* (Charles-Edwards 1993). This is likely to have been because the *derbfine* would have grown to be too unwieldy to be of use. The use of the *derbfine* was not completely dissipated, probably as large numbers of family members could be wiped out in a small space of time, an important consideration when plague and inclement environmental conditions could be so prevalent.

It is within this tightly knitted framework of family ties, rigid hierarchical structure and rural economy that the settlement landscape is formed, with farming always the emphasis of settlement location and structure.

5.4 The Normative View:

With so many extant remains and settlement in general being an important element of archaeology, there have been many disparate approaches to the analysis of where people chose to build their dwellings. These approaches are often formed from the preferences and experience of the archaeologist who creates them. As an example, the seminal work *The Irish Ringfort* by Matthew Stout (2000) relies quite heavily on statistics and is regarded as one of the most comprehensive works on this settlement type. However, this has led to some problems. *The Irish Ringfort* is now the “go to” book on settlement in Ireland, but Stout’s statistical analysis used only a small proportion of sites (approximately 300) in a limited geographical area. It would be informative to run the same analysis in a GIS using all of the ringforts in the country, but this is outside the scope of this thesis. As with all models the issue is whether the model itself is applicable to other regions, and whether it can maintain its integrity after interpolation. In the case of Brega, some of the approaches hold water while others do not translate so easily, although the destruction and removal of ringfort sites in the southern part of the kingdom adds greatly to the difficulty here.

In both *The Irish Ringfort* and a chapter in the book *Agriculture and Settlement in Ireland* (2015) Stout puts forward the idea, based on work by Eoin MacNeill (1923) that that the farm size for an *ócaire* (the lowest grade of free adult male), was one *tír cumaile*, or 13.9 hectares with each ascending grade having one additional *tír cumaile*. This idea is on somewhat shaky ground however as Stout (2015, 15) himself acknowledges there are "some contradictions to this in early Irish law" and Fergus Kelly (2000, 421) suggests that "there are no contemporary records which give the acreage of… an individual farmer". If this was true however, Brega would be made up of approximately 329,500 *tír cumaile.* Unfortunately it is not possible to extrapolate from this total number how many of the different grades of farmer and noble the kingdom contained. Physical size was only one aspect of the value of land however, and Mac Niocaill (1971) gives an excellent breakdown of these. In essence, it shows that better quality land is of higher value, so a kingdom like Brega with lots of high quality arable land would be regarded as more wealthy than a kingdom of the same relative size in another part of the country.

It has been proposed that in any study of settlement in a historic period, a multi-disciplinary approach is essential, combining not only the archaeological evidence, but also the historical and scientific information available to us (Cozzolino et al. 2019; Ortman et al. 2020; Stout 2005), and the above paragraph shows the danger of not combining both. Only by using every available source of data might we form a more accurate picture of the complex topographical and cultural underpinnings of settlement distribution in Ireland, and GIS is just one facet of this. Llobera (2001, 1006) argues, in relation to the use of archaeological GIS that, "only through the development of new methodologies and a revision of landscape theory in archaeology we will be able to overcome the limitations faced by current approaches". The methodologies and theory in all forms of archaeology are constantly evolving, some major and some minor, and Verhagen (2013, 310) has argued that the integration of digital archaeology has been revolutionary in some aspects but also a gradual integration, just like the increase in digital aspects of our daily lives in general.

With the huge numbers of extant ringforts mentioned above, it must be considered that settlements, how they were constructed, lived in and then eventually abandoned, were an important facet of how people lived their lives. Just as today the places people lived were an expression of their social status and this was particularly applicable in a society as hierarchically structured as Ireland at this time, bearing in mind that society may not have been quite as tightly structured as would be imagined from reading the *Críth Gablach*, the Irish law tract concerning status. Either way, O'Sullivan (2011, 346) makes the valid point that what could range from subtle to obvious distinctions would have been pronounced to people at the time, regardless of how difficult it is for us to recognise these nuances today.

Lynn and Heslip (1983) point out that these distinctions can be seen in ringforts even quite close together, such as Rath 1 at Ballyhenry which yielded a large number of finds and the more prominent Rath 2 which yielded very little. This clouds the issue as to which was more important or why the less imposing ringfort would seem to have a much higher abundance of artefacts, probably indicating higher use, than the other and this was also seen at two ringforts, Garryduff 1 and Garryduff 2 in Cork (O'Kelly, 1962–64).

There is an argument that these buildings and sites can be seen as stages on which people performed their social identities (O'Sullivan & Nicholl 2010) and during this chapter the way in which these "stages" were formed and interacted with the landscape is studied. This concept corresponds quite well with the idea of Practice Theory (e.g. Bourdieu 1990; Giddens 1984; Taylor 1993). This idea is also discussed by Reckwitz (2002, 255) and he states that "social order is thus basically social reproduction". In this context it would mean that the reproductive aspects of building dwelling spaces in largely the same way across a landscape can impose a social order on that landscape and the people who live within it. That order was imposed even on house designs is irrefutable, as there is evidence from the *Crith Gablach* as to how each grade of farmer must construct his house and what it must contain to maintain his position in society.

It would be a mistake however, to assume that settlement across the island was uniform. In fact, there were regional variations and these also occurred during different temporal phases, often pushing the construction dates of these sites back to the Bronze Age (Raftery 1976, 293) and this has been discussed in more detail by Proudfoot (1970, 38-44). So, while the main focus of this chapter relates to settlement in Brega it by no means assumes that the settlement pattern is replicated across the whole island. In the past, attempts to categorize ringforts into a strict morphology often obscured this variation. As will be seen later, the circular ringfort, while being the predominant shape, still has enough variation, such as the figure of eight, D-shaped, plectrum shaped etc. to be significant. They were also built earlier than was previously thought, some in the Iron Age, and later, into the 11th century in some rare cases. The improvements in radiocarbon dating have vastly improved our ability to narrow down the temporal phase of ringfort, cashel and crannog construction and occupation quite significantly.

Having stated that Ireland was heavily settled, the current evidence in the form of actual settlement sites would point to Brega having been sparsely populated, particularly to the south of the N52 road. Juxtaposed to this is the amount of building, particularly ecclesiastical building which went on. George Eogan (2010, 17), quoting a personal comment from renowned historian F.J. Byrne suggests that “Brega is credited with having the first stone church in Ireland, at Duleek, the first round tower, at Slane, and the first monastery, at Monasterboice”. With these ecclesiastic buildings being produced we have evidence for at the very least a strong clerical contingent in the area. The topography of the area with its low hills, excellent farmland and plentiful rivers combine to make Brega one of the best areas of farmland in the country. Mitchell & Ryan (2003) have also argued that, quite paradoxically, place names including *Rath* are very common in Leinster, where ringforts are least common, less so in Connacht and Munster and rare in Ulster where ringfort building was carried out far more densely than in Leinster. Why this is so is difficult to ascertain, but it is possibly an effort to associate with ringforts of higher status, status being such a central element of Irish

society at the time. It does however lend itself to the theory that at one time Leinster, and Meath and Dublin in particular, were more heavily settled than the current remains would indicate, but that these remains have been destroyed over time. In fact, the large numbers of settlement remains in places like Sligo and Clare are a conundrum as the land they sit on is usually far less suited for farming of any type, whether livestock or arable, than the wide plains of Brega with its rich soil.

Another possible explanation may be that this region contained a very different type of settlement altogether – one that was more open and unenclosed by banks or ditches and that this explains why Brega seems less densely populated by ringforts. This may seem a strange statement considering the fact that field systems had been in use since the Neolithic (Herity 1971; Herity & Eogan 1977; Caulfield 1978), but there could have been quite strong regional variations. Some, possibly tenuous, evidence for this is a line in the *Táin* which translates to “there were no dykes or fences or stone walls in Ireland at that time, only the open plain” (Kinsella 1970). As the *Táin* is an Iron Age saga, and therefore later than field systems were known to be in existence, its veracity is in doubt, but it does raise the possibility of at least regional variations in the level of enclosing features on settlements. Groenman-van Waateringe (1981, 287) has suggested that walls built in areas such as Céide, County Mayo, were an effort to alleviate the downwash of soil and wind erosion in an oceanic climate. The need for this may not have been quite as important in an area of central plain such as Meath and perhaps led to the lessening of the need to enclose spaces, either with a wall or a ringfort.

A clue may be gleaned from iterative attempts to map the landscape. Discussing the difference in map editions, O’Flanagan (1981, 321) says that “the reduction of the number of antiquities shown is notably marked in those areas where landlord control on landscape modification was strong and in areas which notched up massive population increase during the 19th century”. These map editions are the strongest indicators of destruction of sites, both

by the Anglo-Normans and later landlords, and it does help to narrow down a time frame for this destruction, albeit a quite wide time frame. It is ironic then to think that this process of disappearance of sites from maps is now being reversed by improvements in technology.

Either way to suggest then that farmers ignored this area, and all its abundance would simply be incredible. Rather we need to search for the reasons why the material remains have been removed over time.

Those reasons are probably quite varied and complex. An issue which could have a major impact on the number of settlement remains is probably the amount of building which went on before the requirement for archaeological excavation in advance of any building works. The building of large towns such as Navan, Trim, Drogheda and Dundalk probably decimated large numbers of ringfort remains and the extensive building on the outskirts of Dublin to the south of the kingdom undoubtedly destroyed many sites.

Meath, which predominates the land area of the kingdom of Brega was “one of the most intensively settled Norman regions in Ireland” (Graham 1975, 223; Duffy 1983, 23) and “was more fully occupied by the colonists than any other rural area in Ireland” (Murphy 2008, 117). Murphy (ibid., 118) also argues that “a new landholding élite ...moulded a settlement landscape around the dual needs of military support and commercially based agriculture”. This need for commercially based agriculture was an extensive change away from the established system of subsistence agriculture and quite possibly led to many ringforts being ploughed away. Excavation during work on the M3 confirm that sites such as Castlefarm 1 and Roestown 2 were in use both before and after the arrival of the Anglo-Normans.

It is also widely believed that they were sometimes reused to form part of a motte and bailey (Barry 1987, 37; Lynn 1981-2, 112; McNeill 1989-90, 57-8; Ó'Drisceoil 2002; O'Keefe 2000, 21-2; Ó'Ríordáin 1979, 56; Orpen 1907; Westropp 1904). This can cause some confusion as is the case with Rath Airthur, as mentioned earlier. Chris Lynn (1975, 31) has argued that "the Anglo-Normans would select an earthwork for their motte whose banks were steep and fresh, the whole point being to save digging; therefore, if a ringfort was utilised as a bailey it would tend to be a late one". This argument is interesting in respect of *Rath Airthir*, which is mentioned in the *Dindshenchas* and was thought to have been the location of the fair at Teltown. The first known reference to this fair comes from the Annals of the Four Masters and mentions the fair in AD 539. The mound seen in Plate 3 below and the impressive ramparts are likely factors leading to the monument being originally classified as a motte and bailey.

Plate 3: *Rath Airthir* (Navan and District Historical Society)

There is much debate around settlement in early medieval Ireland in whichever forum it is introduced. As mentioned earlier O'Sullivan and Nicholl (2011) discuss dwellings as stages for social performance. Bolger (2011, 1), while mentioning that we should look past the status

or gradation elements of settlement, says it is an expression “of the underpinning principles of kinship, land tenure and clientship”. One thing that is sure and has been proven by the recent escalation in excavation is that the traditional view of what makes a “ringfort” needs to be explored more fully and the traditional view of these settlement types was not as all-encompassing as initially thought**.**

5.5 Ringforts

O’Riordáin (1979, 142) defined ringforts or ringforts as “a space most frequently circular, surrounded by a bank and fosse or simply a rampart of stone”. While this can be taken as true in the most general form, the wealth of research and especially excavation since then has shown a far more complex and nuanced architecture than was available to O’Riordáin at the time of writing. As mentioned earlier ringforts have many more shapes than was traditionally thought and are also defined by many different features such as a bank, ditch, scarp and differing combinations of these, or may, in a small number of cases, have no defining features at all. In general, however, the average diameter of a ringfort is thought to be 30–40 meters, although there are large variations in this figure. While there is a huge focus on the cow in the economy of early medieval Ireland, most ringforts would seem to have practised a form of mixed agriculture, with evidence for growing crops and other animal husbandry such as sheep and pigs.

Relatively recent papers have been published describing ringforts as “circular” (O’Sullivan and Downey 2007, 32). While this reductionism is a convenient way to disseminate information to the public, it can be misleading in the light of recent excavations in which morphological examinations have led to a range of different settlement enclosure types being identified, such as oval, D shaped, and plectrum shaped, and some which have no defining features at all. An argument can be made that this reductionism damages the overall debate on this settlement type. There is an irony evident here in that while ringforts are undoubtedly

the main settlement constructs in the country, there are a small number of ringforts built which show no evidence for ever having been occupied such as Garryduff 2 in Cork,which O'Kelly (1962–64, 121) described as "archaeologically sterile", adding cloud to an already difficult debate.

The figures below indicate the distribution of the differing shapes of ringfort in Brega, defined as circular (figure 5.3), D shaped and conjoined (figure 5.4), sub-circular (figure 5.5) and oval (figure 5.6), by the surveying archaeologist who wrote the scope notes on the HEV.

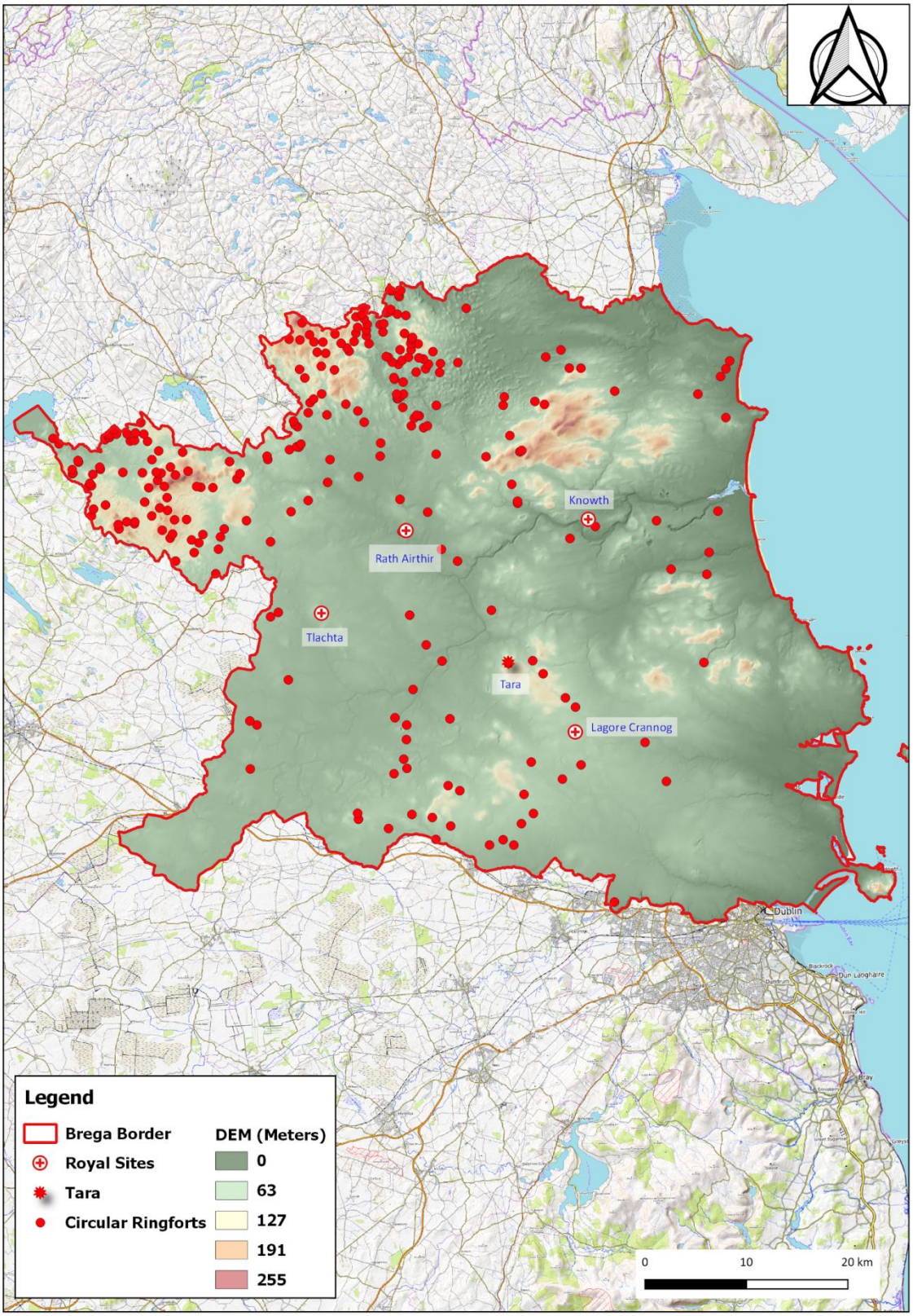


Figure 5.3: Distribution of circular ringforts (after OSM, EU-DEM, NMS with additions)

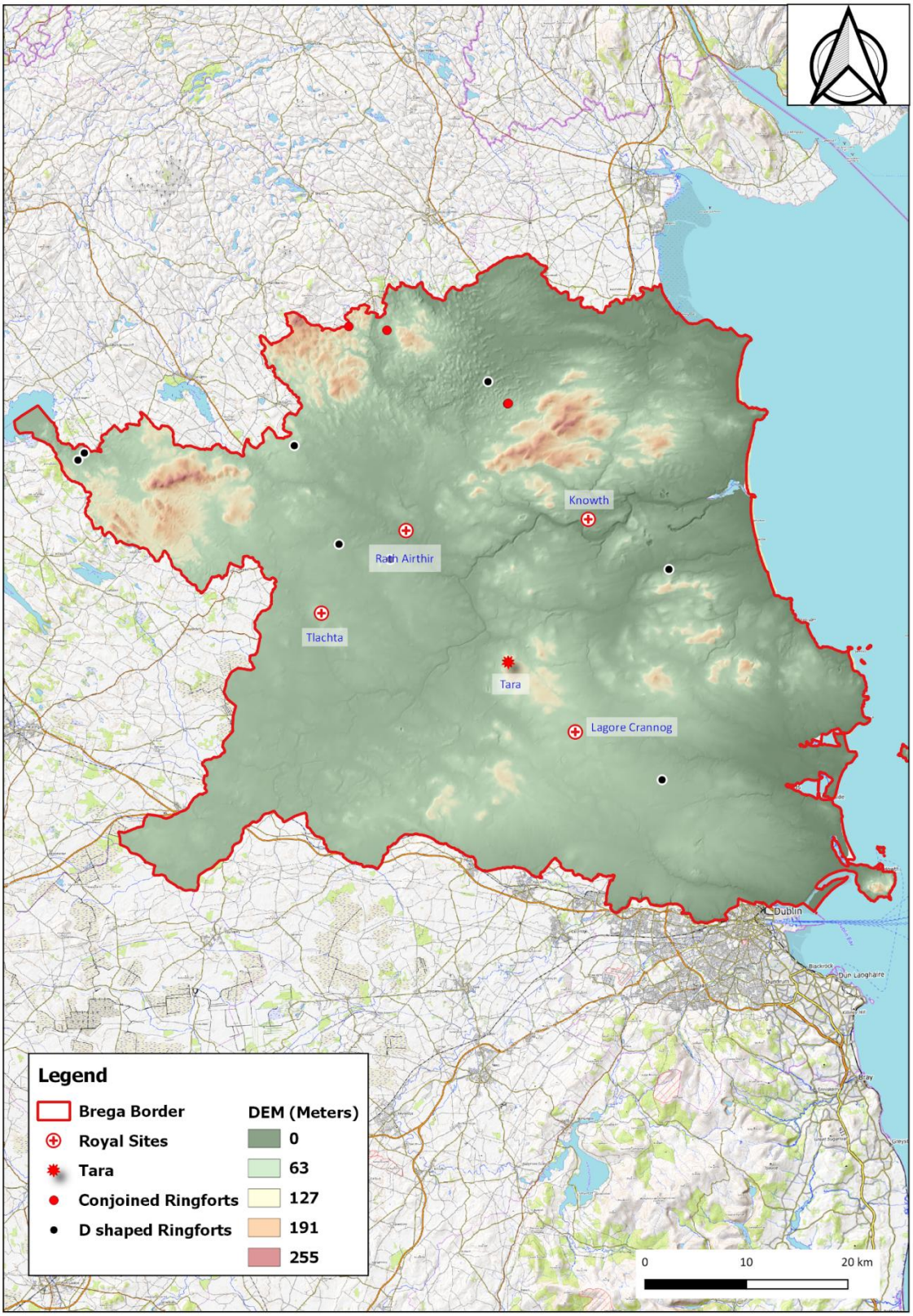


Figure 5.4: Distribution of conjoined and D shaped ringforts (after OSM, EU-DEM, NMS with additions)

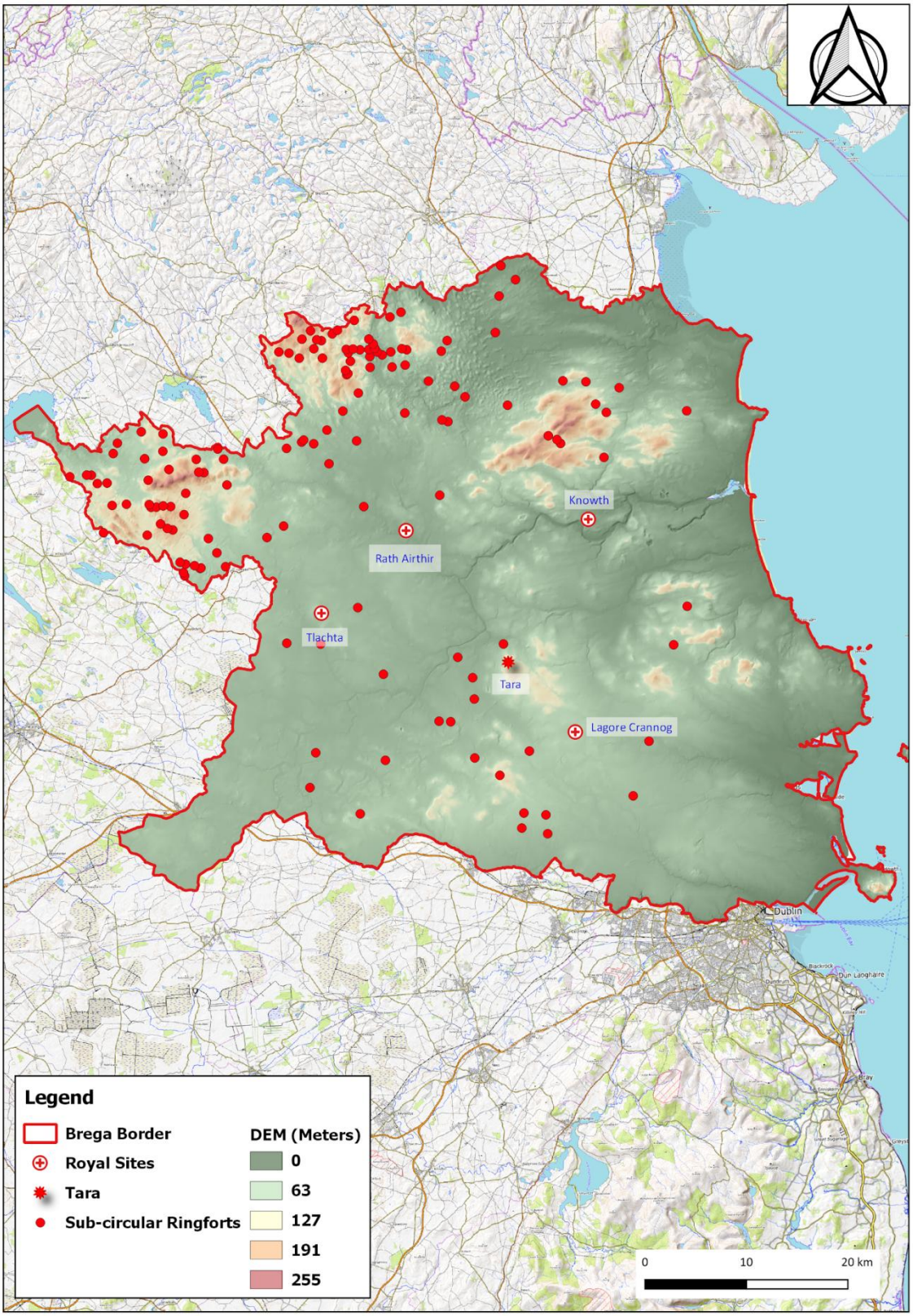


Figure 5.5: Distribution of sub-circular ringforts (after OSM, EU-DEM, NMS with additions)

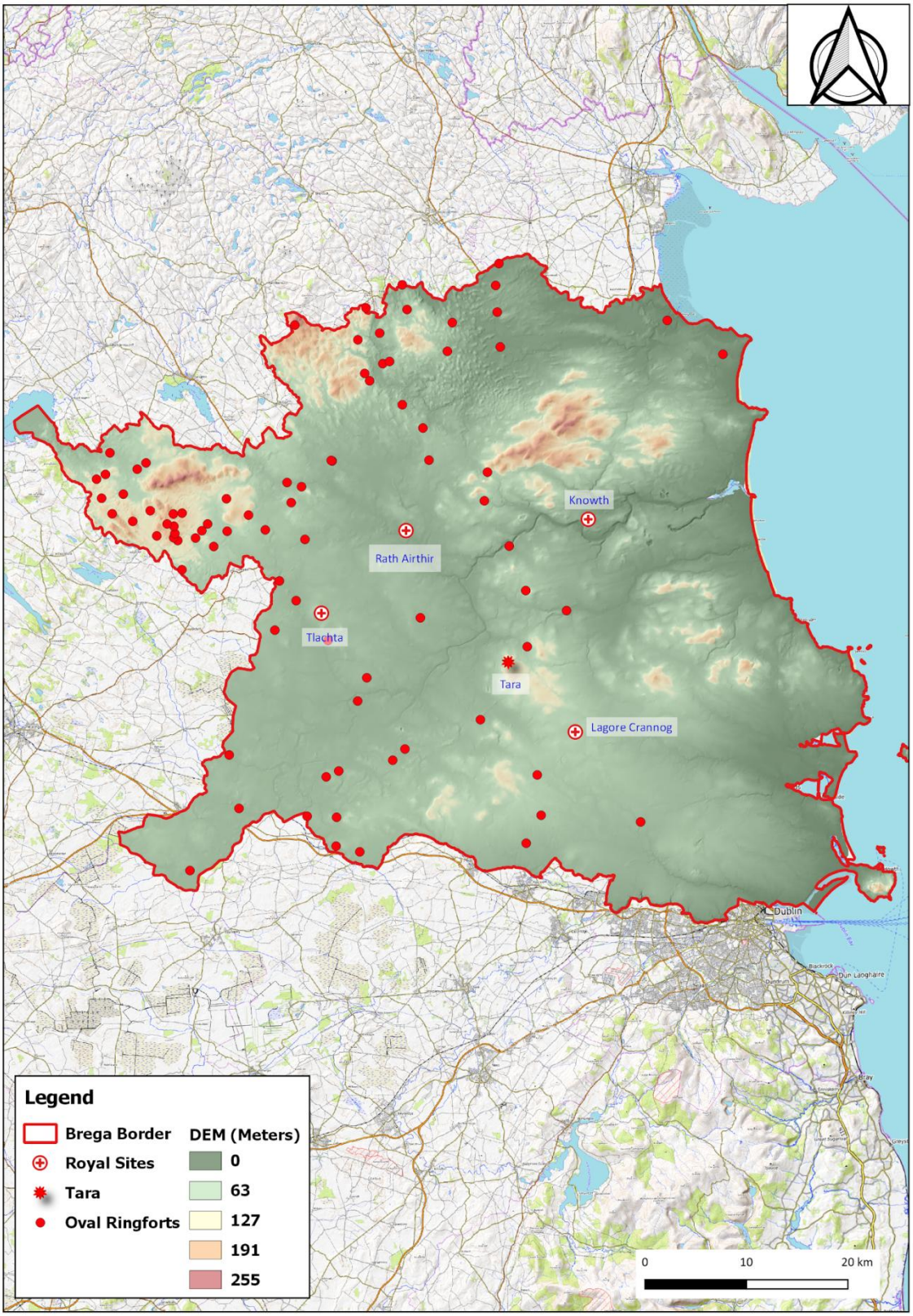


Figure 5.6: Distribution of oval ringforts (after OSM, EU-DEM, NMS with additions)

As a general rule, the literature relating to ringforts uses the diameter when discussing size. As mentioned above this can be quite misleading when other shapes are introduced to the mix. Taking these other shapes into account means it is probably more applicable to examine the size of the enclosure by the area it surrounds rather than by a diameter. In this project the area of the circular ringforts was calculated in the usual way of $A = \pi r^2$ and the oval and sub circular ringforts with the equation for an ellipse = a x b x π.

For example, Stout (2000, 150) states that in the south-west midlands 40% of ringforts have interior diameters of 28-35 meters. Unfortunately, there is no breakdown as to which shape each ringfort is related to and where the measurements are taken from. It is unlikely that all of the ringforts in this area are perfectly circular, and as such it would be useful to know in the case of say, an oval ringfort if the measurement used was the longer or shorter of the two radii in order to form a better overall impression of the size of the ringfort. In comparison to Stouts (ibid.) figures of a diameter between 28 to 35 meters mentioned above, in the case of Brega this figure is 32.3%, but it is difficult to compare regional differences without knowing how Stouts figures were arrived at.

For example, in Brega there are only 260 of the 494 ringforts defined as circular (figure 5.3), which is only 52.63% of the total. In other words, the area of only just over half of the ringforts can be easily found from its diameter. When looking at the 260 ringforts defined as circular, and allowing some leeway for subsidence and spreading over time, there are still only a possible 75 circular ringforts with a diameter of between 35 and 45 meters, which is only 15.18% of the total. Figure 5.7 shows the area of the ringforts using graduated symbols, in other words the larger the dot the larger the area of the ringfort, and Table 5.1 below tabulates this. Table 5.1 omits D shaped and conjoined ringforts due to their small sample size, which are 8 and 4, respectively.

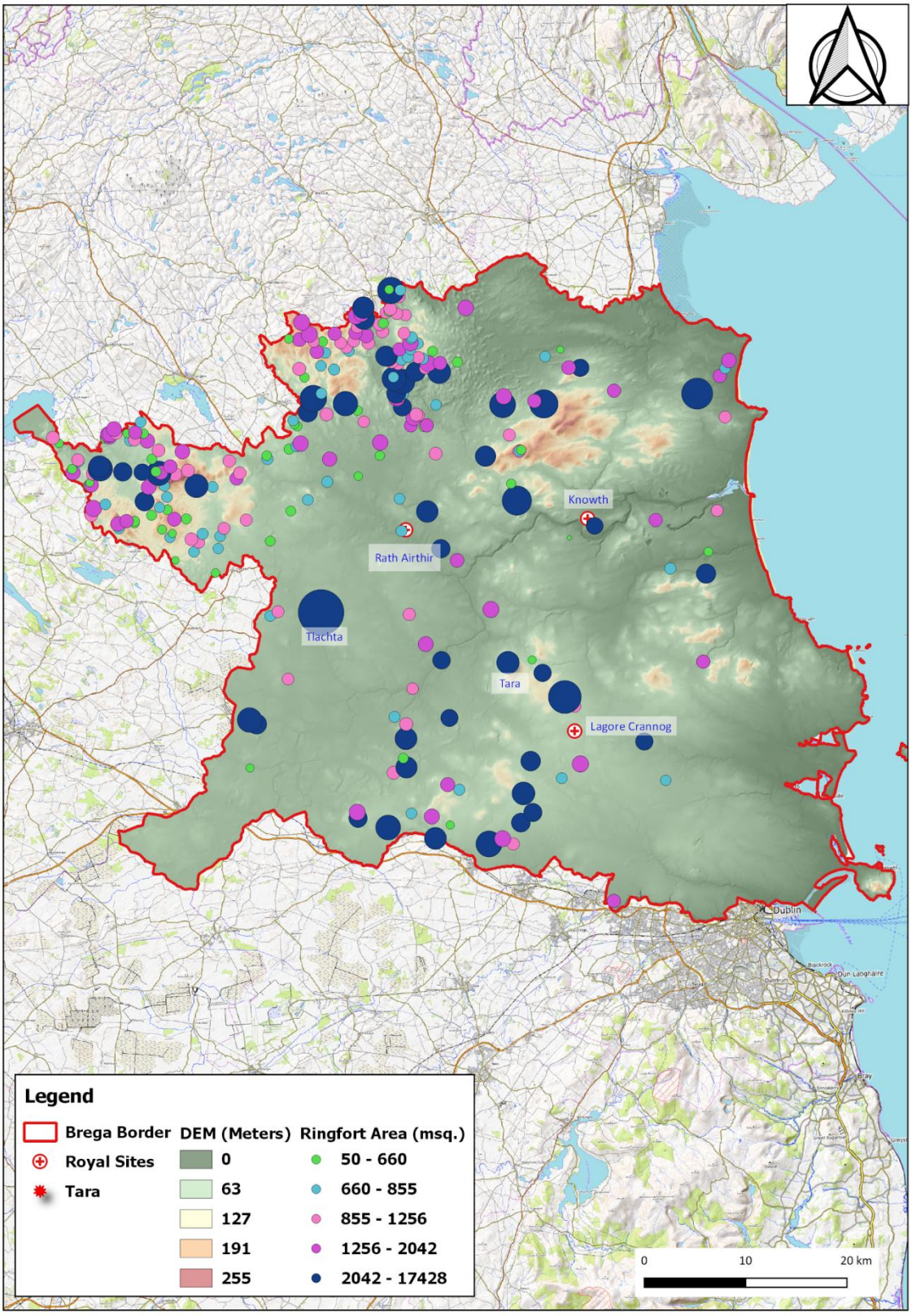


Figure 5.7: Area of circular ringforts in Brega depicted by graduated symbols (after OSM, EU-DEM, NMS with additions)

Table 5.1: Area of ringfort shape in relation to their vallation

Ringfort Shape	Vallation	No of Ringforts	% of Total	Ave. Area ($m^{2)}$	% Increase
Circular	0	22	8.46	3848	
(260 total)	1	175	67.3	4610	19.8
	2	53	20.38	10253	122.40
	3	9	3.46	18661	82
	4	1	0.38	69746	273.75
Sub-circular	0	18	12.94	916	
(139 total)	1	93	66.9	1662	81.44
	2	25	17.98	5759	246.51
	3	3	2.15	11650	102.29
Oval	0	6	7.22	829	
(83 total)	1	63	75.90	1495	80.33
	2	12	14.45	5075	239.46
	3	2	2.4	20359	301.162

Table 5.1 highlights some interesting differences in the data. There is a stark contrast between circular ringforts and the other two common types, oval and sub circular, with the circular ringforts being much larger regardless of the number of banks and ditches. In fact, the average size of a circular univallate ringfort is only slightly smaller than a bivallate oval or sub circular one.

In this case under the heading vallation, the 0 column is indicative of a ringfort which does not have a bank or ditch, but which is defined by a natural scarp. While the circular ringforts are much larger than the other two types, the oval and sub circular ringforts are very similar in area at all levels of vallation. The percentage increase in size also remains quite stable between the sub circular and oval ringforts, even as the number of banks and ditches increases. There is an anomaly here in the case of trivallate ringforts, with the oval ringforts being almost double the size of the sub circular ones. Table 5.2 shows the similarity in the percentage size difference between the circular ringforts and the other two types, and this starkly outlines both the large size advantage the circular ringforts have, and also the similarity of the trend between the oval and sub circular types.

Table 5.2: Increase in size from oval and sub circular to circular ringforts

Vallation	% Increase in Area Between Sub Circular and Circular ringforts	% Increase in Area Between Oval and Circular ringforts	Difference %
0	375.32	464.17	19.15
1	277.37	308.36	10.05
2	178.03	202.02	11.88
3	160.18	90.85	-76.31

The above evidence strongly shows that circular ringforts within Brega were of a much larger size than oval or sub circular ringforts. The question now is why this is the case. It is generally regarded that the number of banks and ditches related to a ringfort is the measure of its status, and thereby the status of the people living there and there is much evidence for this.

The number of banks and ditches may not have been the only measure however as the data above shows. MacNeill (1923, 305) tells us from the *Críth Gablach* that the ringfort of a king of a *túath* should be “seven score feet of perfect feet are the measure of his stockade on every side”. This would seem to imply that circularity was important, and exact measurements needed to be taken to ensure a king maintained his status. Stout (1991, 207) agrees with MacNeill and uses a circularity index when examining ringforts in the baronies of Ikerrin and Clonlisk in the southwest midlands. This index is derived by dividing the minimum internal diameter by the maximum internal diameter. A return of 1 means a perfect circle, and the closer the result is to 1 then the closer to a true circle the ringfort is.

It is unlikely that the passage above from the *Críth Gablach* is meant to be taken literally. To test this idea, if the commonly used phrase of “score” means 20, this would give a radius of “seven score” or 140 feet or 42.67 meters. This is an area of 5720 meters squared, far bigger than the average size for a ringfort quoted by Stout, but only approximately half the size of a circular univallate ringfort in Brega. In fact this size rests squarely in the bracket for oval and sub circular bivallate ringforts in Brega. This creates a difficulty in comparison as the area of the ringforts were calculated differently in this study versus Stout’s. Stout's ringfort data was not broken down by shape, and the circularity mentioned in the *Críth Gablach* is not maintained, but it is noteworthy all the same.

Unfortunately, while Stout offers the above figures, no interpretation is made as to why the figures are important. All of the ringforts in the area also seem to be treated as circular, with internal minimums and maximums measured. This can lead to vastly different figures as seen in the examples above, with oval and sub circular ringforts being far smaller. In the case of Brega there are 260 ringforts classed as circular – similar to 264 in Stout's study, however only 44 of these are provided with internal and external diameters, and it is difficult to know how many of Stout's samples were classed under other configurations. When a circularity index is calculated for the 44 Brega ringforts using the same method as Stout with the caveat above it returns a mean of 0.56, which is the minimum in Stouts survey and far less than the mean calculated in his two examined baronies of 0.88. It is also unlikely that in a region as powerful, economically wealthy and perfectly suited for agriculture, that the people were generally living in smaller dwellings than in parts of the country without these attributes. This can possibly show that while narrowly focussed studies are undoubtedly helpful, there can be wide regional variations which must be accounted for.

The diameter suggested above from the *Críth Gablach* is approximately 140 feet or around 42.5 meters, but the *Críth Gablach* is not explicit as to whether this is an internal or external diameter. Of the 260 circular ringforts in Brega there are 31 which have an external diameter of between 31 and 39 meters, far too many to all have been kings of *túath*. There are currently only 41 circular ringforts for which we have internal and external diameters. Of these, there are 4 which have diameters of between 39 and 42 meters. Of these, 2 are trivallate ringforts: Rodanstown (ME049-019----) and Rathtroane (ME048-014----). The other two are bivallate ringforts at Castleboy (ME031-033009-) and Rathe (ME005-033----). The average external diameter of these sites is 76 meters, with an average internal diameter of 39.75 meters, very close to the figure stated in the *Críth Gablach.* This also provides an average of 36.25 meters covering the banks and ditches, showing that the ramparts are almost as extensive as the actual living area inside. The combination of circularity and vallation would indicate that these ringforts may be the residences of kings or at least higher

nobility. None of these ringforts have been excavated however, so this cannot be reinforced by finds of high status goods on the site. Juxtaposed to this is the fact that the three ringforts with the biggest overall diameters have very different internal diameters, 52 meters each for Rathdrumin and Trevet Grange, and only 20 meters for the most prestigious quadrivallate site in the area at Tlachtga. All of this makes the whole picture still quite complicated

Stout also gives an average overall diameter of 47.9 m for Ikerrin and 52.3 for Clonlisk. Of the circular ringforts in Brega that figure is 41.06 m. Stout also states that 37% of ringforts have overall diameters of between 40 and 49 meters. Again, in Brega this figure is 18.07% - a stark contrast. Even if a very rough calculation is done and the longest measurement is taken for sub circular ringforts and oval ringforts and this is averaged with the diameter for circular ringforts the figure is still only 21.43 m. While this again highlights regional differences, it also strongly highlights the dangers of reducing the measurements for ringforts to a single diameter figure. It is considered here to be unlikely that the population of a kingdom as prestigious, economically powerful and culturally prominent as Brega, would live in smaller settlement sites than in other parts of the country as a general rule.

Another issue which undergoes much discussion in the literature is the dating of ringforts. In general, the main period of ringfort building is agreed to occur between AD 600 and AD 900 and continuing to reduce until around 1000 AD (Stout 1997). However, there have been examples of ringforts built in the Bronze Age (Barry 2000) and Iron Age, such as the ringfort at Cloongownagh, County Roscommon which would seem to have been a continuation of an Iron Age settlement upon which a ringfort was built (Lennon 2000). If this was a common practice it may in part indicate why Iron Age settlement has been so hard to identify in the landscape. Table 5.3 shows the nine sites extensively excavated by the NRA in Brega, primarily associated with early medieval settlement, and the spread of occupation at those sites.

Table 5.3: Spread of dates for 9 NRA sites in Brega

Name	**Meso** 8000 BC – 4000 BC	**Neo** 4000 BC – 2500 BC	**Bronze** 2500 BC – 500 BC	**Iron** 500 BC – 400 AD	**EM** 400 AD – 1100 AD	**LM** 1100 AD - 1600 AD
Raystown		✔	✔	✔	✔	
Castlefarm 1		✔	✔	✔	✔	✔
Roestown 2	✔	✔	✔		✔	✔
Dowdstown 2			✔		✔	
Ross 1		✔	✔	✔	✔	✔
Ross 2			✔	✔	✔	
Boyerstown 3			✔	✔	✔	
Ardbraccan 2			✔	✔	✔	
Calliaghstown 1			✔	✔	✔	

Meso = Mesolithic; Neo = Neolithic; Bronze = Bronze Age; Iron = Iron Age; EM = Early Medieval; LM = Late Medieval.

As can be seen in four of the nine, settlement at the site was recorded as beginning in the Neolithic period. Each of the nine sites had settlement evidence of some type in the Bronze

Age, showing that site selection must have had some cultural influences in addition to the environmental and spatial considerations mentioned in other parts of this study. This factor makes the spatial interpretation of site settlement more difficult. It must also be noted that the evidence for late medieval occupation on the three sites above are dated to the very early part of that period, with the latest being radiocarbon dated to the thirteenth century. The evidence above also shows a continuity of thought in relation to what constitutes a suitable place to live, in other words, a site that was deemed suitable in the Bronze Age seems to have still been considered suitable in the early medieval period. This lends weight to the idea that environmental considerations overrode the cultural when deciding where to settle, as distance to water, slope, height and aspect would not change appreciably over the intervening years.

This leads to the question of why there was an upsurge in ringfort building in the 6th century. This is particularly difficult to ascertain, but several important social and cultural changes were occurring in the country during the period. One of the most important, but also the one with the most nebulous links to settlement archaeology, was the introduction and expansion of Christianity. While there is lots of ecclesiastical archaeology in Brega, linking the flourish of Christianity to changes in how secular settlements were built is tenuous at best. It can be argued that there was a change in the distribution of settlement sites to ensure links with ecclesiastic sites, but not that this had a direct impact on the morphology of the settlements themselves.

One factor which may have had a more direct impact was the explosion in population during this time. One strand of this explosion was likely to have been the introduction of dairying at sometime soon after AD 600. Dairying became “of central importance in the diet of this period” (McCormick 2008, 211). The increasing availability of a supply of nourishing milk and its use for other foods such as cheese enabled population increase. This, along with the economic value of cows was intrinsic to the clientage system.

Cattle were “the normal currency of the Irish” (Kelly 2015, 113) and it would be difficult to overstate the economic and social value of cows at this time, even while acknowledging the increase in arable agriculture. As well as the value of dairy products and meat, social and legal status was based on the number of cows a person owned.

From a landscape viewpoint the increase in need for grass for dairy cows and an increase in arable farming led to wide swathes of forest being cleared. On an individual basis, the value of these animals could have led to the construction of the banks and ditches around a ringfort to protect the animals. Even the loss of one cow could be ruinous for a family. Different grades of farmers would loan or borrow cows from the level above, and some of the offspring must be repaid after a period of time. Loss of a cow could ensure levels of debt that were difficult if not impossible to recover from, and even result in a loss of personal status for the farmer, possibly lowering his honour price - an appalling loss in a society as strongly hierarchically structured as Ireland. The gaining of a cow though, especially through raiding, could not only increase the wealth of the raider, but also demonstrate military or political power and was one way in which a newly inaugurated king could garner a reputation (Lucas 1989, 146-148).

The main reason for losing a cow, other than disease or climate, was more likely to be down to other people in the form of stealing and cattle raids, which seems to be almost a form of sport in some of the saga tales of the Iron Age such as the *Táin.* This was reasonably common according to some commentators (Patterson 1994). The structure of the defences of a ringfort, banks and ditches, would seem to be aimed more at humans than natural predators such as wolves. A bank presents no real impediment to a wolf while the width of the ditch would have to have been much wider than is common to prevent a wolf jumping it or climbing through it. However, a simple wooden palisade of a certain height would have made it impossible for wolves to attack animals kept inside. In the past it has been difficult to ascertain exactly how prevalent wolves were in Ireland at the time, as it was challenging to

differentiate between their bones and those of domesticated dogs. Prevailing thought was that the “dividing line between dog and wolf is uncertain” (Hencken 1950, 226). However, more recent studies have been able to differentiate between archaeological and modern dogs and wolves (Janssens et. al. 2016) and going forward these new techniques should shed more light on the matter.

Wolves were mentioned in the hagiographies and other sources quite commonly, and often not in the form of a predator. For example, Plummer (1922) tells us of Saint Maedoc of Ferns who fed 8 wolves. It is likely that Saint Maedoc was in the minority as the breeding of the Irish wolfhound to combat these predators can attest. The destruction of the forestry which was their natural habitat reduced their numbers, but did not completely eradicate them. The Cromwellians introduced bounties for their killing much later, evidence of their continued menace, and they were eventually hunted to extinction (Power-Bratton 1989). An interesting aside, but one without any depth to the analysis is that links have been drawn with the fact wolves would seem to be more prevalent in Ulster, Laois and Offaly, which coincide with the areas of most dense ringfort siting. Hickey (2000, 187) does argue that ringforts were built “partly as a defence against wolves and to protect livestock, over the period 1000 BC to AD 1000”. Unfortunately, he is a geographer rather than an archaeologist and his dating of sites in any major way to 1000 B.C. tends to undermine his argument.

Chris Lynn (2005, 15) has argued that with an average diameter of 30-40 metres, ringforts would not have had much room to bring cows inside in times of danger. This point is debatable. While it is undoubtedly a relatively small space, Lynn’s point makes no allowance for how many cattle would be enclosed during a period of danger or overnight, for example 2 or 3 cows owned by a small farmer brought in only after dark is unlikely to place an undue burden on the enclosure. Modern distaste for close proximity to farmyard animals including their smells and ordure is unlikely to have been at a similar level at the time, so it is entirely likely that cattle could have been brought inside for defensive purposes and not necessarily

for long periods of time. This is confirmed by the historical sources. In the *Corpus Iuris Hibernici* Volume ii, translated by Binchy (1978, 564–5) we are told “If it is pigs in a stye they spend the night, if cows it is in a cattle enclosure, horses in their proper fetters or in a stable, sheep in a sheep-pen”. These pens and enclosures were inside the ringfort and created a separate place to pen the animals while still keeping them safe.

The defensive aspects of ringforts have been much debated. Lynn (2005, 15) argues that “ringfort defences were not strong enough to resist even a few determined assailants”, and Kelly (2000, 64) agrees stating ringforts were “clearly not designed to provide protection against human aggressors”, while Mallory and Macneil (1991) disparage many of the defensible aspects of a ringfort. What most of the commentators on the defensibilities of ringforts seem to focus on is just that – the defence – without recognising the role of the attacker. There were no standing armies at this time. Armies, or even small cattle raiding parties, were made up of men who in the normal course of life farmed their land. As such an injury or death could be ruinous, both in the loss of the ability to work and so feed themselves and their families. A loss of status might also accompany disfigurement or loss of a limb. As wives and children’s honour price was related to that of their husband/father, the consequences of injuries sustained in battles were quite wide ranging. It would be impossible for any modern author who has not seen combat in a war zone to really experience what it would be like to face trying to cross a ditch and climb a wooden palisade while possibly being under fire from spears or other missiles, all the while knowing that any injury could mean a loss of the ability to support a family or maintain status. All of this risk for the possibility of stealing some, admittedly very valuable, cows or slaves. McCormick and Murray (2007, 110) have made this point and go on to suggest the objective of a cattle raid is to steal cows without exposing the attackers to unnecessary danger. It would seem to this author that the very existence of the defensive aspects of a ringfort would act as a deterrent to raiding on a small scale and others have made this point also (McCormick 1995; Lyttleton and Monk 2007).

Just as today we lock gates at the front of driveways and have alarm systems on houses – none of these are difficult to overcome for an even mildly interested burglar, and yet most homes will have at least some form of deterrent in the hope that an offender will move on to an easier target. There is a sense of security in being in your home with the gates and doors locked and the alarm set – it is hardly surprising that people in the early medieval period wanted to feel the same sense of security.

On a larger scale it is true that a ringfort would not be defensible for any length of time, however the same can be said of stone castles in later periods which also succumbed to attack, burning and destruction from time to time. This was no deterrent to building them and meant they were immune to all but larger scale, more determined attacks. The risk of the cattle being stolen while outside is lessened by having no vehicular transport. Driving cattle in broad daylight is a slow process, and allows time for the owner to catch up, perhaps enlisting help from other members of his *túath* or surrounding ringforts in catching the offenders. Raiding at night however would allow a longer period of time to get away with stolen cattle and make it harder to be tracked, leading to the belief that cattle were brought inside at night and a guard left on duty to warn of any impending assault

Chapter 6 discusses in detail the possibility of the modern N52 road loosely demarcating the line of the Pale, defined by a line of Anglo-Norman mottes. On further analysis figure 5.8 indicates that this line was an approximate interface between the Anglo-Norman settlements and the indigenous ones and Barrett (1972, 35) has noted the “positive correlation between areas which, despite their favourable environmental variables, exhibit low ringfort densities and those areas which exhibit prolonged and intensive Norman occupation”. McNeill (2017–18, 137) has argued that this group of mottes were specifically military sites due to their proximity to a border, in this case likely to be the borders of the Pale. They had specific characteristics such as being more closely spaced and placed closer to routeways probably

in an attempt to provide support to each other in times of need and also to control movement through the landscape.

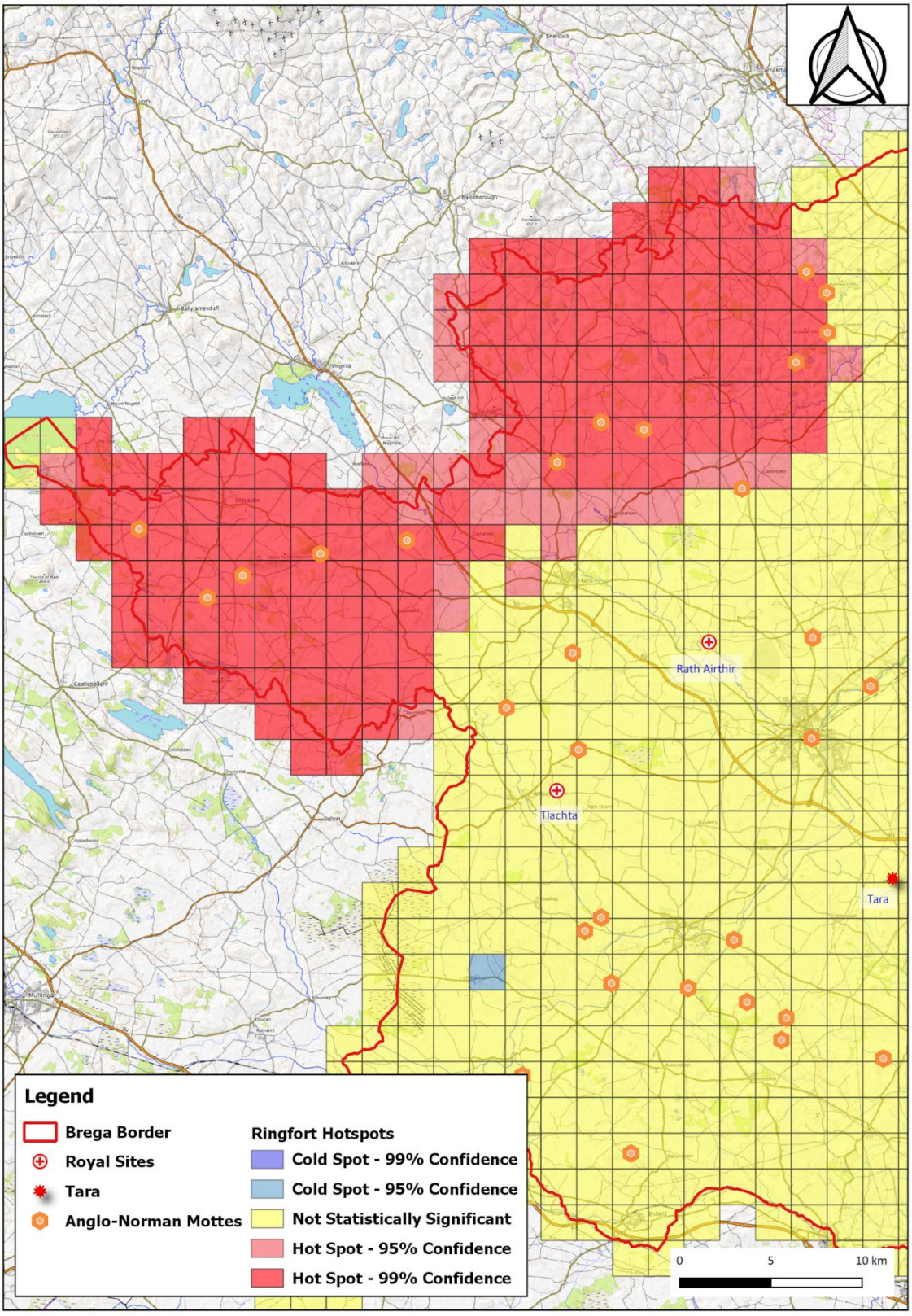


Figure 5.8: Interface between areas of high clustering and Anglo-Norman mottes (after OSM, NMS with additions)

At the edge or just inside the strongly, more condensed indigenous settlement area is a line of Anglo-Norman Mottes. These defensive structures are sometimes confused with raised ringforts – ringforts in which the interior has been built up. To add to the confusion it has been argued (Dickinson & Waterman 1959) that sometimes a raised ringfort, such as the one at Castleskreen, Co. Down, was built and occupied, then occupied and converted into a motte by the Anglo-Normans, and then reoccupied by the native Irish.

Graham (1975, 230) has argued that the colonists were concerned with strategic problems, and the mottes were built in these areas to directly address these concerns. It would seem that these mottes were built to contain the native population, to the north east even going so far as to curl around the area of dense settlement, possibly in an attempt to hem in the population or provide early warning. To the west the mottes are built further inside the border, pushing approximately 6 km inside in some cases. In either case it has been argued that the placement of these mottes was designed to protect river crossings and travel along the major river valleys of Meath (ibid.).

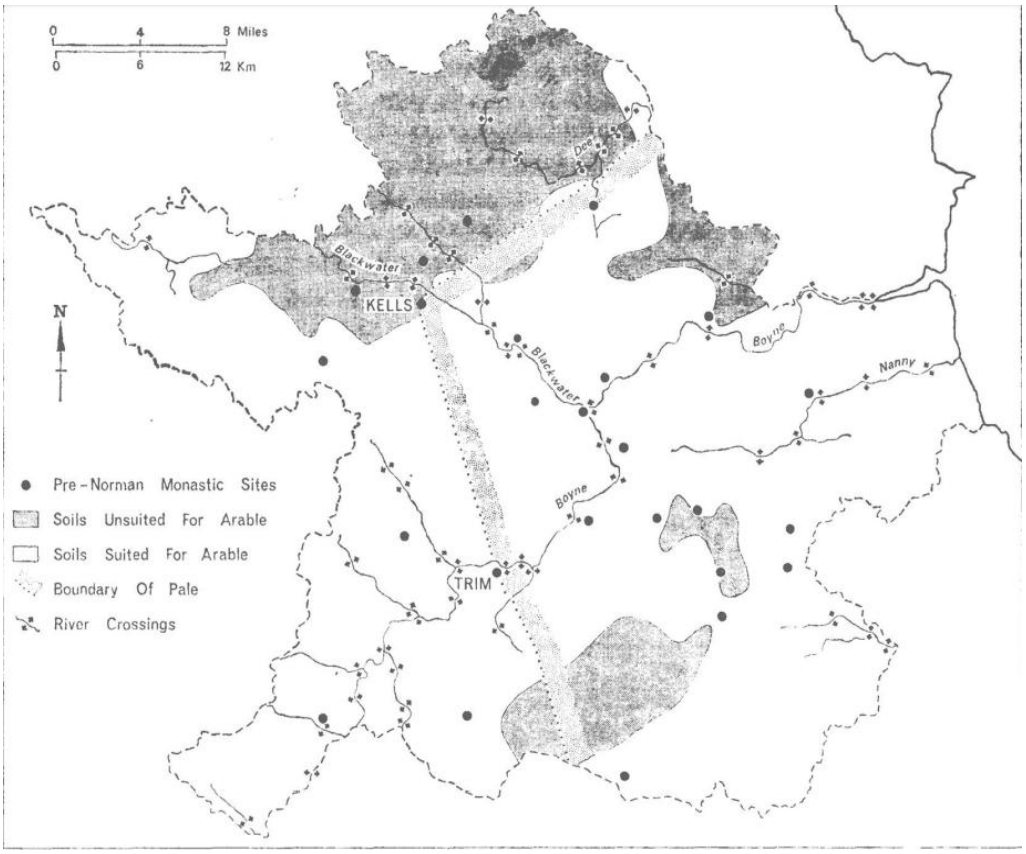


Plate 4: Boundary of the Pale and soil suitability for farming (After Graham 1975)

Graham (1975, 231) argues that this area coincides with the boundary of the Pale although Davies (1976, 72) argues that the pale was a “frontier fixed at the end of the fifteenth century”, so it is likely that there were boundary changes prior to this time.

This area is also composed of land which is less suitable for arable farming which may be a contributing factor as to why there wasn’t a deeper push into the north eastern side, but on the north western side where the soils and farming was better the penetration was deeper. While the boundary line of the Pale was an Anglo-Norman construction, the early medieval Irish had many different forms of boundary markers and some of these are explored in section 4.4. It is likely that there was a border of some type here before the arrival of the Anglo-Normans.

Lynn (2005) makes an argument for the construction of ringforts as a protection against plague and lists 13 episodes of plague and pestilence taken from the Annals of Ulster (AU). He argued that the sweep of the plague in the AD 540’s reduced the population by 25%, although references to this are sparse and unclear (Dooley 2007). The later plagues, or recurrences of the same plague, in AD 664 and AD 684 are referenced in the sources more widely and would seem unequivocally more destructive (Molgaard et al. 2012). Juxtaposed to this argument is the fact that ringforts were being built before these dates and the population increased dramatically during and just after this period. It would seem unlikely that this was the main cause of people isolating themselves in ringforts.

A factor contributing to a large increase in the population were the improvements in agricultural technology. O’Neill (2013, 81) suggests that “the means of production developed from tools like the quern, a single-user, labour-intensive, low-output device, into larger-scale, more mechanised tools”, such as the change from quern stones to water mills. While these larger devices were obviously not as ubiquitous, society at the time allowed for people to own shares in them and distribute the responsibility of ownership as mentioned in the *Críth Gablach* in relation to the responsibilities of an *ócaire*: “he has a quarter of a ploughing outfit”

and “A share in a kiln, in a mill, in a grain store” (Binchy 1941). This enabled food to be produced and stored more efficiently, producing larger quantities with less labour, and thus contributing to the increase in population.

5.6 Distribution and Clustering

Having said that a GIS has many tools for spatial analysis, some specific ones are used here to assess patterns of distribution and clustering. A simple question such as just how far away ringforts were from each other leads to a wide range of questions, a selection of which are addressed here.

These questions are difficult ones to analyse visually on a simple distribution map of such a large area. In the case of Brega this is particularly challenging with 494 ringforts currently present in the landscape. Distribution of sites over a landscape is a question which has a “long pedigree” (Bevan 2020, 60) and absorbed a generation of archaeologists. Distribution maps are included in almost every paper or book on archaeology and have an “orthodox history” (Gillings et al. 2018, 8), yet are not often studied in detail to assess trends in their siting. This is possibly due to the distribution map being so ubiquitous that it almost goes unnoticed except as a visual aid.

O’Sullivan et al. (2014, 48) justifiably argued that there were no nucleated settlements at this time. However, the GIS allows us to analyse the distance between each ringfort and its nearest neighbour. Density of settlement differs greatly between the areas north and south of the N52 road. When queried we find the mean distance between ringforts in Brega as a whole was approximately 980 meters, although in the more densely populated area north of the N52 road this figure drops to 613 meters. A more appropriate statistic is the median, which is 609 meters for the kingdom as a whole, and just 474 for the area north of the N52. The mode for both areas is 297 meters. It is important to note here that these distances are

taken from the centre point of each ringfort, and so the actual distance will be reduced even further by the radius of both ringforts as seen in figure 5.9.

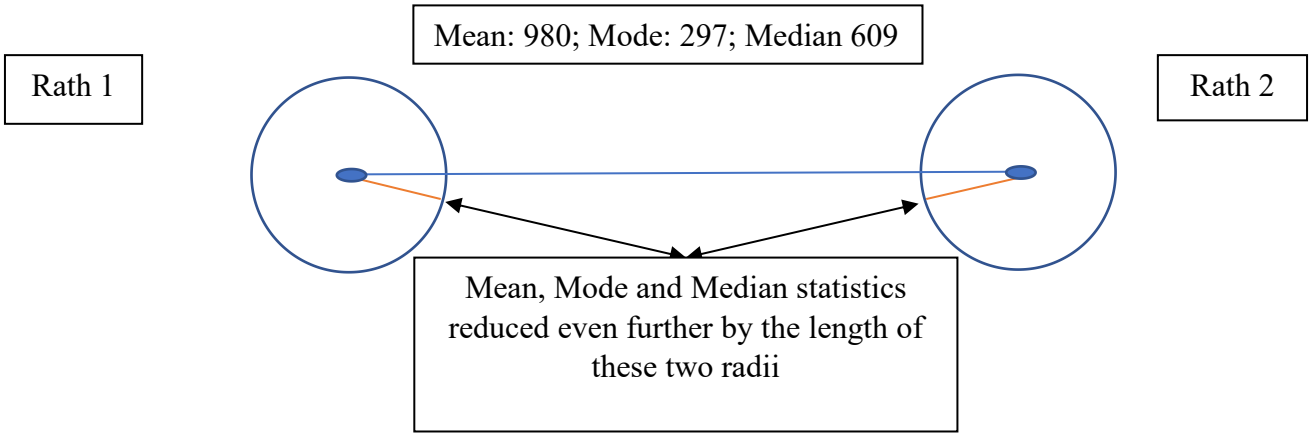


Fig 5.9: Distances between ringforts (Figure by Author)

This shows that in general the spaces between ringforts were quite small. If we consider that in the area north of the N52 the distance between the ringforts was split equally between the people living in each – which admittedly there is no concrete evidence for – then each ringfort would have influence over approximately 150 meters around the settlement. It must be accepted that this is a very approximate figure. As stated at the start of chapter 2, not all of these ringforts would have been built or occupied at the same time or even have the same function as living spaces. What it does possibly indicate is that in a situation where ringforts were close together and one became abandoned, it is unlikely that the neighbour levelled the banks and ditches of the abandoned ringfort to increase his own holdings, or the density of ringforts in the landscape would be even higher. Figure 5.10 depicts a section of the north eastern part of the kingdom. It shows that people preferred to build on slightly higher ground which constrained their settlement practices and this is discussed in more detail later in this chapter. What it can also possibly intimate is that in certain areas of the country it is possible that the data set is almost complete or quite close to it as it is easy to see how closely the ringforts were spaced.

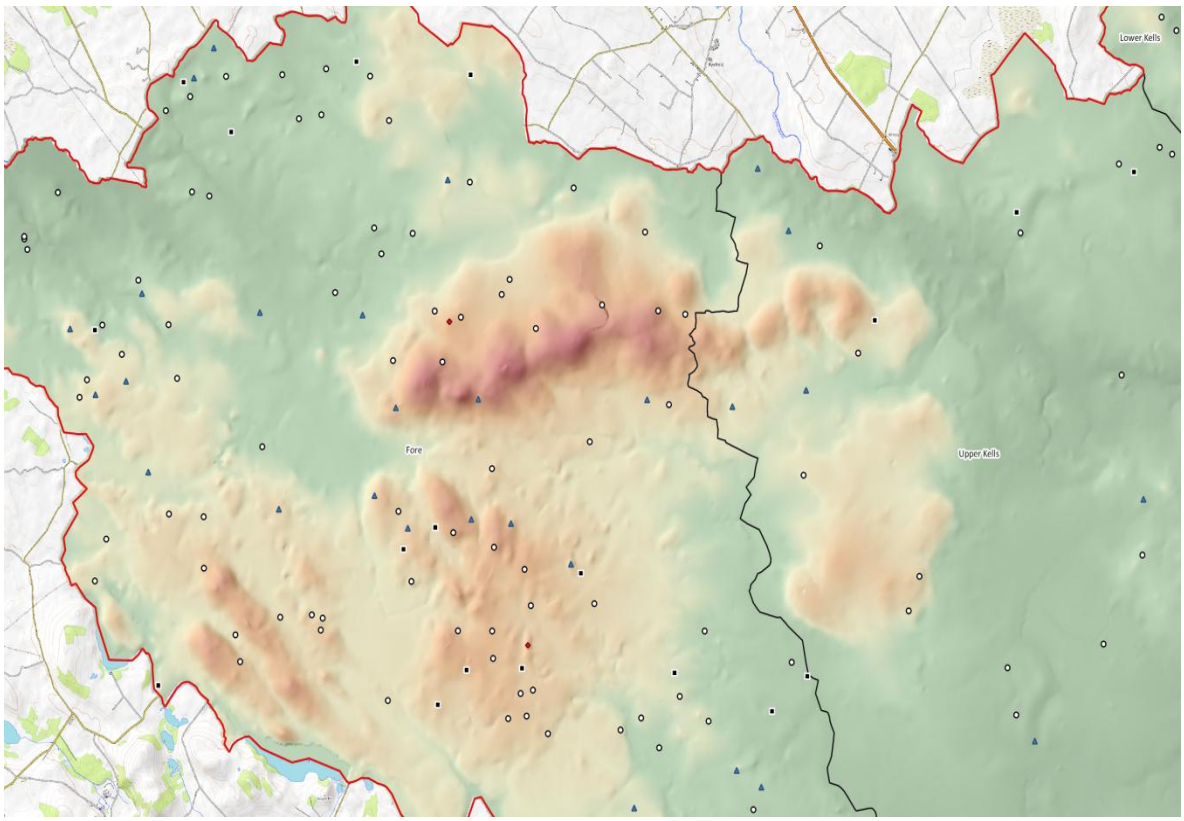


Figure 5.10: Spacing of ringforts in north eastern Brega (after OSM, EU-DEM, NMS with additions)

Therefore, it is possible that the need for nucleation in the traditional sense is obviated as the ringforts are so closely spaced so as not to need nucleation. Communal items such as ploughs and kilns were kept within family groups, and if groups were this close together it reduced the need for focal points within the community, as distances were not large. A common description of the siting of ringforts in Ireland is that they were “dispersed” (Comber 2019, 128), and a dictionary definition of dispersed is “spread widely”. While they were indeed spread widely all over the country, the term dispersed tends to conjure up an image of wide spaces between the ringforts, which the above statistics show is not the case.

A common theme throughout this thesis is one of scale. Traditional distribution maps try to represent the spatial aspects of settlement throughout Brega and often look something similar to figure 5.11, which is an overview of all the known early medieval settlement sites in the form of ringforts, crannogs and cashels in Brega.

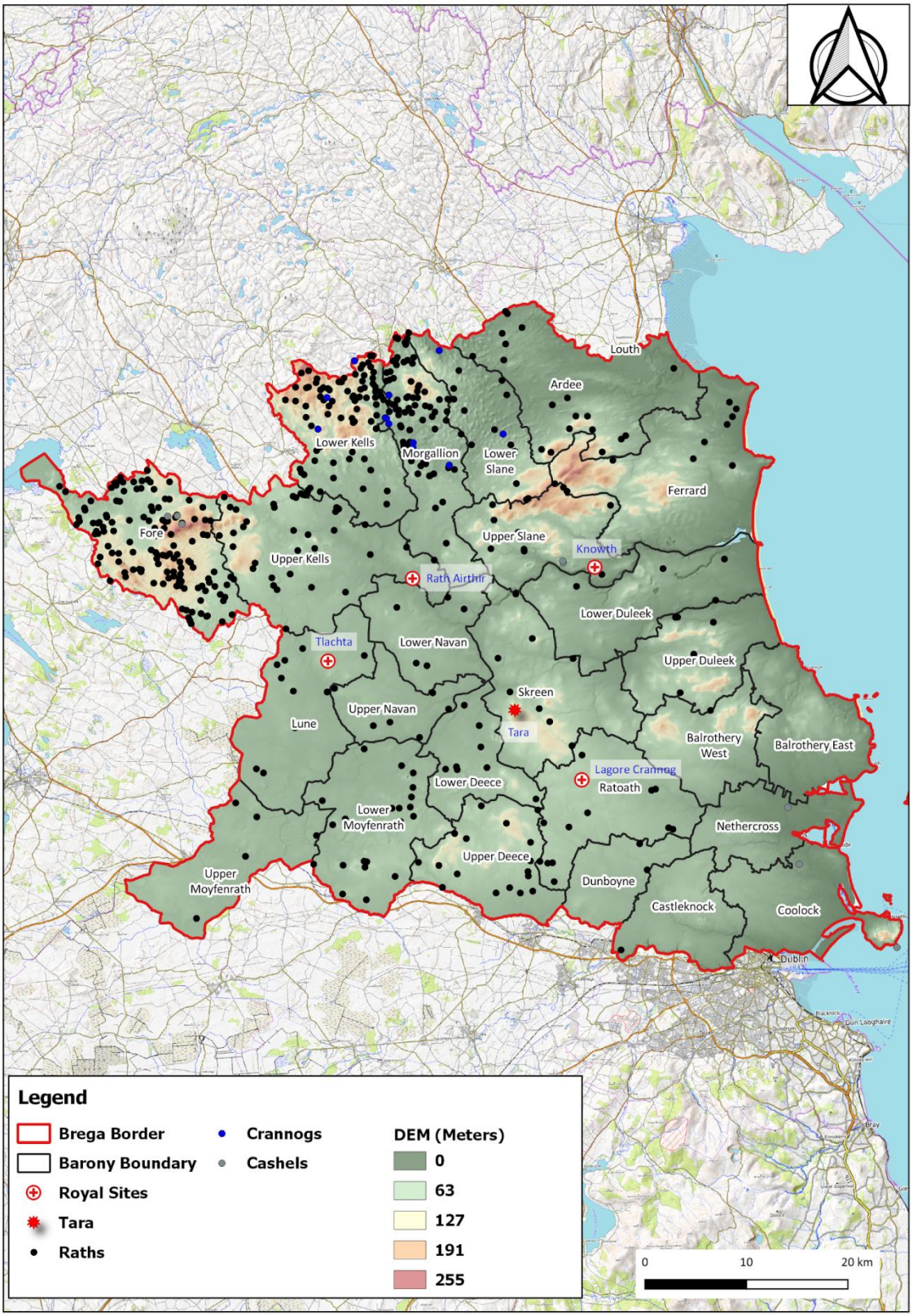


Figure 5.11: Ringforts, crannogs and cashels of Brega (after OSM, EU-DEM, NMS with additions)

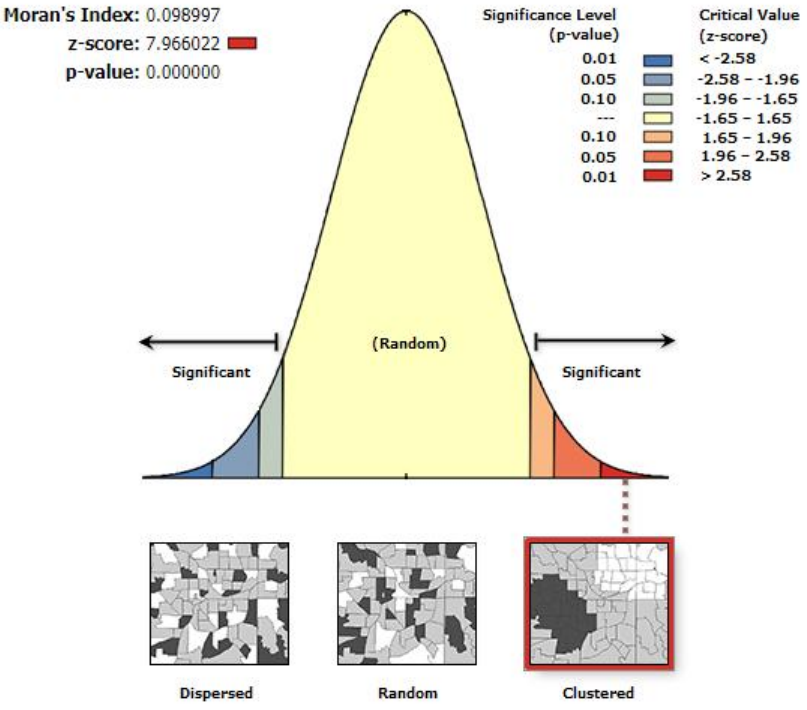
This distribution map shows 494 ringforts, 14 crannogs and 8 cashels in the area, a total of 516 recorded settlement sites. The scale involved in preparing and especially in printing this

map introduces difficulties in representing and visualising the data properly. Reducing a kingdom to one A4 page means that often sites which are close together become conflated into one single point on the map which can be misleading to the viewer trying to get an overall picture of the settlement density.

Notwithstanding this, the distribution of settlement sites such as these in their environmental context contain an enormous amount of detail which can be used for so much more than a basic map. Toolsets and software have been built which specifically target these types of questions, point pattern analysis being one such, and indeed point pattern analysis is important in many other fields, which has led to research into the statistical analysis of point patterns. There are many methods of examining clustering and some of these are used below.

The first step in any examination of clustering is to ascertain if there is any clustering at all. A comparatively easy way to do this is to compute the Moran's I statistic, which is a “powerful technique for the analysis of spatial patterning” (Premo 2004). While Premo was of this opinion in 2004, he also laments the facts that “relatively few” (2004, 86) archaeologists use this type of analysis, although these numbers seem to be increasing, especially since they are readily available tools in a GIS. The results of this statistic will inform as to whether there is any spatial correlation between ringforts in the kingdom and if there is a need to analyse further. This is a technique which comes from locational geography (Cliff & Ord 1973; Getis & Ord 1992; Haggett et al. 1977) and has gained traction in that field and others and is still widely used in archaeological research (Bachaga et al. 2020; Carrer et al. 2021; Vaz 2020). A Moran’s I index was run for the points representing ringforts in Brega. The result is shown in figure 5.12. This shows an extremely low P value - in this case the P value is rounded to 0 as the actual figure is more than 6 decimal places away from the decimal point. The Morans’ I value of 0.098 is also very low - anything below 1 means the ringforts are clustered so this

figure indicates strong clustering. The Z value of 7.96 shows that there is a less than 1% likelihood of this clustering happening by chance.



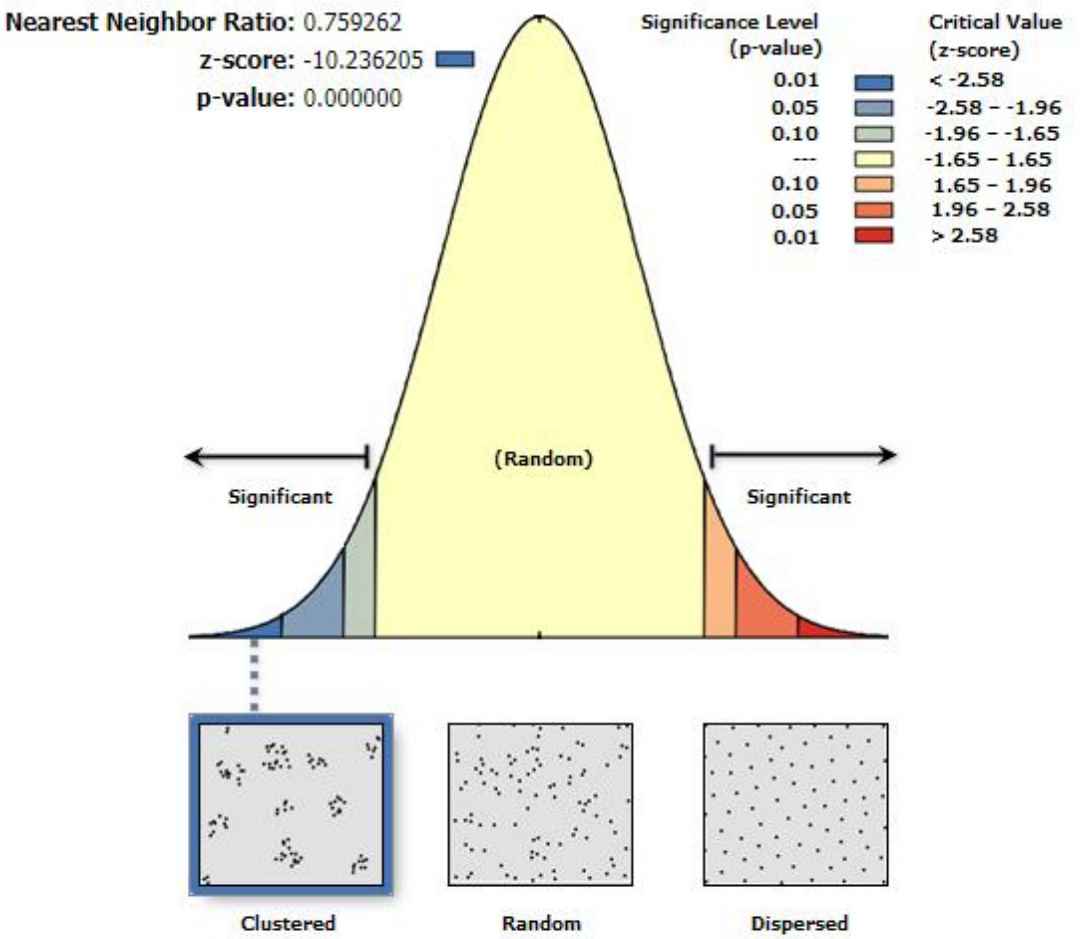
Given the z-score of 7.96602159771, there is a less than 1% likelihood that this clustered pattern could be the result of random chance.

Global Moran's I Summary	
Moran's Index:	0.098997
Expected Index:	-0.002028
Variance:	0.000161
z-score:	7.966022
p-value:	0.000000

Figure 5.12: Moran's I statistic results to indicate ringfort clustering in Brega (Figure by Author)

Having established that there is clustering present in the data, more detailed analysis can now be conducted. A combination of different software packages often returns the best results as they have their own specific strengths and weaknesses, and ArcMap will be used here. ArcMap has tools built in to analyse exactly this type of data, the Near tool and Nearest Neighbour Analysis tool. The Near tool calculates some simple statistics and results in the frequency distribution below. In the case of Brega the mean distance figure from one ringfort

to its nearest neighbour is 980 meters. There are some big differences here with the maximum distance being 8.3 kms, but also the minimum of 34 meters being very close.



Average Nearest Neighbor Summary

Observed Mean Distance:	980.3147 Meters
Expected Mean Distance:	1291.1415 Meters
Nearest Neighbor Ratio:	0.759262
z-score:	-10.236205
p-value:	0.000000

Figure 5.13: Nearest neighbour statistic for Brega ringforts (Figure by Author)

What the summary also shows us is the expected distance between them if ringforts were distributed completely randomly across the landscape of Brega. In this case, the expected

figure is 1291 meters, calculated using the method designed by Clark and Evans (1954) and sometimes called the Clark and Evans Index or Nearest Neighbour Index (NNI). This has been calculated by ArcGIS randomly distributing points across the surface and testing whether the actual distribution differs from the random. Clark and Evans (ibid.) suggest the data can be arranged in three categories where individuals might be random, clumped, or dispersed.

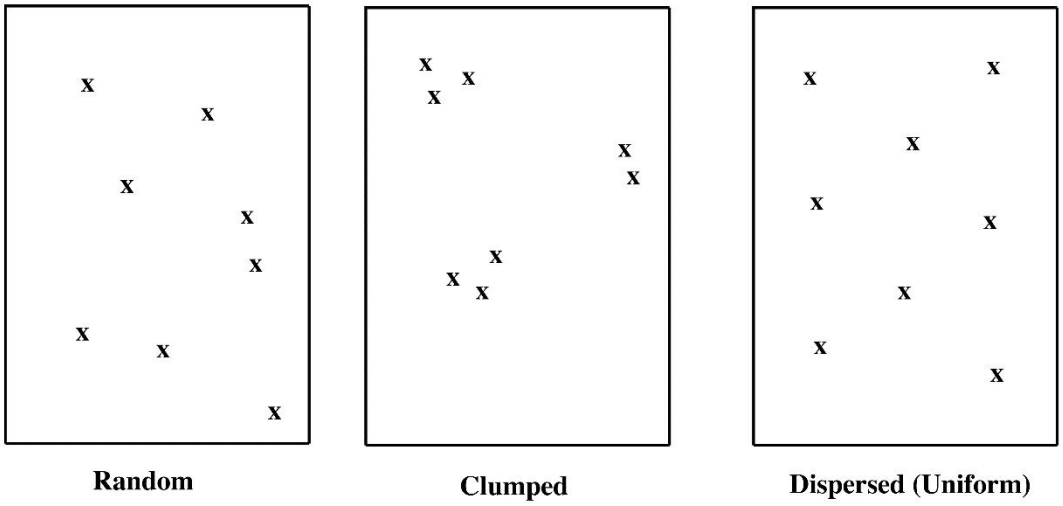


Figure 5.14: Distribution categories for individuals (after Clark & Evans 1954)
It is important to note here that each square above has the same number of individuals per area, they are just ordered differently.

It is noteworthy here to mention that care must be taken when analysing data in different software packages as results can vary depending on the package and algorithm used, and it is best to retain consistency by using one package for a particular technique. Table 5.4 shows the results for the same nearest neighbour analysis in Arcgis and QGIS using the same datasets.

Table 5.4: Differences in Nearest Neighbour Analysis results

	Observed Mean Distance	Expected Mean Distance	Nearest Neighbour Index	Z-Score
ArcGIS	980.31	1291.14	0.76	-10.24
QGIS	980.4	1457.28	0.67	-13.91
Difference	0.09	166.14	0.09	3.67

It can be seen that while the observed mean distance is the same, as would be expected, the algorithm used to create the expected mean difference is slightly different and this has a ripple effect on the NNI and Z-score. In this case, this does not change the value of whether ringforts are clustered or not and also the confidence in the statistic, but this bears attention if using other datasets and multiple software packages. Having said this, the figures used here are calculated with ArcGIS.

The actual figure of 980 meters divided by the predicted figure of 1291 meters gives a nearest neighbour ratio of 0.759, which being less than 1, shows clustering in the data and again shows us that ringforts are not randomly located in Brega. The Z score shows that there is a less than 1% chance that this distribution could have occurred randomly. With an average figure of almost 1 km between ringforts on surface inspection, it could be imagined that there was an approximate distance of 500 meters attached to each ringfort for its own personal agricultural requirements. We can draw a buffer area of 500 meters around each ringfort as seen in figure 5.15 to describe an approximate area surrounding it, with the caveat that a farm would obviously not have a circle circumscribed around it, and in reality is likely to have a more fluid boundary. The buffers can give us a general idea of overlap, however. On visual inspection there seems to be a lot of overlap, and when filtered these overlaps can be seen in Figure 5.16 below.

There is a definite increase in the number of overlaps in the north west of the kingdom, but that could almost be taken for granted due to the increased density of settlement in the area as a whole. The inset map at the top of the figure 5.16 shows that not only would this simple 500-meter buffer overlap in one direction it also overlaps with multiple other ringforts in different directions. By using the ArcMap Clip tool, we can clip the number of ringforts which are inside the areas of overlap and this shows a value of 201. This means that 201, or slightly over 40% of the ringforts of Brega exist within overlapping areas of approximately 500 meters. When this buffer is increased to 1 km this figure increases to just over 68% of ringforts in the overlapping zone. What this does is illustrate that in this denser area of settlement ringforts were very closely spaced, possibly removing any need for nucleation, or making it impossible in the first instance.

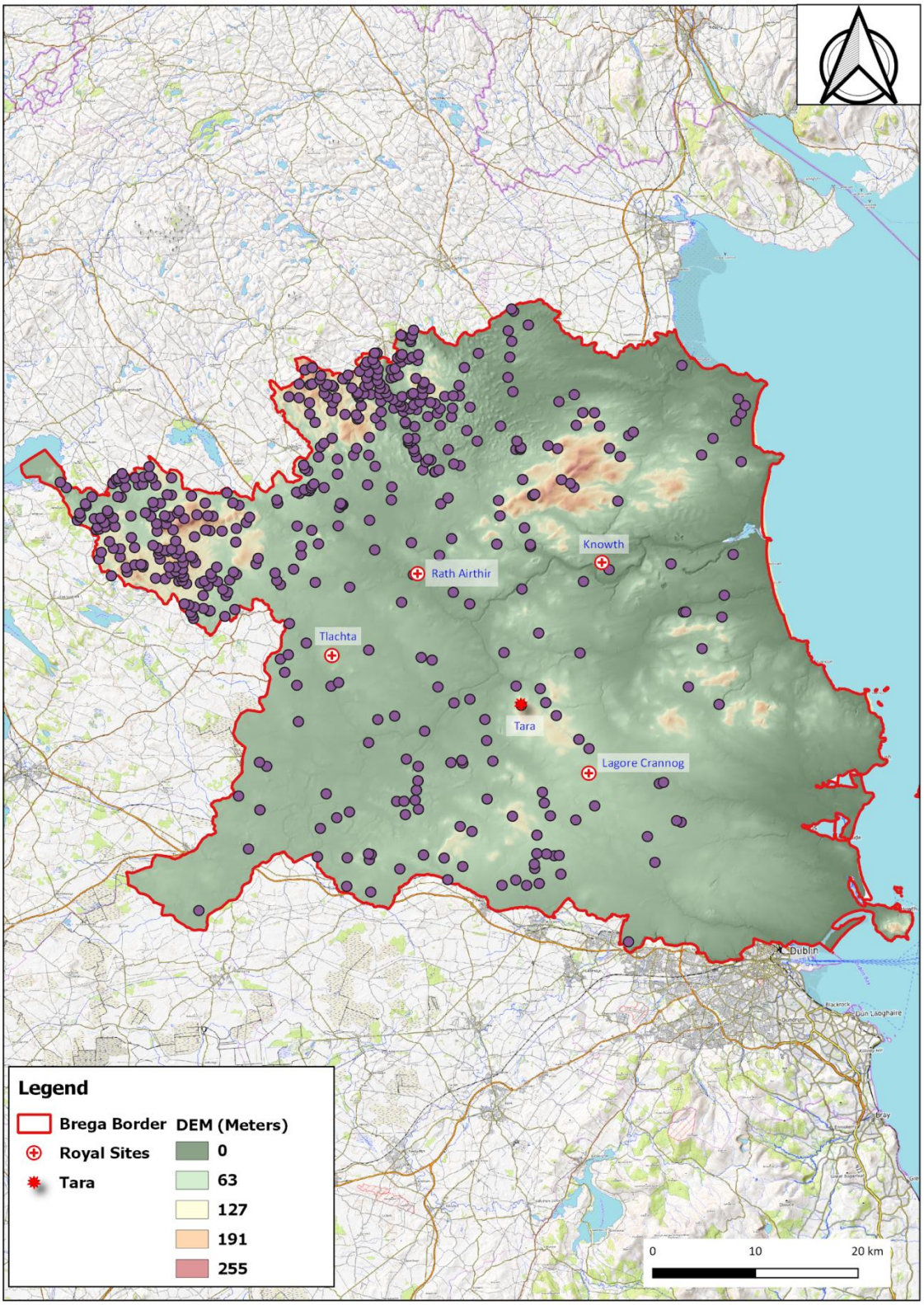


Figure 5.15: Ringforts with 500-meter buffer zone (after OSM, EU-DEM, NMS with additions)

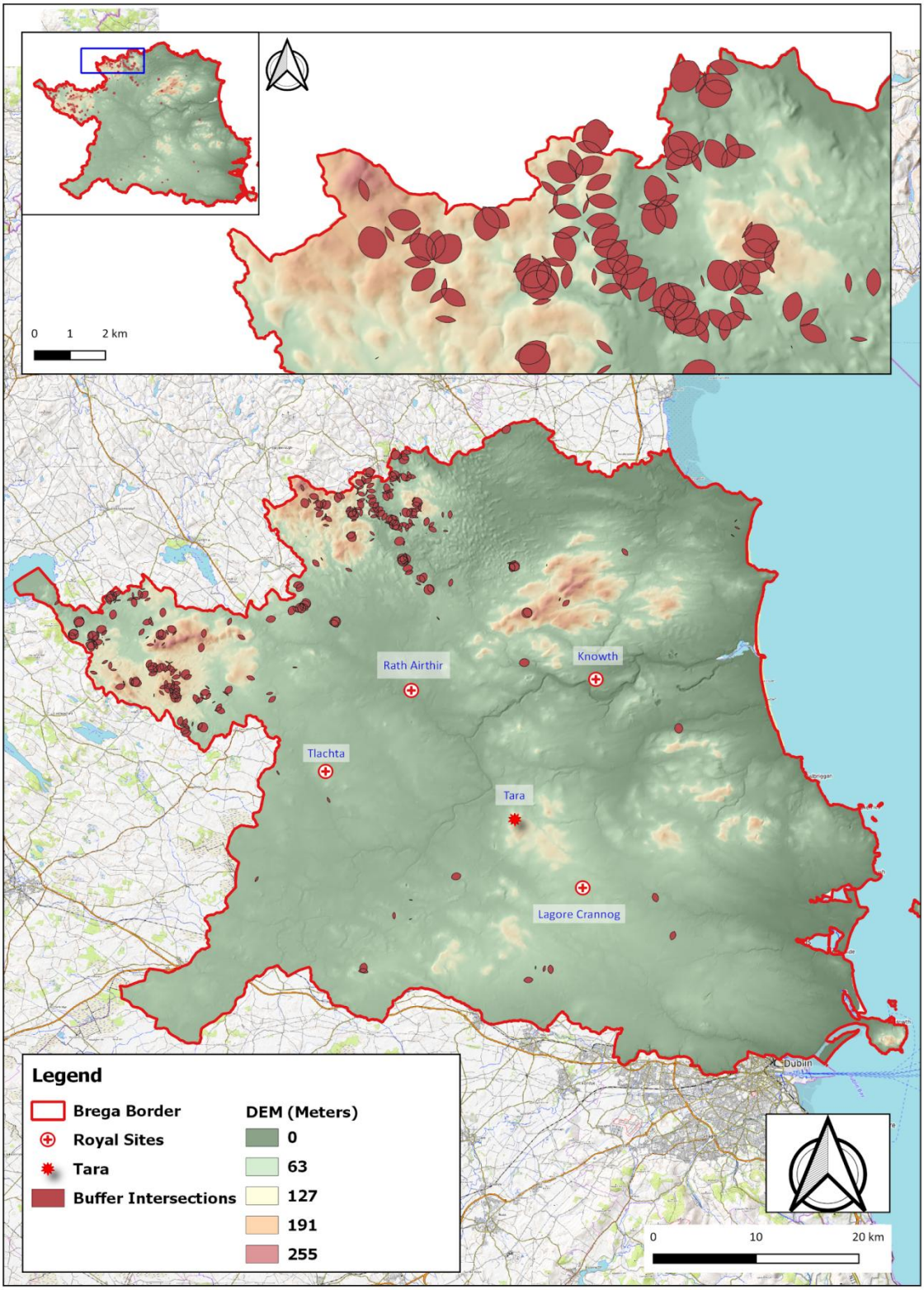


Figure 5.16: Buffer Intersection Locations after OSM, EU-DEM, NMS with additions)

While these statistics are very useful in trying to understand the spatial distribution of ringforts in Brega, the methods outlined above suffer from some major drawbacks. The main weakness of these statistics from an archaeological perspective is that although these methods can certainly tell us there is clustering in the data, they cannot tell us why. What it does show however is that ringforts were not isolated farmsteads with the caveat mentioned above that they were not all occupied concurrently. People lived quite close together and this could be the result from a number of factors, such as familial ties, sharing resources such as ploughs or for protection.

Another shortcoming of these types of spatial statistics are what are termed “edge effects”. Effectively what this means is that a ringfort near the border of Brega may actually have its nearest neighbour just across the border, and in effect may be far closer to a ringfort in Mide for example than another ringfort in Brega. Figure 5.17 shows the ringforts in the townlands which adjoin the border of Brega.

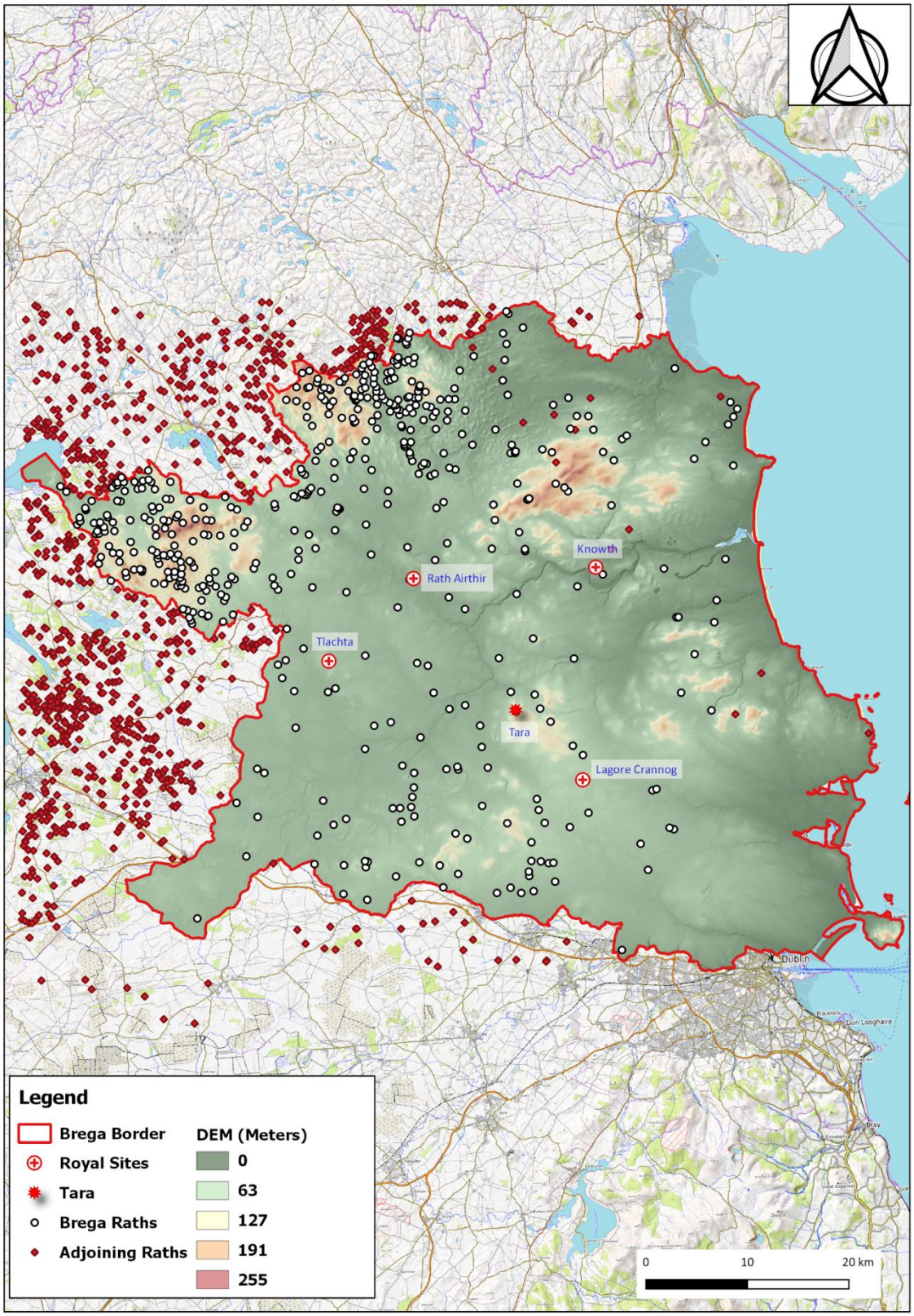


Figure 5.17: Ringforts in the townlands adjoining Brega after OSM, EU-DEM, NMS with additions)

Some of the more distant ones were stripped out to leave only the ringforts within 4000 meters of the border, leaving a dataset of 922 ringforts. It is immediately apparent that to the south of the M4 the density is far more sparse, and it is likely to be no coincidence that this area is both well within a region heavily settled by the Anglo-Norse and also quite heavily urbanised.

When we combine the ringforts both inside and outside the Brega border to see if the edge effects create a difference in results, the outcomes are reasonably substantial as seen in Table 5.5.

Table 5.5: Differences when edge effects are accounted for

Area	No. of Ringforts	Observed Mean Distance	Expected Mean Difference	NNI	Z-Score
Brega	494	980	1457	0.67	-13.91
Combined	922	782	1264	0.61	-22.16
Difference	428	198	193	0.06	8.25

This table shows that there are almost double the number of ringforts in Brega along a 4 kilometer buffer zone around the border. The effect of including these ringforts means the NNI drops from 0.67 to 0.61. In effect, the actual average distance between ringforts drops by almost 200 meters or just over 20%. The expected mean difference also changes, but not by as much at just over 13%. The Z-score also drops by almost 60%, showing that when these ringforts just outside the border are taken into account, they are even more strongly clustered. It also highlights the fact that in any analysis of a region with a fixed boundary, care needs to be taken in relation to the effects of edges and the difference it can make to results.

This could mean that the true nearest neighbour distances are likely to be smaller than the observed ones within the study area. There are many ways to try to combat edge effects but none of them are perfect (see Bevan 2019). The other major issue is the shape of the study area. Areas under study are often regularly shaped such as squares or rectangles, depending on the data available. These shapes will give inaccurate results when compared to irregularly shaped, but more accurate study areas. In this case the exact outline of Brega is used, omitting areas of the sea which would obviously be impossible to build on and so create a neighbour. This also reinforces the need to create as exact a boundary line as possible.

While these statistics are for the kingdom as a whole, there are two quite distinct areas within Brega, divided by the modern N52 road which is considered in more detail below. Due to the large differences in clustering in these two areas the average distance figures are skewed and it was decided to use ArcMap to divide the polygon representing the borders of Brega into two smaller polygons, one representing the northern, more densely settled area, and one representing the area where clustering is not present in order to compare the two. The two are markedly different in relation to their areas. The clustered area is the much smaller of the two representing only 523 sq. kms with 321 ringforts present while the unclustered area measures 2771 sq. kms with 173 ringforts present. This returns a settlement density in the clustered area of 0.61 per sq. km while in the unclustered area it is only 0.06 per sq. km. When the kingdom as a whole is considered, it returns a settlement density of 0.15 ringforts per sq. km. These figures are discordant with the figure for Meath espoused by Stout (2000, 62) of 0.28 per sq. km. This is partially due to the inclusion of the baronies from Louth and Dublin in the overall makeup of the kingdom rather than the baronies which strictly make up Meath.

The 27 baronies which make up Brega show vastly different numbers of ringforts as would be expected given the evidence above.

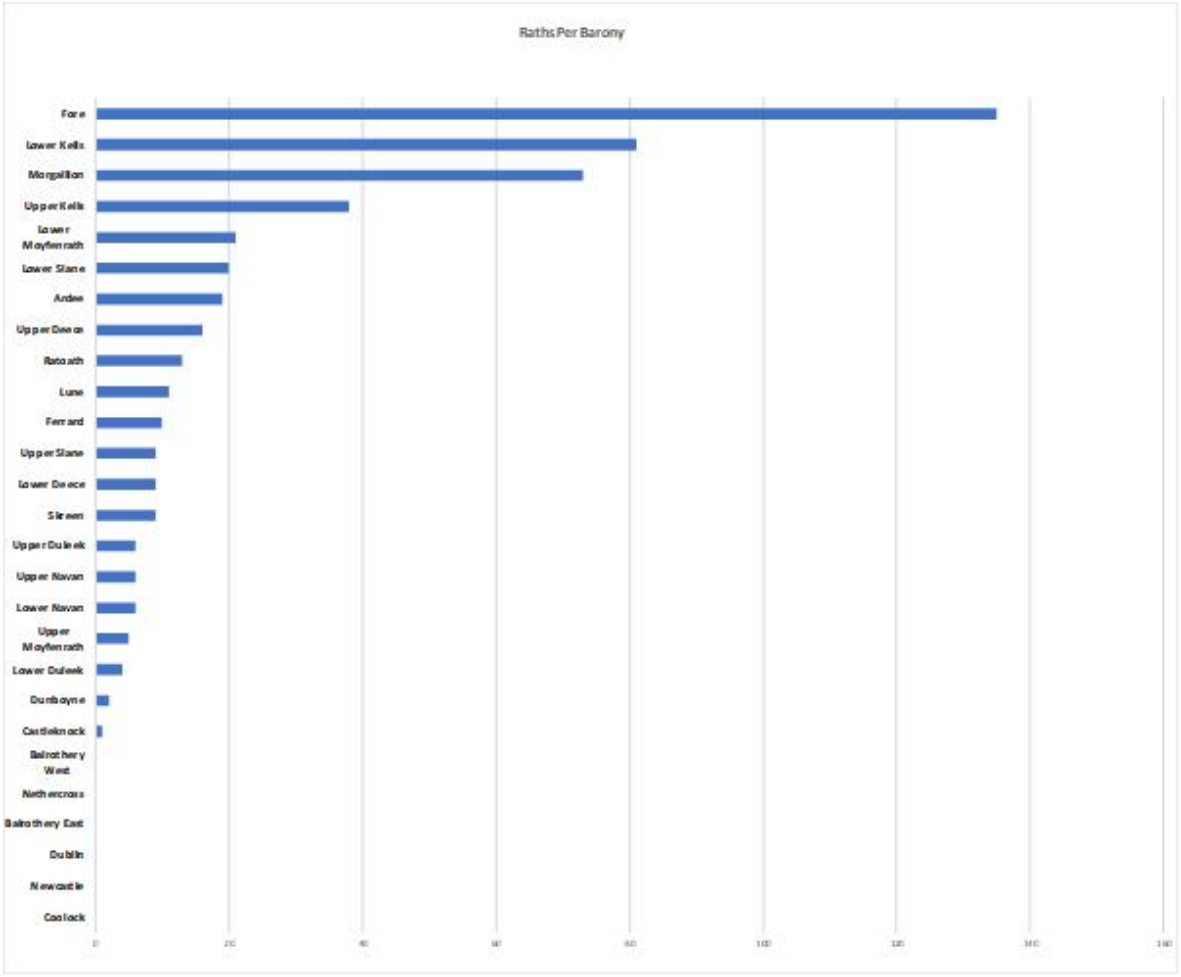


Figure 5.18: Number of ringforts divided by barony (Figure by Author)

It is perhaps not immediately obvious to a reader without a reasonable knowledge of the geography of the area that the baronies with the lowest ringfort numbers are those from County Dublin and are predominantly heavily urbanised, and the highest numbers appear in the more rural baronies of County Meath.

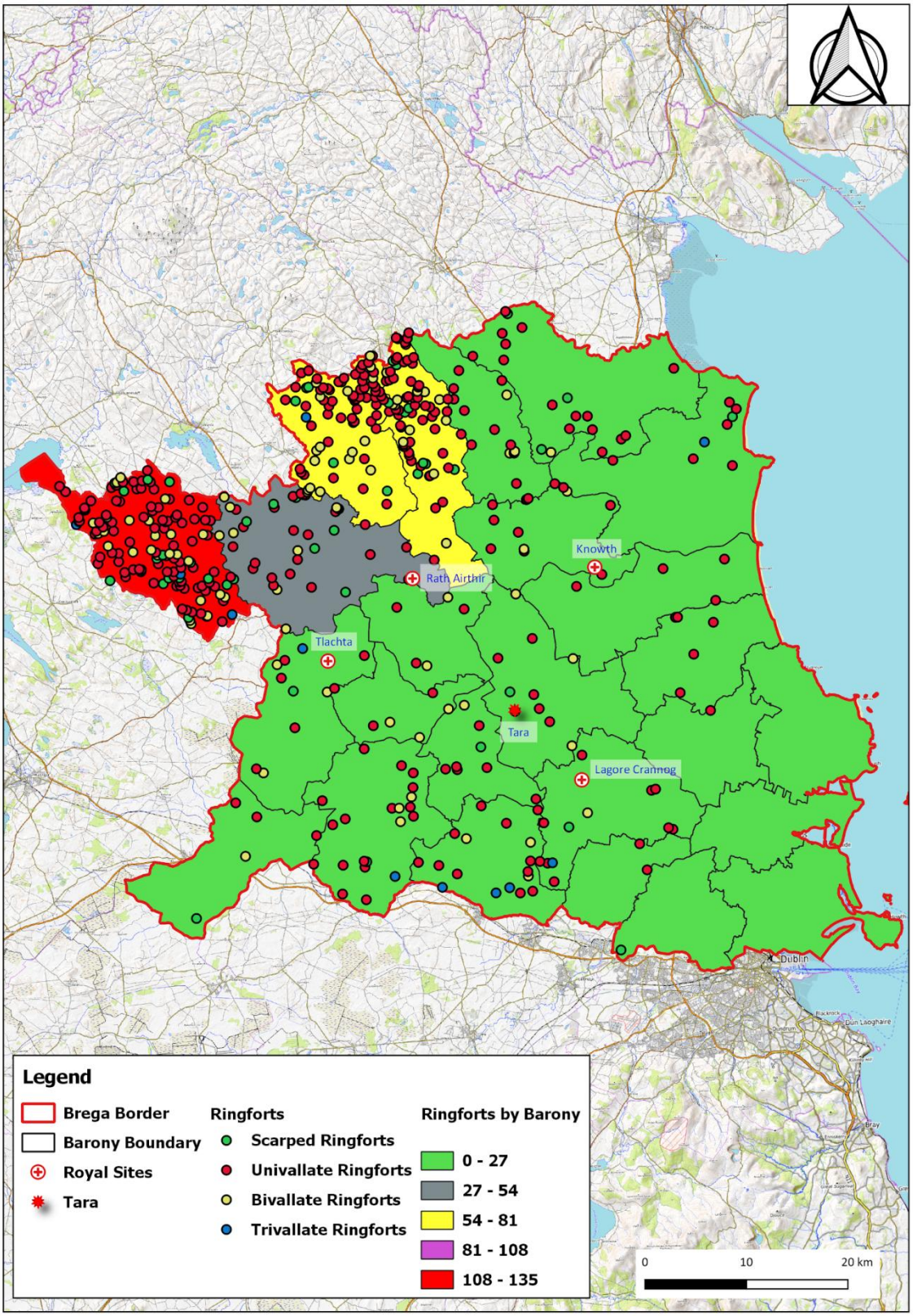


Figure 5.19: Map of ringforts divided by barony (after OSM, EPA, NMS with additions)

It is reasonably easy to see that settlement is more clustered in the western part of the kingdom and sparser in the east. What is more difficult to define from the traditional distribution map is exactly how clustered the settlement sites actually are, and where the dividing line between them is. ArcGIS has many tools that make this easier to define and visualise. In the Spatial Analyst toolbox there is a tool called Optimised Hotspot Analysis. This creates a “fishnet” of grid polygons across the defined space, in this case defined by the borders of the kingdom and aggregates the number of sites in each cell of the fishnet, and colour codes the cells according to how “hot” they are. The fishnet is used as it has evenly defined cell sizes. The particular advantage of this tool is that it then analyses whether the level of clustering is statistically significant and gives a percentage as to how sure the results are. As can be seen in figure 5.20 there seems to be a strong dividing line formed by the modern N52 road. To the west of this line the ringforts are heavily clustered with at least a 95% confidence. However, to the east of this line the clustering is not statistically significant. There are also “cold spots” where clustering is definitively not significant, to a 99% certainty. These correspond with the earlier statement that there has been too much development and removal of sites in the heavily urbanised areas of Dublin and Meath to gain a true picture of settlement before large-scale urban building.

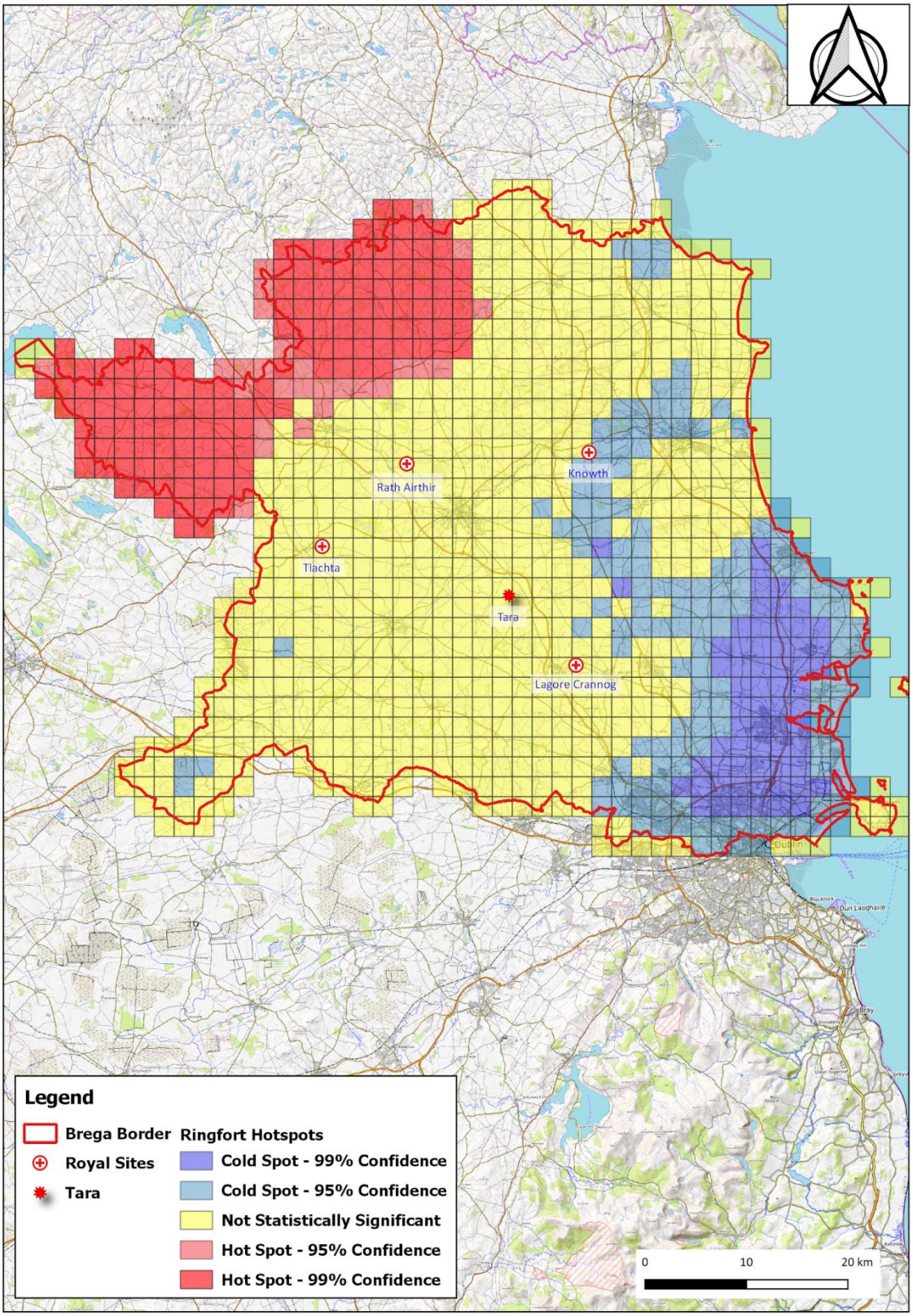
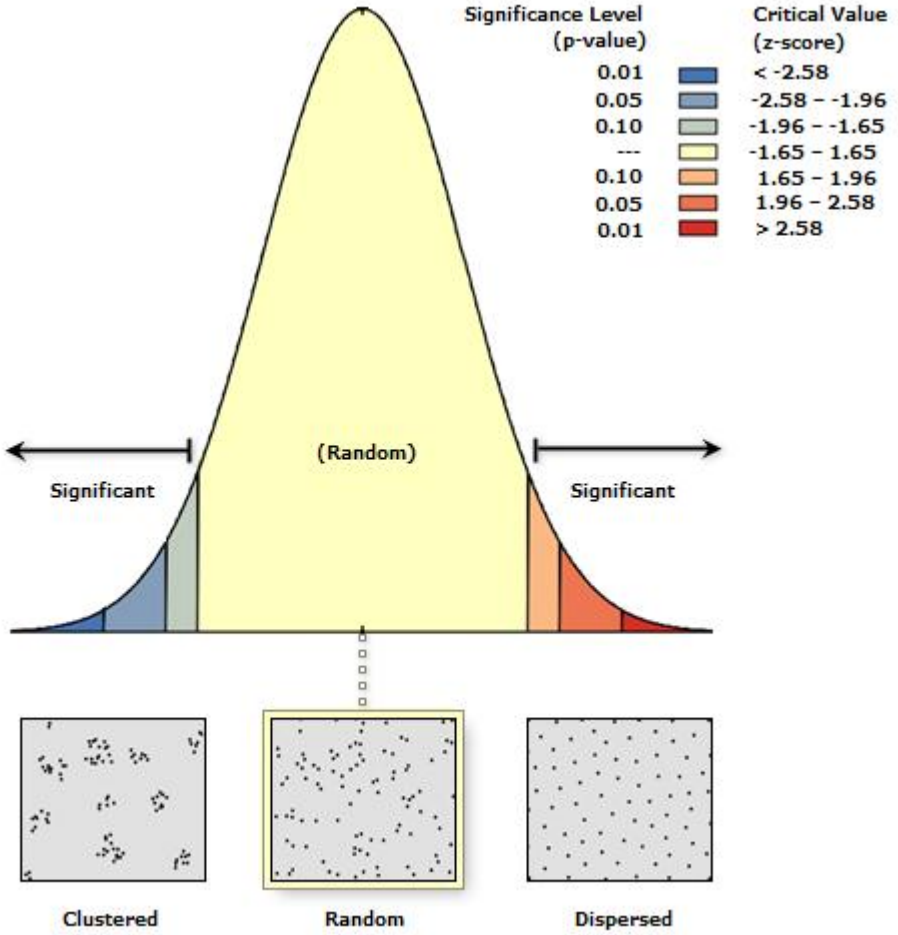


Figure 5.20: Ringfort Hotspots in Brega (after OSM with additions)

The above shows us there is definite clustering in the area in red, to the west of the N52 and that these clusters are statistically significant. What it does not show is whether the different categories of ringfort are clustered or not. It also does not take account of the temporal aspects of their construction which could be important as it has been suggested that the shorter the construction and occupation time spans, the more likely they are to be related spatially (Lynn 1983, 47)

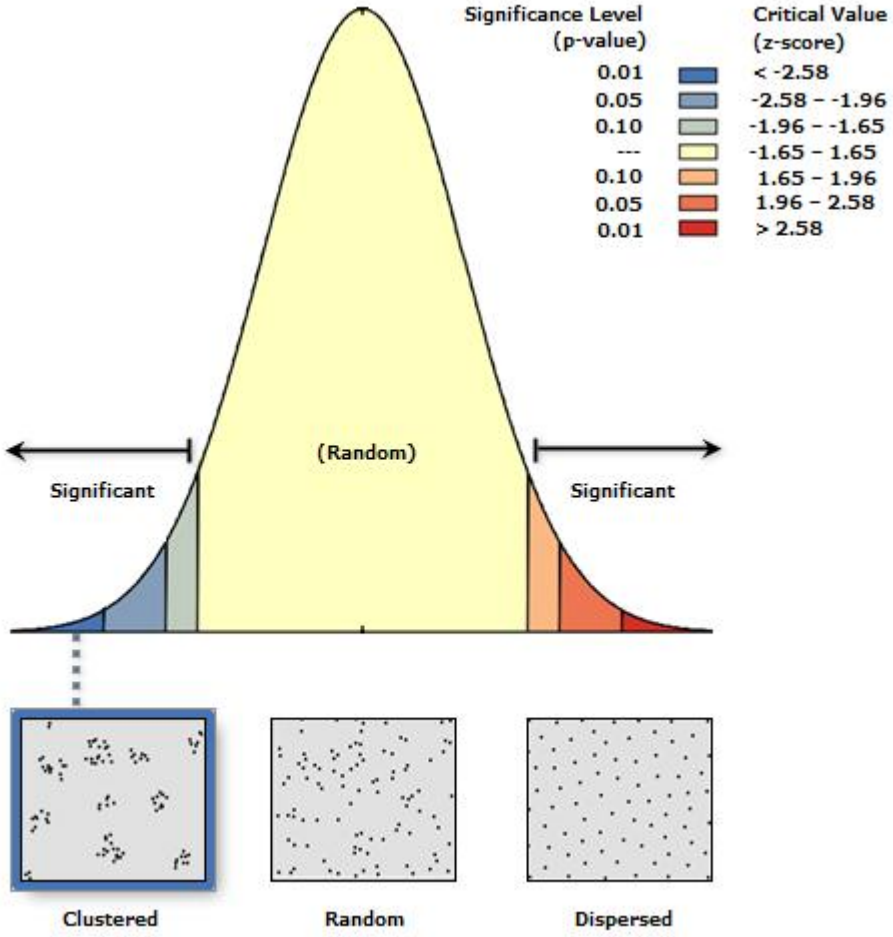
To use the optimised hotspot analysis there is a threshold of 30 points in order for the analysis to be statistically significant. Another tool, the “average nearest neighbour analysis” tool can be used on data with lower than 30 points to indicate whether patterning is clustered relative to a hypothetical random distribution, and this is represented in figure 5.21. All classes of vallation have been examined in the same way to ensure stability of results, and for the purposes here they have been classed as: 1. Unvalletted 2. Univallate 3. Bivallate 4. Trivallate. The one quadrivallate ringfort at Tlachtga obviously cannot be considered to be clustered in this way. This vallation classification has been taken from the scope notes of each individual ringfort on the HEV and added to the attribute table of the shapefile.

This statistic computes the distance between each point and its nearest neighbour’s points and then averages all of the distances. The tool also computes the average distance for a hypothetical random distribution and if the actual average distance is less then this indicates clustering, and if the actual average distance is greater than the hypothetical this indicates dispersal or non-clustering. The GIS also produces a statistic for the average nearest neighbour ratio, which is the actual average distance divided by the expected average distance based on the same number of points spread over the same area. If this index is less than 1 it indicates clustering, conversely if it is greater than one it is said to be dispersed.



Average Nearest Neighbor Summary	
Observed Mean Distance:	3971.4676 Meters
Expected Mean Distance:	4185.8424 Meters
Nearest Neighbor Ratio:	0.948786
z-score:	-0.671693
p-value:	0.501779

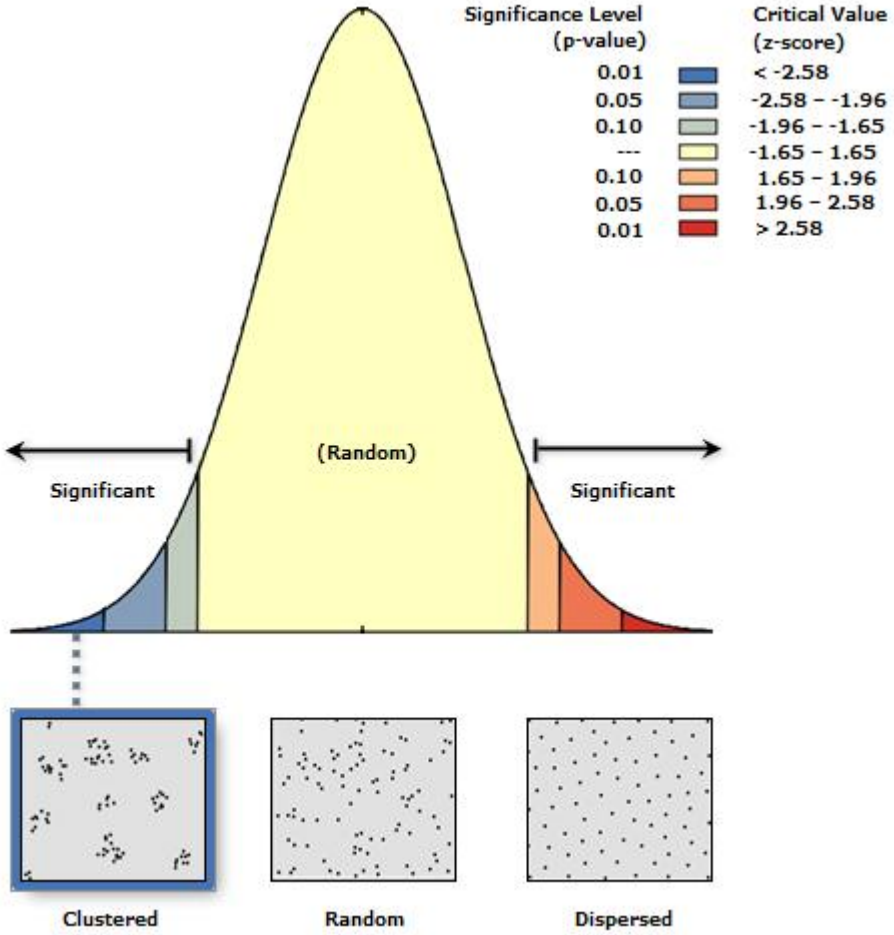
Figure 5.21: Moran's I for nearest neighbour - unvalletted ringforts (Figure by Author)



Average Nearest Neighbor Summary

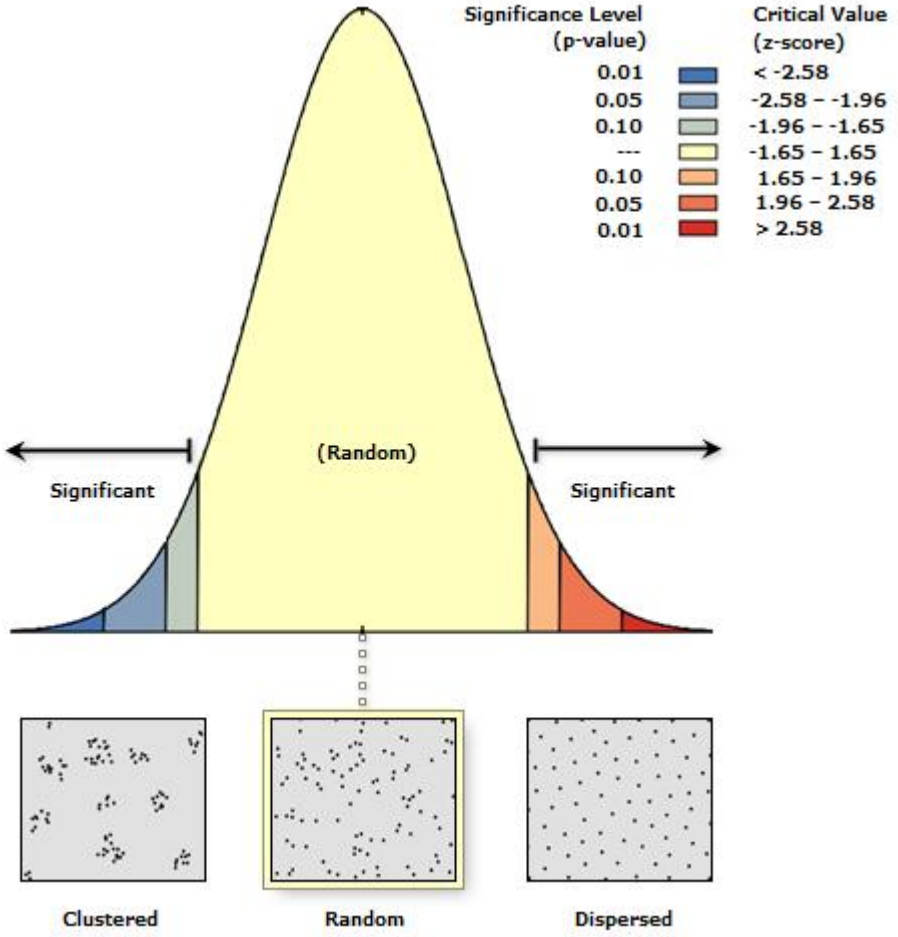
Observed Mean Distance:	1191.3527 Meters
Expected Mean Distance:	1554.0129 Meters
Nearest Neighbor Ratio:	0.766630
z-score:	-8.244290
p-value:	0.000000

Figure 5.22: Moran's I for nearest neighbour - univallate ringforts (Figure by Author)



Average Nearest Neighbor Summary	
Observed Mean Distance:	2188.8788 Meters
Expected Mean Distance:	3008.2305 Meters
Nearest Neighbor Ratio:	0.727630
z-score:	-4.970623
p-value:	0.000001

Figure 5.23: Moran's I for nearest neighbour - bivallate ringforts



Average Nearest Neighbor Summary

Observed Mean Distance:	7045.2986 Meters
Expected Mean Distance:	7409.4534 Meters
Nearest Neighbor Ratio:	0.950853
z-score:	-0.364147
p-value:	0.715748

Figure 5.24: Moran's I for nearest neighbour - bivallate ringforts (Figure by Author)

What figures 5.21–24 show is that not all ringforts exhibit clustering based on their vallation, even though the overall trend is towards clustering in certain areas. What could arguably be considered the lowest class of ringfort – those with no banks and ditches surrounding them, and the highest class (notwithstanding Tlachtga) are not clustered to any reasonable degree.

These are also the types with the lowest number of incidences. The two larger classes, univallate and bivallate ringforts, show definite clustering and have far higher incidence in Brega as in other areas of the country. Having said this, while sites may not be clustered that does not mean the selection of a site was a random process, rather that the distance to the next site of the same type was not the predominant factor in deciding on where to build.

Care needs to be taken with the term “clustering” which often conjures up images of villages made up of groups of small houses situated around or in close proximity to a church. Binchy (1958, 54) did not believe in the idea of villages or clustering in the early medieval period but was of the opinion that settlement in Ireland consisted solely of “isolated holdings” and this is still the prevailing thought today (see O’Sullivan et al. 2014, p.47/48). As seen above with the overlapping buffers and the cluster analysis, the term “isolated holdings” is a misnomer, at least in relation to the area north of the N52. It is the opinion of the author based on the evidence above that it is more likely that while there were some isolated holdings, the majority of ringforts were quite closely associated with other ringforts, most likely the ringforts of others within the kin group.

The early medieval village issue within Irish archaeology is a very difficult issue to prove. If there were small “pre-villages” (Doherty 2015a, 54), then they would likely have formed where modern villages and towns are now, much in the same way our major roads existed in the prehistoric period but are now untraceable to a large extent due to them having evolved into modern roads. If they existed in the traditional sense they could have been built on over time and as they evolved traces of them could be lost to a large extent. Intimations of this can be seen when examining the route networks in chapter 6 - places like Navan were nodes in the transport network during the period and it is unlikely that many roads converged on an “isolated” settlement. However, trying to prove a negative is never very fruitful.
Doherty (ibid.) argues that these pre-villages are not to be imagined as above, but as a “territory which sometimes produced nucleation”. There was some element of clustering, what Patterson (1994, 109) has suggested are not villages in the traditional sense “but only

that residences were near enough for people to interact together regularly". As seen above, ringforts in Brega were more than near enough for people to interact regularly and it is likely that rather than the idea of a traditional nucleated village, that ringforts were situated in a territory made up of their kin groups.

Also as mentioned above Ireland at the time was a highly stratified society at this time – if the country was made up of isolated farmsteads with little interaction it would lead to redundancy in the social strata, indeed having social interaction with kin groups of higher and lower status was an intrinsic part of the fabric of society.

Care must be taken here to follow where the evidence leads. Archaeologists are often interested in the archaeologies of power and elitism, and Thurston (2010, 199) has argued that the controlling elite generally lived in "centers". Even in Stouts (2000, 89) work there is a tendency to place the higher vallate ringfort at the centre of the settlement model thereby transposing more modern values onto the settlement pattern than might actually have been the case. It is argued in section 5.7 that while trivallate ringforts certainly had an element of elitism intrinsic in them, that an outward manifestation of wealth and power was not their primary aim.

A key word in Kelly's statement above in relation to the morphology of ringforts is "commonly". Some sites classed as ringforts do not have banks and ditches and in the case of Brega there are 47 of these, making up 9.49% of the overall ringfort sites. Of these, 44 have their boundaries defined by natural scarps defined by the surveying archaeologist in the scope notes on the HEV. It is not mentioned in any of the known corpus of laws in relation to status where these scarped ringforts fit into the framework, so there is no real indication as to the social status of the people who lived there. Of the 3 ringforts without either scarpng or vallation, only Newrath Big (ME016-023001-) is in Meath and is classed as destroyed, so the possibility is that there was either scarping or vallation present before destruction. The

ringfort at Dawsons Demesne (LH017-083----) also shows signs of destruction from quarrying. In the scope notes for the only other ringfort of this class at Coldblow, County Dublin, Geraldine Stout reports that in a personal comment by James Eogan, he suggests that the ringfort has been levelled and only crop marks show its presence. In essence it would seem that people often took advantage of natural scarping to define the boundaries of their settlement sites. Figure 5.25 shows the distribution of these sites and while they are mainly distributed to the north, there are enough other sites distributed elsewhere for this not to be significant. The sites highlighted in blue are the ones which have been partially or completely destroyed and again there is no spatial patterning evident here. These sites are also shaped relatively similar to ringforts which do not rely solely on scarps for their boundaries. Table 5.6 shows the numbers attached to the shapes of sites.

Table 5.6: Shapes of scarp defined ringforts

Shape	Number
Circular	22
Sub Circular	18
Oval	6
D Shaped	1

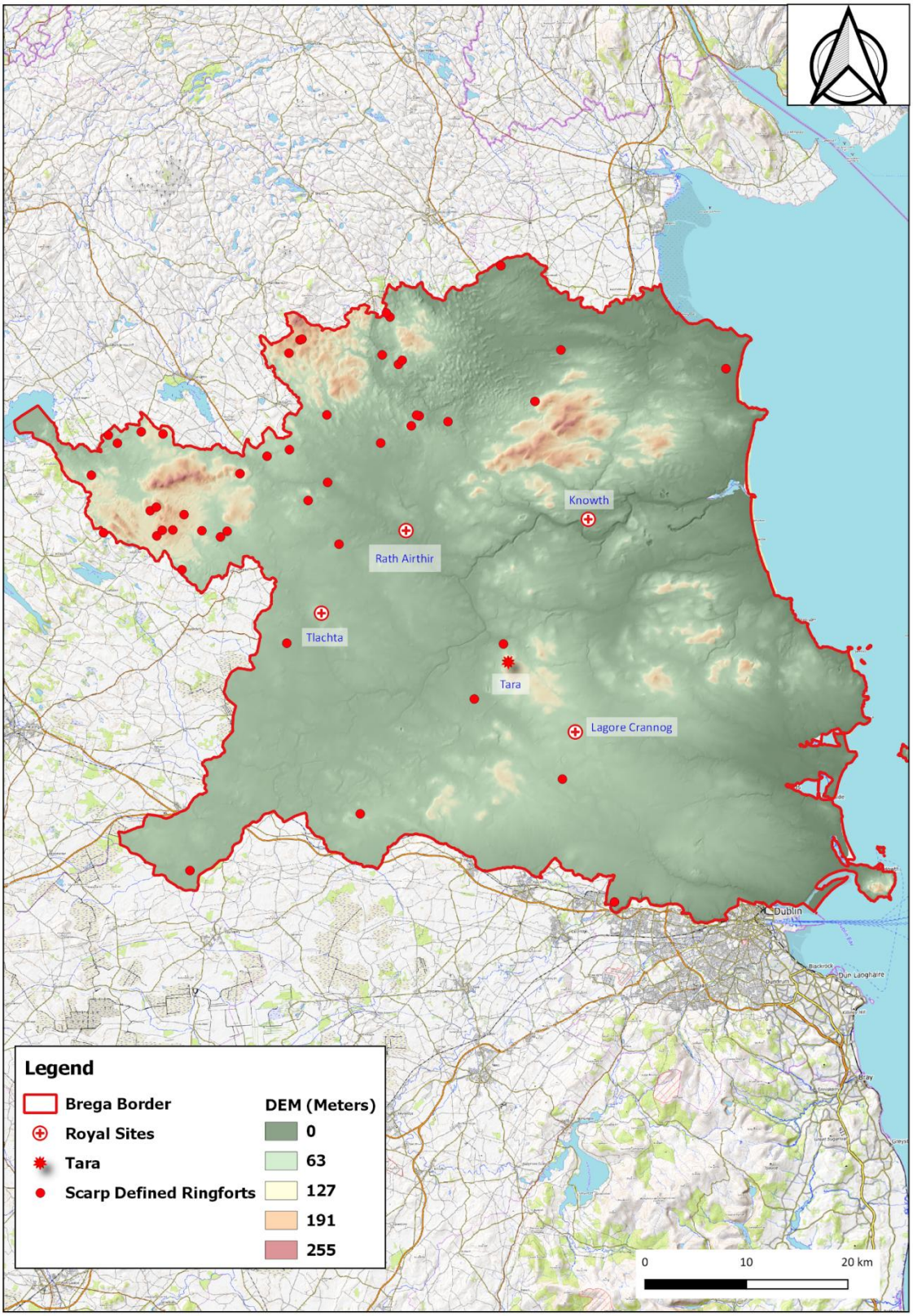


Figure 5.25: Distribution of scarp defined ringforts (after OSM, EU-DEM, NMS with additions)

5.7 Case Study: Trivallate ringforts

While the form of trivallate ringforts are, at least superficially, easy enough to define, their exact function is far less so. Trivallate ringforts in the literature are traditionally thought of as “high status” or “royal” sites. An effort will be made here to show that while these can undoubtedly be aspects of a trivallate site, these descriptions fail to encapsulate the multi-faceted and multi-purpose sites they truly are.

While generally regarded as the dwelling places of the elite sections of society, there are some differences of opinion in the literature as to trivallate ringfort function due to the absence of settlement evidence on some sites, although the evidence for this has sometimes been misinterpreted. For example, O’Neill (2010, 89) discusses the two trivallate ringforts at Garryduff and suggested they operated as cattle enclosures rather than dwellings due to “the absence of evidence for habitation-related structures/features/deposits in the interior of many examples (Garryduff II, Co. Cork, after O 'Kelly and Stelfox 1963, 17)”. Using Garryduff II as an example in this case is quite misleading. While it is true that there were no finds at all inside the enclosure, indeed O’Kelly calls the interior “archaeologically sterile” (1962–64, 121), the site is quite anomalous, especially compared to the nearby Garryduff I, where evidence of pavements, hearths and packed earth indicating dwellings were found, even though the soil type did not lend itself to posthole evidence. The excavations of Garryduff I and II would appear to have been rigorous and effective, and so it must be imagined that there was some other reason for the lack of finds in Garryduff II, possibly abandonment for some reason soon after its completion.

Bolger (2011, 1) has argued that “there is a need to move away from hierarchy/gradation as a primary method of interpreting landscape and settlement”, and this is particularly relative to trivallate ringforts as most mentions in the literature emphasise the high status of the sites. It must also be noted that the *Bretha Comaithchesa*, a law tract documenting how to deal with disputes and cooperation between farmers in the same neighbourhood, begins by declaring

that “status is irrelevant to neighbourhood” (Charles-Edwards 2007, 81). The neighbourhood dimension of these ringforts is particularly interesting and will be explored further below. Barrett (1980, 42) reinforces this, stating “although no direct evidence can be proposed to support the suggestion that multivallate sites were of superior social or military significance, the larger proportions can be indicative of a degree of local importance”. It is argued here that while broadly acceptable, the definition of “local” is too narrow, and that these sites have cross border influence between at least two and very likely more, kingdoms. It must be acknowledged that status is an important factor when studying these settlements, nonetheless it must be regarded as just one element, rather than the totality.

One of the difficulties in dealing with trivallate ringforts is the dearth of excavation evidence. Relatively few exist, and very few have been excavated. Even fewer again have been excavated in recent times using modern and inter-disciplinary techniques. O’Sullivan et al. (2014, Table 3.2) lists 319 excavated ringforts, but only defines 7 of these as trivallate, a mere 2.19 % of the total. One of these, at Posseckstown (ME006-025----) lies within Brega but unfortunately only one test trench was dug into the outer ditch and there were no finds. 14 test trenches were dug at Ballybrowney Lower (CO044-029----) in Cork (Drumm & Tierney 2010), but no finds were reported. Of the others only the ringforts at Garranes, Co. Cork (CO084-084) and Ballycatten, Co. Cork (CO124-034001-) were excavated fully enough to provide us with more detailed information, and Garranes was returned to in 2009 by R.M. Cleary and in 2017 by William O’Brien for further investigation, but not excavated fully. The ringfort at Ballyrobert (CO045-019----) was partially excavated, but no finds were recovered. The most recent excavation, at Baunogephlure, County Carlow (CW008-066----) (Stafford and McLoughlin 2011) was only a partial excavation and the interior was not excavated at all which is unfortunate considering the improvements in excavation and scientific techniques in recent years.

Garranes is notable for many things and one such is its size. The largest trivallate ringfort in Brega, Blackhall Big (ME050-008----) has an area of 8328.07 sq. m., while Garranes is 9455 sq. m. Ballycatten (CO124-034001-) is even bigger at 11095 sq. m., approximately 25% bigger than Blackhall Big. Figure 5.26 shows the area of the ringforts using graduated symbols to indicate their size. This could be a result of regionalism in relation to building practices and Charles-Edwards (2007, 130) has proposed that “regionalism has been identified in the subset of the status texts”, and so by extension in building practices. It would seem unusual that a prominent kingdom which encompassed the seat of the high king of Ireland as well as some of the best agricultural land in the country and some of the easiest access routes to Britain and beyond for prestige goods chose to build in smaller proportions for their “high status” sites.

O’Sullivan et al. (2014, 50) suggests multivallate ringforts in general are “extremely rare”. The 15 trivallate ringforts in Brega constitute only 3.04 % of the total number of ringforts in the kingdom. While this figure looks very low, it is possible that Brega is actually over-represented with trivallate ringforts. Drumm and Tierney (2010, 4) state that there were 600 known ringforts in Wexford at one time and of these only 4 were trivallate giving a percentage of 0.67%, meaning Brega has over 350% more trivallate ringforts than Wexford, further reinforcing the points made above in relation to regionalism. Due to the lack of excavation, it is not always easy to define if the three banks and ditches were contemporaneous or were later additions as the fortunes of the occupiers heightened.

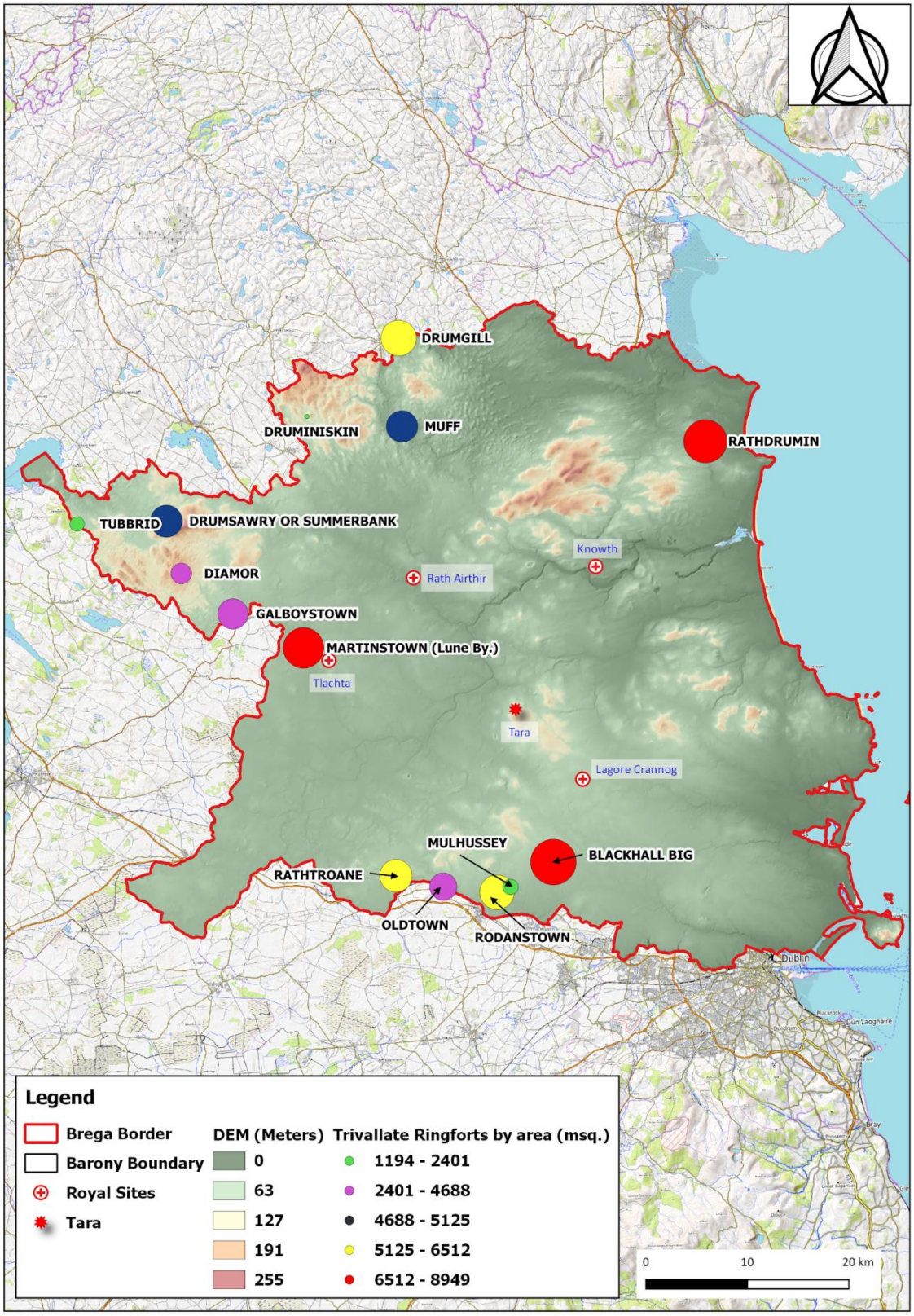


Figure 5.26: Trivallate ringforts using graduated symbols to depict ringfort area (after OSM, EU-DEM, NMS with additions)

Figure 5.27 below shows the distribution of trivallate ringforts in Brega. What is revealed here is how closely associated these ringforts are with the border. The next section contains a discussion of the aspects of trivallate ringforts that might be more properly contained in chapter 4 on boundaries, but are included here as they lay the foundation for this section as a whole.

It is possible that trivallate ringforts, while not explicitly meant to demarcate a kingdom boundary, became de facto border markers among other things. It has long been known that these sites were complex, and the reductive process and labelling them as simply “royal sites” is too simplistic a moniker for such multi-faceted and multi-use sites.

Bearing in mind the fluidity of the kingdom border, especially on the western side where 8 out of the 14 trivallate ringforts are situated, the distance from the ringforts to the border are particularly small. The closest trivallate ringfort at Oldtown (ME049-013----) is a mere 115.69 meters from the border as constituted here, while the furthest at Muff (ME005-067----) is 6.25 kms. The average distance is only 2.27 kilometres and of the 14 ringforts, 13 of them are within 5 kilometres of the border. With the caveats mentioned above about status, one possible function they had could have been that their placement was a mechanism intended to impress or intimidate outsiders as they crossed into Brega. This is unlikely though as these sites are almost “mirrored” on the other side of the border. This meant anyone crossing the border on the western side into Brega would be leaving or passing through Mide, and the cordon of trivallate ringforts that they would have to go through is of similar import there, thus reducing the effect of seeing these places.

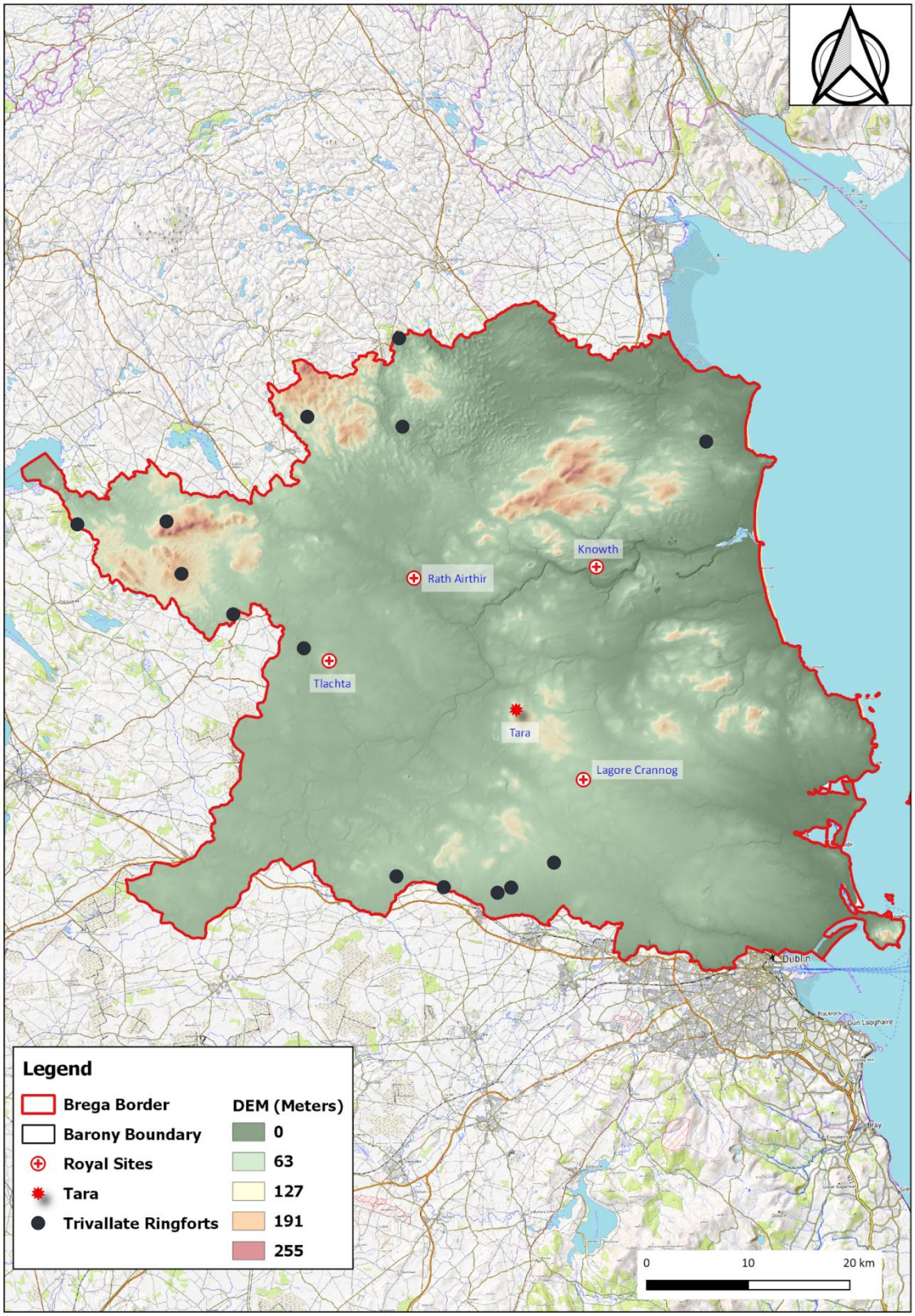


Figure 5.27: Distribution of trivallate ringforts near kingdom boundaries (after OSM, EU-DEM, NMS with additions)

To further examine this “mirroring” we can look at the distances from the trivallate ringforts on the other side of the border in the same way as seen in figure 5.28. In the adjacent and adjoining baronies there are 9 trivallate ringforts. These are also very close to the border, with the nearest being the ringfort in Westmeath at Ballynascarry townland (WM001-012----), which is only 836.58 meters from the border, and the furthest being Froghamstown (WM007-096----) at 8.93 kilometres. The average distance of the 9 ringforts is 5.1 kilometres.

These ringforts are also quite close to each other, almost “mirroring” each other across the borderline. The Generate Near Table tool in ArcGIS allows us to correlate each ringfort with the ringfort closest to it. It is actually possible to work out the distance from each ringfort from one side of the border to every ringfort on the other side, but in this case, it was chosen just to examine the one closest.

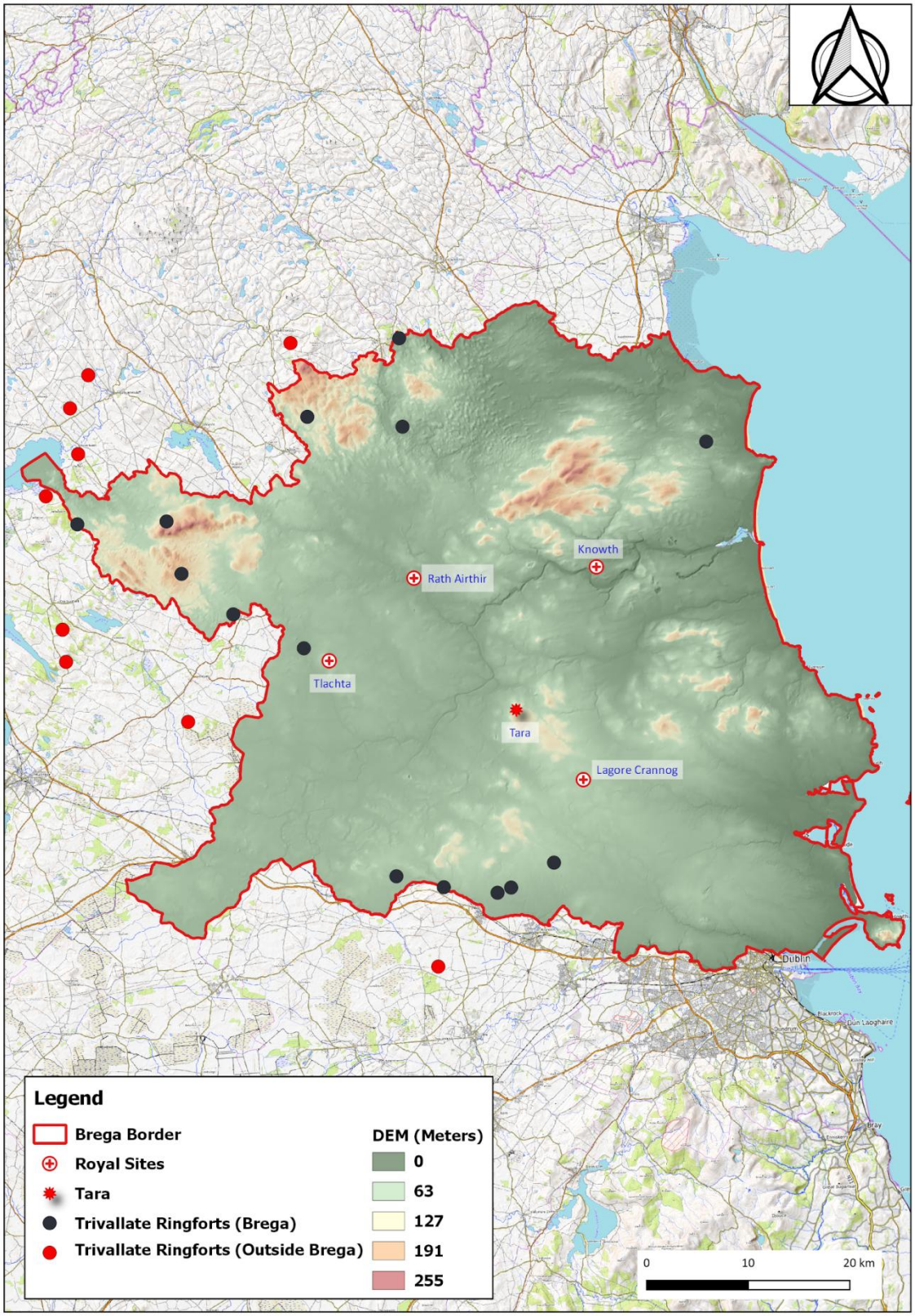


Figure 5.28: Trivallate ringforts “mirrored” across the border (after OSM, EU-DEM, NMS with additions)

The distance between the ringforts can be seen in Table 5.7.

Table 5.7: Cross border distances between trivallate ringforts

Brega Ringfort	SMR No.	Adjoining Ringfort	SMR No.	Distance (Kms)
Tubbrid	ME008-039----	Ballynascarry	WM001-012----	4.14
Druminiskin	ME004-006----	Rakeevan	CV034-044----	7.45
Oldtown	ME049-013----	Donadea	KD009-005----	7.83
Rodanstown	ME049-019----	Donadea	KD009-005----	9.32
Rathroane	ME048-014----	Donadea	KD009-005----	9.78
Mulhussey	ME049-015----	Donadea	KD009-005----	10.58
Drumgill	ME002-002----	Rakeevan	CV034-044----	10.71
Drumsawry Or Summerbank	ME009-057----	Garrysallagh (O'Reilly)	CV042-026----	10.94
Galboystown	ME023-010----	Bracklin	WM013-105----	11.48
Diamor	ME015-081----	Benisonlodge	WM007-033----	12.94
Martinstown	ME023-019----	Bracklin	WM013-105----	13.5
Muff	ME005-067----	Rakeevan	CV034-044----	13.76
Blackhall Big	ME050-008----	Donadea	KD009-005----	15.32
Rathdrumin	LH018-045001-	Rakeevan	CV034-044----	42.06

As can be seen Rakeevan on the northern border and Donadea on the southern border appear multiple times due to being the only ringfort present in that area, and the reasons for ringfort destruction have already been mentioned. There is also an outlier at Rathdrumin on the east coast which does not have a northern mirror, probably due to extensive building along the M1 motorway and the urban areas of Dunleer, Castlebellingham and Dundalk. The average distance between these ringforts, facing each other across the border is 12.85 kilometres. If the anomaly of Rathdrumin is removed, this figure drops to just 10.6 kms. The two excavated sites in County Cork, Ballycatten and Garranes, are approximately 20kms from each other. There is no historical evidence as to why these sites should be situated so close to the border, and so close to each other. In addition to the different aspects of trivallate sites mentioned above and elsewhere, there appears from the above evidence to be a deliberate effort to site these ringforts near the borders, facing similar ringforts on the other side. There are numerous possibilities as to why this could be. An ostentatious display of wealth could be one explanation, but this would appear to be unlikely as the same display is happening on the other side. It is argued here that one of the major functions of these sites was as a sort of trading post. When trading outside the kingdom goods had to be transported, and the time of most peril was when the goods were close to the border, accessible to raiding parties. The defensive nature of the 3 banks and ditches, coupled with the large size, meant goods could be stored in safety prior to trading. If they were thought to be for general storage of goods, even high value goods, there would be no need for them to be situated so close to the border of the kingdom. Another possibility is that they were defensive outposts – designed to be able to shelter larger bodies of men in times of war to protect the borders, close enough to be able to signal to each other in times of need.

5.8 Topographical Influences on Settlement

It has been mentioned above that environmental and topographical factors can affect the spatial distribution of settlements and they can also help us to understand the constraints they place on human decisions regarding site settlements (Chang-bai et al. 2018). This section attempts to examine the water sources, ridges, height and slope of the physical geography of Brega and the effect that may have had on where and how settlements were sited.

5.8.1 Rivers

As has already been mentioned Ireland was heavily dependent on agriculture during the early medieval period. One of the key factors contributing to the success of any farming enterprise, and even the simple sustenance of life was access to water, and in this case Brega was well supplied with approximately 3258 kilometres of rivers and streams in the kingdom. This figure is likely to have been higher between AD 400 and AD 900 before widespread field drainage systems were introduced. ArcGIS provides a complete suite of hydrology tools which enable us to examine aspects of the hydrology of Brega in depth and these will be explored in this section. These tools will be directly applied to the issue of settlement and how it relates to hydrology in the kingdom, and not merely used to examine the waterways themselves.

In an Irish context, rivers have returned some extremely important artefacts such as the Lurgan canoe, currently in the National Museum and the Clowanstown fish weirs also in the museum. Both finds are immensely important in rebuilding how people interacted with their natural environments. Having said this, what is also just as significant is the effect these river basins and watersheds have on the landscape, both in terms of how they helped mould the landscape and also the interactions people had with it. Watersheds and drainage basins

create massive impact on the landscape and “have always tended to provide the most influential matrices for the creation of human territories” (Phythian-Adams 1993, 12) and there are many examples of this from England and further afield (Baker & Brookes 2017, 256). Brega was well populated with rivers as can be seen in figure 5.29.

There is also likely to be a wealth of undiscovered archaeology lying under our rivers. Underwater archaeology is often associated with maritime contexts, but most modern excavations which have rivers in the excavation area will conduct some form of survey or testing. The river environment is often a hostile one with poor visibility and strong currents (Tóth 2008, 2) but there is likely to be a wealth of undiscovered material in the vicinity of settlement sites.

It has to be imagined that the major river in Brega, the Boyne, must be replete with artefacts, having had such a long and dense history of settlement, and yet no effort has been made to find artefacts in the river itself in any large scale or structured way, despite years of investment and research in the area. Important artefacts can be happened upon as can be seen by the find of a Neolithic boat by fishermen in June 2016 (Logue 2018), so it is unfortunate that a more comprehensive program of study and excavation is not in place.

An attempt to define river valleys in relation to Tara has been made by Conor Newman (2005), however these valleys were only broadly defined. Definition of river valleys in the form of watersheds and drainage basins is something which can be accomplished far more stringently with the use of the GIS. This in turn has led to the coining of a relatively new subset of archaeology – river archaeology (Bonnamour 2000; Dumont 2006; Tóth 2006a). While this concept often relates to the riverbed and artefacts that may be deposited there, it also encompasses the valleys and floodplains surrounding them. The importance of this is highlighted in Britain where the Aggregates Levy Sustainability Fund (ALSF) was established

in in 2002, which, similar to the developer pays concept in Irish planning laws, establishes a fund for the geoarchaeological assessment of valley floors so the archaeology can be managed into the future (Passmore et. al. 2006, 270).

Table 5.8 below, which shows the mean values and standard deviations for ringfort distance from a water source shows that 59.11% of the ringforts in Brega are within the mean value or 357.65 meters of a water source, with the furthest away being 1692 meters. This ringfort is actually Tlachtga, the biggest ringfort in the area and also the only quadrivallate ringfort in Brega, although the quadrivallate enclosure called the Rath of the Synods of Tara sometimes causes confusion with this. Tlachta, also known as the Hill of Ward, was a large and prestigious royal site (Davis 2011), with constant activity on a large scale. With a reported 13,000 horsemen once attending a reform synod (Davis 2013, 2), it would seem surprising that there was no accessible source of water for so many people and animals. There is a well on the site (ME030-03) but to date there is no evidence for a date of construction. In fact, the archaeological record contains only 4 wells in Meath not classed as “holy” wells. There are also 48 holy wells, most of which are undated, so there is the possibility that some of the sites, most likely at the longer end of the range or larger sites, had wells dug and used those instead of access to rivers or lakes.

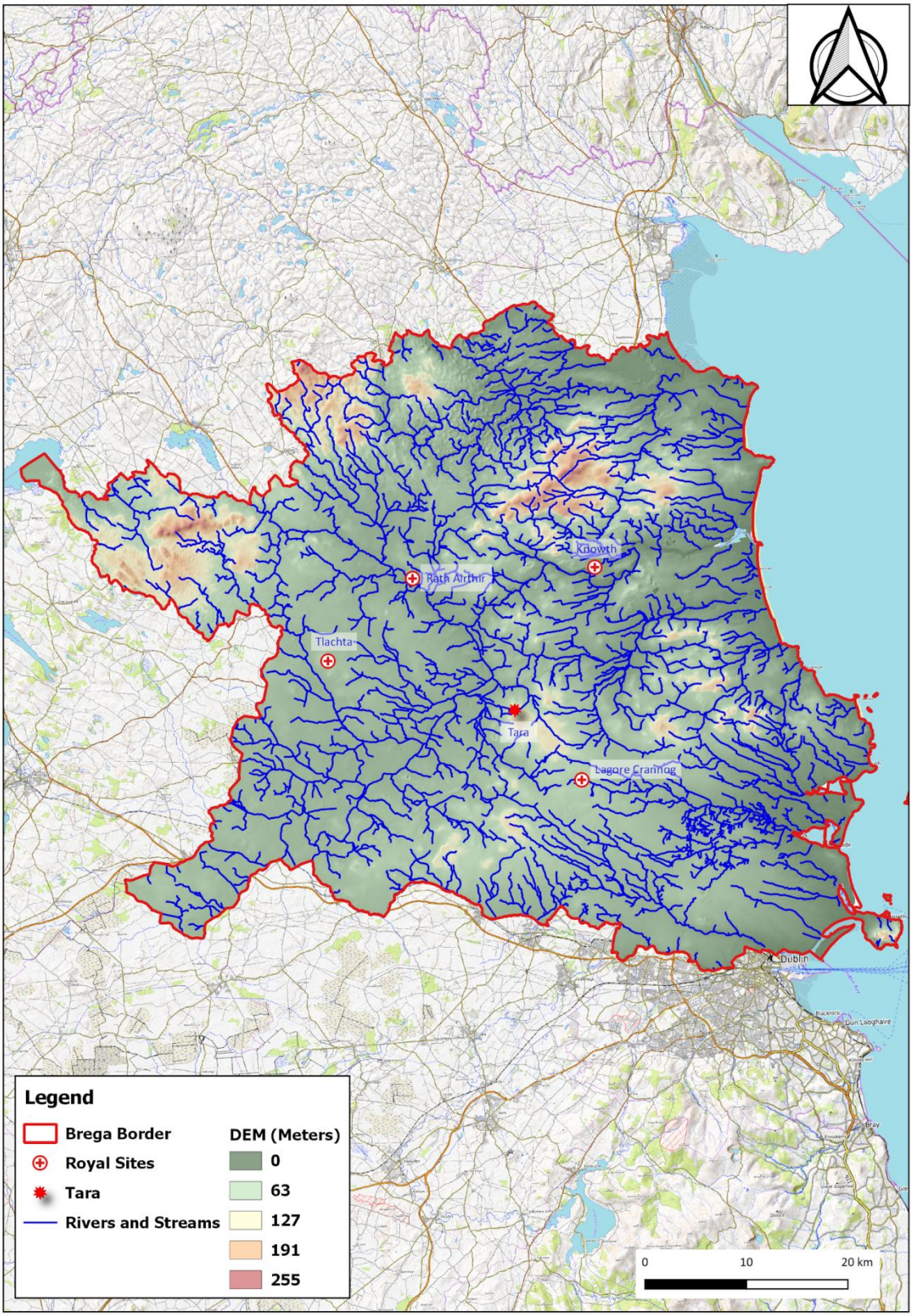


Figure 5.29: Rivers and Streams of Brega (after OSM, EU-DEM, EPA, NMS with additions)

The ranges in Table 5.8 below were derived from the GIS by calculating the distance for every ringfort to a water source

Table 5.8: Mean Distance (in Meters) from a water source and standard deviation for each classification

Range	Mean Distance	Standard Deviation
16 - 435	213.03	116.47
436 - 854	597.56	116.74
855 - 1273	1004.1	106.7
1274 - 1692	1420.31	146.94

Having calculated the bands Table 5.9 shows the number of ringforts in each class.

Table 5.9: Number of ringforts in each classification

Range	Number of ringforts
16 - 435	339
436 - 854	131
855 - 1273	19
1274 - 1692	5

On examination of this table it is easy to see that there is a definite correlation between ringforts and the distance to a water source. It is, however, theoretically possible for this to happen by chance, so in order to test this a statistical analysis in the form of a Pearson's chi squared or "goodness of fit" test was carried out. The chi squared test can ascertain the difference between the observed distribution of ringforts in the area and the expected distribution if ringforts were built randomly in the defined area and also give a figure for the statistical confidence in the result. The observed versus the expected number of ringforts per distance band can be seen in figure 5.30.

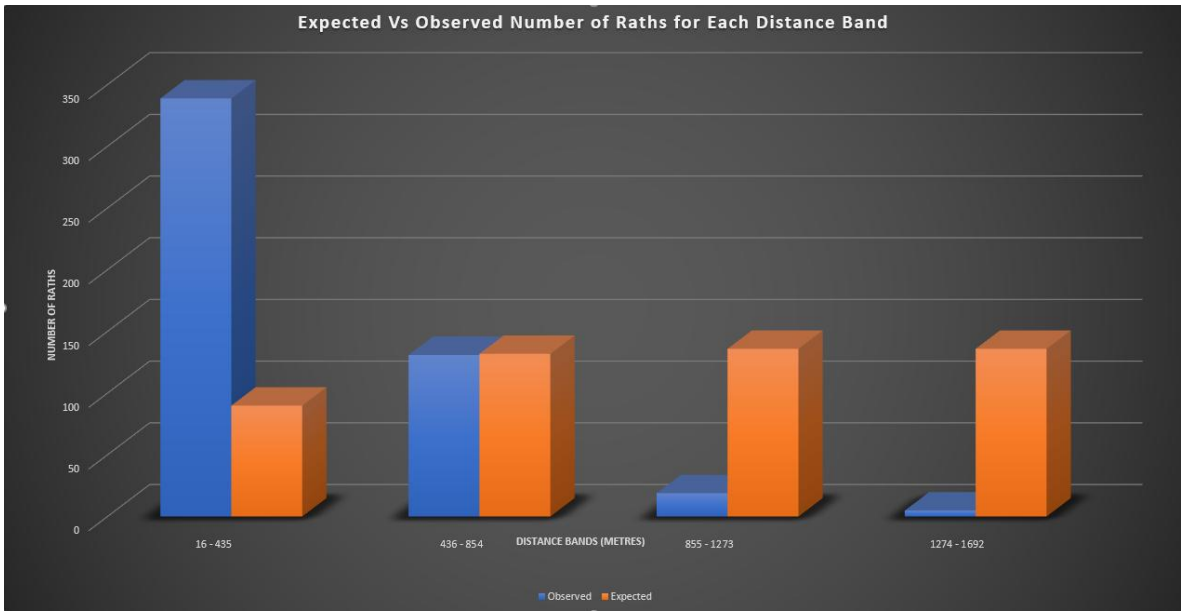


Figure 5.30: Expected Vs Observed Numbers of ringforts per distance band (Figure by Author)

When the Chi Square statistic is calculated it results in Table 5.10 below.

Table 5.10: Chi Squared statistic for ringforts distance to freshwater sources

Range	Observed	Expected	Test Statistic	P Value
16 - 435	339	90	0.183	< 0.00001
436 - 854	131	132	0.268	0.999831
855 - 1273	19	136	0.274	< 0.00001
1274 - 1692	5	136	0.275	< 0.00001
Total	494	494	1	< 0.00001

The results here are notable. The generally accepted threshold for this test is 0.05, or 95%. In this case the first, third and fourth ranges there is over a 99.99% chance that ringforts were sited close to rivers as a result of deliberate action. Contrary to this in the 436 to 854 metre range this figure changes. As can be seen from the table the observed and expected

number of ringforts in this range are almost identical. The p value of 0.999 means that this could actually be due to chance and statistically is likely to be. This does not mean that ringforts were not deliberately built at this distance to rivers, just that it cannot be statistically proven that they were.

The question then is why did people build their settlements so close to water? It has been argued that there is a hierarchical structure to resources (Chisholm 1968:102-104; Clarke 1968, 506; Jochim 1976, 54) and that the most important ones are “so basic and so vital that the distance to them must be minimised” (Roper 1979, 121). It may seem obvious that people chose to live near water sources, but living so close to natural water sources such as rivers, while essential to preserve life, is also not without its dangers. Flooding due to heavy rains or tides in estuaries was a real danger, and storms which brought heavy rains could wipe out crops and damage livestock, thereby putting people at serious risk of starvation in winter.

There is the obvious need for drinking water to sustain life and water needed for crops, although there is no archaeological evidence for large-scale irrigation in early medieval Ireland. There was also a strong need for water for consumption by cattle. Cattle in early medieval Ireland were far smaller than those of today (Kelly 2000, 30), but still needed large amounts of water to thrive. Moran, quoting Teagasc (2014) recommends that modern cows require between 60 and 155 litres of water a day depending on their yield and life stage. Even dividing this by three it is still a large volume of water, and this also created difficulties when moving cattle over land. Due to cattle being so inextricably linked to wealth, it would have been important to keep them fed and watered, especially in summertime. Therefore, the water was usually not brought to the cattle, but the cattle to water and the rights of way across another person’s land to gain water for cattle was enshrined in law (Kelly 2000, 400-401). Other resources such as fish and game which also approach water to drink become more readily accessible when the distance to the resource is relatively small.

While rivers flow downhill and eventually join with larger rivers and then run to the sea, they also form part of a drainage basin, and these basins can form catchment areas. Having identified the rivers in the kingdom is now important to define the ridges which differentiate drainage basins from each other.

5.8.2 Ridges

While regarded as generally flat, Brega has a wealth of ridgelines. Defining the ridges on a landscape scale is made possible with the use of GIS and in particular the Hydrology toolset in ArcGIS and the derivative raster map can then be used in further analysis, such as examining the proximity of ringforts to these ridges. However, as with all GIS data care must be taken, especially to eradicate imperfections or other issues in the data which could cause unrealistic results.

Unfortunately, it is particularly difficult to display these visually on an A4 page at a range of scales as there are a large number of ridges in such a large area as Brega. The scale is important, and ridges can be defined at a number of different scales, making them easier to view at a coarse resolution, but more difficult in a refined view. However, from a scientific point of view measurements can still be made accurately in the database regardless of display issues.

The most common cause of issues here is the existence of sinks. As the name suggests these are “depressions” in the raster – a cell or cells in which flow direction cannot be assigned as the neighbouring cells are higher than the cell being processed. This problem occurs quite regularly due to the rounding of elevations to the nearest integer value, which creates an artificial hole into which water would flow in but not out again. This becomes important in other tools used in this analysis, namely Flow Direction and Flow Accumulation in which cells are assigned an integer value. These tools will not work if the original DEM has cell values other than integers. Tarboton et al. (1991) found that in USGS derived DEM’s

sinks accounted for between 0.9 and 4.7 % of the cell coverage. In the DEM used for this project there are 14,455,092 cells which could mean that between approximately 130,096 and 679,389 cells are incorrect. Areally this translates to somewhere between 2.6 and 13.58 square kilometres of incorrect cells in the raster, and this is obviously too high a margin for error.

This problem is overcome in ArcGIS by the use of the Fill tool which will fill all of the sinks in the raster. The new DEM is now used in the Flow Direction and Flow Accumulation tools to produce derivative rasters. The filled DEM is inverted using the Raster calculator by multiplying all cells by -1. The Flow Direction tool is used next and the key here is to check the “Force all edge cells to flow outward” checkbox, as this allows the projected water to flow away from the ridge.

The Flow Accumulation tool is used, and the key issue here is to make the output data type an integer, which will avoid problems in the resulting raster. The next stage is to decide on the flow accumulation threshold, basically the resolution at which the archaeologist decides to build the raster and what scale the required data is returned. The drainage network needs to be built using the Conditional tool or the Raster Calculator tool, but how coarse or refined the output will be will depend on the needs of the user. Having decided on the value the Create Stream order tool is used to convert the raster to a vector format and the resulting shapefile used in the Stream to Feature tool to return the ridges at the required resolution. The different scales, using a Value figure of 500, 1000, 2500 and 5000 can be seen in figure 5.31. The different resolutions can be seen clearly, and this process makes it easy to experiment for best results for the value chosen and the needs of the project.

Now that the ridges have been defined, they can be included in the analysis of settlement. Using a low threshold value of 500, an initial examination of Table 5.11 which shows the

mean values and standard deviations for ringfort distance from a ridge, shows that almost half of the ringforts in Brega are within 340 meters of a ridge, and almost all are within 680 meters of a ridge.

Table 5.11: Mean Distance (in Meters) from a ridge and standard deviation for each classification. (Value = 500)

Range	Mean Distance	Standard Deviation
0 - 340	167.26	109.54
341 - 680	478.85	93.83
681 - 1020	824.83	94.78
1021 - 1359	1175.92	131

As with the earlier example of distances to water sources, it is theoretically possible for this to happen by chance, especially as we have used a reasonably low Value figure of 500 when defining the ridges in the first place, so a Chi squared test was carried out to check the results, shown in figure 5.32 and Table 5.11.

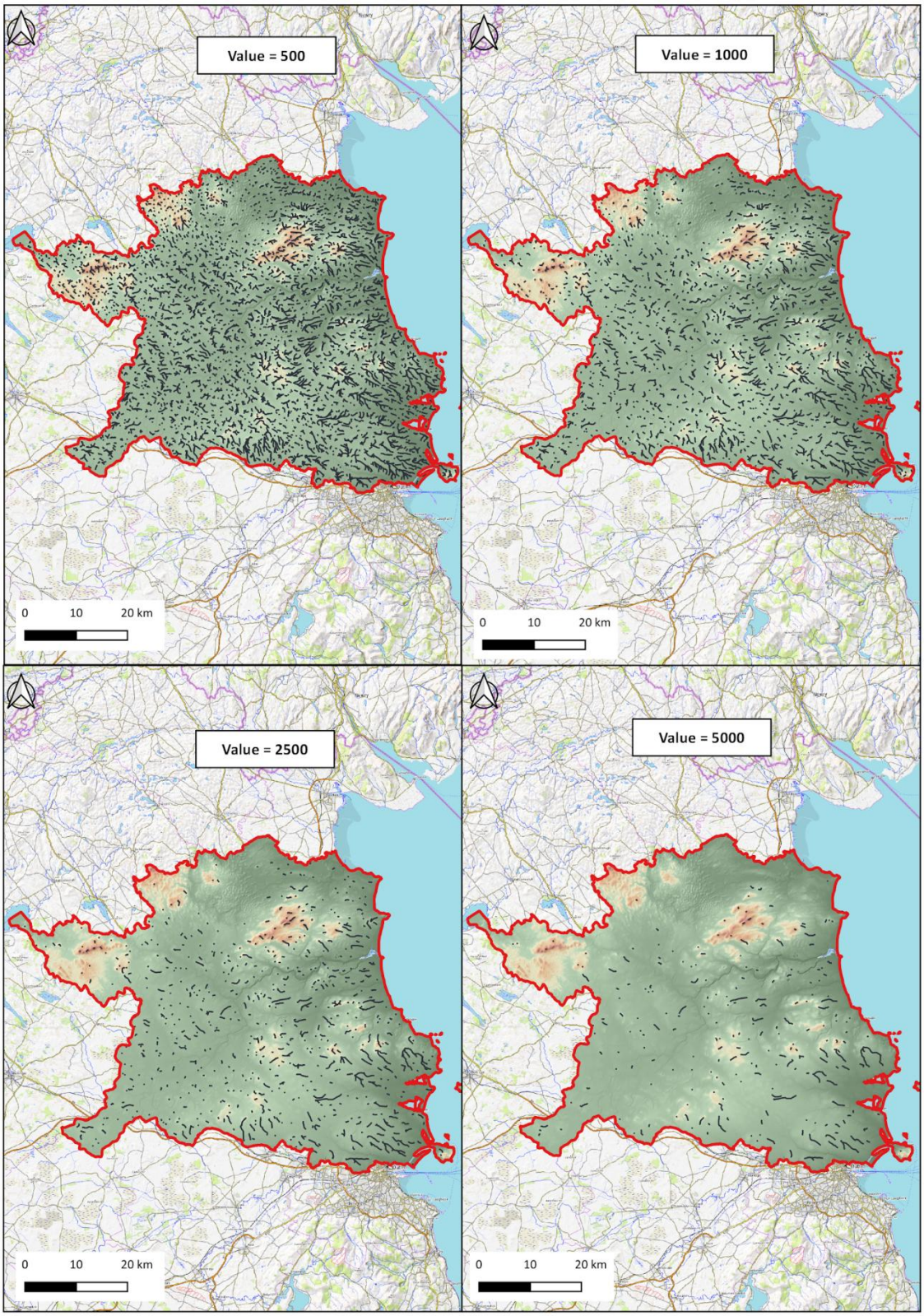


Figure 5.31: Ridges delineated at different scales of resolution (after OSM, EU-DEM with additions)

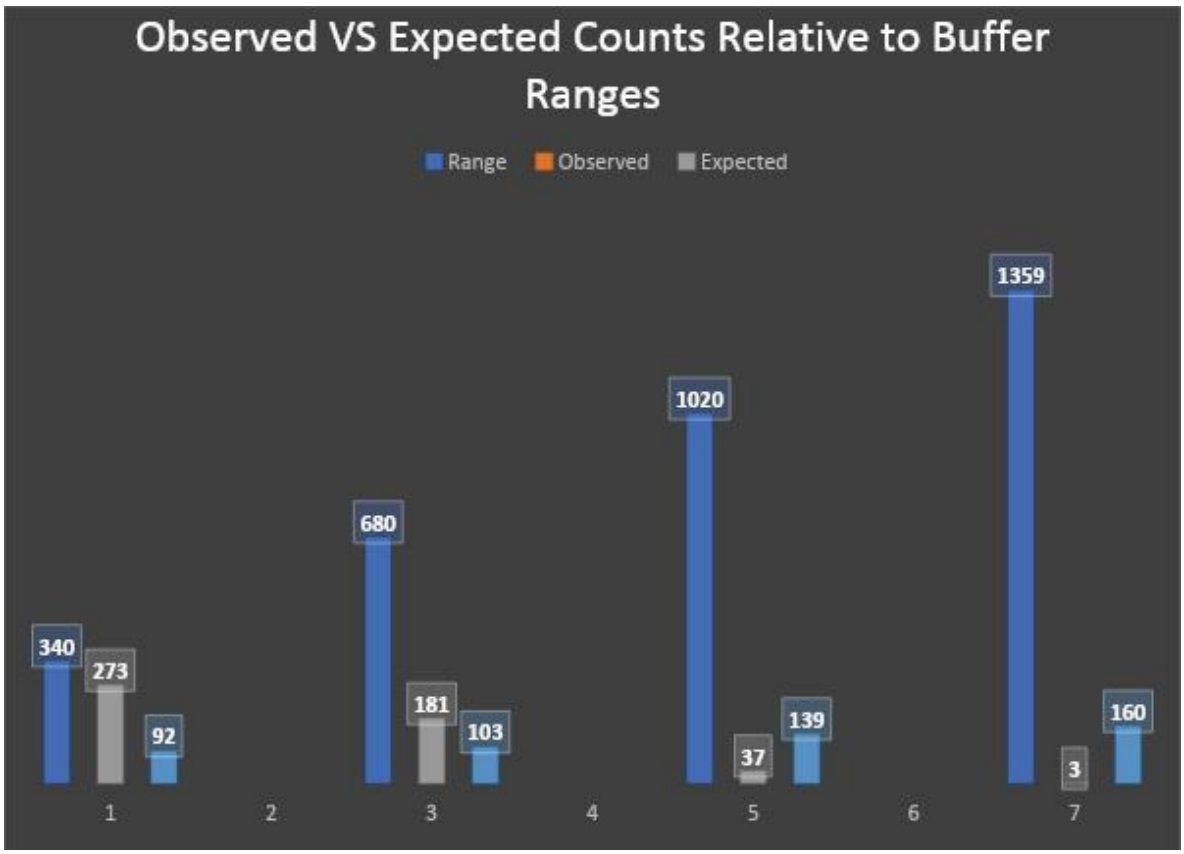


Figure 5.32: Buffer Ranges, Observed Counts and Expected Counts (Value = 500) (Figure by Author)

Table 5.12: Chi squared statistic for ringforts distance to ridges (Value = 500)

Range	Observed	Expected	Test Statistic
0 - 340	273	92	356.1
341 - 680	181	103	59.07
681 - 1020	37	139	74.85
1021 - 1359	3	160	154.65
Total	494	494	644.67

There is a danger however, that these values could be so small due to the very low value of 500 used when defining the ridges. To test this, it was decided to redo the analysis with a resolution 5 times coarser, a value of 2500. This returned the results in Table 5.13.

Table 5.13: Mean Distance (in Meters) from a ridge and standard deviation for each classification. (Value = 2500)

Range	Mean Distance	Standard Deviation
3 - 1390	744.44	384.1
1391 - 2777	1972.84	397.11
2778 - 4164	3353.79	397.67
4165 - 5551	4973.29	415.27

While these distances are higher it must be remembered that the resolution is much coarser and the ridges in question would be more obvious in the landscape.

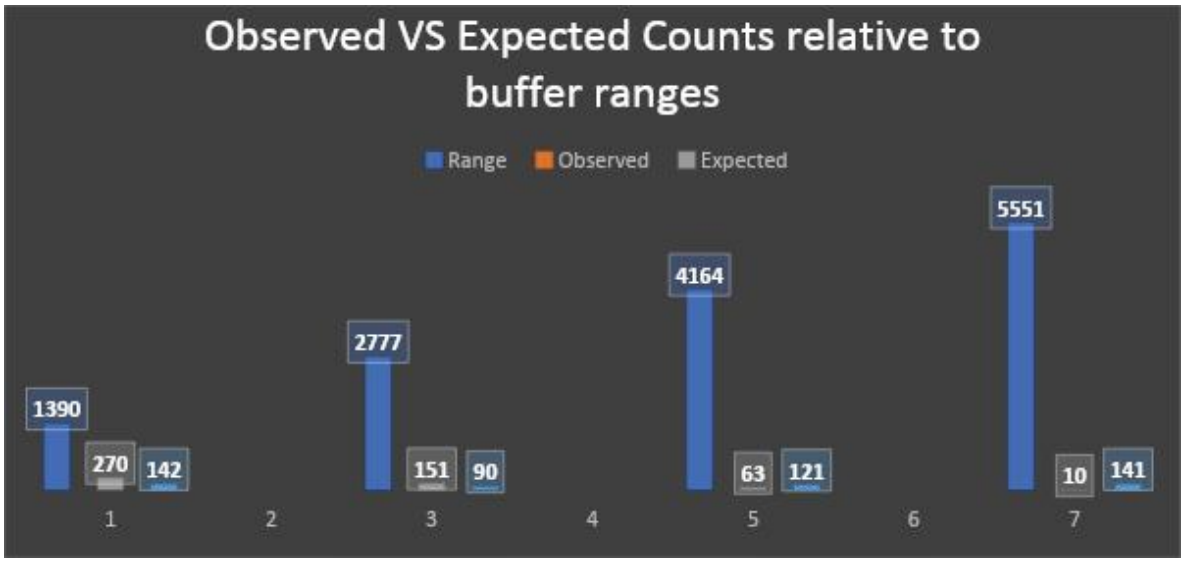


Figure 5.33: Buffer Ranges, Observed Counts and Expected Counts (Value = 2500)

When the Chi Square statistic is calculated for the higher value it results in Table 5.14 below.

Table 5.14: Chi squared statistic for ringforts distance to ridges (Value = 2500)

Range	Observed	Expected	Test Statistic
3 - 1390	270	142	115.38
1391 - 2777	151	90	41.34
2778 - 4164	63	121	27.8
4165 - 5551	10	141	121.7
Total	494	494	644.67

The p value returned, with the higher individual ranges and for the summed total is again less than 0.00001. This proves again that ringforts were deliberately built close to ridges in the landscape, and the analysis can be carried out at any scale and the results will be statistically rigorous.

The two value ranges return very different results. However, it is possible in some instances to ground truth or even desk-check the results produced above, although with such a large number of ringforts and ridges ground truthing is not possible for all. Davis (2011, 37) describes the quadrivallate ringfort called Tlachtga as being “the highest point in the area towards the southern end of the ridge”. This can be clearly seen in Figure 5.34, with the DEM displaying the height and the ridges visible at both scales of construction. The green line with a Value of 2500 picks out the line of only the main spine of the upland area while the lower Value of 500 depicts the other ridges across the area.

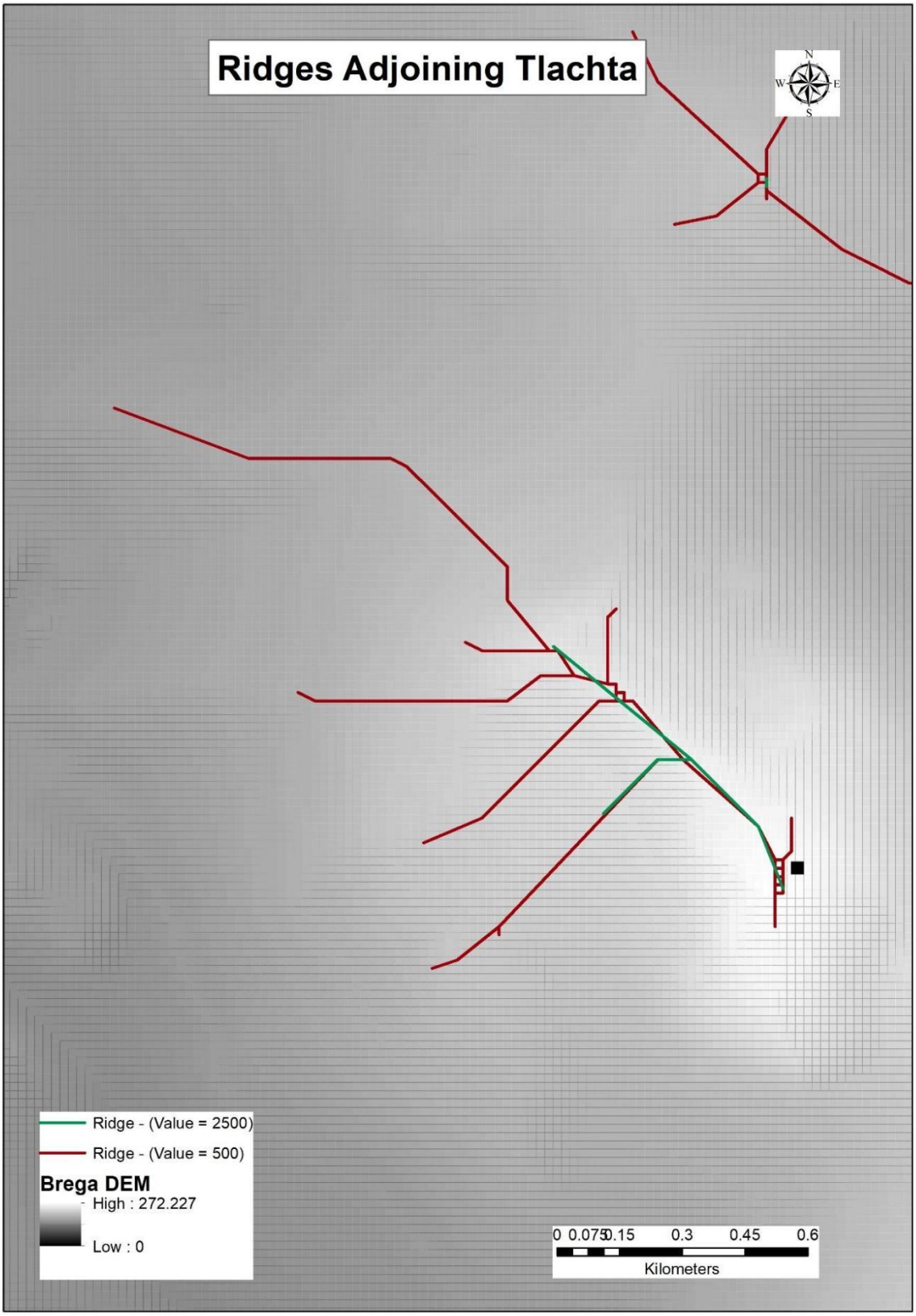


Figure 5.34: Ridges adjoining Tlachtga with differing values (Figure by Author)

The question to be asked now is why did people choose to build their settlements so close to ridges in the landscape? One aspect could be a key concept in archaeology – that of liminality. Drainage basins are formed by ridges from which all water flows to a lowest point, usually a river or lake. As such the ridges surrounding these basins form a liminal barrier, beyond which a traveller will be entering a different space and were often used as landmarks (Lynch 1960). The horizon lines these ridges create have also been well documented in the literature (Willey & Phillips 1958, 33). In a study of transhumance, admittedly in a period later than the early medieval, Costello (2017, 191) suggests that the liminality of spaces which were not entirely familiar "was rooted in the uncertainty which many people felt towards such landscapes". Uncertainty in this case came from many sources. Fear of the unknown, fear of the known in the form of other, possibly hostile *túatha*, and the dangers of travel at a time when travel was not extensively practised among the general population outside their own familial ranges. The boundaries of this liminality could vary and could be different depending on both the scale and the medium through which the viewer chose to see it. In this case, the visual boundaries created by watershed basins created a strong liminal boundary defining the area. Today we see boundaries as being lines on a map, for example county or parish boundaries, but in an era without maps, topographical features were far more likely to have been reference points for boundaries. Ridges are easily recognisable even from a distance and therefore become strong visual markers for travellers.

Crossing a defining ridge creates a strong sense in a traveller of leaving one space behind and entering a new space. The known environment is being left behind and the person is travelling forward into a new space, not always sure if this new space will be hospitable or not, notwithstanding early Irish laws on hospitality.

5.8.3 Altitude and Slope

As discussed earlier environmental and topographical features were often key factors in siting settlements, and an inherent aspect of this is the altitude and slope setting of individual ringforts. Using the DEM to ascertain the heights of ringforts in the area allows us to perform some analysis in relation to whether altitude and slope were contributing factors to the siting of these settlements.

One of the things Brega is most famous for is its plain – Mag Breg, however the kingdom was not completely flat or made up solely of this plain. Figure 5.35 shows a simplified version of the DEM, with the heights divided into 5 categories using Natural Breaks as the classification system for the data. While the plain is clearly visible to the west of the kingdom, there is also a band of even lower land as would be expected along the coastline running to the sea. While the uplands areas are not extremely high, they top out at 272 meters above sea level, there are noticeable areas of uplands, principally the White Mountains between Rathkenny and Dunleer, and in particular *Slieve Breagh* in the north east of the kingdom and around *Slieve na Calliagh* in the north west. The simplified DEM also makes it quite easy to see that the easiest routes into this fertile plain were along the Boyne valley if coming from the east and along the Dee valley if coming from the north. Both of these routes access the interior of Brega by following the course of the river.

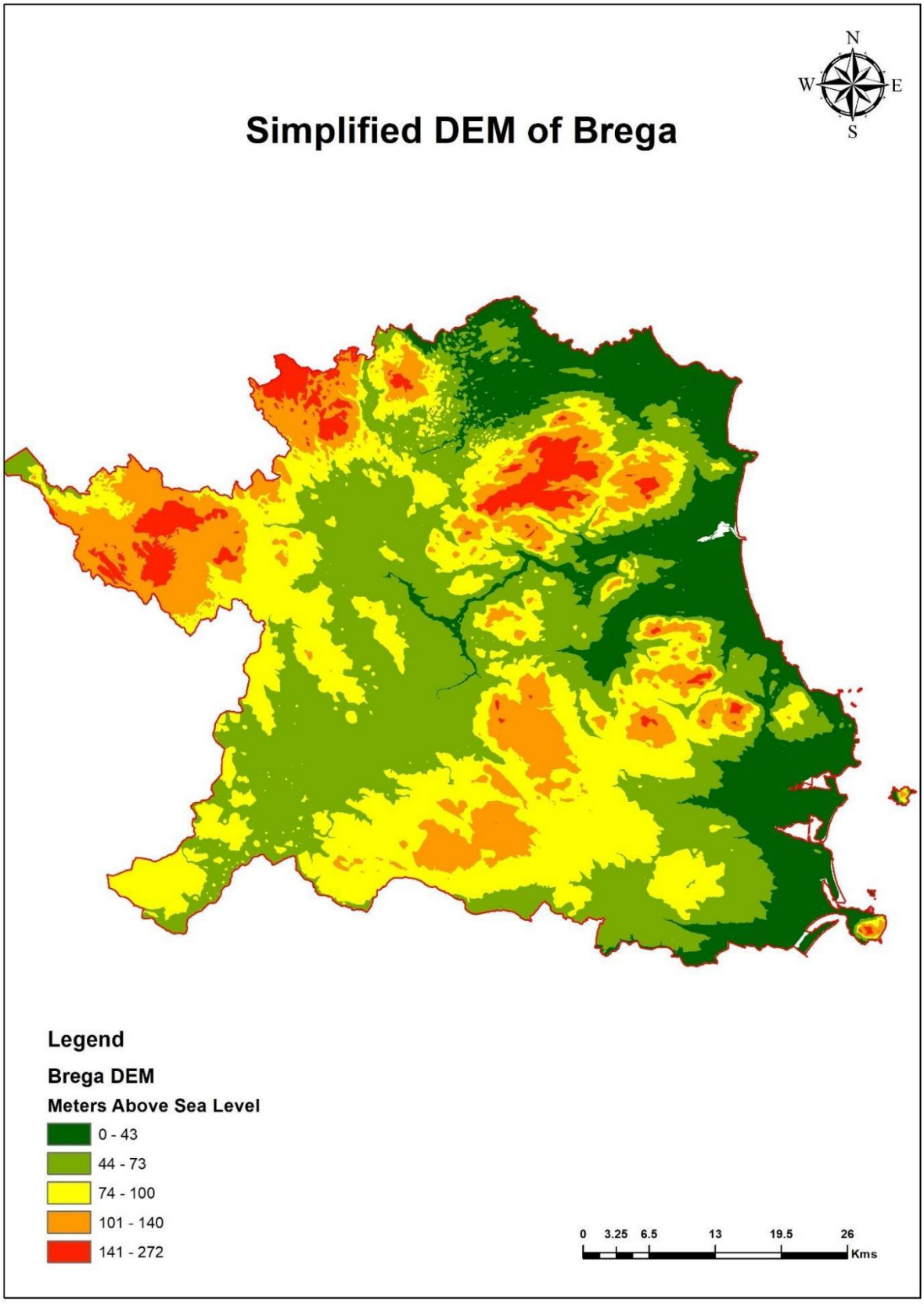


Figure 5.35: Simplified DEM with 5 height categories (after EU-DEM with additions)

It is instructive to analyse the density of ringforts in relation to their height, and also whether other factors such as the shape of the ringfort or its area, allied to its height, has any relation to its siting. To examine this more effectively, the DEM was classified into 5 equal band intervals of 55 meter increments as seen in figure 5.36. It is easily visually reconcilable that the upland areas are much reduced in size when the data is represented in this way. Table 5.15 below shows the data numerically, including the amount of land area within each height band, percentage of total area within each band, expected and actual number of ringforts per band, and the difference between these two figures.

Table 5.15: Height of ringforts in relation to land area

Height Band Meters Above Sea Level	Land Area Sq. Kms	% of Total Land Area	Actual No. of ringforts	Expected No. of ringforts	Difference	Change %
1 0 - 55 m	870.59	26.56	33	131	-98	-296.97
2 55 - 110m	1994.2	60.83	268	300.5	-32.5	-12.12
3 110 - 165m	374.53	11.42	166	56.41	+109.59	66.02
4 165 - 220m	35.78	1.09	24	5.38	+18.62	77.58
5 220 - 275m	3.14	0.09	3	0.46	+2.54	98.47

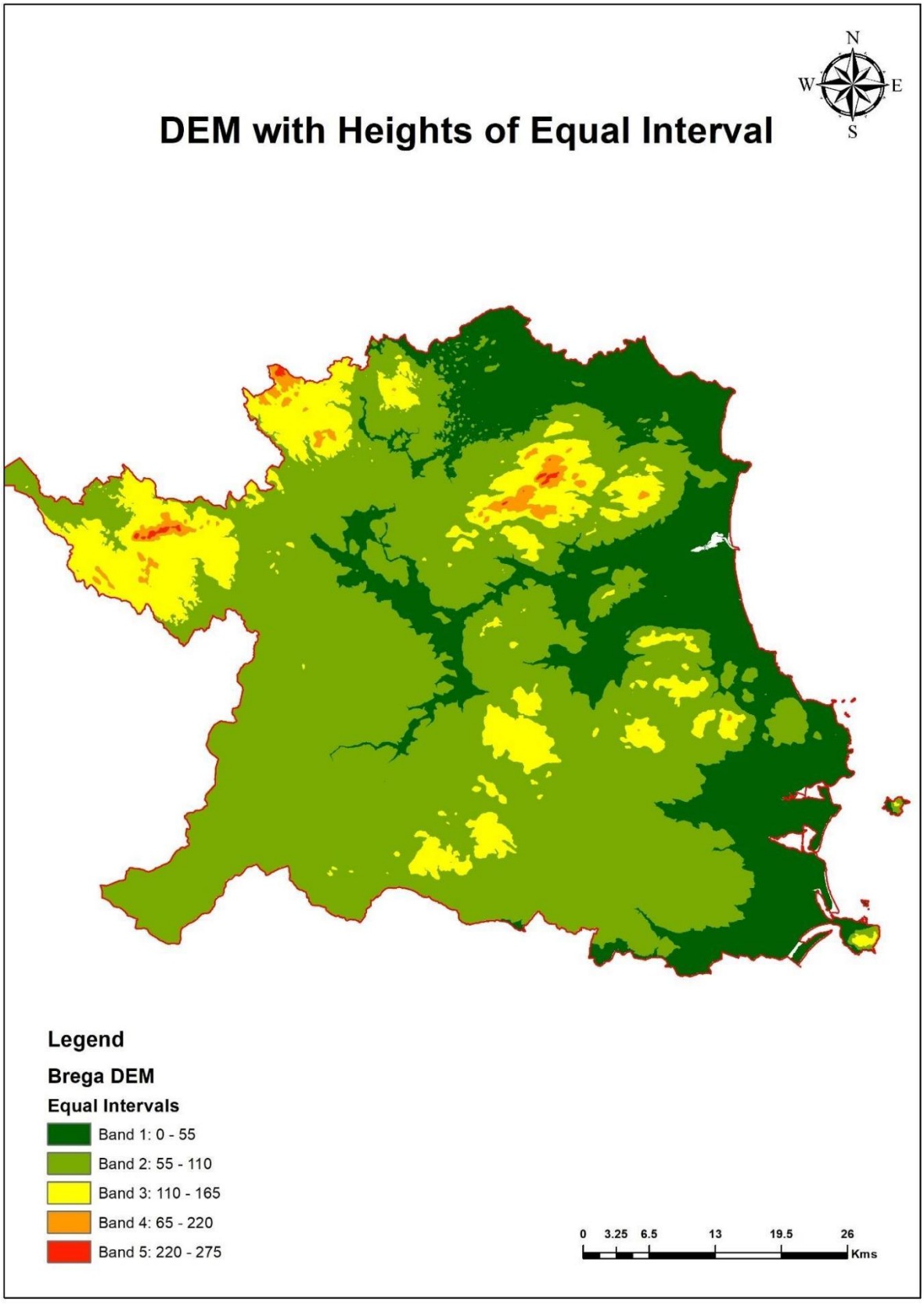


Figure 5.36: Brega DEM with height bands divided into 55 meter increments

Table 5.15 calculates the land area between each band, and then going from the total of 494 ringforts in total, calculates the amount of ringforts that would be expected to be contained on this portion of land.

The above table shows some interesting trends. The percentage change between the actual and expected increases as the altitude rises, and this increase occurs across all height bands. Ringforts are under-represented at the two lower height bands up to 100 meters. Above this height, they are massively over-represented, with an increase of almost 200% in band 3 which has only 11.42 percent of the area of the kingdom. There is a corresponding under representation at the lowest level by almost 75%. A caveat must be mentioned here that most of the lower altitude ranges are along the coastline. Ringforts in this area were both susceptible to removal and were also probably built on due to the establishment and expansion of coastal towns in this area such as Drogheda, Duleek, Balbriggan, Bettystown and Laytown, which are all situated in this low lying area. Having made this point this is more likely to only affect ringforts in Band 1 and would have no effect on the over representation in Band 3, as these figures are directly related to the land area and are not relative to each other. It is interesting to note that people shied away from building at lower levels, which is somewhat surprising as this is initially where the land would be expected to be of better quality and takes less physical energy to move around. Flat, Low lying land is also sometimes susceptible to flooding from rivers and streams which can be helpful for the soil but can also cause damage to crops. Stout (1991, 206) found a similar avoidance of lower levels in the south-west midlands. While Band 2 contains over 60% of the land area, much of that is in the Dublin area and this encompasses the problems mentioned earlier in relation to the removal of sites.

The size of a ringfort in relation to its height presents some interesting points. Intuitively it might be imagined that the higher in altitude a ringfort is built, the smaller that ringfort might

be. This is not the case, however. Table 5.16 shows the average area for ringforts in each band.

Table 5.16: Average ringfort area per within height bands

Band	Area (sq. m)	Min	Max
1	2711.43	50.24	11473.56
2	3315.12	314	22608
3	2698.59	87.92	17427.78
4	3273.31	415.26	17166.38
5	776.88	490.62	1133.54

As can be seen it is only at the highest band, over 220 meters above sea level, where the size reduces dramatically. The sample size is quite small here though, with only 3 ringforts being built above the 220 meter contour, and all three are in the same townland. All three are also circular and univallate. However, the average size of these ringforts can be quite misleading as the largest ringfort in band 5 in Rathbranchurch townland (ME013-045----) is actually very similar in size to the largest ringfort in band 1 at Maine townland (LH015-046---), the lowest lying area.

Having said that band one was under-represented in site location, it also shows that not only did people not want to build at these elevations but when they did build, they also built smaller ringforts. While the average size of ringforts in band 1 is similar to that in band 3, the smallest ringfort in Brega is in band 1, and also the biggest ringfort in band 1 is substantially smaller than the biggest ringforts in the next 3 bands, and only marginally bigger than the largest ringfort built at the highest points of the kingdom. While band 2 is substantially under-represented, bigger ringforts were being built here. Band 2 has the biggest average area, and the biggest maximum area with the smallest ringforts in this band in the middle of the

range. Interestingly, at higher altitudes such as band 4 and 5, the smallest ringforts are far larger than the smallest ringforts in the lower three bands. Bennett (1989, 55) states that there is a similar situation in Wexford and suggests that these ringforts may have had a different function.

It is possible that rather than being dwelling places, these ringforts were used as storage centres for fodder for cattle in the summer months, known as transhumance or booleying in Ireland, when cattle were brought to higher elevations (Kelly 2015, 45). Lucas (1989) has suggested that there is substantial documentary evidence for the practice of transhumance in early medieval Ireland. It is also possible that they were used for booleying at some periods and dwellings at others and for both at other times. Evidence for this sort of practice has been found in places such as Achill Island (McDonald 2016, 59).

It is unlikely that the ringforts were used solely for this purpose though, as Kelly (ibid.) also quotes Bede who suggests that the climate of Ireland was mild enough that the Irish did not need to make hay for winter use. One possible reason is that the cattle could be brought inside to protect from wolves, although in the summer months it must be imagined that other game was plentiful enough for the wolf population. It is impossible to verify whether any dwellings were present without excavation or possibly even geophysics, but no excavations have been carried out on any of these ringforts.

As mentioned earlier in relation to Stout's disregarding of different ringfort shapes, comparison of ringfort areas with other regions is also made more difficult by this. For example, in Isabel Bennetts (1989) study of ringforts in County Wexford, she gives only an internal diameter figure, regardless of the shape of the ringfort so comparison is difficult between regions. This is highlighted below in Table 5.17. Bennet uses 7 different height bands of 30 meters each, rounded from the original figure in feet. She gives a diameter

figure for each of the ringforts in the area, so areas have been calculated on the πr² basis. When compared to the Brega figures, with the area being calculated on a formula correlating more directly to the shape, a stark contrast emerges.

Table 5.17: Ringfort areas compared to Wexford

Band (m above sea level)	Wexford Area m²	Brega Area m²	Increase %	Brega (Circular) Area m²	Increase %
0 -30	1017.36	3158.02	+210.41	0	0
30 - 60	615.44	1721.91	+179.78	1319.68	+114.42
60 - 91	803.84	3791.04	+371.61	1115.55	+38.77
91 - 122	754.38	2934.43	+288.98	1248.28	+65.41
120 - 152	907.46	2412.04	+165.80	1147.74	+26.47
152 - 183	803.84	3011.48	+274.63	1642.61	+104.34
183 - 213	754.38	2720.02	+260.56	0	0

Admittedly the main column for Brega has the more nuanced figures calculated in relation to shape, and if the smaller of the two figures for say, an oval ringfort is taken during Bennetts study, the figures will be skewed. Based on this somewhat rudimentary calculation though the ringforts in Brega are 250.25 percent larger than the ringforts in Wexford. There is a smaller, but more reliable subset of circular ringforts with defined internal diameters in Brega consisting of 44 ringforts. There are no ringforts defined as circular with reliable internal

diameters in the 0-30 or 183-213 bands in Brega. When the area of this subset is calculated exactly as Bennett has done on their internal diameters alone, they are still 69.88 per cent larger than the Wexford ringforts. Other areas show the same characteristics.

In county Louth, Barrett (1982, 86) has shown that almost 33% of ringforts fall between 30 and 60 meters above sea level, and this is quite similar to the land coverage of 31.1%. In the case of Brega this figure falls massively to just 6.07% of ringforts between these heights. There are parallels however with people choosing to site their settlements on higher ground relative to the altitudes in the area, and the trends rather than the actual heights are somewhat paralleled in Brega. This highlights the difficulties as well as the advantages of different approaches to the same subject. It also contrasts the regionality of building practices between the three areas and it must be assumed that other areas would differ from these three also. This also presents the danger of Stouts (2000) tightly geographically focussed model from one specific area of the country being used to interpolate data across a wider area.

There are many possible explanations as to why people built their dwellings higher than they needed to, but likely explanations that have been put forward are the inclination for better drained soils and defensibility. Better drained soils are also a function of slope. The slopes in Brega based on the DEM range from 0 to 38.8 degrees and this can be seen in figure 5.37. Ringforts have not used the full scope of these slopes and have only been built on slopes of between 0 and 12.7 degrees. Table 5.18 shows the number of ringforts contained in bands based on Natural Breaks in the data.

Table 5.18: Percentage of ringforts in slope bands

Band (Degrees)	No. of Ringforts	%
0 – 2.5	334	67.61
2.6 – 5.1	110	22.26
5.2 – 7.6	40	8.09
7.7 – 10.1	8	1.61
10.2 – 12.7	2	0.40

Having said that there are inherent dangers in extrapolating from one particular region to another, there are also times when strong similarities emerge in building practices. This can be seen in a comparison of the slope trends between Brega and the baronies of Clonlisk, Co. Offaly, and Ikerrin, Co. Tipperary in the south-west midlands also written about by Stout (1991). The average slope on which ringforts are built in Brega was 2.32 degrees. In Stout's study areas it is a very similar 2.6 degrees. Stout also states that 54% of ringforts are in the 0.3 degree to 2 degree range, and in Brega this figure is 54.25 %, remarkably similar. It would be instructive to assess whether this was a particularly strong trend which also applied to other areas. A slope of up to 2 degrees is very helpful in terms of draining land, but it is also physically easy to negotiate for people and animals and does not provide undue stress when moving in or about the settlement.

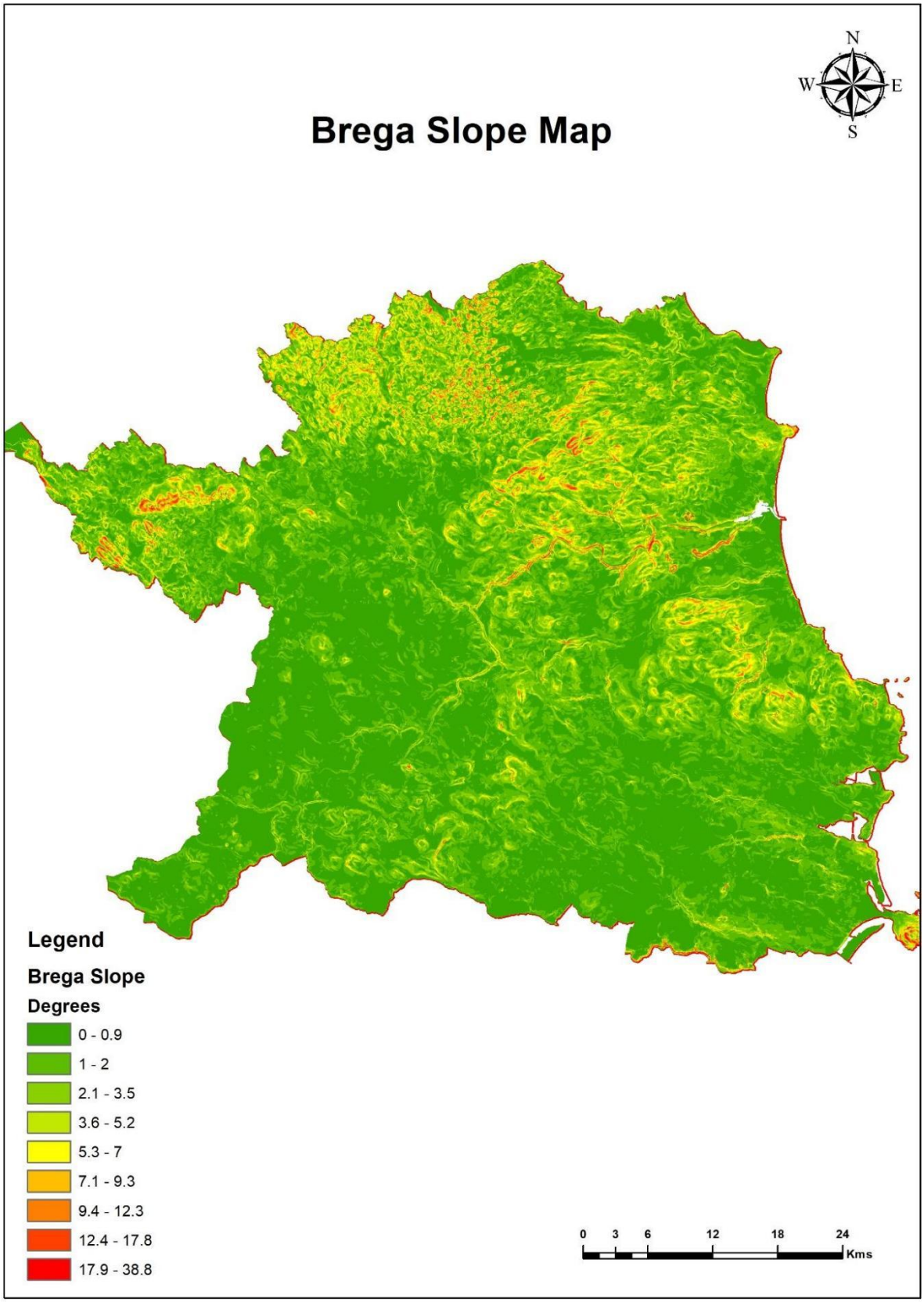


Figure 5.37: Slope Map of Brega (after OSM, EU-DEM, NMS with additions)

5.8.4 Height & Shape

The shape of a ringfort combined with its height does not seem to be correlated in any way. Table 5.19 shows the average height based on whether a ringfort is classed as circular, sub circular or oval.

Table 5.19: Average height based on ringfort shape

Shape	Circular	Sub-circular	Oval
Average Height	104.89	108.63	94.28

As can be seen the heights are relatively similar, with the oval ringforts on average being built slightly lower down. These averages can be explored in more detail in Table 5.20, which has the actual ringfort heights divided into the same height bands as used in Table 5.19 above.

As Table 5.20 shows, while the averages are quite similar, the number of each shaped ringfort in each band varies widely, both in terms of actual numbers of ringforts and as a percentage of the total number for that shape. This would seem to indicate that the shape in which a ringfort was built at a specific height had no bearing on the decision to place it there.

Table 5.20: Number of ringforts and percentages of totals based on shape and height

Shape	Circular		Sub-circular		Oval	
Bands **Meters above sea level**	**No.**	**%**	**No.**	**%**	**No.**	**%**
Band 1 **0 - 55**	16	6.16	6	4.31	9	10.85
Band 2 **55 - 110**	142	54.62	67	48.21	50	60.25
Band 3 **110 - 165**	83	31.92	60	43.17	22	26.5
Band 4 **165 - 220**	16	6.15	6	4.31	2	2.4
Band 5 **20 - 275**	3	1.15	0	0	0	0
Total	260	100	139	100	83	

In looking at the vallation of the ringforts in relation to their height we see that the averages between uni-, bi- and tri-vallate ringforts are again very similar and these can be seen in Table 5.21.

Table 5.21: Average heights based on vallation

Vallation	Univallate	Bivallate	Trivallate
Average Height	103.22	105.66	102.28

While the average heights are broadly similar, there are some distinctions in the data. Examining the data more closely results in Table 5.22 below.

Table 5.22: Trends based on vallation and height

Vallation	Univallate		Bivallate		Trivallate	
Bands **Meters above sea level**	**No.**	**%**	**No.**	**%**	**No.**	**%**
Band 1 **0 - 55**	29	8.51	4	4.39	0	0
Band 2 **55 - 110**	181	53.08	47	51.65	10	66.68
Band 3 **110 - 165**	111	32.55	37	40.66	4	26.66
Band 4 **165 - 220**	16	4.69	3	3.30	1	6.66
Band 5 **220 - 275**	4	1.17	0	0	0	0
Total	341	100	91	100	15	100

Table 5.23: Percentage change based on expected numbers of ringforts in relation to vallation and land area

	Univallate				Bivallate			Trivallate		
Band Meters above sea level	**% of Land**	**A**	**E**	**C %**	**A**	**E**	**C %**	**A**	**E**	**C%**
Band 1 0 - 55	26.56	29	90	-210.64	4	24.16	-504	0	3.98	0
Band 2 55 - 110	60.84	181	207	- 14.36	47	55.36	-17.78	10	9.13	-8.7
Band 3 110 - 165	11.42	111	38.94	64.92	37	10.39	71.92	4	1.71	57.25
Band 4 165 - 220	1.09	16	3.71	- 76.81	3	0.99	67	1	0.16	84
Band 5 220 - 275	0.09	4	0.31	92.25	0	0.08		0	0.01	0

A = Actual; E = Expected; C% = Percentage Change

These tables again show that there is a marked and deliberate targeting of land between 110 and 165 meters to build on, with heights of 165–220 meters the next preference. It is possible that this was done for a number of reasons. One could be to avoid building on land that was more suited to growing crops or to avoid periodic flooding of river valleys, even though moving around sites at higher elevations was actually more difficult than those at lower elevations. The combination of height with slope also made the soils drain better than the ones lower down. Defensively the height also made a difference as visibility was generally, while not always, improved with height.

5.9 The Decline of Ringforts

Why people stopped building ringforts as their predominant settlement type is a matter of much debate, and one that has never achieved a satisfactory consensus amongst archaeologists. An effort has sometimes been made to search for a terminus ante quem for ringfort construction and also occupation, but just as regionality has been shown to be important in the siting of ringforts, it is also a factor in the building, occupation and sometimes reoccupation of these sites. Emap (2014) has suggested that there were two phases of ringfort decline - c. 800 AD and 1000 AD. However, while these two phases are plausible, due to the scope of Emap they are also very general. Somewhat parallel to this is the change from round houses to rectangular ones, likely to have been influenced by the rectangular houses built by the Vikings, as Lynn (1994, 86) suggested there are no examples of rectangular houses before the tenth century.

There is evidence for much later occupation of some of these sites, such as the one at Lisdoo, County Fermanagh which shows at least some occupation of the site from the 14th to 16th centuries (Brannon 1982, 55-8). Another example of this is a ringfort at Lusk, County Dublin in which the occupants seem to have removed all of the wooden supports and took them with them when they left at the end of the ninth century (Giacometti 2011, 166) possibly

to reconstruct a settlement somewhere else. There is later evidence of parts of the site being reused in different forms, although probably not for long term settlement. There are often examples of settlement sites being reused as in Table 5.3. Specifically in the case of Brega, Ross 1 and Castlefarm 1 were occupied from the Neolithic up until the Late Medieval period, and Roestown 2 from the Mesolithic up to the late Medieval period, with a gap for the Iron age where no settlement evidence has been found. What this evidence shows is that while there are definite trends in ringfort abandonment, there are plenty of examples which stand outside this.

Just as there are many theories put forward for the increase in the construction of ringforts in the sixth to ninth centuries, the converse of most of those theories don't hold true when it comes to their abandonment. For example, there were still wolves in existence, there were still episodes of plague and disease, and cattle raiding still happened. Kerr (2007, 114–115) has suggested that another possible explanation is the increase in arable farming, and the shift away from cattle being the mainstay of the socio-economic model. Stout (2017, 162) has also suggested that the increase in grain production helped decrease the importance of cattle, as grain surpluses could be sold and also fed to pigs, and he points to the increase in pig bones, citing the example of Moynagh Lough crannog in Brega in which pig bones were more prominent than cattle. The same was true at deer park farms, County Antrim (Allison et al. 1999).

One of the more plausible models for ringfort abandonment is the shifting of population groups due to a type of proto-feudalism in which settlement was reorganised towards nucleated settlement around a "fortress" under the control of a noble (Graham 1993, 44; O'Keefe 2000, 26; Kerr 2009, 74; Stout 2017, 162), although Emap (2014, 78) suggests there is no clear evidence for this. The regionality aspect reappears again in the form of the rise in construction of the stone forts of the west of Ireland. Constructed in the ninth century (Manning 2016, 185), these large, imposing stone forts made use of the abundant local stone,

a raw material not as readily available on the quality farmland of Brega, and O'Keefe (2000, 26–29) has suggested that nucleated settlements formed around these sites, the *dúns* of Irish lords. These western fortresses in the west continued, whereas in the east of the country and especially places like Brega in the late twelfth century, some ringfort sites, especially platform ringforts, were transformed and reused as mottes by the incoming Anglo-Norman settlers, further reducing the amount of obvious native Irish settlement remains available to us in the kingdom.

5.10 Conclusion

There is a tendency sometimes for archaeologists to almost ignore environmental and topographical variables in the search for more "sophisticated" cultural and ideological underpinnings for physical expressions of how people lived, such as their settlements. However some of these variables are universal, as can be seen in the case of the slope calculations above, in which there is uniformity across regions with particularly steep slopes avoided and a narrow window of slopes used for building. Other variables show marked differences in terms of ringfort shape, size and settlement density proving once again that regionality must be emphasised in any analysis, and a comprehensive overall settlement picture of the country as a whole is a particularly complex problem.

Chapter 6: Communications and Travel and its role in the economy

6.1 Introduction

In early medieval Ireland, people moved through the landscape for a myriad of reasons - social, ideological, and economic. Daily travel by foot, horse or cart was an intrinsic part of the routines of daily life and herding animals, tending to crops or simply visiting neighbours was commonplace. Travel could also be seasonal or episodic. People gathered for assemblies, markets and fairs, could go to a church for mass and pastoral care, or go on pilgrimage to a monastery on a saint's day. In political or ideological terms, early Irish kingship involved movement and travel as kings went on the royal circuit, administering justice, settling disputes and maintaining a presence with their military retinue on the territory. Early medieval Brega was a landscape connected by routeways, both within the territory and externally by sea, river and road to elsewhere in Ireland and beyond. Being a politically significant region within the island, its routeways were all the more important, as a major seat of political and economic power. The movements of people, animals, crops and goods were all part of what made the social and political relationships of Brega and its economy work, both within the territory and through its connections with the outside world.

This chapter will focus on investigating and reconstructing the travel, transport and communications systems of early medieval Brega. The communication networks discussed here should not be confused with our modern, integrated and publicly funded system. Rather it was a network of tracks, paths and roads including river passages, varying in size, quality and levels of maintenance. These were layered and built up over time according to the needs of people to accomplish their social, cultural and economic goals. A strong, interconnected and well-maintained transport network can reduce the cost of transporting goods, and make the transportation of tribute payments, usually in the form of cows or slaves, less onerous, but it also helped to knit communities into networks of dependency, affiliation, loyalty and belonging.

Over 100 years ago the Reverend P. Power (1903, 110) stated that “little or nothing has been done to identify, trace or describe our early highways”. It can be argued that in general, the early medieval roads and riverine routeways of Ireland have still not been comprehensively researched, with only a few major publications on the issue (Comber 2001; Dudley-Edwards 1991; Kelly 2000; O’Keeffe 2001; O’Lochlainn 1940). Considering how intrinsic travel, trade and communications are to the functioning of society at the time, and especially within a kingdom as politically and economically powerful as Brega, it is somewhat surprising how little research has been carried out. There are texts which mention Ireland as part of a wider long-distance trade network, but they are very rarely complete papers or books focussed on these trade networks and sometimes just mention it in relation to some other aspect. For example a comprehensive text like *Reading the Irish Landscape* (Mitchell and Ryan 1997) which, as the name suggests, examines the Irish landscape, does not mention the road system at all in the section on early medieval Ireland. There have been some key publications. Colm O’Lochlainn’s (1940) work on the ancient road systems of Ireland, focusing on the five major roads (*Sli*) of Ireland has been the basis for most of the succeeding research and is often regarded as the seminal work in this area. There was a long break of almost 50 years before Dudley-Edwards (1991) returned to the subject in any major way, with a minor flurry of publication by Comber, Kelly and another specific work by O’Keeffe between 2000 and 2001.

Considering the physical position of Brega within the country, its trade links with Britain, Europe and further afield combined with its transport network of roads and rivers, it can be considered a “nodal” point in the Irish landscape. By implication this means that the kingdom is one point on a network of other “nodes”. Travel, either in the form of movement within the landscape for economic, social or religious purposes, is an intrinsic element of almost any exchange of social, technical and ideological theory and method and is the enabling factor in these exchanges and plays a “central role in society” (Lowe & Moryadas 1975, 75). Scalability is an important factor in these considerations. At a countrywide or even larger

scale, and especially if you include Britain, Brega can certainly be classed as a node within this larger network. However, when the scale is increased, Brega itself contains multiple nodes in the form of the settlement network of ringforts, crannogs, cashels and other sites such as ecclesiastic enclosures, enabling us to study this area at different scales. While the study of these settlement sites has increased over the last decade, what has not kept pace is the study of the transportation links which bind them together.

Having mentioned the dearth of research in this area there are a few notable exceptions namely Doran 2004, Giessel 2006, O'Keeffe 2001, O'Lochlainn 1940. These four works provide a body of historical and archaeological work on internal transportation within Ireland and focus on identifying and mapping the main routeways within the country – the five major *slí* of Ireland. The main cause of dissension between the works cited above is where the roads emanate from – Tara or Dublin. Peter O'Keeffe has formed the idea that the routes were centred on Tara while Colm O'Lochlainn and Hermann Giessel argue that they began in Dublin and this will be examined later. There is a tendency towards Tara however as can be seen by the reference in the Annals of the Four Masters (AFM) in 123 A.D. quoted in section 6.3 below.

O'Lochlainn favoured Dublin rather than Tara as the starting point and Linda Doran (2004) agreed with this. Credence is given to this idea due to the roads having their foundations in prehistoric Ireland, possibly before Tara became a major centre of power and the seat of the high kings of Ireland. While Dublin had not yet seen the settlement of the Vikings, it was still an important port and the long inlet of the Liffey gave shelter from bad weather to trade and fishing vessels, and Dalkey Island was a major trading point. Having said this, Tara was undoubtedly an important site before the early medieval period also, as the large number of prehistoric monuments on the hill can attest to.

Taking these factors into consideration, O'Keeffe's starting point at Tara cannot be discounted, and Barrington (1976) suggests that it was in fact Tara that was "the hub of the road system". Figure 6.27 below shows the road as a schematic, to more clearly gauge the road system from a network analysis point of view. Network analysis is a growing field across all disciplines and is starting to flourish in archaeology, albeit only in recent years. Figure 6.27 is a scale free representation of the road network and (Barabàsi and Albert 1999) have suggested that a small number of nodes will be more highly connected due to processes of growth and preferential attachment. Brughmans (2010, 280) stated the implications of this very concisely: "Such a specific topology has direct implications for the processes underlying it, like the transportation of materials, the spread of religious ideas or the enforcement of political power. These processes would largely take place between the highly connected nodes, and they would only reach the larger number of less connected nodes through these vertices".

As Brughmans (ibid.) said, a comprehensive, cohesive method of transporting people, animals and trade goods was essential to support a strong economy, spread ideas and theories, and create opportunities for socialisation, both within the kingdom and further afield. Just how comprehensive and cohesive the road system was is not known, although we do have some indicators. By the time of the Anglo-Norman arrival O'Lochlainn (1940, 465) suggests that they found "a country so well provided with roads that they have little difficulty moving in moving bodies of heavily clad mailed warriors… without the preliminary military work of making roadways."

It is important to understand also that *why* people moved from place to place is just as important as knowing that they did, and DeGruchy (2016, 427) has suggested that "understanding what made people travel to one place and not another at any particular time has the potential to inform about socio-political and economic relations". Llobera (2020, 1) adds to this further by stating that "the simple act of following an extant path constitutes a

form of communication". Some of these possible reasons are also discussed throughout this chapter.

Brookes (2007, 57) has argued in relation to Anglo-Saxon England that roads are "integral to the sense of identity, territoriality and power", and economic strength is the bedrock on which political power is built and maintained. A king who cannot provide for his people will not remain in power for very long and can lose or have his status reduced in the same way as other grades could. This chapter explores the trade routes and connections that helped make Brega a wealthy kingdom and how this wealth could have bolstered claims to the high kingship of Tara, the site of which was very central to the kingdom. The opportunity for wealth within the kingdom, the cultural prestige to be garnered from encompassing the seat of the high king of Ireland, and abundant trade routes outside the country, the strong links to the "old" religion in the form of an abundance of megalithic tombs in the area and also strong links to the "new" religion of Christianity, were all possible factors which encouraged the Southern Uí Néill to move from their homeland in Connacht to annex Brega and Mide.

Politically the kingdom encompassed many royal sites, and in particular the seat of the high kings at Tara. Travel to and from Tara was an essential and prestigious undertaking and often had a measure of ritual associated with it, especially in relation to the inauguration of high kings, thus ensuring good transport links related to this pivotal point in the country, and its position as a node in the transport network is mentioned throughout this chapter.

So having argued how important the transport and communication links are to any society, this chapter will harvest data from the existing studies, transform it into data suitable for use in the GIS and use the GIS to build a more nuanced vision of these routeways, to analyse existing routes and also to possibly predict the paths of routes which have been destroyed or fallen out of use in the modern day.

Due to the scope of this study the concentration will be on the roads that actually pass through Brega, and other, often major roads, are only mentioned briefly. The river and port networks are also analysed as they were a hugely important element of the transport network. There are caveats though, and while every effort is made here to present as comprehensive a picture of the transport network as possible, it must be recognised that the routes depicted here are still important enough to have been mentioned in written sources. There were many, many more smaller routes which were often beneath the notice of the written sources, and indeed some very local paths were probably only known to the small number of people who used them.

The chapter aims to collate, create and depict the data to recreate the road system of Brega in as complete a manner as possible at this time, to endeavour to more fully understand one of the central contributing factors to its economic and political power.

6.2 Communications and Travel

Roads can provide a wealth of information on the cultural, social and economic transactions of our ancestors, and were “one of the most obvious ways in which past agents engaged with the landscape” (Brookes, 2007, 56). Movement through a landscape can be an impediment to social interaction and also a facilitator of those interactions. Topographical features can be barriers to movement as in the case of large mountains or wide rivers, but they also serve to channel that movement towards places where interaction can take place, and eventually form foci for the transfer of social and cultural mores as well as economic exchanges. Points in the landscape such as the fording places mentioned in section 2.10.2.6 create opportunities for dispersed peoples to meet and exchange socially, culturally and economically. It is no surprise then that settlements tend to grow up around meeting places in the landscape such as fords and ports. It has been suggested that movement represents a universal mechanism through which humans, regardless of size or social complexity, order their landscape (Albert

and Tourneau, 2007), conversely however, it can be argued that the landscape can influence and sometimes order human movement, and the two form a symbiotic relationship that evolves over time.

(Little 1957, 39) has argued that roads can be a prism with which to examine a past economy. Ireland was a pastoral economy at the time, and “cattle ownership formed the basis of wealth as well as being an indicator of status in society” (McCormick 2014, 119). McCormick (ibid.,120) also describes the system of clientship, where a lord advances a ‘fief’, usually of cattle or land, to a client and in return received rents in the form of cattle and/or food. This superficially simple transaction gave rise to the movement of cattle. The cattle would be driven from the lord's land to the clients, moved around depending on the needs of the cattle for grass and water, and then some of their offspring returned with interest to the lord's land after a period of time. Over time this would have led to an accretion of cattle tracks, constantly building a network of paths through generations of clientship transactions. This process was so commonplace and the tracks and number of cattle involved were often so small, that individual tracks would not be worth mentioning in the annals or other sources unless some other factor was introduced to make them noteworthy. This also opened people up to news and information from further afield.

Having said this, it is no surprise then that most of the different types of road have some references to cattle in them. Classes of road were also defined by their size, and the etymology of the modern Irish word for road – *bóthar* – means “cattle road”. The fact that *bóthar* became the modern Irish word for road is perhaps an indication of its ubiquity at the time. Later in the period, approximately from the 8th century onwards McCormick (2014, 119) suggests that the use of cattle seems to have lost some prominence, and cereal production increased. In a study of some sites in County Meath it would seem that barley was the predominant crop, followed by oats (Monk 2017–18, pp. 50–52) and isotope analysis has shown that even though Brega had a long coastline and interior penetration through the river

system, sites like Raystown and Collierstown show very little evidence for marine foodstuffs in the diet (Ryan et al. 2018, 65). However the clientship system was still in use, and even though an increasing amount of fiefs may have been given and received in crops rather than cattle, it is likely that the same transport networks would have been used to distribute the goods.

6.2.1 Types of road in early medieval Ireland

Early Irish law defined different types of road, in hierarchical order. Kelly (2000, 391) distinguished the 5 categories of road described in the law texts and these can be seen in descending order of importance and size in Table 6.1. While it is generally accepted there are 5 categories of road, the ancient text known as Cormac's Glossary suggests there are 7. This may partially be due to difficulties in translation and Kelly (2000, 543) describes how one word for a type of road - *rámat* - is actually more likely to be used for an open space in front of the *dún* (settlement) of a king rather than a road.

Table 6.1: Types of road in early medieval Ireland

Irish	Translation
Slige	Highway
Ród	Road
Lámraite	Byroad
Tógraite	Curved road
Bóthar	Cow-track

A *slí* is defined by its ability to allow two chariots, drawn by two horses each, to pass each other and is the widest of the roads (Morris 1938, 113). A *ród* is one in which a chariot and two horsemen can pass each other on it (Kelly 2000, 538; EMAP 2014, 193), suggesting that a chariot was wider than two horsemen. A *lámraite* was a by-road between two highways and

was intended for errands and winter visiting (Bhreathnach 2014, 118). It has been suggested (Kelly 2000, 538) that a *tógraite* possibly led towards a wood or mountain and had the advantage of being tolled in the form of an animal every second year from a herd which passed, increasing the value of the land.

There was a wider economic aspect to the road system, above the mere tolling of roads. In early Irish laws, with its eternal obsession with classification, property and status, the economic value of agricultural land could be enhanced by its access to resources or places of socio-economic importance. Thus, the Old Irish law text *Tír Cumaile* opens with a question - what are the attributes which add value to a parcel of land?, and the text also describes how these attributes can be assessed from a legal standpoint (Mac Niocaill 1971, 85). The presence of any of the road types mentioned in Table 6.1 near a parcel of land increased its economic value, the more so if it was leading to a place of significance. If the road leads to a woodland (with its resources of underwood and timber), the seashore, or a mountain (with its useful summer grazing) it adds one cow to the value. A road that leads to a lord's house or to a monastery adds three cows to the value of the land. However, minor pathways could also be of benefit to a landowner. If land is close to a cow-track (*bóthar*) that gives access to a cattle-pond (valuable in summer), remote piece of land, or itself connects to a highway, the added value is a yearling calf, although Kelly (2000, 391) differentiates this slightly and states the added value is a two year old heifer.

This is possibly because a later passage in the translation is slightly contradictory stating:

> “three cows for a way if it goes equally as far as a wood and a mountain, and if it only goes as far as either of them, i.e. separately, a cow and a 2 year old heifer”
>
> (Mac Niocaill 2000, 86)

We might imagine that although roads were utilitarian and often communal undertakings useful to the community, they also have their origins and emerge from traditional practices

going back generations. Roads can be “the result of a slow evolution born of need” (Little 1957, 39). This evolution occurred over a long period, with slight route changes, alterations, additions and repairs over centuries of use. Their uses were many. In addition to trade there was also pilgrimage, administration and war and Doherty (2015, 30) suggests that it was the “sophistication of the infrastructure…that made the Norman conquest of Ireland so rapid”. This “sophistication” is not apparent to historian John Gibney (2019) who states that early medieval Ireland had virtually no transport networks other than river travel when the Anglo-Normans arrived.

The social or economic importance of particular places can often be seen in the number of roads that interconnect at that place. The monastery at Clonard which Fitzgerald (1925, 87) rather ambitiously states had 3,000 resident students is at the junction of many routes and is on the *Slí Midhluachra*. Tara also has many junctions in its environs. As mentioned in section 6.3 there is a debate as to whether Tara or Dublin was the origin of the 5 major roads of Ireland – either way it cannot be denied that both were important places as can be seen by the number of roads that lead to them. Doran (2004, 3) has argued that in her study of Longford and Roscommon, the ritual centre at *Cruachain* and other religious establishments were “the main factors shaping the road networks”. If this is taken to be true then it would hardly be surprising for Tara, probably the most important ritual site in the country, to be well serviced by the road network.

The conversion of the Irish to Christianity involved missionary activity and movement through the landscape by clerics. In early Irish sources, it is claimed that Saint Patrick arrived at the port of *Inver Colpdai* on the coast of Brega and travelled throughout the country. In Cogitosus’ *Life of St Brigit*, the saint is portrayed as praying in her chariot as she spread her faith and performed miracles (Connolly & Picard 1987, 8), so it is clear that movement by clerics is there in the early Irish imagination . The emergence of early medieval monasteries with their populations, associated wealth, and their ease of access through coastal ports and

large river systems, made Brega a target for raiders, well before the Viking arrival. Anglo-Saxon raiders attacked many churches in Brega, notably in 685 A.D. (O'Brien 1999a, 48). The kingdom was open to raids from multiple sources throughout the period with some notable ones being the destruction of the crannog at Lagore, the seat of the kings of southern Brega by Vikings in 934 A.D. (Edwards 1990, 38–41) and a number from other Hiberno-Norse raiders in the ninth and tenth centuries (Stout 2003, 81).

It is important to remember then that Brega was on the seaways of the Irish Sea, and connected the territory with the wider world. Little (1957) suggested that Irish roads were directly connected to British roads by the intervening sea lanes, making a large and consistent network. O'Keeffe (2001, 1) makes another point, suggesting "there were many links between the Celtic clans in Scotland and east Ulster" and Price (1995, 250) suggests that the east coast "afforded convenient landing places from very early times". Moisl (1983, 107) suggests that there are 75 entries in the annals up to 1000 A.D. which refer to people, places and events relating to the Anglo-Saxons, but only two of these occur in the fifth century, and also that it was Uí Néill involvement in Northumbrian politics which led to the attack on Brega in 685 AD (ibid., 123).

The idea that Ireland was easily accessible to and interconnected with Britain and had regular contact through land and sea networks as put forward by Little, Price and O'Keeffe above is directly contravened by Ruth Dudley Edwards (1991, 33) who argues that Ireland had many "natural barriers" and its "inhospitable coastline posed almost insuperable difficulties", to invading forces. In reality, Ireland's coastline is actually quite hospitable to anyone with a decent knowledge of tides and how they work. The availability of large rivers such as the Liffey and Boyne in Brega and the River Shannon penetrating the island farther afield also meant that travelling inland was not a hugely arduous task.

The spread and volume of important artefacts would tend to support the former theories. Mediterranean (Phoenician Red Slip Ware, and Late Roman Amphorae, Bi and Bii wares), and Frankish pottery vessels (E-ware) from the fifth and sixth centuries found in Brega probably contained imported oil, wine or dyes (Johnstone 2017; Kelly 2010; Loveluck & O'Sullivan 2016) and their distribution within Brega can be seen in Fig 6.1.

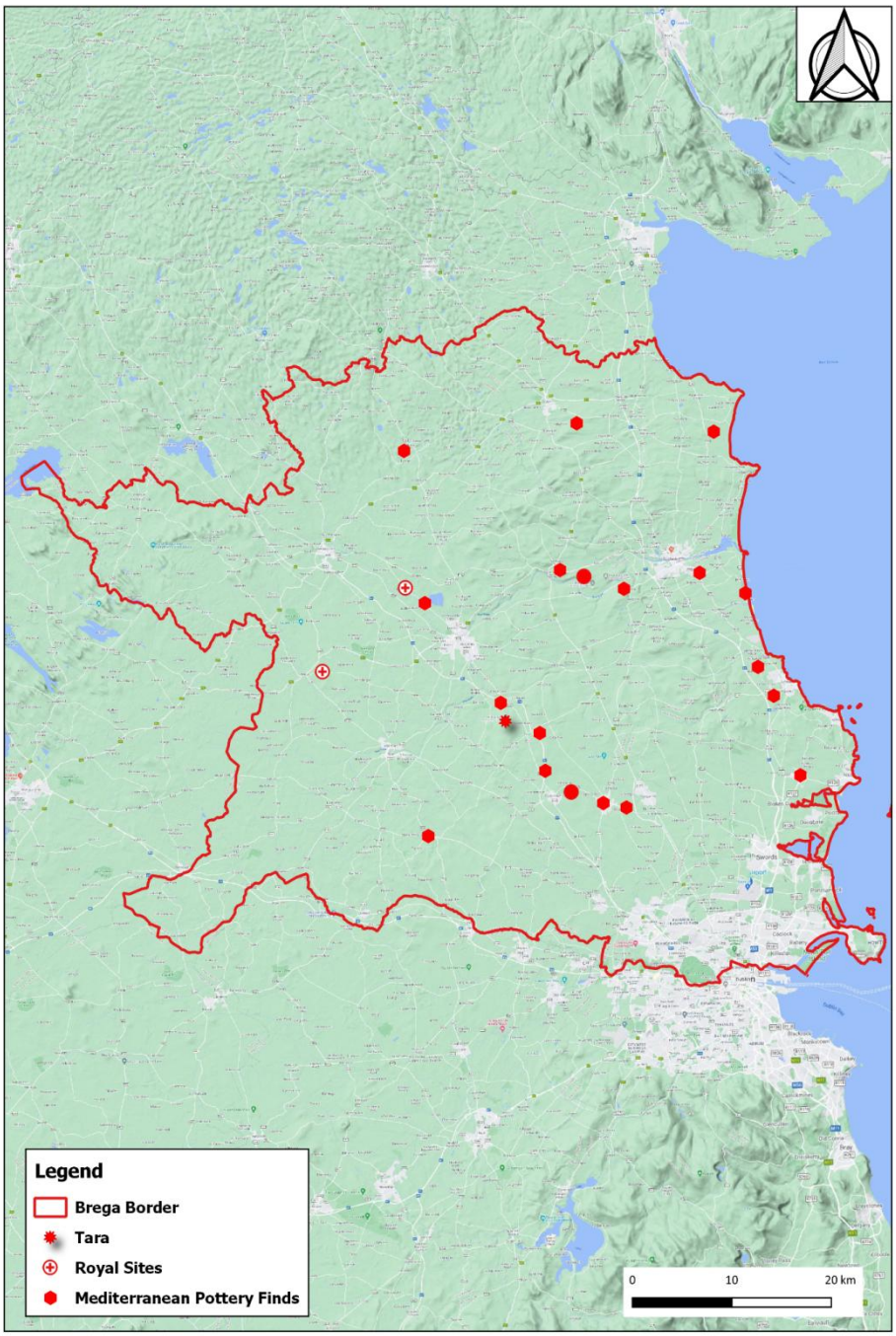


Figure 6.1: Mediterranean Pottery finds (after OSM, NMS with additions)

Despite the lack of research mentioned above, Ireland was “well provided with roads” (O’Lochlainn 1940, 465) and we have seen above that Brega was also well serviced in this regard. The caveat to that may be that the roads were eventually covered over in modern surfaces and that modern routes in general follow the courses of the ancient ones. We will see below that Brega had approximately 820 kilometres of road which we actually know about. These are the major roads – there was likely to have been a far higher level of smaller roads and tracks not significant enough to have been mentioned in historical sources. Another difficulty is the fact that roads by their very nature run through multiple regions and sites, often over long distances, making focussed research difficult. Within this project choices had to be made in regard to the scale of the road analysis. Even while studying a large, county sized area such as Brega, the major highways and some of the other roads start outside the kingdom, pass through and continue to other destinations. In order to limit the scope of the project the LCP analysis has to be limited to the borders of the kingdom. The study of the major *slighe* was limited to just a broad overview due to time constraints but would benefit from a larger, island wide analysis.

Notwithstanding this it is important to note the position of Brega in the overall transport infrastructure of the country, modelled below in figure 6.26. Carleton Jones (2009, 124) has argued that the *Slí Mhidluachra* was the main north/south conduit in the country and enabled “frequent and intensive communications", and also was the node at which east/west communications passed through. This effectively meant the west had more easily accessible contact with the east than with the north or south. This meant that news, ideology, trade and military functions among others were likely to be facilitated by passing through Brega at some point. It also often enabled the peoples of Brega to make more informed decisions earlier than people in other parts of the country, thereby helping to maintain both the political and economic domination of the kingdom. Whether Tara or Dublin was in fact the starting point of the *Slí Mhidluachre*, what cannot be denied is that Brega was at the epicentre of road transport within the country.

6.3 Historic Roads and Least Cost Paths:

Doran (2004, 58) has argued that the road systems are “essentially instruments of settlement and should be viewed as an element of the settlement pattern”, and the roads modelled within this project can lead to a greater understanding of settlement practices within the kingdom. In fact, as we have noted above, land close to a road was considered of higher value than land of equal quality further away. While roads are undoubtedly important in relation to settlement, they are also instruments of other cultural phenomena such as war. In the early 3rd and 4th century a number of attacks were made on Roman Britain by the Germans (Reece 1980, 79), and a strong road network leading to and from the ports enabled both the staging of these attacks and the removal of goods and slaves deep into the heartland of the kingdom where they could be distributed. Baker and Brookes (2015, 71) have also discussed the importance of infrastructure in early military operations in Britain. Similar attacks were launched into the centre of Brega beginning in 837 A.D. with the River Boyne a particular avenue for attack (Jaski 1995, 314) and another major attack in 684 AD (Cronin 2011, 14).

Roads form the lines between nodal points, some of which have transformed into modern towns today, but probably also developed to link places of settlement, and as such they should be explored in any examination of settlement. The five major *slí* of Ireland have been mapped, but almost exclusively by drawing straight lines between known nodes on the routes. An often quoted passage relating the arrival and existence of the major roads of Ireland appears below.

> “The night of Conn’s birth were discovered the five principle roads leading to Teamhair, which were never observed till then. These are their names: Slí Asail, Slí Midhluachra, Slí Cualann, Slí Mor, Slí Dala”.
>
> (AFM A.D. 123) (O’Clery et al. 1966)

While the magical and mysterious appearance of 5 large roads in Ireland is an interesting fiction, the roads themselves were very much a reality. Quite opposite their reported magical appearance in the annals, roads are in some senses a commonplace relic of former times, emerging from prehistory to the early medieval period. While the 5 major roads were in existence since prehistoric times, the emergence of a comprehensive system of roads with 5 major highways tends to be taken at around 350 AD (O'Keeffe 2001; O'Lochlainn 1940). It is quite possible that many of our modern roads are based quite closely on the prehistoric routes, with the main towns mentioned in the literature still present on the road network. This is often not the case in other countries across Europe, where the main roads such as the Appian Way in Rome fell into disuse (Spufford, 2002, 174).

Literary references indicate that the road network was quite extensive. Barrington (1976, 109) mentions the "drunken expedition" of *Cuchulain* from Ulster to Castleisland in Kerry in the course of one night. While this tale is as fanciful as the one above, there is likely to be a grain of truth in it which points to a substantial road network. Fitzgerald (1925, 81, Fig. 22), actually suggests that there were six major highways, with the "Road of the Great Wood" breaking off the *Slí Dala* at Athgarvan and passing through Moone, Leighlinbridge, Callan and ending at Cashel. This rarely appears in any of the other literature however.

While there were five major routes only two of them pass through Brega in any meaningful way and these have been explored in detail, with the others listed but not affecting the kingdom as comprehensively as the other two. It has also been argued by MacNeill (1935, 113) that the road system was essential to facilitate battle and the movement of enemy combatants and even goes so far as to argue "were it not for roadways, in most parts of Ireland no armed force could make its way across country if opposed by local forces inferior in numbers but equal in armament". No evidence has been found in the literature for any large-scale movement of forces or cattle raids which were carried out across the country,

which indicates that the natural barrier of heavy woodlands was still very much a factor in travel at the time.

Table 6.2 below shows the roads as mentioned by O'Lochlainn and others, collated from the major *slí*, hagiographies and other writings, along with their intermediate points. They have been numbered by this author for clarity and no numbering system was used by O'Lochlainn or O'Keeffe.

Table 6.2: Roads recreated within the thesis

Road Name
Slí Mór (1)
Slí Dhála Meic Umhóir (2)
Slí Assail (3)
Slí Mhidluachre (4)
Slí Chualann (5)
Rót na cCarpat (6)
The Tripartite Life of St Patrick (7a)
The Tripartite Life of St Patrick (7b)
Congal Clairingech (8a)
Congal Clairingech (8b)
Acaldamh na Senórach (9a)
Acaldamh na Senórach (9b)
The Life of Findchua (10a)
The Life of Brigit (10b)
Aislinge Meic Conglinne (10c)
Muirchertach mac Néill's circuit (10d)

These roads are recreated below through the application of a GIS technique known as Least Cost Path Analysis (LCP). This results in a modelled route which should be the most energetically and time efficient path between two selected points in the landscape, a technique which has been very rarely used in an Irish context, but is widely used elsewhere (for examples see Herzog 2020; Llobera 2020; Rosenswig and Tuñón 2020). A fuller discussion of the use of LCP's can be seen in section 2.10.

According to O'Lochlainn three of the five major slí passed through Brega and were constructed in the following way: (Place names in italics are within Brega)

1) ***An tSlí Mhór***: Dublin, Lucan, Celbridge, Taghadoe, Timahoe, Monasteroris, Road, Croghan, Kiltober, Durrow Abbey, Ballycumber, Togher, Ballaghurt, Clonmacnoise, Ballinasloe, Aughrim, Kilconnel, Bellafa, Kiltullagh, Clarinbridge.

It can be argued that the *Slí Mór* travels along quite closely and almost parallel to the accepted southern border of Brega for the first section of its path, from Dublin at least as far as Kinnegad. It is quite likely that as this southern border changed over time due to shifting political fortunes and alliances and even the results of battles, that at times the *Slí Mór* was inside the borders of Brega.

2) ***Slí Dhála Meic Umhóir***: Dublin, Drimnagh, Clondalkin, Newcastle, Oughterard, Naas, Newbridge, Kildare, Monasterevin, Togher, Rathleague, Ballyroan, Abbeyleix, Shanahoe, Aghaboe, Borris, Ballaghmore, Roscrea, Dunkerrin, Moneygall, Toomevara, Shanbally, Nenagh, Kilcoman, Carraigtogher, Ballina, Castleconnell Annacotty, Limerick, Mungret, Kildimo, Kilcornan, Askeaton, Foynes, Tarbert.

The *Slí Dhála* again would have paralleled the southern border of Brega until it reached approximately Newcastle where it split southwards and moved on towards Naas. In describing this route O'Lochlainn (1940, 471) states that "It was the road from West Munster to Tara". There would seem to be some contradiction here as the route he suggests does not come anywhere close to Tara, and indeed does not even enter the kingdom of Brega.

3) ***Slí Assail:*** Splits from the *Slí Mhidhluachra* north of *Drogheda, Slane, Navan, Donaghpatrick, Teltown, Kells, Crossakiel,* Fore*,* Kinturk (Castlepollard), Floatbridge, Edgeworthstown, Longford, Cloondara, Tarmonbarry, Tulsk (Rathcroghan).

The basic structure and formation of the friction surface and LCP is discussed in section 2.10, and the sections below focus on their application. Figure 6.2 below shows an overview of the known and predicted route of the *Slí Assail*. The green line represents the Least Cost Path (LCP) from Drogheda to Fore, from the point it departs from the *Slí Mhidhluachra* and continues on its way to Rathcroghan at Tulsk, County Roscommon. These are the known start and end points of the route across the kingdom. This omits the intermediate points as recognised by O'Lochlainn. It is easy to see that the route runs directly across the plain – the easiest possible route. The line is quite straight as would be expected on a relatively open plain such as this one. The fact that the O'Lochlainn route diverges from this would lend itself to the idea that other factors were in play rather than taking the easiest possible course.

The yellow line represents the LCP between each point suggested by O'Lochlainn. There is an immediate choice made here to head towards Slane and then Navan. The route is almost V shaped, and after Navan almost avoids the plain and sticks to the low foothills between Donaghpatrick and Fore. This could be an attempt to move through the landscape slightly more covertly, using the low hills and folds in the ground as cover to hide the movement of

valuable cattle or goods. Another possibility could be that particular hills were used as way markers to make it easier to navigate the landscape.

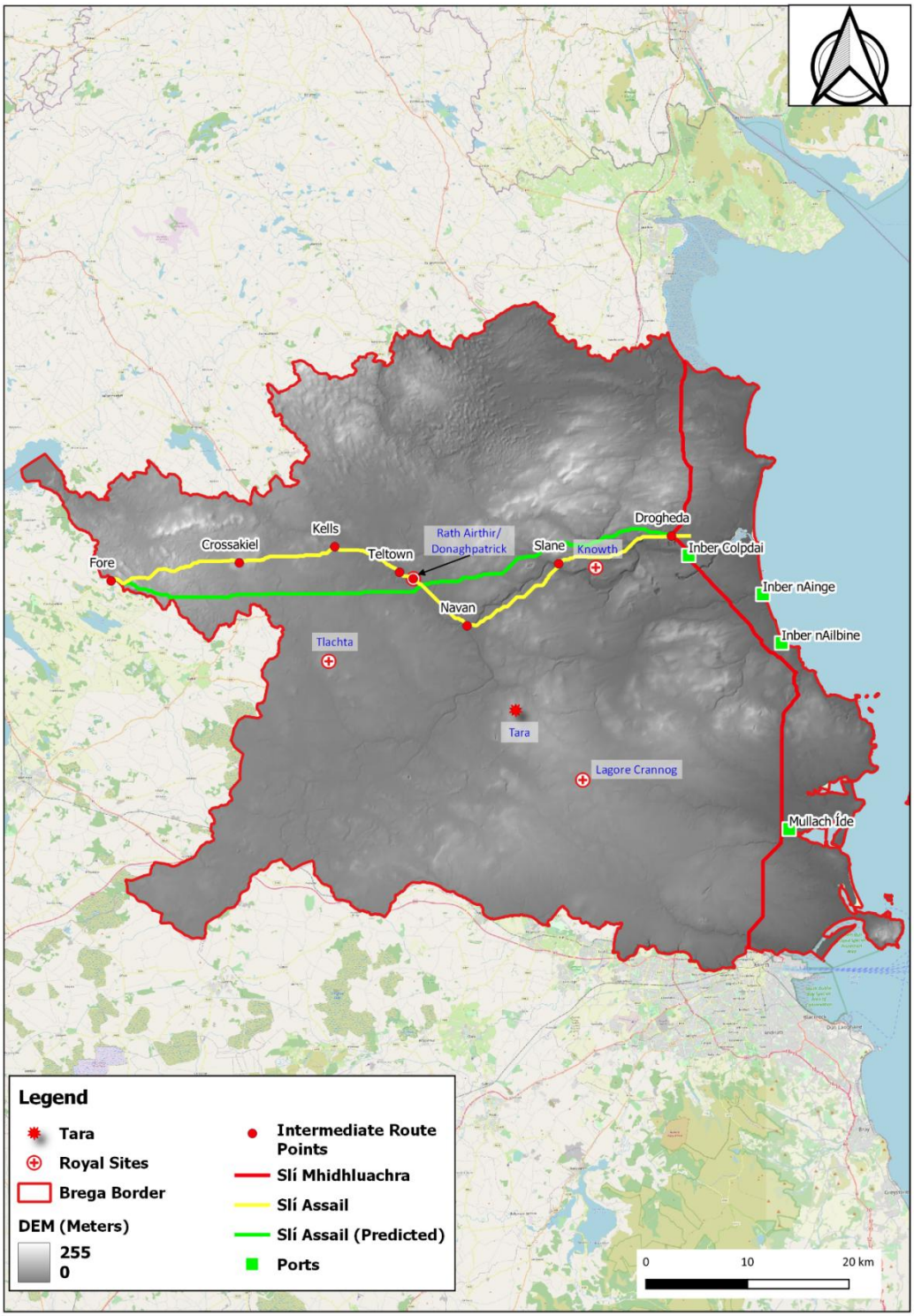


Figure 6.2: Overview of Predicted LCP Route (Green Line) VS LCP (Yellow Line) using known nodes (after OSM, EU-DEM, NMS with additions)

It is also possible that certain points were known places where it was safe to stop for the night, possibly the dwelling of a *briugu* or hospitaller, discussed more fully in section 6.5. There is some evidence for this. Looking towards the end of the route there is a known node at Crossakiel which now has a modern village. It is on top of a hill, approx. 156 meters high, so there is no energetic saving in ascending this hill. However, there are two ringforts, ME016-027---- at 121 meters and ME016-028---- at 153 meters nearby, one of which was quite large with a diameter of 55 meters. The two ringforts are only 350 meters and 650 meters respectively away from the fording points on the Athboy river. It is possible that one of these places might be a *briugu's* dwelling potentially used as an overnight stop, used to corral cattle and keep them safe during their journey, thus justifying the effort of climbing the hill, and also gain sustenance for the cattle drovers. As figure 6.3 shows, it would make more sense to skirt the hill and cross the Athboy river at one of the two fords than to travel up one side of the hill and down the other, so some other factor was in play – more than likely the need to safeguard valuable goods or even people. Stopping here gave access to water, better views of the landscape for protection, and the safety of a ringfort, all valuable commodities when driving valuable cattle.

Table 6.3 shows the distances between the nodes on the route.

Table 6.3: Distances between named points on O'Lochlainn's routes

Origin	Destination	Distance (KMS)
Drogheda	Slane	12.2
Slane	Navan	12.05
Navan	Donaghpatrick	7.2
Donaghpatrick	Teltown	1.58
Teltown	Kells	7.41
Kells	Crossakiel	10.04
Crossakiel	Fore	14.15

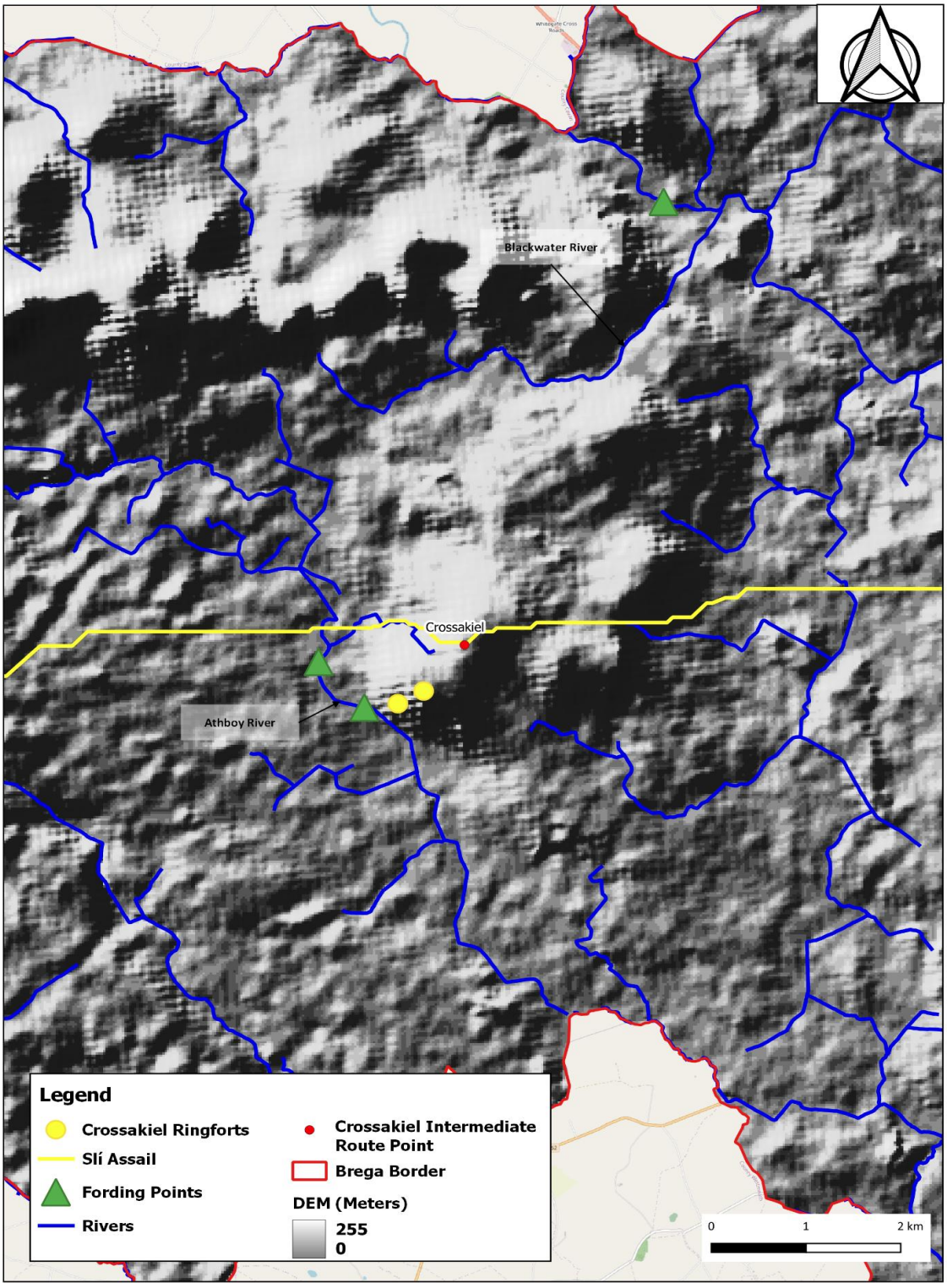


Figure 6.3: LCP travelling over Crossakiel hill rather than around it (after EU-DEM, NMS with additions)

The distances between each node on the road are relatively small. It is possible that the centre sections – Navan to Kells – may have been combined with each other to make one day's journey. Even these three sections combined would be considered relatively short for a

day's walk. With an average speed of 5kms per hour – which is widely regarded as an acceptable average – most of these sections would only take a little over two hours to walk. It is unlikely that a person setting out on a long journey would only walk for two hours each day which leads to the idea that these nodal points along the way were mainly used as stopping places to feed or drink when driving cattle, or possibly as waypoints to navigate by.

Considering many Irish words for road such as *bothar* (cow track) refer to cows, it doesn't seem too much of a stretch to imagine that some of these places were more important when driving herds of cows than they may have been to single human walkers. *Teagasc*, (2003, 42) the Irish agriculture research institute estimates that the average walking speed of a modern cow is 2–3 km per hour. However, this would still mean that sections of approx. 12 km such as Drogheda to Slane or Slane to Navan would only take between 4 to 6 hours to complete, again too short a walking time to be considered realistic for a days' travel. Due to these factors it is a likely possibility that these known places along the routes were chosen due to their topography or convenient placing near settlements rather than their placing at convenient intervals for stopping for the night while travelling. Even small settlements can be very visible in the landscape without the clutter of modern infrastructure. Journeys would often have been conducted in good weather and with clear skies as travel was generally considered a risky undertaking, and under these conditions smoke can be visible from very large distances, and especially if the person is on higher ground. In this way settlements themselves can be used as a marker for travel.

It is interesting to note that the LCP which follows O'Lochlainn's nodal points quite closely echoes the current main road - the N51 all the way from Drogheda to Navan and then turns northwards and closely follows the route of the R147 to Kells. The likelihood here is that the current modern road is built on top of the pre-existing road and even the predicted road with no nodal points added to it runs relatively close. The N51 then joins the R147, paralleling the modern M3, and the modern road turns northwards to join the bigger town of Cavan. The

LCP, however, continues its westwards course and funnels in between the low-lying hills near the prehistoric cemetery of Loughcrew to the North and Slieve Gullion to the south, eventually passing out of Brega at Fore. Also noteworthy is that both routes cross near Donaghpatrick, suggesting that the site of *Rath Airthir* and/or the site of the Patrician church a few meters away were important places to be visited when passing through the area. As mentioned earlier it is possible that the towns along this route grew up around fording places on the rivers and the modern routes are simply following the existing ones quite closely, unfortunately due to the extensive building at these nodal points it is very difficult to predict.

4) ***Slí Mhidhluachra*:** Dublin, *Swords, Balrothery, Clonard, Gormanstown, Drogheda, Drumshallon, Anagasson,* Lurgangreen, Dundalk, Moiry Pass, Newry, Banbridge, Moira, Crumlin, Antrim, Kells and Conor, Ballymena, Donaghy, Armoy, Dunseverick.

Figure 6.4 below shows the *Slí Mhidhluachra* as it travels from point to point on O'Lochlainn's list, however there were some decisions which needed to be taken. One of the issues with the alignment is the node O'Lochlainn has marked as Clonard. In relation to the early medieval period Clonard generally conjures images of the large monastery on the banks of the Boyne near Kinnegad. The place-name Clonard (from the Irish *Clúain Ard*, 'High Meadow') is relatively frequent in Ireland however, and O'Lochlainn's text does not specify which of the many Clonards the route should take. When plotted, a detour to the monastery makes no sense as it would drastically depart from the North/South alignment of the road. In this case another Clonard has been used which is a small townland near Balbriggan and makes a far better fit than the monastery site.

The *Slí Mhidluachra* presents something of a conundrum when trying to trace the line of the road. It has been written about on many occasions, always with variations in its exact

formation. It has been called the “northern road from Tara” by Hamilton (1913, 310) but this beginning would completely ignore the southern section of the road, and O’Lochlainn traces a longer, more coastal route, beginning in Dublin instead of Tara as seen in figure 6.4. O’Lochlainn does however suggest a branch of the route which begins at Tara and joins with the main stem of the road north of Drogheda as can be seen in figure 6.5 and Hamilton states this as his preferred route.

Fitzgerald (1925, 82) agrees and specifically mentions Duleek as a point on the route. Notwithstanding the evidence for these roads being originally instigated in the prehistoric periods, it is noteworthy that this branch of the reputed road passes through Duleek, what MacShamráin (2004, 130) has suggested was “the most prestigious ecclesiastical site in the region”. An illustrious religious site such as this would have had many minor roads and at least one major road passing through it, to enable the provision of hospitality, agricultural access and pilgrimage and also a number of smaller, mass tracks. A similar situation was seen already in relation to the *Slí Assail* and Donaghpatrick. This would indicate that although some of these roads may have had prehistoric origins, they were developed in the early medieval period, after the emergence of Christianity and incorporated the monastic settlements as places at which hospitality could be received.

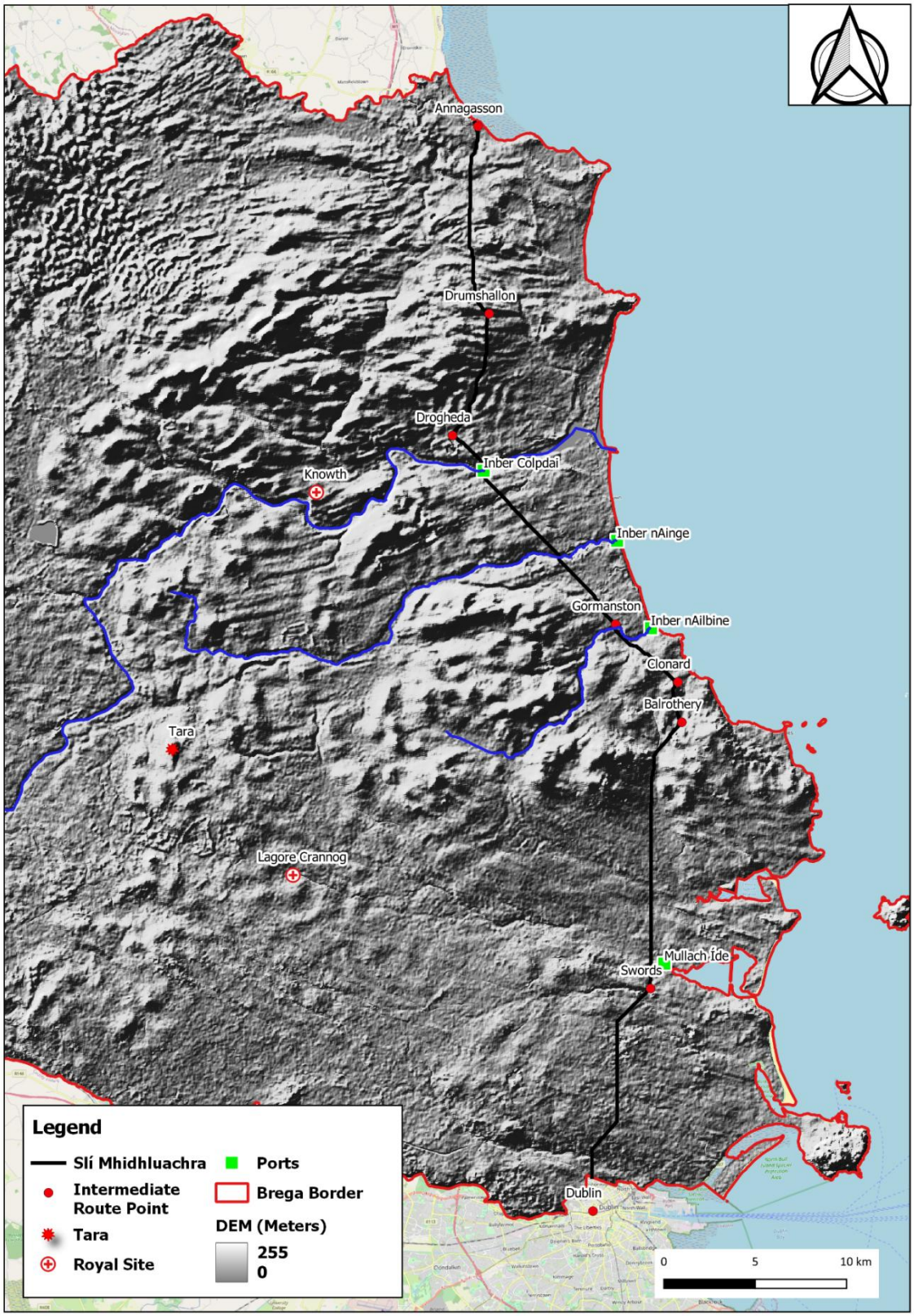


Figure 6.4: Modelled route of Slí Mhidluachre (4) (after OSM, EU-DEM, NMS with additions)

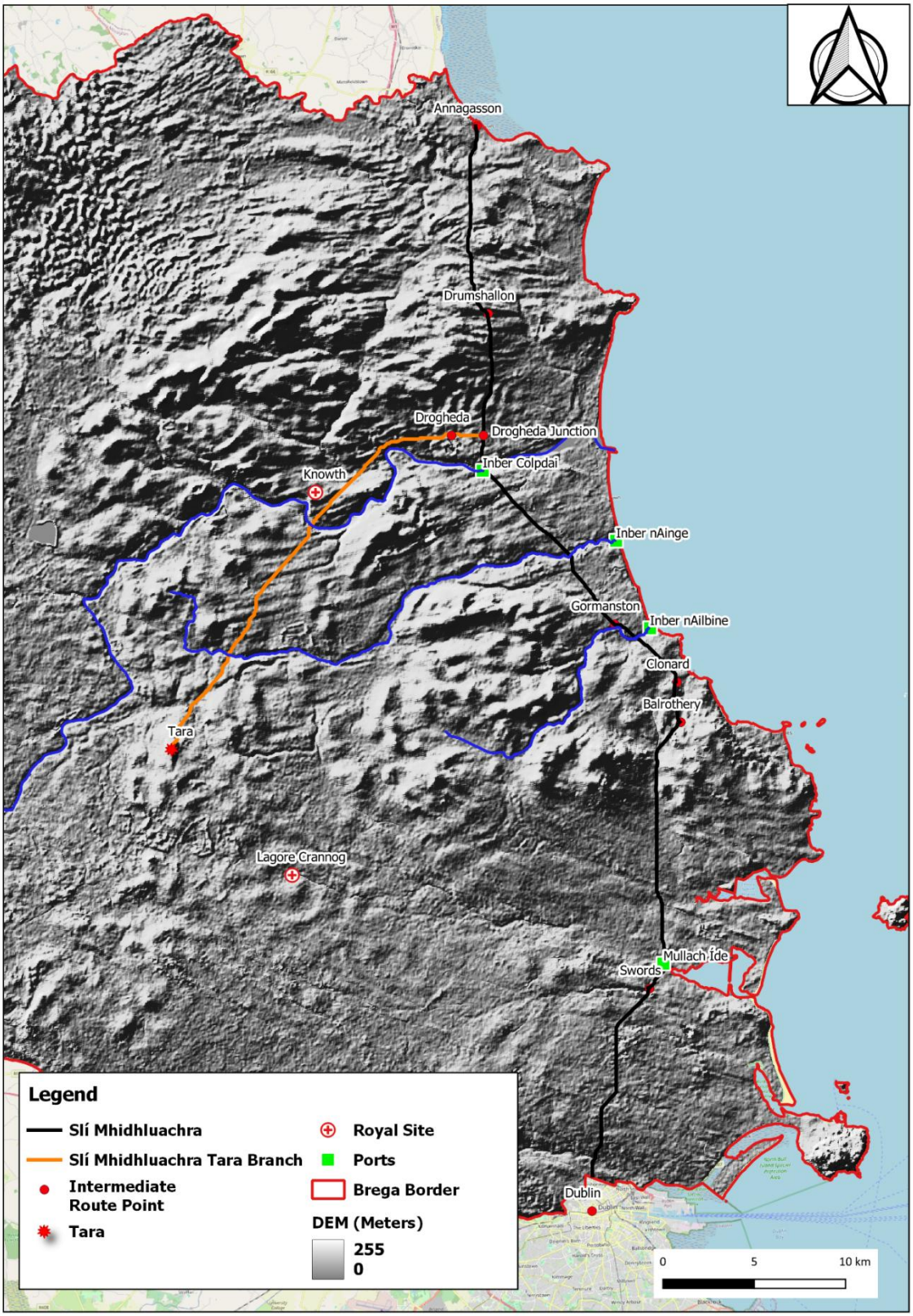


Figure 6.5: Hamilton's suggested start point for the *Slí Mhidhluachra* at Tara (after OSM, EU-DEM, NMS with additions)

Having said this, Hamilton's evidence for the route beginning at Tara seems to be mainly based on textual evidence from *Caithréim Conghail Cláiringhnigh* or "The martial career of *Conghal Cláiringhneach*" (McSweeney, 1904), at least initially. There seems to be a contradiction here, as he suggests the road proceeded directly northwards to cross the Boyne at the "cold ford", so named because the sea meets the river water at that point. However, the distances involved here seem too great to be realistic. From the likely course of the route to the suggested (but not precisely known) point of *Inber Colpdai* is approximately 13 kilometres. Following on from this the actual point of joining the sea is over 21 kilometers. It is impossible that seawater would travel up the inlet for over 20 kilometres. This likelihood recedes even more when considering that the flood and ebb tides move in a northerly/southerly direction on this section of coastline and as such would have even less influence on pushing saltwater farther inland.

O'Lochlainn does give a route for *Congal Chlaringeach* (8b) which coincides to a small extent with the one Hamilton and Fitzgerald suggests is the *Slighe Mhidhluachre*. This more likely route would be to travel north and slightly east from Tara and cross the Boyne at the ford at the Bend of the Boyne site near Newgrange, and both versions of the route agree to this direction. From this point they diverge, with O'Lochlainn's next fixed point being Slane, a westerly direction, whereas Hamilton's continues to the east and north to a point northward of Drogheda.

This branch measures approximately 27 kilometres and as such is long enough to be a named road in its own right. It hardly seems convincing that the two branches of this road bore the same name with no differentiation between them, and Hamilton suggests a further branching to the north of Dundalk.

Figure 6.6 shows the LCP route between O'Lochlainn's nodes in black, and the modern M1 motorway can be seen to follow this route quite closely. This is hardly surprising as the modern motorway is designed to link existing towns. However, the predicted path, beginning in Dublin and finishing in Annagassan, without the intermediate towns, forms a very different picture until it reaches Drogheda, in fact it is actually closer to the M2/N2 route. The two routes leave Dublin and split after approximately 750 meters and then diverge quite strongly as can be seen. The two paths cross the Brega border in the same place at the ford at Drogheda and from then they are almost identical all the way to Annagasson, approximately 19 kilometres later. The fact that the two lines run almost identically for over 17 kilometres lends validity to the model.

Although the two paths split quite widely, they are almost the same length, with the predicted path being slightly shorter at 65.02 kilometres and the one with intermediate stops coming in at 65.85 kilometres. The predicted path follows the modern N2/M2 until it splits off and becomes the modern R152, which it also follows extremely closely all the way to Drogheda, taking in two major towns in Ashbourne and Duleek – referred to later in this project as the "forgotten road" in section 6.4. The LCP is forced to do this by the river Nanny, which it curls around on the western end. So, while the roads are approximately the same length the LCP in green is the energetically less costly route. However, this is not the route known as the *Slí Mhidhluachre*, so other cultural, social or economic concerns must have been in play in the same way as the *Slí Assail*.

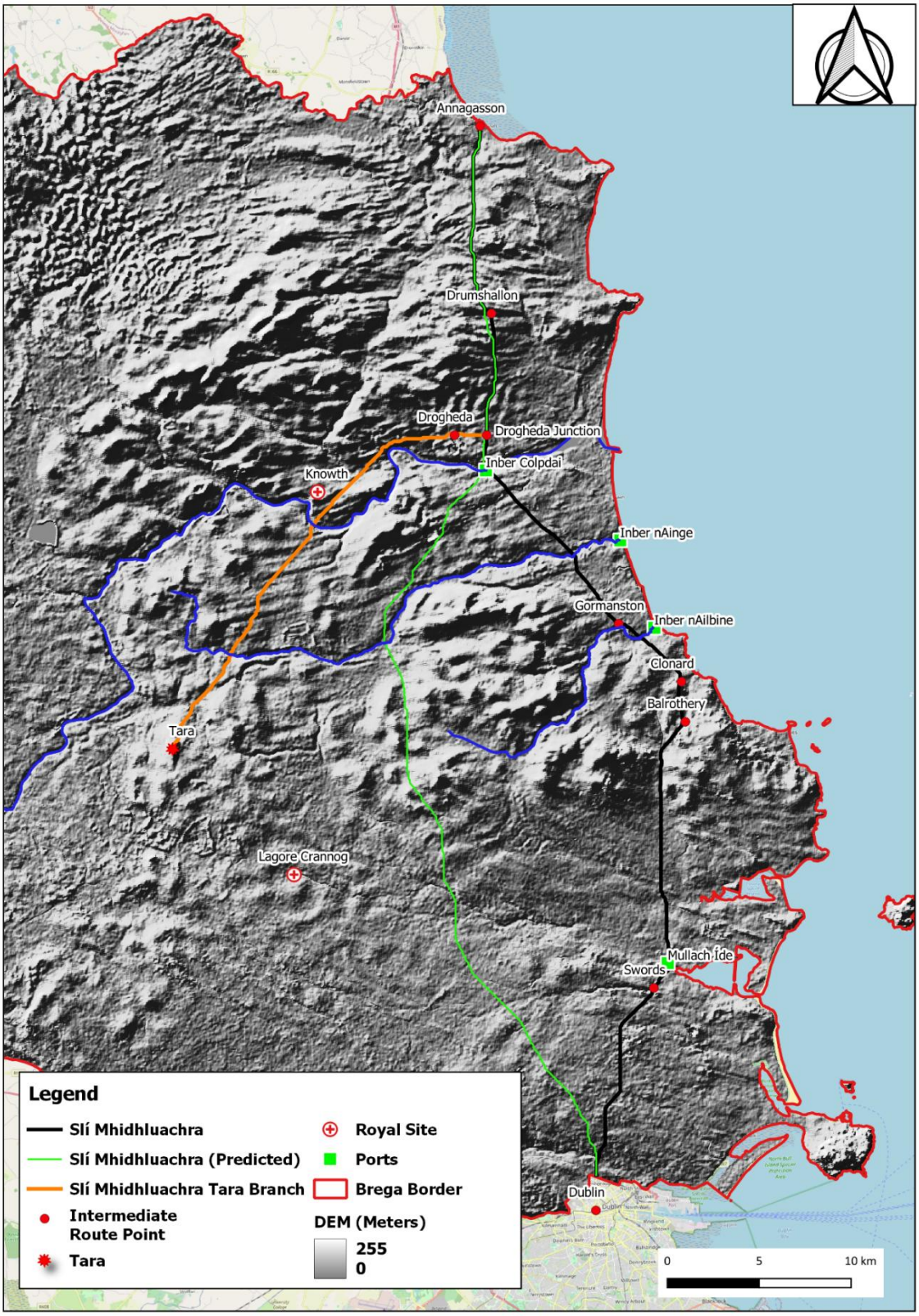


Figure 6.6: *Slí Mhidhluachre* showing predicted path vs path with O'Lochlainn's points (after OSM, EU-DEM, NMS with additions)

One of the possible reasons for this could be the visibility of the coastline from the road. The theoretical aspects of viewsheds and their construction have been discussed in section 2.8 in this thesis and the same modalities are applicable here. Figure 6.7 shows the viewshed of the predicted LCP while figure 6.8 shows the viewshed constructed from O'Lochlainn's intermediate points. The figure of 1.57 meters to account for the average height of a man in the early medieval period was added to the height of the DEM at the points. It can be seen that this route is westward looking, and the eastern view is blocked by the line of hills from Garristown to Bellewstown in a north/south direction and Garristown to Balbriggan from east to west.

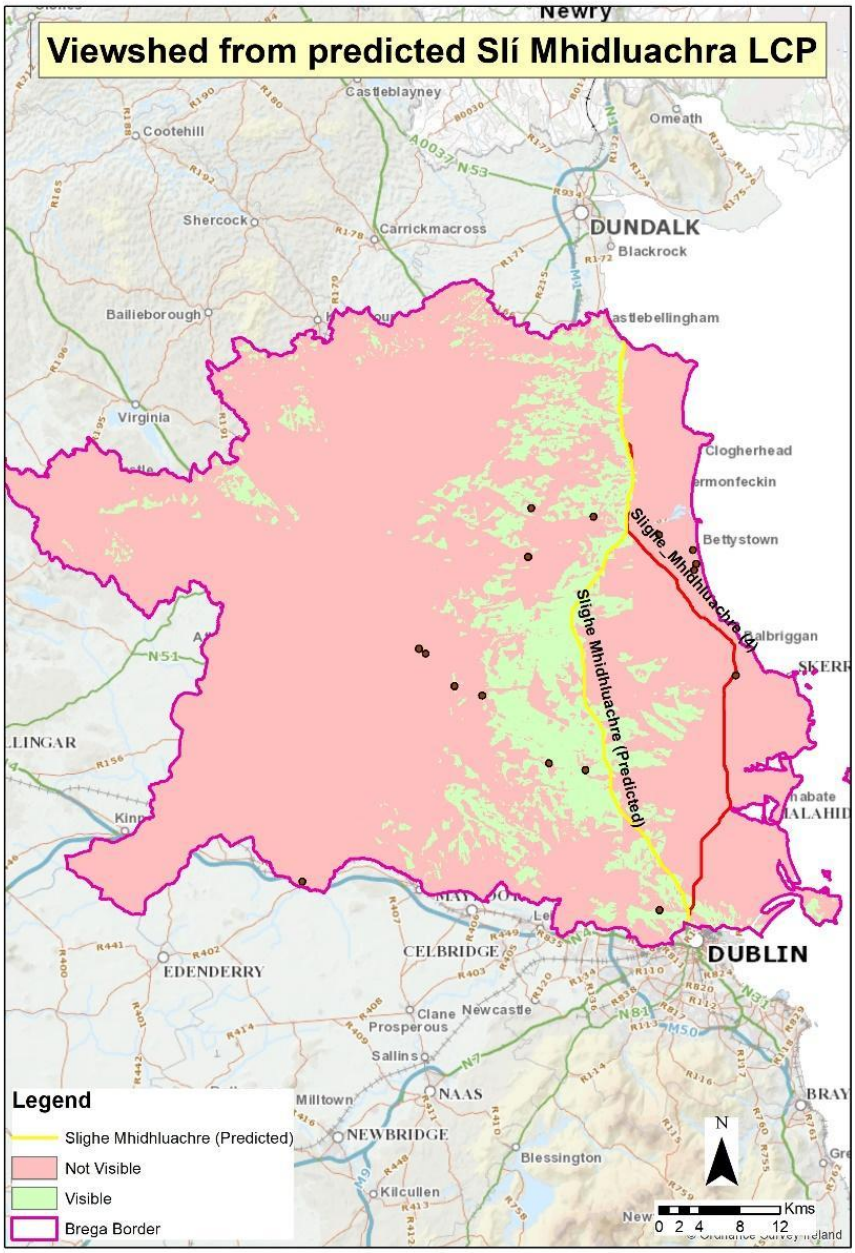


Figure 6.7: Predicted LCP route from Dublin to Annagasson (after OSM with additions)

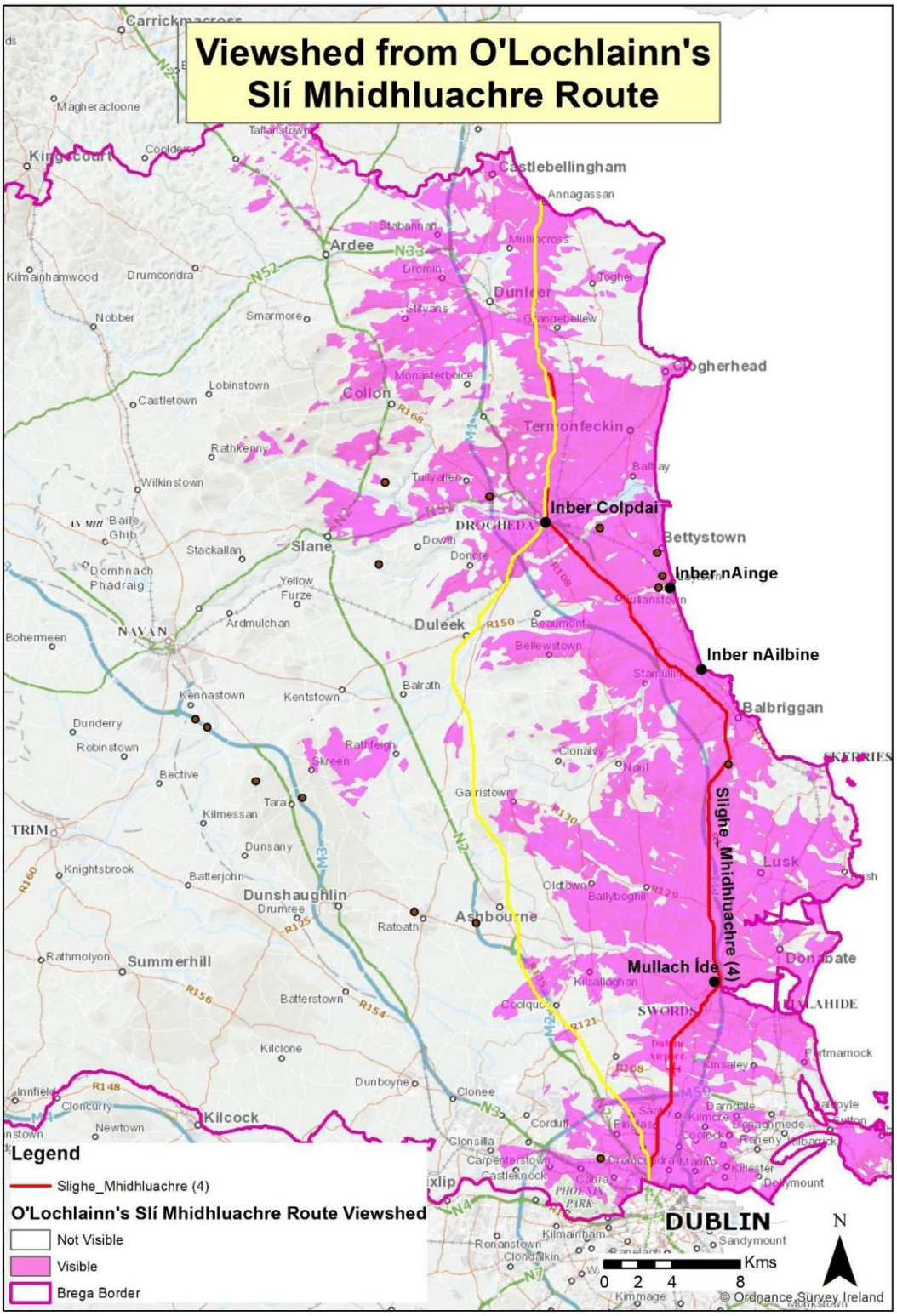


Figure 6.8: Viewshed from O'Lochlainn's route of the Slí Mhidhluachre (after OSM with additions)

The difference between the two is quite apparent. The least cost path from Dublin to Annagasson has no view of the coastline but has a much wider view to the west than O'Lochlainn's route. O'Lochlainn's route has wider views to the east and west, but it becomes more obvious that this route offers a wide perspective of the coast. In particular, from the port at Malahide all the way up to *Inber Colpdai*, which passes and links *Inber nAilbine* and *Inber nAinge*, the view of the coastline is unobstructed. The total size of Brega is approximately 3,294 kms square, and the total area visible from the predicted road is approximately 498 sq. kms, or 15.12%. From O'Lochlainn's route approximately 500 sq. kms, or 15.18% of the kingdom is visible, an almost negligible difference. These two figures are very similar within the limitations of the dataset, only a 0.06 % difference which is quite surprising considering that the roads are almost identical to the north of Drogheda but to the south of Drogheda they are approximately 45 kilometres long and at some points approximately 15 kilometres apart.

This meant that it is likely travellers were prepared to choose a particular route in order to keep the coastline in view for as much as possible. It is likely that this would be due to trade, as once the road passes north of Drogheda and *Inber Colpdai* – the most northerly known port - it moves inland, away from the coast, as if once the goods have been collected and are being transported that viewing the coastline is no longer as important as it was. MacNeill (1935, 107) has also posited a theory that in the third century the threat of an invasion from Rome was a "lively apprehension" and may have been one of the reasons the Ciannachta and Gailenga moved into the region.

We have evidence of luxury goods arriving from abroad in historical texts as well as from material remains. The ninth century text *Tecosca Cormaic* (Meyer 1909, 3) states that "what is best for a king" is "Inviting barks into harbour, Importing treasures from over sea". For importing treasures to be regarded as an important aspect of noble behaviour, it must have been reasonably common or it would not be possible to have that expectation.

It is likely that even though Dalkey, and its surrounding harbours were important ports and trading places, that the four ports in Brega were just as, if not more important, especially as they were linked by the *Slí Mhidhluachre* to Dublin and through its branch to Tara. Even though the *Slí Mór*, due to its name, is often regarded as the main road through the country, the *Slí Mhidhluachre* must be regarded as the main conduit for transporting imported, and thus expensive and prestigious, luxury goods.. The *Slí Assail, Mór, Dála* and *Cualann* would all seem to be offshoots of and subordinate to the *Slí Mhidluachre*, as none of the other road sections have as much access to coastal ports and connections inland. The fact that a large amount of trade funnelled up the eastern coast of Brega was a contributing factor to the wealth and prestige of the kingdom. This coupled with good agricultural land, and the means to transport surpluses, could have been part of the reason the Úi Néill moved into this region. In general, the areas of the ports were not heavily settled and there is very little archaeological evidence for large-scale settlement along the coastline. The examination of this is hampered however by contemporary buildings along what are, in modern times, very densely populated areas.

This extra effort expended to travel South/North on this route can have many explanations. Firstly, and probably the most obvious is its distance from the coast, with settlements nearer to the coastline able to avail of both natural resources from the sea and also the trade links from abroad. The *Slí Mhidhluachra* had easy access to the ports along the coastline making it a valuable conduit for trade goods and was the obvious point of import from Britain and Gaul (France). This part of the Irish seaboard benefited greatly from proximity to Britain. It is clear from the hagiographical sources (Bieler 1979; Anderson and Anderson 1991) that *Inver Colpdai* was a major port and allowed access up the Boyne as far as Trim which is approximately 30 kilometres upriver from the sea. From Trim it is only approximately 13 to 15 kilometres to the western boundary of Brega, depending on where this boundary was actually placed at the time. The Boyne almost bisects the kingdom, so travel upriver in boats meant that a traveller could penetrate deep inside the kingdom and have relatively easy

access north and southwards also. Unfortunately, the exact location of the port is currently unknown. There were also other ports in Brega and these are shown with their associated rivers in Table 6.4.

Table 6.4: Ports on the Brega Coastline

Port Name	Associated River
Inber Colpdai	Boyne
Inber nAilbine	Delvin
Inber nAinge	Nanny
Mullach Íde	Malahide Bay

Notwithstanding this it is possible to estimate their locations although allowing for what could be a comparatively large measure of error. The Boyne, Nanny, Glyde and Broadmeadow are all rivers with a stream order of over 5 on the Strahler scale, which means they have at least 5 tributaries running into them, increasing the volume of the main river. This results in a relatively deep channel and possibly deep enough for a shallow craft to travel inland for some distance. They also have access directly to the coastline. The Blackwater also has a stream order of 5, and joins with the Boyne below Trim, but it is unclear how far a boat could branch from the Boyne and travel up the Blackwater.

It is also unlikely that ports would be built too near to the actual coastline as in an age before stone built harbours, boats were more likely to travel inland, often for some distance, to obtain shelter and safety while at anchor and this can be seen later in the period in the Viking settlement at Wood Quay which is approximately 4 kms inland from the mouth of the river Liffey. Due to these factors, the ports have been estimated at a point as far inland as possible until a point is reached where the river narrows significantly, and these have been plotted on figure 6.9. Malahide bay was another reputed port (Bhreathnach 2005, 411) and due to its differing nature, a point was chosen at the western side of the bay and slightly into the narrowest point of the Broadmeadow river, which again has a stream order of 5 for most of its length.

As can be seen from the map if the estimated points are realistic, then they are very close to the estimated LCP route between the O'Lochlainn's nodal points on the *Slí Mhidhluachra*, again accepting that the LCP is a modelled route and the ports themselves are modelled with an intrinsic measure of error. Nonetheless the distances are very small – the largest being *Inber nAigne* at 2500 meters from the LCP, then *Inber nAilbine* at 800 meters, Malahide Bay at 330 meters and I*nber Colpdai* adjoining the road. This means that when trade or tribute goods are unloaded the distance to a method of moving them on to their next destination is close at hand, enabling the smooth transition of goods. What can also be seen from the above map is that while the modelled road stays quite close to the coastline, it does move inland to avoid hilly areas.

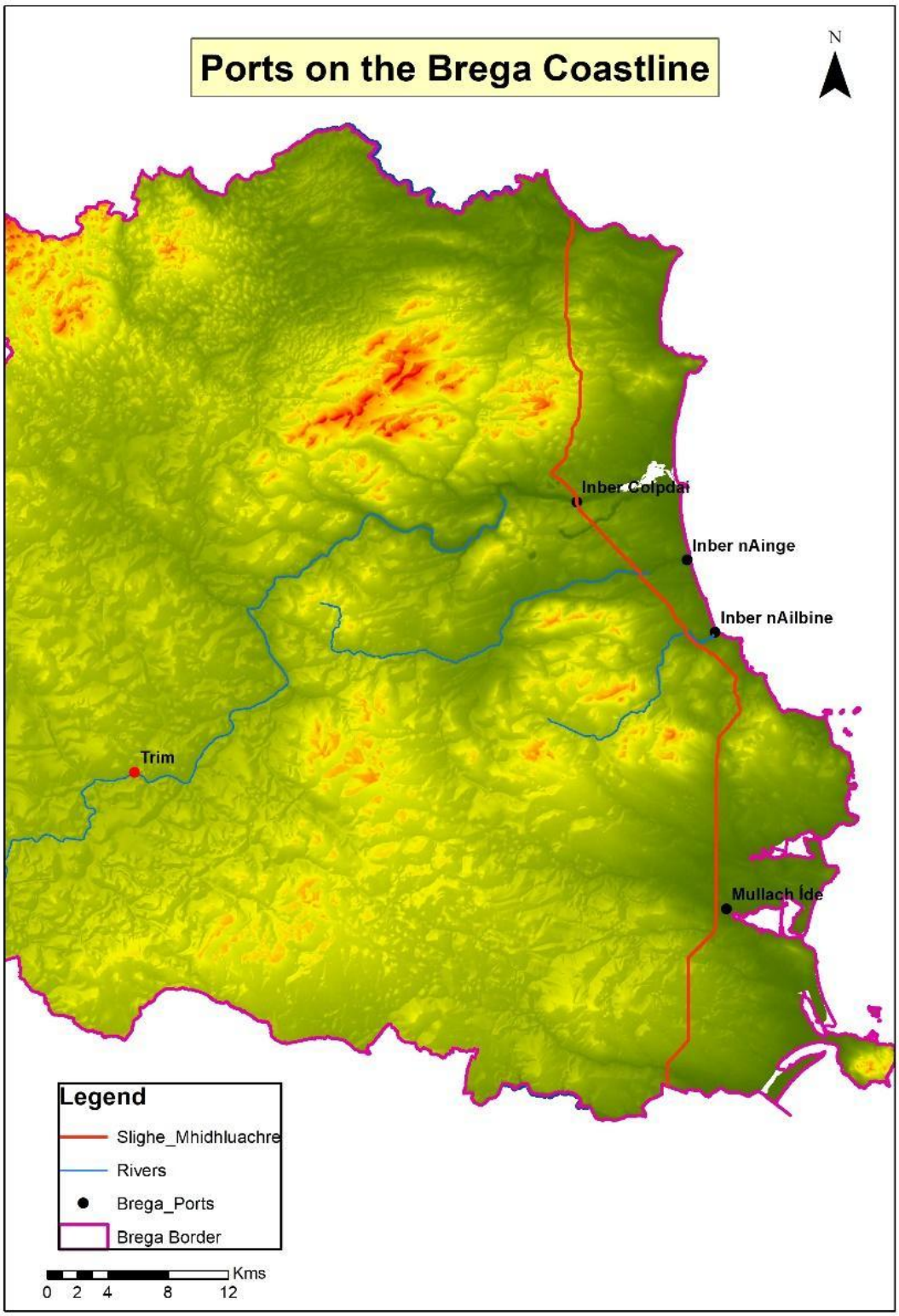


Figure 6.9: Ports on the Brega Coastline (after OSM with additions)

The fact that the predicted route so closely follows the modern M2/N2 and R152 roads gives rise to the idea that the modern roads were built along existing routes. There are the material remains of some quite substantial early medieval settlements along this route. Sites like Raystown (2.3 km), Harlockstown (2.4 km), Baltrasna (1 km) and Muckerstown (0.31km) prove that this area was settled during the period..

***5) Slí Chualann*:** Dublin, Tallaght, Saggart, Rathcoole, Kilteel, Ballymore Eustace, Dunlavin, Baltinglass, Rathvilly, Tullow, Leighlinbridge, Goresbridge, Ullard, Graig, St. Mullins, Ross, Rosbercon, Waterford.

Obviously this road does not encroach upon Brega, but heads southwards from Dublin according to O'Lochlainn, so has not been modelled with an LCP in this case as it is outside the study area.

O'Lochlainn suggests that there were other roads within Brega also.

6) *Rót na cCarpat*: One of the roads mentioned in the *Táin* is called *Rót na cCarpat* and follows the route: *Tara, Tlachtga, Athboy,* Delvin, Rathconnell, Ath Cinn Conn (Mullingar), Luchnavalley, Uisneach, Moate, Athlone.

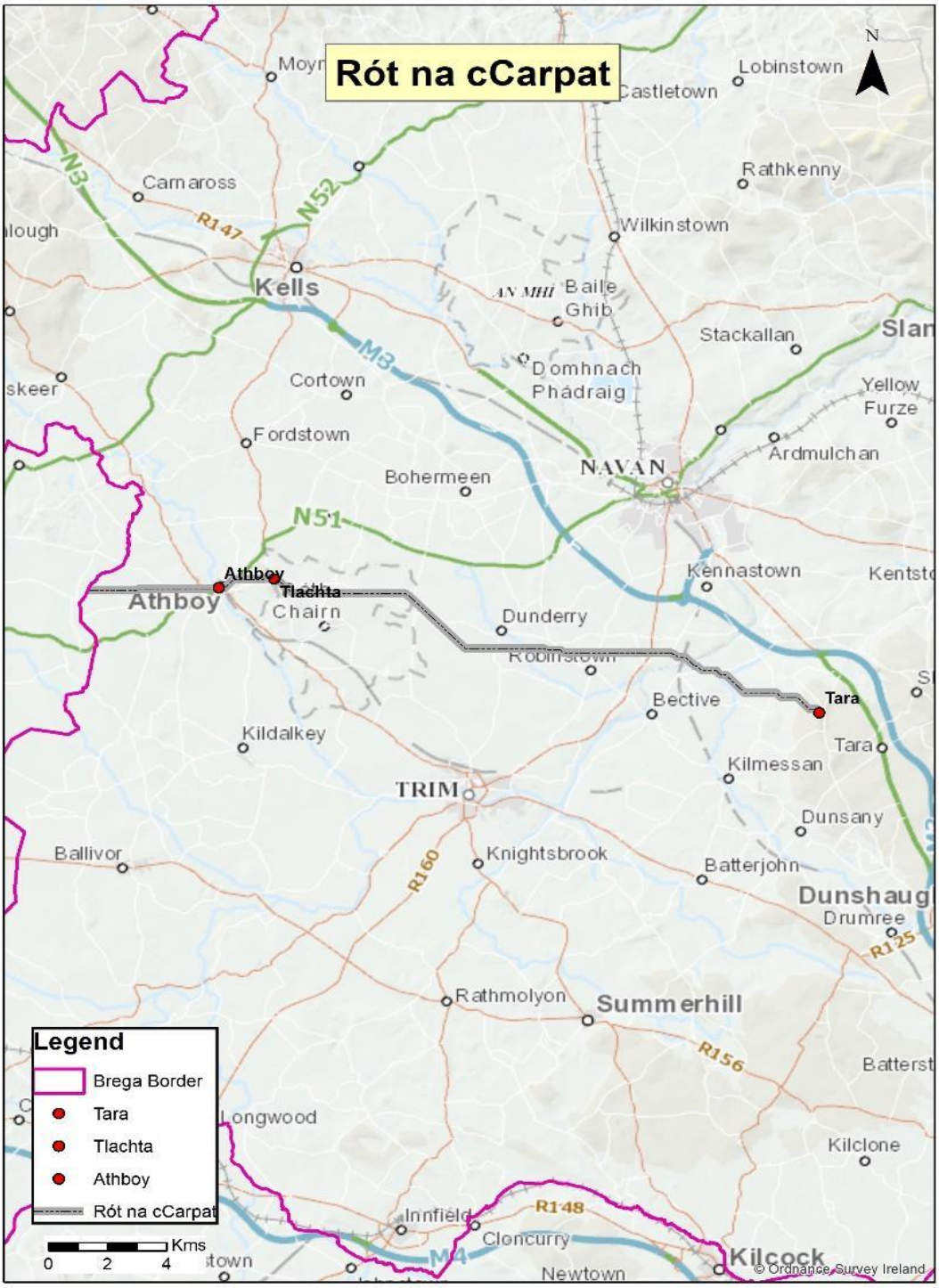


Figure 6.10: Modelled route of Rót na cCarpat (after OSM with additions)

7) Routes mentioned in "The Tripartite Life of St. Patrick:"

As the name suggests this is a partial account of the life of Saint Patrick, originally translated by Whitley Stokes in 1887. Written bilingually (Irish and Latin) it was meant to be read in parts over the three days of Saint Patrick's festival and notionally details some of his movements. One key point here is that the recorded "Lives", were recorded by monks who were probably more concerned with the reputations of their own monasteries and cementing links to the saints than the actual course of the routes. Some of the texts are quite fanciful and cannot be regarded as realistic. As such they are modelled here for completeness and are unlikely to be accurate.

7a) *Mouth of the Delvin river, Slane, Tara, Trim, Athboy,* Delvin, Moyashel, Mullingar, Dusart, Uisneach.

This route travels from the mouth of the Delvin river and joins the *Slí Assail* almost exactly at Navan, although there is a small distance of only 300 meters between them. This distance could conceivably be within the margin of error for the LCP, so it could be said that between Navan and Delvin Saint Patrick simply followed the *Slí Assail* on his travels. The LCP joins up perfectly with the *Slí Assail* at Donaghpatrick and from there to Delvin they are exactly in accordance with each other.

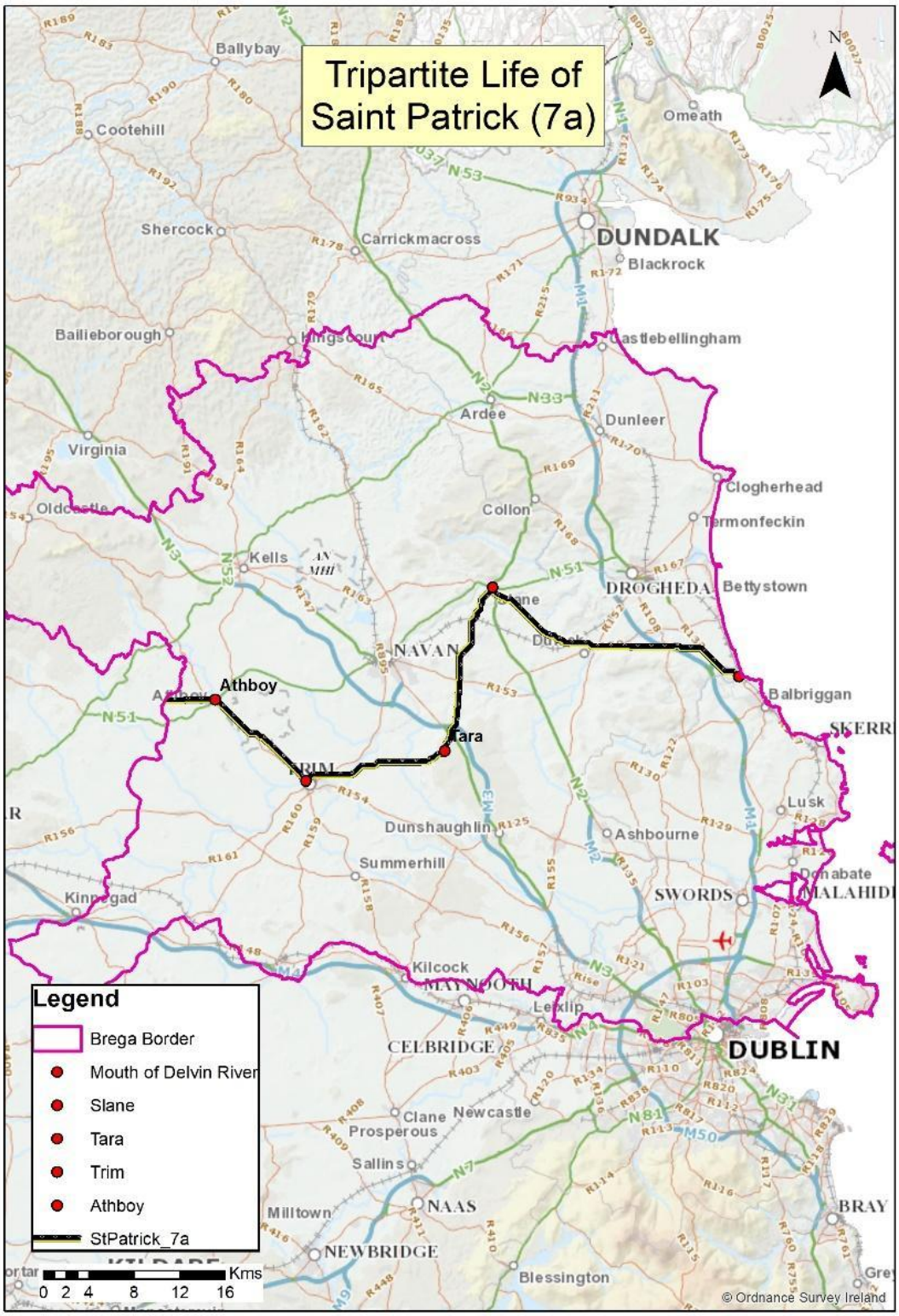


Figure 6.11: Modelled route of the tripartite life of St Patrick 7a (after OSM with additions)

7b) *Tara, Navan, Teltown, Kells, Crossakiel*, Fore, Kinturk, Floatbridge, Abbeylara, Granard, Clonbroney, Longford, Cloondara, Tarmonbarry, Rathcroghan. (This road seems to follow the *Slí Assail* in large parts).

While the full extent of this route is shown here, it is more likely that it is essentially a section joining Tara, Navan and Teltown. At Teltown the road then joins the *Slí Assail* and continues on its route to Crossakiel and into *Míde* at Fore.

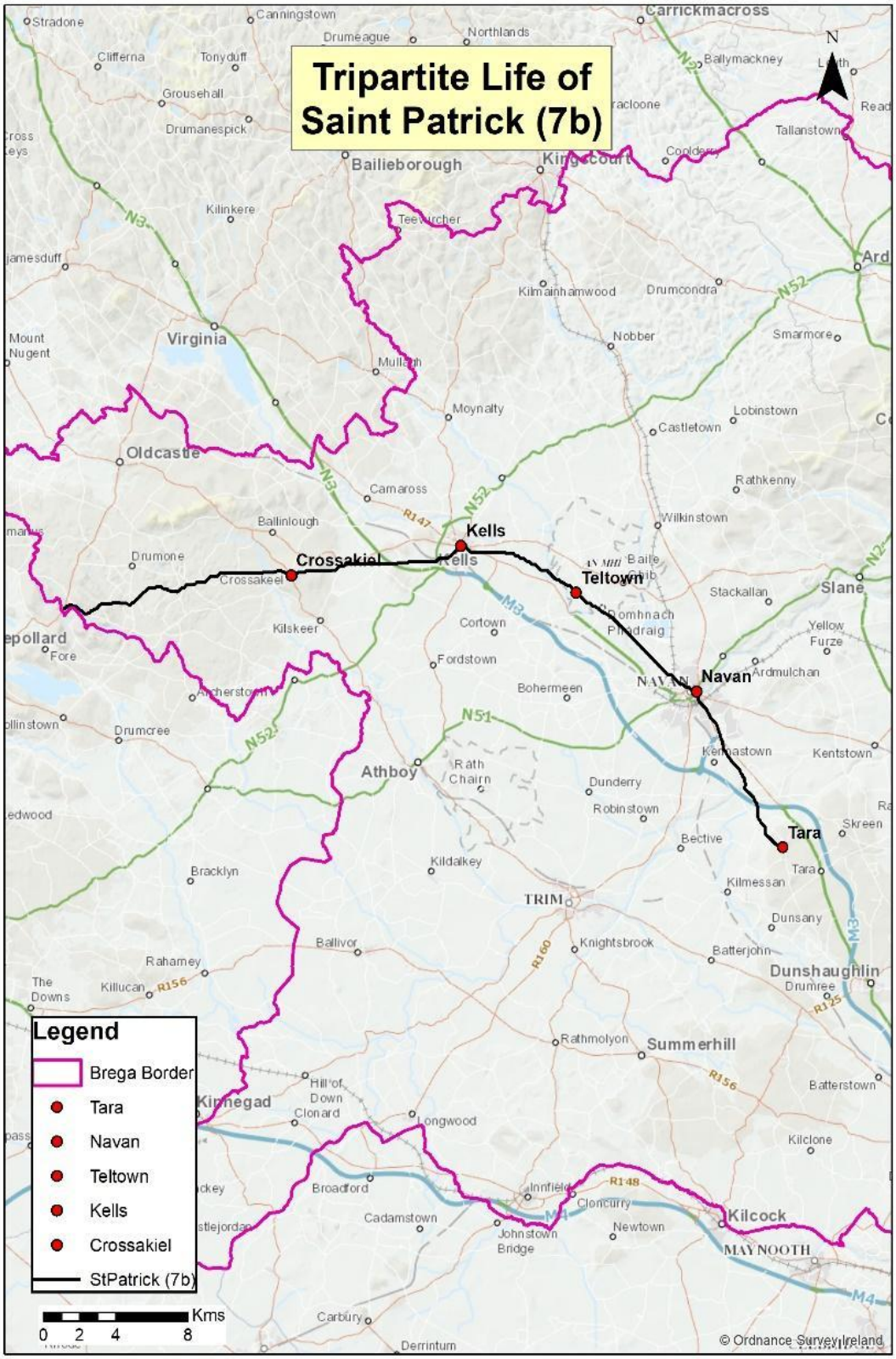


Figure 6.12: Modelled route of the tripartite Life of St Patrick (7b) (after OSM with additions)

8) Congal Clairingech:

This route is mentioned in the Glenmasan manuscript, a 15th century manuscript containing literary versions of the Ulster Cycle tales and is currently held in the National Library of Scotland.

8a) *Tara, Ath an Oigh*, Dundalk, Faughhart, Crossroads northwest of Sliabh Gullion, Newry, Mag Cobha, Armagh, Dungannon, Coleraine.

The placename Ath an Oigh would suggest a fording place on a river, but the location is not known at this time, which is problematic as it would be more accurate to route the LCP through the fording place on any known river. However as this is not possible, the LCP has been run without this intermediate point, and moves from Tara to Dundalk directly.

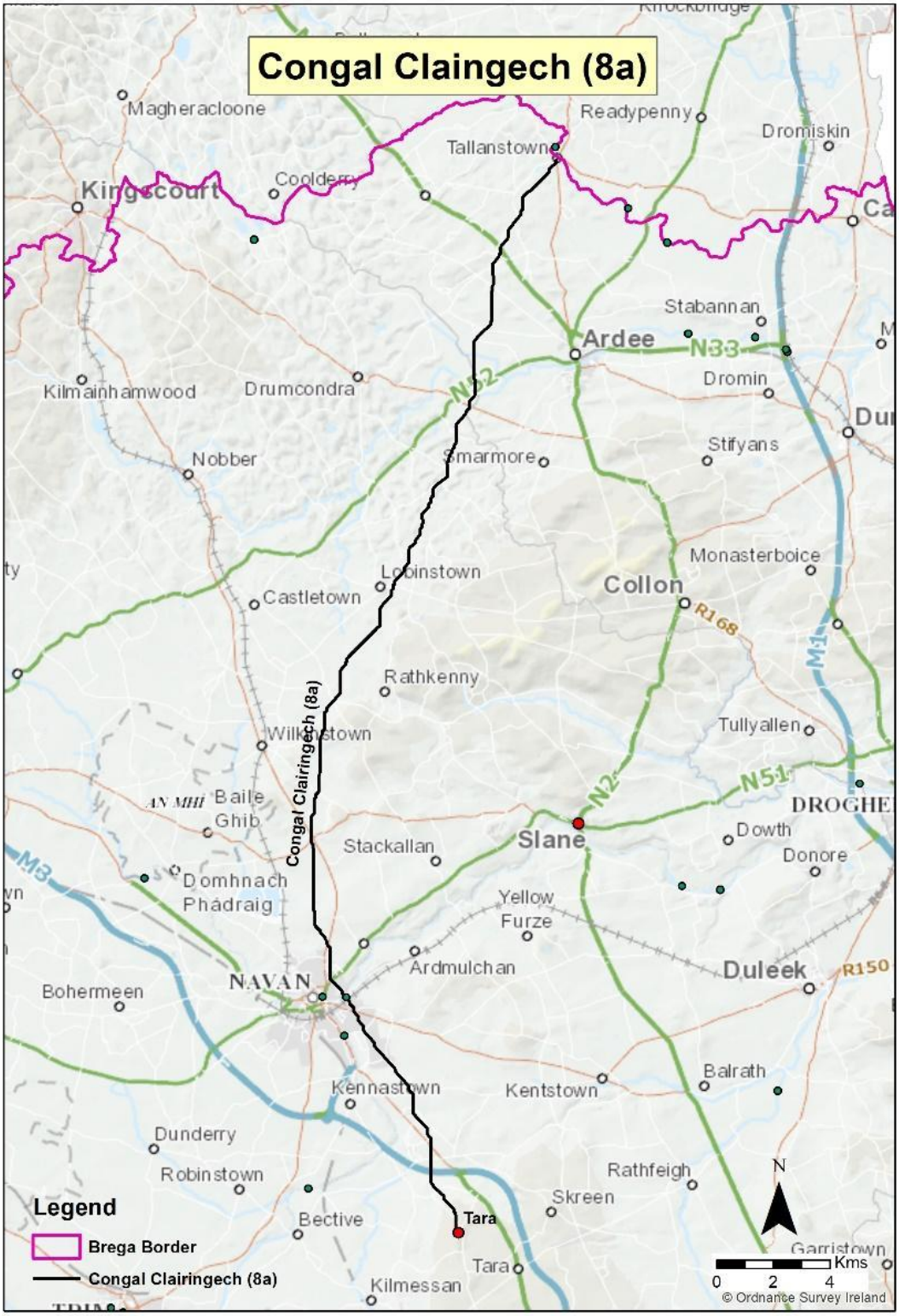


Figure 6.13: Route of Congal Clairingech (8a) (after OSM with additions)

8b) Newry, Omeath, Dundalk, *Slane, Tara*.

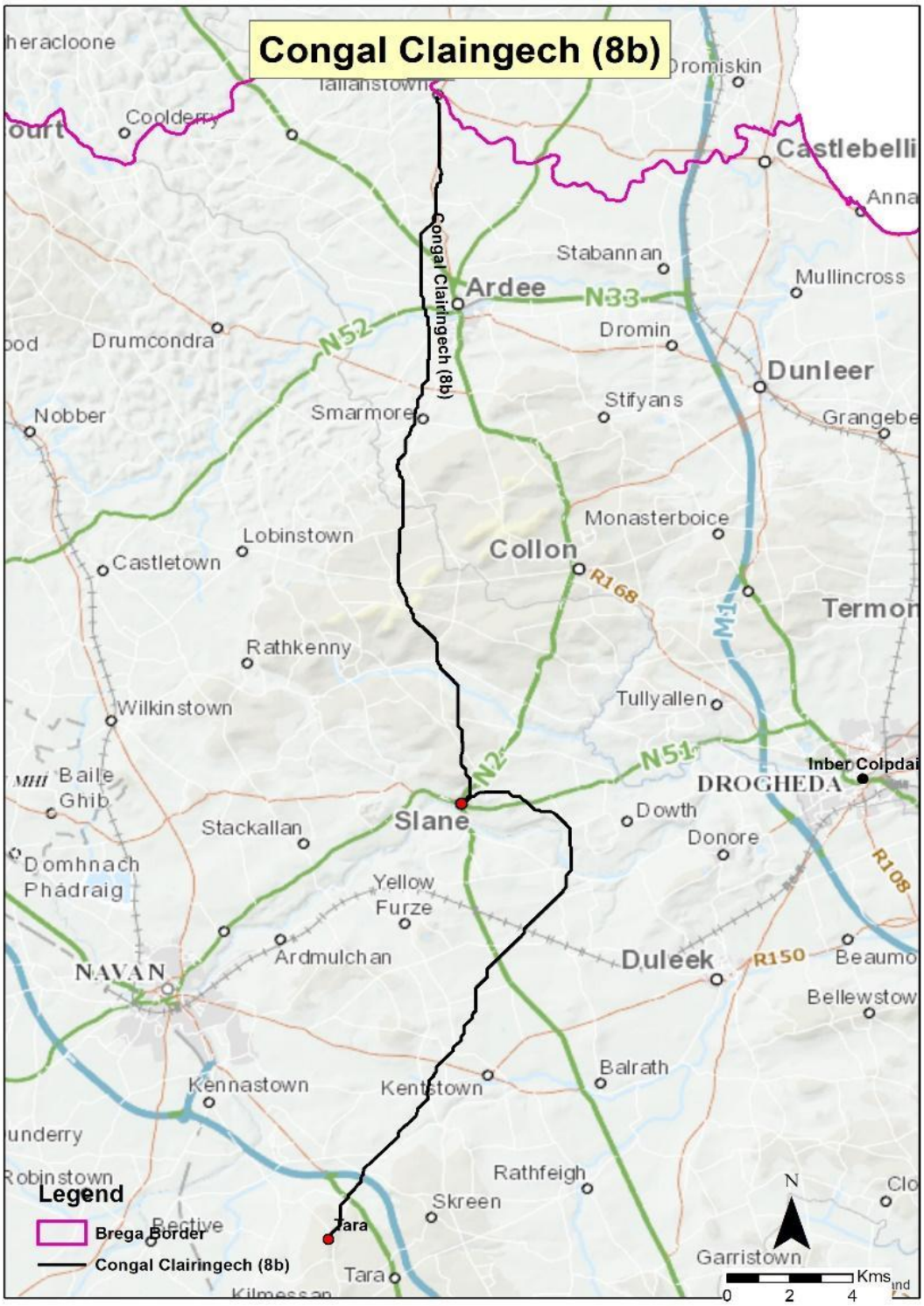


Figure 6.14: Route of Congal Clairingech (8b) (after OSM with additions)

It can be seen here that the route takes a wide loop as it leaves Slane and heads for Tara. This is due to the Boyne being classed as a barrier river during the creation of the friction

surface mentioned in section 2.10. Essentially this means that the LCP cannot cross the Boyne any sooner than the ford at *Ath na Laarg*. It would seem possible that there could have been a bridge at Slane, possibly in the same position as the modern day bridge, and this would cut out this loop. However as can be seen from the historical mapping in figure 6.15 below, this area is liable to flooding and so it is unlikely there would have been a fording place, a bridge is a more reasonable solution.

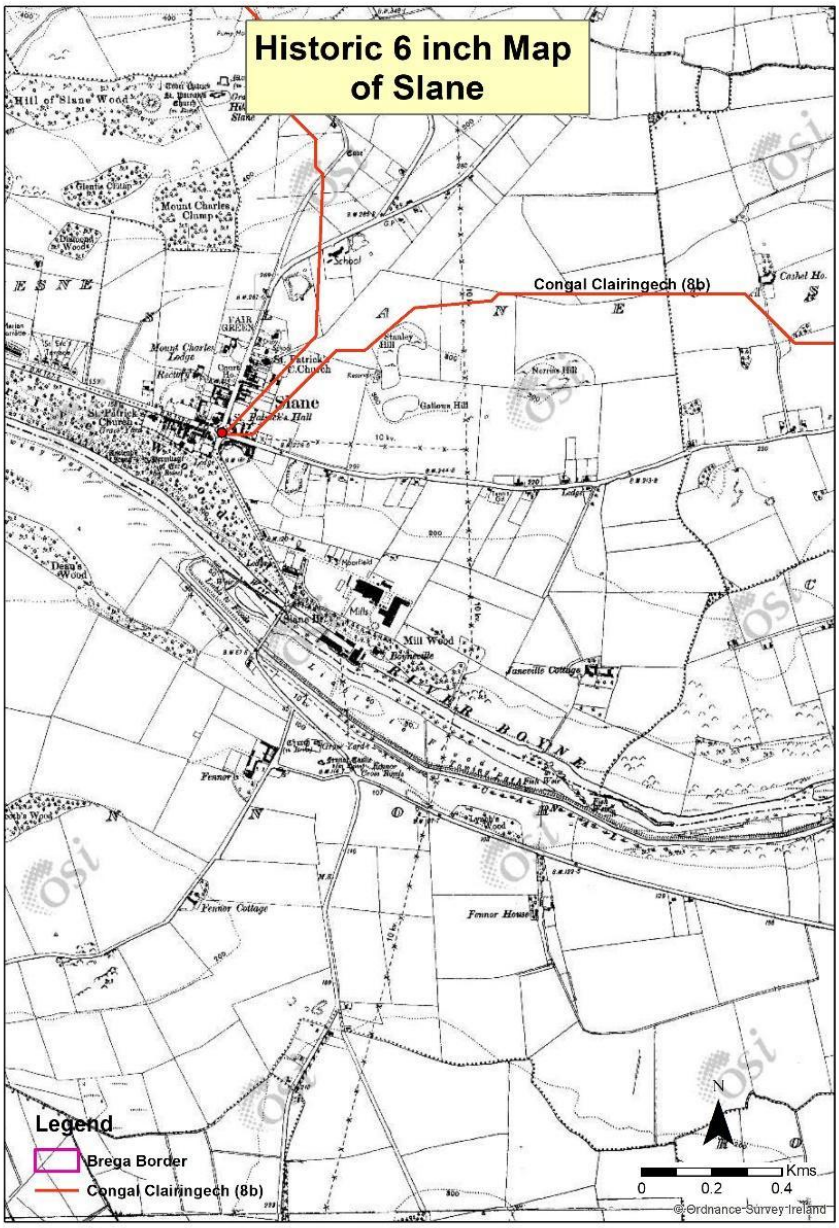


Figure 6.15: Historic map showing flooding areas around Slane (after OSI with additions)

There is no known evidence for a bridge at Slane however, so it has not been possible to merely place one where required to facilitate the LCP. It is just as likely that the route (red line) did indeed take this loop to reach a convenient fording place on the river. The fact that the route enters and leaves Slane is likely to mean that Slane was used for overnight stays, or at the least a stop to reprovision as the LCP between Dundalk and Tara would take a quite different route with the intermediate point of Slane omitted, with the yellow line passing much closer to Navan than Slane as seen in figure 6.16. This might be accounted for as Slane was a royal site but the exact location of the site is unknown.

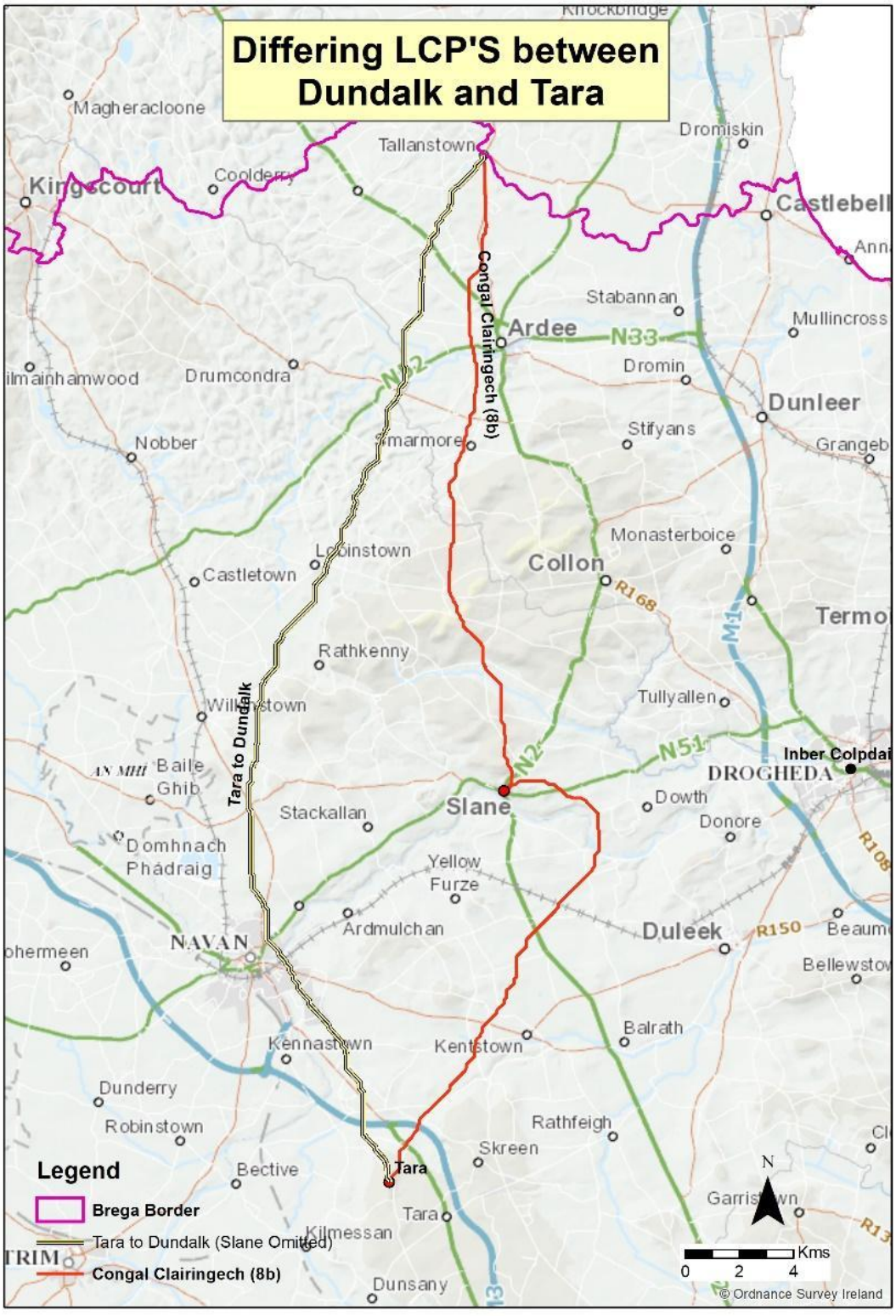


Figure 6.16: Map showing the two routes between Tara and Dundalk (after OSI with additions)

9) Acaldamh na Senórach:

This is a middle Irish narrative also relating to Saint Patrick, but which is of the Fenian Cycle, and *Oisín* and *Caiílte mac Rónáin* relate the story to Patrick (Groenewegen 2017). Both routes start at *Sliabh Fuait*, a mountain near Newtownhamilton Co. Armagh and head southwards.

9a) Sliabh Fuait*, Slane, Drogheda*, Rathdrum, Donard, Feeguile, Kildare, Monasterevin, *Slí Dhála*, Aghaboe, Roscrea, Tipperary, Cullen, Monasterenenagh, Kilmallock, Ardpatrick, Limerick.

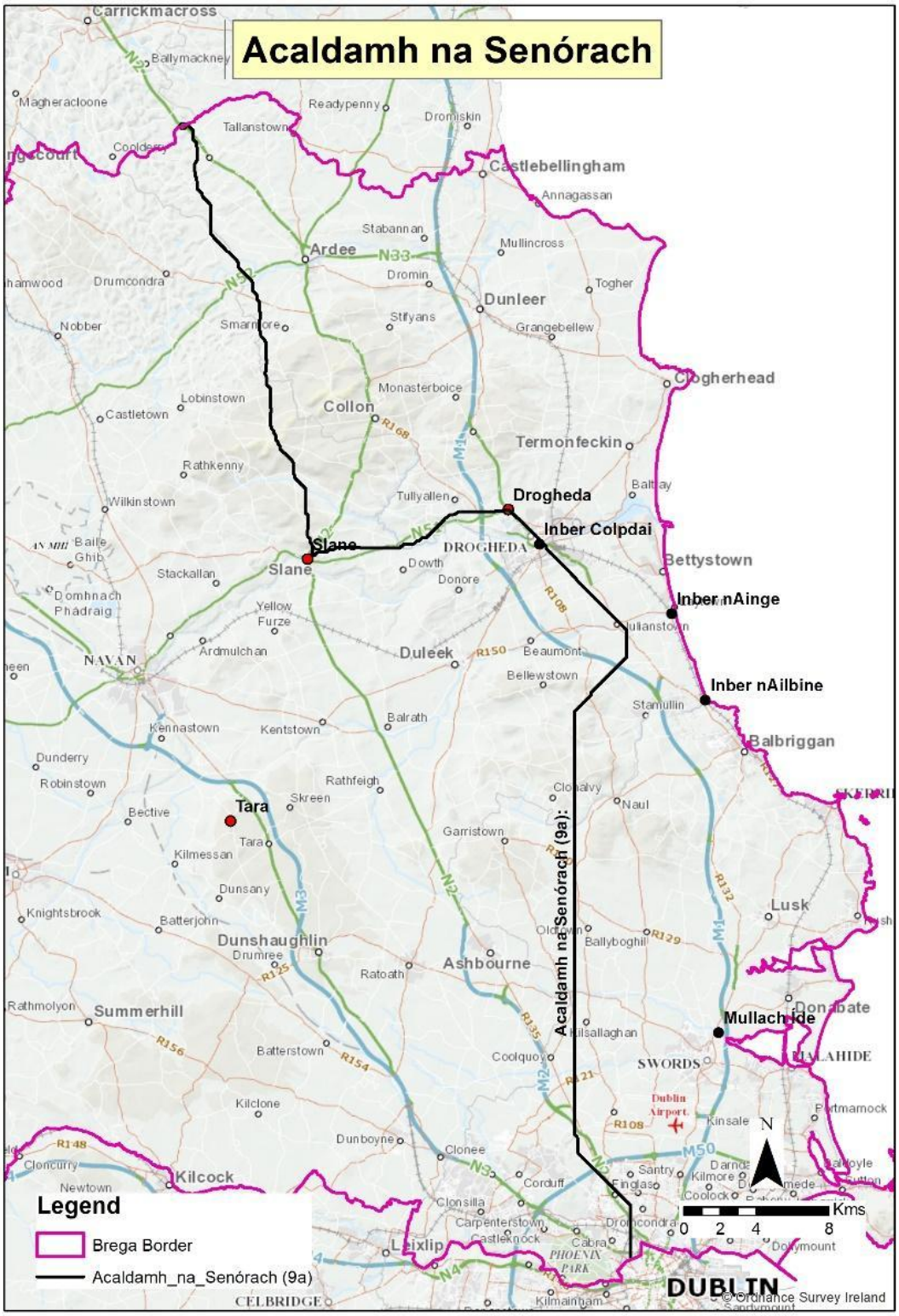


Figure 6.17: Acaldamh na Senórach (9a) (after OSI with additions)

9b) Sliabh Fuait, Dundalk, *Drogheda, Navan, Athboy*, Mullingar, Uisneach,

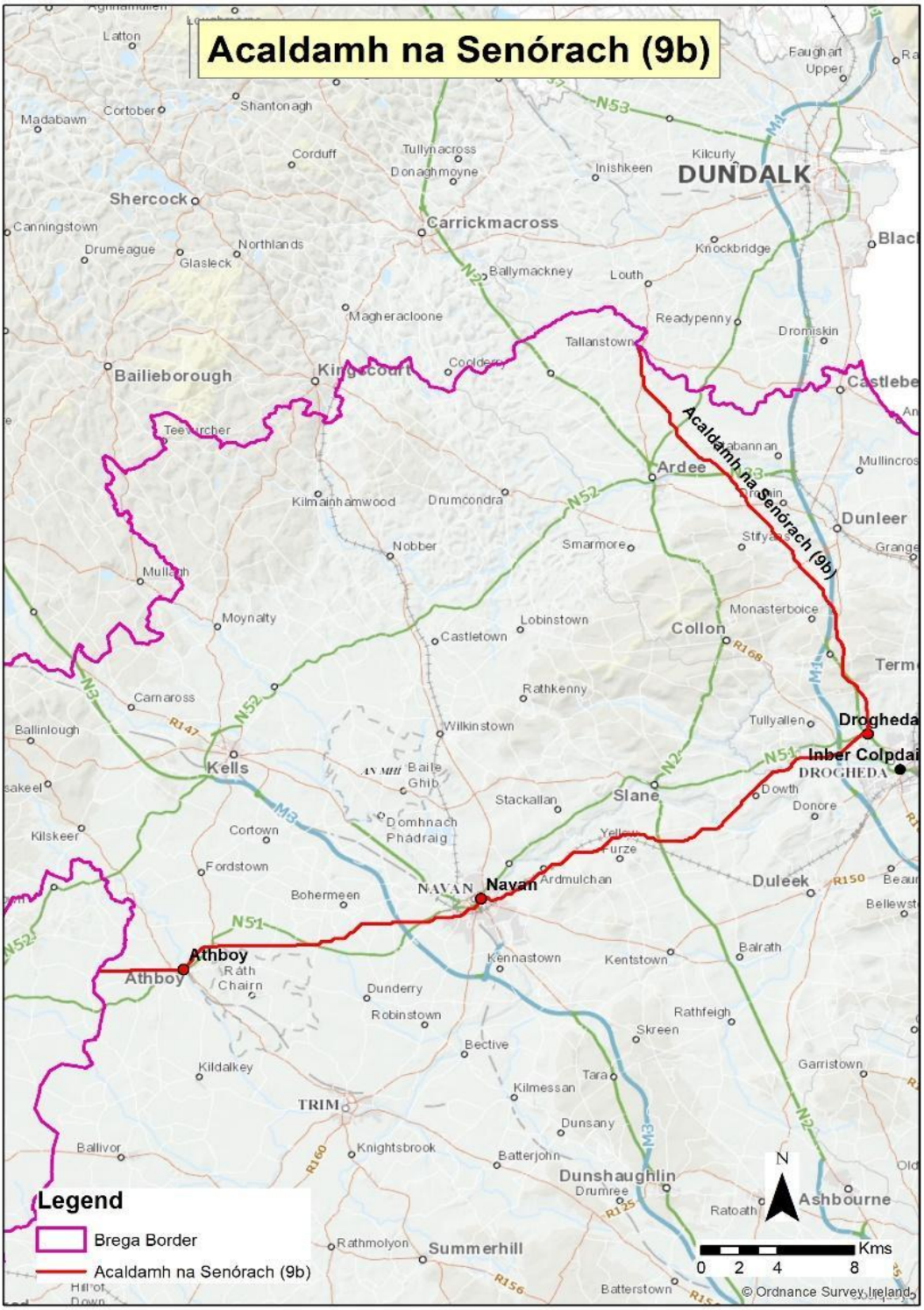


Figure 6.18: Acaldamh na Senórach (9b) (after OSI with additions)

10) Lismore Lives:

Lismore Lives is the name used by O'Lochlainn, but it is more properly referred to as the "Lives of Saints from the Book of Lismore", translated and edited by Whitely Stokes in 1890. The routes are delineated in only the broadest strokes and can only be used for the most general assessment of their paths. The LCP has been used to give the most likely path.

10a) Findchua: Mitchelstown, *Tara, Teltown*.

Findchua defies the modern idea of a saint and could be considered to be more of a warrior, although he also performed miracles. O'Lochlainn seems to have gotten the start point for his route – Mitchelstown - from *Sliab Cua*, the area where Saint Findchua was reputed to live. *Sliab Cua* however has been shown to be more of a general area than a particular place – probably the Knockmealdown mountains and some contiguous land. Another suggestion has also been that of Clonmel. There is definite mention within the "life" of *Ronán* the fair asking the saint to come to Brega and more specifically to Tara, to help the people and *Sechnasach*, son of *Áed Slaine* to protect them "for foreign foes had attacked them from the sea". These foes later turned out to have been British, showing again how much contact there was between Ireland and Britain at the time. There is no specific mention of Teltown in the "life" but there are mentions of other travels, generally to less specific places, although he sang a song about travelling to Rome on pilgrimage. The route does pass through other, modern villages such as Rathmoylan (site of a ringfort) and Kilmessan (site of a church).

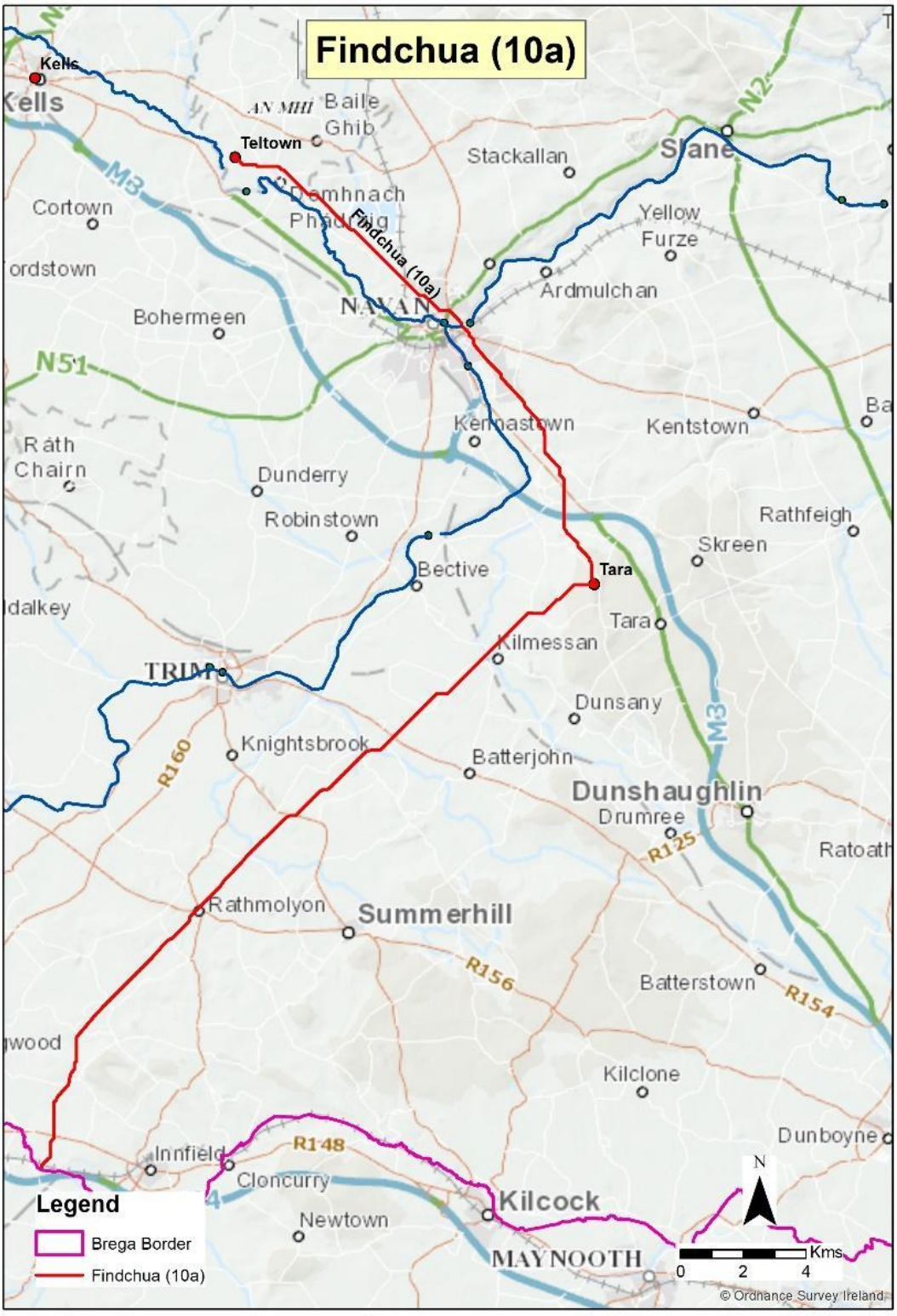


Figure 6.19: The Life of Findchua (10a) (after OSI with additions)

10b) Brigit: Ossory to *Teltown*.

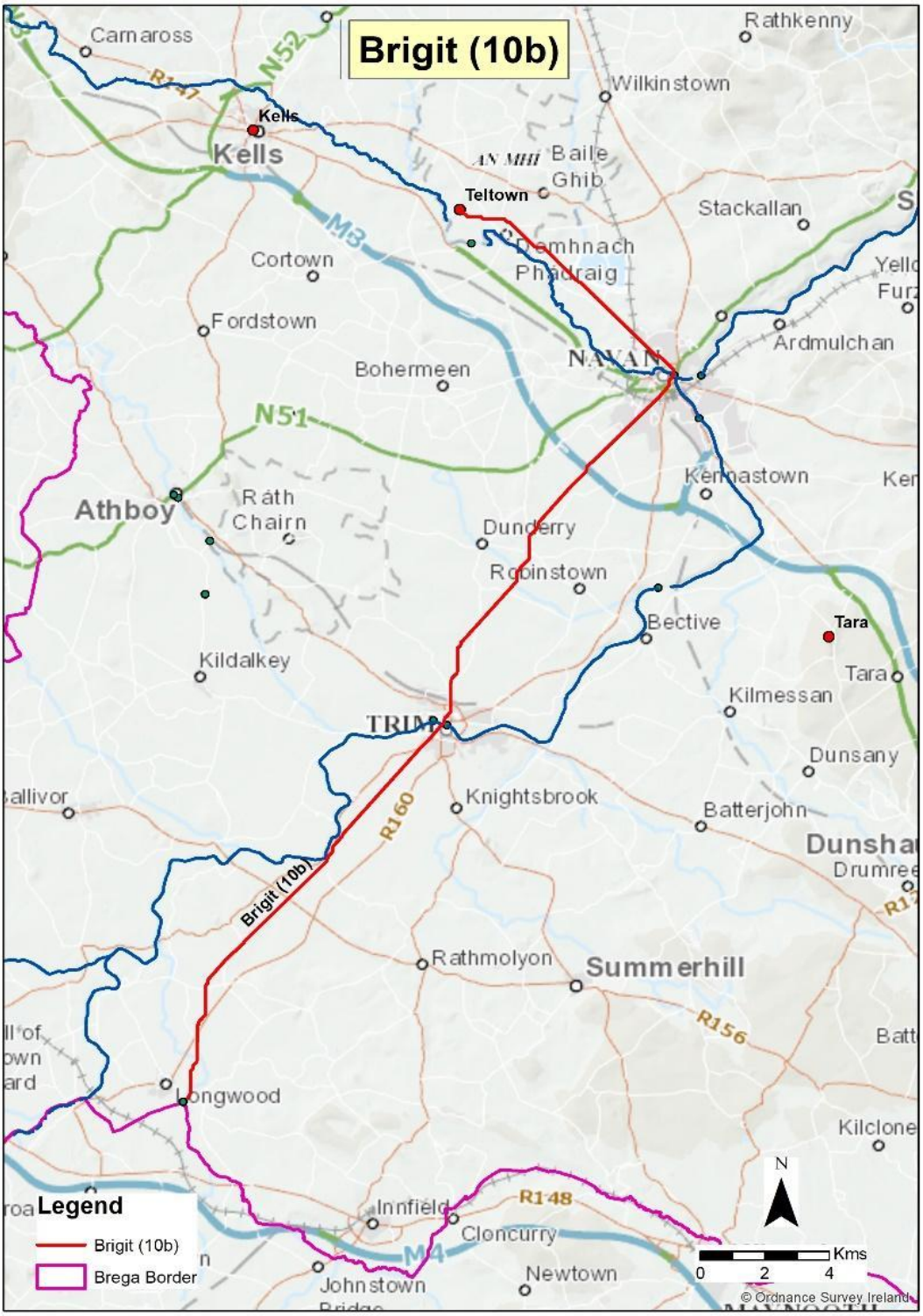


Figure 6.20: The Life of Brigit (10b) (after OSI with additions)

Although O'Lochlainn suggests Ossory as the beginning of this route, as that is where Saint Brigit was based, the line in the book actually states: "Then there came to pass a meeting of the men of Ireland in Tailtin, in the place where Patrick abode, with a synod of Ireland's clerics around him. Now Brigit and Bishop Mél went to the meeting" (CELT 2008). Therefore, the book doesn't specifically state a starting point for the journey. Although Ossory was the place chosen by O'Lochlainn, Ossory is, lamentably, a kingdom rather than an exact place, so this leaves the start point very open to error, and as stated earlier even small variations can skew the LCP.

As a starting point had to be picked, the centre of Kilkenny was chosen, but still marked as Ossory in the GIS for clarity. The route from Kilkenny to the border of Brega has been discarded and only shown from the border of the kingdom. While there are admittedly errors in this process a likely route can still be defined by the LCP and is shown above in figure 6.20. As can be seen from the map coming from Kilkenny, the centre of Ossory, the route would likely pass through the village of Longwood and cross the Boyne at the ford at Trim and then re-cross it at Navan to reach Teltown. The fact that the Boyne was navigable as far as Trim and there was also a fording place at the river there probably gives rise to the town eventually. It is likely that as the terminus for river ingress to the country that a strong trading centre was established at Trim, or at the very least there needed to be some sort of semi-permanent settlement for the transportation of goods to the other parts of the country along the road system.

10c) Aislinge Meic Conglinne: Sliabh Fuat, *Teltown, Kells, Duleek*, Uisneach, Durrow, Limerick, Cork.

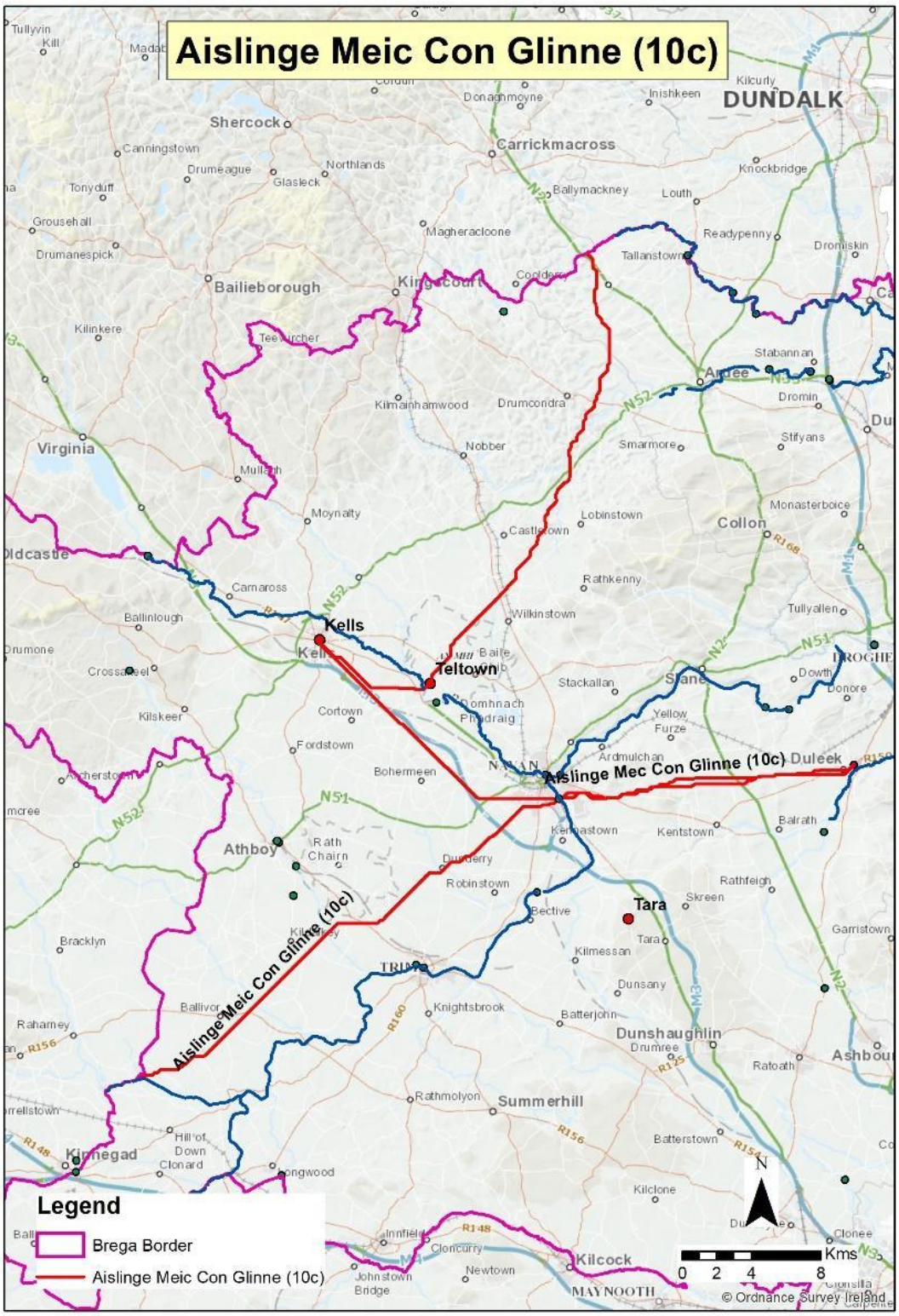


Figure 6.21: Aislinge Meic Conglinne (10c) (after OSI with additions)

This route is taken from a 11th/12th century Irish parody text known as the *Aislinge Meic Conglinne* "The Vision of Mac-Conglinne" describing the hardships endured by a travelling scholar. The man - named Aniér MacConglinne - makes this journey after some trouble with monks in Cork. It is a meandering route and the section from Kells to Duleek in particular crosses over itself. It can also be seen that the route splits between Duleek and the ford at Navan, and although they are quite close together they are not on the exact same line as might be expected between two points. This is due to the effects of anisotropy and reflects slight differences in the friction surface values between the two points.

10d) Muirchertach mac Néill's circuit: Aileach, Ballymoney, Clogh, Moira, Newry, *Annagasson, Mellifont*, Dublin, Newcastle Lyons, Dun Aillinne, Ballaghmoon, Gowran, Tubrid Brittain, Cashel, Limerick, Killaloe, Tulla, Loughrea, Knockmaa, Headford, Rathcroghan, Sligo, Aileach.

Muirchertach mac Néill, or sometimes known as "Muirchertach of the Leather Cloaks" was a king of Aileach of the Northern Uí Néill. The routes listed above are mentioned in a poem entitled "The Circuit of Ireland by Muircheartach Mac Neill, Prince of Aileach" which at one time was thought to have been written in 942 AD, but there are now cogent arguments for it not to have been written until the 12th century (Binchy 1958, 20; Ó'Corráin 2000, 239).

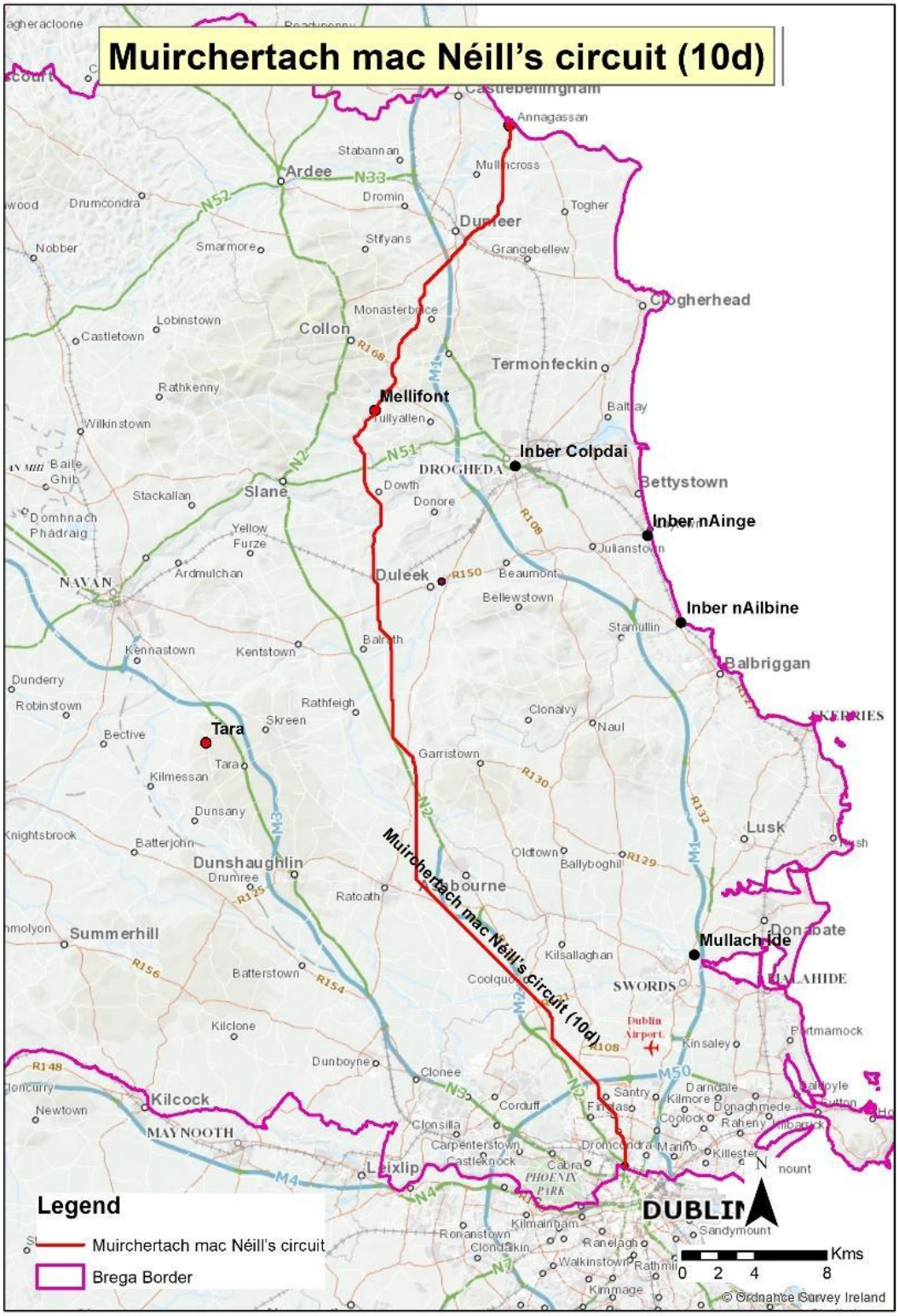


Figure 6.22: Muirchertach mac Néill's circuit (10d) (after OSI with additions)

Muirchertach is reported to have assembled a troop of around 1000 men to “subjugate the Danes” (Cusack 1898, 311), and proceeded to travel around the country seizing hostages, staying one night at each of the stopping points. Ó’Corráin (2000, 242) states that one of the nights was spent at *Áth Gabla*, which is where the Devlin river flows into the Mattock. It is another validation of the LCP process that this joining of the two rivers coincides almost exactly with the route of the LCP as seen in figure 6.23, and in fact is approximately only 600 meters from the joining of the two rivers.This is also another example of fanciful stories in relation to these routes.

The ford is unlikely to have been at the exact joining of the two rivers as the increased flow at such a point would make it an unlikely fording place, so the LCP route modelled here is a strong possibility. In fact, the Delvin river has a stream order of no more than 2 for its entire length, while the Mattock is more variable. Its highest stream order is 4 but these sections lie over three kilometres to the east of *Áth Gabla*. The route follows the modern M2/N2 route quite closely and this is still the main northwards route from Dublin to Armagh and Aileach – Muircheartach’s home territory.

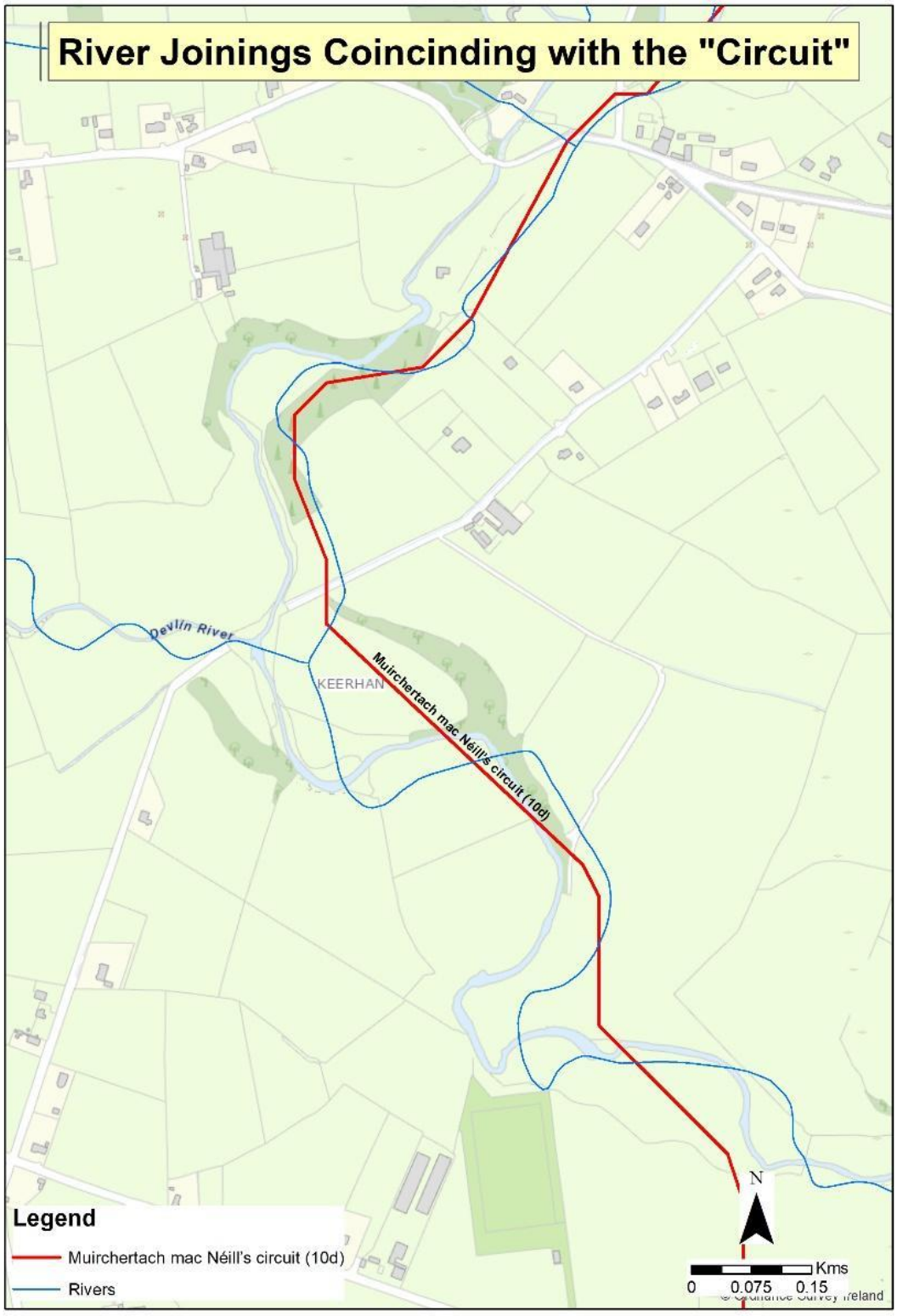


Figure 6.23: Áth Gabla – Where the Delvin and Mattock rivers meet the “Circuit” (after OSI with additions)

Figure 6.24 below shows the complete picture of known roads reconstructed with the LCP with no basemap to gain an overview of the roads and figure 6.25 has the basemap included.

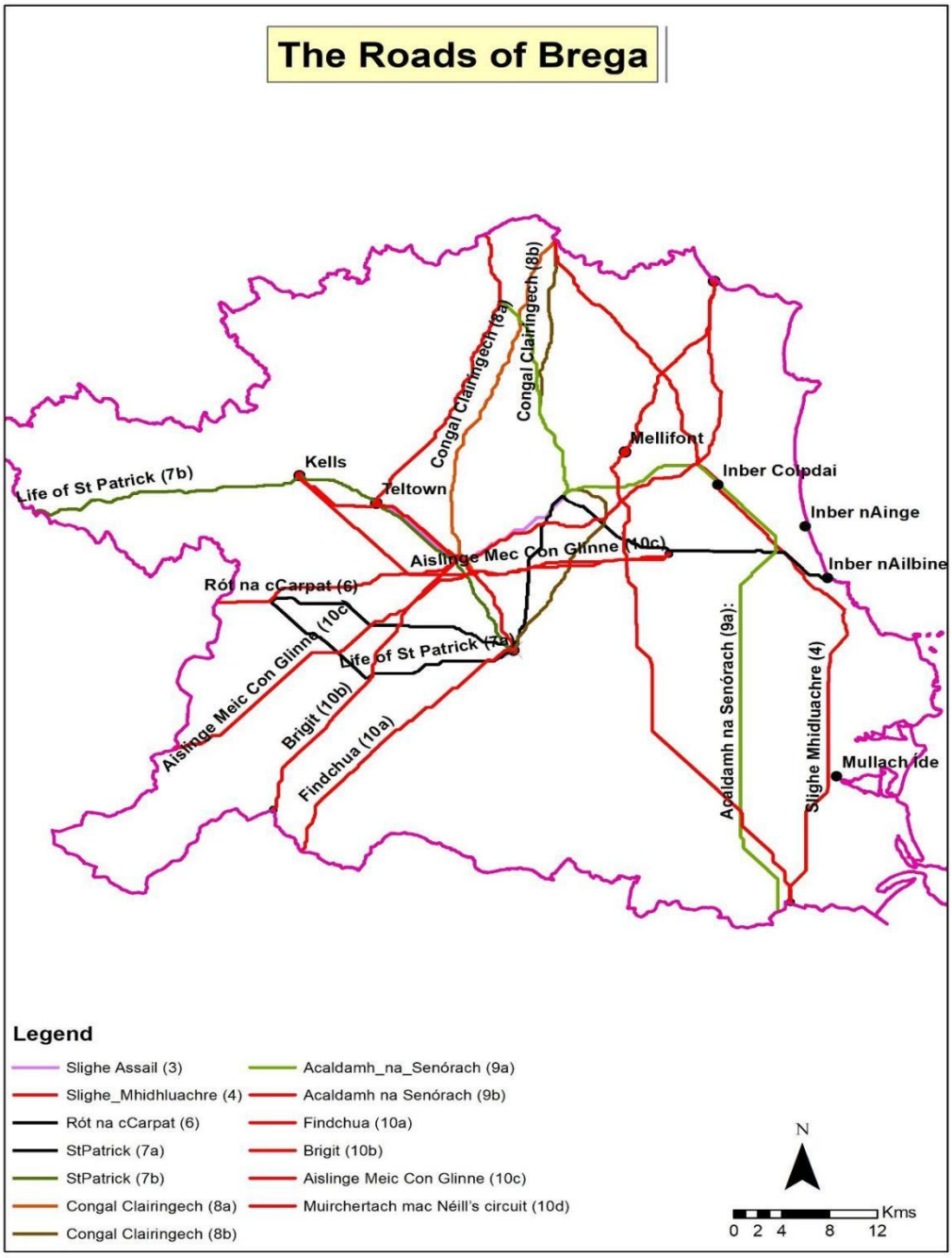


Figure 6.24: Reconstructed routes of Brega (Figure By Author)

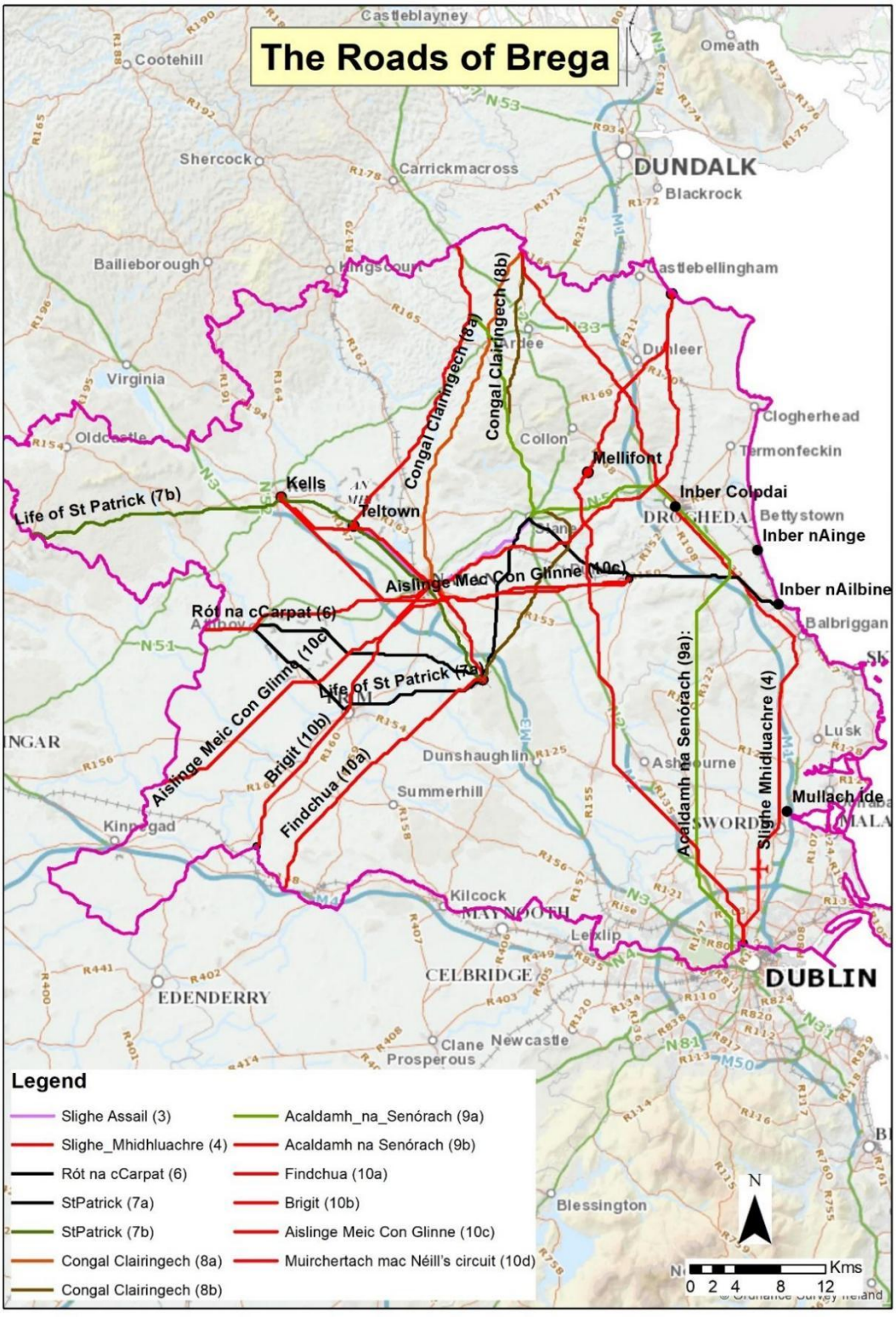


Figure 6.25: Reconstructed routes of Brega overlying OSI basemap (after OSI with additions)

Table 6.5 shows the calculated lengths of each of the roads:

Table 6.5: Calculated lengths of each of the proposed roads

Road Name	Flat Distance
Slí Assail (3)	74.87
Slí Mhidhluachre (4)	65.84
Rót na cCarpat (6)	26.9
The Tripartite Life of St Patrick (7a)	70.15
The Tripartite Life of St Patrick (7b)	60.75
Congal Clairingech (8a)	43.42
Congal Clairingech (8b)	46.35
Acaldamh na Senórach (9a)	86.28
Acaldamh na Senórach (9b)	72.07
The Life of Findchua (10a)	46.64
The Life of Brigit (10b)	37.93
Aislinge Meic Conglinne (10c)	122.73
Muirchertach mac Néill's circuit (10d)	67.92
Totals:	821.85

The calculated figure of 821.85 kilometres of major roads would seem quite a substantial amount. Currently in 2020 there is a total of 3620 kms of national and non-national roads in Meath (Meath County Council 2020). It is unlikely that any other kingdom in the country was serviced so well and had such well developed transport links. It must be noted also that these were major roads, well enough appointed to be written down in the various sources. When the other grades of roads and tracks are added to this figure, the network must have been substantial indeed, and possibly not far off the size of the modern network.

Ireland was a relatively literate country at the time, with many manuscripts still in existence, but there are no maps as we might think of them today which have survived from the period which Andrews (1997, 22) has suggested is because Ireland is so small people didn't need them. There is evidence to contradict Andrews' view. The *Life of Saint Patrick* states that when about to travel to a place he had never been, the saint did not "ask for a road-map". This suggests that there were actually some form of road maps in existence, although if there were they were likely to be rare and valuable. Another example comes from the *Silva Gadelica* where O'Grady (1892) has translated a story in which Saint Molaise met some priests who had a "fine road book". As we have no surviving evidence of one of these books however we do not know if it was a pictorial representation, or some other form of navigation aid such as a list of descriptions of topographical features a traveller could easily recognise to move between prominent points in the landscape.

Doherty (2015, 27) has suggested that this points to the sophistication of the road network and laments "If only one such book had survived!". It would be considerably instructive to have one of these books, although it has to be imagined that with the cost and laboriousness of production and the difficulty of protecting it from the weather and other hardships of travel, they were not ubiquitous. This would still probably mean that less wealthy people had to travel relying on oral directions based on the topography of the land.

We can see clearly from figure 6.26 below that certain places within the Brega landscape were very highly connected and others were less so. Table 6.6 shows the number of connections for each node on the network. The nodes outside Brega but included as the next stop along the network such as Dundalk, Mitchelstown, Ossory, Dubin and Rathdrum have not been added to the table as they are represented for their connections to nodes inside Brega rather than a node of interest in and of themselves.

Table 6.6: Number of connections for each node on the network

Name	No. of Connections	Name	No. of Connections
Tara	8	Slane	7
Teltown	7	Drogheda	7
Navan	6	Kells	6
Athboy	3	Donaghpatrick	2
Ath an Oigh	2	Annagasson	2
Mellifont	2	Drumshallon	2
Gormanstown	2	Clonard	2
Balrothery	2	Swords	2
Crossakiel	2	Tlachtga	2
Trim	2	Duleek	(1)

Examination of figure 6.27 shows that 8 of the known routes pass through Tara whereas 6 pass through Navan and its close environs, meaning both are definitely hubs on the road network, but Tara is actually slightly more important as a hub than Navan.

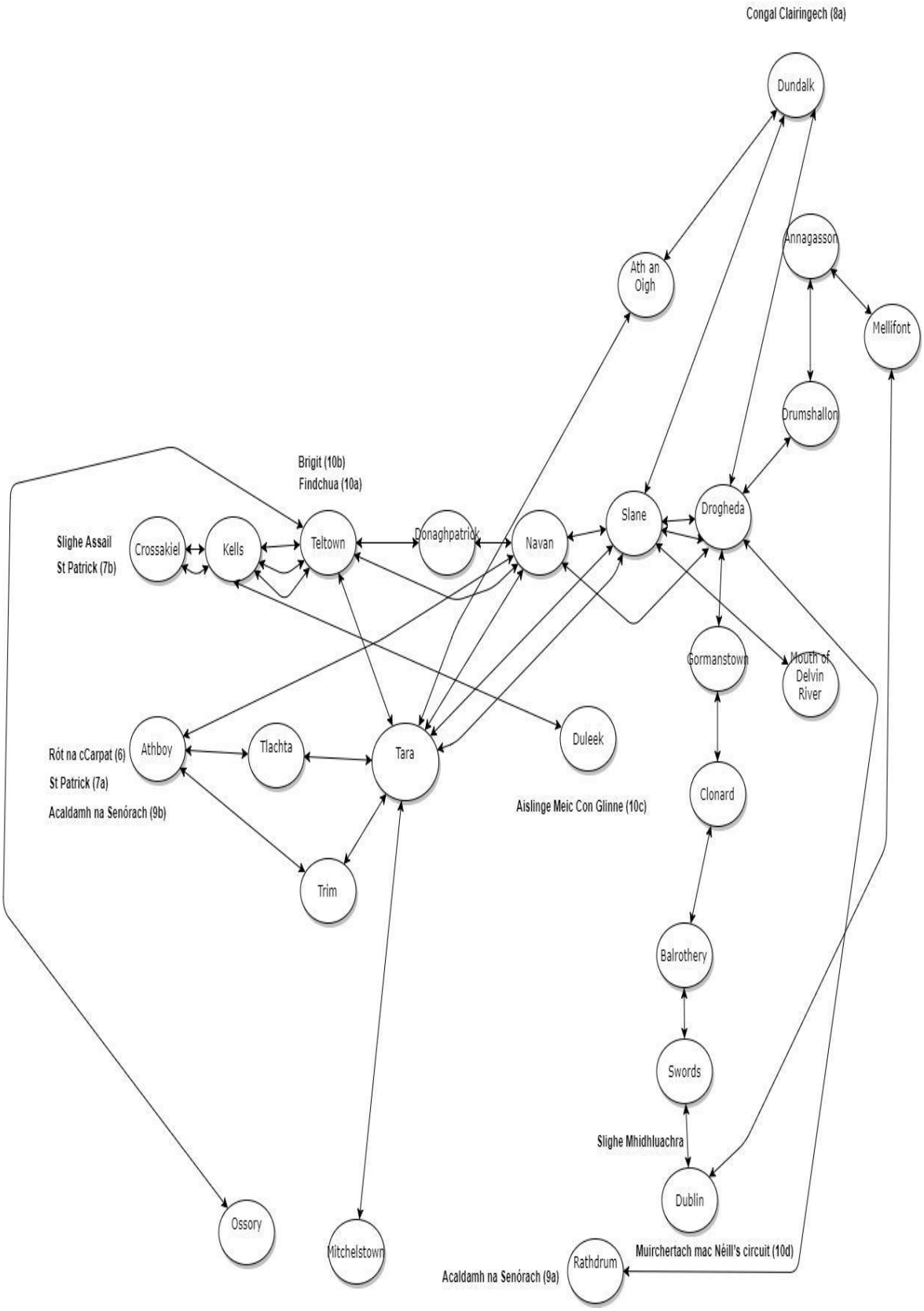


Figure 6.26: Road network schematic for Brega (Figure by Author)

This is slightly unusual due to the fact that Tara is landlocked whereas Navan is along the river route from *Inber Colpdai* to Trim, the highest upstream navigable point of the river

Boyne. This should mean that Navan was the bigger hub, and indeed if two more connections were made – in the form of the river Boyne entering and leaving Navan on its way to Trim, then the number of connections would actually be the same.

Admittedly, Tara had more ceremonial associations, with less routine settlement and farming activities than an area such as Navan. There is only approximately 10.5 kilometres separating Navan and Tara on our LCP. This begs the question as to why there were two such major road meetings separated by such a small distance. Both of those roads are also only known from literary sources and neither are one of the five major *slí*. This could lead to the idea that although Tara was a major centre for assembly at certain times, settlement and trade were more commonplace at Navan, especially due to its river access. It is interesting to note that the roads leading to and from Tara are restricted in their orientation. As can be seen from figure 6.27 there is a rough line defined from the route of Findchua (10a) and that of Congal Clairingech (8b) which travels approximately from south west to north east. This could mean that Navan was almost a staging point for travel to and from Tara, especially by river, and would certainly have seen a throughput of people and goods, both on land and water.

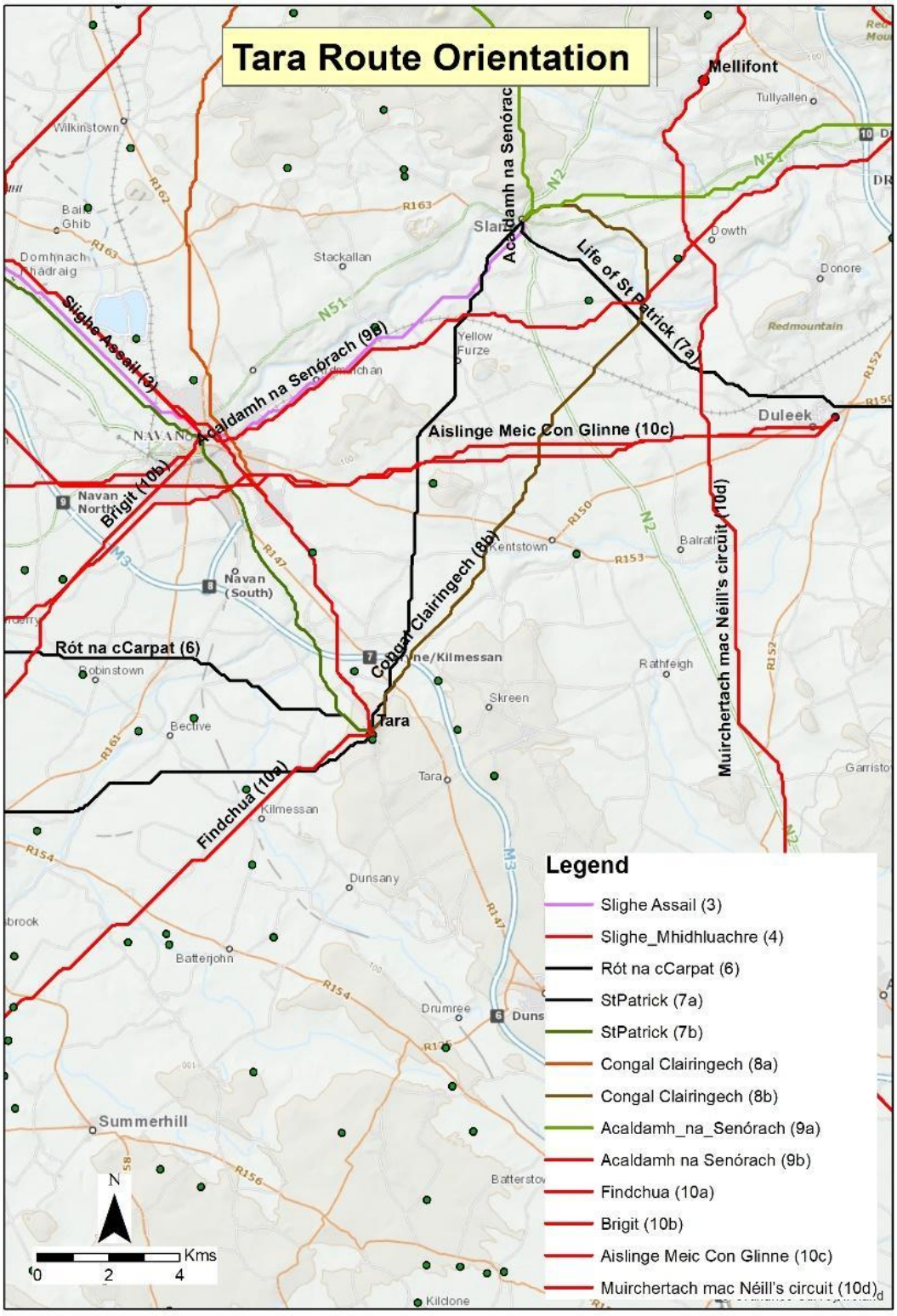


Figure 6.27: Route orientation with respect to Tara (after OSI with additions)

Below this diagonal dividing line there are no currently known approaches to Tara. One reason for this could possibly be enemy territory to the south east, but Tara is far enough inside the borders of the kingdom to be unlikely. It would seem that travel to and from this iconic site were funnelled through Navan and in general the direction of travel was north/south and vice versa. This would mean that goods and in particular trade goods could have had *Inber Colpdai* as their major landing point. These goods would then be funnelled along the *Slí Mhidhluachre* and *Slí Assail* to Tara and other points. It has been suggested that wealth in early medieval Ireland "consisted almost entirely of land, people and animals" and this is undoubtedly true, although prestige goods were important too and the ostentatious display of these baubles was crucial. It is almost impossible for a wealthy man to display, for example, 500 of his best cattle to prove his wealth to others as he travels from place to place, but having prestige, imported goods such as jewellery and weaponry could mark him out as an important person and have the added advantage of being far more portable. It is also possible that there were many routes in this area and the evidence for them just hasn't been found yet.

It is no surprise that the three places with the highest number of nodes or connections are Tara, Slane and Teltown. Tara as mentioned above was a place of assembly and ritual or *óenach*, one of the most prominent assembly sites in the country. Each kingdom held an *óenach* which was a "highly symbolic locale and inherently social occasion where power and authority were constructed, produced and routinised through patterns of ceremony" (Gleeson 2012, 21). Slane was the caput of the kingdom of northern Brega (Doyle 2009, 31) and was the centre of "religious but also royal power" (Swift and Byrne 2008, 12). Teltown was also a major assembly place and part of it was possibly built specifically for this purpose (Gleeson 2018, 104). Interestingly Gleeson notes that Knowth was a documented assembly place for the *Síl nÁedo Sláine* and yet it doesn't appear on the routes of any of the major roads in the literature. Newgrange was also a major assembly place during the early medieval period but this site also is not mentioned in the literature. Gleeson (2015, 43) links early conversion

period churches and assembly landscapes such as these, and it is possible that the prehistoric and pagan nature of sites such as Newgrange and Knowth made them unworthy of mention by the Christian monks who wrote the annals and hagiographies.

Of course, the possibility remains that there were other routes originating in the south east which are unknown to us now. This would seem a strong possibility as the main M2/N2 roads from Dublin run explicitly in this direction, with the caveat of Dublin not being a major Viking trading port until later in the period, so the possibility of prehistoric roads being built up is not as strong as the argument for the roads appearing nearer the end of the period.

Dublin is only mentioned 7 times in O'Lochlainn's list, one less road than Navan. Notwithstanding this, four of these roads are major *slí* – the *Slí Mór*, *Slí Dhála*, *Slí Mhidhluachra* and *Slí Chualann* which could possibly indicate that although the numbers of roads are the same, these four roads are of a higher grade and size than the ones passing through Tara or Navan, which are mainly roads we know of from literary sources. While Dublin as a town was established by the Vikings, the use of the port and the large prehistoric roads that emanated from it may indicate that it was a port in use from before the Viking era.

The *slighe* were the major highways, the construction of which was under the aegis of a king whose land it crossed, but the construction and upkeep of which was the responsibility of many *túath*, with the people of each *túath* responsible for the construction and upkeep of a particular section of road. There is a particularly pertinent story in the Life of St. Brigit (Connolly and Picard 1987) in which one *túath* forces another, weaker *túath* to work on a particularly difficult section of wet road crossing a bog which had been assigned to them.

There are many social and cultural aspects to this form of road building, and many questions to be asked that archaeology can provide few answers for, such as did *túath* take pride in building strong, usable roads? Was there a form of denigration of *túath* who were not as

expert at building road sections as others? Did the stronger *túath* derogate their responsibilities to weaker kin groups as is mentioned in the Life of Brigit? Unfortunately, the material remains cannot point us towards the answers to these questions and the historical sources are lacking in this regard. The building of these roads could have helped to establish and reinforce the status of the builders and often define cultural boundaries. For example, the use of the phrase “the road to…”. This phrase implies the importance of the destination, so if a *túath* is responsible for building a section of the “road to Tara”, that can convey and transfer a sense of importance and cultural superiority to the *túath* who built it, far in excess of that which would accrue to building a smaller road to their local lords’ house.

Dublin would seem to be the nexus for four of the five major *Slí*. This is slightly paradoxical as these main roads were originally thought to have their origins in the prehistoric period, whereas Dublin only grew to prominence after the arrival of the Vikings. This does indicate the possibility that Dublin may have been more prominent than was thought hitherto as it would not make sense for such major roads to combine at a small or unimportant settlement. Obviously due to the nature of the urban landscape in what is now the capital city, further excavation is almost impossible unless major repairs need to be carried out on sections of road, or other infrastructural developments require further research such as the Luas project which has uncovered human – possibly Viking – remains in the vicinity of Trinity college (Gilligan 2014, 4). Regardless, the evidence does point to Dublin as being one of the more important points of entry to the country since the prehistoric period.

As mentioned earlier, one of the major issues with the literature mentioned above is the lack of detail about the actual lines of travel between the known points on the routes. The points or “nodes” on the roads themselves are known, but between these points the roads themselves tend to be drawn in a straight line on distribution maps. While this was understandable before the introduction of high quality GIS software, we are now able to estimate routes which should be more closely grounded in reality.

A case in point is the study of the route of the *Táin Bó Cúailnge* by Paul Gosling (2014). While this is an excellent study of the route in some ways, the proffered maps still show straight lines between points as seen in figure 6.28.

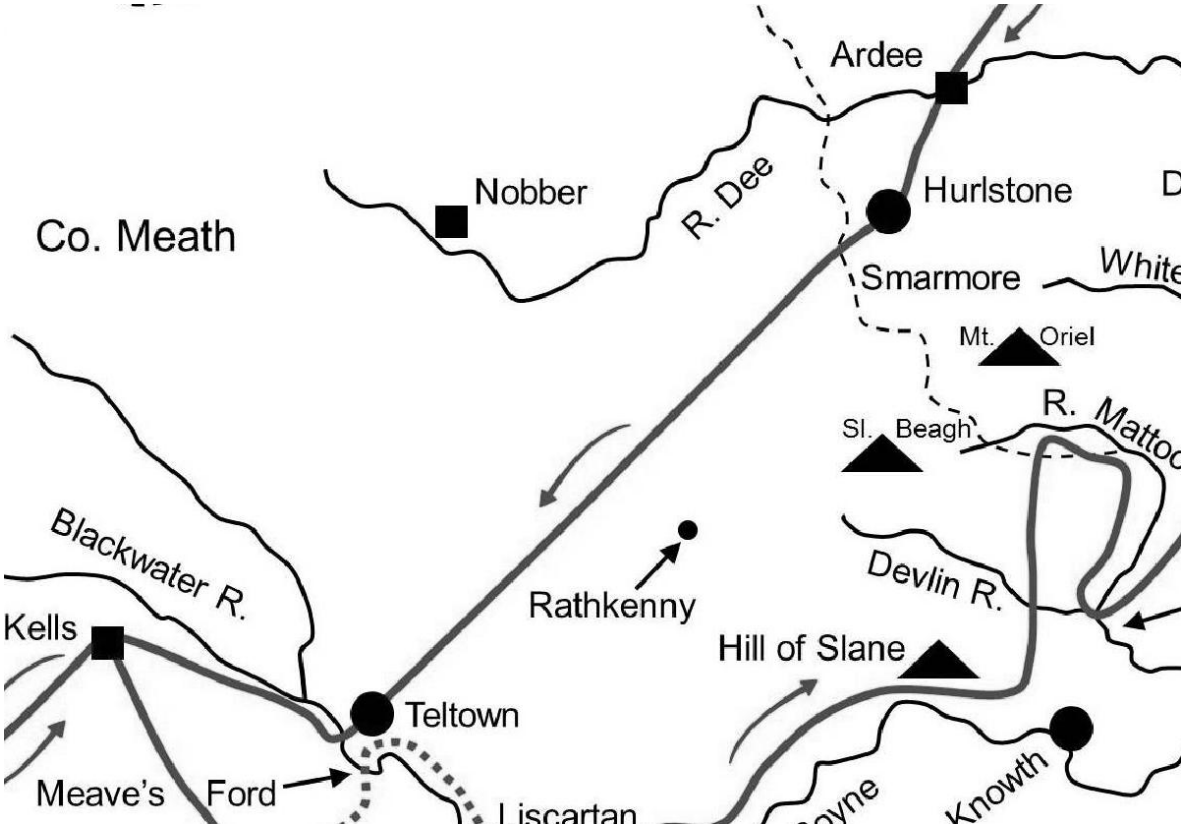


Figure 6.28: Route from Teltown to Ardee (after Gosling 2014)

However, when these points are used in conjunction with the LCP process, we get a slightly different view as seen below.

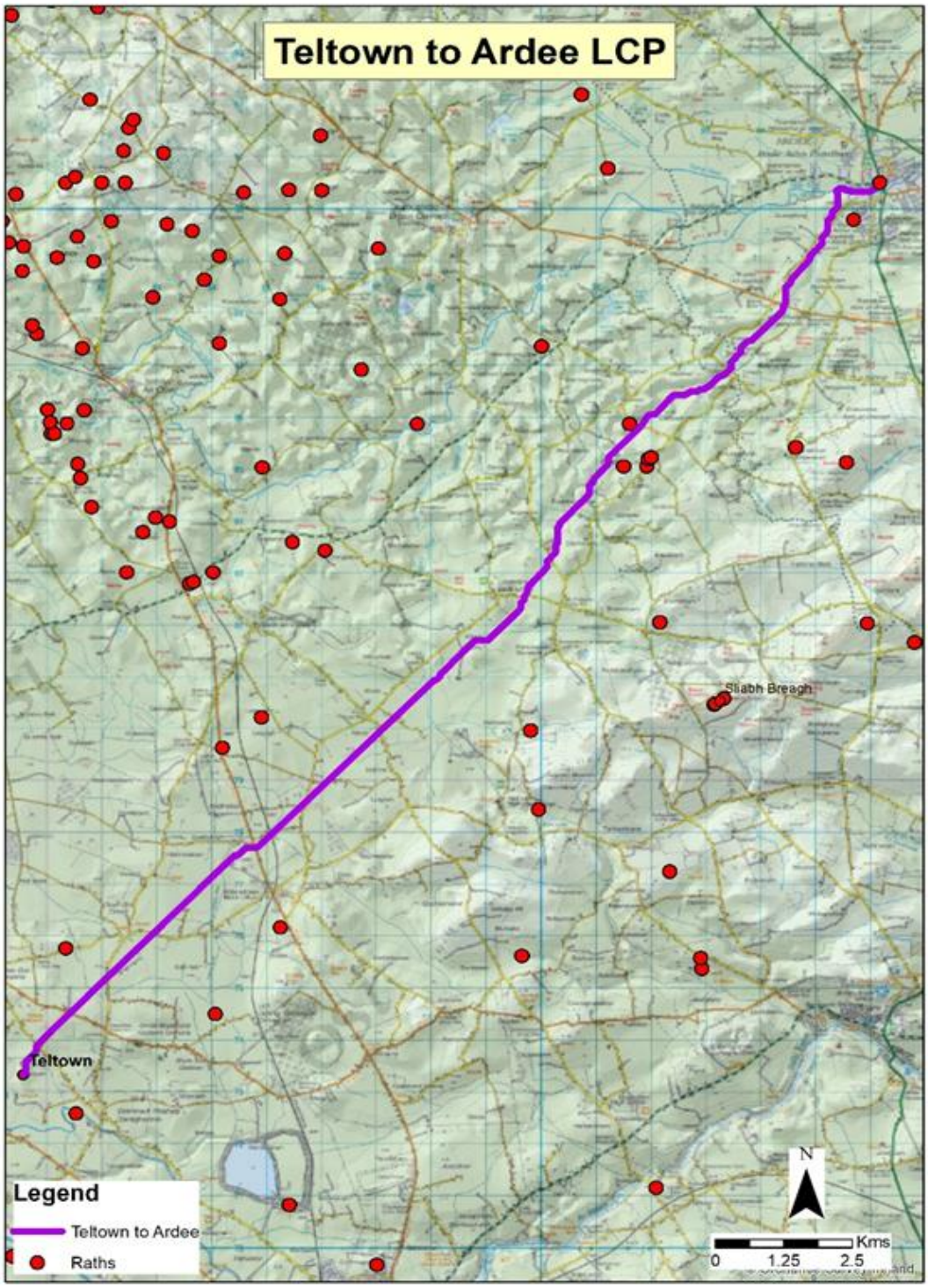


Figure 6.29: Teltown to Ardee LCP (after OSI with additions)

When zoomed in at a higher scale as seen in figure 6.30 the LCP here shows a path closely following the route of the Greenhills river, a likely “handrail” to follow when moving between

two points in the landscape, and one which would allow easy access to water during the cattle raid the *Táin* is written about.

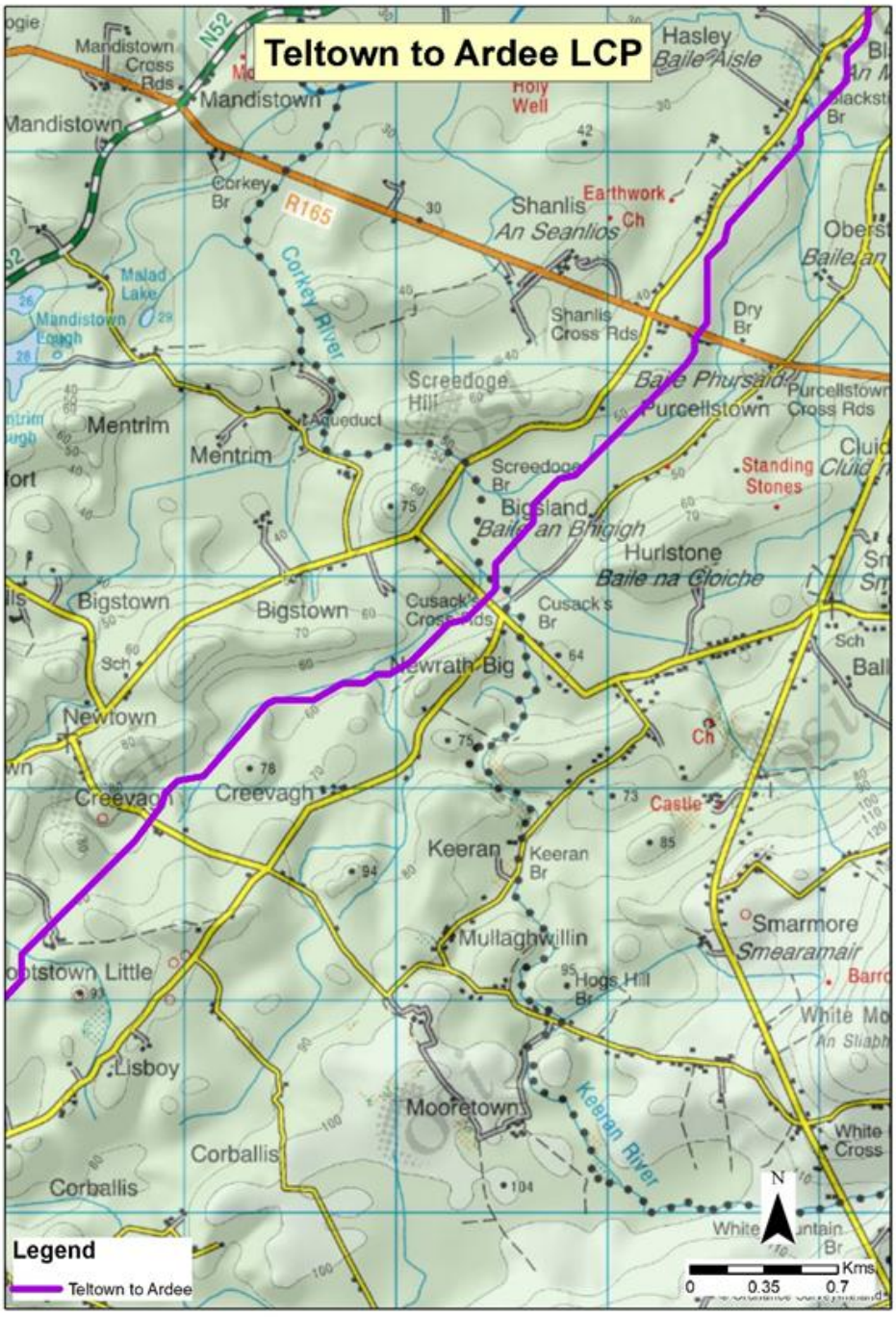


Figure 6.30: LCP "handrailing" close to the Greenhills river (after OSI with additions)

Figure 6.29 above also shows the route avoiding settlement sites, although it must be remembered that the settlement sites shown are likely to be early medieval while the *Táin* is an Iron Age saga.

Interestingly there is one place where the LCP route does come close to some settlements. This is almost exactly 17 kilometres into the journey suggesting a likely stopping place after a day's travel with cattle. Also noteworthy is the morphology of the settlements at this point. There are 5 ringforts very close to each other. Three are univallate ringforts, one of which is conjoined while the others are circular and sub circular, but the really interesting point is that two are bivallate ringforts and both are conjoined, which is extremely unusual. Could this possibly be a stopping place along a route with a conjoined ringfort used to hold cattle or other livestock overnight? With two banks and ditches to protect them during the darkness hours? Livestock is most at risk to a cattle raid while being driven from place to place and trying to keep them together at night in a strange place would be a difficult task, leaving the drovers exposed to a raid on open ground. Admittedly this particular route is based on a saga tale that in all likelihood only has a sprinkling of truth in it, but the inferences do seem to stack up. Unfortunately there are only four conjoined ringforts in Brega, so the sample size is simply too small to test this theory any further within the confines of the current study.

In general, distribution maps of the roads are limited to a single A4 page which in effect renders them useful for only a very general overview, and reliance must be placed on the textual evidence offered. While it is recognised that this is due to the vagaries of printing and publishing, maps on this scale are useful only as a very basic overview owing to their lack of detail. A GIS study of this type can create a permanent record and allow researchers to examine the roads in full or in sections in far more detail than printed maps. A note of caution must be entered here. Whilst the use of GIS modelling in this type of analysis is undoubtedly useful, it is currently unable to take account of cultural factors. For example, whilst is relatively easy to delineate the least cost route for a person travelling from point A to point B, we cannot currently adjust for other social and cultural factors such as visiting friends along the way, or making use of communal resources such as animals, carts or other materials or avoidance of certain places associated with rituals or due to enmity between warring factions.

An extra layer of difficulty is added when some of the social aspects change over time as political and social balances of power and allegiances shift.

The roads were not the only mode of transport however and the extensive river network of Brega was also a transport link. Paradoxically, in some respects these were also a barrier to travel, for example with herds of animals and in other instances such as travel by chariot for high status individuals or retinues, especially in winter or times of high floods. It is also possible that goods, people and technological and social innovations were carried by larger boats along the shoreline of the kingdom to places of trade such as Dalkey Island. It has been argued by Leighton (1972, 92) that “medieval man preferred to use water transport wherever possible”, although he offers no actual evidence for this. O’Brien (1983, 93) agrees stating that “travel by water was likely to be safer, easier and preferable to travel overland” . While there is undoubtedly some truth to these points, the cost of boats large enough to transport cattle in any meaningful way would be far beyond the reach of the majority of people, and so overland transport was likely to have been the norm for many.

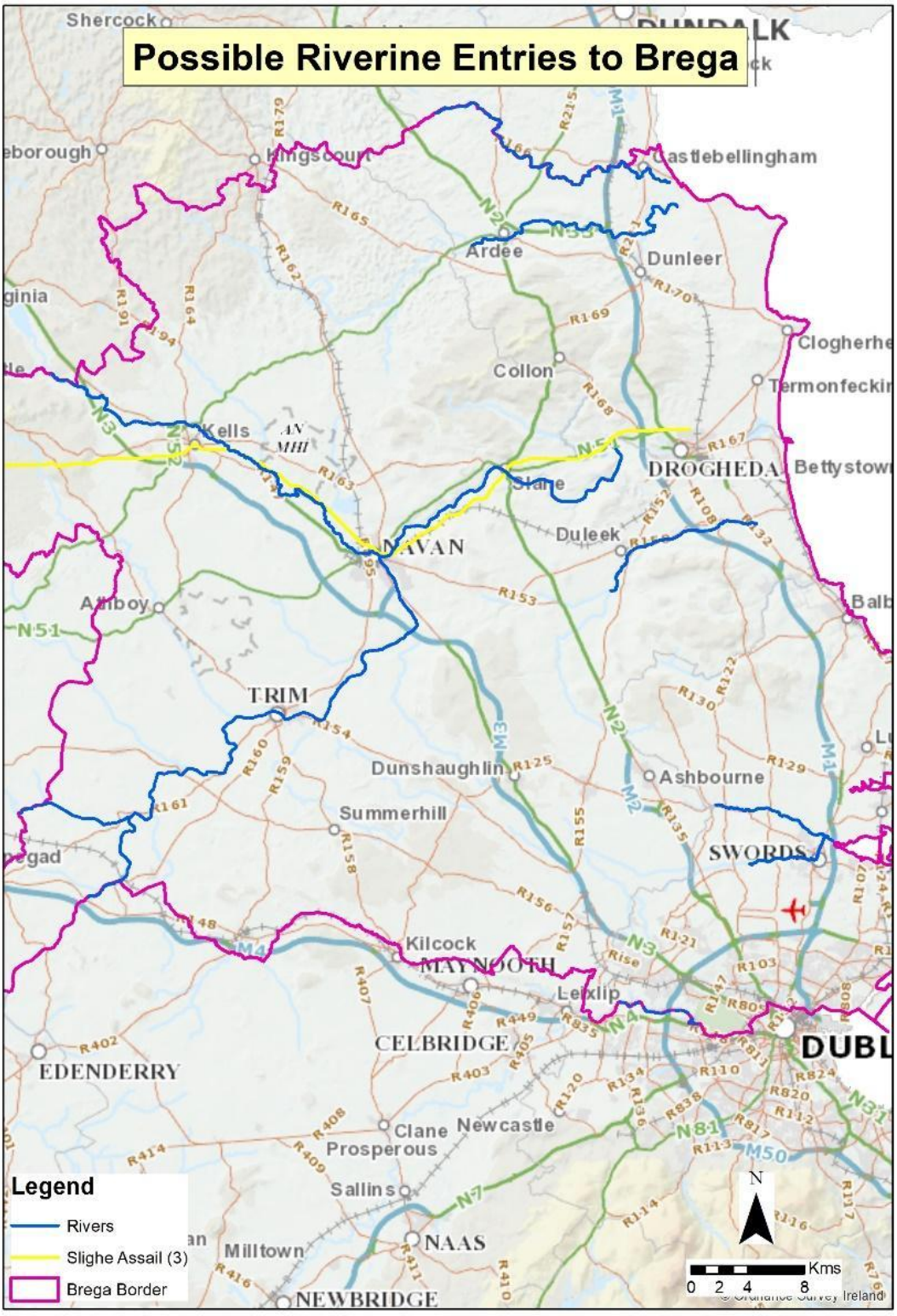


Figure 6.31: Possible riverine entries to Brega (after OSM with additions)

In assessing whether a river channel is small enough to wade, or large enough to enable large boats to travel up or down them, the method devised by Strahler in 1957 is generally

used. In summary the higher the stream order the more streams and rivers which flow into the main channel and correspondingly the larger volume of water, essentially the higher the stream order the bigger the river, and this can be seen in the table below with the biggest rivers in the area, the Liffey and the Boyne, having the highest stream orders.

There are 9 rivers in Brega with a current stream order of 5 or over and these are shown, with their corresponding lengths in Table 6.7.

Table 6.7: Stream order and length of major rivers in Brega

River Name	Stream Order	Length (kms)
Blackwater	5	32.01
Boyne	5/6	71.11
Broadmeadow	5/6	9.65
Dee	5	20.75
Deel	5	7.69
Glyde	5	17.32
Liffey	6	2.32
Nanny	5	13.82
Ward	5	7.38
Total		182.05

The total figure of just over 182 kilometers is quite a substantial number, approximately 5.75% as there are only approximately 3126 kilometers of rivers with a stream order above 5 in the whole country (McGarrigle 2014, 121). If divided equally over the 26 counties then an expected return would be 3.84% of the total for each county, indicating that Brega was well serviced by a network of rivers capable of transporting boats and small ships.

Whilst the Liffey is a much longer river with a higher stream order for much of its length, only the section of it which penetrates Brega is shown here. Also, the map does not show the continuation of some of these rivers as they extend beyond the boundaries of Brega. With this in mind there is still approximately 182 kilometres of likely navigable river in Brega. It is known from historical sources that the Boyne was navigable as far as Trim, but it is likely from the stream order that it would have continued on as far as Grange. Grange 2 is notable as the site of an early medieval ringfort, cemetery with 8 burials and large kiln (Kelly 2006) possibly hinting at a reasonably sized settlement. Of particular interest was part of a metalled surface consisting of small stones that may have been part of a road or pathway (Ronayne 2014). The Deel would have been navigable as far as Raharney, which returned a possible settlement site including a charcoal rich pit fill (Elder 2004). The Nanny continues on until the area of Boolies Little. This was an area rich in prehistoric activity with *fulacht fiadh* and other burnt mounds in evidence. It was also in use in the early medieval period with findings of souterrains and lintel graves (Sweetman 1982). Whilst these figures are somewhat generalised due to the changing nature of rivers, their depths and courses over time, it still shows an extensive river network, capable of being used to transport goods, people and animals over large parts of the kingdom with relative ease.

Whilst rivers such as the Glyde to the north and Liffey to the south were used as boundaries to demarcate territory, they also served as connections between territories and were sometimes an interface for both trade and confrontation. Boats coming upriver from the sea could land on either bank of a river and depending on which side was chosen could show economic superiority in the form of ostentatious display of goods and animals being unloaded. During this period there was relatively large scale importation of ceramics, although this is likely to have been on a piecemeal basis as there is little evidence for large scale *emporia* along the coast (O'Sullivan et al. 2014, 266) with the possible exception of Dalkey Island (Liversage 1968; Doyle 1998) and Dunnyeill Island, Co. Down (McCormick and MacDonald 2004; 2010).

However Dalkey Island is only approximately 25 kilometres from Malahide bay, one of the known entry points to Brega. It is also only approximately 48 kilometres from *Inber nAilbine*, 52 kms from *Inber nAinge* and 57 kms from *Inber Colpdai*. These distances are very easily achievable, especially as the route runs right along the coast, making stopping in the advent of bad weather to find shelter very practical. The tidal flows along this section of coastline can reach 3 knots (knots = nautical miles per hour, approximately 6 land kilometres per hour), greatly enhancing the speed of travel. The strong tidal flows in this area could also be one of the reasons Dalkey was chosen as a trading point. At spring tides inside the sound, the tide can reach speeds of 6 knots or approximately 12 kilometres an hour. This would mean that entering and leaving places like Bullock or Colliemore harbours are only useful when running with the tide and make running against the tide extremely slow and difficult at the height of the tidal flow, thus restricting movement in the case of emergencies. Outside the island the tide is far less strong, only reaching speeds of half of the above, leaving far more scope for escape in case of a dispute or emergency.

Dalkey Island in particular has produced one of the highest amounts of imported glass and pottery in Ireland which Doyle (2009, 17) has argued “had a symbolic appeal far greater than its intrinsic value and that it was used by secular groups as a means of expressing their identity and of extending and maintaining their power” and that this material was brought in across the sea and redistributed from places like Lagore Crannog, a royal site of Brega (Doyle ibid.). There is also another concentration of sites along the Boyne and *Inber Colpdai,* the port at the mouth of the Boyne has been suggested as another emporium (Charles-Edwards 2000; Gowen 1988; Doyle 2009; O’Sullivan et al. 2014). Doyle (ibid., 22) also lists imported pottery and glass from other sites in Brega such as Collierstown 1, Colp West, Randalstown and Stalleen.

Later in the period Wallace (1987) has suggested that the Viking bases along the coasts, in particular Dublin, Waterford and Limerick, traded with their surrounding hinterlands, and a

Viking hoard of silver was found at Loughcrew. Brega is obviously closely geographically connected with Dublin, occupying a large area to the north of the Viking settlement of Dublin, and there is also evidence for settlements at Annagassan and Rosnaree, so it has to be imagined that there were trading relations between the these settlements and their Úi Néill neighbours. The ability to source prestige imported goods would have been an important talent, and goods like these could be used to ingratiate a person with a member of a higher social order, or even increase their own status and honour price. On the other side the Vikings often vied with each other for power or ascendancy over other bases (Downham 2007), and links were forged with the native populations to enhance this. In this way bonds were forged and ideas and goods transferred more easily in the surrounding areas, meaning the spread of Norse ideas spread from these centres. These would have impacted the peoples of Brega far more than in places farther afield such as the west coast, and this point has been made by Downham (2016, 371) in relation to Hiberno-Scandinavian culture in general.

There are modern day anthropological parallels also as can be seen by the hinterlands around American military bases in Germany, where people generally speak a good level of English, and usually speak it with an American twang. The transfer of prestige trade goods was also more common in the immediate vicinity of these bases, allowing convenient access for the locals in much the same way as the people of Brega had a higher chance of eliciting trade goods from Viking settlements. This access to “foreign” goods could have been one contributory element towards the importance of Brega in its early medieval context. This settlement and trading between ostensibly disparate groups created a complex set of relationships, particularly in the interface zone between the groups. The divisions and alliances created a new mix of politics, not all of it seamless and Brubaker (2005, 13) contends that these divisions and conflicts are an under researched area.

That the road network was hugely important in early medieval Ireland can be seen by the many entries in the law tracts governing different aspects of the roads including their

construction, cleaning and maintenance, and roads were the responsibility of the landowner for which he was legally responsible. Every social and cultural interaction outside the immediate boundaries of a settlement, be it a bank and ditch or a stone cashel, has some element of travel or transportation to it. This could be a simple walk to the fields for agricultural work or walking to the river or well for water. However, as well as these simple tasks there are a far wider variety of social and cultural interactions which require a greater degree of travel. In general, the lower classes would not have travelled too much outside their immediate landholdings, but even within this there would be visits to relatives inside the *túath,* market days and festivals.

Among the higher levels of society travel was often by horse or chariot and this has been mentioned many times in the annals and sagas. Unfortunately, we have very little early medieval archaeological evidence for chariots (Fox 1960; Harbison 1971; Piggott, 1969; Jope 1955), with the Doogarymore Wheel being probably the most meaningful artefact found so far. Horse bits are the most common metal finds in Iron age Ireland (Raftery 1994, 107) so it is unfortunate that there is so little surviving evidence from later periods. There are numerous depictions carved into high crosses and literary evidence for the existence and use of horses and chariots, so there is no equivocation about their use, regardless of the lack of archaeological remains. McCormack (1997, 92) goes so far as to state that “if one were dependant on archaeological evidence alone one would greatly underestimate the role of the horse in early medieval Ireland”.

The plains of Brega were particularly suitable for breeding horses, much as they are today, and the horse, both for racing and pulling chariots, was particularly important to the area. Evidence for this can possibly be seen in the carvings on high crosses. Peter Harbison (1992) describes 235 high crosses in Ireland of which only 6 depict a chariot. Of these 6 crosses, 3 of them are in Brega, possibly highlighting the importance of horses and chariots in the area.

De Leeuw (2008) argues that two of the six do not represent Celtic heroes as suggested by Henry (1940) but rather are biblical depictions, based on Harbison's (1992) work.

There is also no evidence for other forms of travel aids such as stilts and small scooters such as a modern-day child might use even though these have been found spread across many other parts of Europe during the same period (Leighton 1972, 62). Later in the early medieval era chariots fell from use and the upper classes rode on horseback and horse ownership was an important signifier of status (McCormick 2007; Kelly 1997).

Horses were important animals in early medieval Ireland. Generally thought to have arrived in Ireland in the Bronze age, the use of horses meant that "trade and exchange systems extended further, became socially more complex, and carried a higher volume of goods than would have been possible with pedestrian transport" (Anthony 1994, 191). They enabled perishable goods to be carried more quickly and with less effort and wastage, enabling more successful trading. Horses also symbolised economic wealth and were a signifier of power and prestige. They were the preserve of the upper classes, the lords and wealthy farmers (Kelly 1997, 96) and just like portable prestige goods they signified the importance, wealth and social class of the owner. During the excavations of Newgrange horse bones were found which had shoulder heights of 111cm and 120 cms (Wijngaarden-Bakker 1986, 84) these were possibly the indigenous Irish hobbey horses as suggested by Maguire (2016).

McCormick (2007, 88), based on the work of May (1985) has found the average shoulder height of horses in the early medieval period to be 132cms, showing that smaller, native horses were possibly being interbred with larger horses from outside Ireland. All of the taller horse remains found at time of writing in Ireland, individuals with a shoulder height of over 137 centimeters, have been found in Knowth and Lagore crannog – two royal sites. It is hardly a coincidence that the caputs of kings would have the biggest, most impressive

animals, to reflect their noble status and transfer to them a measure of their height, speed and power.

A man astride a horse can be an impressive and often intimidating sight, especially to a large number of people who could possibly never have seen a horse before, or at the least had very little contact with them. It also adds height which can be an added advantage in a military setting. Being able to see above the heads of troops and see the dispersal of opposing troops is a decided advantage in a battle. The ability to leave the battlefield very quickly can also be important although in Ireland a king who showed cowardice has his honour price reduced and if he is injured in the neck retreating from a battle his honour price is reduced to that of a commoner (Kelly 2015, 19).

Horseshoes were found in excavations of Viking Dublin early in the 11th century. (Kavanagh 1988, 110). This could conceivably have been due to the increased volume of well-kept and constructed roads with harder surfaces, necessitating horseshoes to protect the feet of valuable animals (Raepsaet 1997, 57). That the animals were valuable is not in doubt, and if further proof were needed it can be established by the fact that a horse's body contains a large amount of meat, but they were generally not eaten until they reached old age, and then usually only in times of need. McCormick (2007, 92) reports that from Moynagh Lough crannog the bones found were of old horses and the skeletal remains had evidence of wear from cheek bits. He suggests that horses were only eaten in periods of acute hunger.

In a society where land rents and tithes of cattle or crops were paid to people higher up the social ladder in return for land, it was important that lords and kings travelled among their own people, making contact and making their presence felt within the *túath*. These kings also demanded military subservience from their people, and it was probably easier to fight for a king you had met, or at least seen, than a complete stranger. Processions like these through

a *túath* helped create the social climate that bolstered the economic system in place at the time, and hospitality for a king while he travelled was provided for in law. From a social perspective, the roads were the factor which enabled these bonds to be created and strengthened. There is some intrinsic instinct in man that he turns out to see the elite in his own society. Even in today's more modern, sophisticated society people will regularly line the streets in all weathers to catch a glimpse of the nobility of their respective countries.

Distance impedes the level of interaction between early peoples and communities, mainly because of the cost involved in traversing it, so reducing this cost by building quality roads can reduce this impedance and increase the level of social interaction in a society.

As the Christian faith spread throughout Ireland a new phenomenon emerged – mass and pilgrimage paths began to appear throughout the country as well as farther afield, and saints and other missionaries travelled throughout the country spreading the gospels orally. Something to note here is that "it is of primary importance that in the beginning it was people, not documents, who spread the good news about Jesus" (Riddle 1938, 145).

Dissemination of the church's message in the earliest days happened through the medium of missionary travel and preaching. It is noteworthy that after the initial wave of missionaries and priests spread across Europe and into Ireland, after a period of time that wave was reflected back across Europe, with Irish saints in particular spreading across the European mainland, founding monasteries and spreading the Irish version of their faith vast distances from their homelands. That these missions were successful can be seen in the establishment of monasteries such as the one at Bobbio by St. Columbanus and at Lindisfarne established by St. Aidan along with St. Finnian and St. Colman (Blackwell 1992, 19). The most famous of these travelling monks was St. Brendan, colloquially known as "The Navigator", and his travels and travails are laid out in a Latin text entitled the "*Navigatio Brendani*". Not every

ecclesiastical traveller would have been such accomplished navigators however, and the established transport infrastructure for the wine trade facilitated the principal pilgrimage routes from Ireland to Rome (Loveluck & O'Sullivan 2016, 27).

Hughes (1987, 150) has suggested a substantial level of pilgrimage travel, not only abroad, but also within Ireland itself. O'Sullivan (2009, 285) suggests that "In the Middle Ages, pilgrims were entitled to expect lodgings for the night and food while on their journey". The style of food and lodging offered in ecclesiastical establishments is likely to have varied though, and Gwynn and Purton (1911, 129) quote Maelruain of Tallaght who refuses to let his monks touch liquor or eat meat other than deer or wild swine, although Saint Dublitir of Fingal asks him to relax these restrictions. The rapid spread of Christianity throughout this period as argued by DePaor (1996) meant that an increasing number of ecclesiastic sites would have been responsible for offering hospitality.

Charles Doherty (2015, 23) tells us that the Life of Saint Brigit makes clear that "pilgrimage to Kildare was of enormous importance in the mid-seventh century" and massive structures such as the bridge at Clonmacnoise show us just how important travel between ecclesiastic sites was, and these have left lasting impressions in the archaeological record. Harbison (1991) also discusses some of the major pilgrim routes and suggests that they were quite extensively used. Monasteries had a responsibility to provide rest and shelter to travellers, particularly those on holy pilgrimage, and there were dire consequences for those withholding hospitality from those in need. Jackson (1971, 293) tell us that churchmen in charge of wealth who "embezzle those treasures instead of devoting them to the guests and the needy ones of the Lord" were found "bound to fiery pillars with a sea of fire around them up to their chins, and fiery chains in the form of snakes around their waists". That this torment was seen in a vision by *Adamnan* and not actually real probably only slightly lessened the impact on early churchmen who "carried with them a responsibility for public service" (Simms 1978, 70). There was also a secular obligation to provide shelter and this is discussed more

fully in section 6.5. Unfortunately, it is almost impossible to distinguish archaeologically between roads which were built for pilgrimage and those which were created for more secular use.

All of these interactions required the use of paths or roads making these networks immensely important in the day to day lives of people in all strata of society. The task of recreating these networks is made more difficult, in part due to a lack of historical information. For example, while the annals may report that two groups of combatants met at a particular place, they rarely if ever mention how the two groups got there or what route they had taken. It has also been mentioned earlier that Brega was a wealthy kingdom. Without a substantial and functioning route network to facilitate trade and movement of goods and resources this was unlikely to have been the case. There were many economic aspects to the route networks too. Land rents had to be paid and cattle and crops driven to the respective lords' settlement. The circulation of this wealth in the form of cows was the main economic component of early medieval society, so having a solid network of roads made these exchanges more readily accessible. Another possible reason for lack of historical information is that the major roads were so well known that they did not need explicit mention in the sources, thereby making their definition all the harder today. Economic transactions did not occur in a void, and people were needed to accompany and exchange the economic instruments, whether that be trade goods, animals or agricultural produce, which sometimes exposed them to differing cultural ideas. Foreign trade goods and in particular high value items often penetrated far inland from the ports at which they arrived, facilitated by the transport network of the kingdom.

As mentioned above there was a responsibility on both monasteries and the laity to provide shelter to travellers. Travel in general could be a hazardous undertaking due to weather conditions, wild animals and the existence of brigands and De Paor (1973, 19) tells us of "numerous passing references in the literature testify to the prevalence of this menace to the traveller". Weather conditions were likely to be quite similar to today (Weir 1995, 111),

although Lamb (1995, 165) disagrees, but even during relatively calm climatic periods there are often isolated incidents such as heavy snowfalls which could be disastrous for people of the early medieval period who didn't have modern protections.

It must be remembered that routing decisions were far more important in a time where multiple day trips could mean sleeping out of doors and if the weather was harsh this could be a life-threatening exercise. Even the higher classes in their chariots needed to be conscious of the burdens on their animals when travelling any great distance. Food would have to be carried for any type of extensive journey and this could add to the cost of travel. There were also no road markers as we know them today, so waypoints and directional changes would have needed to be based on definite and easily recognisable points in the landscape which was often provided by topographical features. Due to these vagaries of travel longer journeys would often have had waypoints or stopovers known to the traveller. These generally came in two forms – the secular hospitaller (*Briugu*) or monastic sites.

6.4 The Forgotten Road?

It is undoubted that there were many roads, from cart tracks to highways, which are not mentioned in the incomplete historical resources we have. It is the opinion of the author that a route can be discerned from the archaeological evidence of at least one road which is not currently known from historical sources. The postulated route starts from the port at Malahide Bay on the Broadmeadow river, slightly inland where the river narrows and gives shelter and protection to boats at rest.

From this point an examination of the excavated remains of imported, high status pottery from the Mediterranean can be seen in figure 6.32. When this map is examined more closely it is interesting to note that there would seem to be a line of imported pottery running from near the possible navigable termination point of the Broadmeadow river where it meets

Malahide Bay, a known port, along the modern R125 road until it joins the modern M3 and then continuing on north-westwards towards Donaghpatrick and the high status tri-vallate site of *Rath Airthir*, shown in figure 6.32.

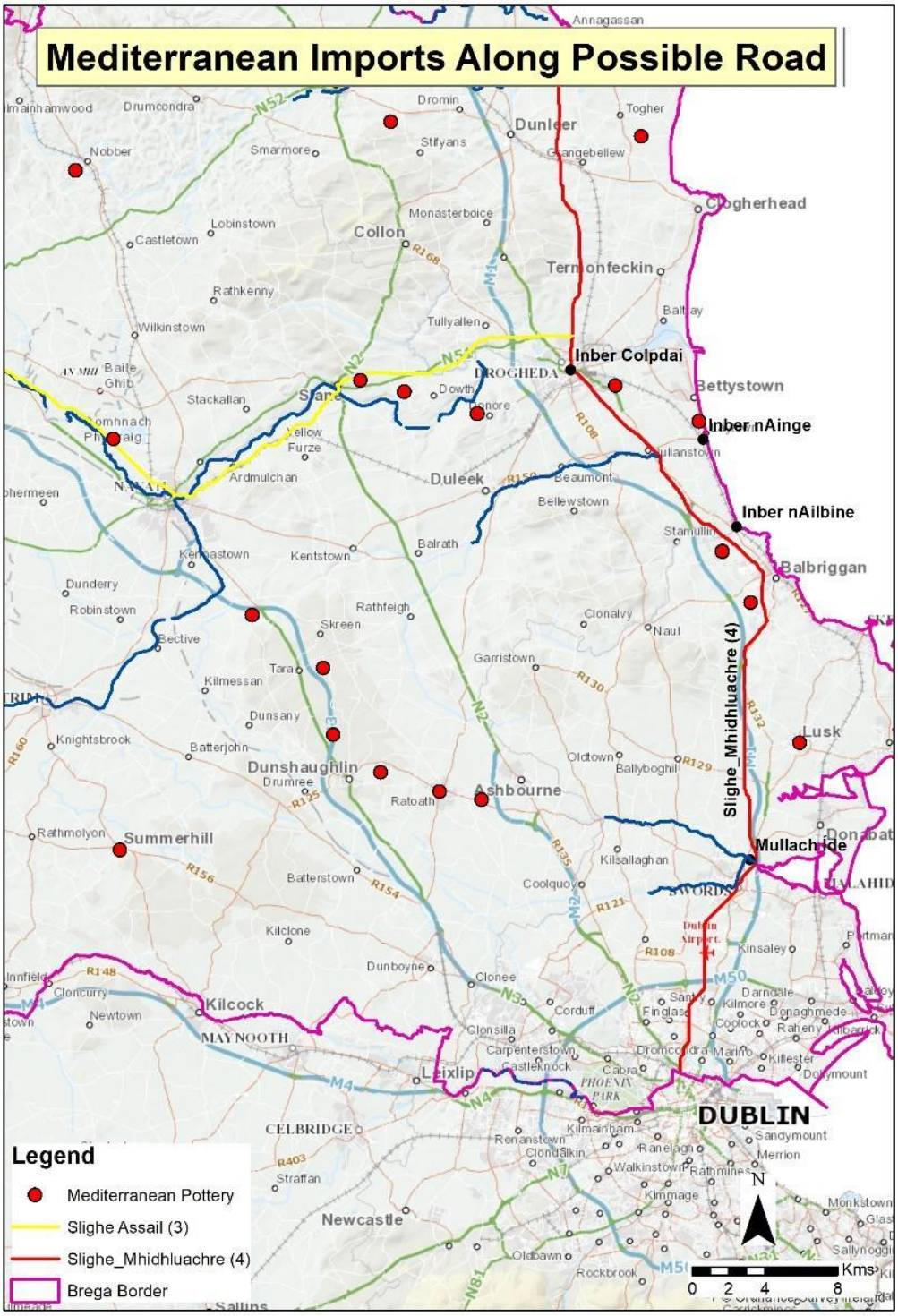


Figure 6.32: Pottery finds along proposed “Forgotten road” (after OSM with additions)

The caveat to this is that the R125 and M3 have benefitted from recent excavation along their routes due to the construction of the motorway which could give rise to an increase in finds. Nonetheless this did not necessarily mean that the excavated finds would contain large amounts of imported pottery, but could just as feasibly have contained more mundane, localised finds. Added to this is a line of early medieval burials as shown in figure 6.33, proving activity and especially burial along the route. Another point of note is that this route passes very close to the crannog at Lagore, the seat of the kings of southern Brega. Figure 6.34 below shows the LCP route from Malahide Bay to Tara. While being quite parallel to the modern R125 for most of its course there are differences between the LCP route and the modern road. It is inconceivable that the *caput* of the king of southern Brega, and a site as prestigious as Lagore did not have any road access. At its closest point to the modelled LCP road the crannog is only approximately 430 metres away, and only 600 metres from the modern road, which runs a little to the north of the LCP route to avoid farmland.

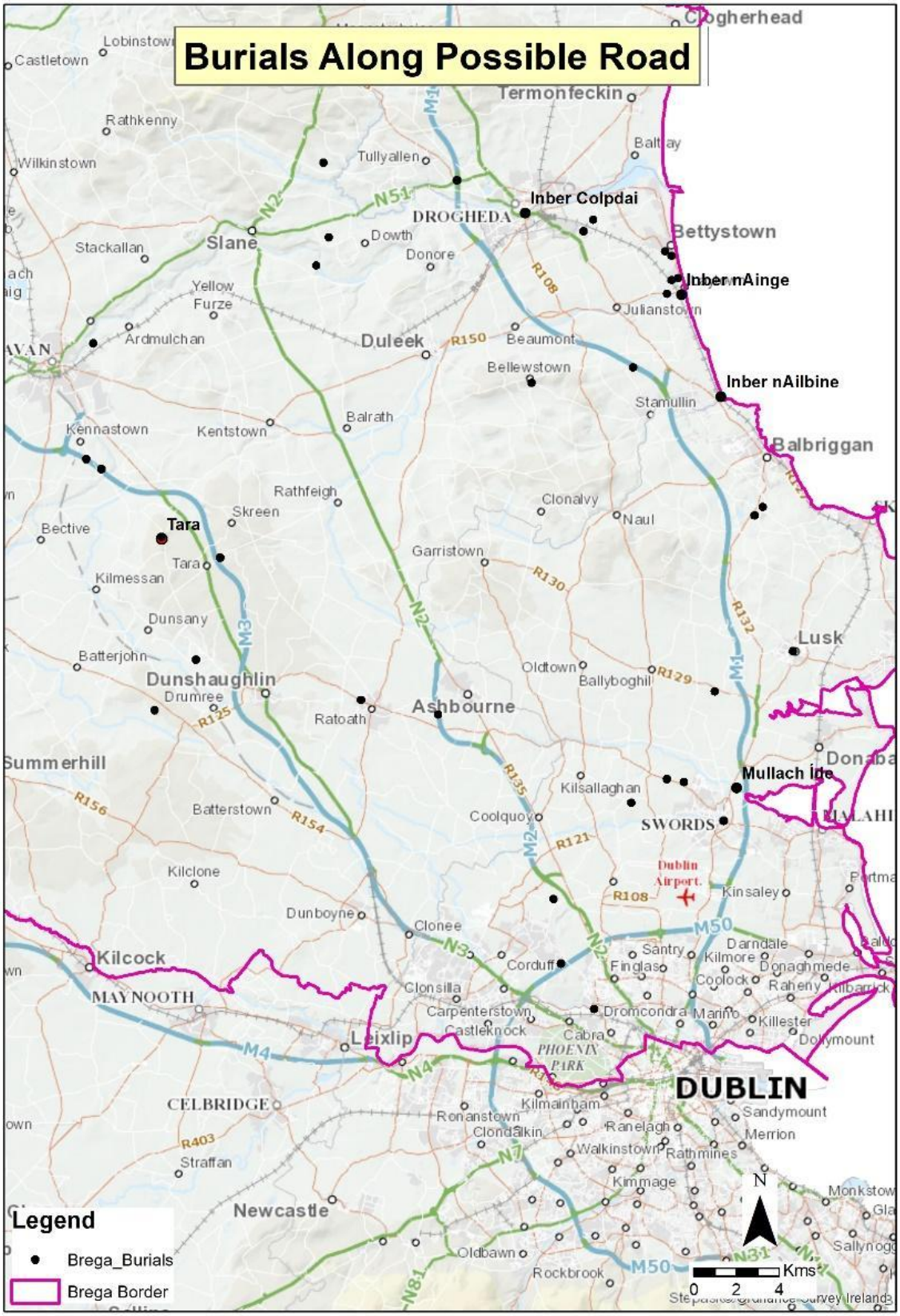


Figure 6.33: Burials along “Forgotten Road” (after OSM with additions)

The burials were often quite substantial, and the numbers of bodies buried and cremated can be seen in Table 6.8. Sites have been listed in order of their spread from the port at Malahide Bay.

Table 6.8: Locations, number of bodies and interment dates for proposed road. (after Mapping Death project)

Name	No. of Inhumations	No. of Cremations	Active Burial Period
Oldtown	36	0	EM
Rathbeale Road	2	0	EM
Raystown	133	0	5th – 9th C
Ratoath	56	1	5th – 9th C
Killeen (Site B)	10	0	EM
Collierstown 1	61	0	5th – 9th C
Tara	8	13	8th – 9th
Ardsallagh 2	0	1	5th – 7th
Ardsallagh 1	30	1	7th C
Grange 2	6	1	5th – 6th C
Kilmainham	2	0	5th – 6th C
Total	**344**	**17**	**361**

As can be seen, the remains of 361 people were buried along the proposed road line during the early medieval period. This shows quite a large population in the area, mainly inhuming their dead. This number of people can only mean settlement of considerable proportions over a long period of time, and indeed the bigger numbers such as those at Ratoath, Raystown and Collierstown 1 are all sites which were occupied from the 5th to the 9th centuries. To illustrate this line more clearly the burials and imported pottery have been combined and plotted with background mapping in Figure 6.34 and also without a basemap in Figure 6.35.

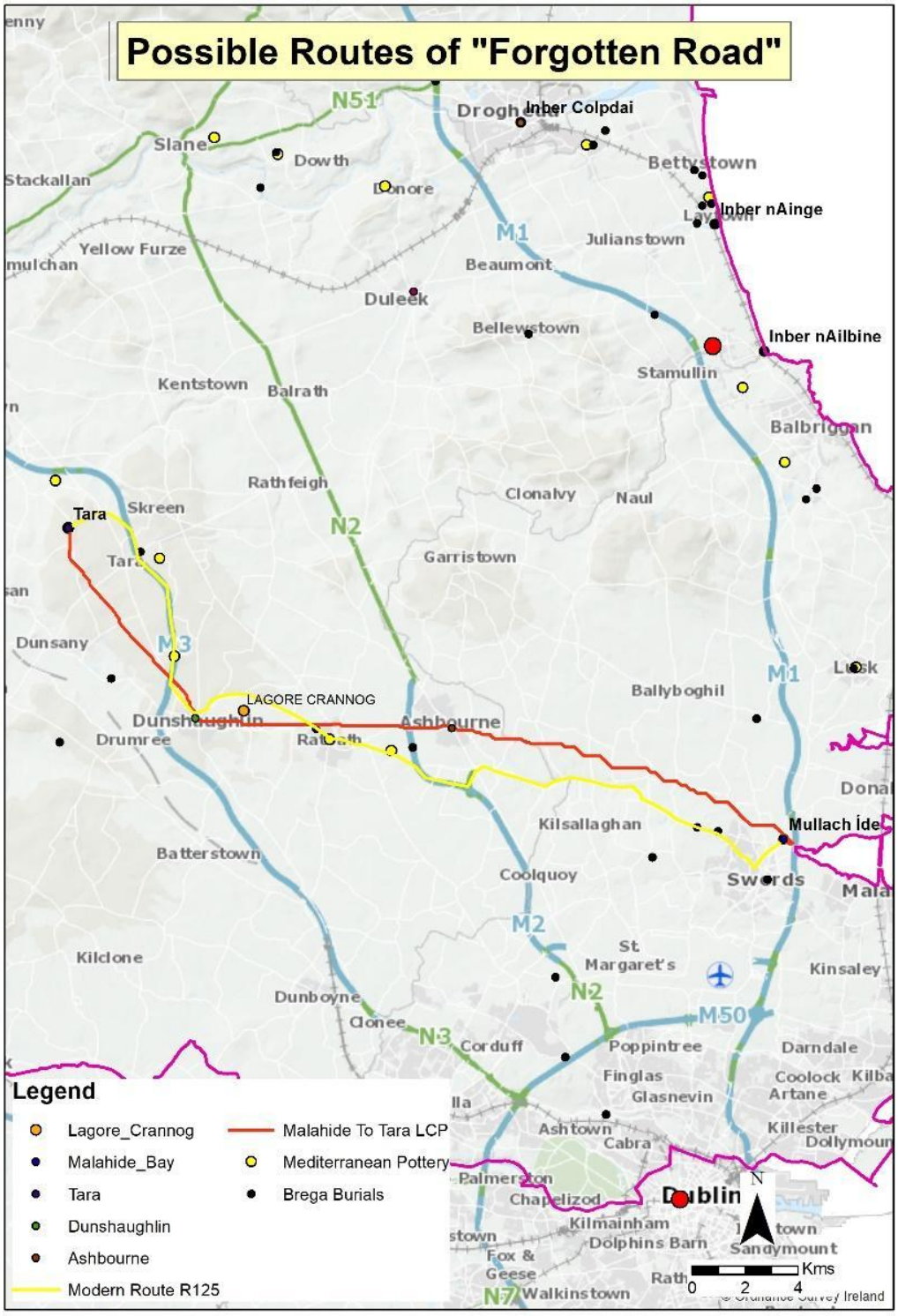


Figure 6.34: Possible route of “Forgotten Road” (after OSM with additions)

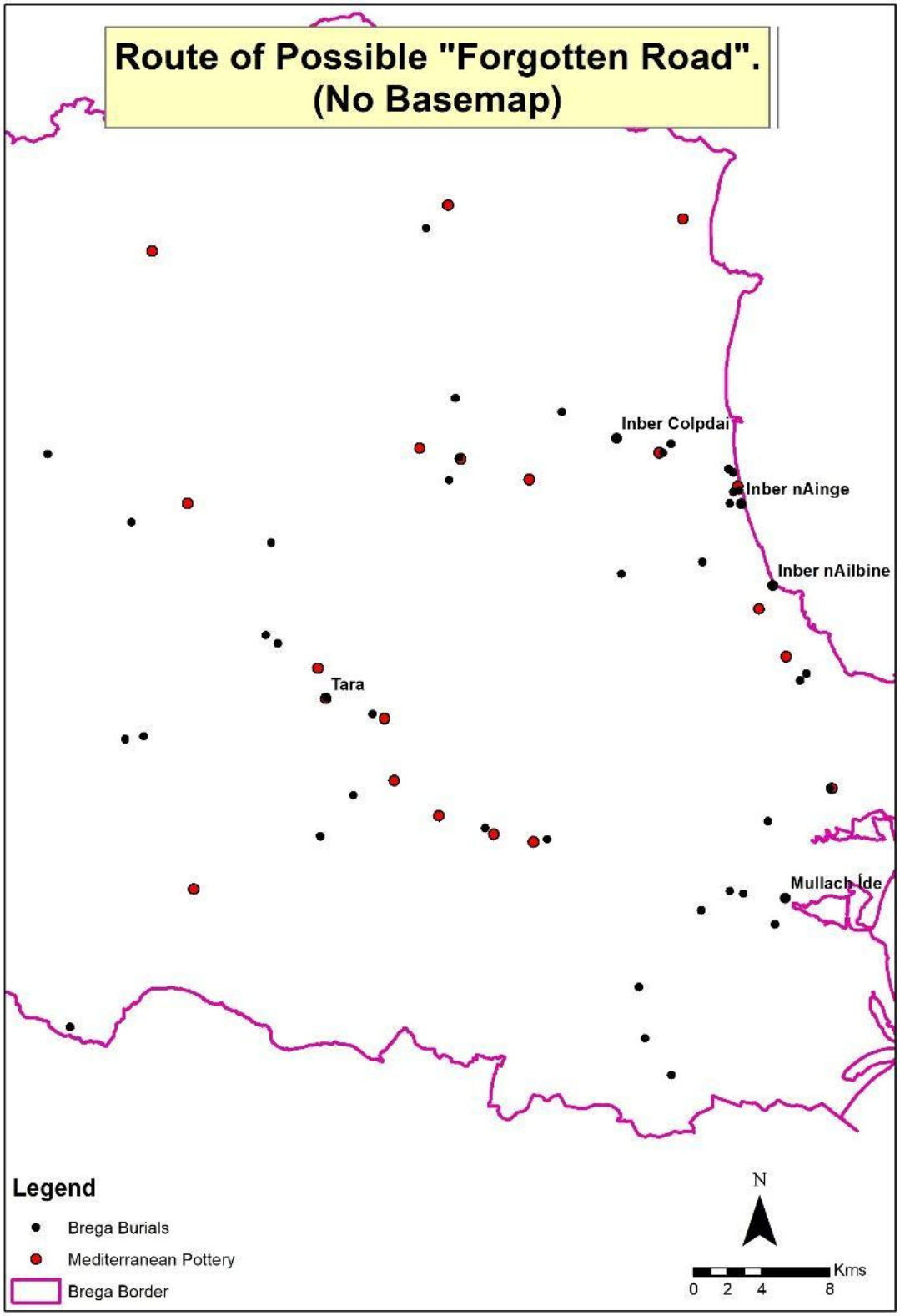


Figure 6.35: Possible route of “Forgotten Road” (No basemap) (after NMS with additions)

There are other possibilities also. There are three burials to the south which closely follow the line of the N2/M2 and these are shown in Table 6.9.

Table 6.9: Burials along the N2/M2

Name	No. of Inhumations	No. of Cremations	Active Burial Period
Pelletstown	4	0	5th – 8th
Cappogue Castle	16	0	5th – 6th
Kilshane	123	0	7th – 9th
Total	143	0	143

While Kilshane is the only burial with substantial numbers, this route would also be on a radial line from Dublin, much like the modern road is today. It must also be remembered that these two routes need not be mutually exclusive, and it is possible that both stems were in use, joining up somewhere in the region of Ashbourne. This would also mean a more direct route from the ports in the Dublin area, such as Dalkey Island, to Tara and on to Navan. This would then account for the lack of important roads to the south of Tara as mentioned earlier. In essence then the proposed route would run through: Malahide Bay, Ashbourne, Ratoath, Dunshaughlin, Tara, Navan, Kells, or alternatively with a Dublin starting point: Dublin, Capogue, Kilshane, Ashbourne, Ratoath, Dunshaughlin, Tara, Navan, Kells.

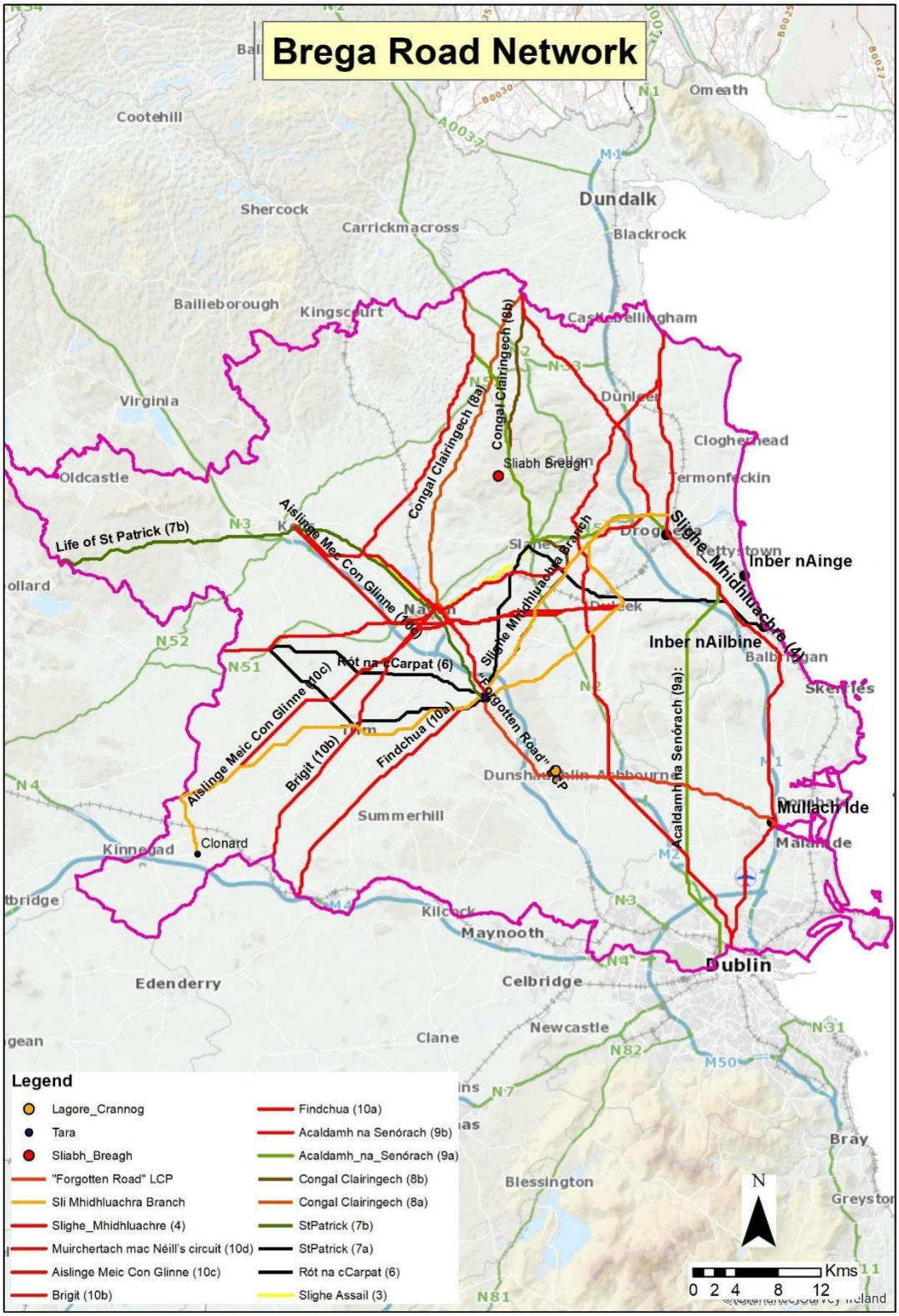


Figure 6.36: Complete modelled LCP road network of Brega (after OSM with additions)

Figure 6.36 above shows the complete road network of Brega in as much detail as is currently known, using the LCP model, and this image also includes the “Forgotten Road”. The kingdom is well provided with roads that were big enough to mention in historical and hagiographical sources, and there was a wealth of smaller roads that did not warrant a mention in the sources. It can be seen that there are still substantial areas to the north and south which seem to be devoid of any roads. The one to the northwest comprises an area of approximately 523 square kilometres and the one to the south contains an area of approximately 485 square kilometres. In an area as abundant with roads as Brega, it is unlikely that these huge swathes of land had no road network, it is more likely that we have lost information on them over time. Realistically these large areas would have had an abundance of roads of many types, but to date it has not been possible to trace them. Having said this it is acknowledged that there were no known prehistoric burials in this area, and as roads were often shaped in prehistory this presents a difficulty. However, topographically there are no major barriers to travel or roads in the region, and there is abundant evidence for early medieval activity as shown below.

There are a range of low hills between roughly east-west Summerhill and Bogganstown, and north-south between Newtownrathganly and Dunshaughlin but these are of insufficient height to cause any major detours. There are also no major barrier rivers as described earlier, and also only one small area of wetland comprising approximately 1.56 square kilometres.

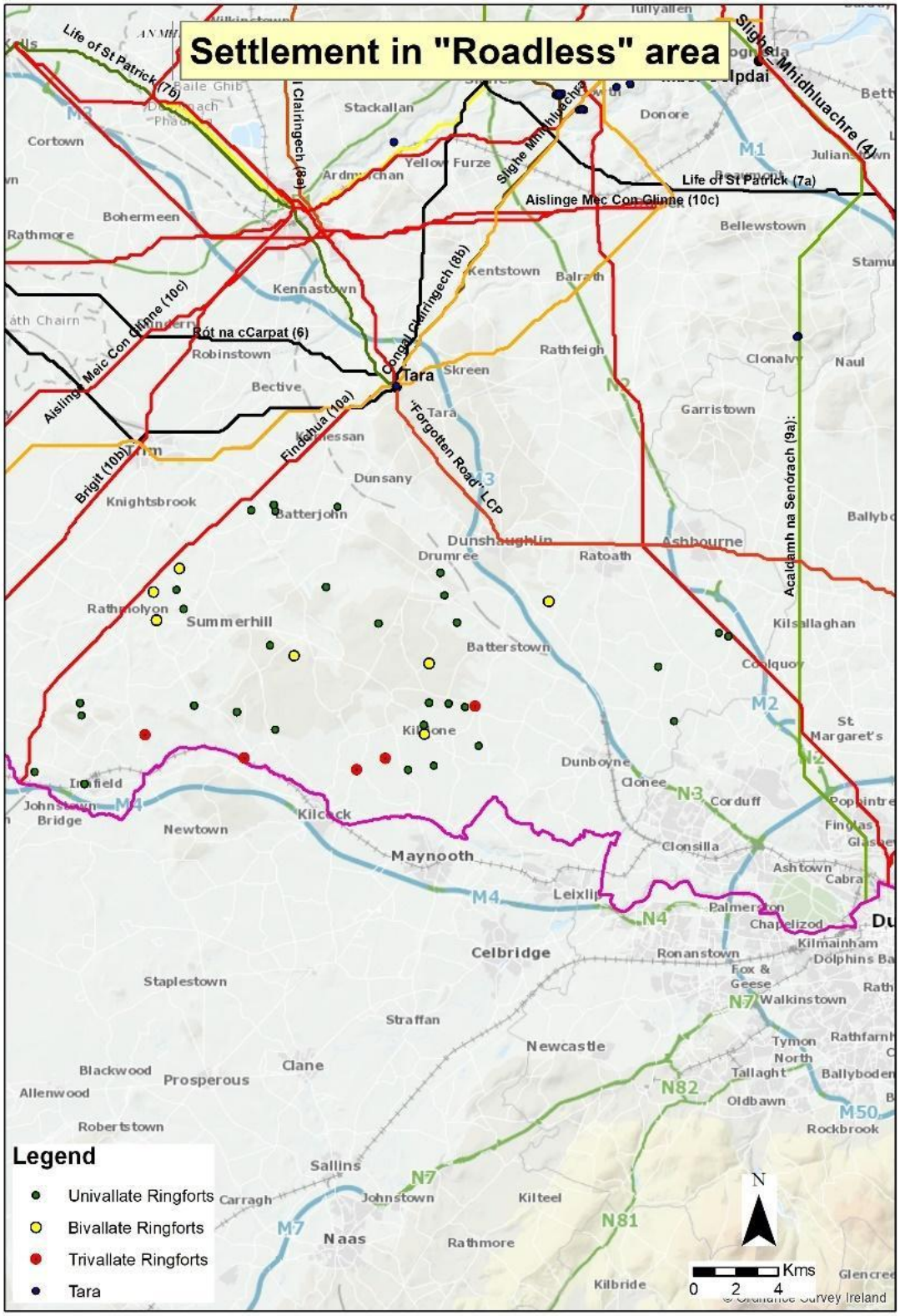


Figure 6.37: Settlement in the Southern “roadless” area (after OSM with additions)

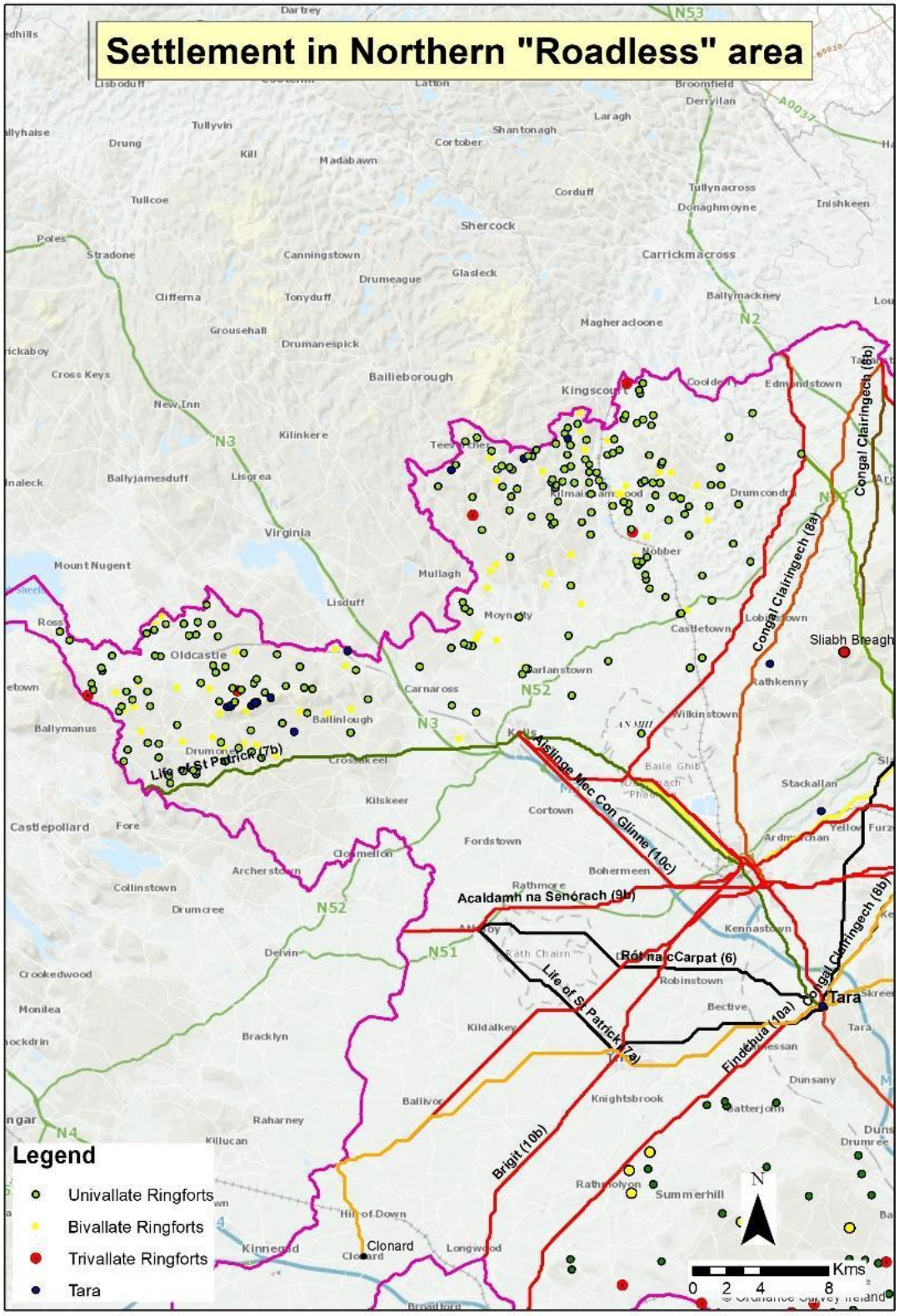


Figure 6.38: Settlement in the Northern “roadless” area (after OSM with additions)

As can be seen in figure 6.37 there is a substantial level of early medieval settlement in this area. There are 5 trivallate ringforts, 7 bivallate ringforts and 30 univallate ringforts. This

would represent a high ratio of high status tri- and bi- vallate sites to univallate sites. The picture in the roadless area to the north somewhat replicates the picture in the southern area, although there is evidence for more prehistoric activity here in the form of the passage tombs at Sliabh na Calliagh and Carns. This area is even more heavily settled than the area to the south with 5 trivallate ringforts, 55 bivallate ringforts and 193 univallate ringforts.

Unfortunately, none of the trivallate sites have been excavated, but in general large, multiphase multi-vallate settlement sites within Brega such as Roestown 2 and Castlefarm 1 were places of exchange and crafts. Castlefarm 1 in particular had evidence for prestige jewellery making and metalwork as well as imported pottery which Kinsella (2008, 98) suggests demonstrates the possibility of long range trade networks. Although these sites are not within the southern "roadless" area, they are similar in size and status to the aforementioned sites which can be interpolated to mean that they held widely the same functions. If this is taken to be true then sites such as these would have had many roads and tracks in their surrounding areas to enable the transportation of clientship exchanges and imported, prestige products. The *Slí Mór* also runs parallel to the southern border of this area and it would be unrealistic to assume that there was not a network of roads, paths and tracks which joined up with the major highway, further reinforcing the point that a large portion of the data in relation to these road networks is currently lost to us.

6.5: Resting Places: The Briugu

As mentioned earlier, travel in early medieval Ireland was an arduous and often dangerous task, made even harder if driving cattle or in bad weather. Due to this there was a need to provide respite to travellers throughout the country. Catherine Marie O'Sullivan has carried out extensive work on hospitality in medieval Ireland and the providers of that hospitality, researching places where people could gain temporary respite from the rigours of travel. She suggests that "the obligation to provide hospitality was, in varying degrees, inescapable for the men and women of medieval Ireland", and contributed to "significant relationships"

(O'Sullivan 2004, 164) between often disparate parties. This hospitality came in many guises, but the need to provide for it stretched from the nobility downwards and also rested with the church. It would be hard to overstate the social significance and interactions demanded by the strictures governing hospitality. In fact, denying hospitality meant paying a persons' full honour price in reparation – the same punishment the miscreant would incur if he or she actually murdered the person (Kelly 2015, 8). Secular responsibility for the provision of hospitality fell to a class of people called hospitallers or *briugu.* A *briugu* was "a wealthy landowner who out of his own great resources provided hospitality for all comers and in this way acquired a higher social status" (MacEóin 2009, 482).

While this was an opportunity to use their wealth to attain higher status, kings, lords and *briugu* themselves could lose their position and be reduced to the rank of free commoner if they withheld hospitality (Kelly 2015, 27). It is unclear though whether hospitality needed to be provided to someone of a persons' own rank or higher within the *túath* only or outside also. It would seem unlikely that for example, a *boaire* from another *túath* could just arrive in a neighbouring kingdom and receive unlimited hospitality. It is more likely that travelling within lands owned by a persons' own *derbfine* conveyed these rights and travelling outside one's own *túath* meant the use of a hostel or monastery. If this was not so it would remove the necessity for *briugu* whose responsibility it was to provide hospitality to anyone in need.

The provision of hospitality was also a way in which people could raise their social status and Kelly (ibid., 36) tells us of the cadre of *briugu* who, by dint of being wealthy men "of non-noble birth (who) could acquire high rank through displaying the hospitality and generosity so admired by the early Irish". As with all social status in Ireland the *briugu* had different grades and built his house "at the meeting of three roads" (Kelly 2015, 37). These *briugu* were wealthy influential men with the same honour price as petty kings. As mentioned earlier however, this status could be removed for offences such as withholding hospitality from someone or failing to provide the mandatory ration to people of station. That they were accorded special privileges can be seen in the translation of the text *Lānellach Tigi Rīch 7*

Ruirech by O'Daly (1962, 84) which states that the *briugu* occupies position nine at a feast and sits "by the bounteous king's forearms". In fact according to MacEóin (2009, 484/485), quoting the *Uraicecht Bec*, the tract on status, a *briugu* is of equal status with a noble if he has twice the land and property of that grade, so it is no surprise that he could be sitting by the "king's forearms" as in theory he could be of equal status to that king.

Briugu kept large houses in which to offer hospitality but to date there has been little effort to differentiate what must have been their large holdings from other high-status sites. Hayden (1912, 262) suggests the hostel of a *briugu* needs to be a "spacious and warm house, designed to entertain many guests at one time". This is probably to convey a sense of equanimity to travellers who may be sharing the space with travellers from other *túath*, some of whom may be hostile to each other. The *briugu* also had no military role – something which was unusual for wealthy men of the time unless they were one of the learned classes. This was again probably to make travellers feel comfortable and safe and avoid creating hostilities that could put the hostel under attack. As the *briugu* was legally responsible for anyone under his protection at all times, creating an unsafe situation for his guests could be ruinous. However, juxtaposed to this McKone (1984, 2) tells us that in many of the prose tales of the time "the climax is a battle and slaughter that follow upon the feast". It can only be considered as a literary device as failure to ensure the safety of his guests in "battle and slaughter" would surely render them inoperable and result in the loss of status of the *briugu*.

So far it has not been possible to distinguish archaeologically with any certainty the high-status settlements of the *briugu* from others, such as the residences of kings, but earlier in this chapter we examined some possible sites which may exist at likely stopping places along the main road system of Brega. Unfortunately, it has been impossible to find any data in the literature that might point to the internal layout or goods needed for a hostel which makes the task even more difficult. Another difficulty seems to lie in the fact that the hostel would be an

extension to the home of the *briugu,* and not just a stand-alone building or site (O'Sullivan 2004, 122).

Loveluck (2013, 98) warns of the dangers assigning high-status based only on the appearance of material wealth, and in an Irish context there is an abundance of documentary evidence reinforcing exactly this point – that material wealth, especially in the forms of landholdings, does not necessarily signify elevated status, as proved by the honour price for travelling poets and craftsmen. Status can be conferred on people who were not materially wealthy, and that status can sometimes be manifested in other ways not immediately apparent from archaeological remains, such as cloaks of particular colours or personal adornments such as tattoos or the hair paste made from resin extracted from pine trees found only in the French Alps, and used to style the hair of the Iron Age bog body found in Clonycavan, on the borders of Brega (Lobell & Patel 2010). Although of an earlier date than the early medieval period, practices like this are common throughout the world and continue into modern times.

There may be a tentative link with topography in the etymology of the name *briugu*. The root of the word brí meaning "hill" could possibly link the place of operation of the *briugu* with a house on a hill or small rise. Stokes (1893, 416) also tells us in the translation of "The deaths of Goll and Garb" that the multitudes went to the house of Conall Mac Gleo Glass to his "high, uplifted houses". This height in the landscape would also help to make it a more obvious point in the landscape at which to stop for respite on a journey. Vendryes (1996) completely rules this out however as he suggests that the etymology of *briugu* is unknown, although MacEóin (1999, 172) contends that notwithstanding this it "does seem to provide a suitable starting point for the discussion". The name is also found as *bíatach* and *brughaidh* later in the period. Kinsella (2010, 114) has suggested that non-circular settlement enclosures, while varied in morphology, have a tendency towards having a higher diameter than the "average" ringfort and are also "situated on the highest point of the surrounding landscape, be it on a

ridge, hill or small rise". A possible example of this is seen in the case of Crossakiel earlier in this chapter. Could these sites be the hostels of the *briugu*?

Chapter 7: Reflections on Early Medieval Brega

"The most sought after kingdom in Ireland".
(Bhreathnach 2014, 47)

The word "Brega" has many connotations. A pre-eminent kingdom, a collection of smaller kingdoms, a significant political entity, a contested territory, a cultural collective, a mental space, a physical landscape and many more, creating a mosaic that is ever changing as it moves through time with shifting political, economic and cultural influences. The linking factor throughout is people, and this chapter takes a look at those people in the context of Brega.

7.1 The Southern Uí Neill Hegira

The expansion westwards of the Southern Uí Neill from Connacht in the fifth century was the event which drove change in Brega over the succeeding few hundred years. The two dynasties – the Síl nÁeda Sláine and the Clann Cholmáin annexed Brega and Mide respectively. While the focus here is on the Síl nÁeda Sláine, we must be cognizant of the fact that the Clann Cholmáin was taking control of Mide in parallel to the Síl nÁeda Sláine annexation of Brega, so the whole region was undergoing somewhat of a political upheaval even if this did not directly impact the daily lives of every farmer in the region.

The question as to why they moved from their ancestral lands in Connacht to annex land which was already settled and controlled by the Lagain and commit themselves to decades if not centuries of conflict, is an interesting one. It is also one which does not have a simple answer, instead having multiple facets which make up the whole. One factor may have been a sense of ancestral entitlement. Another may have been that the population was rapidly increasing at this time, and it may have been felt that the kin group needed more space to expand, and if this was to happen it would make more sense to expand into territory that was

fertile and had prestige rather than slowly try to encroach on the surrounding lands occupied by groups they would have had generations of interactions with. There has also been a suggestion that population groups had moved from Connacht to the midlands in the past (Charles-Edwards 2007, 466), and that the Síl nÁeda Sláine were simply following a precedent.

The two dynasties traced their lineage back to *Niall Noígollach* or Niall of the nine hostages, the famous and legendary high king of Ireland through his great-grandson *Diarmait mac Cerbaill*. This may have given them the sense of *imprimatur* to expand beyond their original ancestral lands, with the seat of the high kings of Ireland at Tara being a central target, especially for the Síl nÁeda Sláine who appropriated this particular territory. Áed Sláine's reign as high king was relatively short lived however and only lasted from AD 598 until his death in AD 604. Bhreathnach (1996, 71) has suggested that the control of Tara was ritually significant to those kings untouched by Christianity. Contrary to this though is a raft of ecclesiatic building, sometimes in stone, the reputed activities of St. Patrick in the area and esteemed clergymen such as *Adomnan* getting involved in the politics of the kingdom.

As well as Tara, Brega was associated with many ancient passage tombs - the major complexes at Newgrange, Fourknocks and Loughcrew and the other, smaller ancestral tombs or *fertae*. The domination of these sites was also important in establishing physical and psychological supremacy over the local population. Weight is lent to this idea by Newman (2005, 381) who, during excavations at Ballynee, discovered 3 ogham stones which were usually a mark of a boundary and also the burial place of an important person. These stones were moved and used as the lintel stones in a souterrain, thus both removing the boundary marker and also the memory of the person buried there. That the stones were reused for something as mundane and functional as a souterrain showed a disregard for the power and prestige of the original population and the dominance of the incomers.

We have little clear idea of what the population groups in Brega were before the 5th century, something which Gleeson (2013b) describes as “remarkable”. Unfortunately, due to the paucity of settlement evidence from the Iron Age, forming a clear picture of what happened to these people is challenging. An example of this is Moynagh Lough crannog which has evidence for activity since the Mesolithic period through to the Early Christian period, with an apparent gap for the Iron Age (Bradley 1991). It is possible that famine or disease reduced the numbers living in the area significantly and the evidence for their settlements have been destroyed over time making them hard to trace. In certain parts of Brega as seen in chapter 5 it is very difficult to discern exactly what the population numbers might have been due to the loss of settlement sites in the late Iron Age. There are hints of late Iron Age activity around the ancient passage tombs, at Newgrange where there are late Roman votive deposits probably as a result of pilgrimage or cult activities, and at Knowth passage tomb, which was used for Iron Age inhumation burials.

It is interesting to note here the juxtaposition of the Síl nÁeda Sláine moving into a territory defined and overshadowed by passage tomb complexes at a time when Christianity was making progress across the whole country. While we don’t have exact dates, the spread of stone ecclesiastic buildings shows a strong clerical association with the kingdom. This could have introduced tensions both within and without the kingdom. Not everyone was instantly converted to Christianity and there must have been at least some of the nobility clinging to their ancestral beliefs, while others welcomed the “new” religion. The fact that the church now had influence over people that hitherto were answerable only to their own kin group and the nobility of their *túath* could also have created strains, introducing a new cultural dynamic.

In Brega, we can see Iron Age/Early Christian enclosed burial grounds with 61 inhumations at Collierstown 1 (O’Hara 2009b) and 30 inhumations at Ardsallagh 1 (Clarke 2008). The radiocarbon dates suggest that people are burying their inhumed dead with *recent* (not ancient) ancestors (e.g. grandparents, great grandparents) at a time of Christian conversion.

Some of these sites have Iron Age cremations, so it is clear that some links with the past are being deliberately maintained.

Juxtaposed to these notions we have the reality of the kingdom of Brega. An economic, political and clerical powerhouse, yet it was a kingdom riven with strife throughout the early medieval period. Indeed, it was precisely because it was such a powerhouse that prompted the divisions within it.

7.2 Physical realities and reflecting on the grain of the landscape

Gauging the physical aspects of the landscape of Brega also provides a barometer as to why the kingdom was so “sought after” as Bhreathnach is quoted as saying at the start of this chapter. The physical topography, drainage and soils of the kingdom itself provided the ideal setting in which to farm, trade and travel. The kingdom of Brega takes its name from the famous *Magh Breagh (Breá*), ‘Mag’ meaning plain, ‘Breá’ meaning fine or good. So, the "fine plain" of Brega was made up of good quality soil, over 77 % of which was suitable for grassland cultivation. In a society in which cows were the main symbol of wealth, especially earlier in the period, having the ability to feed them high quality grass was a major asset and the area is still famous for its high quality grasslands today. In modern times in Irish farming practice, yearling calves from the west of Ireland were sold to Meath farmers to fatten them up.

The people of the time understood their environment. In early medieval Brega, as this study has shown, almost 50% of ringforts were sited on surface water gley soils, which are not quite as good for farming as other soils in the area, possibly indicating that people knew the quality of the soils and wanted to keep the better soils for their agricultural produce. People in Brega also didn't build their dwellings on peat soils which can become waterlogged very easily - only 7 out of the 494 ringforts in the area are built on peaty soil. It is also possible

that these areas were designated not to be used for building on and were possibly a shared resource for the *túath* to use as turf for cooking and heating.

The period saw many physical changes to the landscape. The increase in building of ringforts and their associated dwellings, gardens and farms were almost ubiquitous across the landscape, notwithstanding the lack of evidence for settlement south of the N52 road as explored in chapter 5. Archaeological excavations across the Meath region indicate that although early medieval people lived within settlement enclosures, the wider countryside was not divided up into fields. The rural landscape was largely unenclosed, at least in ways that are archaeologically visible. However, early Irish law with its perpetual emphasis on status and property, indicates that trespass by people or animals into another's land was subject to fines. It is obvious that trespass cannot occur without a discernible boundary to cross, but whatever they were, such as wattled fences or hedgerows, they are not visible to us today.

It was not just the size of the farm which made it valuable. The quality of the land was also at issue, and Brega was well served with rivers to drain the good quality soils mentioned above. These rivers also meant that cattle did not have to be driven too far for water, and because the soil was drier, and therefore firmer, cattle did not do as much damage to the grassland as they would have done in the Connacht homeland. Based on today's figures, Brega had a network of almost 3300 rivers and streams so drainage and water for cattle was plentiful with the average distance from a ringfort to water being approximately 350 meters. As seen in chapter 5 the people of Brega chose to build their ringforts close to low ridges as well as water sources.

The populace was aware of the height and slope of the land they were building on also. When taken as a percentage of the total land area, there was a strong preference to build at a height running between 110 and 165 meters. When broken down by the percentage of total

land area, the expected number of ringforts built at this height would be 56.41. The actual number built between these heights was 166. Noteworthy here is that the ringforts built at this altitude had a smaller area than those built at any other height except the band which rose above 220 meters, which had a sample size of only 3 ringforts. These figures contrast strongly with those of Barrett (1982, 86) who states that in County Louth 33% of ringforts fall between 30 and 59.9 meters above sea level. In Brega this figure is 6.07%. In fact the average height of all ringforts in Brega is approximately 102 meters above sea level. This is probably partly due to Louth having a higher general elevation than the plain of Brega, but a fuller evaluation of the topography of Louth is outside the scope of this thesis.

The slope of the land was also an important issue for ringfort builders, and unlike the contrast in height compared to County Louth, when compared to the slopes espoused by Stout (1991) for the baronies of Clonisk and Ikerrin, they show a remarkable similarity. The average slope of a ringfort in Brega was 2.32 degrees and in Stout's study it was 2.6 degrees. Overall 54.25% of the ringforts of Brega fall between the 0.3 and 2 degree range and in Stout's study this figure was also 54%, significantly close. The 2.32 degree average slope was a quite optimum number - it allowed easy negotiation of the land without undue stress from moving up and down hill, but was also steep enough to allow good drainage of the land. Considering how close the figures are to the ones in Stout's study it would seem feasible that the optimum slope to build on was a well known factor, and people actively sought out these places to site their ringforts.

After the depredations of the Justinian Plague in the AD 540s it seems that there was a sharp increase in the early Irish population, which coincided with the increase in ringfort building in the late 6th/early 7th centuries A.D. In addition to this there was extensive clearing of forests from the 5th to the 8th century. There was also an increase in the use of cereal drying kilns and watermills and sites like Raystown which had five kilns and six watermills were obviously processing cereals at a much higher rate than before. O'Sullivan and Downey

(2019, 51) proffer that cereal drying kilns emerge as early as the 4th century and that Meath is close to the highest number of cereal processing sites found, although it must be noted that Meath was also likely to have high rates of developer and road-scheme led building also, which would contribute to higher finds of sites than other parts of the country.

This leaves us with a chicken and egg conundrum - did the increase in population lead to forest clearance and an intensification of agricultural production as people needed more food and as such needed more space to farm ? Or alternatively, did the constitution of more land for cattle and arable crops from forestry allied to the improved technologies create an agricultural surplus that facilitated an increased population ? The answer is likely to be a combination of both - a synergistic twining of population growth and increased agricultural performance. Forest clearance in particular had an effect on the landscape, breaking the natural wind barrier and leading to more erosion of the soil in certain situations. From the early 8th century on however, the population levels started to decline, and this coincided with a reduction in forecast clearance, possibly because the land that was already cleared was enough to support a dwindling population.

Returning to the topography of the kingdom, this large plain which was surrounded by low ridges also had no high mountains or large areas of bogland, which made travel an easier prospect than in other parts of the country. It also meant a less onerous task for the people of a *túath* who were responsible for the construction and upkeep of the roads. This is likely to be a part of the reason why Brega was so well provided with roads - they were far easier to construct and negotiate than in other areas with a less facilitatory topography.

In addition to this Brega had a number of navigable rivers. These rivers were a key element of transportation involved in the smooth running of the economy and this is discussed in section 7.7, and also in the politics of the kingdom in section 7.3. The use of these rivers to access the Irish sea and so facilitate transport to Britain placed the Síl nÁeda Sláine in a

pivotal position to influence politics, not only within Ireland but also farther afield. They also facilitated the import and export of luxury goods which is again discussed in more detail in section 7.7.

Taken as a whole, the topography of Brega added to the economic, social and cultural aspects of the kingdom did indeed make it the most sought after kingdom in Ireland, as the Síl nÁeda Sláine eventually found out to their cost as they lost hegemony over the kingdom to the Clann Cholmáin.

7.3 Politics and Power, and how it plays out in Brega

An idyllic vision of early medieval Ireland is often portrayed - the land of saints and scholars - and there are grains of truth to that vision. Irish churchmen were held in high esteem throughout Europe and there was a learned class who were educated and oversaw the legal system. However, this idyllic vision seems to be diametrically opposed to the political realities in Brega. Instead, the kingdom is riven with strife - internal and external conflict on a consistent basis almost throughout the whole period which ends with subsumption of Brega into Mide, a disheartening end for generations of the Síl nÁeda Sláine who had fought to retain power.

The physical annexation of Brega came in the form of two strands – cultural and political interactions both internally and externally and the building and occupation of enclosures and dwellings.The political interactions during and after the Síl nÁeda Sláine takeover mentioned above was not a smooth process and resulted in a couple of centuries of warfare, strife and conflict, particularly along the western and southern borders with the Clann Cholmáin and the Laigin, but also internally within the kingdom and from farther afield with the Northern Uí Neill, Anglo-Saxons and later the Vikings. The political situation throughout the period is complex and often confusing. Stability was never maintained for long, and alliances shifted, often in

quite surprising ways. In a country bound by laws, however aspirational, that covered most aspects of daily life, annexing other kingdoms by whole population groups was not something that was envisaged, and had no real way to be approached even if it had been.

It is likely that it was a combination of all of the factors mentioned in this chapter, with varying degrees of importance, which led to the movement from Connacht of the Síl nÁeda Sláine, but another factor which can hardly be considered to be inconsequential is the timing of this move. Throughout this period Ireland was involved with politics in Britain. There was substantial trade as well as raiding and strong ecclesiatical ties. Due to this the Irish would have been well aware of the Roman occupation of Britain and the possibility of Roman expansion into Ireland. Any Roman invasion would have been made more difficult by a settled society with demarcated lands and borders which was looking outwards rather than inwards. However, the decline and eventual collapse of Roman Britain meant any movements into new territories could be accomplished without the corresponding fear of having to defend newly settled lands from a possible Roman invasion and resources could be concentrated against foes closer to home such as the Laigan and Clann Cholmáin and the population groups they dominated to gain control over the kingdom. While the Irish and in this case the Síl nÁeda Sláine were involved in Romano-British and later Anglo-Saxon politics, they were also heavily involved in their own internal struggles. Unfortunately, this is difficult to see archaeologically and most of our evidence comes from the written sources.

The political history of Brega is constituted of dynastic struggles on many levels between Áed Sláine, Cólmán Mar and their progeny the Síl nÁeda Sláine and the Clann Cholmáin respectively and also intrusive polities who wanted Brega for themselves. The two men were sons of Diarmait mac Cerbaill, the great grandson of Niall of the nine hostages. As such they were actually members of the same *derbfine*, which in theory should have made them allies instead of causing generations of conflict.

However generations of conflict there were and it could be argued that at least some of the genesis of this lay in the killing of Cólmans son Suibne mac Cólman by Aéd Sláine, and then Suibnes son Conall arranging for the murder of Áed Sláine in AD 604. Unfortunately we don't know why Áed did this, which is a pity as it would be interesting to know how the nucleus of this animosity was formed. *Fingal* or kin slaying was a crime abhorrent to the Irish at the time, and it happened on other occasions as dissension continued, but was not something which would have been undertaken lightly. Reminiscent of the gangland killings of today, Conall mac Suibne was not content with this and went on to kill two of Áed's sons, and then in turn being killed himself a year later in AD 635 by another of Áed's sons, Diarmuit mac Áed Sláine. There were also many battles between the two dynasties, and the line of trivallate ringforts sitting close to the border of both kingdoms would lend weight to the idea that they had at least partially a defensive/military function. The southern border with the Lagain, external enemies of the Síl nÁeda Sláine also has a line of trivallate ringforts along the border, reinforcing the possibility of a martial aspect to the sites. This was definitely needed as Bolger lists battles along this border against the Laigain in AD 600, AD 677, AD 704, AD 726 , AD 770, AD 781, and hostings into Brega in AD 756 and AD 777.

Alliances also shifted and changed during this time and in the mid 670's AD the Clann Chólmáin were allied with the Northern Uí Néill, bringing them into conflict with the Síl nÁeda Sláine, who destroyed the "fortress" *Ailech Frigrenn* in a battle in 676 AD. This was quite unusual as property was not generally destroyed in this way. This, alongside the aforementioned kin slayings shows the ruthlessness and levels of violence involved. It was only 12 years after this defence of the kingdom that the two families fought internally at the battle of Imlech Pich in AD 688 which split the kingdom into North and South Brega and probably hastened the demise of Síl nÁeda Sláine control of the over-kingdom of Brega.

Another example of the shifting alliances can be seen between the Síl nÁeda Sláine and the Laigain. The southern border between Brega and the Leinstermen was heavily contested

and “clashes constantly occurred” (Binchy 1958, 117). However, by AD 902 alliances had shifted enough to enable Máel Findia mac Flannacáin, the king of Brega and Cerball mac Muirecáin, king of Leinster, to join forces to attack and defeat the Vikings at Dublin and send them back to sea. It is a testament to the transport network of Brega, more of which in chapter 6, that the attack on Dublin was made from the north and south simultaneously, and troops were able to move into position and coordinate an attack, something which would be very difficult to do if the terrain was hostile and a functioning transport system was not in place.

Throughout the 7th century the Síl nÁeda Sláine struggled to cement their place in Brega, and it has been suggested (Gleeson 2013a) that it was only by around 700 AD that the “classic” picture of Brega as we think of it today was in place. During this time (the 7th century), there were three main branches of the Síl nÁeda Sláine, each usually connected with a *caput* and a church, again maintaining those ecclesiatical links. These are the *Deisceirt Breg,* the *Ciannachta* and the *Fir Chul Breg* (Bolger 1997, 25).The Fir Chul Breg, the people of the “nook” of Brega had their seat at *Rath Airthir* and the church of Donaghpatrick, hardly surprising since the impressive trivallate ringfort and the church are only about 150 meters apart, ensuring close contact between the secular and ecclesiastic communities. The northern branch as mentioned earlier are thought to have had their seat around Slane, but this is due to the surname of Áed Slaine rather than any substantial evidence. Wherever it was to begin with , from the 8th century the *caput* moved to Knowth and lasted until the 12th century (Eogan 2010, 25). The Deisceirt Breg were based around the modern baronies of Skreen and Ratoath and the ruling dynasty, the Clann Chernaigh Sotail had their seat at Lagore Crannog (Hencken 1950, 4).

However by around 800 AD the Fir Chul Breg were ruled by the Síl nDlúthaig in the north, the Ciannachta in the Boyne valley area was under the hegemony of the Uí Chonaing

(Bhreathnach (2014, 46) and Southern Brega was controlled by the Uí Chernaig (Charles-Edwards 2002, 399)

The over-kingship of Brega was almost permanently lost to the Síl nÁeda Sláine in 728 AD when Cináed mac Írgalaig, the Síl nÁeda Sláine king of Tara was killed by the Cenél Conaill king Flaithbertach mac Loinsig. After his death there were no more kings of Tara from the Síl nÁeda Sláine with the exception of Congalach Cnogba in the tenth century. Instead an agreement seems to have been reached between the Southern and Northern Uí Neill dynasties that the over-kingship would pass from one to the other. This seems to have been effective in quelling conflict, and Charles-Edwards (2002, 396) advocates that from 743 AD until 919 AD all kings of Tara died in their beds or by accident.

7.4 Religion, Belief and Practice in the Brega landscape

Religion was important in Brega. The Síl nÁeda Sláine seem to have embraced Christianity, and some of this enthusiasm for the "new" religion may have been genuine, but it was also likely to have been one more aspect of their grasp for political and economic power. This change in religious faith was a major change to the cultural, economic and physical faces of the kingdom.

There are lots of references to religious figures in the written sources, with perhaps the most famous being the landing of St. Patrick at *Inber Colpdai*. Slane, where the Síl nÁeda Sláine are originally thought to have settled, is often regarded as St. Patrick's base and possibly the place he went to on his return to Ireland. As with most of these types of claims, written much later in the hagiographies, people wanted these links as cachet for themselves and the regions they lived in, so their veracity is extremely dubious. Nonetheless, regardless of the actual movements and enterprises of St. Patrick, the belief in his activities was the important factor for the people at the time. It is often mentioned in the literature that the Síl nÁeda

Sláine used passage tombs and ancestral graves or *ferta* to legitimise their claims to Brega, but it is argued here that they moved on from this, recognising the emergence of the Christian church and the nascent power it held.

It is not explicitly mentioned in the written sources, but there is a question as to whether the Síl nÁeda Sláine could have also used the Christian church to legitimise their holdings, and the *quid pro quo* was to not only allow, but actively help resource the building of impressive stone buildings. It would seem coincidental that the first monastery, the first round tower and the first stone church were all built in a kingdom in which one population group was trying to exert control over another and solidify their claims not only to the kingship of Brega, but also to the kingship of all Ireland. In the internal political machinations between the Southern Uí Néill clans and the external ones between the Síl nÁeda Sláine and those outside the kingdom, the church could be a powerful ally, and these stone buildings would have increased the status of the clerics in control of them, with that increased status also reflecting back on the secular community. This would not have been unusual as their kin group, the Northern Uí Néill had control over the church on Iona (Moisl 1983, 122). In fact, after the Anglo-Saxon raid on Brega in 684 AD, it was a churchman Adomnan who travelled to Northumbria to persuade king Aldfrith to return the slaves which had been taken. This whole episode in the written sources also shows the influence of the Irish in Anglo-Saxon politics, as it was the Uí Neill who helped put Aldfrith on the throne of Northumbria in the first place.

7.5 Boundaries - spaces where interesting things happen

One of the biggest results of these shifts in the political landscape of the country was the constant relocation of boundaries. Boundaries at this time were demarcated in multiple ways, often, but not always by topographical features that could be used as way markers. In general, it is not possible to see these boundaries archaeologically, and the clues to their whereabouts have to be gleaned from the historical sources with differing grades of success.

For example, following the battle of *Imlech Pich* Brega was split into North and South Brega, with a different *caput* in each kingdom and the sources tell us this, but they do not explicitly mention where the new boundary line was formed.

We do however have some evidence for physical boundaries in the landscape in the form of the *ferta* mentioned above. These ancestral graves, often thought to be an aid to subjugation of a population group, were mentioned in the laws in relation to boundaries. They were named as boundary markers in the law texts and there was a process in which someone who had been deprived of their land could reclaim it from the present owner by crossing over the burial mound. This law relating to land possession was termed *tellach* but was meant to be used for individual holdings rather than the annexation of a kingdom. *Ferta* seem to have been important in Brega, possibly as mentioned earlier to cement the claim of the Síl nÁeda Sláine to the land. Of the 47 known *ferta* in Ireland, almost a third (15) of these sites are in Brega. These sites were very visible in the landscape as shown in chapter 4. It is interesting that while a large number of settlement sites seem to have been destroyed by the Anglo-Normans, a relatively large number of these mounds survived. This could possibly have been due to the Anglo-Normans own religious beliefs about disturbing the dead, or simply because the mounds were usually constructed on ridges overlooking rivers and as such were not on land very suited to farming. It is intriguing to consider that the times when most reinterment was done in these tombs, the fifth and ninth centuries, was also when there was an influx of people, the Síl nÁeda Sláine to Brega in the fifth century and the arrival of the Vikings in the ninth century. The reuse of burial mounds was a long tradition in Ireland and the use of mounds for burial was also widespread in Scandinavia. With such a small sample and a wide spread of dates it is difficult to make a definite correlation between the two and it is outside the scope of this thesis, but it could bear some more attention.

The trivallate ringforts mentioned above were possibly also meant as a bulwark against attack from other *túath*, in some ways resembling the Anglo-Saxon *burghs*, controlling the

territory around the borders and acting as a staging post for troops. If they were acting purely as royal residences or places to manufacture indigenous prestige goods, they could have been sited anywhere and didn't need to be placed so close to the borders and this can be seen clearly in figure 7.1. There is no topographical reason for these large ringforts to be sited so close to the border. What is likely to be missing from the distribution map are trivallate ringforts along the eastern coastline - again probably in part due to the Anglo-Norman occupation, and also the later development of towns and cities in coastal areas. While these ringforts were not "royal residences" in the traditional sense, they would likely have been places to receive, manipulate and then transport prestige goods, precious metalwork and other crafts. As such it is hardly conceivable that the only trivallate ringfort on the east coast of Brega was at Rathdrummin (LH018-045001-) which is approximately 10kms from the port at Drogheda and we must assume that the others have been lost. The fact that these sites are "mirrored" across the main borders with Mide and Leinster as seen in figure 5.28 only adds to the likelihood that these sites were used for the defence of both the kingdom itself and the valuable craftworks and imported goods contained on the site.

In fact the reputed royal sites of Brega - Tara, Slane, Lagore Crannog, *Rath Airthir*, Moynagh Lough, Knowth and possibly Raffin fort were nowhere near the main borders of the kingdom with Mide or Leinster as seen in figure 7.1. The other royal site, Ervey crannog, was situated right on the border on what is now the modern day border between Meath and Cavan. It must be noted here too that while Slane would seem to be the original stronghold of the Síl nÁeda Sláine, the exact location of the site is not known, and thus the mark on this particular map is the modern day village of Slane.

Figure 7.1: Royal sites and trivallate ringforts of Brega (after OSM, EU-DEM, NMS with additions)

7.6 Dwelling in the landscape of Brega

In the rise, hegemony of Brega and demise of the Síl nÁeda Sláine, Byrne (1973) argues that although the existing peoples of Brega were subjugated, they were not driven from their land. It has been argued Gleeson (2013a) that the existing peoples, the Fír Arda Ciannachta, Delbna Bec, Fír Chúl Breg, Uí Maic Uais Breg, Leógaire, Déisi, Gailenga Becca, Gailenga Móra, Luigne, Saithne (the last 4 of which also had Connacht roots and affiliations) stayed in place and the Síl nÁeda Sláine formed an over-kingship above them. This meant that when the Síl nÁeda Sláine lost control of the kingdom, that the existing subject peoples were still settled in the same locations, and this implies a cohesion and adherence to traditional building patterns that were juxtaposed to the political instability and fighting.

In fact, building practices in general continued much the same as in other parts of the country, in that ringforts were the predominant settlement type. However, there are regional differences between Brega and other parts of the country, although the caveat here is that the data for other areas have been collated by other authors and so it is unlikely that they have used exactly the same parameters as the ones used in this study which could possibly skew some comparisons.

As mentioned in chapter 5, an analysis of settlement in Brega has a particular difficulty in comparison to the rest of the country due to the settlement of the Anglo-Normans and the resulting damage to pre-existing settlements, roughly denoted by the line of the N52 road. To the south of this road evidence for settlement is comparatively sparse although it is impossible to believe that some of the best farming land in the country would be left unsettled. Rather it is more likely that the Anglo-Normans ploughed out or otherwise destroyed many ringforts, which they would not have seen as the same cultural or folkloristic characteristics as the native Irish, especially in respect to the lore and traditions linking ringforts with the *fear sidhe* - the faeries. There might be a tenuous link that farmland as good as this could have

had unenclosed settlements, but it has been suggested that there is little or no evidence for widespread unenclosed farmsteads in Ireland (O'Sullivan et al. 2014).

It would seem that even though the people of Brega lived in ringforts, they were not as concerned about the shape, with a circularity index of 0.56 compared to that of 0.88 calculated by Stout (1999, 207) in the baronies of Ikerrin and Clonlisk. It could also be argued that they were not as interested in size either with Stout's figures showing bigger ringforts overall in Ikerrin and Clonlisk than in Brega. It is possible that with the land being of such high quality that the people of Brega preferred to farm it, and so kept the size of their enclosures as small as practicable. The figures above emphasize both the differences in regionality and the need for a consistent approach to the examination of these monuments to ensure a consistency of evaluation. While the differences between Brega and Ikerrin and Clonlisk have been highlighted, there are also some areas of notable similarity, particularly in relation to slope. While we don't have a slope map for Stouts (ibid.) areas, he states a figure of 54% of ringforts sitting in the 0.3 to 2 degree range and in Brega this figure is 54.25 %. This figure is remarkable considering the differences in topography between the three areas and indicates that people were well aware of the need for drainage for their enclosures, but also the need for the land to be as flat as possible to facilitate ease of movement. It would be instructive, although outside the scope of this thesis, to do a comparison of slope across all baronies in the country.

While in general ringforts are thought of as circular, in Brega only just over 50% have actually been defined to this shape, and the rest were sub-circular, oval etc. It is also interesting to note that these circular ringforts are much bigger in terms of their overall area than sub-circular or oval ringforts with the same number of banks and ditches – possibly suggesting a slightly different use. The oval and sub-circular ringforts are also very similar in size to each other.

It is generally thought that the number of banks and ditches related to an enclosure help denote the status of the residents. It is unlikely to be the overall size of the enclosure that denotes its status, as the univallate circular ringforts are almost as big as the bivallate ringforts of the other shapes. Not all scholars agree with this, and Comber (1997, 101) has suggested that “size is directly related to the wealth of the inhabitants”. In the case of Brega as seen above this would seem to go against the accepted norm of the vallation of a ringfort denoting its status and the status of the inhabitants and increased wealth generally meant increased status. With such high numbers of univallate ringforts matching the sizes of the bivallate ringforts it must be considered unlikely that the majority of the population was wealthy, even on such good agricultural land as Brega had.

Comber (ibid.) also argues that large scale ringforts at Knowth, Co Meath and Garranes, Co. Cork provide evidence of a broader, wealthier economy. It is argued here and addressed in more detail in section 5.6 that these large trivallate ringforts, which were generally situated near the borders of the kingdom, had a different function, and that they were multi-use enclosures rather than simply royal residences. One of these uses would have been for trade across borders with other kingdoms, with strong defences to guard the precious items within. Trade was often conducted at fairs or *óenach* which would have allowed for the transfer of goods amongst a wider selection of people, but it is unlikely that items would only be traded at these large gatherings a couple of times a year. These large trivallate sites situated near the borders would have allowed production to take place in a safe environment, whilst also creating a recognised point for trades to be conducted.

In any analysis of ringforts in Brega there is one major problem – the paucity of evidence from south of the line created by the N52 road. There is a stark contrast in the number of settlements above and below this line which can skew some types of analysis. For example, the area above the N52 covers approximately 660 square kilometers and has 334 ringforts. Below the N52 the area is 2631 square kilometers and 160 ringforts. This is a stark contrast -

a density of 0.5 ringforts per square kilometer above the N52, and 0.06 below the line, or to put it another way, over 67% of all the ringforts in Brega are clustered above the N52 and this can be seen in figure 5.1. If for example we were to take a rough number found elsewhere (O'Sullivan 2021) of 10 people inhabiting a ringfort including the family and slaves, based on 494 ringforts in Brega we have a population figure of 4,940 inhabitants. However if the density above the N52 was replicated across the whole kingdom, we would have 1665 ringforts, a 337% increase, with a corresponding population of 16,650. While this is generally accepted to be the result of the agricultural practices of the Anglo-Normans, the loss of data is regrettable and results in a fragmented overall picture of the settlement of the kingdom. Going forward the predictive modelling of sites could be very useful for this area to give a better picture of the overall settlement in the area and this is a method that is finding increasing success across many disciplines from archaeology to ecology and beyond.

Further credence is given to the idea that the removal of ringforts was a result of Anglo-Norman expansion by the line of mottes just to the north of the N52 and paralleling it seen in figure 5.8.It is likely that the line of this road was a major boundary in its day, possibly with another road in existence at the time and approximately following the current line of the modern road. It is not a coincidence that this line of mottes bisects the two areas with strongly differing settlement densities. This type of analysis is benefited greatly by the use of the GIS and enables us to generate statistics more easily.

7.7 Economy, production and redistribution

The economy of early medieval Ireland was almost entirely based around agriculture. While there was foreign trade, precious metalworking and crafts, agriculture was predominant. The economy, or more precisely people's personal wealth and possessions, was inextricably linked with their social status, and their values and rights within law. A person's honour price projected their position in society and could protect them under law. However there was also

a need to maintain this status, and so it is no surprise that when the Southern Úi Neill decided to move from their (often poor quality) lands in Connacht, they moved to some of the best farming land in the country.

All kingdoms and *túatha* within the country were not equal and existed with varying degrees of economic, cultural and political power. In all of these respects the kingdom of Brega and its constituent lands were far superior to the lands the Southern Úi Neill were leaving. It is possible that this sense of ancestral entitlement meant that they distinguished themselves from others, and rather than seeing themselves as annexing other people's lands, felt that they were only taking back what was theirs, the high kingship of Ireland, in the first place and to which they had a right to as befitted their status.

Allied to their historical or genealogical view of themselves might also have been their contemporary view of themselves. As mentioned earlier, status as defined by the laws was an essential element in how people viewed both themselves and others and status was inextricably linked with wealth. In general, the lands in Connacht which the Uí Neill left were far less suitable for the rearing of cattle and growing of crops than the lush, well drained soils of Brega as discussed in chapter 3. The wide arable plain of Brega ensured that in a system where clientship prevailed, there was often a surplus of both cattle and crops with which to supply new clients. This surplus could help a farmer move up the social ladder and hopefully help to secure the future status of the family, something which ultimately failed as during the ninth century Brega began to be forcibly incorporated into Mide and become subjugated by the Clann Chólmáin.

Combined with the production value of the land, the land itself had value. This can be quite confusing as the unit of area in early Irish law is the *cumal*, the same term used for that of a female slave. Disturbing as it is, it reveals the distance between us and early medieval

Ireland when we reflect that enslaved women were a unit of currency. Juxtaposed to this is the argument of Ó Cróinín (1995, 269) who suggests that there was little or no trading in slaves before the arrival of the Vikings. It would seem however that if female slaves were common enough to be treated as a unit of currency they must have been relatively commonplace (Boyle 2004, 87). Somewhat ironically, this would intimate that female slaves were more important or had a higher value than male slaves, when in general the honour price of a man was higher than that of a woman.

Kelly (2015, 99) suggests the actual unit area of a *cumal* to be 13.85 hectares. Each *cumal* had a different value depending on the quality of the land, so the highest quality of land had a value of 24 milch cows, while bogland was worth only 8 dry cows. Due to the topography of Brega, most of the land was of high quality, with very little hilly or bogland unsuitable for farming. Even today, land values in Meath are substantially higher than any of the counties in Connacht, the area the Síl nÁeda Sláine moved from (SCSI/Teagasc 2021, 33). Value is also added to the land if it has a road running past it and as chapter 6 shows, Brega was well supplied with roads and as such the value of the land increased even more. In a country so concerned with property, status and hierarchy, the control of land which was valuable in and of itself and also for its production value meant that a person or a family had the opportunity to improve their status and move from one class to a higher one, at least across generations. Conversely, the opposite was also true however and someone who had fallen on economic hard times could lose status and descend to a lower class. While the wide, arable plain of Meath did not guarantee an increase in wealth and therefore status, it at least increased the likelihood of this happening.

However, the Ui Neill's initial hegemony over Brega allied to their increase in political power meant an associated rise in their economic position resulting in increased wealth. This enhanced economic position also increasingly facilitated access to imported prestige goods which were landing at the ports and moving through the well-developed transport system as

mentioned in chapter 6. Control of this transport system and associated movement of prestige goods such as Frankish pottery (E-ware), wine and olive oil was another contributing factor in the growing pre-eminence of Brega. Prestige goods such as these were often used as outward signs of wealth designed to impress and intimidate people of lower orders. It would be visually very striking if someone had exotic jewellery on their body or imported pottery, fine spices, wine and olive oil in their house and these outward manifestations of wealth and power were again conspicuously important in a society so concerned with status.

Sites like Knowth, Lagore and Moynagh Lough have extensive evidence for all types of specialist crafts such as metal and glass working, bead and leather making etc. It is possible that the status of these sites attained was due more to the specialist workers who made these items rather than the actual person who controlled them. These specialist workers had a status that was somewhat parallel to normal farmers, and often didn't farm their own land but traded their items instead. This internal trade and exchange often needed transportation from the sites of the raw materials to where it was being worked, for example lignite mainly found in Armagh being worked at Lagore. Again, the transportation of raw materials created their own route networks, probably accessing a major *slí* and then branching off at a convenient access point. As well as the physical imposition the roads made on the landscape, they also facilitated cultural interactions, with news, ideas and other cultural expressions interacting throughout the journey.

It is the enclosures in the form of univallate ringforts that allow us to attempt to examine the material remains of the lower orders, if we adhere to the paradigm that vallation was a demonstration of status rather than size. The lower a person's place in the social hierarchy the more difficult it is to reconstruct their past lifeways. Kings and the lordly wealthy own things - large houses, gold and silver objects and weapons, horses and chariots - slaves own nothing. Kings are mentioned in the written sources at their inaugurations and feasts and noted for the great deeds they perform – slaves were not important enough for clerics to write

about. As such it is much easier to trace and discuss the higher echelons of society. Numerous books and papers have been written about early medieval Irish kings but almost nothing about slaves due to the paucity of evidence and yet there is evidence for a large number of slaves in the country at the time. In fact, if it wasn't for references to slaves in the law tracts it is arguable that we wouldn't even know they existed in the country. Interestingly it would seem that while male slaves did much of the menial labour, it was a *cumal* or female slave who had value and was used as a unit of currency in law. Kelly (2015, 112) describes how the honour price of the lowest grade of king is worth 7 *cumals,* although by the seventh century other currency was being substituted.

Slaves were part of the economy, albeit a relatively small one compared to agriculture. They were taken in raids much like the one that brought St. Patrick to Ireland and could be traded like livestock. Actual livestock formed the centrepiece and dominated the economy, mainly in the form of cattle although arable crops grew in importance later in the period. The *bó mlicht* or milch cow was the basic unit of currency. While difficult to see archaeologically, there must have been a vast network of *bothár* (cow-tracks) which are not visible to us today as well as larger roads which are more archaeologically identifiable, and the road network as modelled here can be seen in figure 6.24.

The clientship process which formed the basis of most economic transactions, in importance if not in actual value of individual items, meant that there had to be a transfer of a fief, mainly in the form of cattle, but sometimes also in other arable goods, from the *flaith* (lord) to the *céile* (client) and then a food-rent returned to the *flaith*. This meant that there would be regular, although infrequent, travel between the holdings of a *flaith and a céile*. Combined with this there are other aspects of travel, such as the need for cows to be driven to water sources. Additionally, there is no evidence for farmers in early medieval Ireland to have saved hay for winter fodder, so cows would have been moved to winter pasture. All of these different aspects created structure within the landscape, building up paths and tracks over

time until a very comprehensive network of available paths were formed, although the remnants of these are very faint. Without this well-developed path, river and road network, these transfers and movements would not have been possible, or at the very least made difficult, so a functioning method of transporting cattle and other goods was essential for the smooth running of society and the economy.

The two elements of the economy mentioned above, slaves and cattle, highlight the obstacles to creating a fuller picture of the economy of early medieval Ireland. There are large amounts of data for some aspects such as faunal remains, but very little for other aspects such as slavery.

Other traces of the economy we have evidence for is external trade. Brega was perfectly positioned for external trade. A number of coastal ports important enough to be mentioned in the annals allied to a short crossing to Britain placed it in an excellent position to receive imported goods. In a time of wooden boats and ships, sea journeys tended to keep to visible coastlines where possible, and open water crossings were kept to a minimum, usually using the shortest route possible. Brega also had large rivers like the Boyne and Blackwater penetrating deep into the kingdom, allowing for a much easier journey than would have been possible overland. There is plenty of evidence for a thriving trade with Britain, Gaul and further afield. Mediterranean pottery, mainly E-ware but also types A, B, F and G have been found on sites throughout the kingdom. Roman coins and Samian ware as well as artefacts and raw materials from Italy, Germany and Spain have all been found. There are concentrations of these types of objects in the more prestigious sites mentioned earlier such as Knowth, Moynagh Lough and Lagore. It is likely that these sites were used as a type of “clearing house”, where merchants came to trade their wares, but possibly also to give kings and higher nobility the chance to look them over and pick out the choicest pieces. There was an element of power in play here as boats would not have been able to land or travel inland, or goods travel overland, without the permission of the king of the *túath* they passed through.

There was also an element of reciprocity in this in that if the king were too harsh on the merchants, they were likely to stop coming and deny access to these goods. There was also an important role for the church here as wine for the sacraments would need to be imported, and this ensured dialogue between the ecclesiastical and secular hierarchy for its movement.

The importation of prestige goods was not a consistent flow throughout the period. Charles Thomas (1990) divided up the period into two phases – the fifth and sixth century and the sixth and seventh century, with Comber (2001, 84) later adding a third phase from the eighth to the tenth centuries. Phase 1 denoted a period with relatively little importation of foreign prestige goods to Brega, and this coincided reasonably closely with the influx of the Síl nÁeda Sláine to the area. It is feasible to imagine that the Síl nÁeda Sláine would have focussed tightly on their need to cement their control of the region and limit the remit of outsiders. Once this was done however, and the increase in power and wealth more assured, it was possible to look outwards. The increase in pilgrimage and missionary work among the clergy would likely have added to the knowledge of other places among the nobility of Ireland and piqued their interest in foreign goods. The arrival and settlement of the Vikings also led to the importation of goods such as amber from new areas not hitherto on the main trading routes.

Just as in other parts of this thesis the notion of scale is an important one. The distances people travelled were very likely linked to their status. Once a slave arrived at a settlement it is very likely they ever left it again. Lower grades of free commoner were likely not to have travelled very much either, mainly to the settlement of their *flaith* during exchanges of fief and food-rent. Lords and kings were more likely to travel more extensively, circuiting their holdings and availing of the hospitality their subjects were bound to provide by law. Ecclesiastic travel could be both with monks staying in monasteries for long periods of time, but also sometimes travelling long distances for pilgrimage or missionary work.

7.8 Communications

People moved within the landscape – fairs, religious purposes, fulfilling their clientship requirements, making or repairing goods, tending to cattle and crops, visiting friends and family – all required the ability to move to a larger or lesser degree. As well as these social constructs, the economy could simply not function without a comprehensive transport network. The clientship system of fiefs being given by a lord and food rent returned depended on the ability to move cattle and produce in both directions. Prestige and foreign goods were imported from abroad and either landed at the major seaports or sailed upriver for ease of access and distributed from there.

The fact that the transport system was so well developed for the time was likely to have been a factor in the appropriation of Brega by the Síl nÁeda Sláine. The kingdom was valuable, lush with crops and animals, well provided with roads and rivers to transport those items and other prestige goods, culturally and politically prominent and a hub for the spread of Christianity so it is no surprise as to why the kingdom was so coveted.

The transport network of the kingdom has been touched on here in relation to different elements, but in essence it was a crucial part of the functioning of the kingdom, and indeed any society. The road system is so commonplace that it often escapes notice and yet it is an integral part of the economic and cultural fabric of society. Colm O'Lochlainn (1940) collated references to the five great *slighe* and journeys from the annals and hagiographies and compiled them into a list, however these were not placed on a map. It must also be remembered that some of the evidence, especially from the hagiographies, is not entirely reliable.

The river network is similar - in rural Meath today we see a river like the Boyne as a nice place to have a walk, but in early medieval Brega it was an intrinsic element of the transport system, bringing goods, people and animals to where they needed to be. It is interesting then to note that there has been no major schematic of the transport and communication systems of Brega. In fact an attempt to map the road system of *any* early medieval kingdom in Ireland has never been made until this study. In addition to this other elements of the transport system such as the navigable rivers, fording places, stepping stones and footsticks have also never been mapped. Collating these different elements has helped to create a better picture of the transport network of the kingdom and was essential in creating the Least Cost Path models used to create a more nuanced depiction of the routes of the road system than could have been gained by drawing straight lines from the places on O'Lochlainn's list.

It can be seen in figure 7.2 below how comprehensive the road network is, and yet this is likely to be only the larger roads in the kingdom, important enough to be mentioned in written sources. There must also have been a spider web of smaller tracks and roads to enable people to access different areas of their locality, but traces of these are likely to be so faint most of them will never be found. As mentioned earlier the proximity of a road can add to the value of land, and a place like Brega with good quality land to begin with, is made even more valuable by such a comprehensive network of roads.

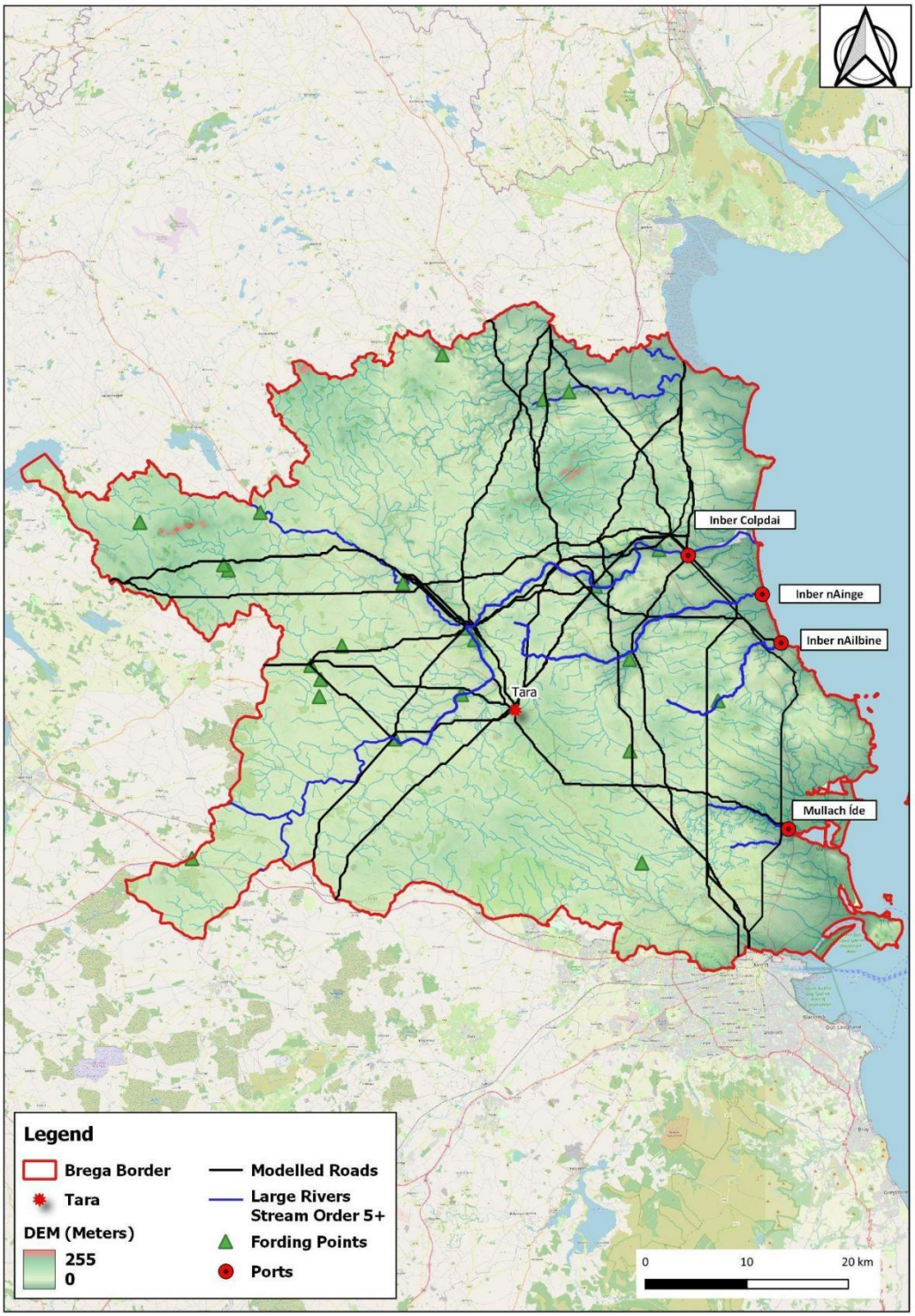


Figure 7.2: Transport network of Brega (after OSM with additions)

As well as their economic importance, they were often the conduit for information and formed the basis for cultural interactions. Road building and maintenance was a communal undertaking within a *túath*, and controlled by the king, and it is possible that apart from

óenach or assemblies, meeting to construct or maintain roads might be one of the few times people met others from outside their immediate localities.

The rivers were also an essential link in the chain, both for internal and external transport. The four main ports at *Inber Colpdai*, *Inber nAilbine*, *Inber nAinge* and *Mullach Íde* provided access from Brega to the Irish sea which then opened up travel to Britain, Gaul and the Mediterranean.We know from written sources that the Boyne was navigable as far as Trim, a long way inland. The Delvin river at *Inber nAilbine* and Nanny at *Inber nAinge* were also likely to have also been navigable at least part of the way inland and the same can be said for the Blackwater, Glyde and Broadmeadow rivers, which all have a stream order of 5 or above on the Strahler scale mentioned in Chapter 6.

All of the points could have led to a wealthy, powerful and harmonious kingdom. Unfortunately for the Síl nÁeda Sláine their relationship with Brega can be reduced to just a few lines. They came from Connacht and conquered Brega, they enjoyed wealth, success and political power for a period of time, and then lost that political power and prestige and were subsumed by their Clann Chólmáin kin. Patrick Gleeson (2013) has argued that the reign of Áed Sláine was ignominious and it could be argued that his progeny descended into, if not ignominy, then certainly near obscurity.

7.9: The Church and the landscape of Brega

Having said in chapter 1 that this thesis is primarily focused on secular settlement, it would be remiss not to mention the early medieval Irish church. It is arguable that the arrival and spread of Christianity had an immense impact on the physical as well as the spiritual landscape of Brega. The introduction of wooden and stone churches, ecclesiastic estates and monasteries left a lasting impression on the landscape.

It is not explicitly mentioned in the written sources, but there is a question as to whether the Síl nÁeda Sláine could have used the Christian church in an effort to legitimise their holdings, and Ó'Carragáin (2021, 281) has stated that kings used churches to "reinforce their authority in the different subdivisions of their kingdom, and sometimes placed a series of churches along a boundary to express dominion", yet another example of the variety of boundary markers in early medieval Ireland. The *quid pro quo* was to not only allow, but actively help resource the building of stone churches and round towers. Indeed Ó'Carragáin (2021, 279) has suggested that "a substantial proportion of the earliest churches are positioned within or near royal and assembly landscapes" and "many powerful sections of the elite chose to invest in the new religion" (ibid.) That these elites supported the church, both financially in the first instance and also ideologically, is likely to have increased the speed with which the new religion spread, as clients made an effort to ingratiate themselves with their lords.

This expansion of the church would also have caused changes to the physical landscape, both locally and in terms of the organisation of estates. The physical church and associated buildings required space, both for themselves and for the associated farms to keep the clergy fed. This space would have come from the king of the *túath*, and would have ingratiated him with the church, a critical consideration at a time when Christianty was spreading throughout the country. Before the ninth century wooden churches were the most common in the landscape (Ó'Carrigáin 2010b, 111) although our evidence comes from written sources as there are no surviving examples. With this in mind, even though stone church buildings were generally small, the stone built church at Duleek, reputedly the earliest in Ireland, and the round tower at Slane would have been very impressive buildings to local people who most likely would never have seen anything like them before. While churches were not built very high, the sheer height of the round towers would have maintained a "great physical presence " in the landscape (O'Keefe 2004, 133).

A distinction needs to be made between churches which were usually small, and large ecclesiastic estates. The church would have organised its own estates with tenant farms, woodlands, horizontal mills, corn-drying kilns, barns, and other buildings, and these landholdings were often extensive, occupying a fifth to a third of their kingdoms and forcing a considerable reorganisation of royal lands (Ó'Carragáin 2021, 66). These ecclesiastic estates would generally have an inner and outer enclosure, called a *vallum*, with the enclosures becoming more holy as they moved towards the centre, and farming and craft working happening outside the outermost enclosure, and they usually had a substantial ditch (Emap 2014, 147). Some of these could be quite substantial reaching almost 500 meters in some cases (Swan 1985, 97). They were also very multi-faceted places with farming, food processing and crafts often taking place, and excavations at places like Clonmacnoise have shown it to be a "very busy settlement" (Bhreathnach 2014, 187–188).

These church buildings and farms would have created new pathways and on a very local scale these would have been for people travelling to mass, for pastoral care and the sacraments, but on a larger scale there were pilgrims paths that would have been much less frequently traversed. Bhreathnach (2014, 224) has suggested that "no one could have travelled through the early medieval landscape without encountering a church settlement, large or small". So while there was a striking physical impact of all of these sites on the landscape, there was undoubtedly a strong social and idealogical impact also.

These ecclesiastic developments often lead to Ireland being called "The land of Saints and Scholars'". However, the romantic idyll of early medieval Ireland as a land of saints and scholars, like most utopian perceptions, contains components of truth, but the plenary position is far more complex, and Brega is an ideal lens through which to view this.

The contribution of the Irish clergy to the greater church across Europe is undoubted “simply because early Irish monastics wrote more about themselves than any other literati in early medieval Europe” (Bitel 2020, 298). The volume of writing alone is an indicator of scholarship. Coupled with some of the impressive artwork and lettering in tomes like the Book of Kells, the many inscribed crosses and other innovations such as offering the calculation for the date of Easter at the Synod of Whitby in 664 AD meant that Irish missionaries were well respected and “shaped Christianity as it expanded around the world” (Gribben 2021, 2).

Chapter 8: Conclusions

8.1 Introduction

Attempting to fully examine the complexities of any landscape, politically or otherwise culturally defined area is a gargantuan task, and one made even harder when a span of 700 years is taken into account. It is simply not possible to find every nuance involved in 700 years of settlement, cultural and political change, warfare and technological advances. The complete corpus of archaeology to date cannot be said to incorporate all there is to learn about past cultures, and certainly no one thesis can even begin to encompass it. What is possible and what this thesis has done, is add to our overall insight by using a fresh approach to add another layer of knowledge to what is already known. Much as archaeology itself is accomplished by digging down through, and examining differing layers, this thesis has dug through and investigated some of the layers that make up the palimpsest that is the early medieval kingdom of Brega.

8.2 Primary GIS Datasets

The central tenet of this thesis was to assess the use of GIS software to identify, modify, create if needed, and produce results from datasets available to Irish researchers to examine landscape and settlement using the early medieval kingdom of Brega as a case study. Initially the main software used was ArcGIS, but eventually Quantum GIS, a free software package was used more extensively. There is an increasing governmental trend towards making datasets paid for from the public finances available free of charge to the taxpayers who actually pay for them and this creates opportunities for any citizen of the country to conduct their own research. All that's needed is a computer and internet connection. The two primary datasets used in this thesis, the NMS data for the ringforts themselves and the EU derived Copernicus project DEM are both freely available for use, and the scope of uses to which they can be put are increasingly varied. The quality of these datasets is also increasing over time and are likely to become even more precise and extensive going forward. Secondary datasets created within this study also add to the body of knowledge and the processes defined within the study are available for use by other researchers for other projects. There were many datasets created within the project, and some of those datasets have led to answers and some have created more questions. The mechanisms for analysis defined within the thesis can also be used as a framework for comparison of results from differing geographical regions.

These two datasets —the NMS data for the ringforts and the EU derived Copernicus project DEM—have advantages and disadvantages. A major disadvantage with the core NMS dataset in this case is the substantial destruction and removal of sites to the south of the N52

road. This is not a problem with the dataset per se, but rather a deficiency with our knowledge of the physical remains on the ground. This is an assumption - it is impossible to prove there were settlement sites here which are now unaccounted for, but the preponderance of evidence from the rest of the country and even within the kingdom itself would make this a very valid assumption . However it does skew the results of any analysis in relation to the density of settlement sites within the kingdom as a whole. This highlights the importance of assessing regionality within settlement practices, something which is mentioned often in this text, and reinforces the need to incorporate the historical data rather than rely solely on raw GIS data. Although this study considers settlement on a large scale within the kingdom, a larger scale within the country would probably return different results, as there are strong regional differences due to anthropogenic factors as in this case, and also due to differences in topography and natural resources.

8.3 The role of GIS in understanding landscapes

The study has shown that the topography of the landscape forced decisions on people as to where they built their settlements. Ideal solutions were not always available, and cultural expression was often influenced by environmental factors. Nuanced analysis of the topography and settlement is enhanced and sometimes even made possible by the use of GIS. In using the GIS as a tool this thesis has achieved a breadth of analysis simply not possible to do manually within any kind of a realistic timeframe, however a consistent point that is reinforced throughout the thesis is that the GIS is just one more tool to be used judiciously in the study of settlement. Settlement in a landscape at this scale is complex, and multiple factors are in play such as the social, cultural and economic needs of the population, and the restrictions and opportunities provided by the landscape itself. Even though the use of GIS is advocated here it is also recognised that it is not the only approach to the subject, and should be used as one avenue of study rather than representing a panacea. This is one reason why this thesis has incorporated not just the technical and computing power of the GIS, but also the historic evidence to be found in manuscripts and literature.

One of the difficulties in studying settlement successfully at the kingdom scale in a study like this is the volume of data. Without the use of the GIS some of the analysis of the environmental factors involved in the siting of ringforts, such as the distance to water and the distance from one ringfort to its nearest neighbour, would have been almost impossible due to resource restrictions. As such would have made the project much smaller in scope Resources generally within a PhD project would likely allow only one or two of these variables to be analysed manually. A key advantage of this type of study is the ability of the

GIS to analyse large volumes of data which allows the study of lower status settlements which are often overlooked, instead of being forced to narrow the focus to higher status sites. The spotlight of archaeological study is often shone on elite members of society as they have a disproportionate ability to decide cultural changes by shaping laws and economics, but the bulk of the population also form the bulk of society who build, occupy and eventually discard settlements. No analysis of settlement can be considered remotely complete without examining the settlement evidence of this cohort.

One of the central themes of this thesis was to identify datasets available to Irish researchers, and use them in a case study, in this case settlement in Brega, to assess their suitability for use. Only the NMS dataset is specifically designed for archaeology, all of the other datasets have been produced with different aims and agenda in mind. This has been accomplished extremely well, with datasets from the EU based Copernicus program, the Mapping Death project funded by the Heritage Council and environmental data from the EPA and GSI meshing to provide usable inputs. These inputs have then been manipulated to produce meaningful outputs for archaeological purposes.

The thesis has also investigated some of the advantages and also the pitfalls involved with these datasets. For example, the Copernicus DEM is very useful at the landscape scale, but the resolution is too coarse to allow micro investigation at the site scale. A much higher resolution DEM, or even more useful, LiDAR , would make investigation of areas such as those immediately outside the bank and ditch would be useful.

DEM’s like this are essential as a base layer in many different types of analysis, and these datasets are constantly evolving and improvements in precision are being made. In addition there are difficulties with the NMS datasets. Some records are missing location or other data which is essential for their use in a study like this, so data must be “cleaned” or otherwise prepared before it can be used properly in the GIS. However, the same can be said of most large datasets - they are rarely, if ever, complete and ready to use without some form of manipulation. These digital datasets have a massive advantage over the old paper records in terms of access and particularly how widely they are made available to researchers. The paper records take a much longer time to collate, print and disseminate. Limited copies of archaeological inventories were available when they were originally printed, and a lot have fallen out of use outside major libraries, whereas the digital data is accessible at almost any time by anyone.

8.4 Words, places and stories - combining historical and archaeological data in GIS

This thesis has successfully combined historic data with archaeological data in the GIS. To investigate whether this could be done with the datasets available was one of the main aims of the thesis and this has been accomplished. This study has combined these quite successfully in a number of different ways. Early Irish historical data combined with topographic and archaeological data enabled us to better understand the likely impact and role of political boundaries in Brega. For example there is no way to define archaeologically define the border between north and south Brega, and indeed the boundary was often fluid throughout the period. There is also no way to define purely through the archaeology which family or dynastic groups lived in which areas, so mapping these groups must necessarily be done on the basis of historical data (ie. It is often done in practice by just putting a dynastic group's name in big font on a small-scale map).This is another example of the thesis successfully meshing the GIS with historical data. There are two other specific examples of how this data can be combined well. The first is the case of the proximity of trivallate ringforts to the borders of the kingdom and second is the line of Anglo-Norman mottes near the line of the Pale and the kingdom boundary. The western boundary of the kingdom was quite fluid as mentioned before, but the two lines of trivallate ringforts "mirroring" each other each side of the boundary line can reinforce the historical idea of where the boundary line was. While the exact line may have moved, the space between these two lines of important ringforts can at least provide a likely "corridor" for the boundary. This also reinforces McCotter's (2014) evidence for the later medieval barony borders matching the boundaries of the *túath*. In this case the western barony/*túath* boundaries correspond quite well with the trivallate ringfort corridor. Similarly, the line of Anglo-Norman mottes near the southern boundary can help reinforce and somewhat define that boundary. Presenting these boundaries, ringforts and mottes on a simple map can give the reader an overall picture that is easier to grasp than simply text alone and again the GIS makes the production of these maps much easier.

A further example of the combination of historical and topographic data was seen in chapter 6, with its focus is on communications and travel examining the known routes of the major *slighe* and the composition of other routes to be found from a range of literary sources. Then, with these nodal points as a starting place, they were combined with the Least Cost Path Analysis in the GIS to model more nuanced outlines for these routes, rather than simply drawing a straight line from one point to the next. A straight line from one point to another is useful to a certain extent, but it is a very blunt depiction of the route, but unfortunately one that appears in the literature quite often. To repeat a point made above - 16 roads were reconstructed in this way to give a valuable insight into the transportation networks of the kingdom, but an attempt to model even one of these roads manually would likely take many

months if not years. It is only because this type of technology and computing power is available to us now that these types of analyses are possible. One of the other aspects of this route production was the collation of all the known river fording points, both at fords and footsticks. This was accomplished through the interrogation of both the 6 inch and 25 inch digital historic maps. This again is another task made easier by the GIS as access to paper maps or replicas of these maps are much harder to access.

As far as this author is aware, this PhD thesis forms the *only* comprehensive map and detailing of transport infrastructure, not only of Brega, but of any early medieval kingdom in Ireland. So, for example, the exact location of the early medieval ports is not known for Brega, though we have clear evidence for the importation of commodities like E-ware, but likely locations were added to the GIS using judgement and best estimates. These ports, combined with the location of the fords, rivers, and roads gives the most complete illustration of the transport infrastructure of the kingdom available.

8.5 Understanding the land. How GIS helps us explore people in their physical landscapes

As mentioned above, analysing large scale data is difficult without the GIS. In Stout's seminal work *The Irish Ringfort*, he used statistical models to analyse settlement. While there have been many papers written in relation to ringforts and settlement, there have been very few large scale case studies done until EMAP in 2014, with most researchers narrowing their focus to either the site or locality level. There is a large body of research which relies heavily on Stout's work, and in some ways this has canalised research in the area. Indeed even relatively recent papers (for example Dowd 2018) are still citing Stout's figures for the overall numbers of ringforts, when EMAP and Curran's (2020a) research has shown these numbers to be vastly underestimated. New approaches such as some of the ones used in this thesis can expand on this valuable work which has gone before.

Having said that Stout's work canalised research in this area, just as the topography of the kingdom canalised or channeled settlement towards particular areas. The topography was not the only deciding factor in where and how to place settlements, but in a society where agriculture and agricultural production were essential not only to sustain life, but also to sustain a person's status and place in society, the ability to farm livestock and crops was essential. This factor, coupled with topographical elements such as steep cliffs and boggy

ground amongst others, imposed restrictions on where people could build and forced them to impose order on the landscape in a particular way.

The physical landscape itself underpinned the agricultural success and therefore the economy of Brega. The landscape itself and all of the advantages it offered was one of the major factors in why Brega was such a coveted place, and it was not just the physical size of the kingdom that made it so attractive, but also the quality of the land. Land values were decided on many factors, and location and ease of access to water, roads and other resources increased its value considerably.

Centered on a large plain and based on a bedrock of limestone, the kingdom generally was covered with well drained mineral soils which were excellent for growing grass, thereby facilitating cattle farming, and also arable crops. The geology was also important in that there were no large mountain ranges to impede travel or create difficulties for farming the poor soil usually found on them. There was also very little boggy ground and lots of rivers and streams which served both to drain the land and create opportunities for transportation of goods along the larger rivers. These large rivers drained into the sea along the eastern border of the kingdom and so created access to trade and prestige goods from farther afield, and there are many examples of Romano-British artifacts, as well as E-ware pottery from Gaul and Mediterranean pottery found within the kingdom.

In fact there are currently over 3200 kilometers of rivers and streams in Brega and this figure was likely higher before widespread drainage programs for farms. There is no evidence for widespread irrigation during the early medieval period, so access to water sources was imperative to maintain life, both for people and very valuable animals. This is another instance where the GIS can provide excellent results in an analysis. The distance from every ringfort to its nearest freshwater source was calculated and almost 60% of them were within approximately 360 meters of a water source. Tlachta is an outlier in this analysis in that while there is a ringfort present, its use was generally accepted to be of a more ceremonial nature, and daily access to water would not be as important. The rivers were divided up into distance bands and a Chi square test was carried out to test if their distance to water could have been the result of chance, but with the exception of the second band with an average distance of 600 meters the idea of this siting being by chance can be disregarded. Rivers also contributed to the travel, economy and communications of the kingdom and this is mentioned in more detail below.

There do not seem to be many wells in the region. In fact there are 4 which are classed as wells and another 48 which are classed as holy wells, but most of these are undated so there is no satisfactory evidence that the majority are early medieval. There is also a question as to whether people would have had access to holy wells for their daily resource needs.

River valleys create ridges between them. They are prevalent all over the country and yet there has been no study of them as a topographical variable in relation to settlement. This approach is unique to this thesis and the author has not been able to find a similar analysis anywhere in Irish literature. The hydrological modelling features in ArcGIS allow the user to select the resolution of the analysis and this study used two different values for comparison purposes, and 4 different resolutions can be seen in figure 5.32. It was then decided to compare the 1st and 3rd value (500 and 2500) to examine a spread between them. When the lower threshold of 500 is used, almost half of the ringforts in Brega are within 340 meters of a ridge. Almost all of them are within 680 meters of a ridge.

Ground truthing a new technique like this is difficult due to the sheer numbers of ridges and ringforts in the country, so a known example was used. Davis (2011, 37) states that the monument at Tlachta was at the southern end of a ridge at the highest point in the area. This was plotted on Figure 5.35. The monument can be clearly seen at the highest point of the area as represented on the DEM. The line of the ridge was also plotted at both resolutions, and both are in the position they would be expected to be if the technique is accurate. At the coarser value only the steepest part of the ridge is shown, but it is still accurate, and the lower resolution also shows the spurs running off the main ridge.

There are many possible reasons as to why people built their dwellings so close to ridges in the landscape. Protection from the wind and sightlines from particular directions may be possible considerations. The idea of liminality has been raised in the literature, although it is argued here that this would be a factor more important to a traveller moving through the landscape than someone planning to stay and live in the one place permanently.

Mentioning ridges draws connotations of height and slope, and these were very important factors in the siting of ringforts. The majority of the kingdom is made up of the famous plain, and none of the hills are particularly high with the highest point of the kingdom being 272 meters above sea level. However there are differences in the heights at which people built

their ringforts and this is yet another topographical variable that is rarely mentioned in the literature.

The results of the examination of ringfort heights are stark. The height above sea level was divided into bands and the land area calculated per band and then the actual and expected number of ringforts present were determined.To summarize, people did not build very much at low levels. This may seem paradoxical in a kingdom famous for its vast plain, but in the first band between 0 and 55 meters, which forms just over 25% of the land surface, there are almost 300% less ringforts than would be expected based on land area. The next band up is closer with only approximately 12% less than expected. The biggest change is shown in band 3, between 110 and 165 meters, where there are almost three times as many ringforts as we would expect to see based on the land area. In fact just over 33% of the ringforts in the kingdom are sited on 11.42% of the land - the total percentage of land in this band. The next two higher bands also show a far higher percentage of ringforts than would be expected. Almost 55% of the ringforts in the kingdom are sited between 55 and 110 meters with another 33% between 100 and 165 meters, so 88% of all ringforts are sited in quite a narrow 110 meter height band showing a very definite predilection for these heights. It is recognised that there is a possibility that these statistics have been skewed at the lowest height band and a substantial proportion of this land is at the coast as would be expected, and that section of coastline has many towns along it which would result in the removal of settlement sites. While lower land can be susceptible to flooding, and it has already been shown how close ringforts were built to rivers, it is also easier and less energetically costly to move around on flatter land, but this does not seem to have been a big enough incentive for people to build there.

When the size of a ringfort is calculated in relation to its height a couple of trends emerge. At all height bands there is a wide disparity in the size of ringforts, and the average area is reasonably close regardless what height the ringfort is built at, except for the highest band. There are some interesting points to be made here. At the lowest elevations in band 1, the ringforts are smaller than their counterparts in the other bands. In other words the smallest ringfort in band 1 is smaller than the smallest ringforts in the other bands, and quite substantially smaller in the case of bands 4 and 5. The biggest ringfort in band 1 is also substantially smaller than the biggest ringforts in the other bands, showing that people tried to avoid building at lower levels, and when they did they tended to build smaller ringforts.

The height bands were adjusted to enable comparison with Isabel Bennetts (1989) study of ringforts in Wexford. When adjustments were made to the Brega data to bring them in line with Bennetts data, a much smaller sample size results - 44 ringforts instead of the 494 in the complete dataset. With this taken into account the Brega ringforts are almost 70% larger than the Wexford ringforts. This is interesting as Wexford is also an area of generally high quality arable land, so the ringfort size might superficially be expected to be similar. Barrett (1982, 86) in a study in County Louth stated that 33% of ringforts sit between 30 and 60 meters above sea level, in Brega this figure is just over 6%, a stark contrast. This highlights the danger of very tightly focussed regional analysis, and the even bigger danger in trying to interpolate that across the country rather than comparing and contrasting different regions.

Another function related to height is slope. Calculation of the slope of every cell in the DEM is another process, like most of the processes above, that would simply be too arduous to do manually, but yet can add value to the analysis. It is referred to above that one possible reason for avoiding building on very low lying land is the risk of flooding, and elevation helps to drain soils. Good soil drainage is also a function of slope. The slopes in Brega range from 0 to 38.8 degrees, but these higher grade slopes are obviously too high for settlement sites. The actual range on which settlement sites are built on in the kingdom is 0 to 12.7 degrees. In general people built on very slight slopes, and tried to avoid steeper inclines. Just under 68% of the ringforts in Brega were built with a band of 0 to 2.5 degrees. The next band from 2.6 to 5.1 degrees contained slightly over 22% of settlement sites, giving a total of approximately 90% built on slopes of less than 5 degrees. This meant that soils would have good drainage, but also that movement in and around the site would not be too arduous. Interestingly whilst other variables differ between regions the slopes people chose to build on in Brega were remarkably similar to that found in other parts of the country. In Stout's studies in the midlands, he found ringforts were built on an average slope of 2.6 degrees and in Brega this figure was 2.32 degrees. In his study area 54% of the ringforts were in the 0.3 to 2 degree range and in Brega this figure is 54.25% - a strikingly similar result.

So while there are similarities between Brega and other study areas in regards to slope, there are other marked differences in terms of the numbers of ringforts of particular shape and size, and also of settlement densities.

8.6 Exploring political topographies and territorial boundaries in GIS

The sea created the eastern boundary of the kingdom. The other boundaries were more fluid, with the rivers Glyde and Dee forming the northern boundary and the Liffey and Rye the southern, although there was fluctuation in these over time, and physical or topographical boundaries did not always define the extents of an area. It was the western boundary however that seems to have been the most mutable. The cause of this instability was the political and economic maneuverings of different population groups who coveted this valuable agricultural land as mentioned above. The annexation of the kingdom by the Síl nÁeda Sláine early in the 5th century created conflict on all sides, and this conflict continued throughout the early medieval period until they lost hegemony over the kingdom to the Clann Cholmáin who they had clashed with throughout the period. It wasn't just the economic value of the land that attracted the Southern Uí Neill, of which the Síl nÁeda Sláine and Clann Cholmáin were branches, but also its political and cultural position as the seat of the high king of Ireland.

As well as the internecine warfare between these two groups, there was also contention with the Ulaid and Lagain who originally controlled Brega. Strife also arrived later in the period in the form of the Vikings, raiding deep into the kingdom up the rivers and eventually settling in Dublin, right on the southern border of the kingdom. By that time though, the Síl nÁeda Sláine were a spent force.

All of these factors contribute to the difficulty in clearly defining borders for the kingdom, and chapter 4 explores this in detail. Also mentioned there is the care that has to be taken when selecting datasets for use in the GIS. It has been voiced at various points in this thesis that one of the difficulties as well as one of the advantages with the use of GIS is the "point and click" availability of the tools within it. Different datasets were discussed above which provide contrasting outcomes, so while the GIS is invaluable, the knowledge base of the archaeologist using it is also essential, and choosing which dataset to use is an intrinsic part of the process.

While the above attempts to define the external kingdom border, it also must be remembered that there were many internal borders, not all of which are obvious to modern readers. Of particular interest here is the use of *ferta* or ancestral graves to mark borders and delineate territory. Using something as important as the remains of your ancestors is demonstrative of how important some of these boundaries were to the people who decided to mark them.

Whether it was designed to signify ownership of the land or demonstrate domination of a subjugated people cannot now be known with any certainty, but what is certain is that it was not something which would have been taken lightly, either by the people who interred their ancestral remains in these graves, or by the people who saw them as markers in the landscape.

Using the GIS to analyse the landscape setting of these important markers enables us to look for trends in their siting. It is generally thought that they were placed on bluffs overlooking rivers in an attempt to make them more visible in the landscape. When investigated with the GIS however, using a combination of viewsheds and a terrain ruggedness index, indications are that they are more visible at greater distances than at a very local scale. This would seem to reinforce the idea that they were meant as a signifier to outsiders, rather than as a mechanism to dominate local people who would likely already have known of the existence of the *ferta* anyway.

Another interesting trend here is that the intervisibility of these graves does not correlate with the number of burials. In other words the number of burials within the grave does not seem to directly correlate with the size of the viewshed or the amount of the landscape the *fert* is visible from. This is possibly counterintuitive as it might be thought that the biggest graves with the biggest number of inclusions would be expected to dominate the largest part of the landscape, but this is not the case.

It might also be imagined that the ferta which were in use for the longest period of time would have the most interments but this is also not the case. The largest number of burials, 358 at Johnstown, were in a grave that was only used for about 400 years. Next was Collierstown with 61+ burials in 300 years and Bettystown with 61 burials in 100 years. Rosnaree only had 4 burials over 4500 years and Pelletstown had 4 over 3200 years. Due to the short span of almost half of these inclusions, it is possible that a lot of interments were made around the beginning of the 5th Century in either an attempt to ward off encroachment from outsiders, or to dominate the indinginous inhabitants.

There would also seem to be a link to the boundaries of the kingdom in the form of trivallate ringforts as mentioned in section 8.4 and in more detail in section 4.3. Figure 5.27 and 5.28 show that there is a line of trivallate ringforts close to the western and southern borders and these are “mirrored” on the other side in what was Mide. While these sites were unlikely to

have been directly intended to demarcate a border, it is unlikely that their siting at the interface between kingdoms was coincidental. Often labelled as “high status” or “royal”, these are complex sites which have suffered from a lack of understanding due to the paucity of excavation. The reality is likely to be that they had many functions, including acting as a bulwark against foreign troops much like Anglo-Saxon burghs in Britain, and also as trading posts with the ability to safely contain trade goods. The almost constant conflict throughout the period described earlier ensured that such a bulwark was needed.

The GIS was useful in plotting the locations of Anglo-Norman mottes. Late in the period it can be seen in figure 5.8 that a new type of boundary was created in the line of Anglo-Norman mottes encroaching around the edges of high density ringfort settlement. This line loosely follows the extents of the Pale, the areas controlled by the Anglo-Normans with the caveat that this line was formed at different times over a wide period, and did not just emerge fully formed. It also must be noted that while the line generally divides the areas of higher and lower ringfort density, it is likely that the settlement of the Anglo-Normans in the area is precisely the reason why we have a lower density settlement. Simply put they destroyed ringforts in order to improve their land for ploughing. These mottes were also built strategically and Figure 5.8 clearly shows the line of the modern M3 road straddled by them. Chapter 6 shows that many of our modern roads are loosely based on much earlier routes, so the modern road is likely to be not too far removed from the older one.

8.7 Using GIS to understand aspects of settlement

Brega is quite problematic in regards to its settlement. It was a key area of settlement from the earliest times. In fact it is likely the oldest artefact ever found in Ireland, a flint flake from Mell, near Drogheda was found within Brega (Mitchell and Sieveking 1972). While it can in no way be claimed that this flint flake indicates settlement at this early date, there is certainly a long history of settlement in the area as evidenced by the numerous substantial prehistoric monument complexes.

However settlement evidence for the Iron Age is almost non-existent, or more correctly, very little evidence has been found yet, so the settlement picture at the start of the early medieval period is somewhat clouded. Exacerbating this we have the Pale, the area settled by the Anglo-Normans, encroaching on the kingdom and defined roughly by the line of the N52 road. South of this road there is much less evidence for settlement which clouds the overall settlement picture somewhat, and has a major impact on any statistical analysis. Realistically,

based on what we know from the area north of this line and the rest of the country, settlement density figures below the line were likely to be very similar to those above it. This again shows the importance of taking regional variations into account, as this factor would not be replicated in other areas of the country.

This contributes to an important question for early medieval scholars - the idea of nucleation and whether it was present in the Irish settlement landscape. There seems to be a tendency to try to "reach" for nucleation in the landscape, grouping sites of lower status around ones of higher status and this can be seen in Stout's work (2000, 127, Figure 3.3). However it is generally accepted that there was no nucleation present in the traditional sense (O'Sullivan et al. 2014, 48).

It is successfully argued here that while there is no evidence for nucleation in the traditional sense, there was definite evidence for clustering. Simply put, ringforts were built very close together. On average in Brega they were approximately 1 kilometer apart. This figure has the caveat mentioned above that when the area below the N52 is taken into account, the 1 kilometer figure drops to just over 600 meters. Also lowering this distance is the existence of the *airlise*, which is an area outside the *les* (enclosure) amounting to one spear cast on all sides according to the *Críth Gablach* (Binchy 1941). Norman and St Joseph (1969) also note that there are petal shaped field systems around the perimeter of the *les* so the actual distance between the boundaries of each individual settlement is likely to be substantially smaller.

One of the most commonly accepted tests for the clustering mentioned above is the Moran's I statistic and this has been used in a plethora of archaeological analyses all over the world. This creates a Nearest Neighbour Index (NNI), and a value of less than 1 is indicative of clustering in the data.In the case of Brega the NNI is 0.759 which shows definite clustering. The GIS also enables us to calculate the level of certainty the NNI is calculated at, and in this case there is less than 1% chance that this clustering is randomly formed.

A new approach taken within this thesis and enabled by the GIS was to create a buffer around each ringfort to see how much overlap there was. This is a technique the author has not been able to find in any other settlement literature in Ireland, and is likely to be the first time this has been attempted. A 500 meter buffer was drawn around each ringfort, to allow space for the *airlise* and the *les*. This figure is slightly arbitrary as we don't know the exact dimensions of the *airlise* and the dimensions of the *les* change with each ringfort, but it can

still give a general indication of overlaps. When plotted over 40% of the ringforts in Brega are in a buffer zone of another ringfort. When adjusted for edge effects the NNI is even lower and the overlaps increase substantially. This shows that while ringforts have sometimes been termed “isolated farmsteads", they were in fact not isolated as all, but usually located very close to one another, so having family so close by to share resources may have obviated the need for nucleation in the first instance.

Another technique used here and enabled by the GIS is the use of “Hotspot Analysis”. This can be seen in Figure 5.20 and is a very useful graphic to visually compare the different areas of the kingdom. While the area to the north of the N52 road shows significant “heat” as mentioned earlier, what this graphic shows is the effects of urbanisation on the material remains of settlement in the area. While the central plain had many ringforts destroyed as mentioned earlier, the heavily urbanised areas of Dublin, Drogheda and surrounding towns have almost completely destroyed any evidence of settlement in the area. This is a tool that could usefully be applied in other areas to find not only areas of clustering or settlement density, but also areas where settlement was more sparse and an attempt could be made to establish the reasons for the underlying cause.

8.8 An analysis of ringfort shape

The shape of a ringfort is superficially thought to be circular, but this is often not the case, and ringforts have more shapes and sizes than previously thought. However, ringfort shape is something that rarely appears in the literature on any large scale. While it is often mentioned in individual excavation reports, it is rarely studied on a landscape scale with Stout (1991, 2000) being the main proponent. The name ringfort itself gives rise to the idea of circularity, and the shape of ringforts was undoubtedly important in early medieval Ireland, but was also very complex and full of contradictions. The *Críth Gablach* tells us that the ringfort of a king of a *túath* should be “seven score feet of perfect feet are the measure of his stockade on every side” MacNeill (1923, 305), which since the figures were included in the manuscript would seem to highlight the importance of their circularity. This “seven score feet” would equate to approximately 40 meters. Interestingly in Brega we currently only have 41 ringforts for which we have readily available internal and external diameters, and only 4 of these closely match a diameter of 40 meters - two trivallate and two bivallate ringforts. These would superficially seem to be the residences of kings. Unfortunately none of these ringforts are mentioned in the surviving literature as being the residence of a king, whereas we do have the seats of the kings of the kingdom mentioned at places such as *Rath Airthir* or Lagore crannog.

It has been suggested (Stout 2007, 15) that a circular shape was possibly used to link the shape with the tombs of the ancestors, or on a spiritual level to avoid having corners where the devil may haunt. Stout does also offer more practical reasons for this shape, and it is argued here that they are a more realistic assessment of why a circular shape was chosen. In fact, it is a common principle of civil engineering that a curved wall is stronger than a flat wall, so there is less chance of a palisade being pushed flat from the outside by wind or attackers if it is curved. Chapter 5 has detailed some of the issues in discussing features like circularity, and particularly important is the fact that these ringforts have been described and measured by different archaeologists in different parts of the country. As such, a particular ringfort might have been described as sub-circular by one archaeologist, but oval by another. There is little detail in Stout's work as to how these designations have been arrived at in his research which makes comparisons with different parts of the country more difficult.

In terms of circularity as described in the scope notes on the HEV, only just over 52% of ringforts in Brega are defined as circular, which stretches Ó'Riordáin's (1979) description of them as "most frequently circular". Of these circular ringforts only just over 15% have an area reasonably matching the figures Stout quotes for the south-west midlands of between 28-35 meters. In this area Stout states that about 40% of ringforts have this diameter. Table 5.1 highlights an important point here - circular ringforts have a much larger area than oval or sub-circular ringforts regardless of the number of banks and ditches surrounding them. In Brega the average area of a circular univallate ringfort is 4610m², while a sub-circular univallate ringfort is only 1662m² and an oval univallatte ringfort is 1495m². The oval and sub-circular ringforts maintain the same percentage increase in size as the number of banks and ditches increase.

These figures create an interesting paradox. Multivallate ringforts are often mentioned in the literature as "high-status" sites, and the evidence above from the *Crith Gablach* would seem to reinforce this. Yet status also depended on the amount of land a person owned. It is hard to imagine that a farmer of low status would make his farm less profitable by building a very large enclosure, thereby reducing the acreage available for arable crops and pasture for his cattle. In Brega however these univallate "low status" ringforts were substantially larger than "high-status" multivallate ringforts. It is likely that the sheer proliferation of univallate ringforts make the exact nature of this type of settlement more obscure.

As well as the shape of ringforts, the dating of the sites in Brega is interesting. The main thrust of ringfort construction is generally accepted to have been between the 7th and 10th

century. However within the kingdom we have nine sites excavated to a high level by the NRA, and of these nine sites Roestown 2 shows settlement evidence from the Mesolithic period, and 4 others, Raystown, Castlefarm 1, Roestown 2 (Continued occupation) and Ross 1, show settlement evidence from the Neolithic period. All 9 sites show occupation during the Bronze Age. During the Iron Age settlement continues at 7 sites, with no evidence from Roestown 2 or Dowdstown 2, and then they are all occupied again during the early medieval period. Three of them also show continuation of occupation into the late medieval period between the 12th and 17th century. High quality, extensive excavations like these can provide real depth to our analysis of settlement, and throws the accepted dates of construction and occupation of ringforts into doubt. The question must be asked if more sites were fully excavated in this way if we would see a wider spread of construction and occupation dates than is currently accepted. Admittedly, here the sample size is small, nine out of almost 500 ringforts. It would be an interesting future project to collate this data in different areas of the country at a more granular level than EMAP was intended to do.

One factor that eludes us archaeologically is if these sites were occupied almost constantly through these ages, were the inhabitants the original settlers who owned the land and passing it from generation to generation, or if these sites were occupied by the influx of Síl nÁeda Sláine who moved into the area. It is quite possible that sites like Roestown 2 and Dowdstown 2 which fell out of use in the Iron Age were reoccupied by newly encroaching peoples in the early medieval period.

As mentioned above there is a general acceptance that the construction of ringforts increased between AD 600 and AD 900. Improvements in agricultural technology meant an increase in production and output. This is likely to have led to the substantial increase in population we see at this time. A general increase in prosperity is often coupled with a need to protect the fruits of that prosperity and this could have been one factor why ringforts were built, although as shown above, ringforts were often constructed long before the increase in population and prosperity. There is a much discussed debate in the literature as to the defensibility of a ringfort, but it is argued here that most of the archaeologists who argue these points have no real experience of battle, especially at a time when injury or disfigurement could mean loss of status, family or even the ability to produce enough food to live on. Thus the defenses, while in no way being intended to withstand a protracted siege, would often be more than enough to deter small raiding parties and wild animals.

8.9 The case of trivallate ringforts

While a special emphasis has been placed on trying to understand more about settlement at all levels of society, these important sites with multiple ramparts cannot be ignored. Study of these sites is almost hamstrung by their size and assumed importance. Development led excavation will usually be altered to avoid passing through these sites, and research led excavation on this scale would simply be too costly and time consuming. So it is that we are trying to examine a very important monument type with far less excavation evidence than we have for almost any other monument type. Even the trivallate ringforts at Garranes, County Cork have had only partial excavation.

These monuments are often considered “royal” or high status sites, and indeed *Rath Airthir* in Brega was a royal seat at one time. However it is argued here that while they may have come under a royal purview, these sites were multifaceted as well as multivalleted.

It has been argued that they were not dwellings, but were used as cattle enclosures (O’Neill 2010, 89), yet there is evidence at Garryduff 1 for hearths, packed earth and pavements suggesting dwelling places. Barrett (1980, 42) states that there is no direct evidence to suggest they were of “superior social or military significance”, yet their proximity to the borders of the kingdom and their strategic influence on routes in and out of the kingdom cannot be ignored, especially combined with the addition of the extra banks and ditches. It is interesting that in a powerful and wealthy kingdom which contained the seat of the high kings of Ireland, the trivallate ringforts were smaller overall than in other parts of the country. This could possibly indicate that it was the number of banks and ditches that added to the status of the site and not necessarily its overall size. Alternatively, it is possible that they were big enough for the use to which they were being put, and didn't need to be made any bigger. Having made this point it would seem that Brega might contain more of these sites than other areas. For example in Wexford, Drumm and Tierney (2010, 4) suggest that there only 0.67% of the ringforts are trivalllate, whereas in Brega that figure is 3.04%, so it is possibly in the number of trivallate ringforts that power and prestige is shown rather than their overall size.

A very interesting point raised in this thesis is the “mirroring” of trivallate ringforts across the kingdom borders, seen in Figure 5.28. While being cognizant of the fact that the border was fluid at times, it cannot be coincidence that of the 14 trivallate ringforts in Brega, 13 of them are within 5 kilometres of the border, and the average distance is 2.27 kilometers. Across the border in Mide, modern County Westmeath, there are nine trivallate ringforts, and the

average distance to the border is remarkably similar to the Brega ringforts at 5.1 kilometers. This strategic placement could be for many reasons, two of which might be to monitor access to the interior of the kingdom, and also to intimidate or display power to travellers to the kingdom. The GIS has a useful tool called the Nearest Neighbour tool and this allows us to calculate the distance from one dataset, the Brega ringforts, to the nearest point in another dataset, the Mide ringforts. When this is calculated the average distance between them is 12.85 kilometers, but when the outlier at Rathdrumin is removed this figure drops to 10.6 kilometers. It is argued here that the distance between them was so small so as to ensure both their strategic value and also to reduce the distance needed to travel if trading between kingdoms. For example, if cattle were traded between Brega and Mide, the Mide drovers would not want to be in a perilous position driving cows for many miles to get back to a place of safety when cattle raiding was endemic in Irish society. The space between the trivallate ringforts could have served almost as a “no man’s land” halfway between both sets of border posts and so protected by them.

These were multiuse, complex sites. They could have been used as military staging posts in times of conflict, of which we know there were many. They also could have been used for the temporary storage of animals when trading across borders. They were used for craft production. They also served as royal seats. Trying to define or categorise them as one thing, which happens so often in the literature, is too reductive and the reality is likely to have been that they were employed for all of the above at different times and sometimes even simultaneously.

8.10 Reconstructing the communication and transport networks of Brega with GIS

Travel and communication is an intrinsic part of any society and contributes greatly to the economy and the cultural functioning of that society, and it can be argued that society could not function without these elements. In general travel within early medieval society can almost be thought of as a series of concentric circles. The innermost circle would be small distances as people moved about their daily work, to fields to tend crops and animals. The next circle outwards can be thought of as the *derbfine* (kin group). This would be normal social mixing for local customs and festivals and passage rites for men and women, but this would still be at quite a local level. The next circle would consist of trade for items not made locally and also of visiting the nobility to either receive a tithe or return the food rents and for *óenach* (assemblies). For most people their travel would be limited to the inner circles and most people would not have left their localities in their lifetimes. The outermost circle can be thought of as being almost strictly limited to the nobility who sometimes made circuits of their

lands. There are other instances in which people may have travelled more widely than normal, such as if travelling to a battle outside their own *túath* as part of their service to a lord, and there were also merchants who travelled. As Christianity grew, attendance at mass would have created new trackways as people travelled to their celebrations and ecclesiastic building and settlement undoubtedly had an impact on the landscape.

Considering how important travel and communication is to the functioning of society it is quite surprising how little detailed analysis has been carried out on this subject. There are only a few major publications on the topic, (Comber 2001; Dudley-Edwards 1991; Kelly 2000; O'Keeffe 2001; Ó Lochlainn 1940) with Ó'Lochlainn's study still being the most detailed over 80 years after publication. Somewhat surprisingly, there is even less information directly relating to Brega, which contained the seat of the high kings of Ireland and was one of the most politically and economically powerful, and also most highly contested, kingdoms in the country. It is argued here that one of the major contributing factors to this political and economic power was the network of roads, rivers and ports that facilitated many cultural manifestations, such as struggle for political power, trade in high value imported goods, and movement of cattle and food rents throughout the kingdom.

In any analysis of the route network of a kingdom like Brega, it must be recognized that the picture is incomplete. There were many small roads and tracks that were beneath notice except to the local people who used them, and these were not recorded anywhere so we have no records of them, although some are likely to be the basis for existing pathways and rights of way to this day.

Brookes (2007, 56) argued that roads were one of the most obvious ways in which people interacted with the landscape, and this is undoubtedly true, but it is also one of the main ways they interacted with each other. People met and passed each other on roadways, fords, stayed overnight in the hostels of the *briugu* (hospitallers), who provided hospitality to travellers and met and conducted economic transactions at particular places along the road. It is partly through these interfaces that news, ideologies and economic transactions were transmitted.

Economic transactions were often the bolster of cultural transactions. In early medieval Ireland there existed a system of clientship, where the lord gave a fief of cattle or crops to his client who then repaid them with interest in the form of an extra cow or crops depending on

the exact nature of the transaction. So much of Irish culture involved cattle. The system of clientship, the status of a person was measured in cattle, and the need to drive them to and from water was so important that the modern Irish name for road - *bóthar* - means “cattle road” or “cow track”.

The roads had a hierarchical structure depending on their size, and like many other parts of Irish culture the strictures were laid down in the law tracts. For the individual types of road see table 6.1. Certain types of road, the *tógraite,* could be tolled, but roads had other economic values also - namely the ability to raise the value of land that has access to them. These are laid down in the old Irish law text the *Tír Cumaile* and a road which had access to a woodland or the seashore for example, added to its value. It is interesting to note here that even though Brega had such a large network of roads, there seems to have been very little distribution of marine foodstuffs throughout the kingdom.

Roads also shape the landscape, and can lend importance to sites by the amount of roads that lead there. Paradoxically important sites could also have led to the construction of roads to access them. The importance of places can often be seen by the number of roads that connect them, and both Tara and Dublin were well serviced in this regard.

Unfortunately a downside to such a well developed road network was the ability to transport troops more quickly around the kingdom. Movement of the Síl nÁeda Sláine into the area was probably facilitated by the comprehensive road network. Then came Anglo-Saxon raiders who attacked many churches in 685 A.D., and by Vikings and Hiberno-norse raiders later in the period. While these raiders arrived by ship, facilitated through the many ports and deep rivers, their attacks and then retreat to their ships were enhanced by the ability to move in and out of the kingdom quite quickly. Irish monks and monasteries were well known and well respected throughout Europe at this time and this recognition probably helped to make them targets for raiders.

These roads, ports and rivers also meant that Ireland, and Brega in particular, was very connected by sea to Britain and further afield, enough so in fact that the Uí Néill were heavily involved in Northumbrian politics. Dudley Edwards (1991) argued that Ireland’s coastline was hostile to approaching ships, but the reality is that while there are strong tides in some areas, mariners of this period understood them well and could navigate them with ease. An example of this is the use of Dalkey Island as a trading point. Between the island and the mainland the

tide runs quite strongly during spring tides and could restrict a ship approaching or leaving a mainland harbour until the tide was favourable. Landing on the outside of Dalkey island meant that ships could land and leave as required, thus showing a good knowledge of how tides worked, and also possibly indicating that the mainland could have been inhospitable to traders on occasion, necessitating the need to leave quickly.

There were other ports closer to Brega also shown on Figure 6.10. There is much evidence that these ports were in use, with mentions in the hagiographies in relation to Saint Patrick, but more solid evidence can also be found in the form of Mediterranean and Frankish pottery vessels, probably containing oil, wine and other foodstuffs. There have been enough of these found to suggest relatively widespread importation of these goods, and wine was also imported for the church.

A difficulty with studying the roads within a kingdom is that some of them start outside the kingdom, pass through it and continue on. Notwithstanding this the focus of this thesis was on the sections that pass through the kingdom itself. As such the thesis models approximately 820 kilometers of road for which we have evidence in the literature, mainly based on O'Lochlainn's list in his 1940 essay. The two of the 5 major *slighe* ran through Brega and joined with each other within the kingdom, meaning both north–south and east–west transport were facilitated, and news, troops, goods or anything else that needed moving over long distances were likely to have moved along these major highways rather than smaller roads through often hostile territory. These roads were also in theory well kept with kings having responsibility for ensuring their maintenance and their clients owing service to maintain parts of the roads.

It was mentioned above that there are relatively few detailed studies of the ancient road networks of Ireland. The ones that there are often don't show a map of roads and even O'Lochlainn's essay consists only of a list of stopping places along the routes, but no maps. The ones that do show a map usually just draw a straight line from one stopping place to the next. It has become quite common in other countries to use a technique called Least Cost Path Analysis to model ancient routeways, but that technique is almost non-existent in Irish literature. The closest we have for it in this country is the paper by O'Brien and Bergh (2016) which does attempt to model the routes, but forces them to follow the eskers as there is some small evidence that certain routes would have travelled this way. As far as the author is aware this is the only thesis or paper in Irish archaeology that implements a Least Cost Path with multiple variables included in the analysis.

People in general will pick the easiest routes between two places, and these routes were refined over a wide span of time, often hundreds of years as people made choices in their route selection and constantly refined those choices, and it is the result of these choices that this thesis attempts to model. In the early days of LCP analysis only one variable was used - that of the slope of the ground, calculated from a DEM. This thesis has used a much more layered and nuanced approach, combining multiple data layers into a combined raster known as a friction surface. Each cell in this surface has a different impedance based on the result of combining multiple layers.

This was not without its difficulties. For example in the river network, small streams were treated in the same way as a large river like the Boyne which is obviously incorrect as cattle or people could move across a small stream but not a deep, wide river like the Boyne. So it was decided to overcome this by examining the historic maps and literature to find all the fording places and footsticks and use them as a layer with a low impedance, so as the LCP got nearer to a ford across a river it would channel the LCP towards it. Stream orders were also incorporated into the friction surface to include what is termed in the thesis as “barrier rivers”, which meant deep and wide rivers with a high stream order would be completely blocked to movement as it would be extremely difficult for cattle to be moved across it or a person to even swim.

Sixteen roads were modelled in this way and gave rise to some interesting observations. For example the Slí Assail diverges quite strongly from the LCP in order to pass through Navan. Navan as a node on a route network had many roads leading into and out of it and could be considered a hub for travellers. It was also accessible to the sea for boats coming up and down the river as the Boyne was navigable as far as Trim. Another interesting notion is shown in the case of what is modern day Crossakiel, where the LCP keeps to the lower ground and skirts the hills, but the known route ascends up those hills. It is not known exactly why this route was chosen, but possibly because two large ringforts on the hill summit would afford good defensive views for anyone penning cattle within them, and also the hills would be a landmark to navigate by. These two ringforts are also very close to fording points on the Athboy river, which means it is possible that they were *briugu* hostels where travellers could stop for the night, affording easy access across the river, water for the cattle, and a safe hilltop to pen the animals.

Another notable point is the examination of the route of the *Slí Mhidhluachre* - the main north–south route in the country. The LCP in this case closely follows the modern route of the

N2, showing this is the least costly route energetically. However the ancient route of the *Slí Mhidhluachre* actually follows the line of the modern M1 quite closely. Why this route was formed is not mentioned specifically in the literature, but it is likely to be its proximity to the sea to enable transport of goods. Another technique which is quite common in other countries, but also almost non-existent in Irish archaeology is Viewshed analysis. A viewshed was carried out on the two modelled roads and it can be easily seen in Figure 6.7 and Figure 6.8 that the coastline can be seen far more easily from the route that follows the M1. This is with the caveat that forestry or other vegetation does not block the modelled view, which is something there is no way to reconstruct.

We have no evidence at the moment for the exact location of the ports along the Brega coastline. However we do know that ships would move inland as much as possible to avoid storms and to aid travel to the interior of the kingdom as can be seen by the settlement at Wood Quay - approximately 4 kilometres inland from the mouth of the Liffey. With this in mind a location has been chosen to map the ports as far inland as possible before the river narrows significantly. When the modelled ports are combined with the modelled route of the *Slí Mhidhluachra* the distance from the ports to the road are very small, and well within the margin for error. Taking this into account it is possible that the route actually intersected with the ports, or had smaller, short sections of access road joining them to the main highway. These nuances cannot be teased out by just drawing straight lines from node to node on the map, and they highlight the usefulness of these techniques.

The other routes collated from O'Lochlainn (1940) and O'Keeffe (2001) are then modelled also, but not in as much detail as the major *slí*. All of these routes are then shown on figures 6.25 and 6.26 making a comprehensive map of the modelled routes of Brega, with figure 7.2 including the roads, ports, large rivers and fording places. When the lengths of these routes are calculated it amounts to 821.85 kilometers of road. Meath County Council (2020) state that there are currently 3620 kilometers of roads in the county, so bearing in mind as mentioned earlier that the smaller roads and cow tracks in the kingdom were not mentioned in the literature it is not too much of a stretch for the imagination to conceive of these figures being quite similar.

There are many "nodes" in the transport network of Brega, and indeed it can be said that the kingdom itself is a node in the wider transport architecture of the country and even further afield. Within the kingdom however some nodes are more connected than others and these can be instructive. As a general rule the more connected a place is, the more important it is.

Transport networks are not built to service unknown or unimportant places, the more connections a place has is a strong indicator of its importance. For example, the most connected place in Brega was Tara. Tara itself is a complex site with much prehistoric burial and ritual and also being the seat of the high kings and a site for assemblies, so it is hardly surprising that there are so many connections. Teltown, another assembly place, also has 7 connections marking it out as important. Slane, Drogheda and Navan come next, with Slane being regarded as a royal site and as such would be well placed. It is not surprising that Slane, Drogheda and Navan have all grown into large towns since they were such important places from early times. Interestingly however Knowth and Newgrange, two recognised early medieval assembly sites, have very few connections, and this is possibly due to the omission from the literature of the time of these strongly pagan sites by the monks who recorded the annals.

Another interesting point is that Dublin is thought to have come to prominence only after the settlement of the Vikings, and yet O'Lochlainn lists 7 connections to it in his paper. Furthermore, 4 of these roads are major *slí* all converging at Dublin, although exactly where they converge is unknown. These roads are thought to have their origins in the prehistoric period. This would beg the question - if there was no major presence in the area before the Vikings why are so many prehistoric roads concentrated at the same place ? Due to the highly urbanised nature of the city it is unlikely we will ever find out. However, the size of the river Liffey and its use as a port would indicate that it was in use before the arrival of the Vikings, but the evidence has been buried under concrete. The Viking longphort at Dublin was not far from the interface with Brega and it is undoubted that there were many interchanges of both goods and cultural ideas between the two.

The Liffey was not the only river in use at this time and travel by water was an efficient way of moving around the landscape. Brega has 5 rivers with a stream order of 5 or above, meaning they are all quite wide and deep as they get closer to the sea. This means that entering the kingdom through one of the sea ports and travelling upriver was an efficient way of travelling through the kingdom and as well as facilitating the transport of goods, was often quite a stealthy and fast way for marauders to penetrate deep inland. In fact Brega has approximately 182 kilometers of river with a stream order of 5 or above, which is more than would be expected for the size of the kingdom which in addition to the large number of roads meant the kingdom had a very comprehensive transport network.

Another efficient way to travel was with horses, both in chariots and on horseback. While we have very little material evidence for the use of chariots there are many mentions of them in manuscripts and stories like the *Táin*. They are also carved on high crosses and of the 6 existing high crosses with chariots carved on them, 3 are in Brega. This highlights not only the importance of the chariot, but also the strength of the Christian church in the kingdom.

The definition of a *slí* is a road on which two chariots can pass each other - the largest form of road in early medieval Ireland. The next size road, a *ród* also mentions a chariot which can be passed by two horsemen. It is perhaps a tenuous indication that a chariot might be wider than two horsemen, and if this is the case then chariots were probably drawn by at least two horses. Chariots such as these and the horses that drew them were the preserve of the wealthy, and acted as symbols of status, wealth and power. Most native Irish horses were relatively small, and it is no coincidence that the remains of larger horses were found at Lagore crannog and Knowth - two royal sites of Brega. This also indicates that horses were being imported and likely interbred with native Irish horses, making them an even bigger display of wealth and power.

8.11 Other considerations in the route network

Even though this thesis has tried to assemble as complete a picture as possible of the route network of Brega, it is acknowledged that this picture is far from complete. Most of the routes reconstructed here are taken from historical sources and the sources themselves are quite fragmentary. Chapter 6 discusses what the author has termed the “Forgotten road”. This is an attempt to trace the possible line of a route from the material remains found along it. There were many roads which were not classed as highways which were probably only really of concern to people from a local region and not of importance to the wider population. There is a possible route from Malahide bay along the route of the modern R125 which ends somewhere near Donaghpatrick and *Rath Airthir*. There are a number of pottery finds from the Mediterranean along this route, and there is a possibility, albeit without any hard evidence, that this pottery may have been for ecclesiastic use at the church at Donaghpatrick or at the royal site of *Rath Airthir*. This route, modelled as an LCP, also passes very close to Lagore crannog, another royal site of Brega. There are also 361 cremations and inhumations along this route, indicating there was possibly a relatively large population in the area.

Notwithstanding this there are two large areas in Brega with no known roads, what the author has termed the “roadless” areas. One to the northwest covering 523 square kilometers and

one to the south comprising 485 square kilometres. The term “roadless” is somewhat of a misnomer, these areas were likely to have been replete with roads, the traces of them just havent been found yet or have been ploughed out or built over, even possibly by modern roads. There are substantial numbers of ringforts in the areas, and sites like Roestown 2 and Castlefarm 1 which have evidence for crafts and metalworking, and these goods would need to have been transported to their eventual destination.

With all of these road and river transportation networks available, travellers needed places to stay. Travelling was still a dangerous pastime in early medieval Ireland and inclement weather and hostile kin groups could make a trip fraught with danger. However there was an onus on certain groups to provide hospitality for travellers. This was a very serious undertaking as to refuse hospitality to someone meant paying them their full honour price - the same amount that would have to be paid if the person was murdered rather than just refused hospitality.

Within a derbfine there would have been a responsibility to provide food and shelter. There was also a responsibility on the clergy to do the same. The third major group were called the *briugu* or hospitallers. These were wealthy men of non noble status who were also very wealthy, and offered hospitality to travellers in return for an increased social status. As with all other aspects of Irish life, the requirements for a *briugu* to attain and then maintain his status were laid down in law. They were often as wealthy or more wealthy than the petty kings they answered to. They were answerable under the law for the safety of the people in their houses, and while offering hospitality in this way could increase their social status, failing in their duties could also result in the reduction of that status. Chapter 6 offered one possible *briugu* site at Crossakiel, but it is acknowledged that this is tenuous, we have no way to identify the dwellings of the *briugu* archaeologically, as they were usually part of the owners ringfort and dwellings. There are also no mentions in the manuscripts of how the house of a *briugu* should be laid out so for the moment they continue to be somewhat of a mystery.

8.12 Further Research

As with all research, each thesis or project has a particular scope, but the limits of that scope give rise to avenues for further research. The first stage might be to expand the scope of this project. The thesis has endeavoured to create a framework that could be used across different regions and territories, and it would be valuable to compare and contrast the findings here against other kingdoms, starting with Mide and expanding from there. It would be particularly interesting to contrast a kingdom with a topography consisting of lower quality agricultural land to examine if there are consistencies or anomalies between them. One of the difficulties with this would be the disparity in classification of ringfort size and shape by archaeologists in different parts of the country. A ringfort which might be classified as oval shaped by one archaeologist might also be classed as sub-circular by another in a different part of the country. Another difficulty would be differences in morphology, for example settlement sites known as cashels, are more prevalent in the west of the country where there is an abundance of stone. It would be an interesting experimental archaeology project to build a traditional ringfort and also build a cashel in a stony area to compare the differences in the required resources taken to build each.

While the dataset is quite large, it was still restricted in its scope. If time and resources had allowed it would have been instructive to examine the interior of each of these ringforts for structures, and also examine them externally, possibly with LiDAR to ascertain if there are identifiable trends in the field systems around the ringforts. Brega has probably the largest free LiDAR dataset available for any kingdom in the country due to the production of these datasets for iconic sites such as Newgrange and Tara, unfortunately these datasets do not cover the whole county so this was not possible.

As mentioned above the NRA sites which were excavated to a high level showed a much wider spread of occupation dates than might be generally accepted, and it would be very informative to target different areas of the country and collect dating data at this micro level to see if the trends shown here are replicated.

The trivallate ringforts mentioned in section 5.6 could also bear further scrutiny. It is difficult to properly determine the function of trivallate ringforts when so little excavation has been carried out. Due to the destructive nature of archaeology and the imagined importance of these sites, it is unlikely that development-led projects will lead to their excavation. Large road and water schemes are more likely to detour around them and leave them in situ. The

huge expense of fully excavating even one of these sites also makes them prohibitively expensive for pure research purposes, so we are left with a dearth of information for what are often regarded as high-status sites, about which we know very little in comparison to the lower orders of ringforts. In relation to this specific project it is notable that the trivallate sites are “mirrored” across the border with Mide, and it would be informative to know if this is replicated between other kingdoms also.

Chapter 6 considers the transport and communications of the kingdom and peripherally touches on the fact that Brega was a nodal point not just within Ireland but also farther afield. Another avenue of further research would be to trace these transport routes further afield, to Europe and beyond and trace Irish trade goods abroad in the same way pottery and other prestige goods from abroad can be traced within Brega. Trade facilitated the transfer of ideologies as well as goods, and the tracing of these trade networks to their endpoints could possibly indicate Irish influences abroad.

In short, to quote a famous Irish political slogan: “A lot done, more to do”.

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