Title	Negotiating the landscape: Prehistoric and early medieval movement in a landscape of esker and bog
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Publication Date	2017-10-20
Item record	http://hdl.handle.net/10379/6922

Negotiating the Landscape

Prehistoric and Early Medieval Movement in a Landscape of Esker and Bog

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This research was funded by the Galway Doctoral Scholarship and the Irish Research Council Doctoral Scholarship

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October 2017

For Granny,

Our Matriarch

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Abstract

The aim of this thesis is to understand movement and the evolution of routeways. The role of the individual and their decision-making process is discussed as a fundamental factor in the origins of paths and routeways. This process begins with the process of landscape learning, cognitive mapping and wayfinding, and is augmented over time with sharing of knowledge, monument building, technological advances, and the control and appropriation of road systems by elite members of society. In order to adequately discuss this evolution, this thesis involves a diachronic study of movement, beginning with landscape learning and practice of movement in the Mesolithic period. The changes and developments of the Neolithic period, Bronze Age and Iron Age are discussed, culminating in the development of road systems in the Early Medieval period.

This topic is explored with a study of North Offaly in the Irish Midlands. It is a complex landscape of wetlands, esker ridges, rivers, dryland, and formerly vast woodland which provides several impediments to movement, as well as a number of natural routeways. The different scales of movement which would have been practiced are evident in this landscape, with a network of wetland trackways facilitating local movement, while natural routeways allow inter-regional movement. The evolution of these paths and routeways are discussed over the *longue durée*, demonstrating the continuity of movement, as well as occasions in which routeways became obsolete in response to major changes in settlement, social structures or technology.

The decision-making process is also considered with the use of digital methodologies. Least Cost Paths and Agent-Based Modelling are used in this research to explore the variables involved as people navigate the landscape and negotiate obstacles. These paths are compared to the archaeological evidence to demonstrate how seemingly elegant structures can arise out of the cumulative behaviours of individual agents.

Acknowledgements

My deepest gratitude to everyone who has helped me in the considerable journey it took to complete this PhD thesis. From the time I was four years old, I have been fortunate enough to have had an excellent education from all of my teachers in Scoil Éanna and St. Michael's Loreto, Navan, and the staff of the National University of Ireland, Galway. I would like to thank my supervisor, Dr. Stefan Bergh, who allowed me the freedom to negotiate my own path but was always ready to guide me, Dr. Carleton Jones for his advice and comments on a draft of this work, my internal and external examiners, Conor Newman and Prof. Andrew Fleming, who provided insightful advice for the final transcript. All of the staff and fellow postgraduates from the Department of Archaeology have been invaluable in providing constant feedback, support and sharing far too many cups of tea.

My thanks also to my family, because academic success starts at home. I have benefitted from the support of my parents, the many animated discussions that I have had over the years with my brothers and sisters, and the countless crosswords shared with my grandmother. It all contributed to how I think and work.

Most of all thank you to Donal. You supported and looked after me the whole way and I couldn't have done this without you. I am who I am because of you.

Chapter 1: Approaching Movement

1.1 Negotiating the landscape

In landscape studies, we acknowledge landscape as being more than simply aesthetic scenery, but a lived-in space where natural topography and human culture create a meaningful theatre for personal and communal interactions. The human experience of the landscape is derived from our minds as much as our bodies. Our minds process our perceptions and understandings of the world around us, allowing us to learn a landscape, create mental maps, name places and conceive of some sort of order to our surroundings. Meanwhile, our bodies are the medium by which we interact with the world, through the senses of sight, sound, smell etc. but also through our capacity to use our bodies as a vehicle with which to move through a physical space, and expose our minds to new stimuli and experiences. This thesis aims to understand the process of movement and our negotiation of the landscape, which will require consideration of both of these aspects. We must perceive and interpret the environment around us, while also testing the capabilities and limitations of our bodies through locomotion in order move through and negotiate the landscape. As such, the discussion will explore the ways in which we create cognitive maps and communicate landscape knowledge, as well as the decision-making process involved in making our way through the landscape.

The landscape simultaneously presents natural routeways as well as obstacles which influence our behaviour. Our decisions also defer to our understanding of and ability to read a landscape, the presence of paths, territoriality, the deterrent of taboo, and accumulated knowledge through placenames, directions and stories. Just as landscape is the sum of all human interaction with it, the emergence of routeways, paths and roads is a cumulative phenomenon, derived from generations of footfall, transmission of knowledge, and sometimes explicit episodes of construction. Movement is thus more than simply the negotiation of topographical features, but a journey through a cultural narrative whereby the landscape is perceived according to the cultural context of the individual, with journeys being undertaken on paths which in the most literal sense involve walking in the footsteps of the ancestors.

While movement is practiced with considerable continuity, routeways and paths are also entities which are in a constant state of flux as they change and evolve to meet existing needs or overcome new environmental obstacles and cater to technological requirements. As such, this thesis will discuss movement as it was practiced in Ireland over the *longue durée* from the Mesolithic period to the 9th century AD, at which time a bridge at Clonmacnoise was constructed, demonstrating the engineering capabilities of people in the Early Medieval period. This allows us to discuss the process of landscape learning that early settlers would have had to engage in, the appropriation of natural landmarks with burial monuments, the contribution of technology to movement, the legislative control of movement, and the emergence of routeways over the course of many generations.

Despite the importance of movement, the study of it was for many years confined to the pursuit of the physical traces of ancient roads, rather than any attempt to understand the process. Ethnographic studies were some of the first to draw attention to the practice, with several authors detailing the movements of hunter-gatherers, or the remarkable abilities of some groups to navigate without compass by way of extremely accurate cognitive maps and wayfinding (Binford 1980; Basso 1996; Widlok 1997). The popularity of Landscape Archaeology from the 1990s onwards has encouraged a holistic view of landscape, which has helped to recommend movement as an important part of our interactions with the world. No landscape study is complete without discussion of potential routeways through it, and these are often inferred from the locations of monuments in studies from the Neolithic period onwards (Condit et al. 1999; Bergh 1995, 119; Bradley 2007, 36). The rise of the phenomenological approach has championed the perceptions and experiences of individuals in the landscape, for which movement is a key component (Tilley 1994). Recently, popular authors such as Robert MacFarlane (2007; 2012; 2013; 2015) have recaptured the art of travel writing with rich descriptions of the natural world and movement, which was formerly practiced by antiquarians, naturalists and poets.

In negotiating the landscape, one must acknowledge and react to the combination of physical, cultural, political and mythological components of a space, insofar as this information is possessed by the individual. Attempts to move through a landscape are made with reference to one’s own perceptions and knowledge, which is arrived at through personal observations and experiences as well as shared wisdom and communicated information. One’s interpretation or knowledge of these aspects of landscape varies according to kinship, rank or profession, meaning that experience is not uniform from one individual to another, or from one period to the next.

1.2 Study area

In order to demonstrate the effect of landscape features on movement, this thesis will feature a study from North Offaly in the Irish Midlands. It is a landscape dominated by glacial features known as esker ridges and wetlands of raised bog, providing both natural routeways and obstacles to movement. This region allows us to explore the challenges to movement created by wetlands, river crossings and woodland, as well as the potential for movement brought about by the natural routeways of the rivers, esker ridges and corridors of well-drained soils. It is a landscape which provides us with evidence of several long distance inter-regional routeways, as well as an abundance of local trackways from all periods within the wetlands which represent the very surface upon which the people of the past walked.

It was home to the *Slighe Mór*, the most famous of the five major Early Medieval roads. This road was said to have followed the course of the *Eiscear Riada*, a series of esker ridges which connected the east and west coasts. Flanking these ridges were large areas of raised bog, making the raised, well-drained and linear surfaces of the eskers favourable routeways. The region was also the site of a significant northeast by southwest orientated routeway, known as the *Midland Corridor*. This natural corridor of movement occupied the dry soils connecting the Boyne catchment area of Meath with the Tipperary region of North Munster, essentially connecting the northern and southern halves of Ireland. River systems offered additional options for movement, and indeed would have been the earliest routeways used in this area. While the wetlands may have slowed movement, they were not insurmountable obstacles, and they have preserved a remarkable network of *toghers*, or trackways, which would have facilitated movement on a local level and expedited inter-regional movement.

It is therefore a complex landscape of natural routeways and obstacles, preserving evidence of human ingenuity in overcoming obstacles and adapting the landscape to its own ends. The inter-regional routeways of this landscape would have connected the region to a number of well-populated areas in prehistory and the Early Medieval period, as well as ensuring traffic through the area. This region was something of a boundary place, in large part due to the bogs and eskers acting as natural boundaries. The *Eiscear Riada* acted as the dividing line between *Leath Chuinn* and *Leath Mogha*, or the northern and southern halves of Ireland, and four of the five ancient provinces of Ireland met in this region. While this was the landscape that separated these areas, the routeways it provided were conversely what linked them. The coming together of regional influences through these routeways can be detected as early as the Bronze Age, where the northern and southern portions of the Midland Corridor are marked out with different types of monument, and the material culture is merged in the composition of the Dowris Hoard (See Chapter 5).

The study area, discussed more fully in Chapter 2, therefore provides a complex topographical and geo-political environment whose geography at once facilitates and impedes movement, and connects and separates regions. The presence of long distance routeways and roads, as well as local trackways, allows us to discuss movement in terms of scale, and to examine the different patterns and factors involved in the different types of movement that were practiced in this region. The diachronic approach of this research also allows examination of the evolution of the system of movement through this area over the course of several millennia as the natural and cultural environment underwent quite dramatic changes.

1.3 The vocabulary of movement

In order to proceed with a discussion of movement, we must clarify the vocabulary we use in its discourse. In the first instance we must ask, what is *movement*? This thesis aims to explore the process of moving, the negotiation of the landscape, the evolution of routeways and the mundane and consistent movements which make up everyday activity. The word *movement*, however, has a number of potential meanings and numerous studies are devoted to various aspects of it, complicating targeted research on the topic. The word has been used to describe large scale migrations, mobility strategies, landscape interaction, routeways, roads, communication, trade and networks, demonstrating how sprawling a concept it is. The 2012 Neolithic Studies Group Seminar, entitled *Movement and Mobility in the Neolithic*, sought contributions,

> 'on all aspects of the movement of people, ideas, animals, objects, and information, and using the widest range of archaeological evidence available

> […], including: isotope analysis; artefact studies; lithic scatters and assemblage diversity; and computer applications' (Neolithic Studies Group 2012).

Similarly, the 2015 European Association of Archaeologists Conference devoted a theme to Archaeology and Mobility where movement was understood to refer to

> 'not only […] the physical & geographical movement of people but also the movement of people socially, economically and culturally. It includes too the mobility of knowledge and ideas, through innovation or necessity, and whether for altruistic, selfish or sinister reasons' (European Association of Archaeologists 2015, 116).

Clearly, the word is used to describe a great deal and there is a real need for coherency in the vocabulary to describe these themes. In this research, *routes*, *routeways*, *roads*, *paths*, *trackways* etc. are all used to discuss movement, and it is important to understand what these terms mean and how these entities are used.

A *routeway* is a general corridor of movement, and can be several kilometres wide. It is essentially an idea which describes an axis along which the landscape is conducive to the movement of people and animals. A routeway may accommodate a multitude of mundane *trails*, *paths* and *animal tracks*, all operating on an extremely local level within the wider regional parameters of the routeway. Muir (2000, 95) describes this as "swarms of merging, branching, diverging and re-uniting trackways" within a zone of movement which maintains the same general axis over time. Routeways themselves are notoriously difficult to date, and we must rely on the distribution of dated sites and settlements along the course of a proposed route, supplemented with palaeoenvironmental evidence to determine the impact of vegetation cover on movement.

The local *paths* are often the physical remains left behind by an individual's movements through the environment, characterised by a narrow trail of flattened vegetation and bare or eroded ground. This trail impresses upon other individuals, looking to find a physically and cognitively easy path, and they are likely to follow the same path. This physical trace is called a *desire line*, and it is formed by persistent use of the same path by a single or multiple individuals over a period of time.

Desire lines are rarely straight, with the most obvious deviations being the circling of obstacles. A close look at these paths will show tiny deviations, as the individual reacts to micro changes in slope of which even they may not be aware. *Desire lines* are therefore the most fundamental expression of movement, arising out of the decision making process of one or more individuals from an initial blank slate. These physical traces may be used multiple times by the same individual making routine movements, and they are perceptible to other individuals also seeking to move in the same direction. Tilley (1994, 27) describes features such as this as “biographic encounters”, alluding to past activities and events. In this way, a path becomes established from a multitude of repeated actions made by a number of people over time. These *desire lines* are visible in almost any public park or green space, where paved paths are often devised by planners with an artificial scheme of right angles, but are subsequently ignored by individuals as they move organically by taking shortcuts and meandering over micro topography, ultimately creating a more desirable path.

Occasionally, the landscape might introduce obstacles which complicate movement, but can be negotiated with the help of technology. This includes the crossing of wetlands, floodplains, mudflats and rivers through the construction of timber trackways, known in Ireland as *toghers*, stone and gravel causeways, and bridges. *Toghers* have been categorised into three types according to their extent and scale. Primary toghers are well defined structures over 15m in length with a number of structural components and sometimes several phases of construction or re-use. Secondary toghers are trackways of clear orientation measuring over 15m, and tertiary toghers are short lengths of trackway which cross a localised part of the bog which may or may not have a clear orientation, often characterised as *puddle toghers* (Irish Archaeological Wetland Unit 2002d, 23). Among these classifications, the design of the trackway may vary from simple deposits of brushwood to complex feats of carpentry such as those of corduroy design. While the desire lines above are derived from an organic or almost unconscious agency, trackways are deliberate constructions of which even the simplest forms required a planned action; their creation demands a conscious decision to negotiate an obstacle by building across it, the collection of resources, the manufacture of the track or bridge, and possibly the organisation of a considerable workforce to orchestrate the project and maintain it. Features such as these may be simple entities within a local system of movement, but they also often feed into a broader system where the more general notion of a routeway is bottlenecked by terrain and forced to cross a bog or river at these locations. This is probably the earliest version of roads, where a routeway needs to be fine-tuned to include a river crossing or specific stretches of trackway.

A *road* is a clearly defined linear surface which can accommodate a range of traffic types including pedestrian, horse and wheeled vehicles. It is generally part of an arterial system of major and minor roads which link together neighbouring regions and localities. They may be the amalgamation of a number of older paths derived from desire lines, and when necessary will incorporate toghers, causeways, bridges and fords which predate the road. Hindle (2001, 8–10) observes how multiple parallel lines of paths and roads, sometimes of different origins and periods, can be preserved within the course of a routeway, citing the Icknield Way as an example (See also Taylor 1979, xi). This is part of the organic emergence of a road system, with some paths being maintained or made redundant as requirements of movement and modes of transport change over time.

Roads are vital components of landscape archaeology as they tell us how people moved around and interacted with the landscape around them. For Taylor (1979, ix), the physical road itself was not what compelled him to their study, but the dynamics of the interaction in which the roads impacted on the people and the landscape, which in turn affected the character of the roads. This relationship has been explored by a number of authors who view roads as instruments of settlement (Doran 2004, 58) and as a reflection of the socio-political hierarchy (Fleming 2011, 43).

The more established a road network becomes, the more complex the rules relating to construction and maintenance. While earlier trackways could be locally organised projects, a connected road system demands more organised control. The law tracts relating to roads, discussed in Chapter 6, describe a hierarchy of roads and their functions as well as instructions on their design and maintenance which were the responsibility of local lords to oversee. In this way, roads become coherent entities over time through their emergence from a natural routeway, reinforcement through repeated use, definition through construction and maintenance, and organisation through social control.

Clearly, they are complex entities which were part of the mundane, everyday activities of local settlement, as well as contributing to a network of politics, control and economy which could be accessed by the elite. In order to fairly interpret settlement, economy and political structures, roads and the various scales of movement which they facilitate must be considered in their discussion. As Higgins et al. (2012, 140) observe, “different processes operate at different scales and therefore must be studied accordingly.” They explain that scale is an integral part of the relationship between pattern and process, the understanding of which is essentially what all research is concerned with. Fleming (2011, 43) envisages a system of “dendritic” roads as being akin to arteries and veins, with the capillaries facilitating the daily activities of ordinary people covering short distances, while the major long-distance roads reflecting the priorities of the ruling class. A system of roads is almost fractal in its composition in that as we look closely at wide and narrow scales, it continues to be complex. Major roads branch into minor roads, which in their own turn branch into tracks, paths, desire lines etc. True fractal geometry however requires recursion and self-similarity. It is clear that different processes are at play in the different scales of movement. This research will demonstrate that the system of movement is typically a bottom-up emergent phenomenon which is often subject to later top-down social control.

1.4 Individuals and decision-making

The current project is concerned with the process of moving and the role of individuals in creating a system of movement. The decision-making process of the individual is part of a complex feedback loop where one’s decisions impact path creation and settlement etc. before these factors in turn influence the choices of other agents. It is an exercise which involves not only the practical exercise of negotiating obstacles and identifying the easiest route to a destination, but also the practice of learning a landscape to create a cognitive map, interpreting its features, and sharing knowledge about the world. Agent-Based Modelling is used in this research to emulate some of the components of the decision-making process, drawing inspiration from the behaviours of more simple organisms in the natural world, such as the movements of lines of ants.

When moving in the open, ants form a column and follow the leader towards the nest or other target. While the leader may take a circuitous path in an effort to find the target, the column of ants eventually smooths to a more direct route as each individual cuts corners by maintaining its orientation towards the ant in front of them, rather than following the exact same path. For humans moving through a landscape, an initial individual may also take a circuitous path as unforeseen obstacles are negotiated. This individual may take this journey again with knowledge of such obstacles, or they may have left a desire line which hints at a path to be taken. In any event, later attempts to make this journey may involve slight shortcuts, organically smoothing the path to one that is reasonably direct in negotiating obstacles, thanks to multiple attempts over time in a process similar to the Ant Lines.

As useful as this method is though, it does not necessarily reflect the experiences and perceptions of that individual. In recent decades the experiential element of moving has been discussed at length by authors such as Tilley (1994) and Macfarlane (2012). They frame movement as a mediator of how we experience landscape. This interaction with the landscape involves not just a relationship with the physical terrain, but an acknowledgment of the identity and significance that the community has created for that space, primarily with the use of place names and story-telling to create a narrative-based geography (Basso 1996; Tilley 1994, 18). In this regard, movement is a journey of the individual which is experienced through the medium of their physical form, cultural upbringing and access to landscape narratives.

The process of *landscape learning* is discussed in Chapter 3 and developed throughout the thesis, demonstrating the continuity and accumulation over time of the meaning and significance which is assigned to landscape. *Legibility* refers to the ease with which a landscape can be read and negotiated by travellers who interpret spatial information around them (Golledge 2003). This requires visually assessing the landscape and using features and landmarks to predict how to proceed. Essentially, generic knowledge is applied to an unknown landscape, allowing the explorer to make informed decisions. The presence of a river, for example, makes a landscape more legible as it acts as a memorable feature and will ultimately lead to a lake or the sea. Features such as coast lines, mountain chains and esker ridges can be read with ease if a person has had past experience of similar features, but if a person lacks the generic knowledge to apply to such landscapes, they will find the landscape illegible and have trouble with initial explorations.

Localities with legible and memorable features, such as large rock outcrops, bodies of water or confluences of major drainages are usually the sites of initial colonisation (Donahue et al. 2006, 252). These features act as nodes around which movement and settlement are orchestrated. Large lakes are referred to by Mesolithic researchers as *central* or *persistent* places (Lovis et al. 2006b, 273), which attract long-term occupation or frequent re-occupation. Static and highly visual locations such as these act as landmarks, anchored in our experiences and our memories. Landmarks help to make a landscape more legible, and therefore easier to negotiate and to commit to memory (Golledge 2003). They also make it easier to communicate, and places such as these are often the first to be assigned place names. The development of place names and stories around landmarks and places improve the legibility of a landscape by providing us a way to learn about a place without having to physically experience it. Widlok (1997) refers to socially shared communications about landscape as *topographical gossip*, and he attributes the remarkable wayfinding abilities of the Hai||om Bushpeople to this practice (Chapter 3.2).

Successful landscape learning leads to *landscape literacy*, enabling an individual or community to effectively negotiate and exploit the landscape, while those who are unable to read or comprehend it may struggle to move through or occupy a region. This process involves the building of a cognitive map which is built around *central* or *persistent* places – places which activities are performed around and which are often highly visual and memorable.

Beyond the humanities and social sciences, science has been piecing together the physiological and cognitive aspects of learning a landscape and wayfinding. Path integration was first observed by Darwin among animals, and Edward Tolman realised in the 1940s that rats could solve a maze faster each time they used it, showing that they had created a mental representation for the maze – a cognitive map. Humans have also been shown to have the ability to *home*. Various biological processes are involved in this, some of which are discussed further in Chapter 3, but the most fascinating is what has been dubbed our *Internal GPS*.

The 2014 Nobel Prize for Physiology and Medicine went to John O' Keefe, May-Britt Moser and Edvard I. Moser for their work in identifying the brain cells which create this GPS. O' Keefe discovered in the 1960s that certain cells in the hippocampus of rats would fire at particular places (O' Keefe et al. 1971; O' Keefe 1976). The direction of approach did not matter, but the location itself appeared to stimulate this reaction, with different nerve cells firing for different locations (Fig. 1). He named these *Place Cells*, and it was these cells, he concluded, which were used to build the cognitive map hypothesised by Tolman. Without this map, an animal cannot return to a location via a novel route if there is an obstruction.

Figure 1 O' Keefe's Place Cells activate at particular places (https://www.nobelprize.org/nobel_prizes/medicine/laureates/2014/med_image_press_eng.pdf)

Figure 2 The Mosers' Grid Cells activate at locations which form a grid pattern (https://www.nobelprize.org/nobel_prizes/medicine/laureates/2014/med_image_press_eng.pdf)

The Mosers and their team later discovered another system of cells in the Entorhinal cortex that react to location (Fyhn et al. 2004; Hafting et al. 2005; Sargolini et al. 2006). These cells fire throughout the field of a familiar environment, rather than at fixed locations. The positions at which they fire are arranged in distinct, regularly spaced clusters arranged in a hexagonal grid (Fig. 2). These *Grid Cells* produce a type of coordinate system which represents distance and works with Place Cells to create the internal GPS. Other cells include *Boundary Cells* which tell distance to the edge of a landscape. Overlapping boundaries can give an indication of position. There are also *Head Direction Cells* which are based on the direction the animal is facing and *Speed Cells* which follow the speed of the animal. All of this information is fed into the GPS, or more accurately, a *Spacio-temporal memory system*, which is used for cognitive mapping, homing and wayfinding (Sargolini et al. 2006).

This explains at a physiological and cellular level how spatial updating is possible from recognising landmarks from our cognitive maps. Thus, recognition of place is key in navigating a landscape, and any method we have of clarifying nodes in our cognitive maps must improve our ability to navigate and communicate directions. Place names and story-telling must feed into this physiological process. While digital GPS involves formalising, measuring and ultimately de-personalising human-environment interactions, this physiological version thrives on the use of landmarks, personal and shared experiences and cognition.

To sum up, the theoretical approach of this research is principally concerned with the role of the individual in the creation of routeways. While Agent-Based Modelling might be considered deterministic, it is used simply as a tool to explicitly explore the role of individuals in path creation. The experience of the individual is also acknowledged, specifically with regard to how they perceive the world around them with the help of cognitive mapping and *landscape literacy*. This consideration inevitably leads to the world of neurobiology, which has successfully explained what has been observed by ethnographers for decades… namely, how do some communities have such accurate mental representations of their landscapes in the absence of cartography and surveying?

1.5 Aims and objectives

This thesis will examine the practice of movement with reference to the following aims:

Aim 1: *To explore the decision-making process of individuals in their movement through the landscape with consideration of natural topography, social and cultural influences, and trace evidence of earlier movements*.

This thesis will explore the development of movement from a bottom-up perspective, with the role of the individual being central to the emergence of paths and routeways. As such, the factors involved in the decision-making process of individuals, such as environment, motive and *landscape literacy* are a major part of the discussion.

Aim 2: *To distinguish movement on inter-regional and local levels, in order to interpret exceptional and infrequent movements as well as mundane and frequent ones.*

Different patterns and processes are at play between the major inter-regional routeways and local paths for everyday activities. A consideration of the scales involved in movement is necessary in order to distinguish and understand these processes.

Aim 3: *To demonstrate the consistencies and changes in movement over time, a balance which contributes to the evolution of routeways.*

Movement is a system in flux, with the emergent patterns subject to change as environmental, technological, social and political changes demand. A discussion of the consistencies and changes of these patterns will help in the understanding of how systems of movement develop.

Aim 4: *To show how movement can be inferred from any aspect of archaeology*.

Movement is ubiquitous and the study of all aspects of archaeology, from material culture to settlement and burial practices, can be enriched by viewing it from a movement-centric framework.

Movement within the landscape of North Offaly will be specifically explored through the following objectives:

Objective 1: *To reconstruct the environment of the landscape of North Offaly in prehistory and in the Early Medieval period.*

The changing topography and vegetation would impact one’s ability to navigate and move, so it is crucial to understand the environment which individuals would encounter when attempting to negotiate the landscape.

Objective 2: *To identify the types of movement that took place in the study area.*

The consideration of settlements, trackways, inter-regional routeways etc. will help to identify the types and scales of movement which took place. This will help to determine the differences between local movements and long-distance travel, and to separate opportunistic use of natural routeways from deliberate attempts to create and maintain systems of movement.

Objective 3: *To determine the relationship between the settlements in the area with the routeways.*

Settlement is not practiced in isolation and it requires movement to sustain the population and communicate with outsiders. While settlement is attracted to pre-existing routeways, the settlement itself typically reinforces these routeways and stimulates new paths.

Objective 4: *To identify the variables of the decision-making process involved in interacting with the landscape in such a way that it can be easily applied to other landscape studies.*

The advantage of North Offaly as a landscape study is that we already have some understanding of its major routeways and access to a considerable body of data concerning wetland *toghers*. By identifying the variables involved to produce these systems of movement, the hope is to contribute to studies of movement in landscapes which are lacking in such evidence.

In this way, specific objectives relating to the study area can inform the over-arching aims of the thesis in order to understand movement and the emergence of routeways.

1.6 Methodologies

Movement begins with the individual, and the experience and behaviours of the individual have been central in the approach to movement in this research. In addition to this, the study area requires a methodology which is suitable to the study and interpretation of a landscape of considerable area. Many of the methodologies used in this research are considered conventional approaches to landscape study, but they have been undertaken with consideration of the role and experience of the individual. This has been supplemented with the explicitly agent-centric methodology of agent-based modelling. This approach is intended to produce research which contributes to our understanding of the abstract concept of movement, as well as producing a comprehensive landscape study of North Offaly.

Literature review: A literature review of archaeological studies was undertaken to familiarise the writer with the varying approaches to movement and to situate this research within our current understanding of movement in general and throughout the study period. Chapters 3 to 6 cover the Mesolithic to the Early Medieval periods and each chapter begins with a general discussion of monument types, technology, culture etc. and how they contributed to the practice of movement at that time. This exposes the varying approaches to movement which are practiced by archaeologists and anthropologists who specialise in particular periods. While scholars of the Mesolithic, for instance, may concern themselves with mobility, wayfinding and landscape learning, medievalists are more likely to devote attention to developing law systems, historical or mythological itineraries, and discussion of control and economy.

Previous studies of the archaeology, history and ecology of the study area were also consulted in order to reconstruct the landscape throughout the period of study and to assemble a body of evidence from which to infer and interpret movement. The Bord na Móna operated wetlands have been extensively surveyed by the Irish Archaeological Wetland Unit (IAWU) and Archaeological Development Services (ADS)[1], who have identified hundreds of sites of trackways and platforms which tell us about how the bogs were accessed and exploited. Infrastructural projects have been responsible for a large body of data which was consulted in this thesis. A number of excavations were carried out along the course of the M6 motorway and the N52 Tullamore Bypass by Transport Infrastructure Ireland (TII), formerly known as the National Roads Authority (NRA), for instance. The Bord Gais Pipeline to the West project also required a number of excavations from within the study area. Other excavations from the area are recorded in the excavations.ie database, and the Record of Monuments and Places provides details of recorded monuments across Ireland. Palaeoenvironmental studies were consulted to supplement the archaeological data with ecological information.

A number of primary written sources which refer to movement were also consulted throughout this research, primarily in the discussion of Early Medieval movement. Mythological sources such as *Togail Bruidne Dá Derga* (Stokes 1902; Knott 1975)

[1] I am grateful to Conor McDermott, Charles Mount and Jane Whitaker for providing survey and excavation data from the Bord na Móna operated bogs

and *Caithréim Conghail Clairinghnigh* (MacSweeney 1902) describe journeys undertaken with reference to roads and landmarks, and the topographical poems of the *Dindshenchas* (Gwynn 1903a; 1903b; 1903c; 1903d; 1903e) describe the origins of the *Slighe* and notable places in the Irish landscape. The Early Medieval law tracts outline in precise terms exactly the expected quality of roads, the occasions when they were used and who was free to travel on them (Kelly 1988; 1997). By consulting these sources, it is possible to suggest courses for ancient roads and to interpret their significance in their social, political and economic contexts.

GIS: ArcGIS 9.3 and 10.2 were used to create a series of maps of the study area, with contour, river, county boundary, townland and road data from the Ordnance Survey of Ireland (OSI Licence number NUIG230615), bedrock data from the Geological Survey of Ireland and soils data from the Soils and Subsoils database provided by the Environmental Protection Agency. Archaeological sites were illustrated using data from the Record of Monuments and Places, the excavations.ie database, the Irish Archaeological Wetland Unit, the County Offaly Artefact Inventory and a selection of published and unpublished reports from wetland surveys, the Bord Gais Pipeline to the West project and National Roads Authority excavations. A selection of maps was made which illustrate a number of monument types from each period under discussion, to demonstrate the changes which occurred in settlement, burial and movement over time. This visualisation of the landscape was crucial in identifying and exploring areas in which there was potential for movement and settlement.

The find locations of artefacts were determined through a consultation of excavation reports and the County Offaly Artefact Inventory (Offaly County Council 2005), containing information from the Topographical Files of the National Museum of Ireland. Artefact depositions are often observed at important fords, and their presence can provide a good indication for the date of these crossing points. A number of known fords in the study area have revealed items through dredging, and further examples are suggested throughout this research as a result of retrieved artefacts and the surrounding subsoils. Similarly, this research will discuss possible relationships between Bronze Age hoards and routeways, with wetland discoveries potentially suggesting dates for dryland routeways. Artefact distributions are also used to demonstrate activity in the study area in the Mesolithic and Neolithic periods. There are only a few known archaeological sites from the study area which are of Early Prehistoric date, but the artefact distribution throughout North Offaly demonstrates that the area did support human activity.

The Least Cost Path function from ArcGIS was used to calculate potential paths between an itinerary of locations through which O' Lochlainn (1940) proposed the *Slighe Mór* ran. In this research, slope and subsoil type were used as variables, with bogs being difficult to traverse while eskers are easy. The methodology and its applications are discussed fully in Chapter 7.

Agent-Based Modelling: Agent-Based Modelling is an excellent tool with which to reduce complex systems down to the behaviours of individuals. This was achieved in this research using the NetLogo programme. The method is described fully in Chapter 7, but in short, the programmer assigns instructions and behaviours to individual agents and exposes them to the digital world where they interact with each other and the world according to those behaviours. For the purposes of this research, this involves the creation of a model in which agents are released who must find their way through the landscape to their destination, ultimately creating a coherent path from the decisions and actions of many individuals over time. Modelling allows us to consider the role of the individual in the formation of systems, and the process of building the model can be a more useful interpretive tool than Least Cost Path creation in this respect.

Fieldwork: The fieldwork for this research involved a considerable amount of walking through the landscape in order to understand the effect of topography, visibility, vegetation and soil type on movement. A number of archaeological sites within the study area were visited, as well as the natural features of eskers, bogs and native woodland. The paths produced by the modelling procedures were assessed through field visits and through walking them as much as was possible.

1.7 Contribution to knowledge

An understanding of movement is crucial to any thorough discussion of landscape, settlement, economy, and quite possibly every area of archaeological research. Movement allows us to access resources, communicate and spread ideas, without which human culture cannot advance. It is the way in which we interact with the world around us, with neighbours, and with outsiders. The approaches to movement have been many and varied, and this research aims to collect some of these approaches to produce a coherent account of movement which is centred on the individual’s experience and cognitive processes.

As such, the contribution of this thesis will be to combine the practical concerns of negotiating morphological attributes, along with the experience of the individual, the role of the community, and the use of technology, to develop a comprehensive view of movement. The emphasis on the decision-making processes of individuals and how they react to particular stimuli has produced far ranging findings which can be applied beyond the present study area. The use of Agent-Based Modelling in this regard is intended to demonstrate the capabilities of the method in the hope that it will eventually become a standard tool in archaeological studies. The impact of movement on interpretation of more familiar archaeological research concerns of settlement, exchange and the emergence of the elite classes is also discussed at length in this research.

The diachronic landscape study of North Offaly is used to exemplify and develop many of the concepts discussed in this thesis. The physical characteristics of the landscape are discussed, as well as the nature of archaeological evidence from the Mesolithic to the Early Medieval period, and the network of routeways and paths which emerged throughout that time. Thus, another contribution of this research is the detailed landscape study of the region of North Offaly, which was deliberately designed in a way to illustrate the continuities and new developments of each period with particular reference to movement.

1.8 Structure of thesis

Movement is universal and exists at many scales and in many forms in the lives of people in the present as much as in the past. Furthermore, the theoretical frameworks under which researchers of various periods and backgrounds operate under influence the questions and approaches which are taken towards movement. As such each chapter is written such that the prevailing approaches of researchers of that period are discussed, in such a manner as to build on the findings and perspectives of earlier chapters. In this way, it is hoped that the accumulation of research devoted to movement in prehistory and the Early Medieval period can be harnessed to discuss the commonalities of the process of movement over the *longue durée*.

Chapter 2 discusses the role of topography in providing routeways and inhibiting movement. The study area is introduced with a description of the physical aspects of the landscape and how it changed over time. These features determine the potential of this area for accommodating movement and settlement.

Chapters 3 to 6 are devoted to discussing period-specific movement from the Mesolithic period to the 9th century AD, with Chapter 6 combining the discussion of the Iron Age and the Early Medieval period. Each of these chapters begins with a discussion of the practice of movement at that time and the learning and transmission of knowledge through cognitive mapping, monument building and stories. The impact of movement is discussed through the material culture and social structures of these periods, and the contribution of technological advances to movement are outlined. The final part of these chapters is devoted to the study area. The environment of each period is introduced before the discussion of the archaeological evidence for human activity, including artefact distributions, settlement, monuments and the construction of trackways. This information is used to comment on the types of movement practiced in this region in the past and to identify routeways as they emerged.

Chapter 7 discusses the modelling component of this research. The concept of agency is developed and the digital methodologies of Least Cost Paths and Agent-Based Modelling are explained. These tools are applied to the study area to illustrate the probable courses of routeways, after which they are assessed through field walking and desk-based research.

Chapter 8 is a discussion chapter whose purpose is to gather together the observations of this research into a comprehensive outline of the concept of movement. This consists of a discussion of the emergence of routeways as a complex process, involving the role of the landscape itself and the perceptions and cognitive processes of individuals. It concludes with a summary of the importance of the theme of movement to the discipline of archaeology.

The thesis concludes with Chapter 9, where the aims of this research are re-visited to determine how successful this approach has been in understanding the practice and impact of movement.

Chapter 2: The Landscape

2.1 Morphology and movement

The role of the individual in the creation of routeways, paths and roads is the principle concern of this study, and foremost in this approach is how people respond to the landscape around them, a major component of which is the physical morphology of the environment. The nature of topographical landscape is such that it can simultaneously be a vector for movement or an obstacle to be negotiated. While some areas can easily accommodate or even invite movement through even surfaces, well-drained soils and access to fords, other regions might complicate travel with steep slopes, wet soils and impassable rivers. Thus, prospective travellers are either facilitated or inhibited in their attempts to practice movement. An area which is conducive to movement is usually referred to as a *natural routeway*, but this is only true if it is actually used for movement, meaning it is the interaction between people and the landscape which makes these routeways.

Routeways are usually the path of least resistance within a landscape and the component which creates the resistance is just as important in the discussion of movement as the routeway itself. A mountain pass or valley through foothills becomes a routeway because it is the most suitable course for people moving through an environment otherwise composed of greater obstacles or more demanding terrain. In contrast, the gradients involved in such passes would probably be found unsuitable in gentler terrain where more manageable options exist. Thus, a routeway exists only relative to the landscape it occupies.

With this in mind, this chapter will discuss the landscape of North Offaly and how its features would have impacted on the behaviours of people living and moving in the area. The geology, soil cover, esker ridges, wetlands, woodland, Midland Corridor and waterways are all described below in an introduction to the study area with an emphasis on land use and the potential for movement. Others, such as Smyth (1982), Jones (2008) and Grogan (2005a; 2005b), have similarly placed considerable emphasis on how the physical characteristics of the landscape create natural routeways and boundaries, impacting profoundly on settlement, economy, politics and movement. The chapters that follow will summarise in more detail the changes in the landscape over the long period under discussion, and how these changes may have influenced the existing patterns of settlement and movement.

2.2 The landscape of North Offaly

North Offaly (Fig. 3) has been chosen as a study area because it is a complex landscape of natural routeways and obstacles, with remarkable archaeological evidence for movement in the form of *toghers*, or wetland trackways, deposition at fording points and an intriguing distribution of archaeological sites. The relationship between bogs, eskers, dryland and waterways create a system within which reasonable routeways present themselves to individuals endeavouring to negotiate the landscape and its obstacles. The naturalist Robert Lloyd Praeger was of the opinion that there was not much to detain him there in terms of ecology or archaeology (Praeger 1937, 235–240), an unusually dismissive view for him, but the chapter that follows describes several natural landscape features of note, and Chapters 3 to 6 summarise and interpret the rich archaeology of the area.

A number of natural routeways are provided by the water courses, fording points, esker ridges and stretches of dryland such as the Midland Corridor. These features provided this region with several long distance *natural routeways,* which provided a means of communication across Ireland. In particular, a number of these routeways, of north-south and east-west orientation, meet in this region. This makes it an important confluence of movement. As we will see in later chapters, these features would take on particular significance in different periods, as settlement and preferred axes of movement were subject to change. The Midland Corridor, for instance, was probably an important routeway from the Bronze Age (Chapter 5), while the esker ridges are strongly associated with movement between monasteries in the Early Medieval period (Chapter 6).

The study area does not per se adhere to any boundaries, modern or ancient. For the sake of convenience, it will be referred to throughout the text as North Offaly, even if in reality it incorporates most of the modern county of Offaly, formerly known as King’s County, along with parts of Counties Westmeath, Roscommon, Galway and Laois (Queen’s County). This area corresponds to the boundaries of four of the five ancient kingdoms of Ireland (Midhe, Laigin, Connachta and Mumhu), making it something of a crossroads between these regions. The boundaries for these kingdoms typically adhered to topographic features which also impact on movement and, as discussed in Chapter 6, there is often a correlation between boundaries and routeways. Thus, it is a landscape of natural boundaries, separating some important political regions which meet in this area, most notably the competing influences of the northern region and the southwest, which we will see played out in the following chapters. It is for this reason that the routeways of this region were so important, symbolically, economically and strategically, as communication between these areas required movement through these midland routeways.

Apart from these natural routeways, the study area provides us with an excellent archaeological record of constructed interventions to overcome obstacles. The raised bogs preserve hundreds of timber, stone and gravel trackways or *toghers*, dating from as early as the Neolithic period to the Post Medieval period, representing the efforts which people were willing to expend to traverse difficult terrain and showing at a very precise level exactly the path which they took through these areas. These constructions represent the very surface over which the people of the past walked, and are important indications of how movement was practiced within the wetlands. Many of them represent the exploitation of the resources of the bog; others indicate local movement to traverse the bog, connecting the dry, settled areas. Still others feed into the wider scale of movement by providing access to the major routeways above. As such, these local constructions, measuring from between a few metres to hundreds of metres, are in fact important indicators of scale in movement, impacting on both local and long-distance movements.

Of course, none of these discussions are possible without access to relevant data and information on this region. As discussed (Chapter 1.6), this region has benefitted from a number of large scale survey and excavation programmes facilitated by the Bord na Móna wetland surveys, the National Roads Authority M6 and N52 schemes and the Bord Gais Pipeline to the West project. A number of palaeoenvironmental studies have also been useful in quantifying anthropogenic activities throughout the period of study. This body of data has been invaluable in the identification and discussion of movement and routeways within the study area.

What follows is a discussion of some of the landscape features of this region which will be referred to throughout the thesis.

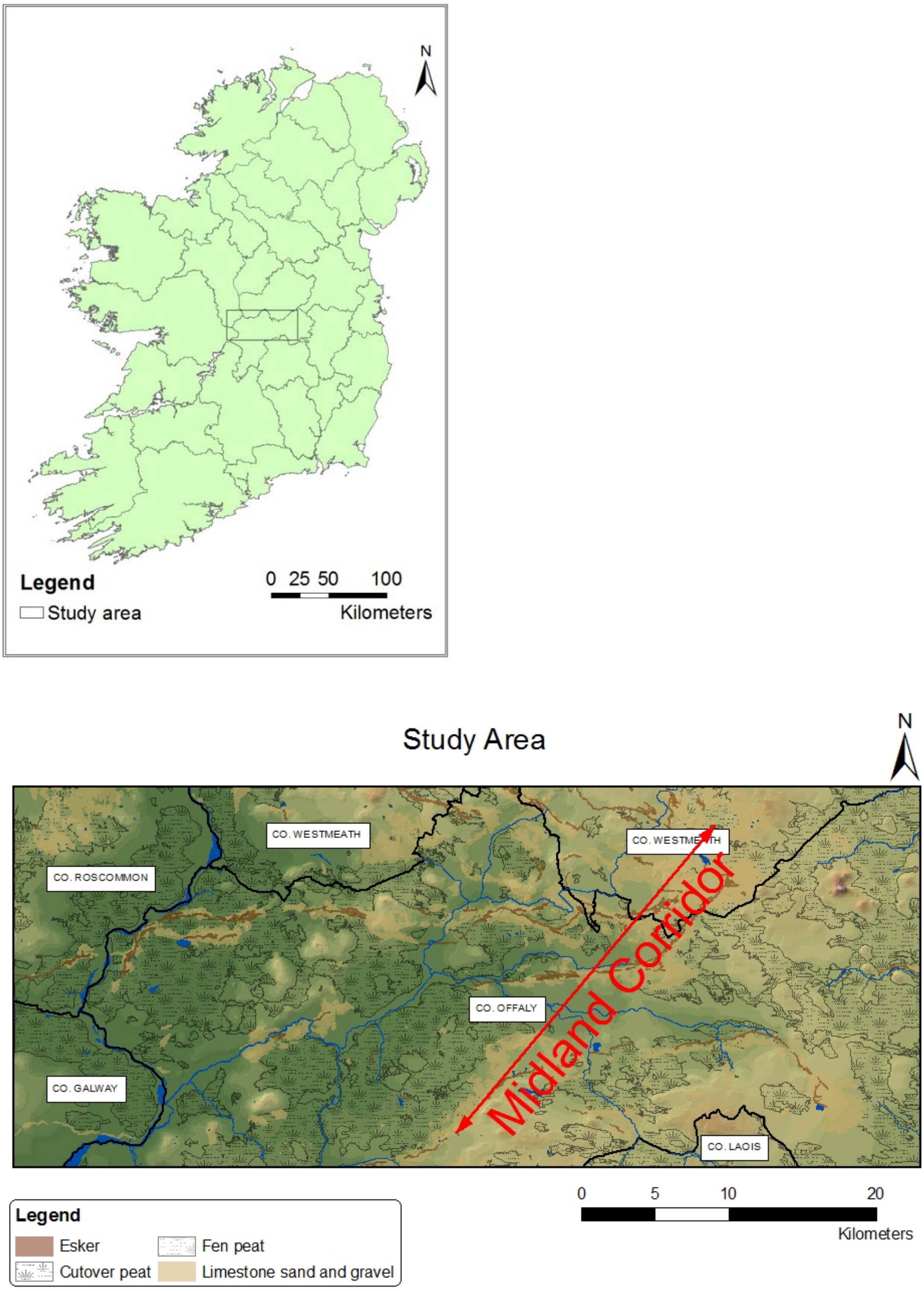

Figure 3 Study area in the Irish Midlands

2.2.1 Geology

The study area is composed of three types of geologies (Fig. 4). Sandstone from the Devonian / Lower Carboniferous transition is the oldest represented, while

Carboniferous Limestone dominates, and Volcanic formations can be found at Croghan Hill.

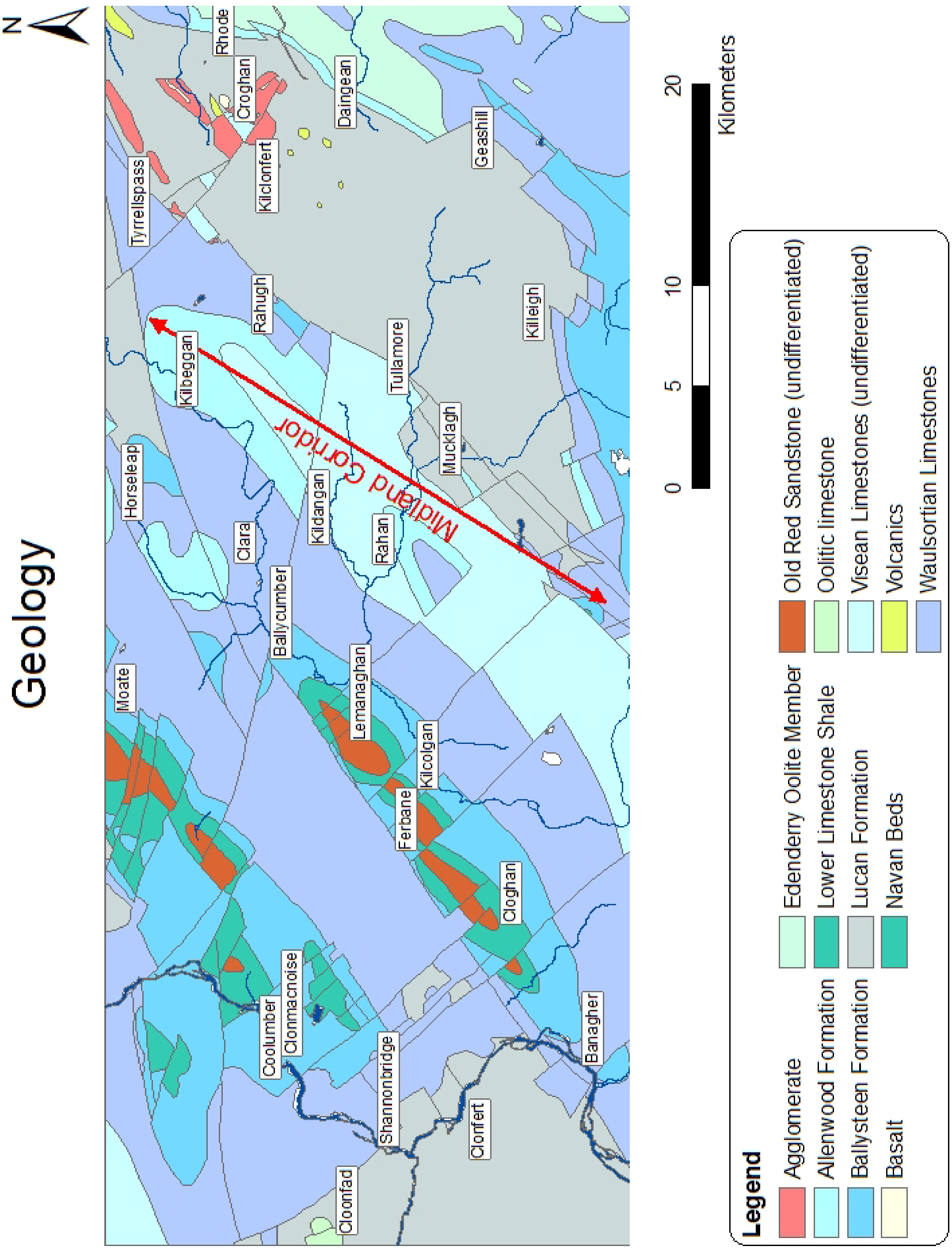

Figure 4 Geology of North Offaly

The Old Red Sandstone is made up of two parallel beds which were laid down along the Iapetus Suture. Old Red Sandstone typically dates to the Devonian period, but this formation may actually date to early in the Lower Carboniferous period (Feehan

2013, 53). One band extends in a northeast by southwest orientation between Cloghan and Lemanaghan, while the other runs from Ballynahowan past Knockdomny Hill to extend a further 3km outside the study area. The formations consist of red conglomerates, sandstones and mudstones, and they are surrounded by the Navan Beds of dark limestone, mudstone and sandstone. Ferbane Mudstone and Cloghan Sandstone can be found in these areas and their fine-grained nature made them easy to carve and ideal building materials.

Limestone dominates the study area, principally Waulsortian Limestone and Lucan Formation, while Visean Limestone extends along the Midland Corridor region. The large amounts of limestone in this area account for the good quality of the agricultural land between bogs. The nature of these formations has made the landscape of North Offaly quite flat, meaning any hills are particularly visible from across a wide area. Midway between Clonmacnoise and Shannonbridge is an area of exposed karstic rock of Waulsortian Limestone measuring approximately 1.2km East-West by 0.5km North-South. This mini-Burren landscape is known as “The Rocks of Clorhane” and extends from the Shannonbridge esker towards the Shannon River (Ryan 2013).

The highest point in this area is the site of a change in geology. The Basalt and Volcanic formations of Croghan hill were established in the Arundian and Holderian Ages of the Carboniferous period. This is the site of an extinct volcano which formed above Visean Limestone while still submerged by the sea. Barryscourt hill, next to Croghan Hill, is also an extinct volcano vent. Both of these hills occupy a 5.5km long area of volcanic geology, giving them an appearance and attributes which are distinct from the rest of the study area (Fig. 4).

Such a feature has obvious ramifications for the study of movement. The valley between these hills is raised c. 20m above the surrounding bogland and offers a gently sloped and well-drained routeway which also provides visibility over the surrounding landscape. Croghan Hill itself is the highest peak between the Slieve Bloom Mountains in the south of the county, and Loughcrew Hills in North Meath. Given the flatness of North Offaly, any hills are quite visible, but Croghan Hill exceeds the other hills of this landscape in elevation as well as exhibiting a visually distinctive profile. In a cycling tour of Ireland, William Bulfin (1908, 60–61) described how he needed to find his bearings to navigate towards Rochfortbridge, Co. Westmeath, and he did so using the visual cue of Croghan Hill. This use of prominent features as landmarks to pilot by allows a traveller to plan a journey, even in unknown terrain, over considerable distances.

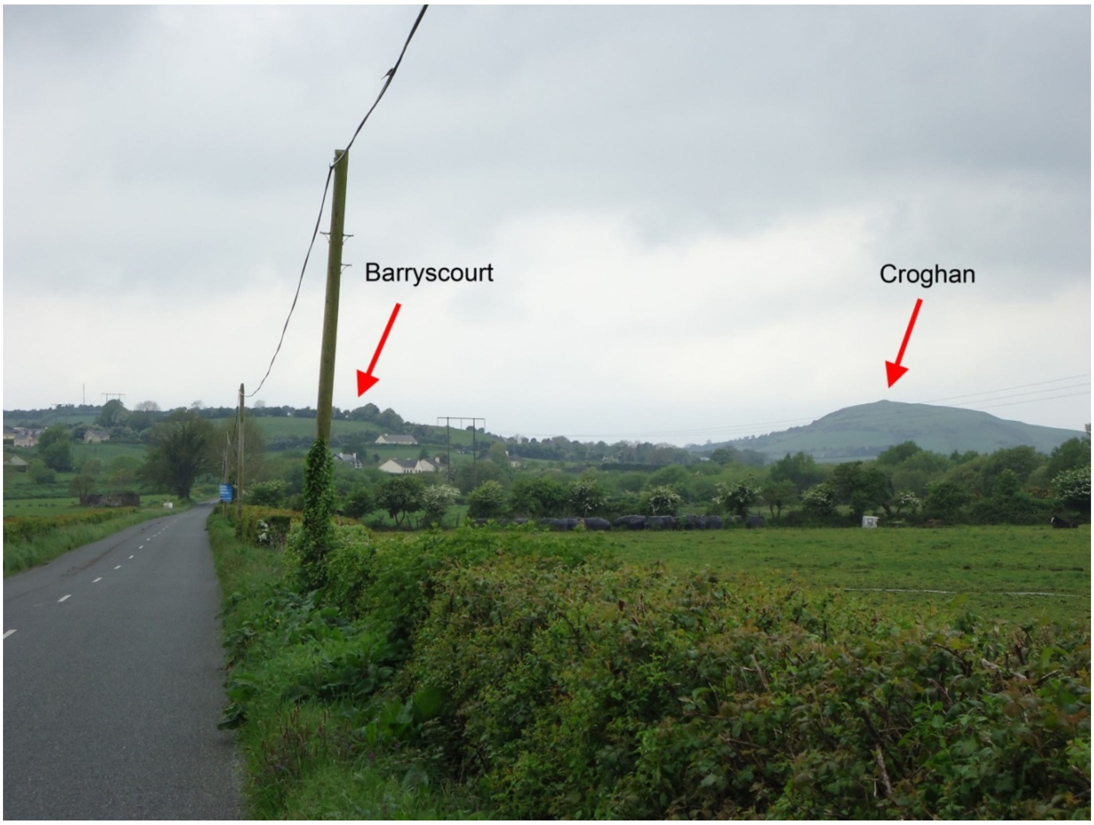

Figure 5 The geologically distinct Barryscourt Hill and Croghan Hill

The fine grained Cloghan Sandstone was a suitable building material and the togher at Bloomhill (See Chapter 6) was constructed from it (Feehan 2013, 300). A quartroze variety of this rock was probably quarried at Bloomhill to carve the crosses at Clonmacnoise (ibid, 317). The cross at Tihilly is similarly carved from Cloghan Sandstone, requiring sourcing of this material from approximately 13km to the west. The limestones of the study area were also used as building materials, with Tullamore and Ballyduff Limestone being polished to such quality that it was known as a marble (ibid, 277). Tubridy (1994, 5) suggests the karstic limestone at Clorhane may have been used as a source of stone for the monastery at Clonmacnoise as the limestone slabs could be easily removed, and its proximity to the river made it easy to transport. Chert is available in some of the limestone formations and would have been used for lithic production in prehistory. Flint does not occur in this region, except for occasional nodules that may have been transported there by eskers. In summary, the geology of the area has impacted on its suitability for agriculture, would have provided suitable stone for lithic production in prehistory, and has been used as a source for masonry material from the Early Medieval period to modern times.

2.2.2 Soils

The subsoils from this area fall into a number of categories, including those that have been deposited by glacial movement, water deposited material, till, peat and exposed rock (Fig. 6). The study area is characterised by the esker ridges which were deposited by glaciers 15,000 years ago, and the raised bogs which started their development 10,000 years ago. Outside of the wetlands, limestone derived subsoils make for well-drained agricultural land which can accommodate movement.

The eskers are typically flanked by Carboniferous Limestone sands and gravels, which are of very similar composition to the eskers themselves, albeit without the characteristic steep-sided form. This sort of deposit tends to have more inclusions than the esker material and can take the form of a variety of other glacial formations, such as moraines, kames, fans and deltas, or may simply appear as flat to gently rolling terrain. While the surfaces of eskers are confined to a few metres across, these deposits can measure over 2km in width and extend for considerable distances, making them suitable areas for settlement and built structures. Many of the archaeological sites within this study area are situated on this subsoil type. These areas are associated with grazing, where livestock can graze from lime-rich soils and shelter in the shade offered by neighbouring eskers (Fig. 7). Such well-drained and agriculturally valuable land would have been highly valued in a landscape dominated by wetlands. The proximity of this subsoil to the eskers means that anyone who controlled this land not only had access to its agricultural capacity, but was also in a position to make use of and possibly exert control over the route provided by the eskers.

Limestone till is the second most common subsoil in the study area. Till is material deposited directly by the melting ice of the glacier, without the actions of water (Feehan 2013, 191). This subsoil type has more clay content than the limestone sands and gravels and, while relatively well-drained, would be wetter and heavier to work. While early activity can be identified on the limestone sands and gravels, archaeological sites on this subsoil type tend to be more recent as the woodlands were cleared to make way for more agricultural land in the Early Medieval period.

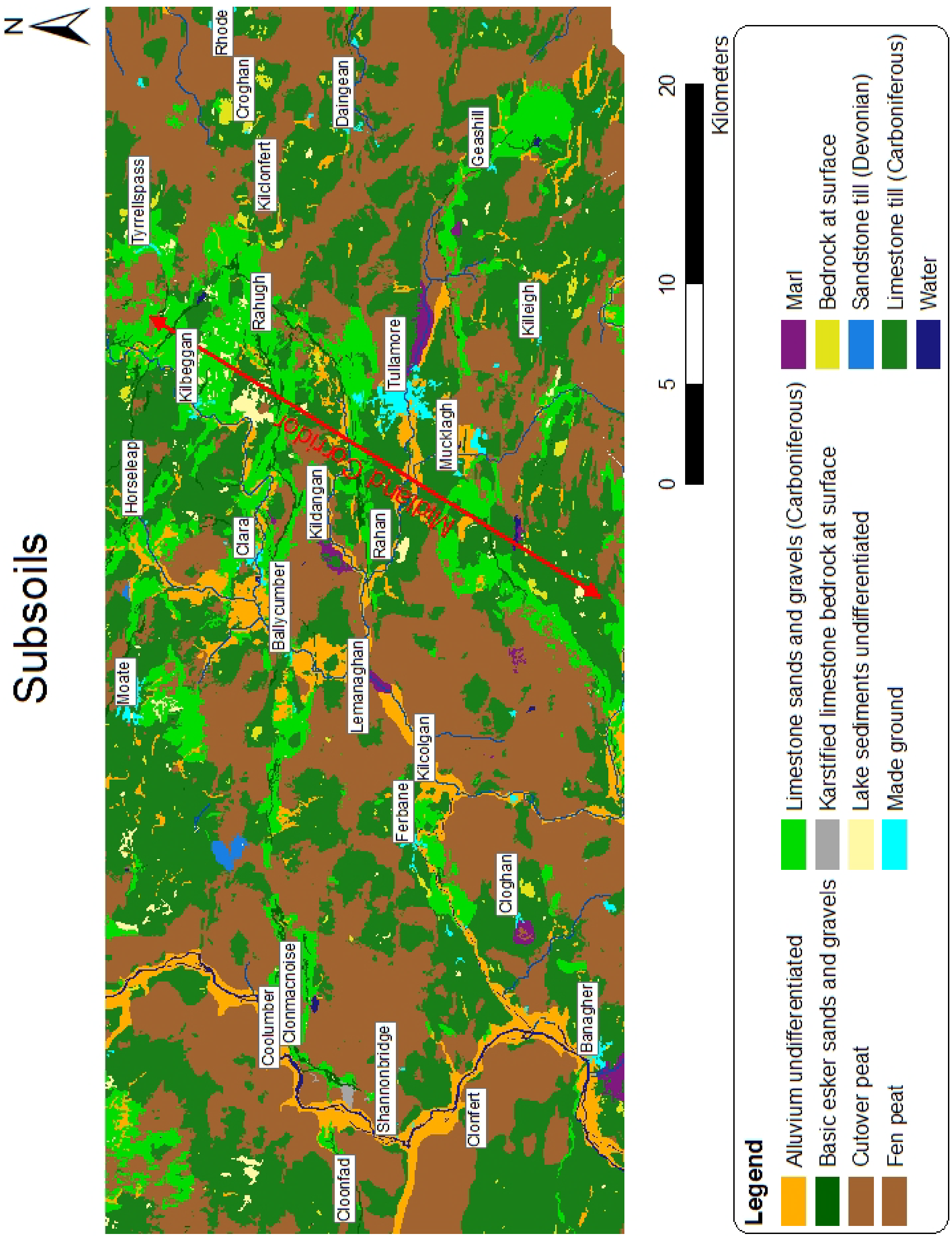

Figure 6 Subsoils of North Offaly

Alluvials indicate areas which have been subject to flooding from the rivers, and the Rivers Shannon and Brosna have particularly wide flood plains of alluvials. These deposits can make the approach to rivers a wet and difficult task, and an appropriate fording point would ideally be situated where firmer soils interrupt the alluvials. In the absence of suitably dry soils, trackways were sometimes constructed to access the ford as we see at Annaghcorrib (Chapter 5). Parts of the Little Brosna and the Middle Shannon Rivers are particularly prone to seasonal winter flooding. These winter floods recede in spring to create areas of summer pasturage, known as Callows, which are used as part of the regional farming practices. There are also areas where the subsoil is composed of lake sediments, most notably north of Durrow, whose wet soils would similarly hinder movement.

Figure 7 Glacial features offering shelter for grazing cattle

Areas of exposed rock are visible at the Karstic rock outcrop at Clorhane discussed above. A number of hills within the study area are also characterised by exposed bedrock at the surface, notably Croghan Hill, but also more modest hills such as Cloghan Hill and Bellair Hill. These are important features in a landscape as flat as North Offaly, and their elevations make them visible across considerable distances.

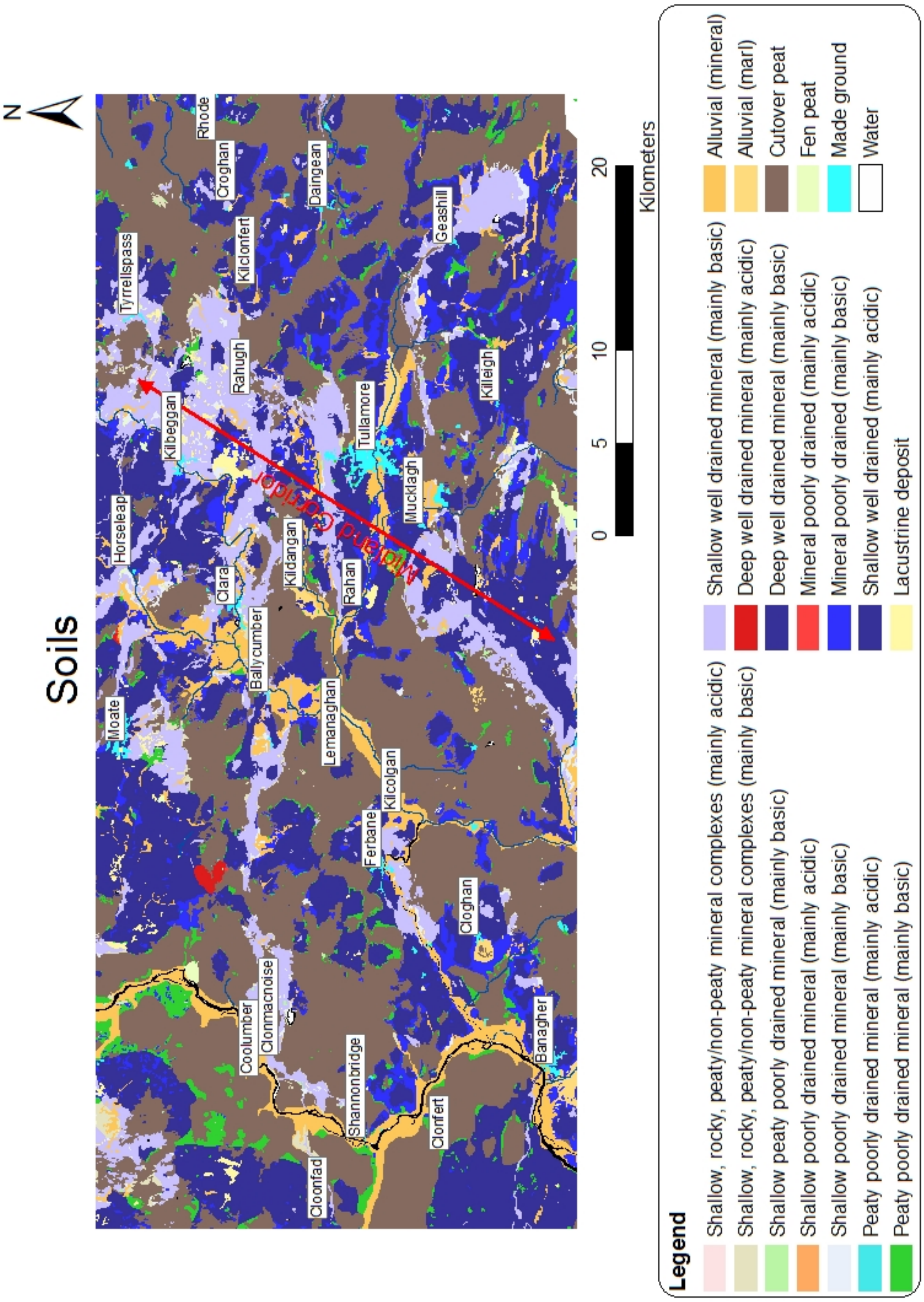

Figure 8 Soils of North Offaly

Of the soil cover, the agricultural land outside of the bogs is composed mainly of well drained grey/brown podzolics and basic brown earths with some poorly-drained basic gleys (Fig. 8). The eskers have a shallow soil cover of well-drained rendzinas and lithosols. The mix of basic dry soils with acidic gleys and peats provides a range of conditions for vegetation, increasing the diversity of plant species available within the study area which in turn impacts on the range of wildlife available for hunting.

It is clear that consideration of soils, and particularly of subsoils, is vital in a complete discussion of movement and settlement in the study area and beyond. The obstacles in this landscape are primarily made up of wetlands and alluvials, while the features that facilitate movement are the well-drained eskers and limestone-based subsoils. Settlement and agriculture have targeted specific subsoil types and these sites must also acknowledge the system of movement in place. The subsoils of this area will feature heavily in the chapters that follow, as the discussion of the archaeology of each period is interpreted in relation to the soil type and its role in agriculture and movement.

2.2.3 Esker ridges

A signature feature of the Midlands of Ireland is the juxtaposition of raised bogs with esker ridges that extend in an approximately east-west orientation across this landscape. The eskers are composed of sands, gravels and other materials which are the remains of sediment from the rivers of meltwater which flowed beneath the glaciers of the last Ice Age. These elevated and well-drained features have been used to demarcate territorial divisions and served as routeways across a landscape dominated by bog. The gravel and sand composition create a naturally metalled surface, making it suitable for pedestrians and wheeled traffic, and is very quick to drain after a heavy rain. Although only accounting for 0.83% of the land area of County Offaly (Tubridy et al. 2006a, 6), they are one of the key features in forming the characteristics of this landscape.

Together they are referred to as the *Eiscir Riada*, which is envisaged as a single entity stretching across the island of Ireland from Dublin on the East Coast to Clarinbridge on the West Coast. In reality, it is a complex system of sinuous features with a number of smaller tributaries, composed of discontinuous and sometimes parallel segments. The glaciation of Ireland appears to have been composed of four ice domes which covered the country, with the Northern Dome and Central Dome fusing at the height of glaciation. The junction between these two ice cores occurred in the Midland region of North Offaly and South Westmeath, and as the glaciation subsided it weakened this junction and gave rise to a series of meltwater rivers in the region (Warren et al. 1994; Feehan 2013, 202–205). The typical high-sided eskers which are to be found in this study area were formed parallel to the ice flow during glacial retreat. The four types of parallel flow eskers as identified by Warren and Ashley (1994) are:

1. Subglacial-tunnel-fill esker – continuous ridge formed in conduits under and within ice, and exposed following ice melting.
2. Fluvial ice-channel-fill esker – continuous ridge deposited in open, ice-walled channels between glacier bodies.
3. Subglacial-tunnel-fill (long beads) – segmented ridge formed during pulsed glacier retreat.
4. Subaqueous-fan (short beads) – segmented ridge consisting of a line of successive hills of sand and gravel deposited during pulsed glacier retreat, under water ponded at the edge of the ice, and oriented parallel to ice flow.

The eskers may manifest as single-crested ridges, composed of a single, relatively even upper surface, or they may present as multi-crested examples with broken or beaded surfaces of several joined-up ridges. Single-crested examples are most suitable for use as a routeway, as they offer an even gradient and better drainage. Part of the Clonmacnoise esker has a particularly beaded surface, with different segments being assigned names such as Bishop's Hill, Tully Hill or The Pinacle. At some of these hills, the road known as The Pilgrim's Road is situated alongside the segment on the more even surface of the Limestone sands and gravels, rather than attempting to follow the exact course of the eskers (Fig. 10).

Depending on the geology of the areas where a glacier passed, the material which is deposited by these underground rivers may be basic or acidic. The eskers of West Galway, for example, are associated with a geology of igneous and metamorphic rocks and are consequently of acidic nature. The eskers of the study area, however, are exclusively basic because of the Carboniferous Limestone in the Midlands. They are typically composed of sand and gravel, but may include up to 5-10% of silt and clay, with some boulders also appearing.

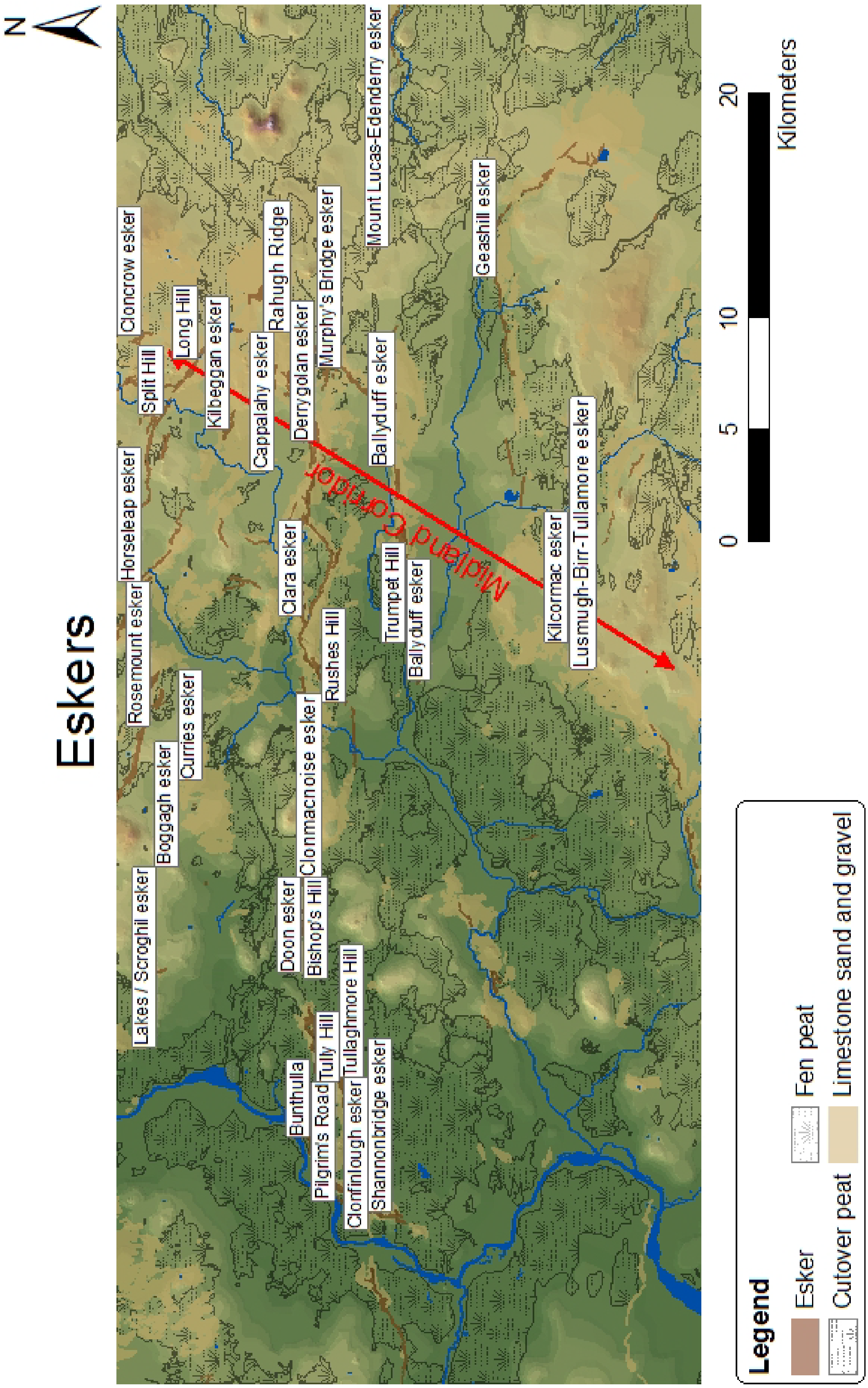

Figure 9 Named esker segments of North Offaly

Figure 10 The Pilgrims Road travelling along the base of an esker

Many of the eskers have been exploited for grazing, with 57.4% of County Offaly eskers being covered in improved grassland in 2006 (Tubridy et al. 2006a, 53), but when unused for agriculture, scrub of hawthorn, blackthorn and gorse can be quick to colonise, as seen in parts of the Clonmacnoise esker. This, in turn, can develop into woodland of oak, ash and hazel, and many esker ridges, most notably Rahugh Ridge (Fig. 11), are clearly visible on aerial photography as a long ridge of woodland. In County Offaly, 33% of eskers are recorded as semi-natural habitat, including scrub, grassland, and woodland. Eskers composed of limestone material are more favourable to many species of grass and wildflower (Hennessy et al. 2010, 29), with orchids commonly found on these eskers, including rare species such as *Orchis morio*. The Clonmacnoise esker supports the largest population of this species in Ireland (Tubridy et al. 2006a, 18). Eskers are rarely associated with tillage because of the shallow soils covering them and low nitrogen values, but some Galway examples, where soils are otherwise wet, show evidence of cultivation of potatoes and cereals (Hennessy et al. 2010, 50, 98–99). The high potential of these features for biodiversity and semi-natural habitats has led to several being designated as either Natural Heritage Areas or Special Areas of Conservation, including the Pilgrim's Road, Doon Esker and Rahugh Ridge.

Figure 11 Rahugh Ridge beneath thick vegetation

The word *eiscir* simply means a ridge in Irish, but it has become the accepted name around the world for this particular type of glacial feature. The impact of its conspicuous presence in the landscape is evident in the place names which reference it, which include the *eiscir* and *druim* elements. Names such as Clonascra (Cluain Eascrach), Derryesker (Doire Eiscreach) or Cappaleitrim (Ceapa Liathdroma), for instance, are all derived from these place name elements.

The course of the *Eiscir Riada* made up the mythological division between the two parts of Ireland known as *Leath Chuinn*, to the north, and *Leath Mogha*, to the south. It is also strongly associated with the *Slighe Mór*, one of the five ancient roads of Ireland. In reality, the sinuous and discontinuous nature of the eskers does not make a single coherent entity as these stories would imply, and there is some confusion as to which esker segments may have been in use for this boundary and for the course of the *Slighe Mór*. A series of ridges run through the study area between Rahugh and Cloonfad (Fig. 9), but a more northerly chain also extends from Clonard to Athlone.

O’ Lochlainn’s (1940) study of itineraries led him to favour the southern system for the location of the *Slighe Mór*, and Geissel (2006, 56) suggests that this is the most obvious option for the *Leath* division too. The northern series of eskers runs through more valuable agricultural land, while the southern series marks a landscape more dominated by raised bog. This esker chain, in the Midlands at least, is a convenient marker between this change from a predominantly wetland landscape to the south, to better drained land to the north. Some particularly prominent, steep-sided segments are used as townland boundaries, such as the Rahugh Ridge. Water features such as streams and rivers are, however, more commonly used as boundaries, and where eskers and water courses appear in close proximity, the water course is typically favoured as a townland boundary.

The largest esker system in the study area is the Clonmacnoise system, which includes segments from Clonmacnoise to the Derrygolan esker in County Westmeath. Other systems of note include the Lusmugh-Birr-Tullamore esker, Ballyduff esker and Rahugh Ridge. Figure 9 illustrates the named segments after Tubridy and Meehan (2006a; 2006b), Feehan (2013) and the Designated Nature Areas of the National Parks and Wildlife Service. These names will be used as much as is practicable throughout this study.

As a routeway, Geissel (2006, ix) notes that the *Slighe Mór* would not have been suitable for military movement, since most conflict in the Early Medieval period in this region would have involved the Southern Uí Néill in the kingdom of *Midhe*, with the people of *Laigin* and *Mumhu*, requiring movement on a north/south axis. Nevertheless, the *Slighe Mór* was one of the five principal roads of Early Medieval Ireland, and it has been particularly associated with the monastic sites of Durrow and Clonmacnoise. It would have been used by religious figures, pilgrims and traders making their way between these important settlements. The *oénach*, or fair, at Clonmacnoise was one of the largest in Ireland and the *Slighe Mór* would undoubtedly have been one of the routes used to travel to it. Tubridy and Meehan’s (2006a) esker survey found that local memory of the eskers as routeways was strongest in the localities of Clonmacnoise and Durrow. These ecclesiastical settlements are both strategically positioned on the eskers and they have maintained their memories as routeways through their continuity in use as pilgrim paths, particularly on pattern days.

2.2.4 The Midland bogs

Following the retreat of the glaciers after the Ice Age, this landscape consisted of the esker and glacial deposits described above and valley floors of dense boulder clay. Poor drainage meant that the nutrient-rich melt-water which filled these valleys was unable to escape to the river systems. Plants such as Phragmites reeds and bulrushes would have grown around the edges, with floating plants such as pondweed and waterlilies colonising the lake surfaces. Eventually, their semi-decomposed remains would accumulate as groundwater fed basic fen peat. There are a number of fen bogs within the study area, with the largest occurring at Finlough.

Most of the bogs of the study area, however, are of the raised bog type (Fig. 14). When fen peat continues to grow, it is no longer within reach of nutrient rich groundwater, and is instead fed by nutrient poor rainwater. This sort of peat has an acidic pH and is dominated by Sphagnum moss, colloquially known as The Bog Builder. This plant can hold up to twenty times its weight in water and it plays a vital role in the capacity of the bog to absorb rainwater and prevent flooding. Sphagnum moss will only grow in acidic conditions and it is usually absent from the bog edges where natural springs and ground water increase the pH of the deposits (Heery 1993, 34). It is because of this that raised bogs grow with a characteristic dome profile. Occasionally, a slightly elevated area of dryland will become surrounded by growing bogs. The chapters that follow will show that these bog islands have often been the focus for activities and some, such as Lemanaghan, have been the sites of major settlements.

The raised bogs that stretch across the Midlands are often referred to in the singular as The Bog of Allen, but it is in fact composed of many separately formed bogs of varying character, and William Larkin’s 1809 map of King’s County more appropriately refers to them as The Bogs of Allen (Horner 2006, 28). Many of these bogs, such as Bloomhill bog, are interconnected mires which formed separately and joined at some point in their development. Bord na Móna is the semi-state company which has ownership of many of these bogs and their management has involved organising the individual bogs into complexes, including the Blackwater Group, Boora Group, Derrygreenagh Group and Allen Group.

Industrialised peat harvesting and poor public perception of raised bogs has created the impression that bogs are wastelands and dead landscapes. From the late 18th century, public records indicate a desire to drain what was designated unprofitable land through the construction of drains, roads and the Royal Canal. The appointment of the Bog Commissioners in 1809 was intended to oversee the improvement and commercialisation of these natural resources through drainage and peat harvesting. In fact, they were valuable resources prior to this, accommodating a range of wetland loving flora and fauna, and they were accessed for hunting and collection of plants up until quite recently. Their value is evident from the preservation of trackways dating from prehistory up to the medieval period which sometimes appear to have been intended to access the bog, rather than cross it.

Figure 12 Bog cotton in Mongan Bog

Figure 13 Sundew and Sphagnum moss in Clara Bog

Natural raised bog can include a variety of environments for the plant life that populate it, with various species preferring hummocks, hollows, pools and lawns. Heather is often found on the drier surfaces of hummocks, while Sphagnum moss favours wetter areas. Other species include bog cotton and deciduous grasses, while the nutrient poor environment means that some plants, such as Sundew, rely on a carnivorous strategy to absorb essential nutrients (Figs. 12, 13). The verges of raised bogs would also have supported woodland, with scrub species such as birch featuring prominently in the pollen diagrams as well as in the timbers selected for wetland constructions.

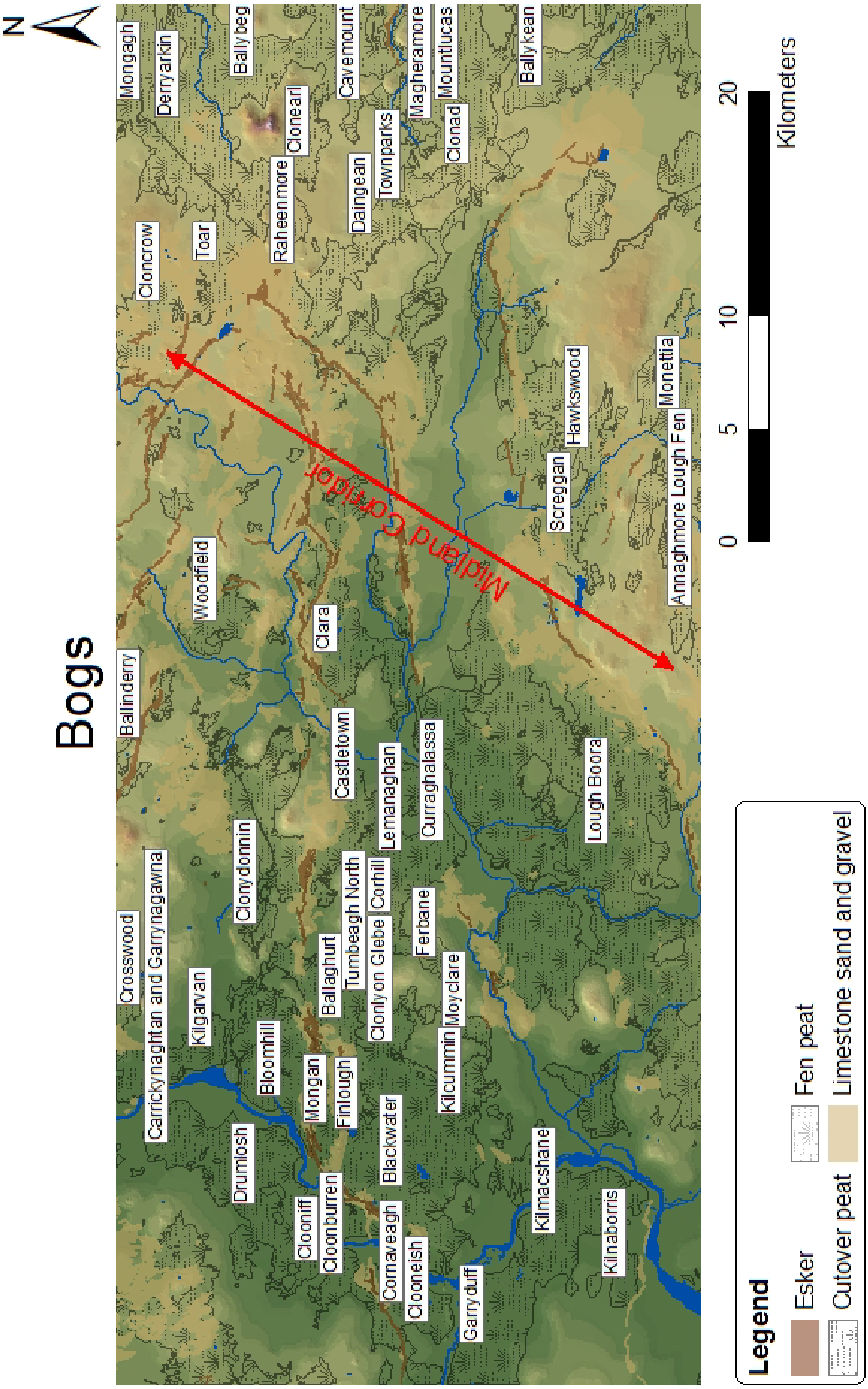

Figure 14 Bogs of North Offaly

2.2.5 Woodland

The landscape between the bogs in this study area is today mostly open farmland, but it was known for its considerable native woodland until the Tudor period. Dense woodland had suited the Gaelic way of life, but Tudor settlers were at risk from sudden attack as the Gaelic-Irish could emerge from the woodland to attack before disappearing back to safety. This was a major factor in the large scale felling of woodland to make way for planned settlements, reduce the territories of the Gaelic-Irish and ensure the safety of new settlers. Much of the native woodland across Ireland was removed for similar purposes, and Fleming (2009, 91) notes the practice of woodland clearance in Wales for safe movement on the roadway near Strata Florida. In a discussion of the poor state of Irish woodland early in the twentieth century, Bulfin (1908, 146) alleges that a landlord in the west of Ireland responded when asked why he didn't plant trees:

> "What! Plant trees to give cover to my damned tenantry to fire slugs at me? Not much",

indicating that concerns of woodland safety endured for some time after successful plantation.

Frequent reference to woodland is made in the documentary record, with woods such as Fiodh Elo at Lynally appearing in accounts of the Early Medieval landscape. Later cartographic evidence clearly shows the extent of woodland over the last 500 years, and many maps seem to emphasise their illustration, demonstrating that they were considered important landscape features for negotiating the landscape and possibly for economic activity. The 1563 "Map of Leis and Offalie" shows a landscape of considerable afforestation, and particular care seems to have been given to illustrating woodland flanking rivers and routeways (Fig. 15). This may have been an accurate portrayal of the landscape, but perhaps the cartographer prioritised woodland that might be encountered by those travelling through this area.

A number of environmental studies tell us about the changes in vegetation in this landscape over the course of the study period. Pollen cores have been published from Ballynakill (Mitchell 1950), Oldtown Kilcashel (Mitchell 1954), Bloomhill Bog (Breen et al. 1988), Clonmacnoise (Parkes et al. 2000), Mongan Bog (Hall 2006), Clara Bog (Crushell et al. 2008) and Clonearl Bog (Plunkett et al. 2009), and these indicate the extent and character of the vegetation throughout the study area. Detailed accounts are given for each period in the chapters that follow, but in brief they describe woodland dominated by *Quercus* (oak), *Ulmus* (elm) and *Fraxinus* (ash), with *Ulmus* numbers declining steadily from the Neolithic period to the Early Medieval period. Marginal areas on the bog edges or along the Shannon Callows supported species such as *Betula* (birch), *Corylus* (hazel), *Alnus* (alder) and *Salix* (willow). Timber identification from wetland trackways reflects the pollen studies, with many trackways making use of birch and other species which thrived on the bog edges, while oak was often selected for well-constructed primary toghers where complex carpentry techniques were used. Occasionally, woodland pollen would drop at the same time as a rise in grass pollens, indicating a period of woodland clearance and agriculture.

Figure 15 1563 Map of Leis and Offalie demonstrating the extent of woodland (Cotton Augustus MS I ii 40 1563)

Place name evidence indicates the prevalence of oak in the woodlands of this area. The study area includes 1050 full or partial townlands, of which 64 contain the *der* or *doire* place name element which refers to oak. Some of these native oak woodlands have survived as demesnes or deerparks, although a number have seen a change in character with the introduction of foreign species such as sycamore or beech into these areas. Charleville forest is one of the best surviving examples of native woodland in the study area, with its 'King Oak' aged between 400 and 600 years old (Magner 2011, 375).

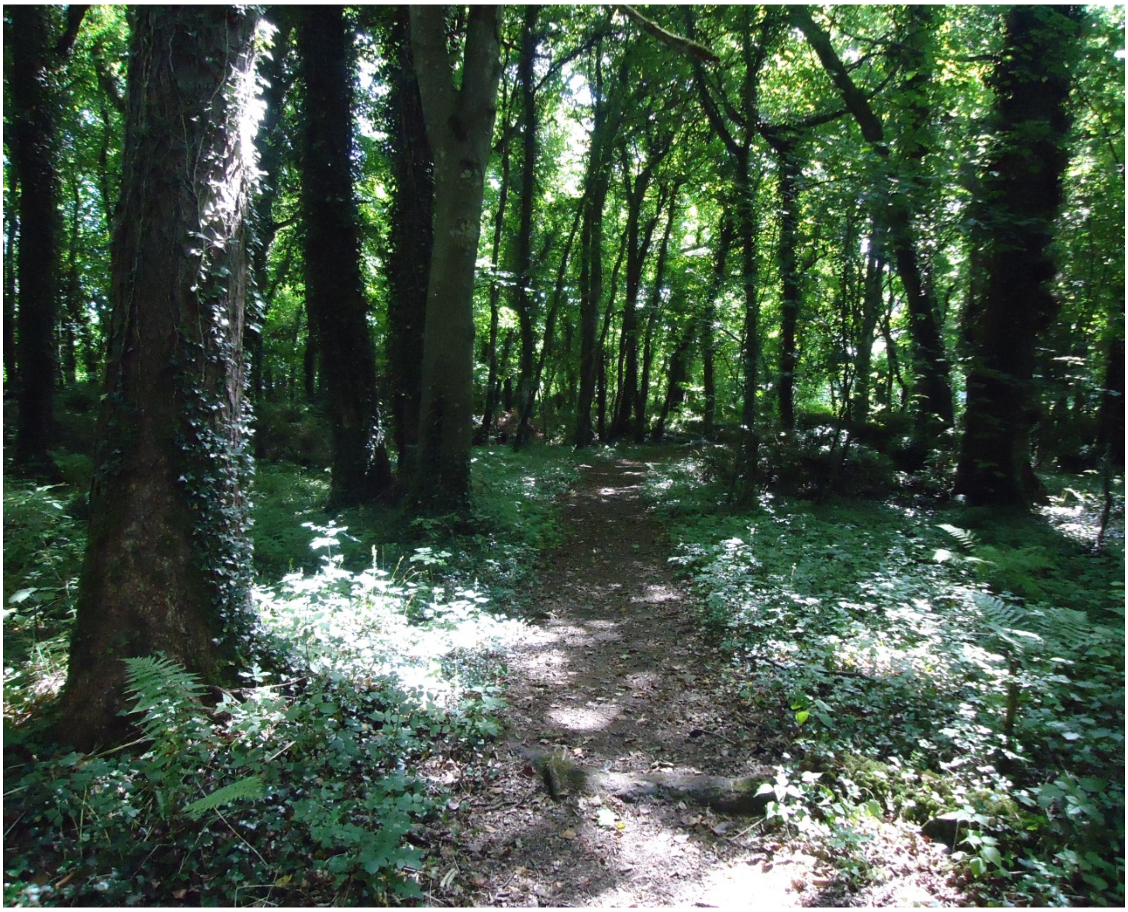

Figure 16 A woodland trail in Charleville Wood

The prevalence of woodland is an important factor in studying movement, as it can impact on the visibility of landmarks to wayfind by. While tree canopies can occasionally obscure views, natural woodland does offer frequent gaps in the canopy to help with navigation. Woodland trails created by animals or people can also be followed and coherent paths and routes can develop out of these (Fig. 16). Thus, while woodland may complicate movement, it is still quite possible to navigate through these areas and follow landmarks and routeways and it has been suggested by O' Sullivan (2007, 169) that the negative impact of woodland on movement may have been exaggerated. The pollen studies (Mitchell 1950; 1954; Breen et al. 1988;

Parkes et al. 2000; Hall 2006; Crushell et al. 2008; Plunkett et al. 2009) show occasional drops in tree pollen as woodland was cleared for agriculture in a process that opened up the landscape to more potential routeways and easier movement. The chapters that follow will show that these clearances often coincide with increased evidence of settlement, movement and routeways, demonstrating the impact of woodland on movement.

2.2.6 The Midland Corridor

A linear tract of dry land extends in a NNE-SSW direction from Ballynagore in Westmeath, bisecting County Offaly and continuing towards Munster (Figs. 3, 4, 6, 8, 9, 14). This c. 40km long feature measures 5-10km across, and was identified by Smyth (1982) as an important routeway in the Early Medieval period, naming it the Midland Corridor. It is composed of limestone till, with bands of eskers and limestone sands and gravels extending in an east-west direction across it to create crossroads of natural routeways.

Raised bogs flank this routeway, making it the reasonable option for movement in this direction through Offaly. The only obstacles of note are the Rivers Tullamore, Clodiagh, Silver and Brosna, which had to be forded. While these rivers are much smaller than the River Shannon, and consequently safer to cross, some of the alluvials flanking these rivers are quite wide, indicating very wet land which would have to be traversed before attempting to ford the river. Archaeological sites appear to cluster where the alluvials narrow, perhaps indicating the points at which these rivers may have been forded.

While Smyth (1982) discusses the importance of this routeway in the Early Medieval period at length, and this discussion has been continued by authors such as FitzPatrick (2015), it has not been previously discussed in a prehistoric context. This research will argue that it served as a routeway in the Bronze Age too (Chapter 5), and it may have its origins as early as the Neolithic period (Chapter 4).

2.2.7 The waterways and the Shannon Callows

The largest waterway of the study area is also the principle river of Ireland. The River Shannon flows from Co. Cavan in a roughly southerly direction through the Midlands before veering west creating the Shannon estuary in Co. Limerick. This river forms a major north/south routeway and flows along the western extent of the study area, providing another potential inter-regional routeway within this study (Fig. 17. Other rivers include the Brosna, Clodiagh, Silver, Tullamore and Boor rivers and numerous streams, which drain from the study area into the River Shannon (Fig. 18). Some of these water courses were navigable and would have been used as routeways to move around the study area, as well as areas further afield within the Shannon river system. The drainage catchment for the Shannon covers c. 17% of Ireland (Bourke 2001, 27), and access to this system offered potential for movement to these areas. Apart from moving along these water courses by boat, they would have acted as excellent guides in the process of landscape learning (Chapter 3), and settlement and movement would have developed alongside them.

Figure 17 The breadth of the River Shannon at Clonmacnoise

The gradient of the Shannon River is quite gentle, particularly as it passes through the Midlands, and this causes dramatic seasonal flooding in this region. This flooding affects some 6500ha of floodplain, which is known as the Shannon Callows. These areas would originally have been covered in fen woodland, but they have been developed to semi-natural grassland, facilitated by fertile alluvials which are deposited across it. This is used as seasonal farmland which is only accessible in summer when and if flooding has receded. The Callows are traditionally associated with grazing, and place names such as Clonmacnoise, Clonascra and Cloonburren along the Shannon refer to meadows and pastures.

Wading birds feed on the Callows in the winter and it is one of the most important summer nesting grounds for these species throughout Ireland and Britain. It supports populations of Corncrake, Redshank, Snipe, Lapwing, Heron and Shoveler Ducks, as well as providing wintering ground for migratory geese from October onwards. Heery (1993, 104–105) notes that the nesting habitats of birds on the Callows would include almost every hectare as a potential nesting site between May and August. The variety of bird species throughout the year would have made the Callows a valuable resource for hunting birds and, because so many of them are ground nesters, the collection of eggs.

The settlement at Clonmacnoise is situated above these Callows and they would have contributed to the wealth of this settlement through their agricultural potential. While Clonmacnoise is located at the meeting point of two major routeways defined by the esker ridges and the Shannon River, it is not ideally located for fording the river, which would have to be done further downstream. It does, however, overlook a particularly wide area of Callows, which are up to 1.5km wide at this point, and this may have been one of the desirable factors of founding a settlement here.

Heery (1993, 17) notes that ‘no houses new, old or derelict occupy the Callows and almost no tarred roads traverse them’. With few exceptions, the archaeological sites in these areas are positioned overlooking the Callows. Movement through the Callows would have been very difficult, and the dry, elevated ground of the esker ridges and limestone sand and gravel were particularly useful in that respect, aided by constructed trackways. The east-west orientations of many of the esker ridges intersect the Shannon at right angles, and it is this material which creates some of the fords in the study area (Griffith 1840, 314). The Record of Monuments and Places records four fording points along the portion of the Shannon which flows through the study area at Creevagh / Cloonburren, Raghrabeg / Raghra, Clonfert North / Killaphort and Carta / Derryholmes, but there are two additional fords on this section of the Shannon at Banagher and Keelogue (Fig. 18).

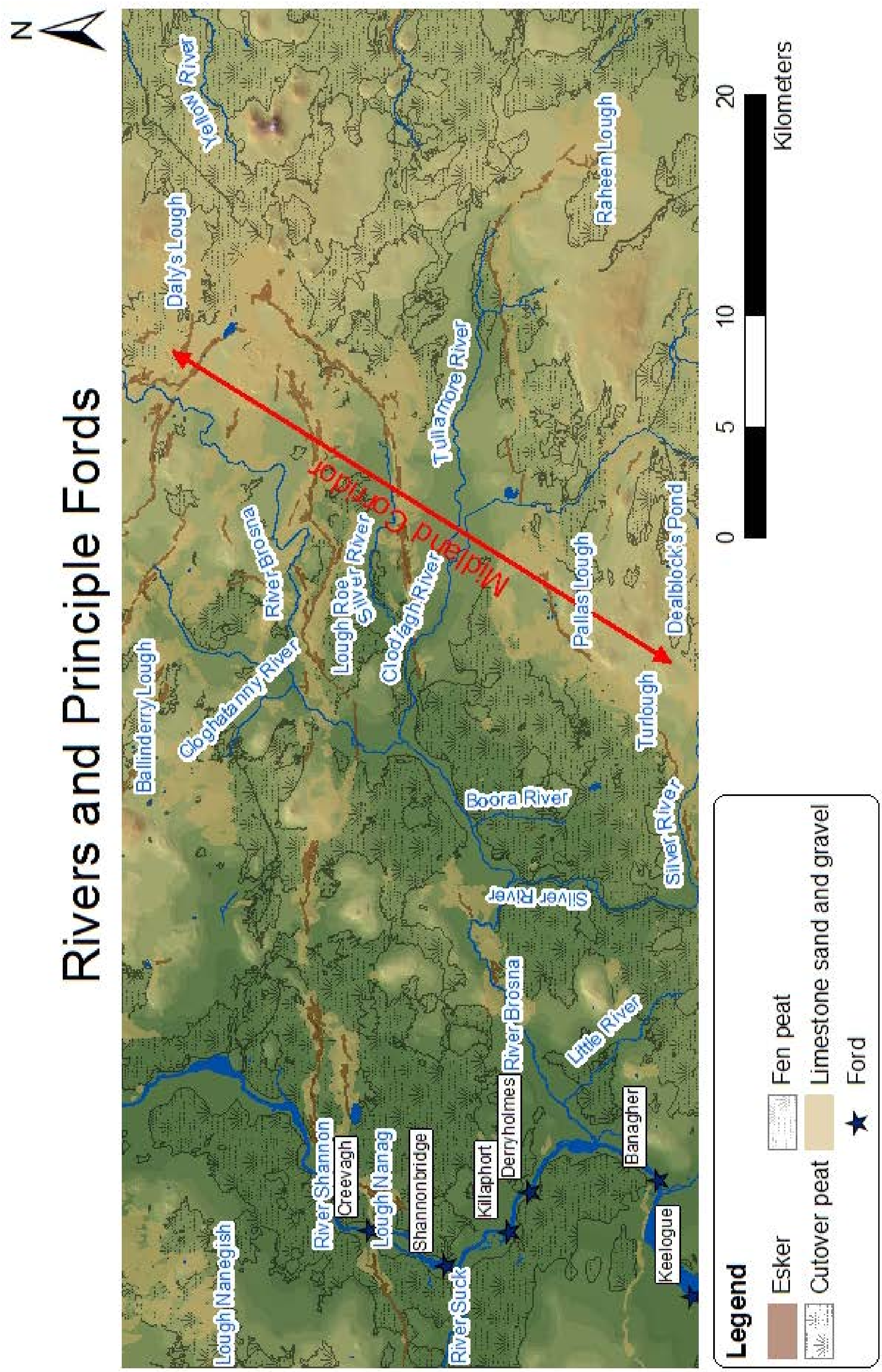

Figure 18 Rivers and fords of North Offaly

The ford known in mythology as Snámh Dá Éan was the point at which Nar slew Buide and Luan while they were in the form of birds (Gwynn 1903e, 350–367). This is thought to be the ford at Creevagh / Cloonburren, also known as Keena's Ford and possibly was the ford of Ballaghna (National Monuments Service 2015, OF005-068, RO056-011003). The *Slighe Mór* is reputed to have crossed the River Shannon at this point, using a band of limestone sand and gravel which extends from the Shannonbridge esker to the river, and across to the Cloonburren esker.

The ford at Raghra / Raghrabeg, in the town of Shannonbridge, has a long history as a strategic point for crossing the River Shannon from prehistory up to the construction of a bastioned fort in the early 19th century. The ford has been superseded by bridging the river, and the current bridge was constructed around 1700 (Fig. 19). The river has been dredged to facilitate deeper-hulled boats and this has destroyed the original fording point, but the discovery of several bronze axeheads and barbed and tanged arrowheads illustrates the use of the ford from the Bronze Age.

The ford at Killaphort / Clonfert North is flanked by a wide area of alluvials. This low-lying, marshy ford appears to have been associated with a stone and gravel trackway called St. Brendan's Road, leading to the ford on the west side of the river (National Monuments Service 2015, OF013-039). It was removed by dredging like other fords on the Shannon, but was not replaced with a bridge.

The ford at Derryholmes / Carta, also known as Slaghta Ford (National Monuments Service 2015, OF013-038), is surrounded by raised bog, making it a difficult ford to access. To overcome this, it appears that trackways were constructed to gain access to the ford, with several in Carta appearing to lead to this point (Chapter 5.5.2.15).

The ford at Banagher is easily identifiable as a line of limestone derived subsoils leading from Co. Galway to the river. This sediment leads to where the current bridge, dating to the 1840s, is situated. Dredging has also revealed a number of stone axes and Bronze Age items from this location (Chapter 5).

The ford at Keelogue is positioned at a point where the river is interrupted by the island of Incherky. The subsoils flanking it are predominantly of limestone till, and the ford itself was quite shallow and relatively easy to cross before dredging (Griffith

1840). This ford and the one downstream at Meelick are the first fords north of Killaloe, making it a very important fording point for the Midlands and North Munster region. Dredging operations revealed stone axes, indicating use of the ford from at least the Neolithic period, and a large amount of bronze items (Chapter 5).

Figure 19 The bridge at Shannonbridge / Raghra at the site of a ford

Fording points on the River Brosna are similarly associated with these sediments. A ford exists north of Ballycumber, for instance, which is clearly visible in the subsoil map as a narrowing of limestone sand and gravel, where the river is otherwise flanked by alluvial deposits.

Heery (1993) points to a correlation between road bridges and points where the Callows are absent. Of the fords discussed above, the ones with substantial areas of dryland, such as Shannonbridge and Banagher, can accommodate construction and settlement and continue to be used as river crossings through the construction of bridges. In contrast, the fords at Creevagh / Cloonburren and at Derryholmes / Carta are surrounded by Callows and bog which restrict movement, and they have consequently fallen out of favour.

Rivers are an excellent example of the the capacity of landscape features to simultaneously act as a facilitator and as an inhibitor of movement. They act as a routeway in their own right when one has access to a boat or raft, and their courses serve as wayfinding devices for those moving on foot, but they are also potential obstacles for those opting to travel over land. The necessity for a safe and reliable fording point in these circumstances allows us to hypothesise with more certainty as to what course routeways took, as the need to ford would create bottlenecks in movement patterns. In this study area, the gravels and hard subsoils which create the fording points are part of the same landscape features that determine routeways throughout the landscape, with the esker ridges and bands of limestone sand and gravel often leading to fords. Thus, discussion of river crossings is directly related to the subsoils which will be referred to throughout this study.

2.3 Summary

It is evident that topography plays a vital role in the character of landscape and in how movement is performed, and this brief description of the morphology of North Offaly introduces some of the components of landscape which will be developed throughout the study. The conditions of the wetlands and vegetation underwent a series of natural and anthropogenic changes throughout the past, and this will be summarised from Chapters 3 to 6 as each period is discussed in terms of how these factors can influence movement patterns and routeways. The subsoils are more stable features as they are determined by geology and hydrology, and these are central to the discussion that follows on movement. Specifically, the modelling component in Chapter 7 uses subsoil as the principle variable, based on observations made on movement over these subsoils in Chapters 3 to 6 as follows.

Chapter 3: Mesolithic Movement

3.1 Introduction

Many discussions on roads skip straight to the Neolithic period to describe the first tracks and routeways (Muir 2000; Hindle 2001), but Taylor (1979, 1–8) has devoted some effort to the discussion of animal tracks and the paths created by the people of the Palaeolithic and Mesolithic periods as they gathered foodstuffs and lithic resources. Mesolithic studies have tended to focus on migration and mobility, but consideration of the negotiation of the landscape and the development of paths can also inform studies focused on these periods. Migration and initial settlement require settlers to *learn* a landscape, and movement is a crucial part of that process. Landscape learning consists of wayfinding, the following of animal tracks and the use of landmarks as mnemonic devices; all strategies which must be understood to comprehend how hunter-gatherers learned and negotiated the landscape around them. Wayfinding and the development of cognitive maps have been effectively investigated through ethnographic studies and the use of controlled experiments, allowing us to discuss the role of the individual in Mesolithic movement.

The evidence from the Irish Mesolithic will be discussed in this chapter. There have been only a few discoveries of Mesolithic date from the study area, most likely due to the growth of bogs over potential sites, but more plentiful evidence from the North Midlands around the lakes of the Inny and Erne systems can illuminate how inland regions fit into Mesolithic lifeways. Landscape learning is the first phase in the cumulative phenomenon of movement and the development of routeways, and the discussion that follows explores the process of learning and interpreting the landscape which initial colonisers would have experienced. The practice of potential mobility models are also discussed, and how they impact on patterns of movement. Finally, the present study is used to explore how movement may have been performed within a particular landscape.

3.2 Landscape learning and wayfinding

Initial colonisation of an empty landscape requires colonisers to learn it in order to successfully navigate, settle and exploit it. Rockman (2003, 12) describes this landscape learning process as,

> ‘the social response to situations in which there is both a lack of knowledge of the distribution of natural resources in a region and a lack of access to previously acquired knowledge about that distribution.’

The outcome of this process is *landscape literacy*, the point at which an individual has sufficient knowledge of a landscape that they can *read* it, exploit it, and communicate landscape knowledge to others.

While recent research has shown that some human activity took place in Ireland as early as the Upper Palaeolithic (Dowd et al. 2016), it is reasonable for the purposes of this research to consider the actions and understandings of settlers acting in an absence of landscape knowledge as a first step to a thorough discussion of movement. Initial colonisation requires careful reconnaissance, particularly in the case of an island which has more limited floral and faunal resources (Woodman 2012, 13). Failure to adequately learn a landscape can result in a move to an area without sufficient resources and can be detrimental to the survival of settlers (Whallon 2006, 261). Two models are generally used to illustrate colonisation, either *Point and Arrow Movement* or *Advancing Front Patterns* (Rockman 2003, 10–11). Point and Arrow refers to direct movements where a particular motive for movement is evident. Advancing Front Patterns are more gradual waves, created by short but regular movements beyond the known area. This is the expected pattern for initial occupation, as it allows time for reconnaissance, landscape learning and adaptation.

Central or *persistent* places (William A Lovis et al. 2006, 273), as described in Chapter 1.4 are the types of places which are learned in this process. These are often large bodies of water which attract long-term occupation and re-occupation. Similarly, Donahue et al. (2006, 252) observe that highly visual features such as rock outcrops, bodies of water and confluences of major drainages are the types of sites that attract initial colonisation.

Having identified a number of landmarks, or reference nodes (Golledge 2003, 37), the cognitive map becomes more developed as information is added which relates to distance and orientation from one landmark, or node, to another. Paths which connect nodes are learned to create a network, which people can move through with reference to the landmarks and the grid that make up the internal GPS. By creating a spatial network such as this, any new place within that space can be tied into the existing network by relating the current position to a known landmark. Cardinal direction does not exist in many cultures, such as the G/wi, Tanana, Ingalik or Kutchin (Kelly 2003, 46), as topography is the preferred orientational indicator in a system which is based on landmarks. Among the Hai||om, a group of former hunter-gather bushmen from Namibia, directions refer to goal regions, such as "The Direction Of The Place Of The Fruit", "The Direction Of The River" or "Sun Goes In", in a system based on landmarks, resources and the sun (Widlok 1997). In these cultures, places and landmarks act as methods of describing orientation and directions in a navigational system that relies on cognitive mapping of place, rather than mathematical compass points.

Types of landmarks can be arranged into categories of common landmarks and idiosyncratic landmarks (Golledge 2003, 36–37). Common landmarks tend to be highly visual, such as hills or lakes, and are commonly known and recognised by groups learning the landscape as they are effective landmarks for even those unfamiliar with a landscape. Idiosyncratic landmarks are more discreet and tend to be useful only to individuals or small groups that share a common understanding of the landmark. Sacred trees, stones associated with ancestors and rock or tree carvings would fit this category and, while they may not be as visually obvious as common landmarks, they may be enhanced as landmarks through the use of place names, stories and personalities. In this way they become another node in the cognitive map, but are only helpful for people who are familiar with their cultural significance and capable of *reading* them.

Rockman (2003, 4) has described three types of information which must be acquired to form a comprehensive landscape knowledge including,

- Locational information – The locations and physical characteristics of resources.
- Limitational information – Boundaries and seasonal or physical limits of resources.
- Social information – The assigning of names, meanings and patterns to natural features.

Locational information is the easiest to learn, through exploration and the use of landmarks and cognitive mapping. While this is sufficient for exploratory activities, it is not enough to guarantee a successful residential move. Limitational information includes the temporal and spatial limitations of a resource, and it takes longer to learn as the stability and availability of a resource must be determined. The seasonal limits and reliability of a resource are vital information in determining the suitability of a location for settlement, but it may take as long as a generation to become fully familiar with this type of information (Rockman 2003, 5).

Social information is the human contribution to landscape knowledge, and what creates a cultural landscape. When a landmark, resource or place becomes part of the lived-in landscape, they require names in order to communicate about them. Naming an entity reinforces its existence as a landmark and makes it easier to communicate in directions to others. Places which are visually impressive are often the focus for stories and mythologies, and these are the very features which act as landmarks to aid navigation. Biesele (1993, 55–56) argues that dramatic mythologising of landscape features enhances their potential as wayfinding devices, and leads to the longevity of the importance of those places. Thus, part of the experience of knowing a landscape involves not just a knowledge of geography, but also of folklore in order to effectively read and navigate a terrain (Kelly 2003, 47). In Ireland, sites such as Croagh Patrick, Howth Head and Lough Derravaragh have been persistent places which have attracted settlement and ritual activity since prehistory, and have also been the focus of mythologies which reinforce their importance.

The most basic type of place name is purely descriptive of the physical characteristics of a place, allowing people to talk about the place and form expectations from the name as to how it looks. This is discussed by Basso (1996) who lists Apache place names which describe the visual characteristics of a place, such as “Bitter Agave Plain”, “Water Lies With Mud In An Open Container” and “Juniper Tree Stands Alone”. Similarly, the Hai||om bushpeople use names such as “The Place Of The Hard Ground”, “Stony Ground” and “Hill Country” (Widlok 1997). This is evident in many Irish place names, with Glendalough (The Glen Of Two Lakes) or The Burren (Rocky District) accurately describing the physical appearance of these places. Learning a landscape is primarily done through direct experience, but social knowledge involving descriptions, place names and stories allows some landscape learning to be done through social interactions. In an ethnographical study of the Hai||om bushpeople, Widlok (1997) found dead reckoning amongst hunters to be possible from what he called *topographical gossip*. People learned about an area by hearing others talk about it while pointing in its direction, which allowed them to visualise the appearance and location of a place to incorporate it into their existing cognitive maps without ever having been there in reality. The accumulation of this knowledge, or *shared cognition* as Widlok puts it, is done socially over generations.

Dead reckoning, as observed among the Hai||om, is the ability to constantly spatially update one's position and to successfully point in the direction of a known destination. It is part of the practice of homing, or path integration, and animals have been observed practicing it by being able to return to nest in novel ways. O' Keefe et al. (O' Keefe et al. 1971; O' Keefe 1976) observed that Place Cells fire regardless of the direction of approach, which is necessary for path integration. The grid created by Grid Cells and an understanding of the effect of distance and direction on current location are also central to this ability. Feedback from muscles and other body parts, or kinesthesis, is combined with signals from the vestibular, or internal balancing, system as well as efferent motor commands to help with spatial updating (Klatzky et al. 1990, 20). Head Direction Cells and Speed Cells interpret this information to determine one's position in their cognitive map. Klatzky et al. (1990) demonstrated through blindfolded path integration experiments that this practice is possible, but less precise, in the absence of landmarks. Participants would typically experience an increase in locational uncertainty the longer they interacted with the environment without touching or bumping into a wall or obstacle. The use of visual landmarks in the landscape creates a more accurate spatial perception, where locational uncertainty is reduced by sighting a known landmark or location. When attempting to walk in a straight line, people tend to veer direction slightly with a deviation of about 18˚ being reported even by experienced explorers (Golledge 2003). This appears to happen most frequently in an unknown or illegible landscape with topographical features which the explorer is unaccustomed to and unable to read, thereby increasing locational uncertainty. Deviation varies depending on speed, with slower movements typically causing the highest deviation. Blindfolded subjects often find their way back to the origin point and it has been interpreted as an unconscious act of homing.

In fact, landmarks do not require full visibility in order to aid wayfinding. Another experiment found that remembered landmarks were enough to improve wayfinding even when they couldn't be seen (O' Leary et al. 2005). This explains how the Hai||om can point to a distant location with ease, as it acts as a remembered landmark learned through topographical gossip. In a densely wooded landscape, as Ireland would have been in the Mesolithic and much of the past, there would not have been consistent access to the visual cues of landmarks through the dense canopy. The studies above demonstrate, however, that remembered landmarks and occasional glimpses through breaks in the canopy would have been sufficient for spatial updating and successful navigation.

It is quite obvious therefore, that landmarks are the crucial factor in successfully learning and navigating the landscape. The development of cognitive maps relies on particular locations in order to create the spacio-temporal memory system or internal GPS. The use of landmarks, place names and story-telling appears to inform this process, as the Hai||om have seemingly managed to incorporate places which they have not physically visited into their cognitive maps. The principle reason for this discussion has been to demonstrate the role of highly visual features in initial explorations of an unknown area, and how their role is supplemented by place names, stories and communication. We must imagine that this is what Mesolithic people experienced as they learned and communicated about the Irish landscape.

3.3 Foraging and Collecting

Movement associated with hunter-gatherers can be differentiated by typically local, everyday movements, and more occasional movements involving residential mobility. Models based on ethnographic studies have been used to understand both of these types of movement, the most well-known of which is Lee's (1969) scheme inspired by his studies of the !Kung bushmen. He estimated a two hour radius, about 10km, was exploited for foraging, fishing and hunting activities, and this has been applied to many Mesolithic studies, including Woodman's study of Mount Sandel (Woodman et al. 1985). This is a reasonable estimate for regular and mundane movements, but is vague in terms of acknowledging resource patches, preferred paths or the effect of different terrain on the time taken to access resources. Longer trips may be taken intermittently which do not adhere to this model, perhaps necessitating overnight camps for the purposes of sourcing prized rock, hunting trips or performing exchange. There is such high regional variation in Northern Europe that it would be unwise to assume homogeneity of mobility (Lovis et al. 2006a), so this model should serve only as an introduction to movement in the Mesolithic, to be explored in context as necessary.

As for how resources would have been exploited, Binford (1980) suggests a system of *Foragers* or *Collectors*, which would impact on the mobility patterns of the group. Foragers would be obliged to move seasonally to different *patches* where food resources are available, requiring frequent residential mobility where the whole community moves residence or camp. The characteristic attribute is that they gather foods on a daily basis, with little or no storage. The size of groups may be quite small, particularly if resources are scarce. The Foraging model exploits a radius around camp where food encounters take place, including some overnight trips further afield to catch and process meat. Clarke (1976, 457) reminds us that barely a month would pass without the availability of a different combination of fruit, roots, nuts, seaweed etc. which would be encountered in this fashion.

Collectors, however, could send out task groups to collect specific resources to bring back to base camp. Rather than the daily task of collecting food, Collectors store food when it is plentiful. This system allows access to several resources which may be geographically distant from each other at once. The base camp can be close to one resource, and the larger size of the community means multiple task groups can be sent out to temporary camps to bring the resource back to base. Thus, less residential mobility is required, but greater logistical mobility is practiced, characterised by the movement of task groups etc. The base camp would typically only be moved if a new site offered greater access to resources, possibly due to a change in season or environment. The bulk of stored resources would also discourage frequent residential moves.

Whallon (2006, 260, Fig. 1) proposes that the availability of game determines the most suitable strategy. Unpredictable and concentrated game suits a Collectors model. The existence of a well-resourced permanent base camp allows the community the logistical ability to organise hunting trips in pursuit of game. Predictable and scattered game is better suited to a Foragers model. The scattered nature of game means limited numbers at a single site, but its predictability can inform a safe and successful residential move. Typically, lower altitude areas are better suited to Foragers, while high altitude environments are more likely to be exploited by Collectors (Lane 2014, 116). A Forager model ideally is limited to small bands of 25-30 people (Whallon 2006, 266) who interact frequently with other bands to exchange partners and maintain access to resources over long distances etc. Thus, this model tends to lead to more homogeneity in material culture than a Collectors model, as Collectors are more self-sufficient and require less contact with other groups.

Zvelebil (2006) proposes three levels of interaction for contact and exchange – regional, inter-regional and long distance. In this interpretation, a region is identified as an area occupied by communities linked by economic, political and kinship ties (ibid. 182). The people of a region interact with adjacent areas for inter-regional communication and more distant areas for long-distance contact. The type of subsistence strategy used directly informs the classification of regions through the size of the territory exploited and the potential for kinship ties with other communities. For Collectors, a larger area is routinely exploited, but their relationship with areas and people beyond that is limited. Foragers exploit a smaller area around camp, but residential mobility gives them the freedom to access distant areas and people. The existence and character of inter-regional routeways depend on the activities and requirements for movement of the people living within a region and as such, the type of subsistence being practiced must be acknowledged in a discussion of the emergence of routeways.

The study of faunal and floral assemblages from Mesolithic sites can identify the seasons that excavated sites were in use. From this, it ought to be possible to reconstruct in broad terms what type of environments suited seasonal settlement, after which we can discuss the character of routeways used to move between them. Movements following the migration patterns of red deer were proposed by Clark (1972), and settlement sites in southern Norway are found on bottleneck points along the migrationary patterns of modern reindeer who take the paths of least resistance between the coast and inland (Bang-Andersen 1996, 435). It is likely that routeways and paths created by animals were being used by Mesolithic hunter-gatherers, as both paths of least resistance and hunting aids. For the Irish Mesolithic, however, the lack of game would create a different pattern of movement. In particular, the proximity of Mesolithic sites to water suggests that movement by water was practiced, either with the help of rafts or boats, or by using the water course as a guide and moving adjacent to it.

3.4 Mobility in Ireland

Woodman's (2012, 11) proposed model for how Ireland could have been settled around 8000 BC involves:

- Exploratory visits to an unknown landscape.
- Pioneering visits to use and exploit the resources.
- A movement towards long term settlement.
- Adaptation of technology to suit the new landscape.

Exploratory visits from Britain would have targeted areas with easy access, such as coasts and rivers. These are features conducive to landscape learning, allowing quick, safe and easily remembered access to new areas. They are highly legible features to which generic knowledge can be applied to quickly form an impression of the overall topographical scheme. These areas also provide access to food resources of saltwater and freshwater fish, shellfish, seaweed and watering animals.

These visits would provide the opportunity to gain locational information, which would be necessary to gauge the suitability of Ireland for potential settlement, while limitational information could be gleaned through the course of steps two and three in Woodman's (2012) model. The wildlife of Ireland in the Mesolithic was not dramatically different to that of Britain, but it was less diverse with the notable absence of red deer (Woodman et al. 1997). Fish played a more important role than red deer in the diet of the Early Mesolithic (Schulting 1999; Schulting et al. 2002; Richards et al. 2006) however, so the lack of this species may not have been cause for concern, and wild boar populations offered an opportunity for alternative game.

Perhaps more significant in the Irish case is the limitational information of lithic resources. Flint resources are available in the northeast of Ireland, with only occasional nodules found in other parts of the country. Non-organic material such as lithic resources are the least transferable type of information for new colonisers (Rockman 2003, 19). They need to be discovered by new settlers and provide material which can be worked in the way that settlers are accustomed to. The flint in Northeast Ireland is good quality and suitable for soft hammer indirect percussion, but beyond that the chert resources are of more varying quality and would require adaptation. In addition to this, soft hammer percussion ideally involves the use of antler which was unavailable in Ireland. Woodman (2012) suggests the adaptation of technology to suit the new landscape would have started almost immediately, adhering to Rockman's (2003, 12) estimation of about one generation to adequately learn the limitational information of an area. It is this process of learning and adaptation which would allow chert and other cruder materials to be used for lithic production, as billet material for soft hammer percussion was scarce while raw material was relatively plentiful (Kimball 2006, 242), contributing to a change in lithic production towards broad blades in the Late Mesolithic in Ireland.

From the density of Mesolithic settlements by coasts, rivers and lakes, it follows that these persistent places were the landmarks around which the landscape was explored and cognitive maps were produced. As explorations were made further inland, bodies of water would allow movement by boat and act as a guide for terrestrial movement. Knowledge of river systems and of entry and exit points of lakes would have been shared in order to negotiate the landscape, access resources and learn migratory patterns of fish (Little 2009a, 703). Little (2005, 91) has discussed the visual impact of these watery places, citing the compelling spectacle of the white marl on the lake islands of Moynagh Lough as an example. This impact, combined with the sharing of knowledge and the development of stories around these places, would have contributed to the making of persistent places and reinforced cognitive mapping.

Exploration inland would have involved the penetration of dense woodland of oak and elm, with frequent pine, hazel and birch. The pursuit of more lithic resources and game would have encouraged such explorations. The undergrowth would not have been too much of an obstacle to movement. Undergrowth and brush grow most densely on the verges where more light penetrates to the forest floor, so a well-canopied, mature forest should be easily walked at ground level. Robust wildlife populations would control some scrub growth as they trample paths through it. These paths would have been useful for hunter-gatherers who could use them as paths of least resistance, leading them to the animals that created them, as well as to other sources of food and water. Visibility is reduced when navigating a forest, but occasional breaks in the canopy would reveal views of landmarks and the sun. Terrestrial topographical features such as hills and mountains would be perceived and learned to navigate in this way. Legible schemata could be used to provide predictable paths, and generic knowledge of rivers or eskers would help to negotiate novel terrain.

The seasonal mobility which was practiced in the Irish Mesolithic seems to have involved the occupation of coastal areas in the spring, followed by rivers and lakes over the summer and the uplands for the winter months, which supports the theory that rivers were followed inland, and suggests a further attraction to the uplands. Woodman (1987) suggests that the material for lithic production in the Early Mesolithic would be gathered through the course of normal hunting and foraging trips, in an embedded procurement strategy. Good quality flint sources were readily available in the Northeast, but the rest of the country is limited to occasional beach nodules of flint or more widespread chert resources. Nodules and prepared cores were sometimes brought from the Northeast, from which we can infer an established communication network (Costa et al. 2009, 798).

By the Later Mesolithic, it appears that specialist trips, or direct procurement, were undertaken to collect lithic materials in larger quantities. Local material was used when possible, as we see in the use of greenstone at Ferriter’s Cove, Co. Kerry (Woodman et al. 1999), siltstones and volcanics at Lough Allen (Driscoll 2009), quartz at Belderrig, Co. Mayo (Warren 2009) and rhyolite in Monvoy, Co. Waterford (Green et al. 1990). A quarrying site has been identified on the Hill of Knockeyon, Co. Westmeath, showing clear evidence of direct procurement of chert which would have been used throughout much of the Northern Midlands (Little 2009b). There are numerous examples of artefacts being recovered whose material was not local, such as Lough Swilly and the Bann Valley where the lithic material was from a source 50km away (Kimball 2006, 242). The low level of artefact re-sharpening suggests that it was not difficult to procure and may indicate direct access to the source (ibid).

The lithics of the Early Mesolithic period in Ireland are carefully curated, while those of the Later Mesolithic tend to be more expedient and generalised. The change in lithic preparation is most likely part of the process of adaptation to the Irish environment, and may be due to a number of factors such as availability of suitable lithic material or the lack of red deer. Kimball (2006) suggests that it is a symptom of a high mobility lifestyle which facilitated ready access to lithic resources. Soft hammer techniques conserve raw material and increase the life of a tool, but ample resources made curation by soft hammer less necessary. A highly mobile lifestyle may well explain the lack of regional variation in Later Mesolithic Irish material (ibid. 241).

In brief then, it may be suggested that the earliest explorations of Ireland would have adhered to memorable features, particularly predictable landscape schemata such as coast lines and water courses. The need for food and lithic resources would have demanded a certain amount of exploration to ensure the survival of the settlers, which would gradually improve landscape knowledge and cognitive mapping. Their level of knowledge would have impacted on the practice of subsistence strategies, as the accumulation of locational and limitational knowledge would encourage a process of adaptation, perhaps ultimately leading to a change in strategies. This appears to have happened between the Early and Later Mesolithic in Ireland and this change in strategies would in turn have impacted on the type of movement which took place.

3.5 Technology

The principle difference between the movement of humans and that of animals is the use of technology to expedite movement. The use of boats makes it possible to move both people and goods over water, and indeed is the way in which Ireland was initially occupied. Meanwhile on land, interventions such as toghers and constructed roads make terrestrial movement much faster and minimise the effort involved in navigating by landmarks. Improvements in technology have aided the movement of people, goods and ideas, impacting settlement, material culture and social structures. The ability to move easily also has the potential to expand boundaries and the areas of influence for the people who could exploit such a practice. In the case of Mesolithic technology, boats were the most important innovation for movement.

3.5.1 Boats

It used to be believed that Ireland was initially colonised by means of land bridges from Britain, but palaeogeographic reconstructions have shown that Ireland was separated from Britain by 16,000 BP (Edwards et al. 2008). This means that any colonisation of Ireland from Britain after this time must have happened by boat. Dowd and Carden (2016) have identified the presence of Palaeolithic activity dating to 12,810-12,590 BP and the possibility for further Palaeolithic evidence may cause a revision of current theories, but the current evidence of settlement in the Early Mesolithic probably indicates a genuine influx of people at this time. Wickham-Jones (2014, 701) describes these pioneering Irish settlers as a maritime culture who made their ways to Ireland by boat. It is assumed that this would have been with the use of dugout canoes, but while some of these vessels have been discovered in various locations around Europe (Burov 1989; Gron et al. 1991; Smith 1992), there has been a disappointing lack of boats of Mesolithic date found in Ireland. One example of dubious date was discovered at Brockish on Lough Neagh, where the boat was dated based on its association with a Bann flake (Woodman 1978, 247; Gregory 1997, 47). A potential Late Mesolithic dugout canoe from Carrigdirty Rock, Co. Limerick, with the unusual material of poplar was later reinterpreted as eroded timber because of the lack of tool marks and the presence of bark on its underside (O' Sullivan 1997; 2001, 71–72). Scotland is similarly lacking in boat discoveries from this period, but there is an abundance of evidence for the extent of maritime economy in Western Scotland in island and coastal contexts which could only be facilitated by boat (Warren 2000; Pollard 2000; Wickham-Jones 2014).

Danish boats of this period were predominantly of lime (Andersen 1995, 60; Christensen 1990), which is a light timber very suitable for canoes and easy to work with pre-metal tools (Gregory 1997). Lime did not grow in Ireland in this period however, so species such as oak, elm or pine would have had to be used, though they are heavier timbers and more difficult to work. Smith (1992, 140) observes that dugout canoes would have been too unwieldy for sea ventures. He suggests that skin-covered boats, which are light and less likely to survive in the archaeological record, may have been used in the settlement of Ireland, while dugout canoes would have been used in inland locations on rivers or lakes. Furthermore, wooden paddles elsewhere provide evidence of boating predating the earliest known logboats, even to before trees of suitable dimensions for dugouts would have been available (Lanting et al. 1996, 92).

The discovery of a boat burial dating to 4790 BC from Møllegabet, Denmark, demonstrates the importance of these vessels to boat users from an early date (Gron et al. 1991). In coastal areas and island landscapes, it may have been more usual to move around by boat than by foot (Pollard 2000, 150–151). Discussions of frequent movement over water between the Scottish mainland and islands, and the Late Mesolithic appearance of Obanian culture has given rise to the concept of *seascapes* (Pollard 2000; Warren 2000; Wickham-Jones 2014). Coastal areas were particularly attractive for hunter-gatherers, as they support food resources throughout the year, are highly legible for landscape learning and navigation, and offer a reasonable method of travel to access places or people. Thus, while physical boats are poorly represented in the archaeological record of Mesolithic Ireland, comparisons from elsewhere and the nature of the archaeological evidence means that we should consider boating as an important method of travel, exploration and communication by Mesolithic people in Ireland.

3.6 North Offaly in the Mesolithic

The Midlands have been largely unexplored by scholars of the Mesolithic period, partially because of the difficulties involved in studying an environment which has changed so dramatically since the development of raised bogs (Little 2009b, 133). Lakeside activity has been studied in the North Midlands at Lough Kinale (Fredengren 2002; 2009; Fredengren et al. 2010), Lough Derravaragh, Lough Sheelin and Lough Iron (Little 2009a; 2009b), where lakeside platforms have been found which are assumed to be linked to fishing activities. Few lakes have survived in the North Offaly study area, however, and the tendency for Mesolithic settlement to occur on lake shores means any settlements from this period in the study area are likely to have been engulfed by encroaching peat. Such sites are not easily found through typical peatland surveys conducted in Bord na Móna controlled bogs, as they would be located in the lowest layers of fen and peat which are unlikely to be exposed by mill harvesting. Archaeological investigations in advance of motorway construction have, however, revealed sites in the earliest peat layers elsewhere, such as at Ballynaclogh, Co. Galway (Maginness et al. 2014).

The environment of the study area was composed of a woodland of pine, elm and oak, with considerable birch and hazel (O' Connell 1980). The bogs which now dominate the landscape would have been at the earliest stages of their development, with conditions varying between open water, reed swamp or fen, and some bogs even showing early *Sphagnum* growth (O' Connell 1980, 45; Bermingham 2005, Chapter 8; Crushell et al. 2008, 91). The early stages of bog development may have caused difficulties with moving around, but sites such as Ballynaclogh above and the limited evidence that has been discovered for this period in the study area demonstrate that Mesolithic people were successfully accessing and moving around in early wetlands.

3.6.1 Lough Boora

Just one lakeside settlement has been discovered within the study area at Lough Boora (Fig. 20). At the time of its discovery it was assumed that almost all Early Mesolithic settlement was confined to the Northeast and coastal areas, but the early dates showed that early hunter-gatherers were willing to exploit inland sites at a considerable distance from the coasts. The lithic assemblage of 200 microliths, 400 blades, three complete ground stone axes and several cores was characteristic of Early Mesolithic technology. Charcoal from hearths on the site mostly fell between the range of 7606-7188 BC (Ryan 1980)[2].

The site was situated on a storm beach overlooking the original, pre-bog lake at Lough Boora, which drained into the Boora River. Chert made up the majority of the lithic assemblage, demonstrating the use of local resources in tool production. The limestone throughout Offaly contains areas of chert inclusions which could be exploited for lithic production, but particularly in the fine-grained limestone between Clara and Tullamore (Hammond et al. 2003; Feehan 2013, 88) only 13km from the site. There were also several pieces of flint, possibly suggesting some manner of communication with the northeast of Ireland.

[2] Calibrated on OxCal Version 4.2

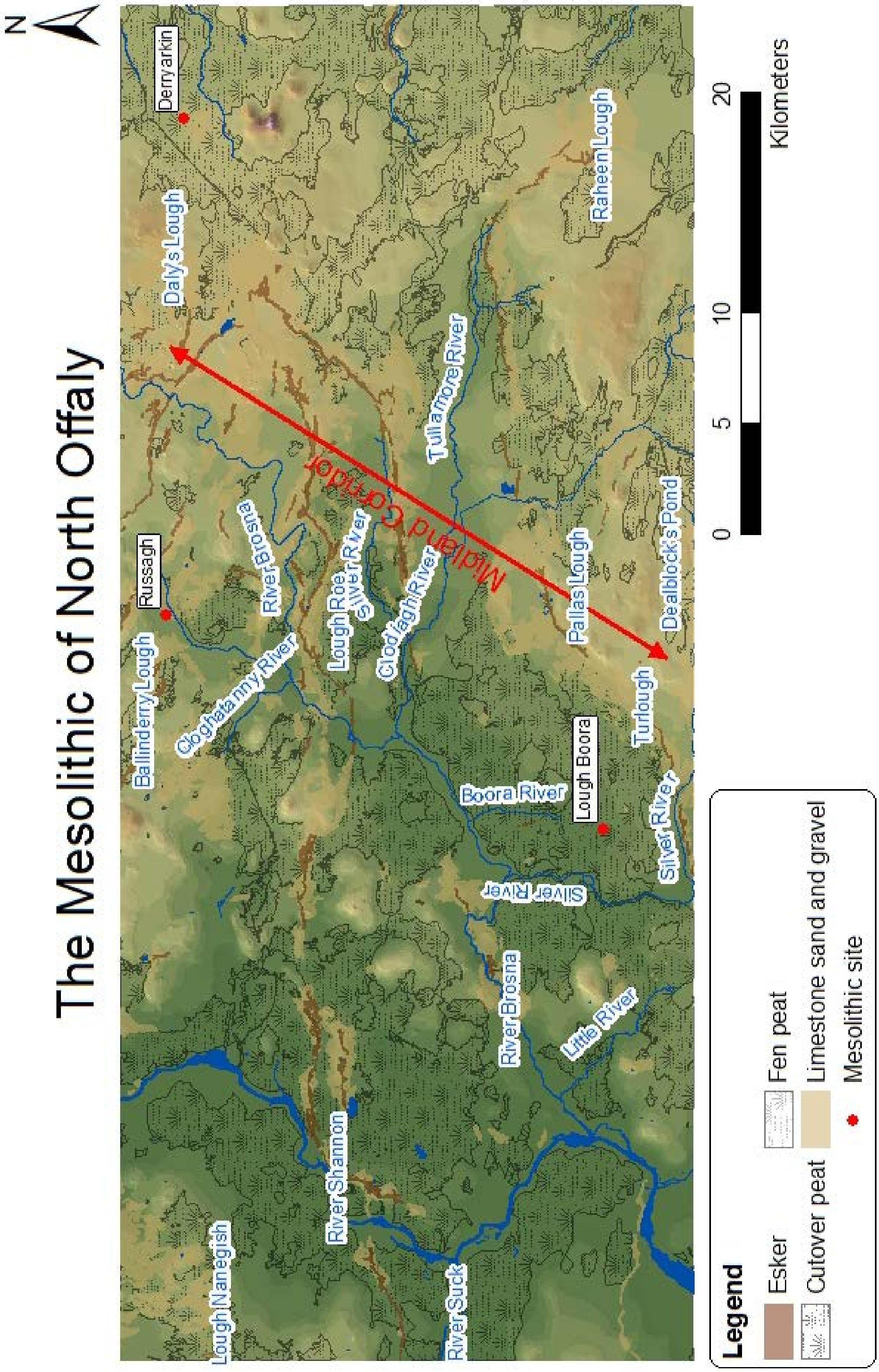

Figure 20 The Mesolithic archaeology of the study area

23% of the faunal assemblage was mammal, with wild pig dominating at 98% and showing evidence of being killed in the summer (van Wijngaarden-Bakker 1990). Birds made up only 8% of the total assemblage, consisting mostly of woodpigeon, with some water birds such as mallard or teal. The wild pig, wood pigeon and hazelnuts suggest woodland hunting and foraging were an important part of the subsistence strategy, and they would likely have gathered other plant material which is unlikely to survive to supplement the diet. Fish dominated the assemblage however, making up 69% of the faunal remains from the site. This was composed exclusively of eel and salmon.

The percentage of fish in the assemblage from Lough Boora is 12% less than that identified at Mount Sandel, Co. Derry. Even considering the preservation difficulties of such fragile bones, this is a substantial difference from the riverside County Derry site. The proximity of Mount Sandel to the Bann estuary allowed access to saltwater fish, which made up 7% of the total fish assemblage, so Lough Boora's inland location may account for this difference. With only a few local exceptions, only migratory fish were available in inland locations in the Irish Mesolithic (van Wijngaarden-Bakker 1990, 129), so any inland occupation would require increased reliance of terrestrial fauna and flora. This would affect the type of movement practiced on a daily basis, requiring more movement through terrestrial woodland contexts.

The Boora River drains into the River Brosna and the Shannon system, providing easy access by water to much of the interior of the country. The Brosna originates in Lough Ennell and Lough Owel in the northern midlands, which is the hinterland of areas of significant Late Mesolithic occupation on the Inny system at Corralanna and Clonava, Co. Westmeath (Warren et al. 2009, 26–27). Seen in this context, Lough Boora marks the early stages of the occupation of the Irish Midlands which adhered closely to the courses of rivers and lakes, locations which facilitated wayfinding, transport, communication, and access to food resources.

3.6.2 Stray finds

While Lough Boora is the only example of a Mesolithic habitation site in the study area, stray finds can further illustrate the presence of people moving through the landscape. The Irish Archaeological Wetland Unit made such a discovery at

Derryarkin Bog, north of Croghan Hill (Irish Archaeological Wetland Unit 2003b; 2003c, 18) (Fig. 20). A Bann flake of chert (Fig. 21) was discovered there in an area that had been milled out to sub-peat levels, demonstrating the extent of destruction a bog would have to undergo to expose potential Mesolithic material. Derryarkin Bog is located north of Croghan Hill and its distinctive profile would undoubtedly have been an important feature in the cognitive maps of Mesolithic people. The find site is located between the Yellow River and Mongagh River, which both flow to the River Boyne, offering a route to the East Coast.

A chert blade (Fig. 22) of possible Early Mesolithic date was also found at Russagh, Co. Offaly (Fig. 20), ahead of construction of the N6 road scheme (O' Carroll 2009a). It was recovered from the fill of a furrow from Post-Medieval agricultural activity, so the original context is unfortunately lost. The site was located next to the Gageborough River which flows south to the River Brosna, and hence to the Shannon.

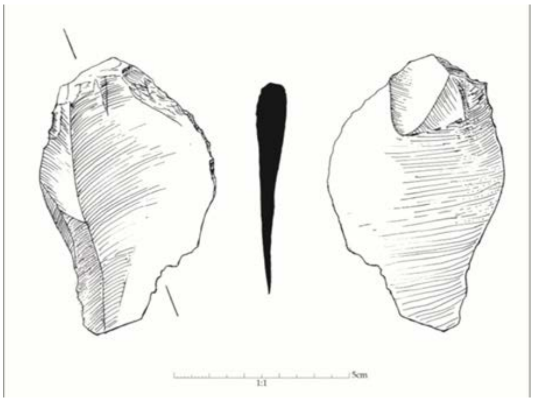

Figure 21 92E0148:94 Bann flake from Derryarkin Bog

Figure 22 E2681:12:1 Possible Early Mesolithic lithic from Russagh

These finds demonstrate further Mesolithic activity in the study area, and it is likely that there are many more stray artefacts in this landscape, though they may be in contexts which are unlikely to be revealed. The proximity of these items to features such as Croghan Hill and the Gageborough River illustrates the importance of these natural landmarks for early settlers.

3.6.3 Discussion

Mesolithic activity in the north midlands tends to be found next to rivers and lakes, particularly where rivers enter or exit lakes. This provided access to the best fishing spots and facilitated movement and social relations (Little 2009a; Fredengren et al. 2010). Very little modelling has been done to reconstruct the pre-bog landscape of the Irish Midlands, but the minimal evidence of Mesolithic activity in the study area seems consistent with this characterisation. All of the examples above are close to former or existing bodies of water, and there is likely to be more undiscovered examples of hunter-gatherer activity in this area.

The existence of these sites demonstrates that Mesolithic people were willing to travel quite long distances from the coast, and movement most likely adhered to the river systems. These locations were demonstrably used for settlement and fishing, but they would also have facilitated quick and easy movement on a legible natural routeway. Movement through wooded landscapes can incorporate landmarks, wayfinding and cognitive mapping, and this would have been necessary to practice hunting, gathering and resource collection. Croghan Hill would have been visible from Derryarkin and may well have acted as a landmark, while Russagh is located close to a number of eskers. For longer journeys, however, the river systems were the most logical and attractive vector for movement.

Chapter 4: Neolithic Movement

4.1 Introduction

The introduction of agriculture, construction of megalithic burials and development of material culture in the Neolithic has attracted the attention of scholars influenced by theoretical approaches such as Invasion Theory, Culture History, Diffusionism and Processual modelling. The Landscape paradigm has been particularly successful in studies of this period, and it contributes greatly to our understanding of movement and routeways. Landscape studies involve a holistic approach to the discussion and interpretation of landscape, encouraging the use of methods as diverse as palaeo-environmental studies, spatial analysis, or experiential exercises in the field. Visits by researchers to a landscape provide an opportunity to interact with the area through the medium of movement, and to emulate or speculate on the movements of past people through the same landscape. Routes and paths 'organize the ways in which humans use and modify nature' (Zedeño et al. 2003, 60), making them crucial features in this period when the landscape was undergoing modification for agriculture, settlement and monument building. What follows is a discussion of movement in the Neolithic, including the supplementation of cognitive mapping through common and idiosyncratic landmarks, regionality as explored through the natural terrain and material culture, and the use of technology to aid movement. The Neolithic archaeology of the study area will also be used to discuss how movement may have been performed in the Irish Midlands.

4.2 Wayfinding in a lived-in landscape

Bradley (2007, 36) suggests that there must have been a number of Mesolithic routeways for the transition to Neolithic lifeways to have spread so rapidly throughout Britain and Ireland. Appropriate use of these routeways may have depended on the cooperation of the indigenous people, who had well-developed cognitive maps including knowledge of river courses and other routeways. As discussed in Chapter 3, wayfinding in the Mesolithic period would have involved incorporating landmarks, river courses etc. into cognitive maps. The same processes would have been used in the Neolithic period, but they were supplemented by the enhancement of significant natural places with the erection of burial monuments, and the creation of new types of places.

While Bradley (2000, 34) argues that natural places are not monuments as they have not been constructed by humans, they often carry many of the hallmarks of them. Common landmarks such as hills, headlands and estuaries would have been highly visible, as many monuments are. Some natural places would have had a spiritual significance, and attracted the same treatment as constructed monuments do in this regard. The word *monument* is derived from the Latin *monere* (to remind), and many natural places are used to remember legends and ancestors in the same way a constructed monument does. The elaboration of natural monumentality through constructed monuments emphasised the natural landscape by drawing attention to it, undoubtedly enhancing the perception of place and the role of the landmark in cognitive mapping. While in many ways this is a complement to natural landscape, it is also an action which fundamentally alters it. Monuments reorder how the landscape is learned, perceived and experienced because they change it. The changing attitude to place is congruous to the changing attitudes towards nature which the domestication of plants and animals brought about (Bradley 1993, 17). Bergh (2002, 139) summarises this by concluding that,

> 'The emergence of monuments indicates that individuals were no longer adapting themselves to the landscape but were making the landscape adapt to them.'

One of the key attributes of monuments is the control of space, influencing or prescribing the decision-making process in how movement is performed around them. Monuments bring additional order to the places where they are built (Bradley 1993, 48), and if natural landmarks are viewed in this way, then the entire landscape parallels the space around a constructed monument. This paradigm would involve the control of movement though landscape dynamics and the schemata of natural features. One is either limited, through difficult landscape features, or compelled, through natural routeways, to move in a certain way and experience landmarks as part of an ordered experience. This natural influence over movement could have been emphasised and formalised through the construction of monuments at natural landmarks.

The clearing of vegetation which would be required to build these monuments would emphasise that location against a backdrop of natural woodland. This altering of the earth (Bradley 1993) is not merely an event which impacts on the immediate vicinity of the clearing, but one which affects the wider landscape both visually and environmentally. The visual impact of such alteration compels more conscious notice, allowing more opportunity to spatially update one's position through visual stimuli. Meanwhile, portions of woodland were cleared for the purpose of agriculture, opening up the landscape to views of landmarks unimpeded by vegetation, and visual reminders such as this may have contributed to a different sense of cartographic scale in tune with the changing landscape. The occasional glimpses of landmarks which can be afforded in a wooded context are thus replaced by more regular views, improving spatial awareness over longer distances and increasing the visibility of the monuments devoted to the ancestors.

The enhancement of natural places with burials simultaneously appropriates the accumulated significance of a place, while also contributing to its longevity, ensuring it continues to be relevant. By appropriating an existing landmark of importance, the communities who build monuments can reinforce their claim on the land and strengthen their group identity. The visibility of these places would serve as constant reminders of ancestral and group identities and they would be key places for piloting, navigation and the development of cognitive maps. If natural places are communicated through place names, stories and lessons as discussed in Chapter 3 (See also Basso 1996), then the erection of burial monuments designed to house ancestors must contribute to this. Stories would circulate about the ancestors, and the events surrounding the communal effort of ambitious projects would surely provide for memorable accounts. In this respect, moving through terrain and encountering landmarks becomes an enriched experience where an individual is moving not just engaging in physical movement, but is interacting with their history and identity; in essence, moving through a *landscape*. This is not performed simply as abstract directions, but is movement through a narrative.

Widlok (1997) describes the orientational skills of the Hai||om as being partially derived from a socially shared cognition. This reflects the accumulation of knowledge about the landscape which is collected and shared over a number of generations. In this respect, the ancestors would have played a pivotal role in the early accumulation of this knowledge and it would be appropriate to acknowledge that by providing them with a burial in a central place in the landscape around which movement is performed and cognitive maps are produced. This can be facilitated by placing burial monuments on highly visible locations, such as hills, or by situating them along the course of a routeway.

Knocknarea, Co. Sligo, for example, is a conspicuous limestone mountain overlooking the Cúil Irra peninsula. The mountain itself acts as a landmark, visible over substantial distances and acting as an ideal node to pilot and map by. The Neolithic cairn on its summit accentuates its prominence and reminds observers of the stories of the person associated with it. Medb's Cairn, as it is known, provides a reminder through place name and stories of the mythological Queen Medb with whom the monument is associated. In this way, the mythologies surrounding her are part of the experience of moving through this landscape, just as Neolithic people would have experienced in relation to the original personality of the cairn.

Below Knocknarea, the Carrowmore passage tomb cemetery exemplifies the positioning of burial monuments along a routeway. The existing road to Sligo is flanked by a number of later monuments, suggesting that this road is part of an older routeway which extended towards Sligo Bay and the mouth of the Garvoge River (Bergh 1995, 119). This routeway leads to a clearly defined natural depression which is flanked by Neolithic monuments. While these monuments may not have been as visible over long distances as Medb's Cairn was, they would have been unavoidable for any individuals making use of the routeway.

In contrast to how members of the community would feel about encountering such monuments, strangers would have had quite a different experience. Common landmarks such as hills would be crucial aids to navigation for outsiders seeking to negotiate a landscape, and the erection of burial monuments on such locations forces the individual to acknowledge that they are moving through a lived-in landscape. While some routeways may require specific landscape knowledge, in other cases the natural dynamics and legibility of a landscape can attract movement by outsiders attempting to negotiate their way through the area. Rivers would continue to be important routeways, particularly for those unfamiliar with, or in the process of learning a landscape. Here too, we see burial monuments overlooking routeways, with the monuments of Newgrange, Knowth and Dowth, for example, clearly visible to people moving along the river.

Strangers may not be privy to the shared knowledge surrounding such monuments and, while they reinforce sense of place for those *in the know*, they would serve as a reminder to outsiders that they are not part of the community or the landscape. They may have been seen as sentinels overlooking the landscape, provoking a sense of wariness on the part of strangers attempting to traverse it. Apart from whatever power the ancestors may have been thought to hold, the manpower and cooperation that would be required to build a monumental burial would reflect the capabilities of the community who occupy a region, a message which outsiders would be compelled to note.

In essence, the construction of burial monuments allowed communities to reinforce their sense of place and create or alter new types place. This impacted on movement through such landscapes, as names and stories allowed for the communication of *topographical gossip* as discussed in Chapter 3.2, new places could be added to cognitive maps, and routeways were defined by flanking burials. For members of the community, this reinforces their relationship with the landscape and their group identity as they move through a storied landscape in which they are literate. Strangers would be exposed to these monuments in a vacuum, knowing only that they are wayfinding in a lived-in landscape as they attempt to learn landmarks and read the terrain.

4.3 Discreet marking of routeways

The monuments discussed above are obvious and conspicuous places, many of them occupying already visible places in the landscape. They are characteristic of *common landmarks*, immediately obvious even to those unfamiliar with the landscape and thus useful for wayfinding to a large audience, the concerns of being a stranger in an occupied landscape notwithstanding. In contrast, *idiosyncratic landmarks* would be useful only to a select few who communicate about them. They can include more discreet features such as a particular tree or an odd-shaped boulder, and directions which include such landmarks would be less helpful for strangers than particularly obvious landmarks. Of particular interest here is how routeways can be marked out by entirely invisible means, namely, the deposition of artefacts at river fords.

In Adolf Mahr’s Presidential Address to the Prehistoric Society in 1937, he drew attention to the large quantities of prehistoric artefacts which were discovered during dredging operations in the Bann, Shannon, Barrow and Erne Rivers (Mahr 1937). Much of this material dates to the Neolithic period, with as many as 768 polished stone axes having been recovered from the ford at Killaloe on the River Shannon for instance. Though some may have been forgeries (Bourke 2001, 33) it is estimated that it formed part of a routeway by 3000-2500 BC (Condit et al. 1999, 28). This has been interpreted as an indication of Mesolithic or Neolithic ritual activities at fording points which were important places in the landscape (ibid.).

The possibility of accidental loss or the sites of battles can be quickly dismissed. These scenarios would leave only a very small number of items behind, and would probably be mostly small items. Nearly 50% of Irish stone axes have been found in rivers (Cummings 2009, 45), and the preponderance of one particular and prized artefact type suggests they were being deliberately deposited to mark out places of importance.

A river can be a very significant part of a landscape. It is simultaneously a feature which connects, through its potential as a routeway, and divides, through its use as a border. It can act as a vector for movement, but also impede travel by acting as an obstacle. As a vector and an obstacle, it acts as a threshold, a *no-man's land*, and a liminal space between the lands either side. A ford blurs the distinction between the river and dryland, and would have attracted ritual attention as well as practical use. While the act of deposition might have been a conspicuous occasion of pomp and ritual, on its completion there would have been no visible impact. The act marks out a place of importance, an important node and waypoint on a routeway, and it would have reinforced the position of the ford in cognitive mapping of the landscape, but its spectral traces would be invisible to those not complicit in the ritual.

While common landmarks are useful for a wide audience, fording points would require specific locational knowledge. Many common landmarks and legible routeways were the locations for burial monuments, while fords were treated differently in the Neolithic by marking them out in a discreet way that only members of the community could acknowledge. This may have encouraged story telling about the ford by those who remembered depositional events, which prolongs the marking out of the routeway by other invisible means.

4.4 Evidence of movement

One of the best indicators of movement is in the appearance of non-local artefacts and materials in an archaeological assemblage. The evidence from the Later Mesolithic appears to indicate relatively limited and local movement of materials, but a change in the Neolithic sees an increase in inter-regional movement of material. This can indicate either direct procurement, or the trade and exchange of artefacts and materials facilitated by a network of communication.

The burial monuments from the Bend in the Boyne passage tomb cemetery in County Meath demonstrate the great lengths which the tomb builders were willing to go to procure materials for construction, particularly in the case of the largest monuments of Newgrange, Knowth and Dowth: many of the materials were not locally available and the volumes required dictate that they would have had to be procured directly from the source, requiring complex logistical planning. Greywacke, for example, was most likely sourced from Clogher Head (Corcoran et al. 2008), while the quartz cobbles from Newgrange and Knowth were procured from the Wicklow Mountains, 50km south of the Boyne Valley (Mitchell 1992). Granodiorite from the Newry / Slieve Croob region of Co. Down, granite from the Eastern Mourne Mountains and gabbro and microgranite from the Mourne / Carlingford area may have been transported by rivers and ice to the sea shore, where they were subsequently collected as attractive cobbles (Mitchell 1992; Meighan et al. 2002). Mitchell (ibid.) concludes that the shores between Giles Quay and Rathcor, on the north side of Dundalk Bay, would have been the best places to collect these cobbles.

It is estimated that there was at least two tonnes of granodiorite cobbles brought to Newgrange (Mitchell 1992, 135). While it has been suggested that they might have been tokens brought back from prehistoric pilgrimages (Meighan et al. 2002), the enormous quantities might suggest more deliberate trips to procure this material. The massive kerbstones of greywacke would certainly have involved carefully planned procurement and transport, and a number of slabs of this material have been identified along the course of the River Boyne in the vicinity of these passage tombs (Fenwick 2017, 42), demonstrating how these stones were likely to have been transported to the region. The presence of these materials in such large volumes suggests that the tomb builders were familiar with the landscapes they procured them from, indicating they were comfortable with travelling distances of up to at least 50km. The most appropriate way to transport these materials would have been by boat, accessing Dundalk Bay, Clogher Head and Wicklow along the East Coast, and travelling up the River Boyne to site.

The appearance of non-local portable objects can similarly demonstrate movement. The River Boyne connected Meath and North Leinster to a number of areas along the North and East Coasts, as well as access to the Irish Sea and across to Britain. Porcellanite (Type IX) stone axes are one example of a non-local artefact type that made its way to this region. These items originate from Rathlin Island and Tievebulliagh, Co. Antrim, and are more commonly found in Britain than in the south of Ireland. The densest distribution outside of Ulster, however, occurs in County Meath, and the Boyne is the most obvious explanation for this, allowing quick access to the Northeast through a combination of river and coastal boating.

The movement of the materials and artefacts along the East Coast in this way adheres to Jones' communication corridor model (2008), where movement in a north-south axis is most easily facilitated along this coast on the corridors of the Rivers Bann and Barrow, and movement by boat along the shore was undoubtedly part of this pattern. The model defines a region by intensity of communication, and this leads to a certain amount of cultural uniformity of language, material culture or burial practices in overlapping or neighbouring regions. The archaeological record of materials, artefacts and monument type in Northeast Ulster, Meath and the East Coast suggests that there was procurement, exchange and symbolic transfer which were part of an intensity of communication which formed part of the Irish Sea zone. The procurement of materials for construction in the Boyne Valley indicates this, for instance, as well as the distribution of porcellanite axes, and indeed, the distribution of passage graves as a monument type in Ulster, Meath and Wicklow.

In conclusion, the archaeological record indicates that movement was being practiced over considerable distances to facilitate procurement, exchange and communication. While woodland clearance would have made way for monuments, settlement and agriculture, boating or rafting over water would have remained an important means of movement for long journeys. This method of movement would have allowed greater quantities of material to be transported quickly than could be facilitated over land, the result of which is access to more raw material, the circulation of more items, and the spread of material culture. The types of material which were being procured in the case of monument building suggest that communication with the regions which supplied them must have been well-established, an assumption which is supported by the physical exchange of porcellanite axes and the symbolic transfer evidenced by the distribution of passage graves.

4.5 Settlement

While the extent and nature of the sedentism which was practiced by Neolithic settlers has been debated at length (Thomas 1996; Whittle 1997; Pollard 1999; Cooney 2003), it is clear that it played a more central role in the lifeways of the Neolithic population than it had among Mesolithic hunter-gatherers. Settlement sites of this period would have targeted light soils for farming, typically on gently sloping ground or low ridges of lowland regions, and nearly all Early Neolithic house sites are close to water courses or shorelines (Smyth 2014, 22), facilitating access to routeways and communication.

The houses of the Irish Neolithic fall into two categories; the rectangular houses of substantial timber construction which were used for probably less than a century in the Early Neolithic c. 3715-3650 BC (McSparron 2008; 2013; Smyth 2010, 5); and the smaller circular houses from the Middle Neolithic onwards which were more typical of prehistory and probably accommodated smaller groups. A pattern has emerged in recent years of dispersed clusters of Early Neolithic houses (Grogan 2002, 522–523; Smyth 2006, 235–236; 2014, 23–27; Waddell 2010, 40) reflecting close ties within the community which would require intense and frequent local movement, with houses acting as central nodes. Although the houses of the Middle and Late Neolithic are more ephemeral and less well-understood; clusters have been found at Lough Gur, Knowth and Townleyhall which may similarly suggest dispersed clusters and accompanying movement.

It is also evident that there were activities taking place away from settlement sites. A scatter of artefacts at Windy Ridge, Co. Antrim, for example, has been linked to seasonal use of uplands for livestock (Woodman et al. 1991, 34). The site would not have been far from the main settlement area at Glencoy, but the evidence on site suggests that a small group would have spent considerable time there, carrying flint with them from the lowlands and repairing their tools as required. A similar practice has been suggested in a study of burials from the Linearbandkeramik (LBK) culture of Central Europe, where there was less variability of strontium levels among males who were buried with adzes than among those without them (Bentley et al. 2012, 9329). Strontium is absorbed through diet and its presence in bones and teeth varies according to the underlying soil and geology of an area. The different strontium signatures are derived from the time spent by these two groups in different landscapes. One possible suggestion for this difference in male burials is that the males without adzes may have acted as stock herders who practiced transhumance, while those buried with them would have been cereal cultivators.

As will become apparent in the present study, marginal areas such as wetlands were targeted for particular activities. While permanent settlement adhered to dryland, excavations on estuaries and bogs suggest that these marginal areas were seasonally exploited (Cooney 2003, 49). The Carrigdirty Rock 5 site on the Shannon Estuary in County Limerick, for instance, dates from c. 3700-3400 BC and has been interpreted as a temporary occupation site which was used in early autumn for grazing, hunting or fishing (O' Sullivan 2001, 84–85). Permanent settlements have not been discovered close to these locations, suggesting a mobile settlement strategy was in use in order to access these landscapes (ibid, 89).

O' Sullivan (2001) suggests a localised mobility strategy was in use. This would allow the main settlement to occupy low-lying valley positions, while access to other resources was facilitated through temporary camps on uplands and wetlands. The hinterland outside of the settlement would have been exploited for seasonal grazing, hunting, gathering, timber collection and lithic procurement. We can infer from this that there were regularly used paths and routeways between the main settlement and the exploited marginal areas. Evidence of this is preserved through wetland trackways in estuary areas and bog sites. The pattern of Irish settlement shows a territorial network, with the homes of Neolithic people occupying the centre of that network (Cooney et al. 1994, 52). Commenting on Britain and Ireland, Thomas (1996, 4) describes a "seasonal pattern of fission and fusion, dispersal and aggregation, in which particular segments of communities, perhaps defined on age or gender criteria, were engaged in particular tasks at particular times of year”. This is the sort of strategy which is required in order to optimise the exploitation of available resources to supplement agricultural produce, allowing for more storage and sustaining a larger population.

Thus, while settlement and sedentism became an important part of Neolithic life, it is important to consider how these houses acted as nodes within the landscape around which a pattern of mobility and communication was practiced. Recent house discoveries have enhanced our understanding of settlement patterns and land use in the Neolithic period, and the marginal areas which were being accessed appear from current information to have been some distance from known settlement sites. We must then consider how movement would have taken place between exploited zones and the settlement node.

4.6 Technology

Technology continued to improve throughout the Neolithic period, which had an impact on movement and mobility. Neolithic stone axes tend to be larger than Mesolithic ones, and improvements in tools would have led to improved carpentry techniques. Movement over water continued to be an important method of travel, which required the production of boats and rafts, while access to wetland areas was often reliant on the construction of trackways to offer safe and stable walking surfaces. Developments in these areas would have expedited movement, improved communication between settlements, and allowed access to resources.

4.6.1 Boats

While the evidence is sparse for the use of boats in the Irish Mesolithic, we have more reliable evidence in the Neolithic period, both in the form of the boats themselves and the presence of materials which could only have been accessed and transported by boat. The use of boats would have been necessary to carry over domesticated cattle and cereals, probably from Britain. Porcellanite from Rathlin Island could only be procured by boat and many examples of Irish porcellanite axes are found in Britain, while Arran pitchstone was similarly imported to Ireland.

Most Irish logboats are found in freshwater contexts, but it is clear from the evidence above that maritime movement was a frequent occurrence. The character of these boats is unknown as sea environments are less conducive to the preservation of these boats than less violent fresh waters (Forsythe et al. 2007, 6). It can be expected that there were more boats in use in maritime environments than the preserved examples might suggest, and 2% logboats of varying periods have been recovered from estuarine locations, but Gregory (2015a) suggests that the hull size and high timber density of dugout logboats would have inhibited open sea voyages. The examples that have been recovered also show no evidence of outriggers, which would have been necessary to stabilise the vessel for travel on the open sea, although two boats lashed together might have accomplished open sea journeys (Fry 2000, 21, 25; Breen et al. 2004, 34). It is therefore probable that other boats, such as skin covered vessels, were in use for sea and coastal travel which have not been preserved due to the conditions of the sea environment.

The locations where Neolithic logboats were recovered show that these vessels were being used in a variety of contexts. A riverine example was recovered from Ballynagowan on the River Bann, Co. Armagh, dating to 3620-3340 BC (Lanting et al. 1996, 86; Fry 2000, 106). Boating over lakes is indicated by a logboat dating to 3502-3350 BC from Lough Erne (Fry 2000, 50). Two other examples of Neolithic date (3641-3378 BC and 3700-3382 BC) were found at Ballylig on Lough Larne, Co. Antrim, suggesting some use of these boats in sheltered marine environments (Fry 2000, 117–118; Breen et al. 2004, 33–34).

A well preserved oak logboat was discovered at Greyabbey Bay on Strangford Lough, Co. Down dating to 3499-3032 BC (Forsythe et al. 2007). It had a flattened stern and tapered towards the bow, with a transverse ridge at the stern acting either as a foot rest, strengthening feature or an element to separate the internal space. It is estimated to have been 9.35m long externally and 8.8m internally, while the internal width was 0.85m. Allowing c.2m per person, there was space for five crew members and it could accommodate a load of up to c. 3800kg. Its proportions suggest it would have been a particularly stable boat, which would have been necessary if it were to venture into maritime contexts from the lough. Although the length of the boat may have impacted manoeuvrability, the tapered canoe form would have improved its handling.

A boat from Inch Abbey, Co. Down, was dated through dendrochronology to 2739 ± 9 BC (Foley 1992). It was in fact an unfinished example which was probably abandoned due to damage on the port side, but it was of tapered form. It would have been of much more modest dimensions than most other early prehistoric examples, with an external length of 3.06m, an internal length of 2.2m and a width of 45cm (Gregory 1997, 439). It was recovered close to a fording point (Fry 2000, 99), suggesting it may have been intended for ferrying across the river and which could account for its small size.

Movement over water was probably how long journeys were achieved in this period. Water courses provide ready-made and easily remembered routeways, with most settlement occurring next to these features, while the landscape would have remained heavily wooded away from settlement areas. The dated examples of logboats that survive demonstrate that boating was being practiced in a variety of contexts and was clearly an important means of travel. While alternative boat designs do not survive, the evidence for travel on the open sea leads us to the implication that other vessels must have been in use and skin-covered boats are the most probable solution. These would have enabled easier movement over open water and would not have had the same restrictions to width and cargo as the logboat variety.

4.6.2 Trackways

By the end of the Mesolithic period, the postglacial lakes which had formed across much of the Midlands were in the process of changing to reed swamp, fen peat and the raised bogs that dominate so much of that landscape today. Some watery areas may have remained accessible by poling a boat or raft, but the build-up of peat in other areas would have accommodated movement on foot. The construction of trackways would have made movement in these areas easier and safer, offering a stable walking surface while removing the difficulties of finding one’s own way through a difficult terrain by offering a path to follow. Such trackways were built in bogs and estuary areas, and would have allowed expedient crossing of difficult terrain, as well as access to the resources which it provided, such as fish, fowl and water-loving plants.

Excavations at Edercloon, Co. Longford, revealed such a trackway, dating to 3640-3370 BC (Moore 2008, 2). EDC 45 was composed of longitudinally placed roundwoods, loosely woven over transverse roundwoods and well packed with brushwood. It took a gently winding path around tree stumps, indicating an area of fen-woodland, and it was probably intended to link two areas of dry land (Fig. 23). Another Neolithic trackway dating to 2870-2490 BC from the same site was a simple tertiary togher, designed to overcome a few metres of difficult ground.

Figure 23 EDC45, Edercloon (Moore 2008, 5)

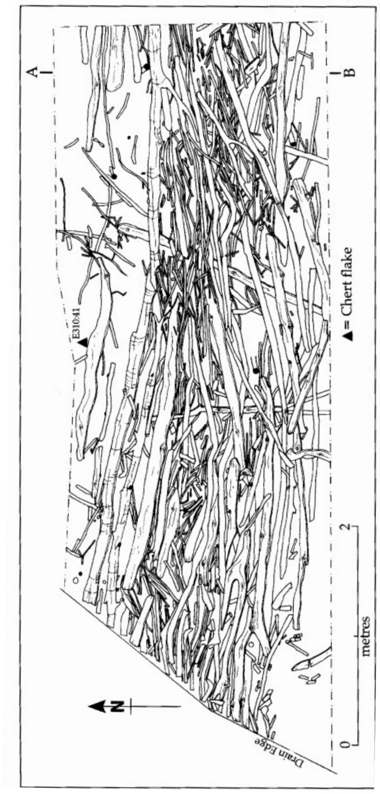

Figure 24 Corlea 9 (Raftery et al, 82)

Other examples of Neolithic trackway were discovered by the Irish Archaeological Wetland Unit in the Mountdillon complex, Co. Longford (Raftery 1996). Corlea 9 (3704-3089 BC) and Corlea 10 (3369-3098 BC) were similarly constructed of longitudinally placed brushwoods and roundwoods (ibid. 81-91). Corlea 9 was a robust construction, incorporating some transverse elements and pegs driven as deep as bedrock. The trackway was up to 25cm deep and approximately 2m wide, extending for 400m across the bog (Fig. 24). This would have required the collection of substantial quantities of timber, and species such as alder, ash and hazel, which are typically found on bog edges, were used in its construction. The depth of this trackway and the pegs which held it in place suggest that the peat was quite wet and required a strong and flexible trackway such as this. It was a considerable investment of time, material and energy, and must therefore have been a trackway of some importance. Its location and orientation is matched by several trackways of later date, as well as Corlea 10, connecting the dry land in Corlea to Lough Bannow on the northeast.

An alternative design was also discovered in this complex at Cloonbony Bog (Raftery 1996, 180–194). This trackway, dating to 2621-2477 BC, was a corduroy construction of transverse roundwoods and occasional split timber, supported by a substructure of longitudinal roundwoods which had been pegged in place. It was predominantly composed of alder, with birch, hazel and ash, and was supplemented with sand which was probably sourced from the dryland to the east. It could be traced for 400m and probably originally extended for 1km between Cloonbony and the River Shannon in the west, and the bog island at Mount Davys in the east.

It is clear from these examples that a variety of construction techniques were in use at this time. They appear to have favoured timbers which could be collected at marginal areas close to the bogs, such as alder, birch, hazel and ash, while oak is quite poorly represented. Some trackways were short constructions intended to overcome a particularly troublesome spot, acting as simple *puddle toghers* (Moloney et al. 1995, 204; Raftery 1996, 197) which could be constructed in a few hours by a handful of individuals. They were possibly intended to gain access to wetland resources and may have been used by a limited number of people. Other trackways, even at this early date, were ambitious projects designed to cross the entire bog. These projects would have required substantial planning and effort, and they demonstrate an axis of movement which must have been important, either in motive or frequency, to merit such labour intensity. This is an important development in the emergence of routeways beyond those provided by water, where we have definitive evidence of how people moved around the landscape provided by the surface they walked on.

4.7 Summary

This brief discussion of Neolithic movement has shown the emergence of routeways over land and water throughout this period. Water travel appears to have remained an important means of long distance movement, but the opening up of the landscape for settlement and agriculture also allowed easier wayfinding over land. Natural landmarks are a central element to landscape learning and cognitive mapping, and would have previously been important to Mesolithic populations in their interactions with the landscape. The new farming population similarly adopted natural landmarks into their cognitive maps and negotiations of the landscape, reinforcing their claim to the landscape by augmenting natural landmarks with burial monuments. This claim would conversely bring its own challenges in negotiating the landscape, and the newly deforested areas may not have been easily negotiated for outsiders seeking to move through an owned landscape. In other cases, this phenomenon could be practiced without leaving a visible trace, through the process of deposition at fords, but would nonetheless be a memorable event which would contribute to cognitive mapping. These monuments would impact on the experience of moving, and the exercise would be intertwined with social knowledge and cultural identity.

No doubt aided by such monuments, as well as the use of boats or rafts, long distance movement appears to have resumed in this period, allowing the procurement and exchange of non-local materials and artefacts. Conversely, agricultural practices and the construction of monuments and permanent settlement sites engender the concept of ownership of the land, which could bring about cultural obstacles to movement. Long distance movements clearly had an effect on the social structures of this period, as exotic and prized items would be introduced into the economy from distant locations. On a local level, regular movements were practiced to access resources in marginal areas or perhaps for pastoral activities. The preservation of wetland trackways allows us a glimpse into how these movements may have been performed. These movements were every bit as important as long distance routes, as they contributed the staples to the local economy.

4.8 The Neolithic period in North Offaly

North Offaly is not immediately recognisable as a Neolithic landscape, owing to its landscape typified by raised bog, as well as the lack of house remains and burials of verified Neolithic date. It is unsurprising that there is such a lack of settlement activity from farmers who would have sought out light, well-drained soils, with wetlands and dense forest dominating so much of this landscape. Despite this, it is clear that this area was being accessed in this period, as evidenced by the widespread appearance of Neolithic artefacts throughout the study area, as well as a number of trackways and wetland constructions which have been discovered through surveys of Bord na Móna bogs.

A cairn on the summit of Croghan Hill may date from this period (Fig. 26), but it is not a landscape of conspicuous Neolithic monuments like we see in other areas. Meanwhile, the recent development-led excavations of Neolithic house sites have not included any from the Midlands, leaving us at a loss to discuss permanent settlement in this region. Smyth (2014, 23) suggests, however, that the archaeological potential of this region has simply not yet been realised, having seen less development in recent years than other locations. In the case of the wetlands, many of the problems which inhibit discovery of Mesolithic material would also apply here. The wetlands may contain a wealth of Neolithic evidence, however, as land use in such a landscape would probably have focused on hunting, fishing and fowling as well as ritual activities.

What follows is a discussion of the environment and archaeology of this period from North Offaly from which we might discern the character of Neolithic activity in this landscape.

4.8.1 The Neolithic environment of North Offaly

Pollen diagrams show no significant human impact on plant life during these millennia, so the woodland of this period is completely natural, and is one of the challenges faced by Neolithic people moving through this landscape. The bogs were undergoing a transition in this period, however, with some being relatively dry and easy to traverse, while others would have been far too wet to negotiate on foot.

The water table continued to rise throughout the Mesolithic and Neolithic periods in the Midlands (See Fig. 14). This led to the growth of fen peat in suitably wet areas, where species such as sedges, reed, bog bean and rushes thrived. At Derrygreenagh, fen peat was in development by 3811 ± 9 BC (Irish Archaeological Wetland Unit 2003b, 9). At Tumbeagh, there was a steady growth of fen peat throughout the Neolithic period at a rate of 8.36cm per 100 years (Casparie 2006, 140). This bog was particularly wet in the Neolithic and this has implications for the potential for archaeology. Trackways are more likely to occur in wetlands where the peat is solid enough to support structures and dry enough to move easily over it.

Elsewhere in the study area, the transition to acidic, ombrotrophic (rain fed) peat happened as early as 4000-3800 BC in parts of Kilnagarnagh Bog (Bermingham 2005, 201). The change was not synchronous among the bogs of the study area, with Mongan Bog developing *Sphagnum* peat around 3200 BC (Parkes et al. 2000, 36). Even within Kilnagarnagh, the northern portion of this bog did not transition until c. 3000 BC. While this type of peat is more suitable for supporting movement and structures, hydrology can vary dramatically over the course of its development.

Quercus (oak) was the dominant woodland species at this time. It is poorly represented in the trackways of this period, which tend to favour species that are found on bog margins. It was present in small numbers at Ballybeg and Cavemount Bogs (Irish Archaeological Wetland Unit 2002e, 11, 13; 2003c, 18), but dominated the assemblage at Derrygreenagh Bog, where there may have been dry bog margins supporting this species (Irish Archaeological Wetland Unit 2003b). In contrast, oak was favoured for dryland construction, and it was the best represented species on dryland sites uncovered during the N6 road development on the northern extent of the study area (O' Carroll 2010, 55). It is well represented in the pollen diagrams, and indeed rose in numbers at Clara Bog in this period (Crushell et al. 2008).

Ulmus (elm) was a widespread species in the Neolithic and most of the dry woodland in the study area was composed of oak and this species. A decline in elm is seen throughout Ireland and Europe beginning in the Neolithic period. While anthropogenic activity caused fluctuations in the numbers of this species, the decline was a steady process over the course of three millennia and is attributed to disease. While it was one of the principle woodland species in the Neolithic in this period, the beginning of the decline is clear from the pollen diagrams (Parkes et al. 2000; Crushell et al. 2008).

Fraxinus (ash) also contributed to dry woodland and it appears in very stable, but modest, numbers in the pollen diagrams of the Neolithic period (Parkes et al. 2000; Crushell et al. 2008).

Pinus (pine) underwent an expansion late in the Neolithic before its eventual decline and extinction, and the plant macrofossil analysis from Ballybeg Bog shows the Late Neolithic structures there were constructed in a pine woodland area which was part of this expansion (Irish Archaeological Wetland Unit 2002e, 9–10). It is represented in the pollen diagrams of Mongan Bog (Parkes et al. 2000) and Clara Bog (Crushell et al. 2008), but Crushell et al. observe that it would have colonised damp soils on the bog fringes and this could lead to higher values in pollen diagrams which do not reflect its true prevalence.

Corylus (hazel) occurs in enormous numbers in the pollen diagrams throughout the study area regardless of period, demonstrating how ubiquitous this species is close to the wetland contexts the cores were taken from. The levels of this species are stable in the Neolithic period (Parkes et al. 2000; Crushell et al. 2008), indicating negligible impact from anthropogenic activities. *Betula* (birch) and *Alnus* (alder) also occurred in marginal areas, appearing in the pollen diagrams (Parkes et al. 2000; Crushell et al. 2008) as well as the timber assemblages from wetland sites (Parkes et al. 2000; Irish Archaeological Wetland Unit 2002e; 2003c).

The difference in timber selection between wet and dry sites is no doubt in large part due to the proximity and availability of woodland species when undertaking a construction project. However, it may also reflect the attitudes towards different types of construction. Many of the Early Prehistoric trackways are simply-built structures which required minimal skill from the workforce, perhaps overseen by someone in charge. Birch, hazel, ash and pomoideae are often used and these light timbers would require very little carpentry skill. Oak is a heavy timber, however, which needs to be split and more carefully worked and assembled to avoid the whole structure sinking, requiring a more skilled workforce. It appears that although we know from dryland sites that Neolithic people possessed these skills, they were not often harnessed for the earliest trackways, with many being simple, light and expedient constructions, probably for local use by small numbers of people to access areas of wetland.

Pollen analysis shows little to no anthropogenic activity affecting plant life in the hinterland of Mongan Bog (Parkes et al. 2000, 36) or Clara Bog (Crushell et al. 2008), where woodland pollens account for over 90% of the samples. It appears then that farming was not being practiced in this landscape in the Neolithic period, and the archaeological evidence below supports this possibility. Meanwhile, the developing bogs seem to have been targeted for activity, suggesting that Neolithic land use in this area was of a different character to farming landscapes, focussing instead on the natural resources of the wetlands.

4.8.2 Burial

The most conspicuous suggestion of Neolithic activity in this area is the mound located on the summit of Croghan Hill (OF010-004001) (Fig. 25, 26, 27). It can be difficult to determine date from the appearance of a cairn such as this. Whereas the possibility that it dates from the Bronze Age remains, the lack of fosse makes a Neolithic date more likely. It also has a slight berm around it, which would be consistent with Neolithic mounds, and it may even have been a passage tomb.

The hill rises to a height of 234m, a modest elevation, but highly visible nonetheless across the low lying landscape of North Offaly. It is the highest point between the Slieve Bloom Mountains and Loughcrew, making it the most obvious landmark over a large portion of the Midlands. Following on from the discussion of augmenting natural landmarks with burial monuments, Croghan Hill would be the most suitable location for Neolithic people seeking to stake a claim, navigate through a landscape of memory and discourage outsiders.

Figure 25 Croghan Hill - a natural landmark with a possible Neolithic burial mound

Figure 26 Burial mound on Croghan Hill

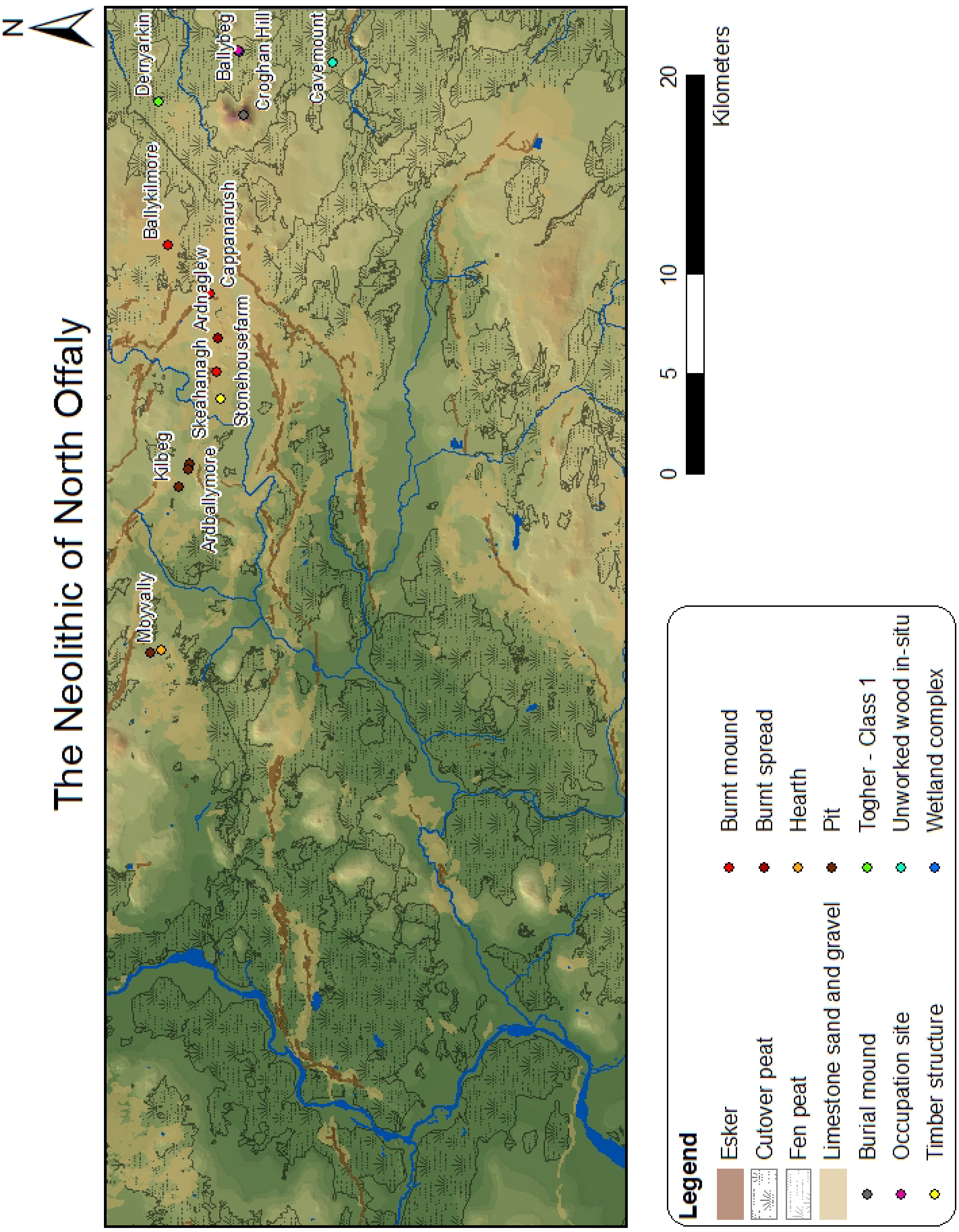

Figure 27 Neolithic sites of North Offaly

There are a number of barrows in the study area which are typically thought of as Bronze Age monuments. Following Newman's (1997b, 153–170) classification of barrow types, they ought to be surrounded by ditches, but a number of mounds within the study area have no trace of this feature. Furthermore, a Neolithic date has been suggested for barrow sites elsewhere, such as Rathjordan, Co. Limerick (ibid, 162, which confounds our ability to date these monuments. Thus, Neolithic monuments may exist within the study area, but excavation would be required to verify this.

4.8.3 Wetland archaeology

4.8.3.1 *Derryarkin Bog*

Derryarkin Bog (Fig. 27) is the area of wetland north of Croghan Hill where the recovery of a Bann flake indicates the presence of Mesolithic people (Chapter 3.6.2). Continuity of activity in the shadow of Croghan Hill is evidenced by the construction of a substantial primary togher (OF003-033, OF-DGH0002) in the townland of Derrygreenagh, composed of longitudinal morticed planks, roundwood and brushwood, linking the dry bog-island of Derrygreenagh Island to the slopes of Croghan Hill. Its position on a fen peat horizon indicated an early date, as did a number of toolmarks of Neolithic character. This was corroborated dendrochronologically with a date of 3640-3625BC and further radiocarbon dating was consistent with this date, making it an extremely early plank trackway in Ireland (Irish Archaeological Wetland Unit 2003b, 6–7, 23). Thus far there is no evidence for habitation on Derrygreenagh Island, but the presence of this trackway demonstrates the use of this landscape in the Neolithic period. This trackway was designed to connect two places, suggesting that both locations were of some significance, and further suggests the potential of a Neolithic date for the hilltop cairn.

4.8.3.2 *Ballybeg Bog*

Ballybeg Bog (Fig. 27), east of Croghan Hill, had once incorporated the now drained lake of Lough Nashade and a watercourse. Pine woodland grew in this area, and it is in this environment that a complex of features (OF010-429, OF-TBD0013) was situated, incorporating natural wood stumps and roots into the construction of roundwood, brushwood, split timbers and twigs. It is unclear if these features represent a single construction event or a series of episodes. It was dated to 2620-2216 cal. BC, indicating a Late Neolithic / Chalcolithic structure, but metal tool marks were identified on some of the timbers, suggesting that at least some of the activity on this site falls within the later end of that date range (Irish Archaeological Wetland Unit 2002a, 5, 31–32; 2002e, 12).

An occupation site (OF010-059, OF-TBD0018) was located next to this complex, dating to 2566-2203 cal. BC. There was evidence of burning, as well as ten pieces of worked flint and a stone adze. It was a stone construction, of similar composition to a barrow nearby which appears to have been related (Irish Archaeological Wetland Unit 2002a, 5–7, 33; 2002e, 12–13). While the barrow association makes a later date possible, the lithic assemblage is of Neolithic appearance (Irish Archaeological Wetland Unit 2002e, 29–32).

The trackways within this bog, many of which are undated, do not appear to have been designed to cross the bog. The most obvious location for that endeavour would have been where the bog narrows further south, but the existing road at this location has removed any chance of recovering such a structure. Instead, the wetland complex appears to be associated with accessing the bog, perhaps for hunting. The dry conditions provided by the roots and stumps of the pine woodland would have made ideal natural platforms, supplemented by trackways and timber constructions, from which to hunt animals. The archaeological remains respect the edge of Lough Nashade, and often adhere to the course of the palaeochannel of the former watercourse, suggesting fishing was also practiced in this landscape.

4.8.3.3 *Cavemount Bog*

Cavemount Bog (Fig. 27), situated south of Ballybeg Bog, is contained on its west side by the hills of Mount Brescoe and Killoneen, and on its south side by the Mountlucas-Edenderry esker. A deposit of unworked roundwood, brushwood and twigs, orientated in a north-south fashion, was discovered *in situ* in this location and dated to 3501-3099 BC. This deposit was orientated on the long axis of the bog, suggesting it was not designed for crossing the wetlands, but for accessing an area within it, possibly for hunting or resource management. Its simple, unworked design suggests an expedient construction, which may have been used only by a few people for a limited lifespan. The authors note that some of the undated trackways in this bog may similarly date to the Neolithic period (Irish Archaeological Wetland Unit 2002b, 2–3, 9).

4.8.3.4 *Summary of wetland archaeology*

Although only a handful of wetland sites within the study area have been dated to the Neolithic, they demonstrate the types of activity and movement that were taking place in the bogs. The Derrygreenagh trackway is an example of the bog being treated as an obstacle, or a medium to be overcome. It was a long construction of elaborate design, suggesting deliberation and cooperation in its assembly. The other sites dating to the Neolithic are of more haphazard construction, some not even displaying toolmarks. They are more localised features, which seem to have been intended for activities and access within the bogs, most likely consisting of hunting, fishing and resource collection.

4.8.4 Dryland archaeology

The N6 road development crosses the northern extent of the study area (Fig. 101), and the archaeological survey preceding construction revealed a number of Neolithic sites which demonstrate there was more use of this landscape than previously thought in early prehistory (Fig. 27). The remains include burnt mounds, pit sites with evidence of burning, a hearth and a timber structure. They were all located in areas of limestone sand and gravel or limestone till subsoil, providing us with a glimpse of dryland activity in this landscape, but most of them are also situated next to wetland areas, suggesting that they were associated with the use of marginal land as discussed above (Chapter 4.5).

Ballykilmore 5 was a complex of four burnt mounds and one burnt spread, with the spread and one of the mounds returning Neolithic dates. These sites were located in an area of glacial deposits overlooking a peat basin, and did not include troughs which would typically appear in such sites. The earliest site #3, a burnt mound, dated to 3696-3530 cal. BC, while the burnt spread #5 dated to the Late Neolithic / Chalcolithic 2488-2294 cal. BC (Hardy 2009). A burnt spread, dating to 3640-3515 cal. BC, at Cappanarush was situated on a lake shore. A cut feature may have been the remains of a trough or a possible terrace by the lake edge for hunting or fishing (McKinstry 2009b). A series of post holes, dating to 3109-2901 cal. BC, were discovered at Stonehousefarm 4, showing that basic structures were being built in the dryland of this region. It was located at the base of a ridge where the soil transitioned to silty deposits (McDermott et al. 2008). Ardnaglew 3 consisted of two burnt stone spreads, dating to 2573-2349 cal. BC, positioned on a partial wetland area next to a stream (McKinstry 2009a). Skeahanagh 4 was a simple burnt mound positioned where the boulder clay joined a peaty area. It had no trough, but a number of unworked timbers created a working platform which was covered in burnt material dating between 2474-2152 cal. BC (Cagney 2009).

The burnt mound sites probably represent repeat visits to use pyrolithic technology next to wetland areas, and they are notably positioned on limestone sand and gravel with local wet features on the northern extent of the Midland Corridor. This area lies between the River Brosna and the tributaries of the Boyne, and the River Brosna seems to have separated this cluster from other Neolithic sites to the west of slightly different character.

The sites to the west include pit sites with evidence of burning, and a single hearth site. An isolated pit with evidence of burning, dating to 2872-2631 BC, was discovered at Moyvally 1 (Bayley 2009b). The site was within 200m of a bog, showing similarities with the Midland Corridor sites. Ardballymore 1 was a single pit filled with burnt stones, dating to 2860-2496 BC, and situated in an area of marshy fields (Bayley 2009d). A Neolithic phase was identified at the Bronze Age site of Kilbeg 6, where two pits with burnt stone fills were dated to 2859-2486 cal. BC (Lyne 2009c). Moyvally also included site #5, where an isolated hearth dating to 2859-2574 cal. BC was discovered (Bayley 2009c). Ardballymore 2 was a possible campsite next to a stream, consisting of nine pits and two possible post holes. Seven of the pits had burnt stone fills, with two dating to 2666-2467 and 2581-2457 cal. BC (Bayley 2009a). This distribution was located on a subsoil of limestone till and, like the sites east of the River Brosna, was positioned next to wet areas. They also indicate episodes of burning and the use of pyrolithic technology, but the stones were deposited in pits rather than accumulated in mounds, and the quantities of stone involved appear to have been more modest for most of these sites, suggesting that these sites did not have repeat visits as frequently as the Midland Corridor distribution. Moreover, while the date range of the Midland Corridor sites span the Middle to Late Neolithic, the western distribution represents only Late Neolithic activity.

These are some of the earliest dated sites of this region, and the cluster at the northern end of the Midland Corridor suggests that perhaps the earliest use of this natural routeway dates to the Neolithic period. The people who used these sites would have been ideally positioned to access the wetlands of this region through the

Midland Corridor, while also occupying a watershed which drains on the west to the River Brosna and on the east to the Mongagh and Yellow Rivers of the Boyne system, allowing access to two important river systems. While the sites are located in a zone which is largely composed of limestone sand and gravel subsoil, they are positioned next to localised wet areas, suggesting that their function was indeed associated with accessing marginal areas from the surrounding dryland. Similarly, the limestone till distribution west of the River Brosna suggests access to marginal wet areas contributed to their siting. Cagney (2009, 12) proposes that these sites represent the earliest stages of the increase in the use of wetlands in the Bronze Age, facilitated by the exploitation of previously unused dryland of the glacial deposits. Condit and O' Sullivan (1999, 31) argue that burnt mounds played a role in landscapes of movement and mobility, and these examples may thus be associated with seasonal hunting and gathering which involved the same route and repeat visits over time (Hardy 2009, 12). This intermittent use may explain the absence of troughs at some of these sites. Hardy (ibid, 15) warns that the timber which was burnt at these sites may have been ancient timber preserved in the nearby wetlands, but it is unlikely that this should have been the case in so many sites when there would have been no shortage of woodland to collect fresh timber.

The Neolithic activity in the study area seems to have consisted of targeted use of the interface between dryland and wetland zones, probably for hunting. It appears that the limestone sand and gravel subsoil was preferred for this practice, probably because it provides easy access to the wetlands of North Offaly. The sites which appear in the Midland Corridor may have had more repeat visits, leading to the accumulation of burnt mounds. Thus, this is the earliest evidence of the use of the Midland Corridor for access to the wetlands of North Offaly. While caution must be advised in the interpretation of this data, due to the N6 roadway following the types of soils discussed above, it is apparent that the sites located on the limestone sand and gravel of the Midland Corridor are earlier, and that the density of sites peters out over the rest of the course of the motorway.

4.8.5 Artefacts

While the distribution of dated sites might suggest that Neolithic activity was limited to the north-eastern segment of this study area, the recovery of stray finds demonstrates that Neolithic people accessed areas throughout the region. Most notable is the frequency of polished stone axes which were retrieved from wetlands and rivers, suggesting ritual deposition was being practiced. These items are typically of Neolithic date, but they were also produced in the Mesolithic and as late as the Early Bronze Age, and some of the examples from this region could potentially be interpreted as evidence for these periods. In total, 152 lithic objects of possible Neolithic date have been recovered from bogs, rivers and dryland in the study area (Fig. 29), indicating that while there is a shortage of evidence for settlement and construction in this region, people were moving through the landscape and dropping or depositing items.

Depositions in rivers are typically associated with fording points, and three verified fords at Creevagh, Shannonbridge and Keelogue on the River Shannon were the find spots of polished stone axes (Griffith 1840; Offaly County Council 2005), suggesting that the first use of these fords dates to at least as early as the Neolithic period. More items were found in rivers and streams throughout the study area, which may suggest fording points existed at these locations (Fig. 28). The River Brosna produced finds at Huntston, Bellmount / Lisderg and Clara, and this could represent precursors to the bridges at these locations. On the River Blackwater, axes were recovered from Derryholmes and Gurrawirra. Meanwhile on the Garrycastle River an axe was found at Killmeelchon, and a similar find was made on the River Clodiagh at Charleville Demesne. These finds hint at the types of movement being practiced in the study area. Neolithic people evidently moved deeper into this area than the Midland Corridor entrance, and the rivers would have been important features in this endeavour in terms of cognitive mapping and their role as both routeways and obstacles.

Cooney and Grogan (1994, 72) note that there may have been a symbolic significance to entering the bog to deposit polished stone axes. If so, this was practiced in the bogs of North Offaly, with polished stone axes being recovered from the bogs at Broughal, Castletown, Clonaderg, Creevagh, Derrica More, Derryarkin, Derrygreenagh, Killoughy, Lemanaghan, Rathfeston, Ballykilmore, Monasset and Rathgarret (Fig. 29). These sites include bogs which are deep in the Midland bog region, fitting into the rubric whereby more Irish stone axes have been found in natural contexts than on archaeological sites (Bradley 2000, 120). Access to these sites would have required movement outside of the use of rivers and the Midland Corridor, suggesting deliberate trips were made to these locations beyond the usual routeways. The distribution in West Offaly lies between the River Shannon and the proposed active area around Croghan Hill and the Midland Corridor, where there is no supporting evidence of occupation. The isolation of these areas may have attracted attention as liminal zones where ritual activity was practiced.

Other lithics from the study area include chert and flint objects as well as hammerstones and adzes. Excavated sites of later date have revealed lithics of Neolithic character, suggesting either a Neolithic phase to the site, or the curation and later use of Neolithic stone tools. One such site is the crannóg at Ballinderry 2, which had phases of Late Bronze Age and Early Medieval date (Hencken et al. 1941; Newman 1997a). Among the lithic assemblage were two hollow stone scrapers, which date to the Middle to Late Neolithic period (Offaly County Council 2005). Similarly, blades of Neolithic type were found at the Bronze Age burnt mounds at Ardan 2 (Hegarty et al. 2009) and Williamstown 1 (Lyne 2009a). A chert blade of either Early Mesolithic or Neolithic date was also recovered from the Early Medieval site at Russagh 4 (O' Carroll 2009a).

The corpus of artefacts from the study area shows that this was an active landscape in the Neolithic period. There was a shortage of land suitable for Neolithic agriculture, and the environmental evidence shows that there was no significant reduction in woodland at this time, so these artefacts must be derived from a different use of the landscape. The Midland Corridor sites suggest that the wetlands were being exploited for hunting, perhaps on a seasonal basis, but the distribution of axes imply that there was also a ritual element to this landscape, involving special trips to deposit items deep in the wetlands. As Bradley (2000, 154) observes,

> 'In the Neolithic period, the creation of monuments at the centre of the sacred landscape ran in parallel with the deposition of specialised offerings in peripheral places such as rivers or bogs.'

This landscape may reflect this concept, with the possible importance of Croghan Hill being perhaps paralleled by the sacred spaces of the bogs.

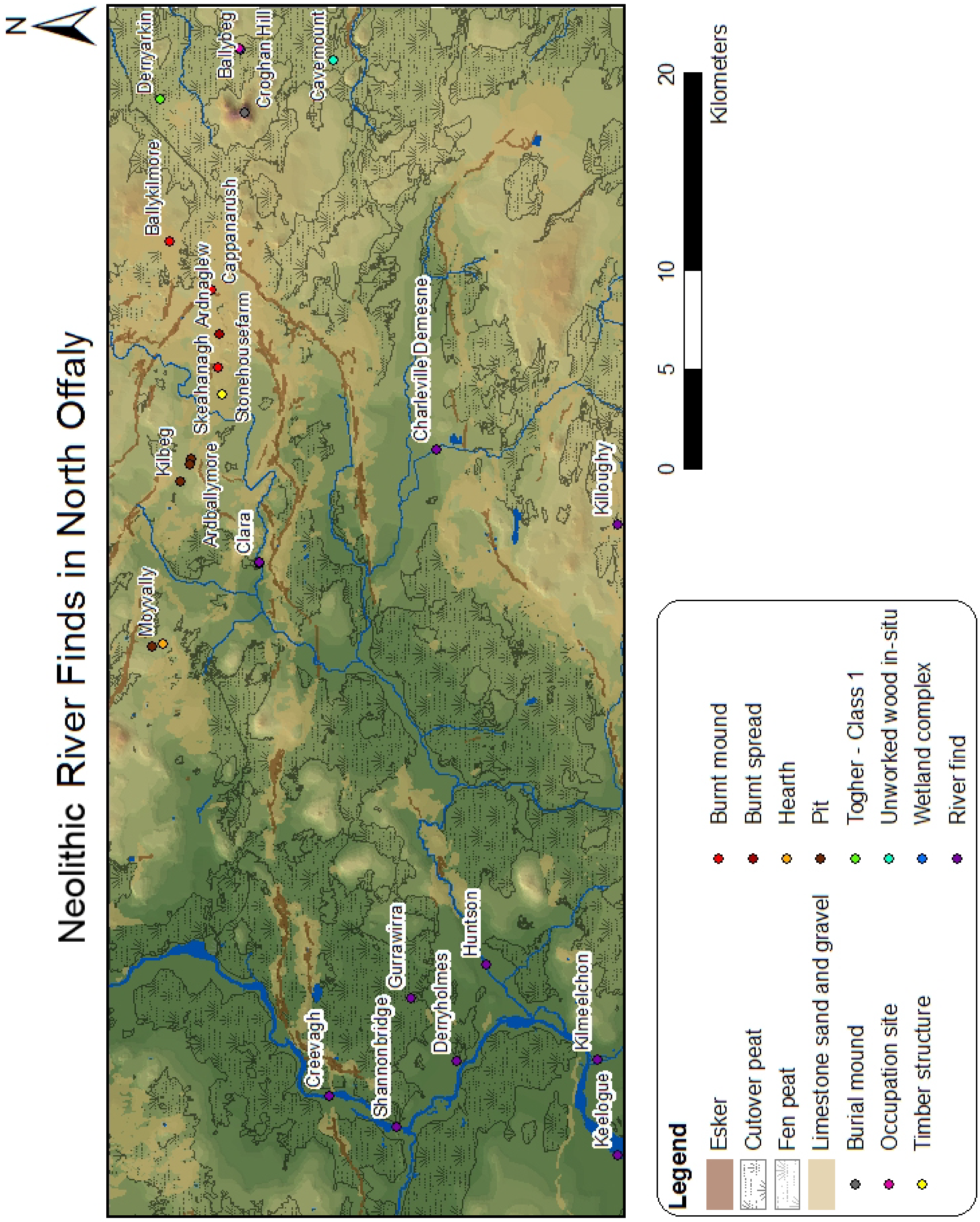

Figure 28 Neolithic artefacts from rivers and Neolithc sites in North Offaly. River finds represent likely fording points and indicate movement in these areas beyond the site distribution.

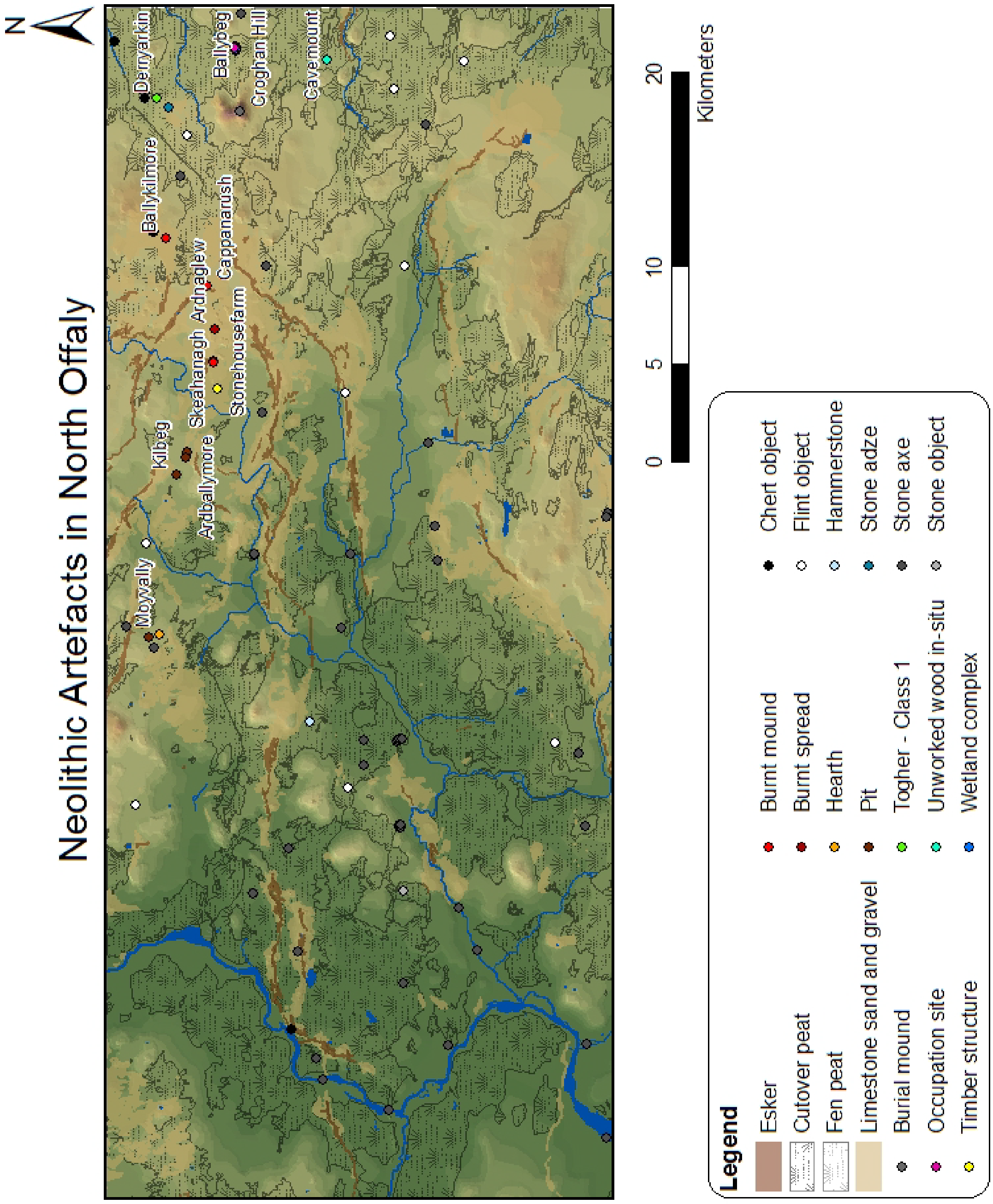

Figure 29 Neolithic artefacts and sites from North Offaly. The distribution shows artefacts were being deposited throughout the landscape, beyond the known sites.

4.8.6 North Offaly and Neolithic movement

The landscape of North Offaly is largely devoid of the high points which are typically used as landmarks in other inland locations. The most obvious feature is Croghan Hill, which has been augmented with a burial monument in the same manner as landmarks in other landscapes. It is uncertain if this monument is of Neolithic date, but the hill itself was undoubtedly used as a landmark for piloting and cognitive mapping in this period, as demonstrated by the orientation of the Derryarkin trackway towards Croghan.

While the nature of development-led research can create a bias in distribution maps and consequent interpretation, there does appear to be a genuine clustering of sites in this region around Croghan Hill and on the northern extent of the Midland Corridor. The distribution of Neolithic sites along the N6 peters out west of the River Brosna, and no sites of Neolithic date were discovered on the N52 Tullamore Bypass (Fig. 101). Meanwhile, there have been extensive wetland surveys in the bogs of the study area where isolated finds have been made, suggesting Neolithic horizons have been reached in some of these bogs, but the only evidence of dated trackways are in the shadow of Croghan Hill. With the caveat that future surveys in deeper bog horizons might reveal evidence to the contrary, the present evidence suggests most activities were within a short distance of Croghan Hill and the entrance of the Midland Corridor.

The rivers would have continued to serve as important routeways, and the deposition of polished stone axes on the River Shannon suggests that the fords in use up until recent centuries were first used as early as the Neolithic period. Further deposition on the tributary rivers of this region may similarly suggest the presence of fords, particularly at the locations where bridges were later constructed.

The esker ridges would have been obvious features in the landscape at this time, but the existing distribution of sites and artefacts do not point to any relationship with the eskers. The glacial moraine deposits on the northern extent of the Midland Corridor attracted some activity, but it is impossible to determine if this translated into movement along the eskers.

The most convincing evidence of settlement activity occurs in the Midland Corridor region where burnt mounds and pit sites date from the Early to Late Neolithic, as well as the Late Neolithic occupation site in Ballybeg Bog. These sites are probably the remains of temporary, seasonal campsites which were intended to facilitate hunting in the marginal wetlands, whereby the landscape would be exploited in ways very similar to how it was used in the Mesolithic period. The presence of Neolithic artefacts throughout the study area without associated structures supports this argument. In addition to the use of this region as hunting grounds, the distribution of polished stone axes in watery places, such as rivers and bogs, suggests that there was a ritual element to this landscape, and special trips were undertaken to deposit these items in liminal places.

While the activities in this landscape are in contrast to many other Neolithic landscapes, they have parallels in other areas. O' Sullivan (2001, 85–86) has interpreted the site at Carrigdirty 5 on the Shannon estuary, for instance, as a temporary campsite to exploit the wetlands for their hunting, fowling and fishing potential, as well as possible ritual activity as evidenced by human bone. In general, the evidence for the practice of movement in this landscape is consistent with the Neolithic period elsewhere. Croghan Hill acts as a landmark, with possible Neolithic augmentation, and the rivers continued to be important means of movement and landscape learning. Despite the lack of woodland clearance, routeways would have slowly emerged through processes of landscape learning. It appears that people were moving from areas further north, possibly from the Boyne catchment area where the Boyne Valley and Loughcrew Hills demonstrate ritual activity and the Neolithic houses of Cookstown Great (McLoughlin 2010) indicate settlement. From there, they may have accessed the Midlands through what would eventually emerge as the Midland Corridor routeway.

Chapter 5: Bronze Age Movement

5.1 Introduction

Bronze Age research tends to focus on the themes of exchange, technology, social organisation and control, and this has been reflected in the approach to movement in this period. The rich material culture of ceramics and metalwork led to early research on movement focussing on migration, exchange, and the spread of the so-called *Beaker Folk*, while the emergence of hillforts in strategic positions in the Late Bronze Age have inspired narratives of control. In more recent decades, the presence of dateable trackways in wetland contexts and depositions at fording points, have encouraged investigations of movement within a landscape context. There is an abundance of physical evidence, from the distribution of monuments and hoards along routeways to the development of the wheel, which allows us to discuss movement in physical, social and economic contexts.

This chapter will outline a selection of the sites and monuments which were situated on routeways in the Bronze Age, namely barrows, standing stones and hillforts, as well as the potential for hoards and depositions to mark out routeways. The discussion will address how they impacted on cognitive mapping and the experience of those travelling on the routeway, both on the parts of those who were within the community and those who were strangers. By the Late Bronze Age, the appearance of control becomes more evident from the relationship of monuments to routeways, and this is similarly apparent in the nature of deposition. Technological advances will also be discussed, particularly the robust trackways and the introduction of the wheel which were facilitated by the advance in carpentry techniques brought about by metal tools. Finally, it has been possible from the distribution of Bronze Age archaeological remains in the study area to discuss the emergence of routeways in this region, and potential dates for their uses.

5.2 Laying claim to a routeway

In Chapter 4, the use of natural landmarks in the Neolithic period was discussed in the context of the augmentation and appropriation of significant and visible places for burial. These *persistent places* were obvious features to anchor landscape learning and piloting, and the stories associated with them would have contributed to the sense of place experienced by people of the community. The augmentation of these places with burial monuments created an enduring and highly visible ancestral presence, and this tradition continued in the Early Bronze Age, with many barrows and cairns being built on mountains and hills, or in close reference to routeways. In this period, widespread clearing of vegetation opened up agricultural land and potential routeways in the landscape. This process also improved the capacity of landmarks for piloting and navigation, as views were less obscured by vegetation. There was increasing pressure on land use and access to resources as population increased, upland soils deteriorated and wetlands expanded (O' Sullivan 2001, 122). In this context, ownership and control must have been a pressing concern; and control of routeways, and consequently the surrounding landscape, appears to have been characterised by monument building in reference to routeways. The manifestation of this appears to have taken different forms over the course of the Bronze Age, which would have communicated different messages to those moving on the associated routeways. While Late Bronze Age hillforts, for example, might seem to emphasise control and power, the low visual impact of many barrows suggests a less militaristic, but nonetheless powerful claim.

This discussion will examine the relationship of three monument types with routeways in this respect, exploring how they are used to mark out and stake a claim over a routeway. Barrows, standing stones and hillforts, while physically very different site types, can all be shown to bear relationships with routeways. The varying appearance and visibility of these monuments would have been viewed in different ways by strangers and by members of the local communities, and could have communicated complex messages to those privy to their mythologies.

5.2.1 Barrows

Barrows are generally considered to date from the Early and Middle Bronze Age, and are typically more diminutive in size than their Neolithic counterparts. While some appear on hilltop locations, many are in comparatively low-lying positions, meaning they are less visible over long distances. This makes them less suitable for use in piloting but, as the examples that follow show, they are often found in proximity to routeways, and the low impact nature of their visibility would have influenced the experience of moving through the landscape for both locals and strangers, depending on their familiarity with the monument and the cultural history they transmitted.

Examples of barrow cemeteries associated with routeways include Feeard and Tullig, Co. Clare, which may mark a routeway across the mouth of the Shannon to Gullane East, Co. Limerick (Grogan 2005b, 44). Meanwhile in Co. Limerick, barrow clusters occur at several locations on the Morningstar River (ibid, 68-72). The Elton barrow cemetery and a series of barrows at Gormanstown are among these clusters, both of which overlook fording points. In the Cúil Irra region of Sligo, a linear arrangement of barrows appears to mark out a routeway along the coastline of Ballysadare Bay which sees some continuity in the form of the existing N59 roadway. It has been suggested that this routeway was associated with the *Fearsat*, sand passes which extended across portions of the bay (Augustin 2003, 44–45). These examples overlook routeways where wet and dry contexts meet, which may indicate these sites were being used to mark out important parts of the routeways and were used for their mnemonic potential, or perhaps they were best placed on a convergence of routes for maximum impact.

The distribution of barrows in relation to routeways is not peculiar to the Irish Bronze Age. It was noted in Denmark as early as 1904 that barrows had a tendency to adhere to routeways, with clusters occurring on the *Oksevejen* or *Hærvejen*, known in English as the Ox Road or Military Road (Løvschal 2013, 235; Price 2015, 236). Elsewhere, the Southeast Kernow Archaeological Survey illustrates the importance of a cluster of barrows in Cornwall which linked the metal rich Bodmin Moor to the English Channel (Frieman et al. 2013). Commenting on the Neolithic long barrow distribution at Cranborne Chase, Tilley (1994, 159) observes that many exist on paths which could mark earlier natural paths through the landscape. A distribution of barrows at Raunds in the Nene Valley of Northhamptonshire may seem in contrast to more upland examples elsewhere, but they are actually part of a similar paradigm where they occupy a communication channel and a major landscape feature (Healy et al. 2007, 53).

The vital characteristic seems to be visibility. At Raunds, it appears that they were intended to be seen from the settlement zone and would have been a familiar presence (Healy et al. 2007). This would also appear to have been the case at

Chancellorsland, Co. Tipperary, where 42 barrows were identified close to a Bronze Age settlement site (Doody 2008). The relationship applies even to later settlements, with the Late Bronze Age settlement site from Black Patch, Sussex, maintaining intervisibility with the Middle Bronze Age barrows overlooking it (Drewett et al. 1982). Meanwhile, the Dutch examples were particularly visible along the Ox Road. While erosion and ploughing have reduced the visual impact of some barrows, many of the Irish examples would always have appeared low profile in comparison to Neolithic monuments however. It has been suggested that freestanding posts may have been common in lowland barrow cemeteries in pre-mound phases (Healy et al. 2007), which would improve their visibility, as would the clearance of vegetation. Even with this intervention however, it is clear that they would be less visible than large scale and prominently located Neolithic monuments. Lowland areas are not as visible over long distances, so monumental size is more necessary for piloting, but the barrow tradition moved towards a model of diminutive size and greater numbers.

If they were intended as a familiar presence, then this familiarity could have been as effective as monumental size. Lowland barrows would have been most useful to the community they belonged to in terms of landscape navigation. Familiar features, even low profile ones such as barrows, would be incorporated as nodes into cognitive maps, and burials as nodes could have been further emphasised through repeat visits, ritual, stories and the identities of the ancestors. As discussed (Chapter 3.2), it is not strictly necessary to sight remembered landmarks in order to navigate by them, and occasional glimpses can eradicate locational uncertainty. The low visual impact of some barrows might suggest that they functioned as idiosyncratic landmarks, the relevance of which would not be immediately obvious to outsiders. For strangers, the low visibility of these monuments would not help their navigation. However, people have a habit of stumbling upon routeways, as the natural dynamics and schema of the landscape direct us in that fashion, and by placing barrows on routeways, outsiders would find themselves surrounded by monuments. Some would be easily spotted, while others would take some time to notice, creating an impression of omnipresence of the ancestors.

This omnipresence must have invited caution to strangers moving through the landscape, but barrow distribution would probably have made the most profound impact on those *in the know*. Sighting such monuments in the first place is more easily done by those who know they are there to be seen. Moreover, the story, background and significance of a monument are lost on an outsider, unfamiliar with its narrative. Basso (1996) has described the capacity of places and names to make an observer recall the ancestors and historical events which caution against wrongful social conduct. For members of the community who were familiar with the physical manifestation of the barrows, the identity, story or instruction which they embodied would be evident, and they would have served as mnemonic devices to remember those stories and to structure the historical narrative (Waddell 2015, 25). A striking example of this is seen in the story of *Togáil Bruidne Dá Derga*, or The Destruction of Dá Derga's Hostel (Stokes 1902), where a group of reavers take a stone each to construct a cairn prior to their attack. Afterwards, they would return to reclaim their stones and they would know their losses by the stones that were left. For the reavers, each stone would signify the individuals that were lost. For later people familiar with the story, the cairn could serve as a reminder of the story of the destruction of the hostel and the character of Conaire Mór.

The moral stories which Basso describes may also be represented by Irish examples. Tech Midchuarta in Tara, Co. Meath, for example, is a later monument of uncertain date, composed of parallel earthen banks through which royal processions would have been made. Newman (2007) has proposed that the breaks in the bank were intentional design features which created glimpses of the nearby barrows. These barrows, he writes, were deliberately framed by the bank in this fashion to encourage moments of reflection on the history, characters, and kingly duties associated with Tara. Some of the stories to which he refers are admittedly of medieval date, and the biographies of the monuments would probably have gone through processes of reinvention over time, but it demonstrates the mnemonic capacity of familiar monuments to those who were complicit in the narrative they propounded.

Perhaps then, the reason barrows are so often associated with routeways is because they were intended to be experienced by those familiar with them. Although they played a role in legitimising a claim over land through ancestral presence, their low visibility is not consistent with monuments which communicate control and power. Rather, it seems that the intended audience were those who already knew they were there, acting as idiosyncratic landmarks, communicating cultural narratives, and providing an opportunity to move through a ritual space while travelling on a routeway. If barrows were the embodiment of certain stories and lessons, then they would be most effective as reminders in places which facilitated regular interaction. Basso (1996, 61) observes that a connection with the landscape is vital for the Apache because it "makes people live right" by providing constant reminders of moral obligations. In this scenario, the distribution of barrows along routeways ensures that members of the community are regularly reminded of the characters and lessons of the past.

5.2.2 Standing stones

Standing stones are notoriously difficult to date, as they appear from as early as the Neolithic and as late as the medieval period, but most are considered to date to the Bronze Age. Many occur in complexes which have been dated to the Middle Bronze Age, which may refine the date for at least some of these monuments. They have been subject to a variety of interpretations, including burial and boundary markers. Many are orientated toward high passes through which the sun or moon can be seen rising or setting, while others are found on hillslopes or entrances to valleys (Waddell 2010). It was noted as early as the 1940s that standing stones sometimes marked the courses of routeways, as a ploughed out pathway at Lough Gur was found to have been flanked by at least 12 standing stones (Grogan 2005b, 28; Doody 2008). This discussion will explore this concept and how they were used on the course of routeways. In particular, it is proposed that standing stones were used to mark out significant threshold points on routeways.

The pilgrimage route between Ballintubber Abbey and the peak of Croagh Patrick, Co. Mayo, is known as the *Tóchar Phádraig* and may mark the course of an earlier Bronze Age routeway (Corlett 1997; 1998). The final 8km is marked by a series of prehistoric ritual monuments, including four standing stones. The pillar stone at Lankill and one of the standing stones at Lanmore mark unusual points on this routeway from which the views towards Croagh Patrick are obscured. Two more standing stones at Lanmore and St. Patrick's Stone at Knappaghmanagh mark points where only the very tip of the summit is visible. The final standing stone along this routeway is the Long Stone at Boheh. It is erected such that the setting sun on the evenings of April 21st and August 21st appears to roll down the slopes of Croagh Patrick. This is the same spectacle that can be observed at the nearby Boheh Stone, a rock outcrop decorated with cup and ring art, on the evenings of April 18th and August 24nd. This may have been an attempt to add greater precision to the dates of this phenomenon.

The standing stones along this routeway appear to function more than simple markers of the course of the route. The profile of Croagh Patrick dominates the skyline and the path toward this highly visible landmark would not require signposting by standing stones. The stones above appear to be positioned at very specific points along the *Tóchar Phádraig* routeway, where visibility is compromised or a celestial event may be observed. Rather than marking the course of the routeway itself, perhaps these stones identify particular threshold points along the way. This concept was explored by Bradley (1997, 88–89) in the siting of rock art along routeways at points where the vista changed, and it seems to apply to the *Tóchar Phádraig* example too, both for the standing stones and the rock art at Boheh. Threshold points need not refer solely to the appearance of the vista, however, and they may involve practical thresholds, as the examples below show.

A routeway extending from Mooughaun Hillfort to Magh Adhair, Co. Clare, for example, passes directly beside four standing stones, with a further four in close proximity to it (Grogan 2005a, 4.9). Some of these standing stones are placed at particular points where the routeway is defined by the course of the river, such as the fording points on the Ardsollus River, the Sruhaunverry Stream and the Hell River. This appears to fit the paradigm of standing stones occurring on threshold points on routeways but, rather than marking a vista change, they mark significant points on the routeway where movement is particularly restricted by the course of waterways. Other examples include a cluster of standing stones in the locality of the ford at Killaloe, which accommodated a routeway across the river and through the Broadford Gap (Fig. 30) (Condit et al. 1999; Grogan 2005b, 93–96). Movement in this zone was restricted by the course of the river and surrounding uplands, and it would have been a major boundary and threshold point on an important routeway linking Southeast Clare and the Silvermines deposits in County Tipperary.

A study of the Derrynasaggart-Boggeragh Mountains of Counties Cork and Kerry demonstrated clustering of archaeological sites along the valley separating the two mountain ranges, including a large amount of standing stones and stone pairs

(Grogan 2005b, 160–161). This was an important upland route connecting the valleys of the Blackwater and Lee rivers, where movement was restricted by topography. In addition, many of these standing stones are located next to fording points and stepping stones in the smaller rivers of this area. This region would have served as a boundary area between the two river valleys, making it a political and social threshold area.

Grogan (2005b, 162) concludes that standing stones in the North Munster region tend to be patterned along routeways or on high ground overlooking them. In the South Munster / Mid-Waterford region, standing stones predominantly appear along river valleys (ibid.), while in the landscape of Southeast Clare, most standing stones were located in well-drained, fertile areas and were found at a variety of altitudes (Grogan 2005a, 54). Within the *North Munster Project* and the *Ballyhoura Hills Project*, their distribution often appears to correlate with that of *fulachta fiadh*, or burnt mounds (Grogan et al. 1996, 41).

Given the variety of contexts which these monuments occur in, perhaps the most appropriate interpretation is that they served as generic yet meaningful marking devices and idiosyncratic landmarks. It would make sense to place marking devices along routeways, as well as to demarcate boundary places or sites where celestial spectacles could be observed. Rather than using such monuments to identify potential routeways, since they appear to mark a range of significant places, they can be used to support a prehistoric date for a proposed route, particularly if they occur around burnt mounds to confirm a Bronze Age date. In particular, we ought to hypothesise why specific points were marked out on routeways by standing stones. Some of these stones might have acted as mnemonic devices at crucial points on the routeway, while others marked boundaries, fording points or visually distinct areas, all of which would act as thresholds and significant way points while travelling on a routeway, and which would presumably have been verbally communicated through stories and placenames.

5.2.3 Hillforts

Hillforts developed in Ireland in the Late Bronze Age and they were typically constructed on prominent locations, some of which appear to have been strategically chosen in order to control routeways (Condit et al. 1999; Grogan 2005b, 123). The cult of ancestry may have declined in the Bronze Age as social and political relationships became more important (Waddell 2010, 286). The rapid development of weapons suggests that this manifested in a more warlike, competitive society, and hillforts would have been part this cultural shift by which leading kin groups would maintain control of territories and routeways. The construction of such sites overlooking routeways suggests movement patterns were well established, and rather than offering visual cues and assistance to travellers like other prehistoric monuments, hillforts appear to communicate control and power. The perceived need to communicate such a message and to monitor movement demonstrates that routeways were important landscape features which were carefully overseen by controlling groups.

While earlier deposition on the Lower Shannon was practiced at Killaloe, O'Briensbridge and Castleconnell, this practice had declined at the latter two by the Late Bronze Age, with only Killaloe continuing to be marked out by deposition, standing stones and the construction of hillforts (Fig. 30) (Condit et al. 1999; Grogan et al. 1996, 33; Grogan 2005b, 124). Laghtea hillfort lies east of the Shannon overlooking Lough Derg, and the approach to the ford. This would have monitored movement along the Shannon and the lake, as well as movement over land on the shoreline between the lake and the mountains. Knigh Hillfort similarly overlooks Lough Derg and the land sloping towards it. West of the Shannon, the ford is accessed by the Broadford Gap, leading through the mountains of Southeast Clare and allowing access to Central Clare and the Burren landscape. The trivallate hillfort at Formoyle was situated on this routeway, and while viewshed analysis showed that it did not have a direct view of the ford itself, it commanded extensive views over the approach to it (McNamara 2005, 119). Beyond Broadford another major routeway connected this pass to the Fergus and Shannon estuaries, with Mooghaun Hillfort occupying a prominent position over it and another routeway along the River Rine northwards to Magh Adhair (Grogan 2005b, 94; Waddell 2010, 283).

East of the Shannon distribution, a similar expression of control has been noted in the positions of hillforts at Ballincurra, Knockadigeen and Garangrena Lower in the Silvermines, Co. Tipperary (Grogan 2005b, 27–28, 100; 2006). These sites overlook a routeway along the Nenagh and Clodiagh valleys and multiple high passes through the mountains. These sites are supplemented by the hilltop enclosures of Greenan, Rathcardan and Liss, making it a particularly dense area of hilltop sites, and suggesting it was an important routeway. Indeed, the route through the Tipperary uplands would have connected the Suir Valley to the major routeway illustrated by Grogan (2005b, 27) (Fig. 31) which would eventually become the *Slighe Dála*, allowing access to the River Shannon and the ford at Killaloe.

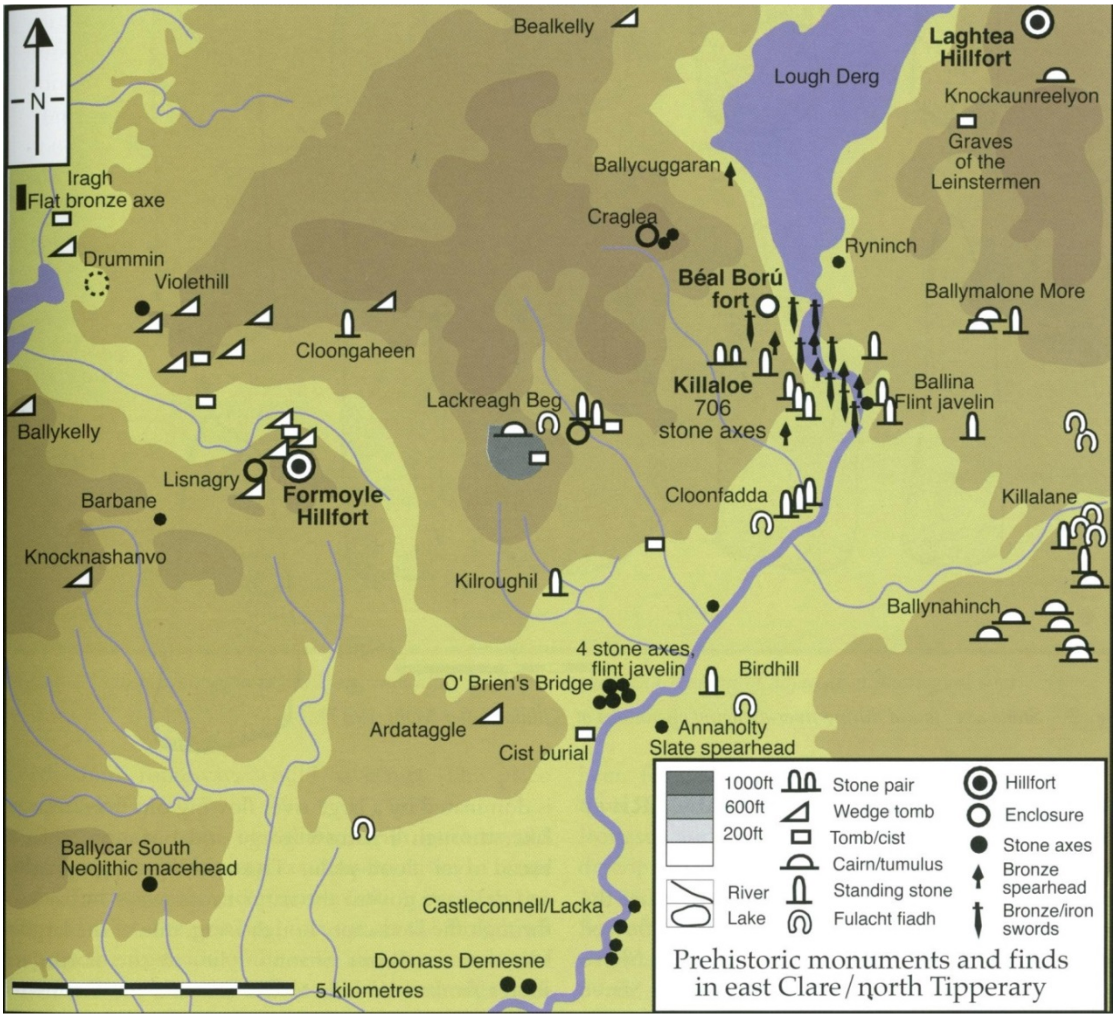

Figure 30 Formoyle and Laghtea Hillforts overlooking approaches to the ford at Killaloe. Note the clustering of standing stones and deposited artefacts. (Condit and O' Sullivan 1999, 25)

A number of hillforts in the Ballyhoura Hills similarly occupy strategic locations overlooking routeways (Doody 1999; 2008). Castle Gale, Co. Limerick, and Carn Tigherna and Caherdrinny, Co. Cork, overlook the river valleys of the Blackwater, Funshion and Awbeg rivers, as well as a network of passes through the uplands of North Cork and Limerick (Grogan 2005b, 28; Doody 2008, 548; Masterson 1999, 101). Caherdrinny is strategically situated over a bottleneck in the routeway between the Nagles and the Kilworth Mountains, while Carn Tigherna overlooks a continuation of this route through the Nagles, on a pass which connects the Blackwater and Bride valleys.

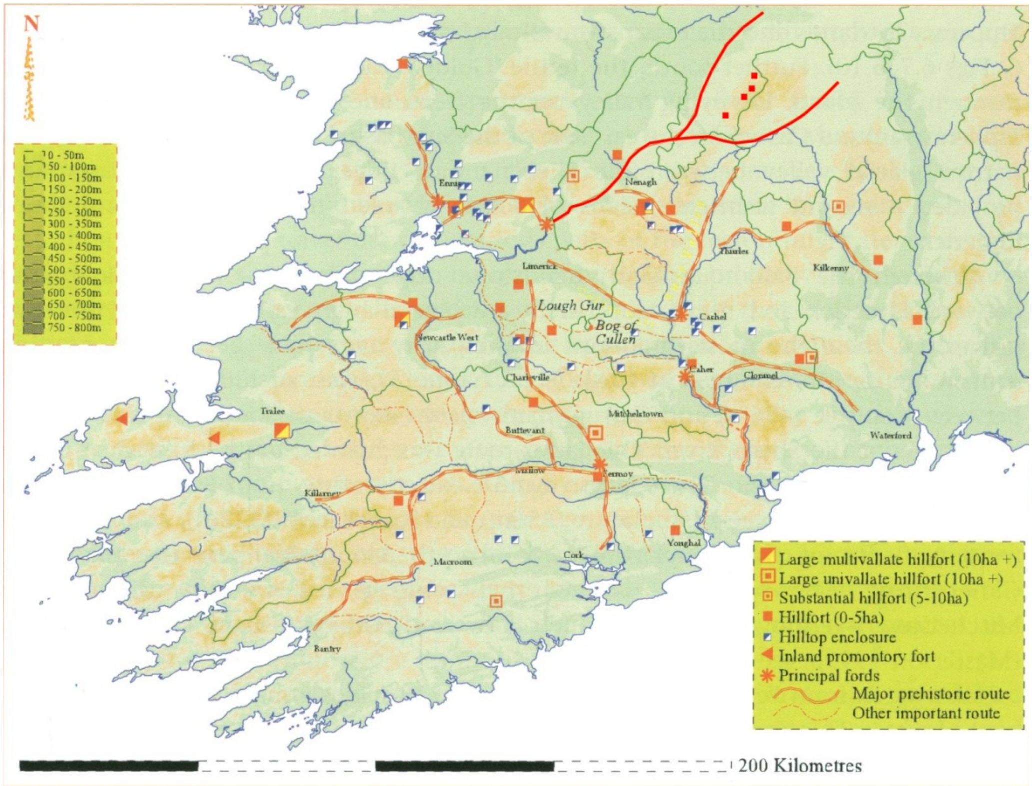

Figure 31 Major prehistoric routeways in Munster. Note the routeways which correspond with the later potential courses of the Slighe Dála and the Midland Corridor (highlighted) and the four hillforts in the Slieve Bloom Mountains (highlighted). (Grogan 2005b, 27)

While the Munster routeways in the examples above are defined by river valleys and passes through uplands, hillforts outside this region similarly appear to overlook routeways. The hillfort at Rahally, Co. Galway, for example, overlooks Kilreekill Ridge and the course of the *Slighe Mór* (O' Lochlainn 1940; O' Keeffe 2001; Geissel 2006; Mullins 2014), suggesting this portion of the *Eiscear Riada* was used for movement at an earlier date than the Medieval roadway. It had commanding views over East Galway, with views as far as the Burren in Co. Clare to the south and the Mayo border to the north, including the meeting point of three baronies which may have origins as tribal boundaries (Mullins 2014, 115).

The southern extent of the Midland Corridor, a routeway defined by surrounding wetlands, exits the study area and passes the west side of the Slieve Bloom mountains, where it is overlooked by the hillforts of Letter (OF037-009001), Knocknaman (OF036-062001), Ballymacmurragh (OF039-012) and Ballycurragh (OF039-037), Co. Offaly (Fig. 31). The continuation of this routeway through South Offaly and Tipperary has been identified by Grogan (2005b, 27), although he does not use Smyth's (1982) Midland Corridor nomenclature. It is also the course described by O' Lochlainn (1940) as an alternative route for the *Slighe Dála*, another example of a prehistoric origin to one of the famed Medieval roads. Grogan (2005b, 97–98) has suggested that the later prehistoric settlement complexes at Shesheraghmore, Uskane, Ballyhaugh and Ballaghar formed the northern extent of lowland Tipperary settlement, and that the Bronze Age hoards from Dowris, Frankford, Cogran and Banagher in Offaly formed a buffer zone between North Munster and the Midlands. This distribution of hillforts falls between these two zones, suggesting they were constructed by a North Munster people who were concerned with protecting their territory and monitoring use of the routeway from the people of the Midlands. Their control does not appear to have extended any further north than this, as there are no other hillforts along the Midland Corridor.

It is thought that hillforts were intended for particular occasions and for their highly visible nature. When they weren't being used for their primary purpose, which has included suggestions of gatherings, ritual, storage, refuge or grazing (Waddell 2010, 378), they would have been an imposing visual feature in the landscape. Condit and O' Sullivan (1999, 35) suggest that Formoyle and Laghtea are contemporary sites and may represent two rival centres exerting control over the approaches to the ford. It would appear from this interpretation that they were intended to display power to travellers from outside, and perhaps competing, territories. Hillforts certainly do appear prominently on the skyline from the surrounding areas, and the high altitude hillforts which overlook routeways are typically larger than average, suggesting they were intended for display for competitors and travellers (Grogan 2005b, 124). It was found, however, in the *North Munster Project* that views *from* hillforts may have been even more important in their siting. 67.7% of hillforts in that study area were found to have panoramic views, with the remaining 32.3% having extensive views (ibid, 121). As important as it was for defence and competition to send a visual message through monumental construction, the ability to oversee a routeway would be far more important in practical terms for its protection. This demonstrates a practical decision in its siting as much as a statement of power, demonstrating the realities of Late Bronze Age socio-political structures.

Control of routeways is more explicit in the siting of the British Iron Age hillforts on the Ridgeway in Oxfordshire. Least Cost Path analysis shows that the most desirable path does not follow the current "Ridgeway" track, but deviates to the locations of hillforts at Liddington, Hardwell Camp and Rams Hill (Bell et al. 2000). It is suggested by that study that the use of the Ridgeway pre-dates the construction of these hillforts and they were positioned in order to control the routeway. Indeed, the generated path actually fell within the Liddington Castle hillfort, entering and exiting the fort where the original entrances lay. It also entered Rams Hill, skirted the bank of Hardwell Camp, and was in close proximity to Uffington Castle. Viewshed analysis showed that they were not positioned to maximise visibility towards them from the Ridgeway, but they commanded extensive views of the landscape and the routeway. Thus, like the Irish examples, the views from the hillfort may have been more important than views to it.

The imposing nature of these monuments creates a very different impression than that of barrow monuments or standing stones. The impetus for such monuments appears to have been a demonstration of strength. While they were positioned such that they were highly visible to those travelling on the routeways they overlooked, the most important factor appears to have been the views from the vantage of the hillfort itself. With this in mind, the intervisibility of hillforts may be more complex than displays of power to rival groups. The ability to see rival activity and their approaches may have been more important.

Hillforts do not appear, as other prominent monuments did, to have functioned as wayfinding devices. Nor do they appear to have acted as mnemonic devices for triggering recollections of directions, stories or lessons. The distribution of earlier monuments on some of the routeways on which hillforts appear demonstrates that they would already have been well defined and established in the cognitive maps of the community. Moreover, the emphasis on views from, rather than toward, hillforts suggests there was a greater concern with surveillance than in assisting travellers on the routeway. The ability to oversee the use of the routeways would be related to the control of it, which is crucial in maintaining control of a region, and this practical consideration appears to have been even more important than communicating power to rival groups. In summary, the relationship of hillforts with routeways is linked to the political dynamics of the Late Bronze Age, whereby control of routeways was necessary to create and maintain emerging socio-political units and control over territory.

5.2.4 Hoards and depositions

The deposition of hoards and single-artefacts was practiced in dryland, wetland and riverine contexts throughout the Bronze Age. The character and locations of these depositions varied geographically and contextually over the course of the Bronze Age, and they may have performed different functions and carried particular meanings depending on the circumstances of deposition. The difference in artefact types between riverine, bog and dryland environments suggests a structured pattern of deposition, depending on the landscape context (Bourke 2001, 34; Becker 2006). Several interpretations have been provided for the range of hoards and depositions in the Irish Bronze Age, including an alternative to burial customs (Bradley 1990; 2000, 37; Waddell 2010, 209), metal working caches of *merchants' hoards* or *founders' hoards* (Levy 1982), conspicuous destruction (Bradley 1990; Grogan 2005b, 102) and votive offering. While the contents and types of hoards have received considerable attention, only recently have the landscape contexts of such depositions been discussed. The focus of this discussion is how such depositions can inform us of movement activities. Chapter 4 discussed the deposition of artefacts at fords as idiosyncratic landmarks, with the act of deposition creating a memorable experience for individuals to incorporate an important landscape node into their cognitive maps, but with an ultimately invisible footprint. Bronze Age deposition would have continued to have an impact on cognitive mapping, but the nature of these depositions also hints at how the participants may have perceived such activities.

Mahr (1937) noted that many of the fording points from which Neolithic items were recovered also produced metal artefacts. Deposition continued in the Chalcolithic / Early Bronze Age with barbed and tanged arrowheads and metal axes, but by the Middle Bronze Age, this practice had transformed towards a preference for depositions of weaponry (Bourke 2001, 5). The Bronze Age depositions from the

Shannon, Bann and Erne rivers are predominantly of weaponry, and 43% of single finds of swords were recovered from rivers (Grogan 2005b, 172). These are typically found in the shallow waters of fords, most often as a result of dredging, and Bourke (2001, 32) has concluded that, while dredging targets these shallow areas, it is in fact a genuine distribution, as the River Barrow was dredged in its entirety and the locations of artefacts were consistent with other rivers. The preponderance of weaponry has contributed to the argument that they represent the sites of battles, but such losses could have been easily retrieved and accidental losses would have consisted of a wider cross section of artefact types (Bourke 2001, 142). Rather, their appearance at sites where stone axes were also discovered suggests that this practice is a continuity of deposition at significant places in the landscape. The change in character of deposition may reflect some sort of change in how fords were viewed. While earlier depositions were prized items such as axes, the move towards weaponry hints at competitive display, aggression and territoriality. With an emphasis on control being apparent in other areas of Bronze Age archaeology as the period progressed, this may have affected the practice of deposition too.

Apart from the importance of fords in constructing comprehensive cognitive maps, these landscape features are vital nodes for negotiating and controlling a landscape. Meanwhile, their liminality as spaces that transcend land and water may have taken on a symbolic and ritual significance. Bourke (2001, 125) observes that, “Territorial assertion in the past was probably assisted by ritual language and actions, just as it is in tense situations to this day”. Thus, a highly visual performance of a ritualistic deposition could reinforce a community’s claim over a ford as a proxy for the territory it services. The ford is therefore an ideal arena for the competitive destruction of metalwork (Grogan 2005b, 102). The prevalence of weaponry in this practice may be linked to competitive displays in which the deposition of weaponry demonstrates the power and martial prowess of the participants by which they control their territory. While use wear analysis has shown that some weapons took damage to their butts and blades through use, some may be post-depositional dredging damage, and many others endured little to no damage (Bourke 2001, 99–119). Furthermore, highly decorated spearheads are among the assemblages recovered from rivers, which were probably prestige or parade weapons, not intended for combat. Like gift giving, deposition demonstrates the wealth and generosity of the giver through conspicuous consumption. However in this scenario, the lack of reciprocity, the permanent removal of the item from circulation, and the often deliberate destruction of the item before deposition, guarantees prestige in a way that conventional gift giving cannot replicate (Bradley 1990, 39).

The dating of deposited items can inform us of the preferred routes at different times in the past. It appears, for example, that the fords at Castleconnell and O'Briensbridge on the River Shannon fell out of favour in the Early Bronze Age as deposition became concentrated on the ford upstream at Killaloe (Fig. 30). This coincides with increased activity and monument building in that area and it is presumed from the pattern of deposition that movement across the river was focussed at Killaloe (Grogan 2005b). This suggests that movement was a factor in riverine depositions, as the most important fords were the ones which were favoured with this treatment. Whether the pattern is a result of many single deposits of individuals crossing the ford, or more large scale and orchestrated rituals involving the attendance of the larger community, it points to recognition of the ford as an important focal point in the landscape at that time.

It is more difficult to discuss hoards on land in terms of movement and routeways. There has generally been more attention paid to the artefacts and character of hoards than the landscape context. Unfortunately, many of these hoards were accidental finds which predate scientific excavation, and the exact locations are not recorded. As such, we cannot comment on the local scale of movement behind the practicalities of actually arriving at the location to perform a deposition. We do, however, know the townlands of many of these finds and it ought to be possible to tie this in with regional and inter-regional routeways, many of which emerged at this time.

This has been demonstrated in small scale in parts of Southeast England, where hoards are often placed on dry but marginal land close to watercourses, burnt mounds, palaeochannels and settlements (Dunkin 2001; Yates et al. 2010). These examples were previously believed to have been in isolation, but new fieldwork demonstrates that they were placed immediately outside of occupation areas. Irish examples have similarly traditionally been believed to have been isolated from social activities (Dickins 1996), but it has been noted that some Irish Later Bronze Age hoards were associated with structures (Eogan 1983, 8), so more fieldwork may yet reveal similar results. The water courses close to these hoards obviously have a capacity to be used as routeways, while palaeochannels also offer a useful dryland route. Not enough research has been undertaken on the landscape settings of Irish hoards to suggest a similar pattern here, but the wider contexts of hoards from the study area, discussed below, may point to a relationship between the locations of hoards and routeways.

In summary, it is evident that Bronze Age deposition in rivers is connected with the use of fording points, and the nature of the artefacts themselves suggest that these sites were important and strategic locations linked to the control of territory. The chronologies which we have for Bronze Age weaponry mean we can date the use of these fords and identify preferences for different fords at particular times. In the case of hoards, recent research in Britain suggests that hoards may have been close to settlement sites and routeways. Irish examples will be discussed further in the present study, and the dating of the objects in these hoards may similarly allow us to assign dates to potential routeways.

5.3 Technology

The Bronze Age was a period of rapid advances in technology, as copper, gold and bronze were all worked with high levels of skill throughout the period. The wetlands were increasingly exploited at this time, and they were accessed and crossed by a series of trackways which demonstrate the improvements in carpentry techniques facilitated by metal tools. Boats continued to be important means of transport, similarly benefitting from improved carpentry techniques. Meanwhile, the first bridges date to this time, and the wheel makes its first appearance in the Irish archaeological record. These examples illustrate the role which technology plays in facilitating and expediting movement. Technology would allow movement to areas which would otherwise be inaccessible and allow the transport of heavy loads over distances that are too far for movement on foot. This undoubtedly contributed to the speed at which technology advanced in this period, allowing for rapid communication and the spread of goods and knowledge throughout Bronze Age society. Outlined below are descriptions of the type of technologies available to the people of the Bronze Age in Ireland and how they impacted on movement.

5.3.1 Boats

Until recently, many of the boats which were classified as Bronze Age were identified by their association with Bronze Age sites. Many more were not dated at all, and there have been lost opportunities of boats which were discovered by chance as recently as the 1970s which were not appropriately recorded and curated, having since been lost, destroyed or decayed. According to Lanting and Brindley's (1996) survey of dated logboats in Ireland, there is a spike in the number of boats of Bronze Age date, showing that this boat type was well represented in this period. Like the Mesolithic and Neolithic periods, there were undoubtedly other boat forms in use at this time, which were less conducive to preservation than robust logboats. The first suggestions of Irish plank-built boats dates to the Bronze Age, for instance, and the paddles which were recovered from Clonfinlough were most likely from a large craft (Moloney et al. 1993, 52).

The introduction of metal tools such as socketed axes, hammers, chisels and gouges would have contributed to the woodworking process (Brady 2008, 19), and would have allowed thicker trees to be felled more easily. The small number of dated boats makes it difficult to compare chronological differences in size of dugout boats, but the task of choosing a suitable tree for felling would have been easier with the possession of metal tools. This is evident from the Lurgan boat (Fig. 32), dating to c. 2400 BC, which at 15.24m long is one of the largest surviving examples of a dugout boat in Europe (Gregory 1998).

The earliest attempts to date logboats involved speculation based on associated artefacts and sites. Two logboats from Cloonfinlough, Co. Roscommon, for example, were discovered in 1852 and dated by associated Bronze Age finds (Gregory 1997, 327). A similarly dated boat from Derryhollagh, Co. Antrim, was found in 1858/9 and dated by its relationship to a crannóg (ibid, 389), while another in Monaltyduff, Co. Monaghan was also dated by its association with a crannóg in 1845 (ibid, 482). The problem with dating boats in this manner is exemplified by two boats from Eskragh, Co. Tyrone. They had been described as Late Bronze Age, owing to their relationship to a crannóg which was dated from 650-400 BC. However, a radiocarbon date on one of these boats returned a date of 358-116 cal. BC (Lanting et al. 1996, 89), placing its production in the Iron Age.

Figure 32 The Lurgan Boat (National Museum of Ireland)

A 1996 survey of Irish dugout boats cited 11 Bronze Age examples (Lanting et al. 1996). Nine of these were discovered after 1975, when the policy of radiocarbon dating adopted by the National Museum in the 1950s ensured adequate dating. Since that study, a number of other logboats have been dated to the Bronze Age, including one from the River Articlave, Co. Derry (Fry 2000, 81), and dugouts discovered by the Underwater Archaeology Unit in Lough Corrib at Annaghkeen, Lee Island and Killbeg, Co. Galway (Brady 2014; O' Sullivan et al. 2014). Two boats on this list, both from Derrybrusk, Co. Fermanagh, were made from alder as opposed to the more typical oak (Fry 2000, 110–111). This may indicate either a move towards different materials at this time, or a lack of oak in the area (Gregory 1997, 60). It is a lighter timber which would make for a faster vessel, but alder responds poorly to being repeatedly dried and wetted, so it would be more difficult to care for than an oak boat.

The Lurgan boat is the best known example of a Bronze Age logboat, discovered in 1902 in a County Galway bog (Fig. 32) (Gregory 1997, 473–474; Robinson et al. 1999; Breen et al. 2004, 36–37). The 15.24m long unfinished dugout, dating to 2561-2345 cal. BC, was of tapered form, carved from oak, and had a series of holes bored in it. Holes have been observed in other boats, such as one of the

Cloonfinlough boats (Gregory 1997, 327). While the holes in the floor were probably thickness gauges, others occurring in pairs below the sheerline may have been intended to attach outrigging or to fasten other boats to it. The size of the vessel has led to suggestions of its use as a warboat, a theory which has been rejected on the grounds that its dimensions would have made turning slow and difficult (Robinson et al. 1999). Gregory (1998), on the other hand, has suggested that its finished, tapered form would have been a fast and manoeuvrable vessel, capable of accommodating up to 35 people. Alternatively, such a grand boat may have functioned as a prestige vessel, at a time of emerging elite. While Gregory considers it unlikely to have been intended as a cargo vessel, Robinson et al.'s (1999) ultimate conclusion is that it probably served as a trade or migration vessel. Fry (2000, 23) similarly suggests logboats are more likely to have been used for trade than warfare. The capacity to tie on stabilisers through the bore holes would make the boat adaptable to different current and wave conditions, which would be desirable on long journeys. The Annaghkean boat from Lough Corrib is of comparable size (12m) and date (2578-2457 cal. BC), and is interpreted as possibly serving a number of functions, including ritual, elite display and use by warriors. It is suggested that it was too well crafted to have served as a simple fishing or cargo vessel (Brady 2014).

The Lurgan and Annaghkean boats are examples of particularly long logboats which were in use in the Chalcolithic. The length of logboats lessened over time, with the Middle Bronze Age boat from Teeronea, Co. Clare, for example, measuring 5.53m long (Gregory 1997, 564–565; Lanting et al. 1996, 86). It has been suggested that this may be related to smaller oak sizes as stands were not adequately replenished (Fry 2000, 14; O' Sullivan et al. 2014, 24), but it seems more probable that either this was a design choice for the task they were intended for or that it was a more practical way to produce these boats to avoid flexing. The contexts from which the dated Bronze Age logboats were recovered are predominantly from lakes and bogs. The logboat is ideal for travelling over lakes, perhaps for fishing or carrying small cargoes, and they were probably in use for local, inland movement over water.

Plank-built boats of Bronze Age date have been recovered from Dover (Clark 2004; Crumlin-Pedersen 2006) and Ferriby (Wright 1990) in Britain. The ability to sew planks together allowed the size of boats to grow, which facilitated more adventurous open water boating and provided better cargo capacity. Planks were sewn together with lashings of yew or willow, with moss caulking between the planks (Brady 2008, 19). While a true plank-built boat has not been recorded in Ireland, the Lee Island logboat from Lough Corrib, dating to 1391-1134 cal. BC, is the earliest evidence of this type of technology in an Irish context. The boat had a longitudinal split running through the centre and had been repaired with withies to stitch the sides together, and using soft wooden laths, wooden cleats and rods to add structural support. Moss caulking was then used to make the repair water tight (Brady 2014, 37). If this technology was in use in the Middle Bronze Age to make repairs to logboats, then the skills would have been available to produce true plank-built boats too, particularly considering the extent of communication which we can infer from material culture between Ireland and Britain. This would mean not only were Bronze Age people in Ireland exposed to plank-built boats from Britain, but they were undoubtedly using similar vessels to facilitate open sea journeys.

Despite the poor dating record, it is clear from these examples that boats continued to serve as an important means of transport throughout the Bronze Age, perhaps with prestigious associations in the case of the large ones. The change in dimensions of logboats may be linked to a change in function or availability of materials, but it implies that the logboats had less cargo capacity at a time when there would have been an increase in movement, trade and exchange of material. This function could have been fulfilled by different types of boats, such as hide covered boats which would be less likely than logboats to survive in the archaeological record, or plank-built boats which could have been produced using the same skills which repaired the Lee Island logboat. While woodland clearance in the Bronze Age opened up the landscape to new land based routes, boats would have been the more useful and expedient method of travel for the transport of heavy loads, meaning it would have remained an important mode of communication, particularly with Britain and the continent.

5.3.2 Trackways

The Bronze Age period saw increased exploitation of wetland and marginal areas. O' Sullivan (2001, 122) explains that various social pressures, such as population growth and social instability, coupled with environmental factors, such as soil erosion and bog growth, may have led to social stratification and the use of the wetlands as part of a social and economic strategy. This would have involved using the wetlands for hunting, fishing and fowling, as well as gathering plants for food and remedies. Although bogs are susceptible to changes in hydrology over time, the general trend would have been towards the growth of sphagnum peat and a more solid peat surface, which would facilitate easier movement over the surface of the bog. Thus, not only was it increasingly possible to access the bogs for hunting, gathering, ritual etc., but crossing bogs became a more efficient way to travel than circling around them, and networks of trackways began to be constructed both accessing the bog and traversing them, some of which would feed into routeways through the broader landscape. What follows is a brief discussion of the types of trackways which were being constructed in the Bronze Age in Ireland.

The majority of trackways were of simple construction, using the most abundantly available materials of birch, hazel and alder. They typically represent a decision by small groups of people to cross a difficult patch of ground in an attempt to move from one location to another. The collection of local timbers would make it a relatively quick project. Many of the simplest trackways do not cross the bog, but skirt around the edges, link hummocks, or access the interior of the bog. This may be a response to local conditions, whereby certain areas of the bog had to be accessed for economic reasons, such as hunting and the collection of resources (Moore 2008, 10; Gowen et al. 2005, 353). They could also have been designed to offer local access in a network of trackways to other, more important toghers (Raftery 1996, 198).

The simplest of these constructions were the continued use of longitudinal trackways of brushwood and roundwoods, such as the Early Bronze Age Derryoghil 7 (Raftery 1996, 127–129), the Middle Bronze Age Corlea 4 (ibid, 65) , or the Late Bronze Age Derryoghil 3 (ibid, 121-122). Some, such as Derryoghil 7, even included pegs to pin the structure in place. While longitudinal trackways are the simplest and most common trackway design, they can create very level and well-constructed surfaces. The Middle Bronze Age Derryoghil 19 (ibid, 145-148), for instance, was constructed of longitudinal brushwood, tightly arranged in parallel rows to produce a very flat walking surface. Other more complex designs may include transverse supports, seen at the Middle Bronze Age Corlea 2 (ibid, 55-60). The longitudinal roundwood design could potentially be slippery and difficult to walk on, and were probably unsuitable for animals (ibid, 200). Brushwood trackways, which are more common, were more suitable for animals and safer for pedestrians. They are light and ephemeral constructions, which may have had short lifespans, although the use of transverse supports in some may indicate some efforts to strengthen the design.

Woven hurdles were also incorporated into some trackways, allowing for light, flexible walking surfaces. Most of the hurdles from the Mountdillon bogs occur from 1300-900 BC, including Derryoghil 6 (Raftery 1996, 126–127), Derryoghil 21 (ibid, 149-150), Corlea 3 (ibid, 61-64) and Derryoghil 5 (ibid, 125-126). The most well-constructed hurdle from this area, however, is a particularly early example, dating to 2335-2037 cal. BC, from Annaghbeg 2 (ibid, 173-177) (Fig. 33). It was 5.25m long and composed of 12 panels woven from hazel rods. The hurdles would have been constructed upright on dry margins, with the panels standing vertically in the ground, before being carried to the appropriate place in the bog. This method allowed the majority of the work to be done on the safety of dry land, without the difficulties involved in undertaking a construction project in wet parts of the bog.

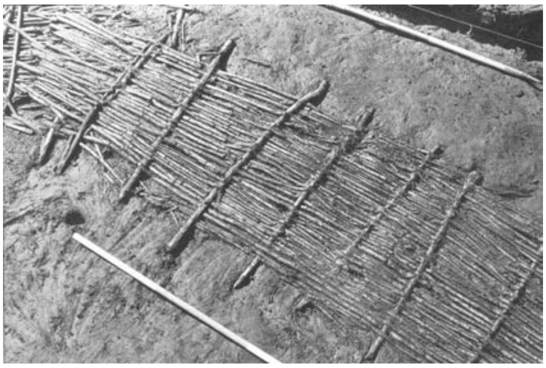

Figure 33 Annaghbeg 2, Co. Longford (Raftery et al. 1996, 177)

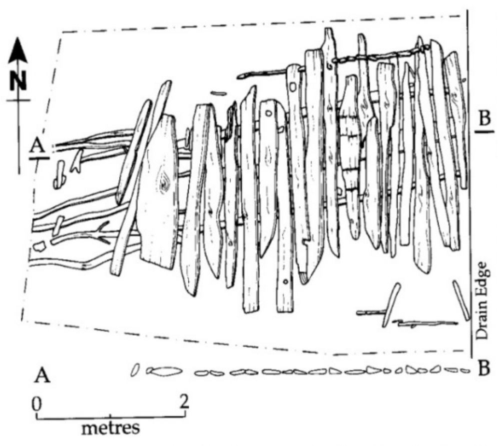

Figure 34 Derryoghil 1, Co. Longford (Raftery et al. 1996, 108)

Unusual constructions include the Middle Bronze Age Derryoghil 10 (Raftery 1996, 132–136), which was composed of transversely placed rods and roundwoods. Perhaps this was an attempt to create a surface suitable for wheels without the labour intensity of sourcing and moving heavy oak timbers for a corduroy trackway. Raftery (ibid, 202) discounted this because of the early date of 1683-1465 cal. BC which predates known wheels, and suggested instead that it was simply an idiosyncrasy of the individual who designed it. Transverse and corduroy trackways were being constructed as early as the Neolithic period, and many of these early ones may have served as more comfortable walking surfaces for humans and animals. At Mountdillon, we see the Early Bronze Age Corlea 6 (ibid, 71-78), composed of transverse split logs and planks, but there was a notable increase in transverse constructions late in the Bronze Age, exemplified by the true corduroy trackway of Derryoghil 1 (ibid, 107-115) (Fig. 34), made from oak planks. The introduction of the wheel may have contributed to the increase in this construction technique, with the earliest dated Irish wheel dating to 1206-970 BC (Moore 2008; Moore et al. 2010). It has also been suggested that the wide dimensions of some Bronze Age corduroy trackways were to accommodate the poor steering of early vehicles (Raftery 1996, 220), but the appearance of this trackway type before this date indicates another factor was at play.

The trackways of the Mountdillon complex, Co. Longford, showed evidence of the use of metal tools and woodland management. Corlea 6 and Annaghbeg 1 (Raftery 1996, 165–172) were dressed with metal axes as early as the Early Bronze Age, for example, and stone axes appear to have been very quickly discarded for metal ones, which could more easily cut deep into heartwood (O' Sullivan 1996). Complex carpentry techniques began to be used, and Late Bronze Age examples, such as Derryoghil 1, were pinned in placed using a system of mortices and pegs. The introduction of better tools also allowed larger timbers to be used, with oak appearing more frequently in timber selection. These substantial and durable timbers would prolong the life of a trackway, but they needed to be suitably supported to prevent the heavy timbers from sinking, so more elaborate substructures began to be used. The increasing use of oak also demonstrates woodland management beyond the closest timbers in the bog margins, although the margins continued to be exploited and even coppiced as we see from the hazel rods at Derryoghil 5 and Annaghbeg 1. The collection of oak would require careful planning involving sourcing, felling, splitting, dressing, transport and assembly of the timbers, and would surely have involved co-operation from the community. The use of oak in trackways was therefore a considerable feat, and it demonstrates the efforts which were deemed suitable for the construction of these trackways.

The improvements in quality of trackways over the course of the Bronze Age is matched by increasing length, with more ambitious projects being undertaken in order to effectively and safely cross the bogs. Corlea 6 is an early example of this, with the corduroy trackway stretching for at least 900m across the bog dating to 2259 ± 9 BC. Corlea 2 is estimated to have been up to 1km in length in the Middle Bronze Age, a considerable length for a seemingly simple brushwood construction, requiring approximately 2.5ha of coppiced woodland. The Late Bronze Age corduroy Derryoghil 1 stretched perhaps as much as 650m across the bog. As discussed above, transverse and corduroy trackways appear in Ireland as early as the Neolithic period, predating the earliest known wheel in this region which dates from 1206-970 BC (See Chapter 5.3.3). It has been suggested instead that such trackways, especially considering the length which some of them measure, were designed as prestige projects for ostentatious display of the skill and wealth of the community (Raftery 1996, 203; O' Sullivan 2007, 173–174). In this way, trackways could be interpreted as more than simply utilitarian paths across wetlands, but as monuments in their own rights. These trackways appear to occupy genuine axes of movement, however, appearing on the narrow portions of bogs and often linking elevated areas of dryland which would have accommodated settlement. In other words, they served a function… but it is still possible for these constructions to have been functional as well as serving as ostentatious prestige projects or monuments.

For some (Gowen et al. 2005, 349), this marks a shift from the passive acceptance of the limitations of a bog environment to efforts to cross bogs which would previously have been unsuitable for such a venture. This is not entirely true, as the earlier exploitation of wetlands through the construction of trackways can hardly be described as a passive response to the bogs, but the Bronze Age does mark an increase in the crossing of bogs in this manner, marking a change from trackways which treat the bogs as the objective, to those which treat it as an obstacle.

Thus, while many of the trackways were simple constructions which served local needs, others were of monumental construction, thanks to improved carpentry techniques. Indeed, even superficially simple trackways such as Corlea 6 would have been monumental undertakings which would have been part of a wider system of movement involving the traversing of substantial areas of wetland. They demonstrate that people were willing to invest in a one-time expenditure of manpower to construct these trackways in return for future savings of time and energy by reducing a circuitous journey around the bog. This will be further evident in the present study, where the trackways quite clearly fit into the dryland routeways which emerged through Bronze Age woodland clearance.

5.3.3 Wheels

The introduction of the wheel represents a major technological advancement for the movement of people and the transport of items. Until this innovation, loads being carried over land were limited to how much an individual or their pack animal could carry on their backs, and boats were the only viable option for transporting heavy loads. This would restrict a lot of communication and exchange only to settlements which were within reach of coasts, lakes and navigable rivers. Bronze Age woodland clearance made movement over land an easier task at this time, but it was the introduction of the wheel which allowed for these routes to be used for the transport of goods and eventually the rapid movement which elites would require. Thus, the wheel was not only a practical device, but one which would have contributed to the elite structures of the Bronze Age.

While one-piece disc-wheels appeared in the Netherlands as early as the Late Neolithic (Van der Waals 1964; Lucas 1972, 38), the earliest evidence for a wheel in Ireland is not until the Middle to Late Bronze Age at Edercloon, Co. Longford (Moore 2008; Moore et al. 2010). It was a fragment of a tripartite block wheel, dated by context to 1206-970 BC (Fig. 35). The wheel was carved from alder, and was one third of what would have been a composite design with lunate openings. The three portions would have been secured with long transverse dowels and there would have been a central opening in the centre portion to hold the axle. The dowel holes were not bored into this wheel portion, and the wheel was not completed. Had it been completed, it is calculated that it would have been about 40kg and 1200mm in diameter. It would have been best suited to a sturdy cart, drawn by animals, which would suggest a particularly early date for draught animals.

Previous to this discovery, another tripartite block wheel of alder from Doogarymore, Co. Roscommon, was dated to 746-396 cal. BC (Lucas 1972), and so this type of wheel was previously thought to date to the Late Bronze Age / Iron Age in Ireland. The rounded tread of the Doogarymore wheel suggests that it had only been used on soft surfaces, into which the wheel would sink slightly, exposing the sides to abrasion but protecting the outer surface from burring. An ash sleeve was fitted into the axle hole to protect the end of the axle and ensure stability while the vehicle was in motion. An identical wheel had been found at the same location prior to this discovery, and a 1m long piece of worked timber 3m away may have formed part of the vehicle which it pulled. The second wheel dated to 474-231 cal. BC, however, which suggests both wheels may in fact be of Iron Age date. Another wheel which was found in Timahoe Bog in 1941 may be of Bronze Age date, and the remaining alder fragment on Lucas' inspection appeared to correspond to the tripartite block wheel design.

Figure 35 Block wheel fragment from Edercloon, Co. Longford (Moore et al. 2010, 61)

Figure 36 Reconstruction of proposed composite block wheel and dowelled rim from Edercloon, Co. Longford (Moore et al. 2010, 67)

A fragment of a wheel rim, or felloe, was also found at Edercloon (Moore et al. 2010). It was next to a trackway which had multiple layers, the lowest of which dated to 1410-1210 BC, but the rim is more likely to have been deposited at the same time as the upper layer, dating to 750-390 BC, meaning it could possibly be of Iron

Age date. Nevertheless, it demonstrates the evolution in wheel technology between the Middle and Late Bronze Ages. It was also made of alder and was a narrow rim of U-shaped cross section. It had seven dowel holes, set in pairs, and five dowels were still affixed to it. The outer edge showed heavy signs of wear and was embedded with small pieces of gravel. In contrast to the Edercloon block wheel, the diameter would have been much smaller at c. 800mm. Moore et al. (ibid, 67) suggest that this wheel would have been a hybrid design in which a lighter version of a tripartite block wheel was augmented with an outer rim and secured by dowels (Fig. 36). Such a design would have allowed for easy replacement of damaged outer edges.

These examples are a strong indicator that alder was the preferred material for wheel production in the Bronze Age and Iron Age. It is a timber associated with shields (Mac Coitir 2003, 34), as it is light and flexible. It has 22% less modulus of rupture, or bending strength, than oak, so it is not quite as sturdy across the grain, but there is only 2% difference in crushing strength (parallel to grain) and it is 27% lighter (The Wood Database 2015). Thus, while not as robust as oak, alder would have created a strong, flexible and light wheel.

None of the trackways from Edercloon were suitable for wheeled transport, but Moore (2008; 2010) suggests the wheels may have been placed there as a votive deposit. In contrast, Lucas (1972, 43) prefers a practical explanation whereby the wheels would be submerged in wet surroundings to swell the timbers after they had dried out and shrunk. This would secure the dowels and ensure the structure did not collapse from ill-fitting components. While alder is an ideal timber for underwater uses, it is not especially rot resistant in other circumstances and cycles of soaking and drying which this methodology describes would promote rot. It is also possible that wheels could be abandoned when they were broken, but the unfinished block wheel from Edercloon would seem to contradict this. Given the practice of deposition in wet places from early prehistory, the most likely explanation would seem to lie in this ritual practice.

The only cart fragments from Corlea are probably of Iron Age date, but the Doogarymore discovery included a 99cm long yew plank which was carefully worked and thought to have been a component of a vehicle (Lucas 1972, 31). The vehicles of the Irish Bronze Age were most likely to have been heavy contraptions with poor steering. It has been suggested above that these vehicles may have impacted on the design of trackways to accommodate the large turning arcs of early steering, and the use of the wheel would also have demanded suitable surfaces on dryland. Routeways would have had to be cleared and maintained to allow the passage of vehicles, and a suitably dry surface would be required to prevent the heavy cart from sinking into soft mud, which would possibly involve the use of gravel or sand. Sand and gravel was quarried from Clonad Bog in the study area, some of which was spread over the toghers around it, and it is possible that this resource was gathered for surfacing paths. The gravel embedded in one of the Edercloon wheels may be evidence of such a practice.

In summary, the development of the wheel would have been of particular benefit to settlements which were removed from boating routes, as carts could be used to carry heavier loads than previous methods of communication at their disposal. The ability to exploit the emerging dryland routeways would have contributed to the emerging elite, as they relied on fast communication and access to exotic items to ensure personal prestige. Perhaps their role in attaining prestige was the reason for what appears to have been votive deposition of wheels in wetland contexts. Finally, while movement over land would previously have been practiced by following paths and desire lines along routeways, wheeled vehicles would require a coherent surface which may even have involved surfacing. Thus, our earliest *roads*, as opposed to routeways, trails and trackways, are probably the result of the rise of the wheel, and consequently may date to the Bronze Age.

5.4 Summary of Bronze Age movement

This discussion briefly outlined the increasing importance of dryland routeways in the Bronze Age, owing principally to the opening up of the landscape through woodland clearance and the need to access more marginal areas. Although only a few site types were discussed above, these examples show an increased emphasis on siting monuments to overlook land routeways, particularly at significant points along them such a bottlenecks, fords and thresholds. These monuments would have communicated messages to passers-by, the nature of which would depend on the type of monument and the relationship to the traveller. In essence, the greater the connection to community knowledge, the easier it would be for individuals to use monuments for wayfinding, having the ability to refer to idiosyncratic landmarks or recall past events or depositions, while secure in the knowledge that they are moving through ancestral lands. Conversely, outsiders without this knowledge could not rely on discreet way points or pre-constructed cognitive maps, and if glimpses of burials were not reminder enough to tread carefully through an occupied landscape then the more practical surveillance from hillforts would surely invite caution.

The fact that Bronze Age people saw fit to oversee their routeways in such a manner demonstrates that they were becoming increasingly important alongside water-based movement. It is quite clear that not only were these routeways being used, but they were guarded, particularly in the Late Bronze Age. This suggests that it was possible for people to move in sufficient numbers and with sufficient speed to mount attacks, and that this was being mitigated against by hillforts. This emphasis on speed is seen elsewhere, with primary toghers being constructed as shortcuts across bogs and the use of the wheel to access areas beyond water routes. While speed and communication contributed to the spread of Bronze Age technologies, materials and the elite culture that they propagated, the ability to move rapidly would also impact on control and warfare, and this may have been one of the factors in the apparently competitive nature of Bronze Age societies.

5.5 The Bronze Age in North Offaly

There was a significant increase in activity in North Offaly in the Bronze Age, not just in the use of marginal wetlands and woodlands for hunting and gathering, but also in the move towards more long term settlement. Palaeoenvironmental analyses show frequent episodes of woodland clearance and agriculture, while a complex network of trackways was constructed to access and traverse the bogs. Meanwhile, there are a number of actual habitation sites which demonstrate the character of Bronze Age settlement in North Offaly. Settlement requires a minimum amount of movement and this is evident in Offaly, both on a local level through the construction of trackways and on a wider scale through the distribution of archaeological sites on the natural routeways provided by subsoils of limestone sand and gravel. As will become evident in the discussion that follows, as settlement became established in this region, it emerged as an area which was well connected with the wider world through a complex network of constructed trackways and natural routeways which would facilitate everyday movements and the type of long distance communication that was necessary to keep astride of socio-political realities in the Bronze Age.

5.5.1 The Bronze Age environment of North Offaly

The Bronze Age was a period of immense change in the bog development and vegetation of North Offaly. While there were still fen wetlands across the study area, many of these bogs developed into acidic raised bog at this time. This would have restricted boating which could previously have been practiced on the lakes and swamps, but the build-up of peat would eventually have been sufficient to support trackways and movement. Meanwhile on dryland, a combination of elm decline and woodland clearance would have transformed the character of the woodlands, allowing agriculture, opening up lines of sight for wayfinding, and revealing natural routeways. What follows is a description of the wetlands and woodland of North Offaly, after which we can discuss the nature of movement which was possible in such a landscape.

5.5.1.1 *Bog development*

The variety of chronologies and the nature of localised wet and dry areas within the wetlands make it difficult to relate a simple summary of the conditions throughout the Bronze Age. Fen, bog lakes, woodland, lawns and hummock-hollow systems are all represented among the wetlands of this study area and they simultaneously provided a range of resources and movement options, but also obstacles of varying magnitude. These conditions would invite different responses from the people interacting with them, and it is important to acknowledge such conditions when assessing wetland trackways.

Open water was still present in some of the pre-bog lakes of the study area. At Clonfinlough, for example, the lake level underwent a number of fluctuations over this period (Moloney et al. 1993, 5), while Lough Nashade would still have been a major landscape feature within Ballybeg Bog (Irish Archaeological Wetland Unit 2002a), and the bog lake at Tumbeagh drowned developing sphagnum peat at least once in 700 BC (Casparie 2006, 136). Fen too was well represented in the Bronze Age, with intermittent growth of fen peat at Clonfinlough to such an extent that it created a suitably stable surface for the construction of a lake-side settlement. This type of peat prevailed until c. 950 BC at Tumbeagh, before being submerged by the lake (Casparie 2006, 124–137; Reilly 2009, 135).

Most of the bogs in the study area made the transition to raised peat and sphagnum bog growth in this period. At Kilnagarnagh, there were originally two separate bogs which formed in the Neolithic period, separated by higher ground, before joining into a single wetland body. The north and central areas had the thickest deposits of sphagnum peat develop from c. 3000-900 BC, while the southern bog formed between c. 4000-2400 BC (Bermingham 2005, Chapter 8).

Some of these bogs also accommodated woodland, with pine growing at Ballybeg bog (Irish Archaeological Wetland Unit 2002e, 9–10) and tree cover in the centre of Kilnagarnagh bog around the ridges (Bermingham 2005, Chapter 8). These would have helped to keep the surface of the bog relatively dry and consolidated, but changing hydrology could quickly change the nature of the bog. The development of the lake at Tumbeagh, for instance, may have been caused by a bog burst c. 1000 BC, which compacted the fen and caused water to accumulate over it (Casparie 2006, 134).

Sphagnum peat can accommodate a variety of conditions and the insect and coleopteran evidence has shown the bogs of Tumbeagh, Kilnagarnagh and Lemanaghan to have included stagnant pools, lawns and hummock-hollow systems which would have had to be negotiated to navigate the bogs (Casparie 2006; Bermingham 2005; Reilly 2009). One of the observations from such studies is that some trackway constructions, such as 99TBN0010 at Tumbeagh, were reactionary structures attempting to maintain a path. It is more usual, however, for trackways to be created in drier conditions when the bog became more accessible. Considerations such as this allow us to untangle periods when the bogs were simply inaccessible from the possibility of there being a lull in settlement.

5.5.1.2 *Vegetation*

While human activity in the Neolithic period seems to have had a negligible impact on the vegetation of the study area, palaeoenvironmental analysis has shown that woodland was being cleared and agriculture was being practiced in the Bronze Age in North Offaly. The clearance of woodland would open up routeways by revealing landscape vistas and prominent landmarks, which would allow for easier wayfinding and supporting views for cognitive mapping. The ability to see and point to a distant location would also facilitate the communication of topographical knowledge and directions. It is important to consider how the character of woodland affected movement in the area in this respect. More direct routes could be initiated thanks to improved wayfinding and the lack of trees to zig-zag around. It may also have been safer, removing the threat of wild animals in the woodland. The type of woodland would also determine the availability of timber for construction of houses and trackways. Meanwhile, recolonisation of scrub plants when a clearing has been abandoned can be more challenging to move through than mature woodland. As discussed previously, a settled and *owned* landscape would also have provided impediments to movement for strangers.

Quercus continued to dominate mature woodland in the Bronze Age, but it underwent periods of decline, as seen in pollen evidence from Mongan bog (Parkes et al. 2000), Clara bog (Crushell et al. 2008) and Clonearl bog (Plunkett et al. 2009). This is also clear from the use of timber on Bronze Age sites discovered on the N6 motorway project (O' Carroll 2010, 54), and a lack of oak may have led to the decision to use ash as the principle building material at Clonfinlough (Moloney et al. 1993, 58–59). While oak appears to have been a favoured timber on dryland structures in the Early Bronze Age, the Middle to Late Bronze Age saw a transition where it continued to be used for key structural purposes, but lighter ash and hazel replaced it as the principle timber (O' Carroll 2010). In contrast, it became a more popular choice in wetland structures in the Middle and Late Bronze Age. This could be a symbolic choice, with the high quality timber being used for trackways which could be regarded as monuments, while light timbers were seen as suitable for settlement sites. Alternatively, it could be a response to the timber available in these locations, with dryland sites undergoing more clearance for agriculture, possibly diminishing accessible oak resources by the Middle to Late Bronze Age, while ash and hazel colonised areas peripheral to clearings. This process may have been slower close to wetlands, where the soils were less suitable for agriculture.

Ulmus was also a major component of mature woodland in the Bronze Age. The Elm Decline had taken hold in the Neolithic period and pollen diagrams show a consistent reduction throughout prehistory of this species (Parkes et al. 2000;

Crushell et al. 2008; Plunkett et al. 2009). Some localised events coincided with simultaneous reductions in oak, and it appears that anthropogenic factors also affected elm populations. Wetland structures rarely included elm, and the human impact was derived from farming. Indeed, there was an increase in elm pollen at Clonearl from 840-580 BC which corresponded with a hiatus of farming and a resurgence of woodland growth (Plunkett et al. 2009). While oak responded well when woodland was left to regenerate however, elm regenerated in fewer numbers owing to the wider effects of Elm Decline.

Fraxinus prefers fertile, well-drained soils but the woodlands close to bogs would also have accommodated this species. It was one of the species affected by woodland clearance for agriculture (Parkes et al. 2000; Crushell et al. 2008; Plunkett et al. 2009; O' Carroll 2010, 54), but there were also some spikes in ash numbers at Mongan in the Middle Bronze Age and Clonearl in the Late Bronze Age. Ash was the most well-represented timber at the Late Bronze Age settlement site at Clonfinlough, where it was sourced from managed woodland (Moloney et al. 1993, 58–59). This may have been a reaction to declining availability of oak, leading to more careful management of available resources. The Blackwater survey found ash to have been widely used in trackway construction and the variety in quality of these timbers demonstrates that clear felling was used over wet and dry land close to the bog (Moloney et al. 1995, 22).

Corylus continued to dominate as a scrub species that could easily colonise wetland areas. The peaks and declines in the pollen analyses are quite dramatic, with peaks typically occurring alongside increases in elm and ash, such as at Clonearl Bog c. 840-580 BC, and declines appearing when *Plantago* pollen increases, seen at Clara Bog in the Early Bronze Age and again at 900 BC (Parkes et al. 2000; Crushell et al. 2008; Plunkett et al. 2009). It is a fast growing species which would have quickly colonised abandoned clearings, and evidence of coppicing from many of the wetland assemblages show that it was also being managed. The use of hazel in wetland structures increased after 1300 BC, and this has been interpreted by Bermingham (2005, 85) as a rise in woodland management, rather than a move towards relying on secondary woodland.

Betula is poorly represented in the pollen diagrams for Mongan bog and Clara bog, only increasing in the Late Bronze Age (Parkes et al. 2000; Crushell et al. 2008). Despite its poor presence in pollen cores, it is one of the best represented species in the wetland timber assemblages. In the Blackwater survey, for instance, it was the most frequent species and made up 34% of the sample timbers (Moloney et al. 1995, 21). Indeed, the majority of roundwood and brushwood trackways from the study area are composed of birch and hazel. This species would have been readily available in the wetland verges and could be quickly felled and prepared for expedient constructions. The birch timbers from Blackwater verify that they were being harvested locally, with many examples showing poor ring growth consistent with that expected from marginal soils (ibid, 23).

Alnus would also have grown in the wetland margins and would have out-competed pine in this period (Parkes et al. 2000; Crushell et al. 2008; Plunkett et al. 2009). At Tumbeagh bog in particular, the marginal woodland was dominated by alder c. 2400-2200 BC (Casparie 2006). In comparison with the other species described here, it was poorly represented in timber assemblages, both in dryland areas (O' Carroll 2010, 56), and in wetland areas (Corcoran 2004, 7; Moloney et al. 1995, 23). Moloney (ibid) suggests that this is for the same reasons outlined above (Chapter 5.3.3), and that the timber would rot too easily because of the fluctuating water levels of the bog.

Timber selection for wetland sites in the Early Bronze Age included a range of materials, including ash, willow, alder, holly, pine, apple-type, elm and oak, but hazel and birch were the best represented. The range of species suggests opportunistic timber collection to expediently construct trackways as required. Later assemblages included less species, suggesting more deliberate timber selection and more planning in the construction process. The Middle Bronze Age was characterised by use of hazel, ash and birch, with oak now making a considerable contribution, and a few cases of other species. By the Late Bronze Age, oak, hazel, birch and ash provide almost all of the material, with very little use of other species. While the availability of oak may have wavered at times, according to the pollen diagrams, it was sought out as a material for trackway construction, particularly for well-constructed primary toghers which were of considerable length. Hazel, birch and ash are also well suited to trackway construction, producing long, light and supple roundwood and brushwood, some of which were sourced from managed woodland. It must be noted, however, that this applies only to dated trackways, and the trackways which are typically chosen for dating are ones which are thought at sampling to be early, or those of elaborate construction. Because of this, trackways which are dated to the Late Bronze Age are biased towards oak plank constructions (Bermingham 2005, 82).

Thus, the dry woodland of this period in North Offaly would have consisted principally of oak, elm and ash. These species underwent intermittent declines with simultaneous rises in *Plantago lanceolata* (ribwort plantain), *Ramunculsus* (buttercup etc.) and *Rumux* (docks etc.) showing that anthropogenic activity was responsible for this. While pine declined in marginal areas, in a pattern consistent with the rest of Ireland, alder was particularly well represented, along with birch and hazel. These species similarly went into intermittent declines when they went through episodes of clear felling, but they are quick to recolonise abandoned clearings and recover quickly from such events. It is in this period that the Midland Corridor and other dryland routes in the study area flourish, due to the cumulative effects of clearances for agriculture and settlement, as well as clear felling for timber collection, allowing the emergence of natural routeways.

5.5.2 Wetland movement in Bronze Age Offaly

As discussed above, the Bronze Age was a period in which many of the Midland bogs expanded and developed towards raised sphagnum peat conditions. This type of peat is better able to accommodate movement and support structures than fen peat and reed swamp, so this period sees a rise in the numbers of trackway constructions in the study area from which we can infer movement. Although there is very little known of dryland settlement in this region in the Bronze Age, the existence of trackways, some of which were considerable time commitments to construct, suggests that there was settlement on the dryland close to the bogs. The locations and orientations of these trackways can help us understand the nature of the settlement and the types of movement which were being practiced by the inhabitants. In particular, the trackways from the study area show a transition from trackways which access the verges of the bog, presumably for hunting and resource collection, to a practice of crossing the bogs to feed into a wider system of movement. Below is a summary of wetland trackways and structures which have been discovered by the Irish Archaeological Wetland Unit and Archaeological Development Services in the Bord na Móna wetland surveys which have been dated to the Bronze Age (Fig. 37). The role of these sites within the local landscape will be discussed, as well as their impact on the development of networks of movement.

5.5.2.1 *Drumman Bog*

Drumman Bog consists of the wetlands north of Rhode, in the northeast corner of the study area (Figs. 37, 38). Chalcolithic / Early Bronze Age activity in this bog is evident from the discovery of a barbed and tanged arrowhead (Irish Archaeological Wetland Unit 2003b, 29), but the earliest known structure is an Early to Middle Bronze Age secondary togher in the townland of Derrygreenagh (OF-DGH 0007, OF003-038), which was dated to 1683-1409 cal. BC. It was orientated in a NW-SE direction, with a varied design incorporating one section of longitudinal construction while the rest was composed of heavy brushwood arranged transversely over a brushwood substructure. The wood species was mostly alder and the preservation of bark indicates that the trackway was not intensively used (Irish Archaeological Wetland Unit 2003b, 37; 2003c, 21). The poor choice of timber and haphazard construction suggest that this was quickly constructed to suit an immediate need, but the wear indicates that its use was of short duration. It is well positioned for allowing movement between the islands of dryland at Derrygreenagh Hill and Knockdrin, and probably fit into local movement between these two places.

A tertiary togher (OF-DGH 0014, OF003-045) was also revealed in Derrygreenagh and was dated to 1187-830 cal. BC. It was orientated ENE-WSW and was constructed from a bed of brushwood overlain by transverse roundwoods (Irish Archaeological Wetland Unit 2003b, 39; 2003c, 21). This trackway ran almost parallel with the margin of the bog at this location, and is most likely associated with activities within the wetland margins, rather than crossing the bog.

Both of these sites were at similar stratigraphic levels to other sites within the bog which may similarly date to the Bronze Age (Irish Archaeological Wetland Unit 2003b, 30). These sites appear to be local in character, rather than elaborate constructions designed to cross bogs. This is a reasonable response considering how wide the bogs of Drumman and Derryarkin are. Any efforts to create a more substantial togher which might serve a wider scale of movement would be more suitably directed at the narrower Ballybeg Bog to the south (Fig. 37).

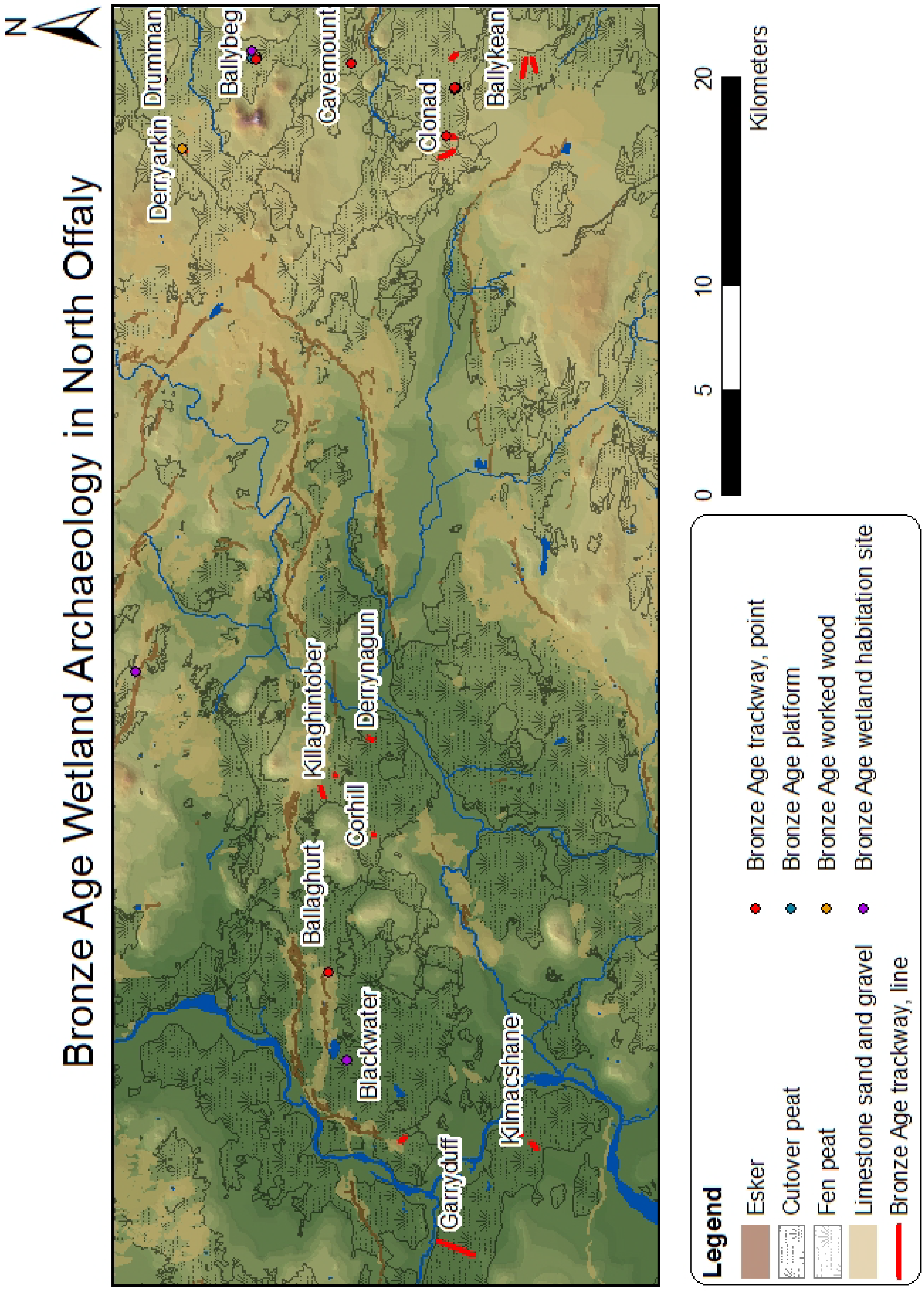

Figure 37 Wetland archaeology of North Offaly in the Bronze Age

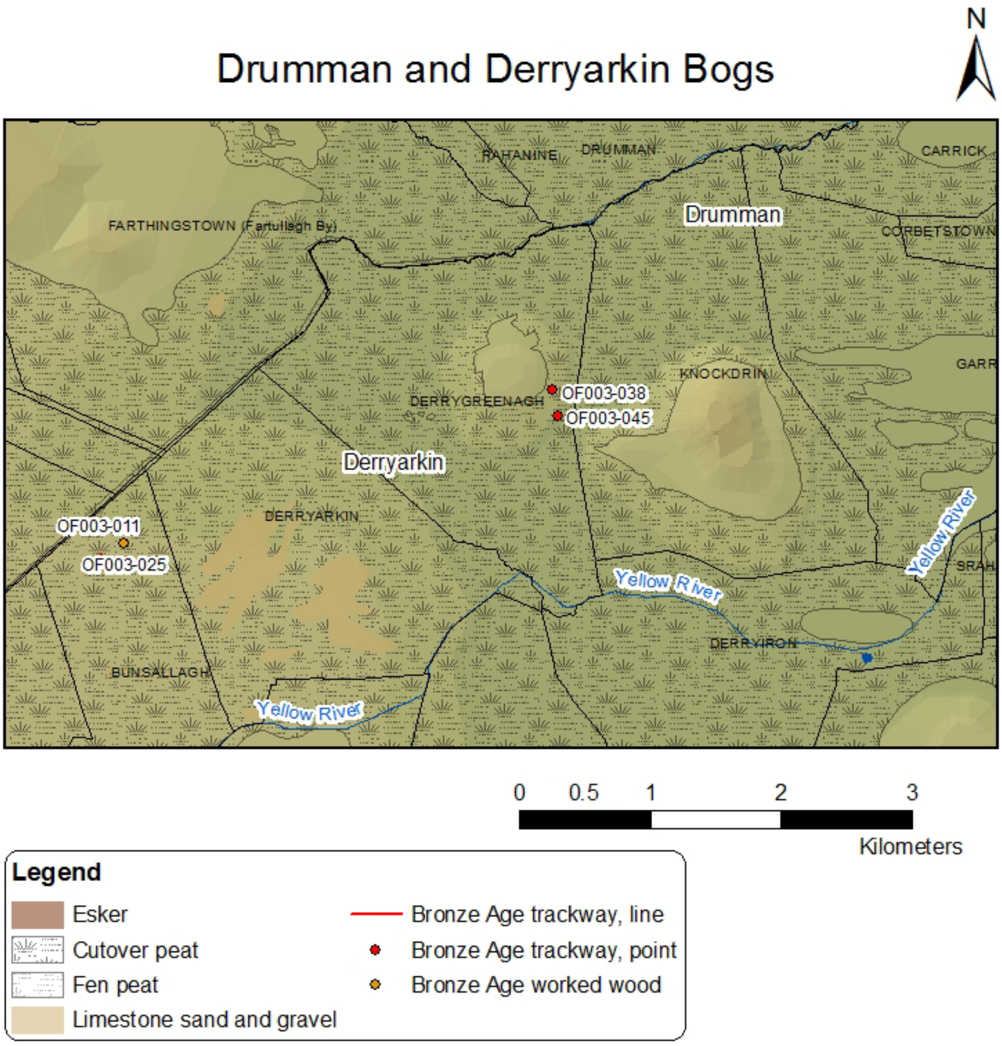

Figure 38 Bronze Age archaeology of Drumman and Derryarkin Bogs

5.5.2.2 *Derryarkin Bog*

Derryarkin Bog is immediately west of Drumman Bog and shares a number of townlands with it (Figs. 37, 38). Mesolithic and Neolithic activity in this bog has been discussed previously (Chapters 3 & 4), and activity continued in this area in the Bronze Age. The earliest Bronze Age structure is a secondary togher (OF-BSL 0002, OF003-011) from the townland of Bunsallagh, dating to 1937-1644 cal. BC. It was orientated north-south and composed of transverse roundwood of *Fraxinus*, resting on longitudinal runners and fixed in place with pegs. While it appears to be located centrally within the current extent of cutover peat and reclaimed land, it was constructed over fen peat which had accumulated over a sub-peat ridge. The ridge would have offered a relatively dry and stable walking surface, and the trackway probably ran from the ridge over the fen peat into the bog (Irish Archaeological Wetland Unit 2003b, 9, 17; 2003c, 17).

A spread of worked wood *in situ* was also found at Bunsallagh (OF-BSL 0016, OF003-025) with a date range of 1686-1414 cal. BC. The deposit was an irregular spread of hazel brushwood, up to two pieces deep (Irish Archaeological Wetland Unit 2003b, 20; 2003c, 17). It had been machine damaged and it is difficult to determine the function of the structure, but it had been part of a cluster of sites around the sub-peat ridge and is probably representative of bog edge activities which seem typical of this region in the Early to Middle Bronze Age.

5.5.2.3 *Ballybeg Bog*

Ballybeg Bog lies south of Drumman Bog, between Croghan Hill and the town of Rhode (Figs. 37, 39, 40). The Late Neolithic / Chalcolithic features from this bog have been discussed previously (Chapter 4), and the complex and occupation site may have continued in use early in the Bronze Age. A barrow (OF-TBD 0019, OF011-060) was also revealed during the course of the IAWU survey. This wetland landscape is an unusual context for a monument of this type, but the soil in which it was built had a sandy quality, which suggests the ground surface may have been reasonably dry at this time. The quality of the peat and the stones used in its construction are similar to the occupation site, which led the excavators to conclude that the two sites were related (Irish Archaeological Wetland Unit 2002a, 8, 33).

A yew bowstave (01E0663:2) was recovered from a disturbed context in the Barrysbrook portion of the bog. It was dated to 2399-2042 cal. BC (Murray 2004), which is consistent with the dates for the occupation site and complex from Toberdaly. This bow may have been used for wetland hunting, which would be contemporary with a platform (OF-BBK 0030, OF010-409) dating to 2289-1952 cal. BC. The platform was composed of poor quality and gnarled timbers of *Betula*, *Salix*, *Pinus sylvestris*, *Pomoideae*, *Corylus* and *Fraxinus*, suggesting that the timber was sourced casually for the construction (Irish Archaeological Wetland Unit 2002a, 25; 2002e, 10–12).

These sites show that this bog was a complex landscape where settlement, hunting and ritual activities were all focussed on a marginal area early in the Bronze Age. The dated structures do not include trackways, and it is possible that conditions were dry enough to make movement possible without the aid of such constructions. It was certainly a period when pine woodland thrived in parts of the bog, and the palaeochannel leading to Lough Nashade may have sufficiently drained the area.

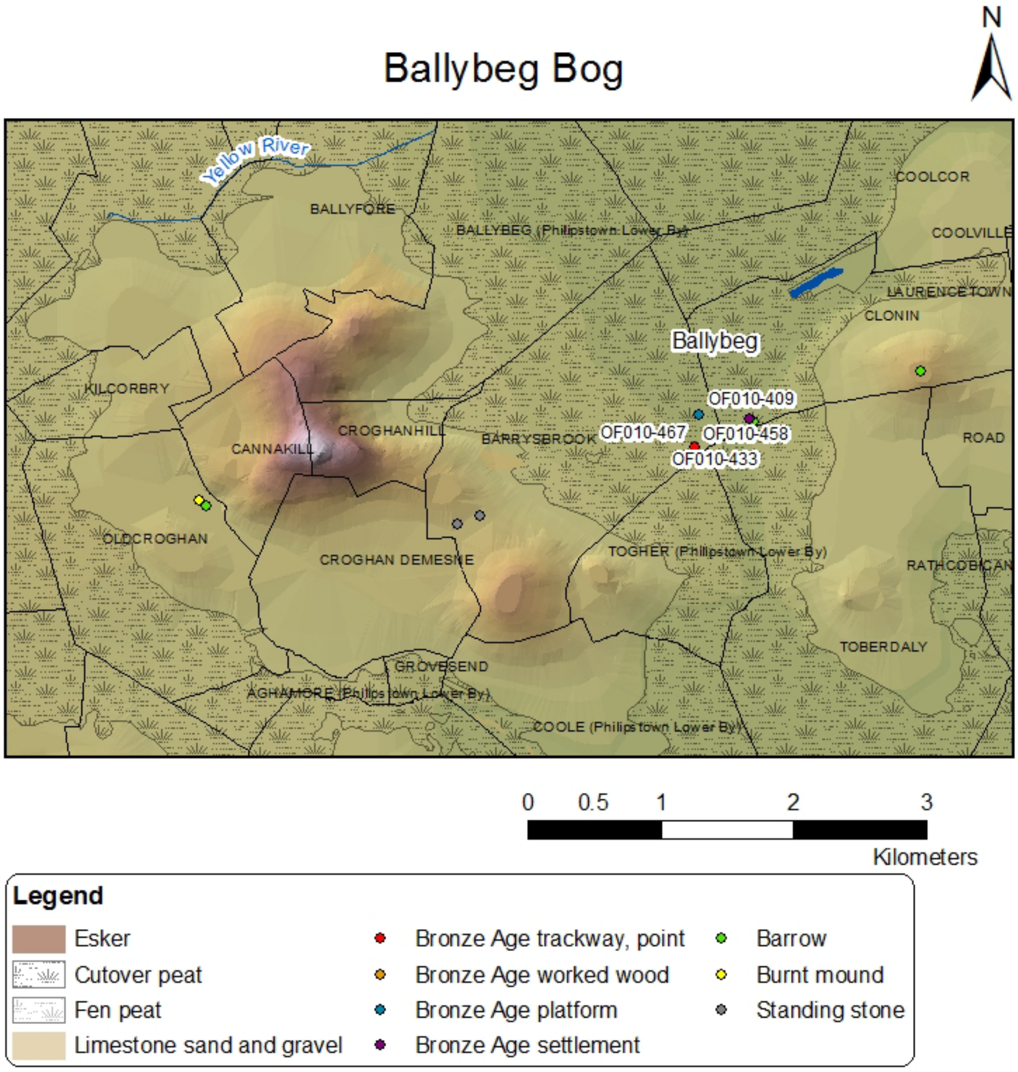

Figure 39 Bronze Age archaeology of Ballybeg Bog

Two Middle Bronze Age tertiary toghers, OF-TER 0020 / OF010-458 dating to 1365-919 cal. BC, and OF-TER 0029 / OF010-467 dating to 1108-800 cal. BC, appear to have been related to the palaeochannel leading to Lough Nashade. The timber from OF010-467 was in poor condition and seemed to have been constructed in a very wet environment and used only for a short time (Irish Archaeological Wetland Unit 2002a, 41, 44; 2002e, 10–12). These two sites suggest that the palaeochannel became more of a focus for movement and activity in the Middle Bronze Age, or that the conditions became wet enough to merit the construction of trackways to move around the bog.

Figure 40 Ballybeg bog (taken from Croghan Hill, facing east)

Late Bronze Age activity is represented in Ballybeg Bog by a deposit of irregularly laid brushwood (OF-TBD 0020, OF010-433) dating to 889-543 cal. BC. It was an ephemeral site which was dated in order to obtain a date for an animal yoke (01E0663:3) recovered from the context (Irish Archaeological Wetland Unit 2002a, 34; 2002e, 10–14). Such a yoke would have been used by an animal to pull a plough or cart, suggesting agriculture or the use of wheeled vehicles was being practiced nearby. The palaeoenvironmental evidence from nearby Clonearl Bog shows an increase in woodland at this time, however, indicating a hiatus of agriculture (Plunkett et al. 2009), so perhaps this functioned as a ritual deposition.

Timber identification from these sites shows more selective timber use over time. The earliest sites are composed of at least six species each, while later sites move towards hazel and ash only in their composition. The timber for the earlier sites appears to have been gathered opportunistically, but the later sites reflect more organised methods of managing timber resources and tool use.

All of the identified sites are associated with the use of space within the bog, rather than attempting to cross it. The dry pine horizons were targeted in the Early Bronze Age, with the palaeochannel and Lough Nashade perhaps becoming more important in the Middle Bronze Age. All of these sites are local in character and would not fit into a wider scale of movement. The highly visible Croghan Hill would have been an important landmark for people attempting long distance movement in this region and this bog would have been the most reasonable place to traverse the wetlands of the area. This was probably practiced at the same location as the Tochar of Croghan, marked by the existing road at the narrowest part of Ballybeg Bog.

5.5.2.4 *Cavemount Bog*

Cavemount Bog lies south of Ballybeg Bog, bordered on the south by the Mountlucas-Edenderry esker and the hills of Killoneen and Mountbriscoe (Figs. 37, 41). A tertiary togher (OF-KEN 0004, OF010-477) was presumed by its short, concave toolmarks to have been Neolithic / Early Bronze Age. It was of north-south orientation, and was composed of transversely laid roundwoods and brushwood, pegged in place and up to two pieces deep. Such a structure suggests wet conditions and it was probably built in fen or transitional peat, before the change to raised bog (Irish Archaeological Wetland Unit 2002b, 3, 9; 2002e, 20–21). A Late Bronze Age site (OF-KEN 0002, OF010-475) was discovered only 31m south of the trackway. It was a poorly preserved site, dating to 1054 ± 9 BC, consisting of a plank and an off-split which did not form a coherent structure (Irish Archaeological Wetland Unit 2002b, 9).

The orientation of the trackway is along the long axis of the bog, rather than crossing on the narrower east/west portions, and it is possible that it was part of a network of trackways which served the internal areas of the bog. The second site supports the idea that there must have been an incentive to access this part of the bog. The bog narrows slightly here on the east/west axis, and perhaps it served as a central point from which wetland activities could be undertaken. The Mountlucas-Edenderry esker would have offered a convenient natural routeway on an east/west axis which would have contributed to a wider scale of movement. Perhaps the availability of this natural routeway is the reason why the structures in this bog are of a local scale, rather than attempting to cross the bog.

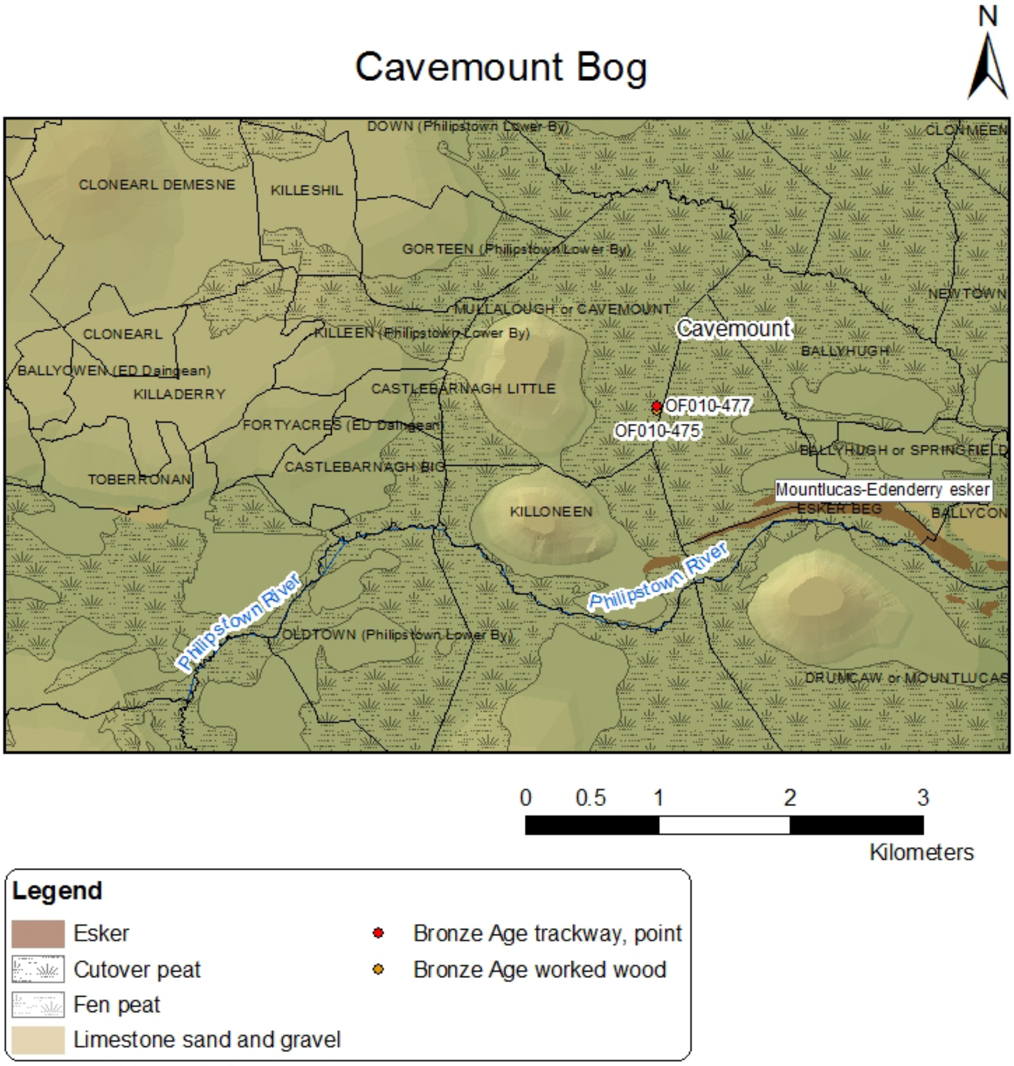

Figure 41 Bronze Age archaeology of Cavemount Bog

5.5.2.5 *Mountlucas Bog*

Mountlucas Bog lies immediately south of Cavemount Bog, similarly bordered by the Mountlucas-Edenderry esker and including a wide expanse of bog which surrounds the dryland at Clonarrow / Riverlyons on the east, south and west (Figs. 37, 42). The earliest recorded site in this bog is an Early Bronze Age tertiary togher (OF-BNK 0006, OF018-121), which was dated to 2308-1983 cal. BC. It was constructed of longitudinal brushwood and roundwoods and orientated in an east-west direction (Irish Archaeological Wetland Unit 2002b, 32; 2003c, 23–24). This orientation would not facilitate crossing the bog, and it is most likely part of the activities which took place in the periphery zone, where a cluster of sites was found.

They may bear a relationship to the *fulacht fiadh* (RD23-2) which was found 600m to the east (Turrell 2012a). This is consistent with the pattern of Early Bronze Age wetland activity in the study area, where wetland structures are representative of activity within the bog, rather than creating crossings to dryland.

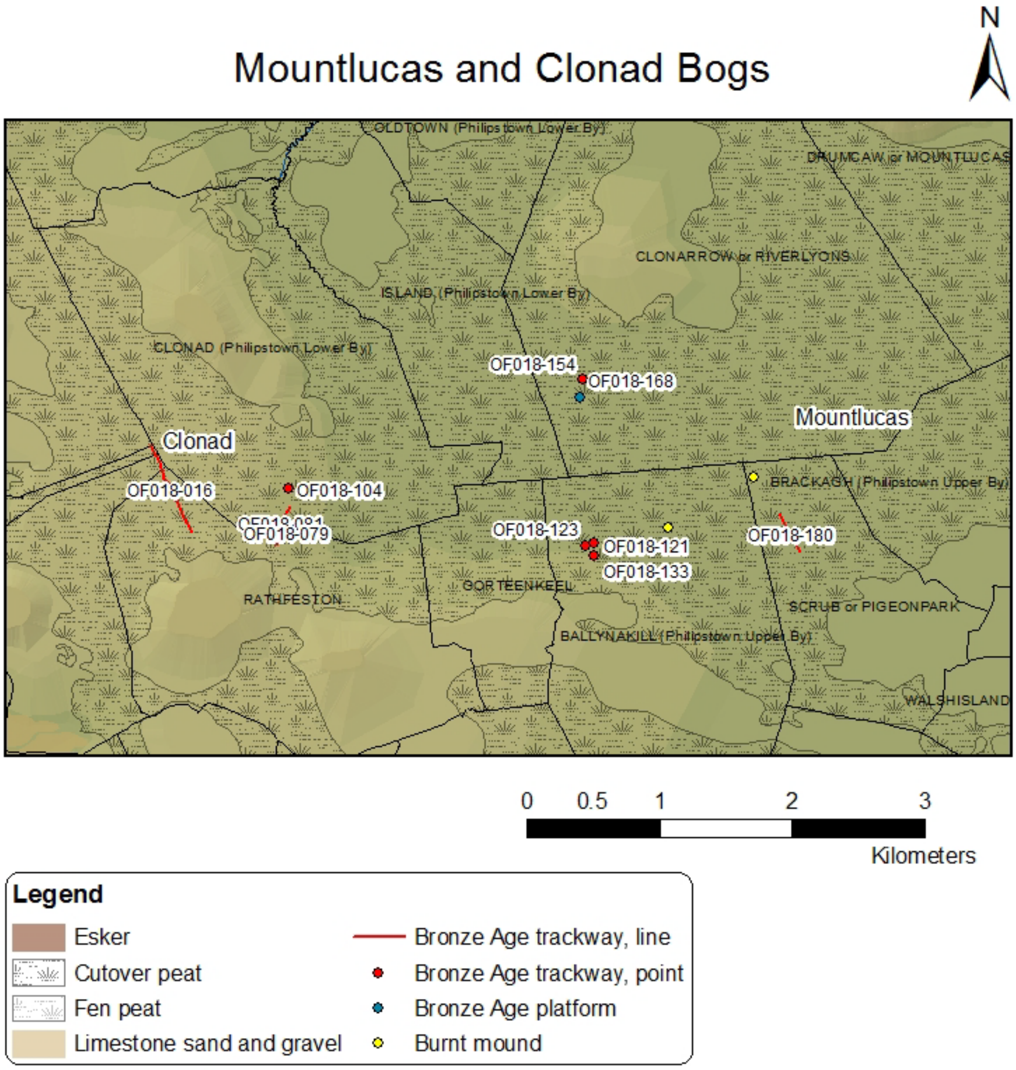

Figure 42 Bronze Age archaeology of Mountlucas and Clonad Bogs

A primary togher (OF-SPP 0001, OF018-180) was revealed at Scrub / Pigeonpark, which was dated by dendrochronology to 1573 ± 9 BC. The Middle Bronze Age trackway was orientated in a NNW-SSE direction and extended for at least 330m. It was constructed from planks, roundwoods and brushwood, layered up to four pieces deep and pinned in place with pegs. The condition of the timbers showed that the track had been exposed, and probably used, for a long time (Irish Archaeological Wetland Unit 2003a, 51; 2004, 23, 26). This trackway is located at the narrowest point between Scrub / Pigeonpark, and the elevated dryland of Clonarrow / Riverlyons. At 2.3km, it is a considerable distance to cross, but the position and orientation of the trackway suggests that this could have been its function. It is also aligned with a *fulacht fiadh*, RD17-6 (Turrell 2012b), within the bog at the midpoint between the areas of dryland, indicating further activity along this axis.

A contemporary platform (OF-CWR 0036, OF018-168) from Clonarrow / Riverlyons was dated to 1570 ± 9 BC. It was used for only a short time before being submerged by the very wet conditions of this part of the bog (Irish Archaeological Wetland Unit 2003a, 44–45; 2004, 23, 25). This platform is at a discreet distance of approximately 100m from a dense distribution of sites to the north, and was probably part of a cluster of structures associated with hunting and other activities within the wetlands. A Late Bronze Age tertiary togher (OF-CWR 0020, OF018-154), dating to 791-404 cal. BC, was discovered among this cluster of sites, suggesting a prolonged use of this area (Irish Archaeological Wetland Unit 2003a, 40; 2004, 23–24). Its east-west orientation would run along the long axis of the bog, but its proximity to this cluster suggests that it was associated with the activities which took place in this portion of the bog. Hunting would be the most reasonable use of this area, and the late date of this trackway would suggest that this was being practiced in the Late Bronze Age and Iron Age.

A similarly dated tertiary togher (OF-BNK 0018, OF018-133) from Ballynakill dated from 803-414 cal. BC. It was orientated in a NNW-SSE orientation, leading into the depths of the bog. It was up to five pieces deep, and the structure made use of the root system of a nearby tree (Irish Archaeological Wetland Unit 2003a, 40; 2004, 23–24). This suggests that it was originally a bog edge location, and the cluster of sites in this portion of the bog may have mirrored the Clonarrow sites as a complex accessing the periphery zone, including the *fulacht fiadh* and Early Bronze Age OF018-121 discussed above. A secondary togher (OF-BNK 0008, OF018-123) dating to 673/672 BC in this location may support this. It was of NW-SE orientation and is believed to have originally extended for a considerable distance (Irish Archaeological Wetland Unit 2003a, 32). This orientation would run parallel to the bog edge, but would link the cluster of sites which stretch across 500m on this axis.

The wetland evidence from this bog shows continuity from the Early to Late Bronze Age in the use of networks of trackways and platforms in the peripheries of wetland areas. The *fulachta fiadh* from this bog suggest that hunting was the motive for accessing these areas, and that outdoor cooking was practiced. Typically, one would expect a move towards trackways which traverse the bog in the Late Bronze Age, but the only semblance of this practice is in the Middle Bronze Age trackway at Scrub / Pigeonpark which would have had to cross a considerable distance. This is, however, the only location where a trackway could contribute to a broader scale of movement, as this bog is part of a 13km stretch of continuous bog in an east-west orientation. The only useful option is to attempt to connect the dryland of Scrub / Pigeonpark with Clonarrow / Riverlyons, but a north-south routeway would be better devised by attempting to cross the wetlands of the neighbouring Clonad Bog, and the archaeological record indicates that Clonad was the more popular choice for this type of movement.

5.5.2.6 *Clonad Bog*

Clonad Bog lies immediately west of Mountlucas Bog, trapped between the elevated drylands of Knockballyboy, Clonad, Rathfeston and Ballyduff South (Figs. 37, 42). An Early Bronze Age complex (OF-CLO 0027, OF018-104), dating to 2196-1894 cal. BC, included a number of platforms and possible interconnecting trackways. One potential trackway area was orientated NE-SW, which would connect the complex to dryland. While the location of the site is now mid-way between the dryland of Clonad and Rathfeston, plant macrofossil evidence shows that it would have been at the edge of the bog, probably on the lower slopes of a hummock. Excavation showed root activity in some areas, indicating dry conditions, and quite a lot of natural wood (Irish Archaeological Wetland Unit 2002d, 17–18; 2002e, 6–8; Corcoran 2004, 38–43). This site may have had a similar function to the Early Bronze Age complex discovered at Ballybeg Bog. It similarly made use of a variety of timber types which were frequently arranged in irregular manners, suggesting opportunistic use of local resources to create an expedient structure, most likely intended for hunting activities.

At Rathfeston, a Late Bronze Age primary togher (OF-RFN 0007, OF018-016, OF-CND004a-s, 04E0722) was an elaborate oak construction of transverse planks, supported by longitudinal timbers, with pegs inserted through mortices to hold the structure in place (Fig. 43). The northwest by southeast orientated trackway was dated dendrochronologically to 1083 ± 9 BC and 911 ± 9 BC or later. It ran for 600m, linking the limestone till of Rathfeston to a gravel knoll within the bog, and was close to 4m wide. It maintained a very straight course regardless of local topography. Macrofossil evidence showed it to have been constructed on the side of a hummock, which would have been a relatively dry area within the wetland zone, but in other places it had subsided into very wet pool areas. A sandy deposit was noted on some of the planks, which may be the result of residue left from quarrying sand from the gravel knoll and transporting it over the trackway, or it could be a deliberate effort to provide a dry surface for traversing the bog (Irish Archaeological Wetland Unit 2002d, 3, 20, Appendix 1.2; Corcoran 2004, 7–21; Whitaker 2014, 27–31). Ten sites were found along this orientation, including some which appear to predate it, suggesting some longevity to the use of this axis of movement. The enormous dimensions and the straight course of this togher suggest a very important trackway, and could be described as a monumental construction. This may have been an important symbolic construction, but the practicalities of such a trackway are also evident. It appears to have been designed to access a gravel knoll for quarrying, and it has been suggested previously that wide corduroy trackways are designed to accommodate the poor steering of early wheeled vehicles. It would be reasonable to assume a vehicle was in use on this trackway to transport the sand which appears to have been quarried, and this sand in turn may have been used to create suitable surfaces for wheels elsewhere.

In Clonad, a primary togher (OF-CLO 0004, OF018-081), dating to 926 ± 9 BC, ran in a NE-SW direction for a distance of 264m. It measured up to 3.5m wide and the structure was up to three layers deep, but it was suggested after excavation that it was in fact a single-plank trackway which had incorporated a platform into its construction (Irish Archaeological Wetland Unit 2002d, 6–7; Corcoran 2004, 28–30). Another primary togher (OF-CLO 0002, OF018-079) ran in a parallel direction at a distance of 80m, and dated to 650 ± 9 BC. It was of similar length (239m) and had a width which varied up to 4.36m. Unusually for a trackway of this date, it was composed of seven different species of timber, which were probably all sourced locally. It was predominantly arranged with transverse timbers forming the walking surface, and a spread of sandy silt was found, possibly for the same reasons it appeared on OF018-016. Macrofossil evidence is consistent with the side of a hummock, while some sections show evidence of bog pools and very wet conditions (Irish Archaeological Wetland Unit 2002d, 11; Irish Archaeological Wetland Unit 2002e, 7, Appendix 1.2; Corcoran 2004, 22–27). These trackways undoubtedly indicate a continuity of use of the same crossing point and suggests that there was complementary dryland activity in Clonad and Rathfeston in the Late Bronze Age. Following on from the discussion of wider movement in Mountlucas Bog, this crossing would have been a suitable place to move in a north-south direction in this region.

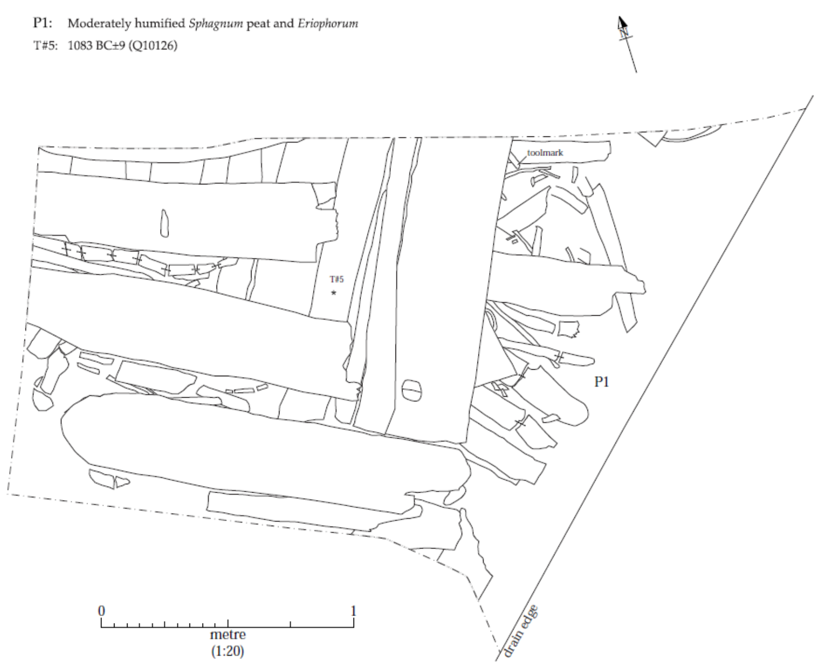

Figure 43 Corduroy trackway (OF018-016) from Rathfeston (Irish Archaeological Wetland Unit 2002d, Appendix 3.8)

Clonad Bog exemplifies the pattern of wetland activity in the study area. The Early Bronze Age activity involved the use of the wetlands for hunting etc., focussing on the edges of the bog. The Late Bronze Age sites, however, include monumental constructions which extended for considerable distances to cross the bogs and could be incorporated into wider scales of movement. This change is the difference between treating the bog as an objective, versus treating it as an obstacle.

5.5.2.7 *Ballykean Bog*

Ballykean lies south of Mountlucas Bog, between the dryland of Walshisland on the east, and Ballyduff and Ballintogher on the west (Fig. 37, 44). A primary togher (OF-KLG 0001, OF026-057) was discovered in the townland of Kilbeg, dating to 1464 ± 9 BC. The trackway was a combination of transverse plank construction and longitudinal roundwood portions, suggesting it was an effort by a number of individuals without rigid management. It was orientated ENE-WSW and was identified over 643m of bog, connecting the elevated ground of Walshisland to the dryland in Ballykean. Several other trackways share this orientation and crossing point, indicating an important routeway over a prolonged period (Irish Archaeological Wetland Unit 2003d, 4, 8; 2004; National Monuments Service 2015, OF026-057).

Another primary togher in Kilbeg (OF-KLG 0002, OF026-058) was similarly dated to 1425 ± 9 BC. This trackway was predominantly composed of longitudinal timbers with occasional transverse timbers and pegs. It was orientated ESE-WNW and extended for up to 918m. It also connected to Walshisland, and terminated at a deposit of gravel within the bog. It may have originally continued past this knoll to dryland in Ballykean, but it could not be traced further in the survey (Irish Archaeological Wetland Unit 2003d; 2004; National Monuments Service 2015, OF026-058).

Both of these trackways allow movement across a considerable distance of difficult wetlands, linking the high ground of Walshisland to the dryland on the west. By reaching the dryland of Ballykean one has access to the elevated land of Geashill and Killeigh, as well as the townlands of Ballychristal, Ballydownan etc., which are dominated by limestone sand and gravel. These areas would have been ideal for early agriculture. The Geashill esker could also be followed west to practice movement on a wider scale. It is noted that the usual pattern from other bogs of multiple tertiary toghers is absent here, with primary toghers making up the Bronze Age activity in the area (Irish Archaeological Wetland Unit 2003d, 6). This may be a result of poor preservation or destruction by machines, or it may be because of local conditions and requirements for movement. It is more usual for trackways which cross bogs and contribute to wider scales of movement to be of Late Bronze Age date, and these examples may represent an earlier attempt to create such routeways, using less refined construction techniques which would support pedestrians and possibly animals, but not vehicles.

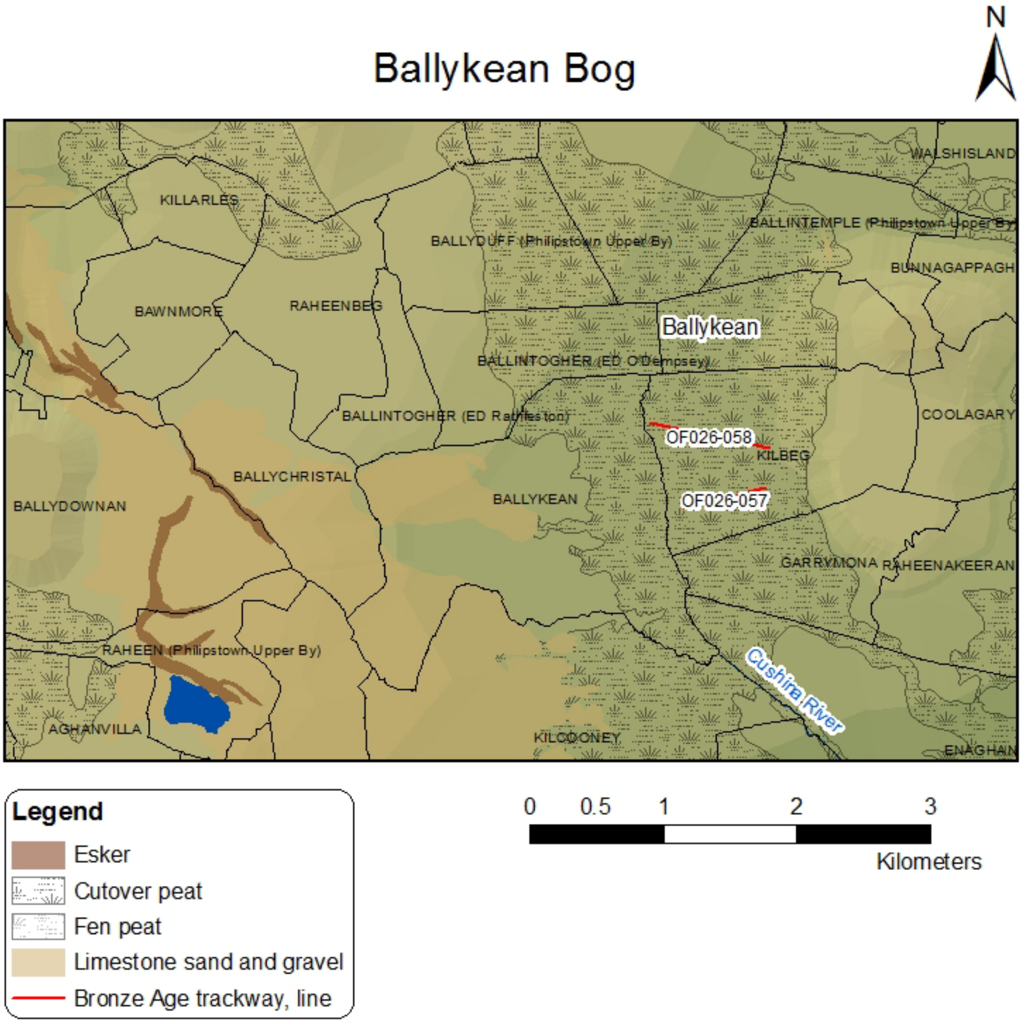

Figure 44 Bronze Age archaeology of Ballykean Bog

5.5.2.8 *Lemanaghan group - Killaghintober Bog*

Killaghintober Bog is part of the Lemanaghan group of bogs in Co. Offaly, south of the Cooldorragh Hills on the Clonmacnoise esker (Fig. 37, 45). A Late Bronze Age togher (98KTR0008 / 98KTR0010, OF007-296) within this bog was dated to 952 ± 9 BC / 940 ± 9 BC. It was orientated in a NE-SW direction and was composed of longitudinal planks, laid end to end, running for a distance of 420m (Whitaker et al. 2009, 25–29, 157). This trackway would have joined a small bog island in Tumbeagh to the dry hill at Killaghintober, from which movement east or west would have been easily facilitated by the Clonmacnoise esker. There are no known archaeological sites on the bog island, but the position and dimensions of the trackway suggest that there was activity taking place there which required only small numbers of people to cross the bog, possibly an agricultural activity. It appears then that this trackway was associated with local activity rather than contributing to wider movement.

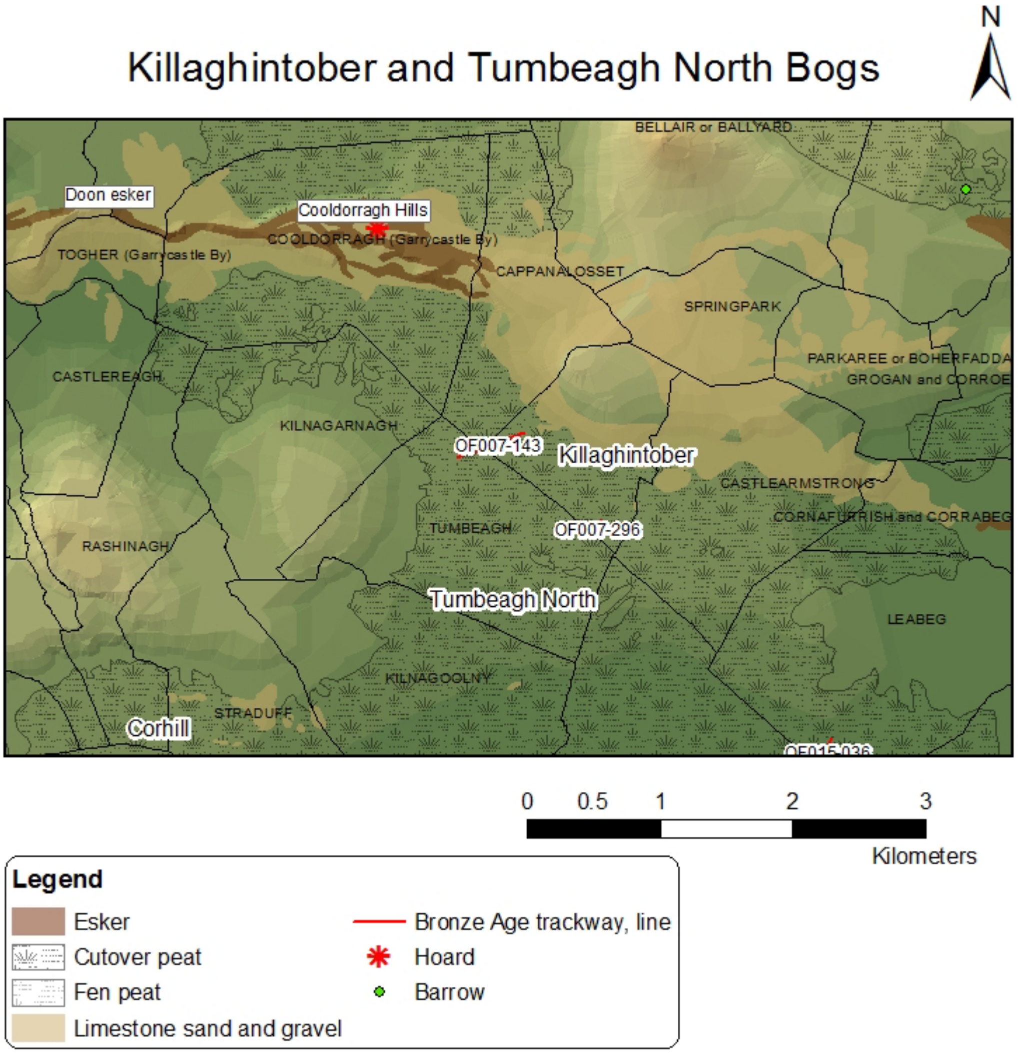

Figure 45 Bronze Age archaeology of Killaghintober and Tumbeagh North Bogs

5.5.2.9 *Lemanaghan group - Tumbeagh North Bog*

Tumbeagh Bog neighbours Killaghintober Bog, sharing a number of townlands (Fig. 37, 45, 46). A secondary togher (99TBN0010, OF007-143) was found there between the townlands of Tumbeagh and Killaghintober, running in an ENE-WSW direction for a distance of over 350m. The trackway dated to 949 ± 9 BC and was constructed from longitudinal planks on a substructure of transverse planks dressed with mortices (Whitaker et al. 2009, 17–21, 157; National Monuments Service 2015, OF007-143). The trackway covered the width of the Bord na Móna bog fields where the bog narrows between the hills of Killaghintober and Kilnagarnagh, and may have originally extended past the survey extent through the reclaimed bog margins. It connects two major areas of dryland in this landscape, and while both sides of this bog have easy access to the routeway provided by the Clonmacnoise esker, it allowed for quick communication between the dry areas of Killaghintober and Kilnagarnagh without a circuitous trip circling north of the bog. Thus, while this trackway is next to a major routeway its function is more likely to have served as a local access route, connecting the two localities either side of the bog.

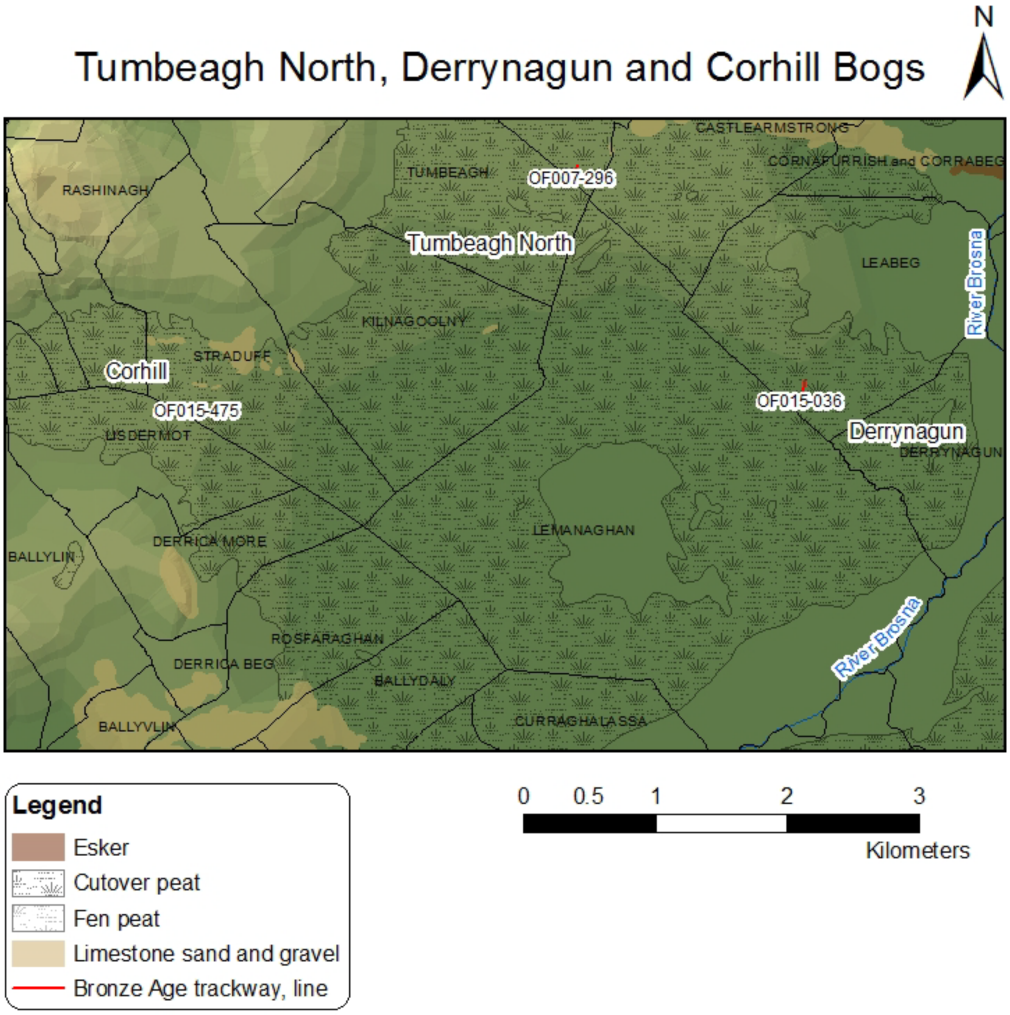

Figure 46 Bronze Age archaeology of Tumbeagh North, Derrynagun and Corhill Bogs

5.5.2.10 *Lemanaghan group – Derrynagun Bog*

Derrynagun lies southeast of Killaghintober and Tumbeagh North Bogs, bordered by the dryland of Leabeg and Derrynagun on the east, and the bog island of Lemanaghan on the west (Fig. 37, 46). A secondary togher (98DNG0004, OF015-036) here was of single-plank construction and dated to 1547 ± 9 BC. It ran in a NE-

SW direction for a distance of 244m in the townland of Leabeg (Whitaker et al. 2009, 16–17; National Monuments Service 2015, OF015-036). This trackway would have linked an area of elevated dry ground in Leabeg to a dense concentration of trackways and timber deposits in the interior of the bog, suggesting it was designed for wetland activities rather than crossing to dryland.

5.5.2.11 *Lemanaghan group – Corhill Bog*

Corhill Bog is on the western extent of the Lemanaghan group, contained on the north by the hill of the same name, and on the south by the dryland of Lisdermot (Fig. 37, 46). A longitudinally constructed plank trackway from Straduff (OF-STD0012, OF015-475) was dated by dendrochronology to 953 ± 9 BC / 910 ± 9 BC. It ran for at least 420m in a NE-SW direction and the northern portions were found to have been built through very wet fen peat, with some areas showing evidence of open water conditions. These very wet conditions caused some movement and slippages among the timbers in antiquity and very long stakes of up to 1m were required to fix the togher in place (Whitaker et al. 2009, 21–24, 154; National Monuments Service 2015, OF015-475). It is positioned on the narrowest portion of bog between the dryland of Lisdermot and Straduff, where it could make use of small islands of limestone sand and gravel as an interim point before reaching the elevated area of Corhill.

Very wet conditions in this portion of the bog suggest that it would have been a difficult route to maintain. The largest concentration of similarly orientated trackways in this locality is 300m to the west, where perhaps more favourable conditions existed. A bog crossing at this point would have linked the routeways provided by the River Brosna and an esker ridge to the south with the East/West routeway of the Clonmacnoise esker to the north, making it a potentially very important trackway connecting two major inter-regional routeways. This could explain why such a construction was attempted in such unsuitable conditions.

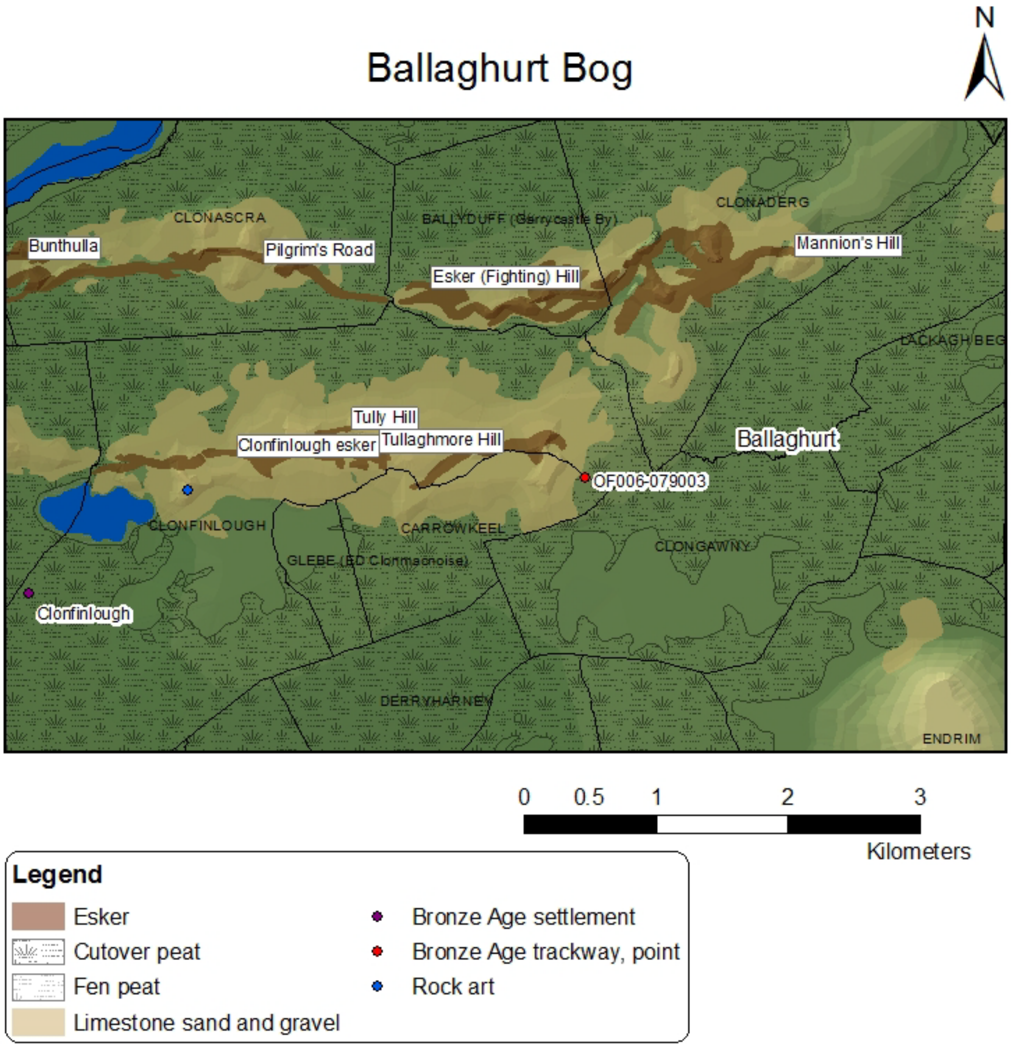

Figure 47 Bronze Age archaeology of Ballaghurt Bog

5.5.2.12 *Blackwater group – Ballaghurt Bog*

Ballaghurt Bog is part of the Blackwater group of bogs, located south of the Clonmacnoise esker and east of the Clonfinlough esker (Fig. 37, 47). A site recorded as a tertiary togher / post row (OF-CFL 0012, OF006-079003) was discovered here, consisting of longitudinal roundwood and brushwood, up to six pieces deep, with a series of 31 posts driven into the southern edge of the togher. The NW-SE orientated construction was dated to 1690-1454 cal. BC (Moloney et al. 1995, 101). The purpose of post rows may have been to act as guides for a safe and firm path through the bog, with many examples of similar structures in the Blackwater survey including horizontal timbers which would have served as rudimentary paths. The site was located at the edge of the bog, next to the limestone sand and gravel which surrounds Tullaghmore Hill and the Clonfinlough esker. The depth of the construction suggests that this trackway was intended to bridge a particularly wet area to facilitate movement between the bog edge and the esker. Moloney (1995, 30) suggests that this trackway was created to access a central area, or possibly the course of the Worm River, which formed the boundary between Doon Demesne and Clongawny. It does not appear to have been intended to cross the extent of the bog, so it is most likely to have been a purely local construction.

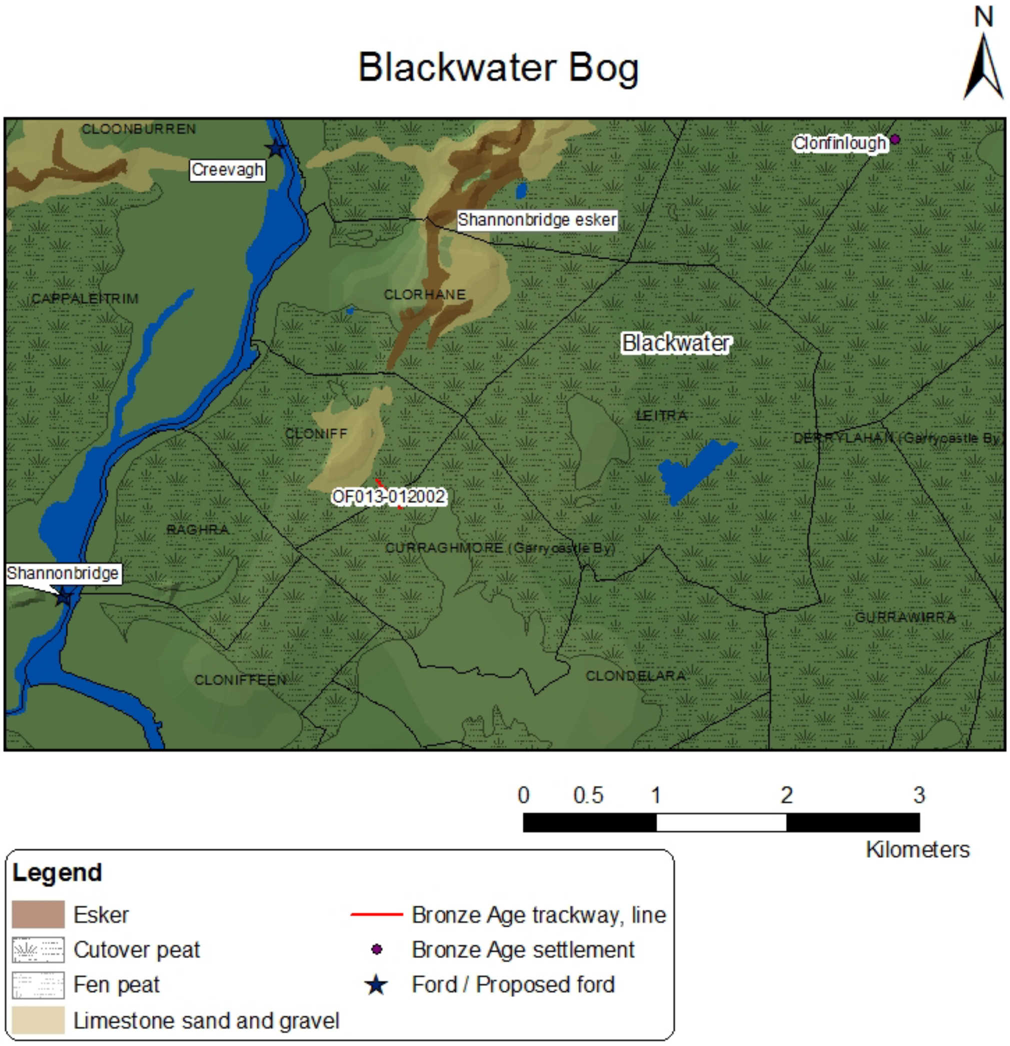

Figure 48 Bronze Age archaeology of Blackwater Bog

5.5.2.13 *Blackwater group – Blackwater Bog*

Blackwater Bog is the expansive wetland area contained by the Shannonbridge esker and the Clonfinlough esker (Fig. 37, 48). In the southwest region of this bog at Curraghmore, a single-plank trackway (OF-CHM 0016, OF013-012002) (Fig. 49) was classed as a primary togher. It ran for 580m in a NW-SE direction and was radiocarbon dated to 1625-1435 cal. BC. It was part of a particularly dense concentration of wetland sites which were at a similar level in the peat, and may have been contemporary structures (Moloney et al. 1995, 31, 34–37, 108). This trackway was clearly positioned to link the limestone till of Curraghmore to an island of limestone sand and gravel at Cloniff, which is separated from the Shannonbridge esker by only 128m of peat. These areas could have accommodated settlement, and the density of wetland sites suggests that there was habitation nearby, but they also fit into a broader system of movement, whereby the limestone till to the south could be linked to the eskers in a manner that minimised the amount of bog or callows that had to be crossed.

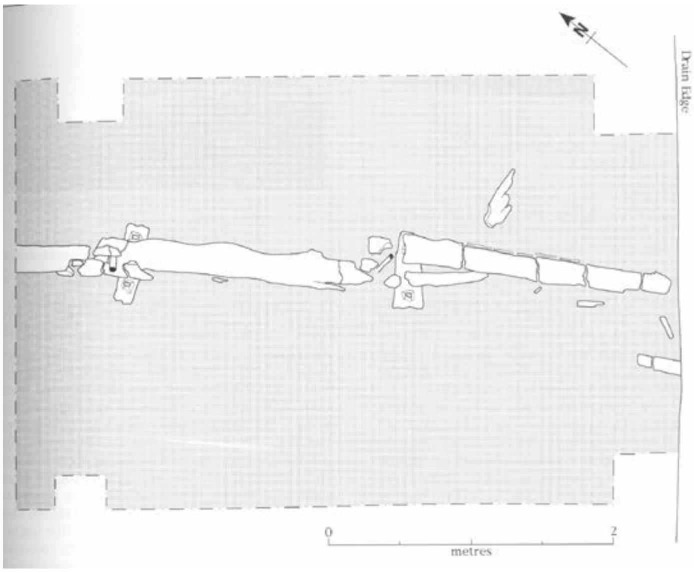

Figure 49 Single-plank trackway OF013-012002 from Curraghmore, Blackwater Bog (Moloney et al. 1995, 35)

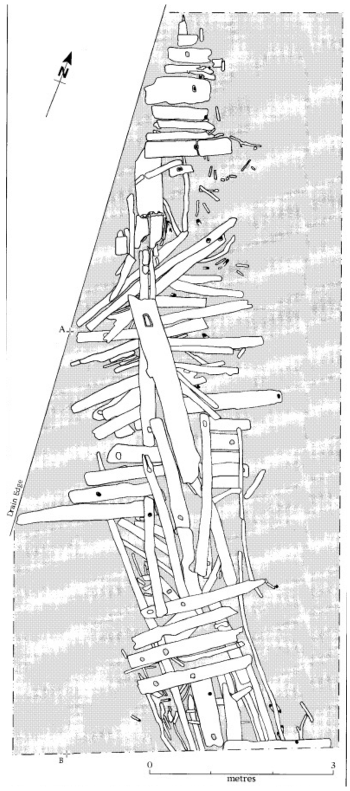

Figure 50 Primary togher GA100-168 from Annaghcorrib, Garryduff Bog (Moloney et al. 1995, 42)

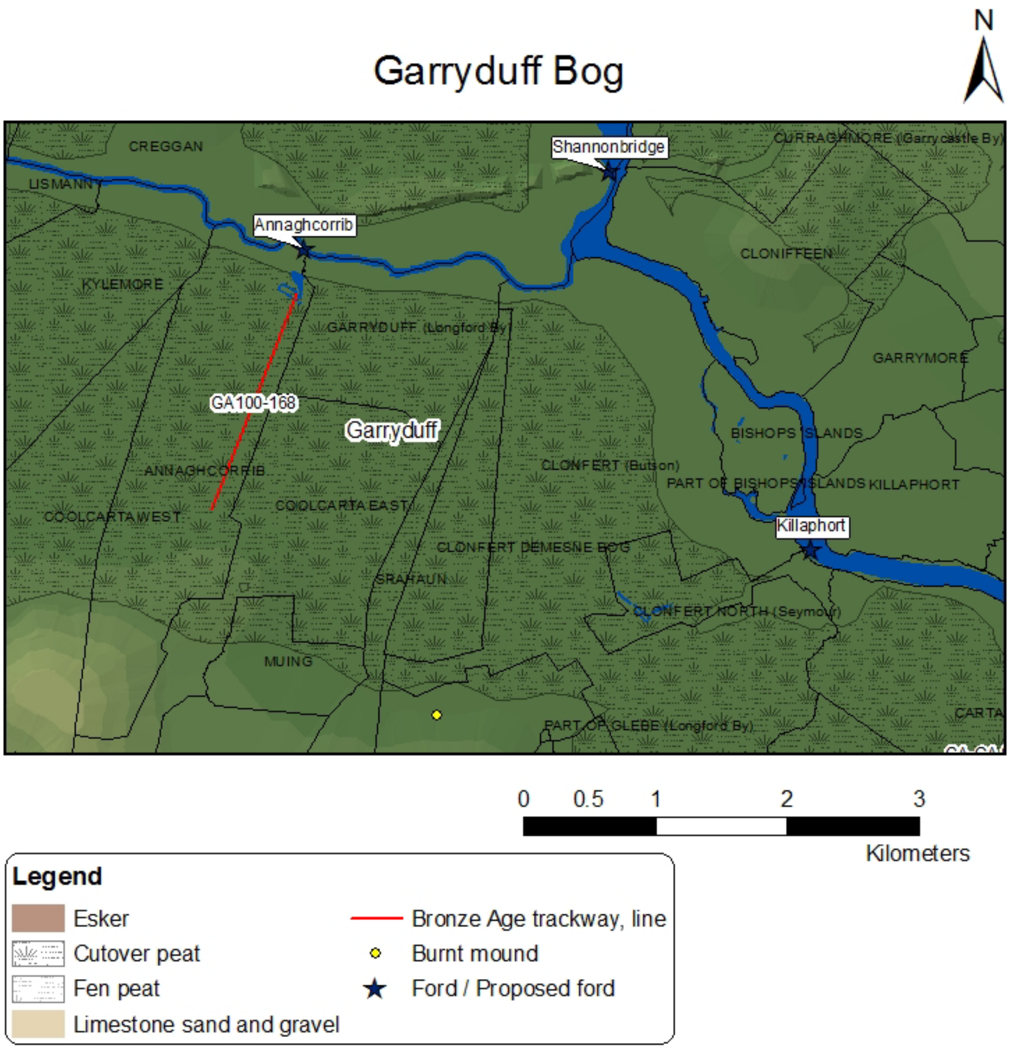

Figure 51 Bronze Age archaeology of Garryduff Bog

5.5.2.14 *Blackwater group – Garryduff Bog*

Garryduff Bog lies across the River Shannon in Co. Galway, with the River Suck acting as its northern border (Fig. 37, 51). At Annaghcorrib, a very well-constructed primary togher (GA-ACB 0001, GA100-168) was made from oak planks, dressed with mortices and pinned in place with pegs (Fig. 50). It was dated to 892 ± 9 BC and ran for a distance of 1750m in a NNE-SSW direction from an elevated area of dry ground in the south towards the River Suck in the north. It ran across a hummock-hollow area, and would have eased movement over the wet hollow areas (Moloney et al. 1995, 39–53, 83). While some sections were built from transverse planks which would be suitable for wheeled vehicles, others parts were of longitudinal design and quite poorly assembled, which would be suitable only for pedestrians. It was an extraordinarily long trackway, necessitating the felling of at least 8 hectares of oak woodland, and it is curious that some sections were of poorer quality. It is suggested (ibid, 46, 52) that it could reflect the requirements for moving over particular parts of the bog, with the wetter parts preferring a wide, floating structure of planks. It was one of a number of trackways of similar orientation and it may have been intended to access a fording point on the River Suck. Many of the fords of this area are created by eskers and bands of gravel intersecting with the river. This was not apparent at this point of the Suck, but Moloney (ibid, 47) describes an area of shallow water which could have been forded through most of the year. Having crossed the river into Roscommon, the Cloonburren / Cloonfad esker is within easy access, enabling further movement over dryland.

5.5.2.15 *Blackwater group – Kilmacshane Bog*

Kilmacshane Bog is also in Co. Galway, between Banagher on the south and Clonfert on the north (Fig. 37, 52). A secondary togher (GA-KME 0015, GA101-056) was surveyed here over a distance of 450m in a NE-SW direction, and was dated by dendrochronology to 1467 ± 9 BC (Moloney et al. 1995, 89). The trackway is located at the narrowest point of this bog, and if it were to continue this orientation past the surveyed extent, it would arrive at a fording point on the River Shannon (GA101-083, OF013-038). The association with the ford and the impressive size of the structure suggest that this was part of a major routeway. Most trackways throughout the study area which appear to contribute to a broad scale of movement tend to date to the Late Bronze Age. The early date of this trackway, as well as the primary togher from Ballykean Bog (OF026-057) which is of almost the exact same date, suggests that this change in movement patterns may have started as early as the Middle Bronze Age.

At Carta, a primary togher (GA-CA 0001, GA101-082?) ran for 840m in a NE-SW orientation. It was composed of longitudinal oak planks, supported by longitudinal and transverse roundwood and fixed in place with pegs. The condition of the trackway suggests that the bog was quite wet and it had begun to sink soon after construction. It was dated to 1013 ± 9 BC, and although it was constructed 400 years later than GA101-056 above, they are of very similar design, showing a continuity of building techniques in the Kilmacshane Bog (Moloney et al. 1995, 27, 32–34, 84).

This trackway is similarly positioned at the narrowest point on the bog, orientated on the ford across the Shannon, connecting the dryland of Clonfert in Co. Galway to the region east of the river. It is evident that this routeway would have been used for several hundred years in the Middle and Late Bronze Age.

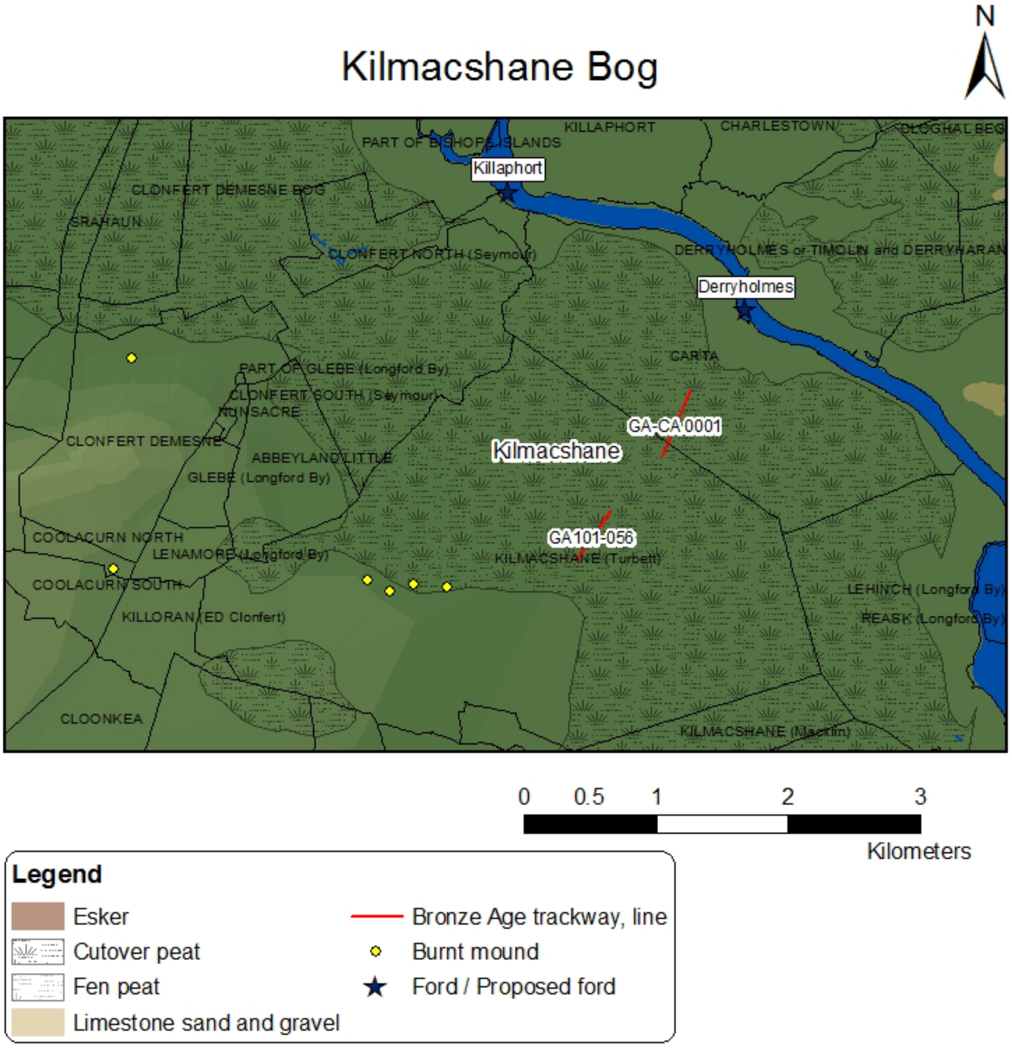

Figure 52 Bronze Age Archaeology of Kilmacshane Bog

5.5.2.16 *Traversing the bog – a summary*

It is clear that there was a marked increase in the construction of trackways throughout the Bronze Age in the study area. Moloney (1995, 18) observes that the concentration of Bronze Age trackways in the Blackwater group appears to have been a genuine increase of activity, as the bogs have all been cut at different rates. These trackways and associated settlement feature demonstrate increasing use of the marginal landscapes of the Midland bogs as the Bronze Age progressed. As soils deteriorated in the Bronze Age, these marginal landscapes became more important and this is reflected by the habitation sites at Ballybeg Bog and Clonfinlough, as well as the large amount of platforms and trackways that were constructed to service particular areas of the bogs. Many of the earliest trackways appear local in nature, including small scale structures that focussed on the periphery zones, as well as complexes and platforms that were sometimes found further within the bog. These constructions were most likely related to hunting and resource collection, and many of them appear to have been built from timber that was gathered on an opportunistic basis, with a variety of wood species being gathered locally and little evidence of managed woodland.

Timber selection became limited to fewer species throughout the Middle and Late Bronze Ages, and woodland management and carpentry techniques allowed for more carefully designed structures. It has been noted that the period around 900 BC saw large scale trackway construction which may indicate climatic deterioration which made the bogs impassable without such structures (Moloney et al. 1995, 47). This theory disregards the evidence of earlier structures, however, which show that trackways were necessary for moving around in the Early and Middle Bronze Age too. If bogs were being traversed routinely at an earlier date, then we ought to find trackways which perform this function that are contemporary with the local access trackways on the bog peripheries. As we have seen from the descriptions above, the earliest trackways that appear to deliberately traverse the bog and fit into broader systems of movement date from the Middle Bronze Age. These trackways were of considerable length, and they were quite well constructed, but the techniques often were inconsistent in some areas. The type of primary togher that we see emerge from c. 900 BC is of very well crafted construction, using complex carpentry and robust oak timbers. Many of the finest examples from this study area seem to be intended not only to cross the bogs at suitable points, but they provide access to further means of communication, such as esker ridges, bands of dryland, rivers and fording points. The changing trend in trackway construction corresponds with the practice of woodland clearance which are noted in the pollen analyses from the study area (Parkes et al. 2000; Crushell et al. 2008), and also in many locations around Ireland. This opening-up of the landscape would have made it easier to travel further in a shorter time, and the construction of trackways would contribute to this new expedited system of movement. It appears that as trackways which traversed the bog became more common, the design of these trackways became more standardised. This took the form of well-designed single-plank trackways in Lemanaghan and very wide corduroy trackways in Clonad. These trackways would have been important lines of movement and could fit into broader routeways provided by the rivers, esker ridges and the Midland Corridor, and they would therefore merit careful planning to create structures that would accommodate traffic and remain functional for as long as possible.

It must be acknowledged, however, that only a selection of trackways surveyed in the study area have been dated, and they tend to be the most complex ones, or those which were thought to have the potential for very early dates. With this in mind, we must accept that these descriptions provide an incomplete summary of wetland activity. Later tertiary trackways which access periphery zones may have continued to be created for hunting and resource collection, as we see at Mountlucas. Such trackways of simple design may have been passed over for dating in favour of stratigraphically earlier trackways in these areas. Many more undated trackways may represent similar activities in the Late Bronze Age.

5.5.3 Hoards and depositions

Within the study area, there have been a number of discoveries of Bronze Age hoards and depositions which provide clues as to how movement was practiced in North Offaly at this time (Fig. 53). 19th century dredging works from the River Shannon have revealed large quantities of bronze objects at the fording points, which tell us that there was considerable deposition being practiced during the Bronze Age. Hoards in bogs and on dry sites are also a feature of this period, and many of the best known Bronze Age hoards were found in the Midlands and within the study area. What do these caches of archaeological objects tell us about movement in the landscape which surrounded them?

Keelogue, Co. Galway, seems to have been the most favoured ford in the study area in this period, judging by the quantity of artefacts that were retrieved from the river there. Works to dredge the Shannon at this location were undertaken in 1843 to make it more navigable, during the course of which the workmen discovered bronze weaponry and stone axes. Among these were at least one halberd, six metal axeheads, nine rapiers, two dirks, four palstaves, three spearheads and one knife

(Harbison 1969a; 1969b; Burgess et al. 1981; Bourke 2001; Offaly County Council 2005). Other objects are recorded simply as coming from the River Shannon in Co. Galway, and they probably describe additional artefacts from this ford. This assemblage includes objects which are diagnostic of the Early, Middle and Late Bronze Age which, along with the Neolithic stone axes, demonstrates that the ford continued in use over a long period of time.

Griffith (1840, 312–313) observed that the fords at Keelogue and nearby Meelick would have been the traversable point of the Shannon north of Killaloe. It was a particularly shallow crossing, and was easier negotiated than at Banagher further upstream. In addition to this, many of the fords across the Shannon in this region are flanked by broad callows or raised bogs. A ford is only useful if it can be accessed from the dryland surrounding it, and some of the fords in this region may have been seasonally inaccessible due to flooding and poor access across surrounding bogs and callows. The low gradient of the river at Keelogue suggests there would have been seasonal flooding, as evident from the reports of the Shannon Improvement (House of Commons. Commission for Improving Navigation of River Shannon 1844) and from the alluvial deposits, but the surrounding subsoils would have made this the easiest ford to access in this region. The subsoils either side of the ford are predominantly composed of limestone till, which would have been fertile, moderately well drained and relatively easy to traverse.

Thus, it was an important ford for facilitating movement in this area, which probably served as the main pass between North Clare / South Galway and Tipperary / Offaly, while also coinciding with large areas of potential agricultural land. While other Shannon fords were the sites of Bronze Age deposition, Keelogue and Killaloe stand out as the principle deposition sites. The nature of these fords makes them the two safest places to cross the Shannon. As we saw in the discussion of Killaloe (Chapter 5.2.2, 5.2.3), the ford at Keelogue similarly provided access to major long-distance routeways, with the Lusmugh-Tullamore-Birr esker connecting the Midland Corridor to the ford and allowing access to the landscape of South Galway and North Clare. The quantities of deposited items at both of these fords indicate that they were seen as very important fords in the Bronze Age.

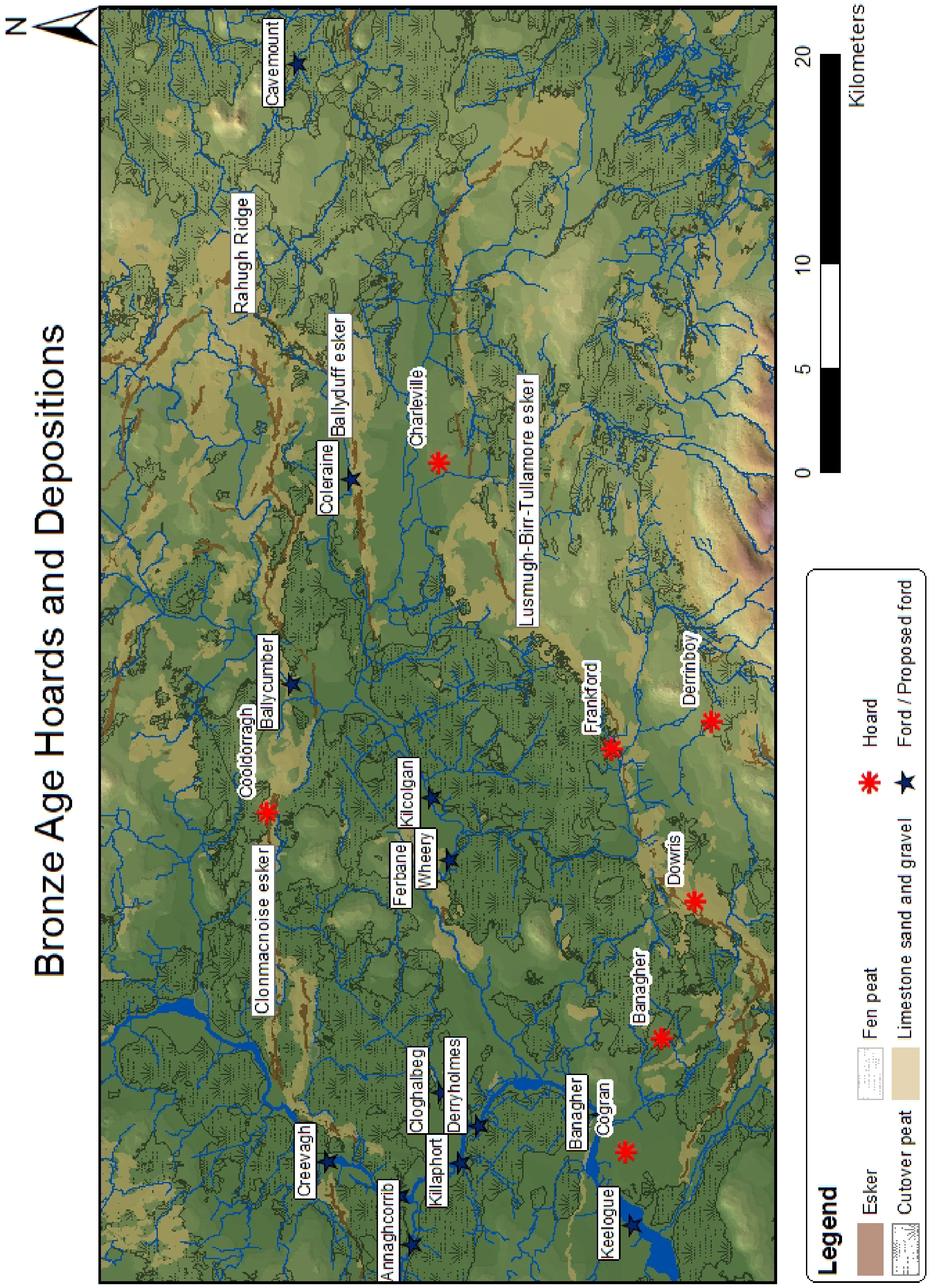

Figure 53 Bronze Age hoards and presumed fords

The depositions are predominantly Middle Bronze Age in character, suggesting deposition peaked between 1600-1000 BC and began to wane towards the Late Bronze Age. This is consistent with the deposition practices along the Shannon, but is at odds with other rivers, where Late Bronze Age deposition dominates most of the assemblages (Bourke 2001, 59). The depositions are predominantly of weapons, which are typical of riverine deposition practices, and may indicate a ritualised martial display at a boundary place and liminal zone.

The practice of deposition at the fords at Banagher and Shannonbridge was on a much smaller scale, if the recovery of objects from dredging is a reliable indication. Dredging at Banagher recovered a Middle Bronze Age spearhead and rapier, and one Late Bronze Age socketed dagger, while Shannonbridge was the site of an Early Bronze Age dagger, a Middle Bronze Age palstave and a Late Bronze Age axehead. These depositions suggest that these fords were in use in the Bronze Age, but the ford at Keelogue appears to have been favoured by at least the Early Bronze Age.

Deposition is not limited to the River Shannon within the study area. While the larger, navigable rivers such as the Shannon, Erne and Bann were dredged in the 19th and 20th centuries, facilitating the recovery of artefacts, it was often in the construction of bridges over smaller rivers that archaeological objects were found. Such bridges are frequently constructed at pre-existing fords, maintaining the course of roads and paths which developed to converge at the crossing points. Small scale cleaning operations have also revealed artefacts, such as in the Esker Stream in Cavemount / Mullough, where an Early Bronze Age axehead and a Late Bronze Age socketed spearhead were found (Fig. 53) (Offaly County Council 2005). Similarly, a palstave was found in the Silver River at Coleraine and the River Brosna revealed a sword at Kilcolgan and a spearhead at Wheery (ibid.).

River finds in the study area also include deposits of bone. Deer and pig remains were found at the site of Ballycumber Bridge, and it is unclear if these are part of a deliberate act of deposition or if they arrived there by chance. Their recovery at a bridge would be consistent with deposition if it were a pre-existing fording point. The location of the bridge is at a point on the river which is surrounded by limestone sand and gravel, which would facilitate movement in this direction. The Early Medieval road of the *Slighe Mór* is also reputed to have crossed the Brosna at Ballycumber (O' Lochlainn 1940), demonstrating that this fording point would have been used at least as early as that as part of an important routeway. Other examples include human bones at Cloghalbeg at the site of Blackwater Bridge on the River

Blackwater (Bourke 2001, 139). This bridging point marks a wide interruption in bog cover, where the subsoil consists of limestone till.

Of particular interest is the record of a human skull from Ballycumber (Offaly County Council 2005). The find circumstances are not recorded, but it is listed in the RIA antiquities register of 1846-1853 and the associated person was P.J. Klasin, the same individual who found the deer bones at this location. This skull may similarly have been found in the river, possibly paralleling the Late Bronze Age deposition of male skulls in rivers such as the Thames (Bradley 1990, 108; Bourke 2001, 133). Human remains were also found in the Brosna at Ferbane, and while they have not been dated, they were identified as male, which would be consistent with the Thames remains (Offaly County Council 2005). A small esker and a significant deposit of limestone sand and gravel are next to Ferbane, leading towards the river, and it seems likely that the remains marked a fording point.

While riverine depositions are clearly correlated with fords and movement, the relationship of hoards with routeways in Ireland has not been previously discussed, and it is made more difficult in the absence of accurate records for the find locations. For the purposes of exploring this idea, Midland hoards which were located outside the study area will be included in this discussion. The contents of the hoards alone indicate movement, as they include items which would have been brought from outside regions, and to get to the site of deposition necessitated some movement, but on closer examination, the hoards in this region seem to be positioned along routeways.

It is immediately obvious when these locations are illustrated on a map of esker ridges and limestone sand and gravel subsoils (Fig. 53), that the hoards of Dowris, Frankford and Charleville are located on a routeway formed by the Lusmugh-Birr-Tullamore esker and associated limestone sand and gravel, which stretches from Tullamore towards the River Shannon. This esker crosses the southern extent of the Midland Corridor, and it terminates less than 3km from the ford at Keelogue, which we have established was a very important fording point in the Bronze Age. The Cogran and Banagher hoards are also located within a few kilometres of this ford, at the point where the Tullamore esker intersects with a tract of dryland of limestone till which connects Ferbane to the region. This has been observed previously by

Grogan (2005b, 98–99), who illustrated the hoards and routeways as described above (Fig. 31). He suggested that these hoards were part of a buffer zone between the North Munster region and the Midlands. Meanwhile, the Derrinboy hoard also appears to be related to the Midland Corridor, being deposited in a bog which flanks the southern portion of the routeway. It seems then that hoards can tell us something about Bronze Age movement.

The dates of these hoards may provide useful information to approximate the periods in which these routeways may have been in use. The only Early Bronze Age hoard was the collection of five axes, a dagger and a halberd from Frankford (Harbison 1966). The Middle Bronze Age was represented by the Bishopsland hoard of personal ornaments found at Derrinboy (Raftery 1961; Eogan 1983, 42–43). The Late Bronze Age included the Cogran and Banagher hoards of personal ornaments (Eogan 1983, 115–116), and the Dowris hoard, an enormous hoard consisting of c. 218 objects (ibid, 117-142). The Charleville hoard includes of range of objects of varying date, with a palstave dating to the 15th century BC while other items, such as a socketed gouge, date to the 8th century or later (Prendergast 1961; Eogan 1983, 190). These items may not be a true hoard, but a collection of artefacts which were found in close proximity in Charleville Demesne, which were eventually acquired by the museum through an antiques dealer.

The dates of the hoards suggest that this routeway was well established by the Late Bronze Age, at which time most of these hoards were deposited. It is noteworthy that when deposition at the ford at Keelogue waned in the Late Bronze Age, it flourished on the associated routeway. This routeway not only provides access to the ford to cross into Clare and the west of Ireland, but it is connected to the Midland Corridor, connecting the northern and southern portions of Ireland. The use of the Midland Corridor in this way is best demonstrated by the contents of the Dowris hoard, which contained a mix of Class 1 and Class 2 horns, usually found in the north and southwest of Ireland respectfully. This area may have been seen as a central point or liminal space between these two regions, a *buffer zone* as Grogan (2005b, 98) puts it, separating two areas of competing influence.

Outside of the Midland Corridor / Keelogue distribution, a Late Bronze Age hoard of weapons from Cooldorragh (Eogan 1983, 190–191) provides another example, roughly contemporary with the Late Bronze Age trackways from Tumbeagh North (OF007-143) and Killaghintober (OF007-296) (Fig. 45). Cooldorragh is located on the Clonmacnoise esker, which is part of the itinerary described for the Early Medieval *Slighe Mór*, and this esker chain can be taken east to join the Midland Corridor, or west towards the River Shannon and the fords at Cloonburren / Creevagh (RO056-011003, OF005-068) and at Shannonbridge (RO056-018002, OF013-037002). While the evidence is modest, this may represent the earliest phases of this routeway.

In conclusion, patterns of deposition in rivers, bogs and dryland can be quite informative when viewed in a landscape context. The contents of the hoards and the reasons behind their deposition have had much discussion, but when viewed as part of a broader pattern of movement and connected landscapes, they have the potential to date the use of routeways. Depositions can offer a *terminus post quem* for the use of a routeway, and can be used to suggest lulls in their use, such as O'Briensbridge on the Shannon, or which routeways may have emerged as the most important ones at particular times. For the present study, this is valuable information to establish the nature of communication in the area, illuminating studies of settlement and regionalisation.

5.5.4 Settlement and expansion in North Offaly

The settlement practices of the Neolithic in North Offaly appear to have been characterised by the seasonal use of open air sites which were subject to repeat visits over the course of hundreds of years. This Neolithic use of the landscape appears to have involved a strategy of hunting, fishing and gathering, rather than agriculture, and there was negligible human impact on the vegetation of the area. By the Bronze Age, there was an increase in use of marginal landscapes, and this is best demonstrated by the use of *fulachta fiadh*, or burnt mounds. This type of site was confined in the Neolithic period to the northern extent of the Midland Corridor and neighbouring areas, but by the Bronze Age they were in use throughout the study area. Meanwhile, there was considerable woodland clearance in North Offaly at this time, coinciding with a rise in other anthropogenic indicators which point to agriculture and settlement. Until recently, we knew remarkably little about the settlement which accompanied this clearance, apart from the site of Ballinderry II which was excavated by the Harvard Archaeological Expedition to Ireland in the 1930s. Since the 1990s, a number of major archaeological projects, including the Bord na Móna surveys, the Bord Gáis *Pipeline to the West Project* and the N6 motorway scheme, have revealed a number of house sites which point to Bronze Age communities which successfully exploited the landscape of North Offaly and were well connected with the wider world.

Apart from the known Bronze Age house sites, there are some 270 enclosures of unknown date in the study area, some of which may also be of Bronze Age origin. The trackways detailed above (Chapter 5.5.2) suggest communities who would have lived close by, in the first instance to warrant the construction of trackways, and secondly to have been able to carry out the planning and labour demands of such projects. The elevated dryland next to bogs or that make up the bog islands seem to have been the focus for a number of trackways, and the lighter soils which make up some of these locations would have been ideal for early farming, while the surrounding wetlands could offer protection and a range of resources. Similarly, the activities practiced at *fulachta fiadh* may suggest there was nearby settlement from which hunting parties etc. were dispatched. The clustering of these sites around some of the newly discovered house sites seems to confirm this.

What follows is a discussion of the character, dates and distribution of Bronze Age settlement features in North Offaly, and what they can tell us about the land use and emerging routeways of this region in the Bronze Age, as well as how much the occupants made use of the available routeways to maintain communication with the wider world.

5.5.4.1 *Fulachta Fiadh*

While permanent settlement sites within the study area are limited to only five examples, there are no less than 53 known burnt mound sites in this region which are likely to indicate the presence of settlement (Fig. 54). The majority of these are recent discoveries made over the course of archaeological investigations in advance of the *Pipeline to the West,* the N6 motorway and the N52 Tullamore Bypass (Grogan et al. 2007; Bayley 2009e; Conboy 2010; Coughlan 2006; 2009a; 2009b; 2009c; 2009d; 2009e; Hegarty et al. 2009; Lynch 2009a; 2009b; 2009c; 2009d; 2009e; Lyne 2009a; 2009b; 2009c; McManus 2009; O' Carroll 2009b; 2009c;

Twomey 2009; Walsh 2009a; 2009c; 2009d; 2009e). The distribution map which these discoveries produce is undoubtedly biased towards the routes of these projects, but most vitally, they point to a density of burnt mounds which was not previously known, and from which we can extrapolate that there must be very many more undiscovered *fulachta fiadh* outside of these concentrations.

The use of outdoor cooking sites from an early date was discussed in Chapter 4, and the *fulachta fiadh* of the Bronze Age show continuity of this practice. Most of the sites which have had petrographical analysis done were shown to have used limestone, with some making use of sandstone. This is considered unusual, and many authors cite O' Kelly (1954, 144–145) that this is because the limestone would burn in fire to produce poisonous calcium hydroxide when added to water. He expounded this theory at a time when very few burnt mounds had yet been discovered in County Clare, the Midlands, and other limestone dominated areas. This is no longer the case, as we see from the burnt mounds in the study area and in other limestone rich places, such as those discovered during the Lisheen Mine Archaeological Project, Co. Tipperary (Gowen et al. 2005, 219). Lyne (2009a) suggests that burnt mounds which use limestone may have been used for liming hides prior to tanning, and a selection of hawthorn, bramble / blackberry, raspberry, elder and buttercup which were found on-site at Williamstown 1 have been interpreted as part of a dying process. However, Kilbeg 1, Kilbeg 4, Kilbeg 5, Kilbeg 7, Mountlucas Bog RD23-2 and Burrow / Glennanummer 3 were burnt mound sites which used limestone and included assemblages of animal bone which showed signs of butchering, suggesting it was possible to use limestone in the cooking process. Indeed, there have been more bones discovered from limestone burnt mounds than from ones using sandstone, owing to the better preservation of bones in an alkaline environment (Hawkes 2015, 55). Others suggest that the use of limestone for this process would be harmless, and that the meat could be protected from the calcium carbonate by wrapping it in straw or other materials (Grogan et al. 2007, 98). The brittle nature of limestone would have been more of a concern, as it is prone to shattering and could not be reused as often as sandstone. The people who used these sites would probably have simply used the stone that was available to them locally, which in North Offaly is predominantly limestone.

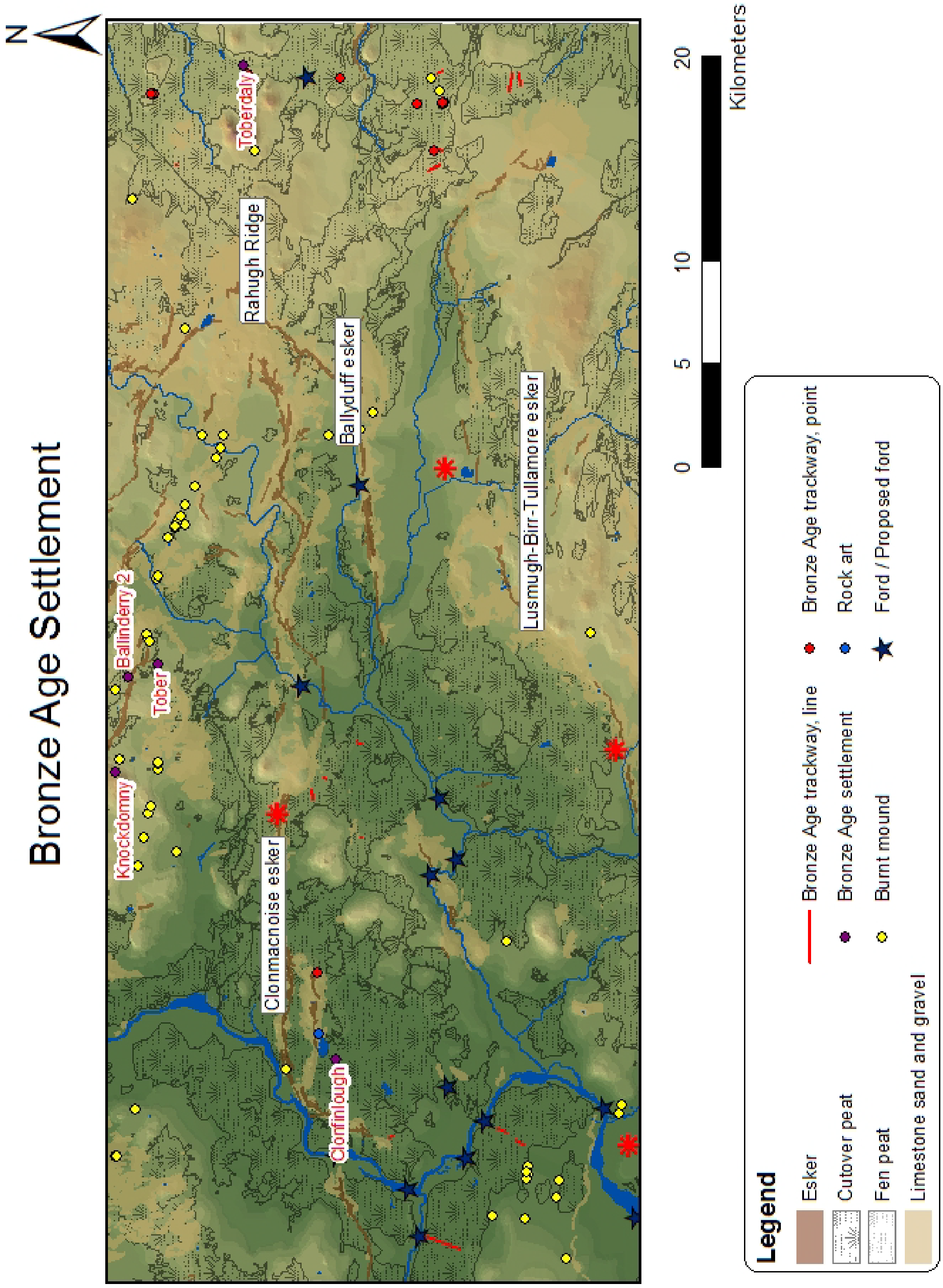

Figure 54 Bronze Age settlement in North Offaly

It is not within the remit of this research to discuss the various possible functions of burnt mounds, which have been interpreted variously as places for cooking, tanning, bathing and brewing, but their presence in this landscape must be seen as a clear indicator of an increase in activity from the Early Bronze Age. These sites are typically situated near streams, in waterlogged soils or on peats, where there was a readily available water source. In this study area, these sites are in areas dominated by limestone till and limestone sand and gravel, but in locations where the conditions were locally wet such as the contexts above. These limestone-based subsoils would be the obvious locations for settlement and indeed, the nature of the faunal assemblages from these sites suggest that they were related to nearby settlement. They include the bones of domestic animals, such as cattle, sheep / goat and pig. Other animals, such as deer and possibly the pig, would have been hunted; supporting the idea that hunting was still being practiced in this landscape. The most convincing evidence that these sites can be used as an indicator for settlement, however, is in the locations of burnt mounds next to the house sites at Ballinderry and Tober below (See Fig. 54).

A correlation between standing stones and *fulachta fiadh* was observed during the North Munster Project, where they often occurred clustered close together (Grogan et al. 1996, 41). Elsewhere, the burnt mounds discovered during the course of the Lisheen Mine Project, located next to dryland on the fen margins of the bog, were interpreted not as transient cooking sites, but as part of the settlement pattern of the area (Gowen et al. 2005, 64, 344). These sites often appear as clusters, such as those at Burrow / Glennanummer or Kilbeg, and Grogan et al. (2007, 88) have suggested that they were the focus of small farming communities of a few close families in these areas. In conclusion, if we accept that the distribution of these sites is biased towards the infrastructure projects which revealed many of them, then we must acknowledge that there must be many more throughout the study area where conditions were suitable. If we further accept that they and the trackways discussed above are an indicator for settlement, then it follows that there are almost certainly many more settlement sites than we can currently verify in this region.

5.5.4.2 *Settlement sites*

A number of Bronze Age habitation sites have been found in the area, which illustrate a community who were well connected with the wider world (Fig. 54). Although small in number, they provide context for the burnt mounds and Bronze Age trackways of North Offaly, and they are presumably an indication of the type of settlement which we might expect to have existed beyond the confines of the infrastructure and survey projects which discovered them.

Toberdaly

The Chalcolithic habitation site at Toberdaly in Ballybeg Bog, Co. Offaly (OF-TBD 0018, OF011-059) (Fig. 39), was composed of a stone spread with charcoal inclusions dating to 2565-2200 BC (Irish Archaeological Wetland Unit 2002a; 2002e). Among the artefacts associated with the site were a stone adze and ten pieces of flint. It is located close to the complex (OF-TBD 0013, OF010-429) (See Chapter 4.8.3.2), which was possibly intended for hunting, and a barrow (OF-TBD 0019, OF011-060), representing a ritual element to settlement in this area.

The presence of flint suggests that the occupants of this site were in communication with outside areas, as it is a material which can only occasionally be found locally in glacial rolled pebbles. On a local level, the site is situated next to Croghan Hill (Fig. 7), one of the most visible natural landmarks over the entirety of the Midlands. This feature could help the planning of journeys to and from this area, and routeways would naturally emerge in reference to it. One such routeway is the alignment between Clonin's Hill, on the east side of the bog, Croghan Hill, on the west, and on towards Clonagh Hill, Mullagharush and Rahugh esker, also coinciding with the narrowest bog crossings at Ballybeg, Oldcroghan and Raheenmore (See Chapter 7, Figs. 94, 98). The site is therefore not only located next to a natural wayfinding device, but it is situated along an axis where movement over a wetland landscape is facilitated through dry hills, eskers and narrow crossing points in the bogs. The site is of an early date and appears primarily to have been associated with the use of the woody fen, pine woodland and lake amenities of this area, but it is located on what became an important route on the course of O' Lochlainn's (1940) *Slighe Mór*, and its suitability for movement may have contributed to the decision to locate the settlement there.

Knockdomny

At Knockdomny, Co. Westmeath (02E0414), a round-house was dated to the Middle Bronze Age, with dates of 1429-1303 BC and 1527-1415 BC (Hull et al. 2006; Grogan et al. 2007, 347–349). It was located on an elevated area of limestone till on the lower northeast slope of the hill which gives the townland its name (Fig. 54, 55).

The site was situated approximately 1km south of the Mount Temple / Moate esker, which offered 13km of dry movement in a NW-SE direction. The house itself commanded extensive views east, south and west. Artefacts included five lithics, of which four were chert and one was flint, which Hull (2006, 7) suggests was derived from glacial till, while wheat grains indicated cereal cultivation. There were no ceramics and a minimal artefact assemblage, and this may mean the site was occupied for only a short time.

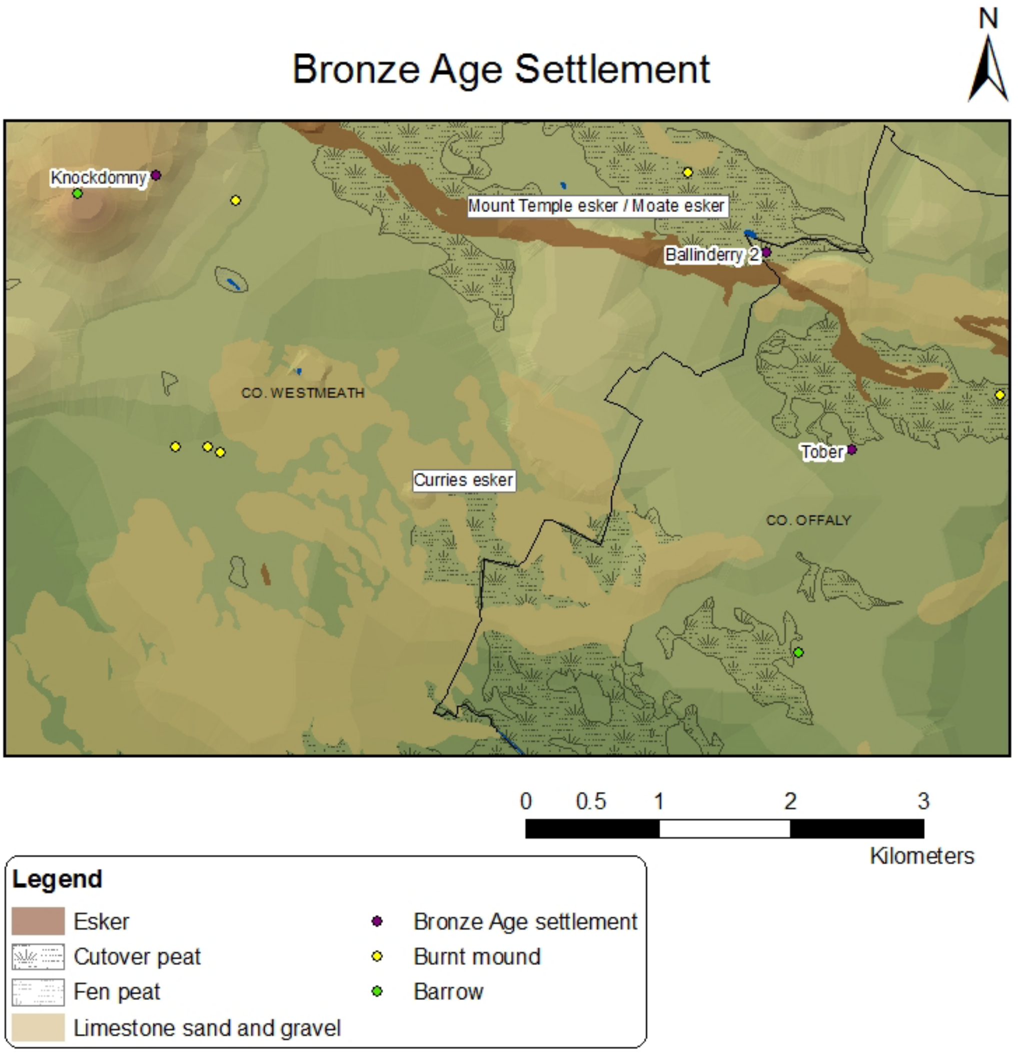

Figure 55 Bronze Age settlement on Mount Temple / Moate esker

Close to the summit of the hill is a bowl barrow (WM030-104), which capitalises on the capacity of the 157m high hill as a landmark and mnemonic device. Like Croghan Hill, this hill would facilitate wayfinding for those moving to and from the settlement, and it was made more effective through augmentation by burial and probably by stories. The esker would also have facilitated movement, and the same esker led to the Middle and Late Bronze Age settlements of Tober and Ballinderry 2, suggesting that settlement sites clustered around this routeway in order to facilitate communication.

Tober

The Middle to Late Bronze Age house at Tober, Co. Offaly, was discovered in the course of investigations for the N6 Kinnegad to Athlone scheme (Walsh 2009b; 2011). It was located on limestone till on the southern edge of a bog, with good views in all directions (Fig. 54, 55). The site is only 600m south of the Mount Temple / Moate esker which leads to Ballinderry and Knockdomny. The circular house site had features of various dates between the 14th and 9th centuries BC. Two four-post structures were identified to the south of the house and were interpreted as grain silos, which would imply agriculture was being practiced. Walsh (2009b, 56) concludes that the site was established between 1200-1000 BC and abandoned by c. 800 BC.

Material culture included a minimum of three ceramic vessels which were of bucket shape, comparable with contemporary material from Stamullin (Co. Meath), Lough Gur, Kilbane (Co. Limerick), Haughey's Fort (Co. Armagh) and Carrig (Co. Wicklow), as well as to the material found nearby at Ballinderry 2. The lithic assemblage is quite poor and there was no evidence of knapping, which may mean that metal artefacts were being used and that the stone items were brought in their completed form to the site (Walsh 2009b, 54). The arrival on site of these items indicates they were engaged in a pattern of movement and/or exchange. Carbonised wheat and barley show arable crops were being grown nearby, and the faunal assemblage included sheep / goat, pig, cattle and fish, indicating they were making use of farmland as well as the natural resources of the nearby streams and Ballinderry Lough.

The artefact and ecofact assemblage from this site shows that by c. 1200 BC, the occupants of this landscape were making use of the same ceramics which are typical of sites across Ireland, and that they must have been part of a well-established system of exchange in order to procure lithic, and possibly metal, objects. The surrounding landscape was being well managed to exploit natural resources such as fish, supplementing the produce from pastoral and arable farming practices. Perhaps if the four-post structures are indeed grain silos, then this accounted for the wealth which the occupants would require to engage in a system of exchange. This house site was therefore well situated on fine agricultural land, with access to natural resources, and next to a natural routeway which was the focus for at least two other Bronze Age sites.

Clonfinlough

A lake-side settlement was located in Clonfinlough, situated on a hummock in an area of fen peat on the southern shore of Finlough, Co. Offaly (Moloney et al. 1993). This small lake is bordered on its north side by the Clonfinlough esker, providing a dry routeway in an east/west orientation towards other eskers and the fords of the River Shannon (Fig. 54). The site consisted of two house platforms, a hut platform and a working platform, enclosed by a palisade which opened onto the lake shore. Dendrochronology indicated that Platform 1 was constructed c. 908 BC, with repair work carried out c. 896 BC. It has been suggested (ibid, 66) that if the upper layers were removed then the site may have resembled Ballinderry 2 (Fig. 56).

The artefact assemblage included two oars or paddles, amber beads, coarse-ware pottery, a possible saddle-shaped quern stone and ground stone. The paddles were dressed with a series of perforations along their blades and one had a u-shaped end, with original lengths of up to 2.7m. Oars of this size would have been too large for the dugout boats discussed above, and they would have been more suitable for a larger composite boat, hide-covered vessel, a wide reed boat, or for poling with a raft. It was most likely for use in the neighbouring lake, where the perforations may have helped to manoeuvre through reedy waters.

The coarse-ware sherds made up a minimum of seven vessels and they were probably created locally, but it is noted by Moloney (1993, 44) that there is no suitable source of clay within 3km of the site. The clay would therefore have to have been procured from the wider landscape, and the resulting ceramics were of the style found at Ballinderry 2 and Tober nearby. These ceramics were consistent with examples from other sites throughout Ireland, such as Ballyveelish (Co. Tipperary), Raffin (Co. Meath), Mullaghmore (Co. Down), Knockadoon, Lough Gur (Co. Limerick), Whitepark Bay (Co. Antrim) and Freestone Hill (Co. Kilkenny) (ibid, 46). This indicates a community which shared ceramic styles which were in use in these distant sites, suggesting that they were well connected through the use of available routeways.

The Clonfinlough Stone is a decorated glacial erratic, situated just 1.5km northeast of this site on a south-facing hill of limestone sand and gravel next to an esker. It is positioned such that extensive views to the south and across the wetlands are provided, but visibility is limited to the north. It has been described as Bronze Age because of the cup-mark decorations and its similarities to rock art from Iberia, but the motifs known as Phi symbols have been suggested to be of medieval origin (Jackson 1967; Shee Twohig 2002). Shee Twohig concludes her assessment by listing scenarios in which:

- All the carvings were produced in prehistory.
- Parts were carved in prehistory with medieval embellishments.
- All the carvings were produced in the medieval period.

If the rock art is medieval, which is the interpretation Shee Twohig favours, then it is probably associated with pilgrimage to Clonmacnoise. If, however, it had a Bronze Age phase, then it is part of the landscape in which the settlement at Clonfinlough would have operated, and it could suggest a Bronze Age date for this portion of the esker as a significant routeway. The proximity of the settlement alone is sufficient to suggest its use for local movement, but given the relationship of Knockdomny, Tober and Ballinderry 2 to the Mount Temple / Moate esker, it seems likely that eskers attracted settlement because of their dry soils and capacity for movement.

Ballinderry 2

Ballinderry 2 in the townland of Ballynahinch, Co. Offaly, was excavated by Hugh O' Neill Hencken on the Harvard Archaeological Expedition to Ireland, and it was found to have been an 8th century AD crannóg site with a phase of Late Bronze Age lake-side settlement (Hencken et al. 1941) (Fig. 54, 55). In Newman's (1997a) reassessment of the Ballinderry 2 excavation, he concludes that the Late Bronze Age phase included a rectangular building of plank and post construction, with a path connecting it to a second building of similar design and dimensions (Fig. 56). Finds from the site included a minimum of 13 coarse-ware pottery vessels, amber beads, lignite bracelet fragments and several bronze artefacts. This phase has been dated to c. 700 BC, based on the selection of bronze items recovered from these strata.

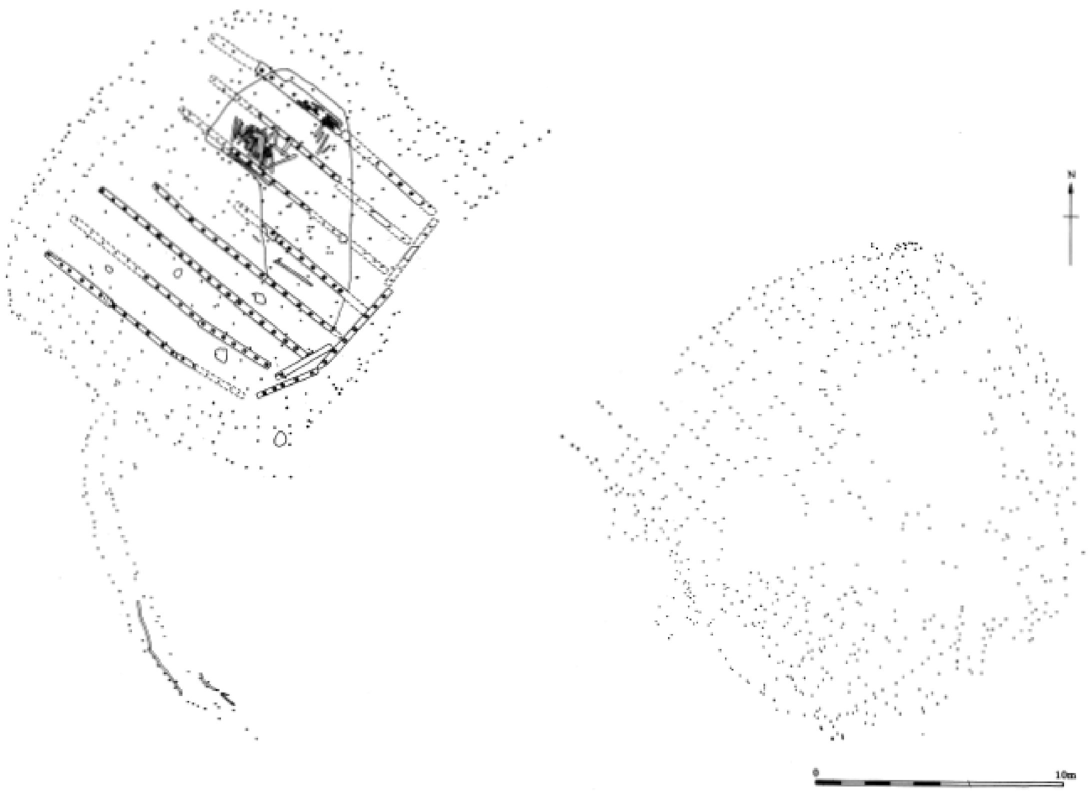

Figure 56 Western rectangular structure and potential eastern rectangular structure at Ballinderry 2 (Newman 1997, 96)

A wide area of limestone sand and gravel extends eastwards, providing well drained dryland, and the presence of a saddle quern and domesticated animal bones suggests that this area was farmed by the occupants. South of the site, the Mount Temple / Moate esker connected the settlement to Knockdomny and Tober. Thus, like Clonfinlough, this was a lake-side settlement of wetland character, located adjacent to an esker ridge and a system of movement. The occupants of this seemingly isolated wetland site could, therefore, easily have travelled between the habitation and agricultural land, or to other settlements for the purposes of communication and exchange. Newman (1997a, 99) notes that wetland sites such as Ballinderry 2 and Clonfinlough seem to have been occupied all year round, showing that this landscape was being fully exploited, moving beyond the seasonal hypothesis proposed for the Neolithic in this region. The assemblages were also similar to those from dryland habitation sites, suggesting that the lives of those in these lake-side “crannóg” sites were not dis-similar to other Bronze Age sites. The bronze items in particular suggest a wealthy settlement, which was possibly derived from the access to a communication route provided by the esker.

Summing up settlement

In summary, while the actual number of habitation sites in the study area number only five, there are a number of conclusions we can make, based on the character and location of the houses, as well as the distribution of other sites related to settlement, such as burnt mounds and wetland activity. Taken together, these sites indicate a Midland community that made efficient use of the landscape, combining wetland resources with the agricultural potential of dry localities. It is also clear that they were engaged in communication and exchange with outside communities, no doubt thanks to some of the routeways which have been discussed previously.

The assemblages of animal bones, cereal grains and quern stones demonstrate that there were parts of the landscape that were suitable for early farming and sedentism, and that agriculture was an important part of the economy in this area. The *Pipeline to the West* project identified the valleys of the Brosna and Clodiagh Rivers, south and east of Kilbeggan, as a potential focal zone for Bronze Age settlement. They conclude that, as farmers moved into this region, they would settle on elevated, well-drained land, overlooking *fulachta fiadh* sites (Grogan et al. 2007, 139). This is essentially the same space occupied by the Midland Corridor, and this region had already been an active landscape by the Neolithic period (Chapter 4). The clustering of barrows and burnt mounds in this area demonstrates that it remained active in the Bronze Age and, cognisant of the potential biases in evidence from development led archaeological projects, it does appear to have been the most active dryland area in this region in the Bronze Age. This is unsurprising, given the availability of dry agricultural land, access to esker ridges and the Midland Corridor, and the proximity of wetland resources.

Grogan et al. (2007, 162) suggest that settlement of south County Westmeath would take the form of local societies, centred on family and community, with zones of interaction limited to a few kilometres of the home. This may be in contrast to communities living south of the study area, beyond the the Midland Corridor and the Midland Buffer Zone, where hillforts suggest a more structured social hierarchy.

Local interaction may describe the earlier habitation sites of Toberdaly and Knockdomny, where there were minimal artefact assemblages, but the assemblages of Tober, Clonfinlough and Ballinderry 2 suggest communication with more distant areas. While the ceramics are locally made, they speak to a familiarity of the style and form of pottery from other regions, and the metal items and amber beads would have had to arrive at site through a system of movement and exchange, with amber originating as far away as the Baltic region. Material culture flourished in the Bronze Age, and the assemblages from these sites show that the communities living in this region participated in this cultural shift. This is undoubtedly thanks to the availability of natural routeways by which to communicate with distant communities. While Grogan et al. (2007, 24) acknowledge that the evidence revealed during the *Pipeline to the West* project is more modest than that in *busier* parts of the landscape, such as Meath or Limerick, it is consistent with the range of evidence uncovered elsewhere. Thus, while the landscape was less densely occupied, the lifestyles, or at least the material culture, of these people were the same as those from outside areas.

It ought to be expected that more Bronze Age settlements exist undiscovered outside of the areas investigated in advance of development, most likely on other elevated areas or in localities of limestone sand and gravel subsoil. It is likely that other lake-side settlements exist in this landscape too, but they would probably be preserved beneath layers of fen peat, and are therefore unlikely to be revealed from peat cutting. Further south of the known habitation sites, where the landscape is more heavily dominated by bog, there have been fewer discoveries of burnt mounds and there are no known habitation sites. Despite this, it is possible to identify some localities which probably accommodated settlement. The clusters of trackways in Mountlucas, Clonad and Ballykean Bogs, for instance, suggest that there was settlement on the associated bog islands and neighbouring dryland, such as Walshisland and the Geashill esker (Figs. 42, 44). At least two burnt mounds are known from Mountlucas Bog, which is consistent with the pattern suggested by Grogan.

The dryland of Kilnagarnagh, Killaghintober and the Cooldorragh Hills is another likely location for Bronze Age settlement (Figs. 45, 46). The Late Bronze Age trackway crossing Tumbeagh North Bog would most likely have linked farming localities on either side of the bog, which consist of elevated and well-drained land which would have attracted early agriculture. The hills of Bellair, Kilnagarnagh and Rashinagh would have assisted in wayfinding, and the Clonmacnoise esker would have accommodated long distance movement.

Across the Shannon in Galway, the trackways at Annaghcorrib, Kilmacshane and Carta were major building projects which must have been contrived by a nearby population (Figs. 51, 52). A cluster of burnt mounds are situated south and west of these bogs, and since burnt mounds are often associated with nearby settlements, the Clonfert / Eyrecourt region may have been inhabited. A community living in this area would have had unfettered access to the fords of Meelick, Keelogue and Banagher, and they made the appropriate interventions to access further fords at Carta, as well as the Suck ford at Garryduff which allows access to the Shannonbridge ford.

In conclusion, the habitation sites which have been discovered ought to serve as a guide for the types of conditions which were sought after when settling this landscape in the Bronze Age. Settlement in this region is likely to have been less dense than other areas, because of the extent of wetland cover, but these discoveries are indicative of the types of habitation which was being practiced in this region. In particular, it is clear that they made an efficient use of the landscape, successfully practicing arable and pastoral farming, supplemented with wetland resources. This marked a significant change in the use of this landscape from the Neolithic period, characterised not just by changes in land use and intensity of occupation, probably due to an increase in population. The artefact assemblages show that these communities were well connected with outside areas and, as the Ballinderry 2 assemblage suggests, may have in fact been quite wealthy. This was probably facilitated by the access to routeways, which may have been a factor in the siting of these settlements. Other parts of the study area which are most likely to have been settlement sites are similarly well-positioned to have had access to routeways.

5.5.5 The emergence of the Midland Corridor

While the Midland Corridor was first described by Smyth (1982) as a medieval routeway, the distribution of barrows where it enters the study area suggests it was an established routeway by the Early Bronze Age (Fig. 57). Indeed, as we have seen (Chapter 4), it may have had its origins in the Neolithic period. The woodland clearance which took place in the Bronze Age created an environment where it could flourish, and it appears that by the Late Bronze Age, the southern extent of the Midland Corridor had also emerged as a routeway.

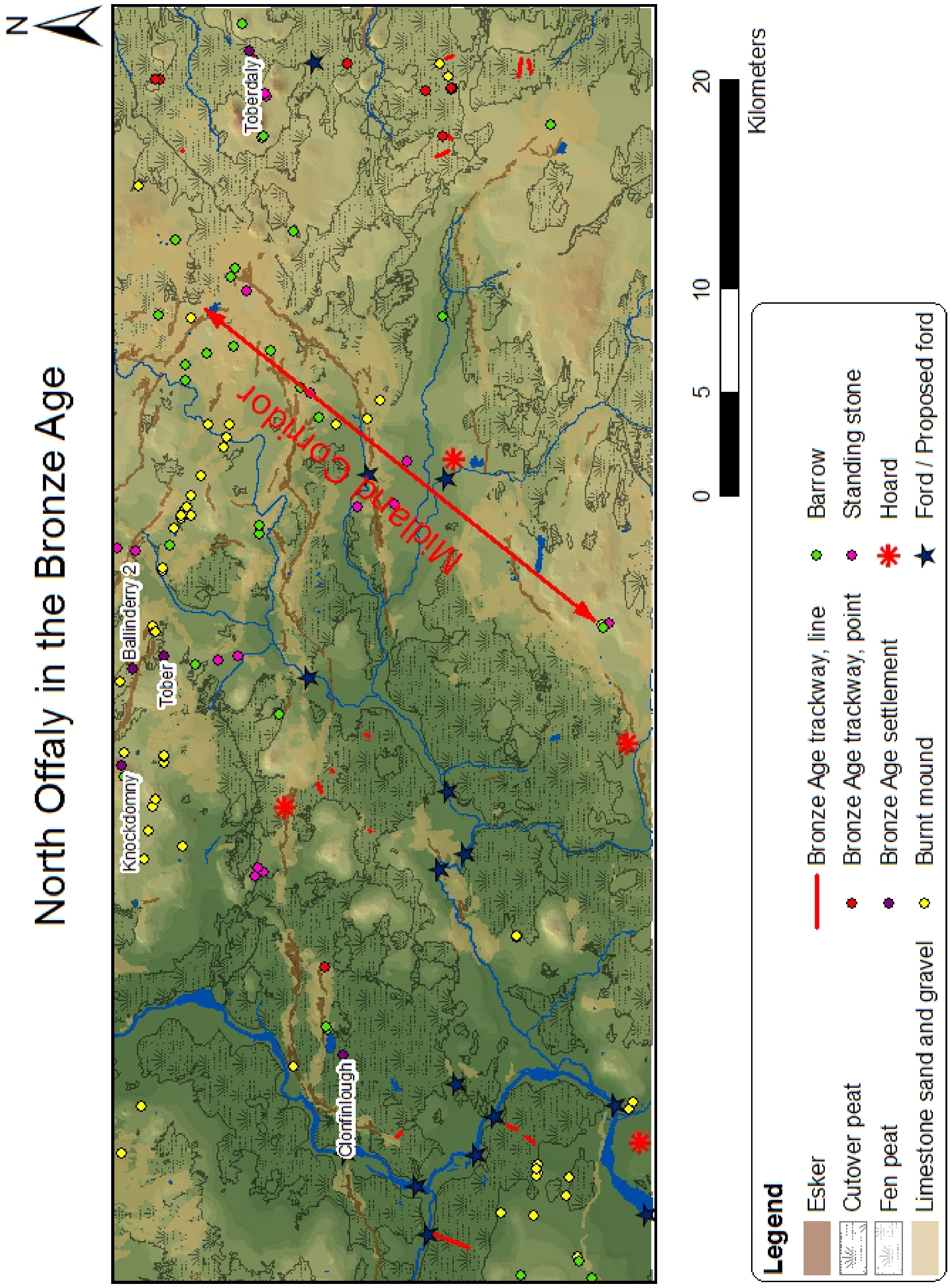

Figure 57 North Offaly in the Bronze Age

As discussed, environmental studies have shown that woodland in the study area underwent phases of clearance, often coinciding with the use of the land for agriculture (Parkes et al. 2000; Crushell et al. 2008; Plunkett et al. 2009). If the valleys of the Brosna and Clodiagh were being used for settlement, as Grogan et al. (2007, 139) suggest, it follows that this area would similarly have been cleared for farmland. This opening up of the landscape allowed this natural routeway to emerge from a landscape of woodland and wetland, creating an important channel of communication that would link Meath and the Boyne Valley to the metal-rich southwest of Ireland.

The most obvious evidence for this routeway is the cluster of barrows which occurs in the areas northeast, east and south of Kilbeggan (Fig. 57). If this area was indeed a focus for settlement, then it is appropriate that there should be a concentration of barrows here, given previous suggestions that barrows were intended to be seen from nearby settlements. This distribution marks the location of the watershed between the River Brosna, part of the Shannon system, and the Mongagh and Yellow rivers from the Boyne system, making it an ideal location to navigate by following the watercourses of two different river systems. It is also the point at which the Midland Corridor joins the plains of Meath to the Midlands region, at which point one can continue southwest on the Corridor, or travel west along the eskers. The correlation between routeways and barrows is therefore also in play here. Some of these barrows are notably situated next to esker ridges, seemingly signposting the way between routeways. Standing stones also appear along the Midland Corridor, extending slightly further south as far as the valleys of the Silver River and the Tullamore River. Some were similarly positioned next to esker ridges.

Beyond the barrow distribution, the characteristics of the Corridor appear to change. Our knowledge of environment and woodland cover comes from pollen studies in the north of the study area, so it is unclear how clearance activities may have impacted the landscape south of Tullamore. The subsoil is heavier limestone till here, so it may not have been as favourable as the northern portion of the Midland Corridor for early agriculture. The Frankford Hoard is most significant, as it is composed of Early Bronze Age items. This shows that there was a line of communication between the study area and the southwest of Ireland, where the copper was sourced, from very early in the Bronze Age. As discussed, the region around Frankford may have been part of a buffer zone between North Munster and the Midlands. It was also a significant point on the Midland Corridor, as it is the point where the Lusmugh-Birr-Tullamore esker departs from the Midland Corridor towards the fords of Meelick and Keelogue. The Derrinboy and Dowris hoards may indicate further use of this routeway in the Middle and Late Bronze Ages.

Outside the southern extent of the study area, the hillforts of Clonlee and Ballycurragh overlook the Midland Corridor as it sweeps past the Slieve Blooms and enters the North Munster region. As discussed (Chapter 5.2.3), the dense distribution of hillforts in North Munster is interpreted as representing the competing forces in the control of routeways and territory. The presence of hillforts at this location in the Slieve Blooms suggests that these competing forces extended their control as far as the southern extent of the Midland Corridor, but no further. It illustrates the importance of this routeway, to merit hillfort surveillance, and their function may have been to facilitate movement from Munster into Leinster, while monitoring southward movement.

The different monument types on either end of the Midland Corridor are the different expressions of control discussed above (Chapter 5.2). The northern barrow distribution, which probably dates from the Early to Middle Bronze Age, creates physically low-profile entities, but a metaphorical omnipresence of ancestors to legitimise a claim over the land, and consequently the routeway. This is in contrast to the Late Bronze Age southern hillforts, where the physicality of the earthworks is far more monumental. Hillforts speak not so much of the presence of ancestors and the inherited claim over land, but a claim based on the prowess and dominance of the people who construct them. This expression of control came later on the southern extent of the Midland Corridor, and this may suggest that prior to that, it was a routeway which was more important on the northern portion. Perhaps before the construction of the hillforts, the Midland Corridor was well established only as far as Charleville, where instead one could continue southwest on the Lusmugh-Birr-Tullamore esker towards the fords at Meelick and Keelogue. The Charleville, Frankford and Dowris hoards mark this routeway, with the Banagher and Cogran hoards nearby, suggesting it was an important one, and the Early Bronze Age date of the Frankford hoard, as well as the Neolithic river depositions, suggest that it was in use from an early date.

It appears therefore that the northern extent of the Midland Corridor was well established by the Early Bronze Age, but that it may not have been until the Late Bronze Age that the southern portion of the routeway described by Smyth (1982) rose in prominence. While the N6 motorway and the gas pipeline schemes have revealed evidence of Bronze Age habitation in the northern extent of the study area, the southern portion has not been examined in the same detail and there are consequently no discoveries of Bronze Age habitation to report in this area. From this discussion, there may have been minimal occupation there early in the Bronze Age, with the limestone sand and gravel surrounding the Lusmugh-Birr-Tullamore esker being the most likely location for habitation. By the Late Bronze Age though, the increase in hoards and the construction of hillforts suggests that settlement increased in this area as the Midland Corridor became better established.

5.5.6 Offaly and Bronze Age Movement

In conclusion, movement on a local and inter-regional level is well-represented in North Offaly in the Bronze Age. While there appears to have been little anthropogenic activity in the region in early prehistory, by the Bronze Age there is undoubtedly a transformation of the landscape and an intensification of activity involving wetland trackways, settlement, burial and material culture. While settlement was not as dense as in other areas, the occupants adapted to the demands of the landscape by practicing pastoral and arable farming, as well as exploiting the wild flora and fauna from the woodlands and wetlands. The toghers allowed the inhabitants to access the resources of the bog, as well as the potential agricultural land contained in bog islands. It also allowed them to engage with their nearest neighbours on a local level, and they were probably in very frequent contact with each other to form communities which transcended the obstacle of the bog. Some of these trackways also appear to have contributed to a wider scale of movement by accessing major natural routeways.

On an inter-regional scale, the routes formed by the rivers, the esker ridges and the Midland Corridor allowed the communities to participate in the advances in technology, agriculture, ritual and material culture that are seen throughout Ireland at this time. The construction techniques used on the house sites and the trackways are comparable to sites elsewhere, and the communication networks which brought the metal tools to the area for use in these projects would have also facilitated the spread of these designs. The ceramics are also typical of many domestic sites, and the presence of prestige objects of metal and amber show that the communities were of sufficient importance to engage in exchange of such valuable objects.

Despite the poor evidence of settlement in the area, there are large quantities of artefacts from the study area, ranging from the utilitarian and prestige objects of site assemblages, to single finds, depositions and hoards, particularly in the Late Bronze Age. The most likely explanation for this wealth is the location of the study area between the two powerful Bronze Age zones of Meath and North Munster. This Midland region provides the routeways which link these two zones, with the Shannon and the other rivers, the fords, the eskers and the Midland Corridor all providing means to move between these areas. Any communication between these two territories would have to make use of these routeways, and the modest communities which occupied North Offaly may have profited from such efforts. Therefore, while the study area may have been a quiet landscape in terms of settlement, it would have acted as an important crossroads in later prehistory and was part of an island-wide system of communication.

Chapter 6: Iron Age and Early Medieval Movement

6.1 Introduction

This chapter is devoted to movement in the Iron Age and Early Medieval periods. A major part of the decision to discuss these two time periods in a single chapter is the treatment of mythology and proto-history. The Iron Age is something of an enigma in terms of the archaeology of the period. Exceptional monuments which must have been massive undertakings for communities around Ireland exist at royal sites such as Tara and Rathcroghan, as well as enormous linear earthworks such as the Black Pig's Dyke, and the outstanding corduroy trackway at Corlea. Despite such impressive sites, however, we know very little about settlement, movement and mundane aspects of Iron Age life. While mythologies may provide a tantalising glimpse of Iron Age life or earlier, they appear to be medieval retellings of older stories. They may hint at genuine aspects of the Iron Age, in particular place names and routeways which may contribute to this study, but as Waddell (2015, 1) writes,

> 'any attempt to reconcile prehistoric archaeology and medieval myth might justifiably be seen as a foolhardy if not a futile exercise'.

As such, it is more prudent to discuss these periods together while such sources are being used, hinting as the stories do at how they may relate to Iron Age characteristics, but exercising caution in any attempt to separate these periods.

In previous chapters, the word *road* has been deliberately avoided. Earlier movement was discussed in terms of negotiating obstacles, navigating by natural features, and cognitive mapping to move through the landscape. As such, the word *routeway* was more appropriate when discussing general corridors of movement, while the terms *trackway* or *path* describe desire lines naturally evolving into more coherent paths, passes through naturally constricting landscapes, or the human intervention involved in constructing *toghers* in wetland contexts. By the Early Medieval period, and perhaps as early as the Iron Age, *roads* as a contemporary audience would understand them began to develop. That is, a clearly defined linear feature suitable for pedestrians, horses and wheeled traffic, which may have involved partial construction, and was part of an inter-connected and branched system of other minor and major roads. The system of the five major ancient roads of Ireland, known as the *slighe*, adhered to this pattern and is discussed at length below. A number of contributing factors to the change towards road systems are discussed in this chapter, including elite movement by horse and chariot, control of territories, and the ownership and enclosing of land, but despite these evolving systems, the vaguer concept of a *routeway* is still appropriate in some cases where an axis of movement is identifiable without a delimited surface.

As will become evident throughout the chapter, there are countless avenues to be pursued in discussion of movement in the Early Medieval period, of which only a few have been prioritised in this discussion, but the Iron Age remains a period where we must speculate based on unreliable mythology and a fragmentary archaeological record. Despite attempts to prioritise strands of evidence in this discussion, this is necessarily a very long chapter. The findings of previous chapters culminate in many ways with the themes that follow, and the rich archaeological and literary evidence provides opportunities to discuss many aspects and scales of movement for which we are ill-equipped to contemplate in a prehistoric context. This includes reference to social structures, settlement, law, and the contribution of local sites to regional and inter-regional systems of movement.

6.2 Mythology and protohistory

As discussed above, while mythologies may paint a picture of Iron Age Ireland, whatever genuine Iron Age characteristics remain are embellished with a medieval treatment. Jackson (1964) described such tales as ‘a window on the Iron Age’, and while his suggestions have been heavily criticised (Koch 1994), even he was cautious in how accurate a picture mythologies depicted of the period, admitting it to be ‘very dim and fragmentary… but still a picture’ (Jackson 1964, 5). Their value in the present study is in their descriptions of travel undertaken by the characters within the narratives. They describe a selection of routeways and make specific mention of places and landmarks which are part of these journeys. For this to have made sense for an Early Medieval audience, then the narrative should generally refer to a realistic geography. This allows us to demonstrate places between which movement seems to have taken place and hypothesise from the descriptions how that may have manifested. Sometimes multiple recensions exist, and later versions of tales may have been amended to include more places, but even in these scenarios, the description should refer in some way to a realistic landscape.

Mythologies are also significant in terms of their capacity to communicate and transmit cultural geography. Just as Basso (1996) observes in the use of Apache place names and stories to describe the physical characteristics of places and provide moral lessons, Irish place names and mythology may have accomplished the same end. Many of the place names which survive today are of Early Medieval and possibly even Iron Age origin. Many of these early place names either describe the physical qualities of a place, or refer to characters from mythologies. Place names enable us to create our cognitive maps, and by relaying mythologies which are rich in place names of both of these types, the audience is able to build a cognitive map containing not only places which they are familiar with, but more distant locations too.

A number of mythologies and protohistories will be cited throughout this text. One example is the early tale of *Togail Bruidne Dá Derga*, or The Destruction of Dá Derga's Hostel (Stokes 1902; Knott 1975). In this story, King Conaire Mór travels through the landscape, with the story describing taboos of movement, natural landmarks, references to roads, and descriptions of hospitality. Another useful source is the place name lore and stories associated with important places recorded in the *Dindshenchas* poems. The rich descriptions offered by sources such as these, while deeply imbued with reference to ancient belief systems, can also offer brief glimpses of the topographical reality which would have existed for those engaging with the story.

The *Lives* of saints are also useful in recreating routeways which would have existed. These early clerics were able to move freely between territories in a manner that few other individuals were permitted, and the *Lives* typically record places of note that they visited or rested at on their travels. These itineraries were a crucial source in O' Lochlainn's (1940) studies in mapping ancient roads, and some accounts even name the road on which they were travelling. Fleming (2010, 13) observes that as road systems developed, movement would rely less on navigation by landmarks as discussed previously, and sequences of crossroads would have become an easier way to navigate. Itineraries are recorded in this fashion, where journeys are relayed by listing places along the way, thereby using a system of chunking to produce mental maps and communicate directions.

While it is not within the remit of this research to untangle the literary complexities of this rich body of evidence in great detail, the crucial point is that the roads, routeways and topographical components of the stories in general would have had to be realistic to the audience, so that they could effectively learn and share the story, or to have used the knowledge from them to inform their own movements in the landscape. As such, mythological and protohistorical sources are referenced throughout this chapter where they may enrich our discussion of the locations and importance of roads and routeways.

6.3 The Slighe

The *Slighe* are the names given to the five ancient roads of Ireland which formed the basis of the Early Medieval road network, a system which enabled rapid movement and the ability to exert control over wider territories (Fig. 58, 59). These roads are ideal case studies for the characteristics and effects of the emergence of early roads, as we can consult mythologies, law tracts, historical documents and the archaeological evidence to reconstruct their courses, describe their morphologies and discuss their role in the prominence of certain settlements. They are the *Slighe Assail*, *Slighe Midhluachra*, *Slighe Chualann*, *Slighe Dála* and *Slighe Mór*.

6.3.1 The emergence and 'discovery' of the Slighe

The mythological explanation for the origin of these roads is recorded in a number of *Dindshenchas* poems. They are described as a *discovery*, made on the occasion of the birth of King Conn Cétcathach, when visitors were said to have arrived at Tara from all over Ireland. The *Dindshenchas* records their discovery as follows;

> 'They were hidden, inaccessible,
> in the days of Fianna and Fomore,
> till the birth of Conn of the hundred fights
> the ancient prince's path was not discovered.
>
> Since Conn the faultless was born
> ye can see them and know them;

thanks to the five who fixed them,
young men are riding over them.' (Gwynn 1903d, 281)

The story is an example of how notable places and moments are attributed to a powerful king, but it hints at how a coherent road system was connected to power structures and the creation of authority. In fact, some segments of these roads were part of routeways which we have seen were in use in the Bronze Age, and perhaps as early as the Neolithic period. O' Lochlainn suggested that they were attributed to Conn because of his associations with the *Eiscear Riada*. The esker ridge, which is seen as synonymous with the *Slighe Mór*, was also described as the border which halved Ireland between *Leath Chonn* and *Leath Mogha*. The association with the *Eiscear Riada* / *Slighe Mór* may have later been extended to all of the royal roads.

Morris (1938, 113) observed that *Togail Bruidne Dá Derga* described four roads to Tara, which he took to refer to the *slighe*, leading to some confusion as to whether all five *slighe* converged there. The relevant text is as follows;

Eirg do Themraig innocht, ol sé. Is córu deit. Atá tairbfeis ann ⁊ is tú bas rí de, .i. fer lomnacht i ndiaid na haidche íar **sligi** di **ṡligthib** na Temrach, ⁊ cloch ⁊ tailm lais, is é bas rí.

'Go to Tara tonight,' says Némglan; ''tis fittest for thee. A bull-feast is there, and through it thou shalt be king. A man stark-naked, who shall go at the end of the night along one of the roads of Tara, having a stone and a sling – 'tis he that shall be king.'

Luidseom íarum in c[h]ruthsa ⁊ bádar trí ríg cacha **sráite** dina ceithri **sráitib** día tíagad do Themair oca urnaideseom, ⁊ étach acco dó, ar is lomnacht da-rairngiread a thaideachd. Con-accesom don **rout** for mbátar a aite ⁊ do-bertatar étach ríg dó imbi ⁊ da-bertatar hi carpat ⁊ for-nenaise a gíallu. (Knott 1975, 5)

So in this wise Conaire fared forth; and on each of the four roads whereby men go to Tara there were three kings awaiting him, and they had raiment for him, since it had been foretold that he would come stark-narked. Then he was seen from the road on which his fosterers were, and they put royal raiment about him, and placed him in a chariot, and he bound his pledges. (Stokes 1902, 25)

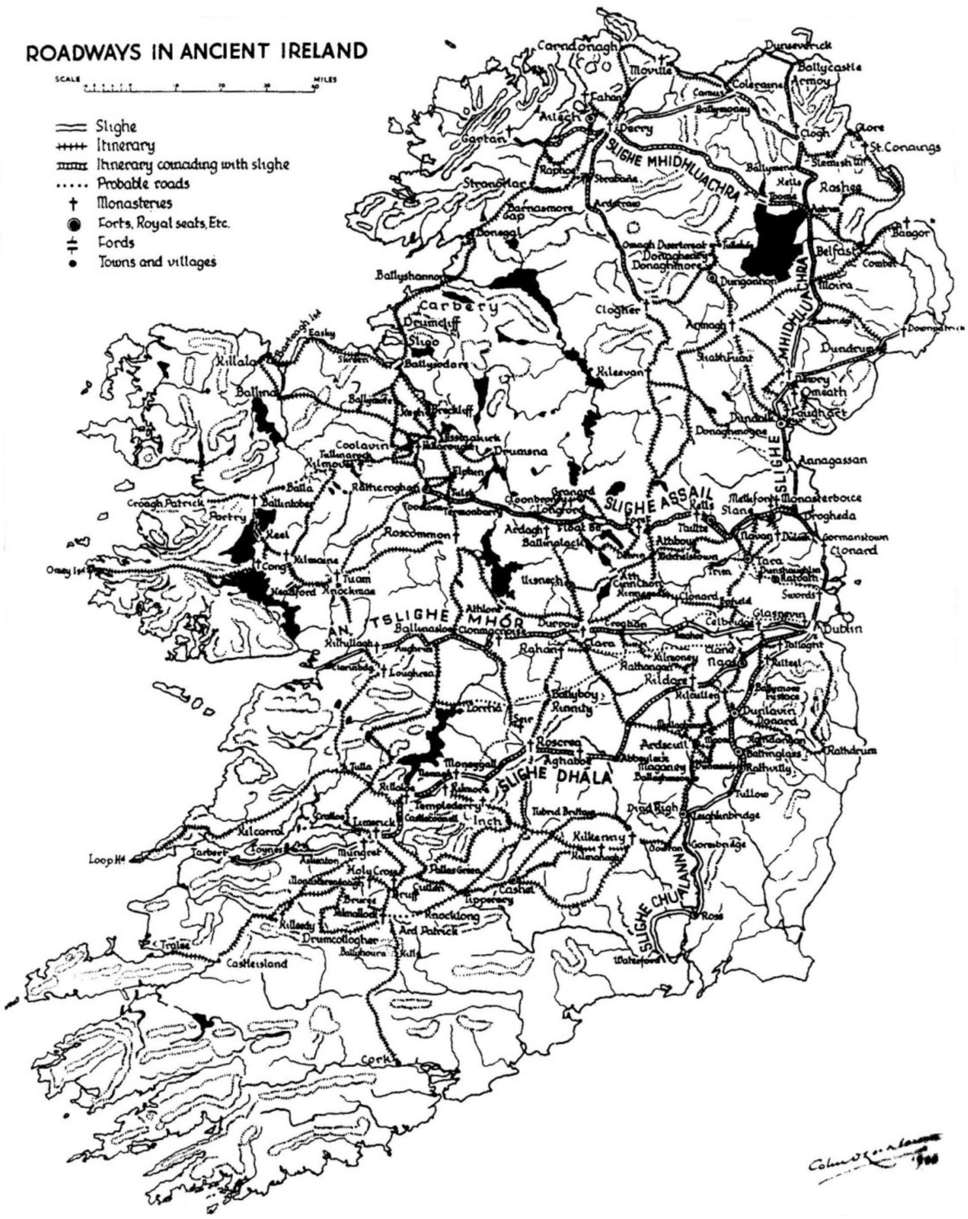

Figure 58 O' Lochlainn's proposed courses for the Slighe (1940, 475)

The words *slighe*, *sráit* and *rout* are used here interchangeably (Máirín Ní Dhonnchadha, pers. comm.), compounding the problem of what character these roads were. It clearly describes roads which go to Tara, of which there appear to have been only four. Morris (1938) suggests that the five *slighe* were not made at once, and this seems likely. The association of the *slighe* with Tara may have been an effort to connect Tara to pre-existing routes, which could have been part of a building programme (FitzPatrick 2003, 166). This would not necessarily require five separate roads from Tara. The *Slighe Chualann* and *Slighe Midhluachra* were connected on the coast, so a single connecting road from Tara could have served both roads. Moreover, the story later goes on to have Conaire travel some distance towards the coast before being presented with the option of taking either of these roads, suggesting a single road connected them from Tara. Similarly, in *Caithreim Conghail Clairinghnigh*, the *Slighe Midhluachra* is not named until Congal has travelled a considerable distance from Tara. Perhaps if a set of roads was created radiating out from Tara to connect to pre-existing *slighe*, as Petrie (1839, 152) illustrated (Fig. 59), then these connecting roads would eventually be known as *slighe* themselves.

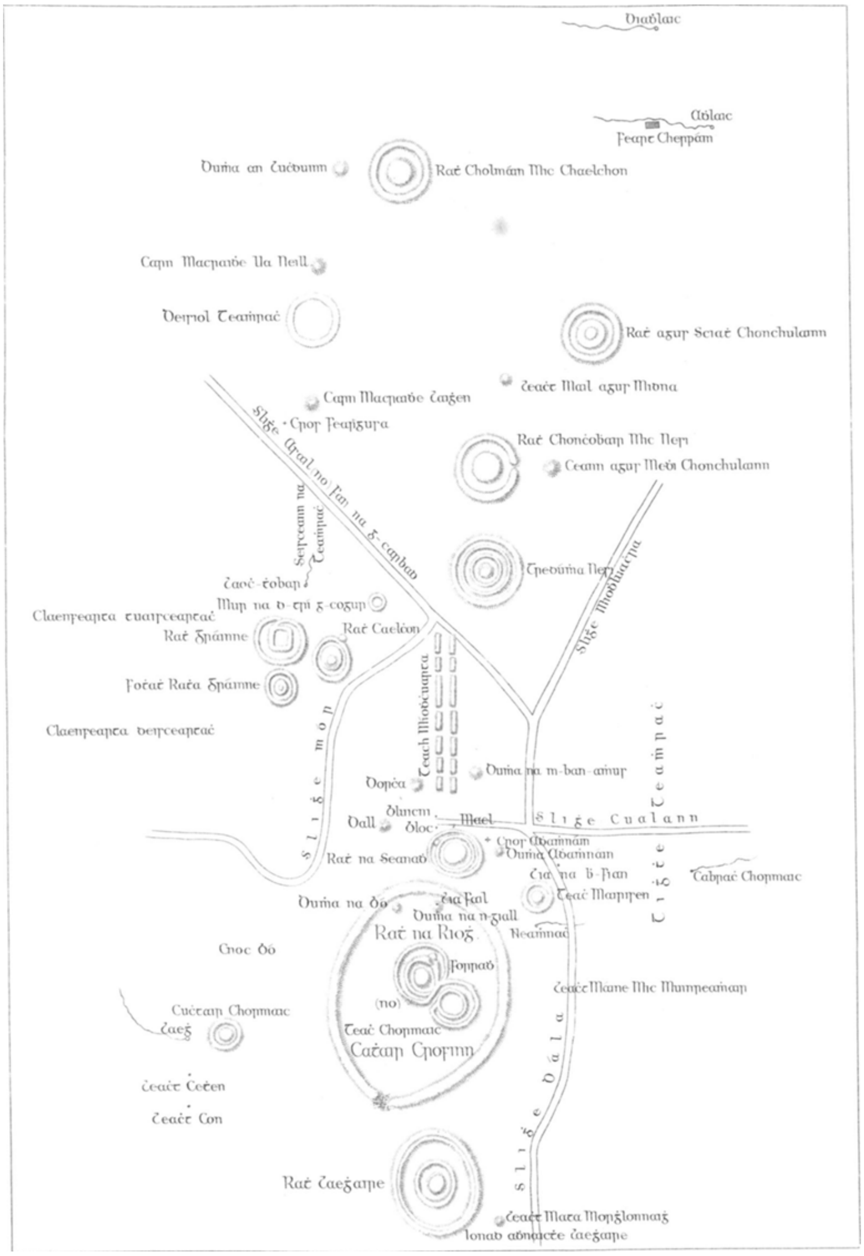

Figure 59 Petrie's illustration of the Slighe at Tara (1839, 152)

Some authors describe the roads as radiating out from Dublin (Fig. 58), and while this may seem as though they have been influenced by later movement in which control was exerted from the Pale after the Anglo-Norman invasion, there is sound geographical reasoning for this. As noted by Jones (2008, 120),

> ‘Ireland’s topographic ‘grain’ makes the number of potential east/west communication routes more numerous than potential north/south routes’,

because of the combination of drumlin belts, esker ridges, mountains, bogs and rivers. The only exceptions to this in terms of major inter-regional travel are the roughly north/south axes offered by the land routes of Midland Corridor and the East Coast, particularly along the Bann Corridor and the Barrow Corridor, or boating routes along the east and west coasts and the Shannon River. A network in which these corridors could maximise intersections with the east/west routeways could be created around three possible central nodes. One would be along the River Shannon, which one could argue was a role later filled by Clonmacnoise and ultimately by Athlone after the Anglo-Norman invasion. Another would be the plains of Meath, and Tara undoubtedly owes much of its prominence to the ease with which it could access many of these communication routes. Finally, there is the Liffey basin, ideally at a fording point such as Átha Cliath. While the ford itself was quite a treacherous one (Smyth 1982, 10), this portion of the river also acted as a boundary to Leinster, which we will see fits into the scheme of routeways also acting as boundaries. Access to Dublin Bay would have opened up the network to travel by sea to Britain and elsewhere. Crucially for Tara, the potential convergences of routeways at Dublin were at a convenient distance to create connecting roads. Both of these areas are part of the central-eastern plain described by Hamlin and Hughes (1977, 26–27), which provides a variety of land routes, rivers and landing places to make it a particularly well-connected region.

The most likely scenario is that the *slighe* system is a network of independently emergent routeways which developed into roads, making use of natural corridors of movement between nodes of importance that were in regular communication. These roads would eventually become well enough established, both physically through repeated use and construction, and mentally through communication and cognitive mapping, that they would form a logical and coherent road network. By this reasoning, portions of these roads would be of varying antiquity, and perhaps local and regional elites had some role in refining the system, which would account for the attempts to create origin stories for them.

Colm O' Lochlainn's (1940) essay on roadways in ancient Ireland is considered the seminal piece of work on the *slighe*. By consulting itineraries from accounts such as The Tripartite Life of St. Patrick and *Táin Bó Cuailnge*, he produced a list of places joined by *slighe* and other roads. He also produced a map, illustrating the courses of the *slighe*, itineraries, probable roads, settlements and fords (Fig. 58). George Petrie (1839), Henry Morris (1938), Gustavus Hamilton (1913), Hermann Geissel (2006) and Peter O' Keeffe (2001) have also discussed potential routes for these roads. While Petrie, Morris and Hamilton took their leads from the mythologies and itineraries as O' Lochlainn did, Geissel combined this approach with fieldwork, producing a very detailed description of his proposed *Slighe Mór*, while O' Keeffe focussed on identifying old roads from the existing system. The results are of varying quality and the suggested courses for the roads are in some instances drastically different. O' Keeffe (2001) criticises O' Lochlainn for suggesting routes for which he believes there to be no evidence for early roads, but O' Keeffe's own approach relies too heavily on preserved roads and those which are illustrated on 17th and 18th century maps. A road in decline may not have been illustrated on such maps, and may be barely visible in the landscape after only a few generations of disuse or landscaping. Thus, while consultation of documentary records and maps are helpful, they should be combined where possible with a variety of field observations.

In order to explore the extent to which this system of roads connected various settlements throughout Ireland, the background of each of the five roads will be explored in detail here. The picture which they create is one of well-connected royal sites and ecclesiastical settlements, which were able to increase their control and prosperity by expediting communication to distant areas and engaging in trade and exchange along the routeways. What follows is an overview of the background of each of these roads, as well as the potential courses they took as suggested by several authors. The illustration of these roads on the accompanying maps demonstrates how extensive this system of movement was, creating a complex network of interconnecting roads.

6.3.2 Slighe Mór

The *Slighe Mór*, or Great Road, has strong associations with the *Eiscear Riada* and is described as following its course. This has led to a number of authors, including O' Lochlainn (1940, 471), using the two names interchangeably. Indeed, even the Book of Leacan uses the names as synonyms, describing its course from Athcliath Cualann (Dublin) to Athcliath Meadhraidh (Clarinbridge) and attaching its discovery to Nar, son of Aengus of Umhaill (Petrie 1839, 229). Similarly, the *Dindshenchas* poem reads;

> 'The line that divides Erin in two
> Was the Escir Riada (it was no lie)
> Whose name, held in bright renown,
> Was the Great Road, greater than any tilled plain' (Gwynn 1903d, 283).

The relationship between the two entities was obviously a very close one to the chroniclers, and it explains the dilemma of separating the road from the natural feature. The difficulty lies in the fact that the *Eiscear Riada* is not a single, continuous feature as described in these accounts. Rather, it is a series of discontinuous, parallel and serpentine ridges which extend in an approximately east-west orientation between Dublin in the east and Clarinbridge in the west. This discontinuity has complicated any attempt to define the course of the *Slighe Mór*. Despite this, it is quite evident that the *Eiscear* would indeed have served as a road (Fig. 60). Its name translates to 'ridge of riding', implying that not only was it used for movement, but it was associated specifically with riders on horseback, meaning it was a road used by elite members of society. The law tracts describe the use of ditches for major roads, and while this is not evident on the eskers, the natural drainage of these features would have meant they did not require a ditch.

O' Lochlainn's conclusion is the most well-known itinerary for the *Slighe Mór* (Fig. 61). He described two potential routes, with his preferred option passing through North Offaly and crossing the Shannon at Clonmacnoise, while a second option takes a more northerly esker chain through Westmeath via Clonard, and converging with the first option west of the Shannon. The second route still exists in the form of the R148 and R446, formerly the N4 and N6. The Book of Leinster also described the *Slighe Mór* as having passed through Clonard, suggesting that this was a route which was understood by some as the *Slighe Mór*, at least in the 12^{th} century.

Figure 60 The Pilgrim's Road follows the Clonmacnoise esker

A number of authors agree generally with O' Lochlainn's first option, with a few minor changes. Doran (2004, 65–68) follows O' Lochlainn's lead, but draws our attention to the ford known as *Snámh Dá Éan*, the legendary ford believed to have been at Creevagh / Cloonburren, which may have served as the river crossing before the construction of a bridge at Clonmacnoise in the 9^{th} century. Fitzpatrick and O' Brien (1998, 6) propose that the *Slighe Mór* entered Offaly south of Clonard before passing Croghan and diverting slightly to take a route via Kilclonfert to Rahugh. While Geissel (2006) uses O' Lochlainn's route as a guide for his investigations, he favoured a route from Dublin via Clondalkin to Celbridge. This route diverges from the glacial sediments which are found at Lucan, and he does not offer a suitable landscape, documentary or place name reason for this change of course, apart from the importance of St. Mochua's monastery at Clondalkin. He also deviates from O' Lochlainn between Ballinasloe and Killtullagh. O' Lochlainn's route requires a deviation southwest from Ballinasloe to Aughrim, ignoring the esker ridge which leads in a westerly direction most of the way to Kilconnell. While Geissel's route does not adhere to the esker either, it makes occasional use of it on the way to Kilconnell, making his suggestion a closer match with the *Eiscear Riada* connection.

Other authors argue for a more northerly route, similar to O' Lochlainn's second suggestion, and some of which use Tara as the end point. Smyth (1982, 29, 152–155) believed the *Slighe Mór* to have run from Brega to Athlone, with a path along the dryland between Clonfad and Tyrellspass which formed the southern boundaries of the Fir Bile, Fir Tulach and Cenél Fiachach. O' Keeffe (2001, 75–81) similarly favours a northern route to Athlone, although his reasoning is dubious as he makes the erroneous claim that the ford at Athlone was the only one to have been named *Ath Mór*, which he concludes must be associated with the *Slighe Mór*. He also disputes O' Lochlainn's route from Timahoe to Monasteroris, because the road from Timahoe to Carbury is not illustrated on Taylor's 1783 Map of County Kildare. As discussed previously, the depiction of roads in later maps is a helpful method, but by no means conclusive as to the existence or otherwise of roads which may have gone out of use by the time of survey.

The obvious difficulty is in resolving the accounts which have it following the *Eiscear Riada* from Dublin, and those which attest it was associated with Tara. O' Keeffe (2001, 75–81) is of the belief that the *slighe* all led to Tara. He believes the association with the *Eiscear Riada* is a false assumption, and that it only joins with the eskers on the west side of the River Shannon but that this detail was misrepresented by the chroniclers. This seems unlikely, because the finest and most continuous portions of the esker which merit the concept of a boundary and routeway are to be found east of the Shannon. His reason for avoiding the esker in the east is because of his belief that the *Slighe Mór* began in Tara and that it made use of the ford at Athlone. A route from Tara need not ignore the eskers, however, as demonstrated by Petrie (1839, 229), who suggested that it ran from Tara off *Fan na gCarbad* (The Slope of the Chariots), before turning southwest through Trim to reach the *Eiscear Riada*. Since the eskers were used for movement, there was undoubtedly a version which continued along these features to Dublin, possibly with a connecting route to Tara at a convenient location as the royal site increased in importance. This could potentially lead to the use of the name *Slighe Mór* for multiple roads, also explaining why the Clonard-Moate and Croghan-Clonmacnoise routes may have shared the name.

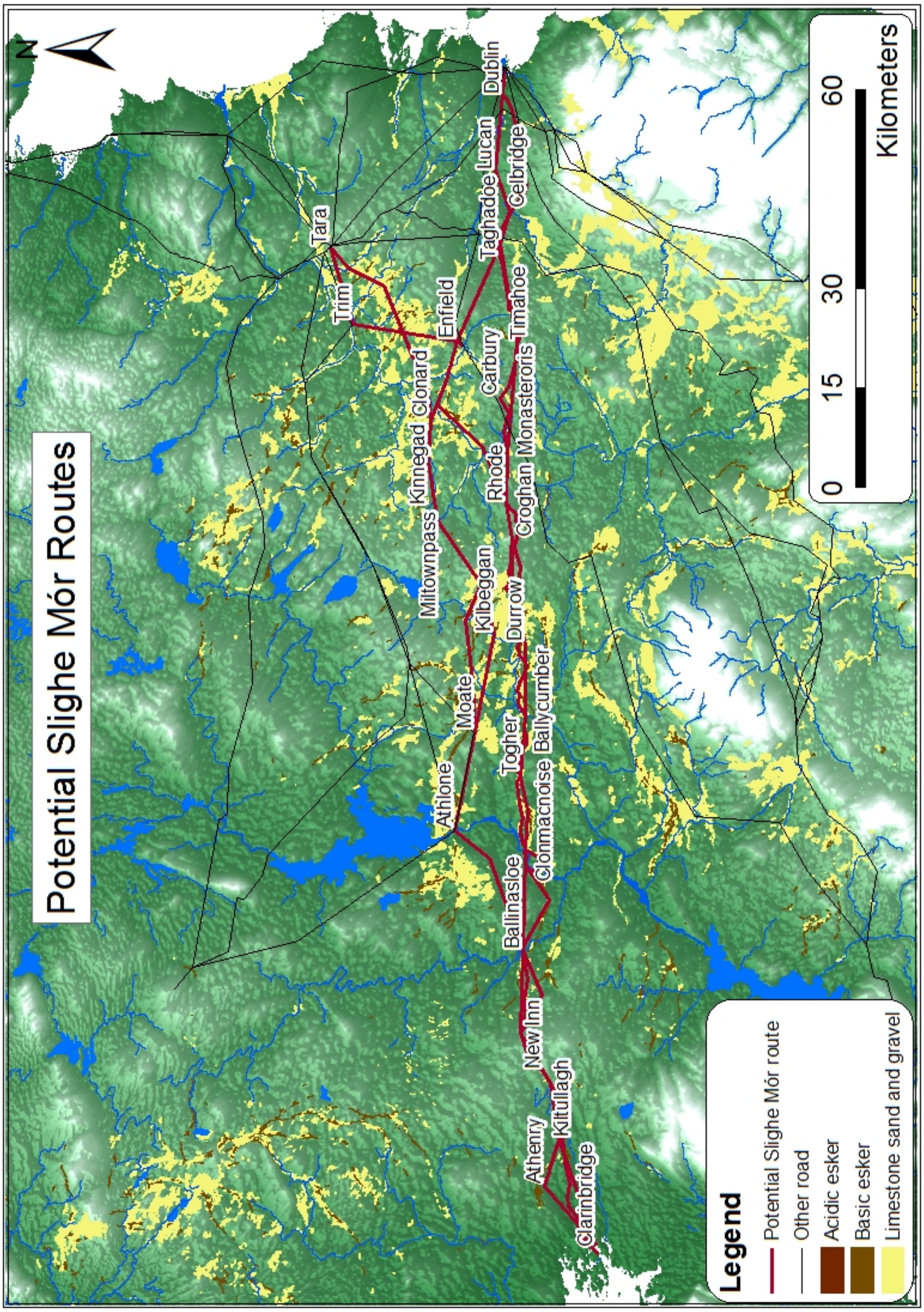

Figure 61 Potential routes suggested for the Slighe Mór. Note the adherence to esker ridges. (Petrie 1839, O' Lochlainn 1940, Smyth 1982, Fitzpatrick & O' Brien 1998, O' Keeffe 2001, Doran 2004, Geissel 2006)

Table 1 Suggested courses of the Slighe Mór

O’ Lochlainn	Geissel	O’ Lochlainn 2	O’ Keefe
Dublin	Dublin		
	Cornmarket		
	Clondalkin		
Lucan	Peamount		
	Loughtown Lower		Tara
Celbridge	Celbridge		Kilmessan
	Griffinrath		Galtrim
Taghadoe	Taghadoe		Rathmolyon
	Dunmurraghil		
	Staplestown		
Timahoe	Timahoe	Enfield	Togher
	Derrinturn	Moyvally	Longwood
	Carbury	Clonard	Clonard
	Clonmullen		
Monasteroris	Monasteroris	Kinnegad	Kinnegad
Rhode	Rhode		
	Ballybeg	Kilbride Pass	
Croghan	Croghan	Milltown Pass	
	Mullagharush	Tyrellspass	Tyrellpass
Kiltober	Rahugh	Killavally	
Durrow	Durrow		Ballynagore
	Ashfield	Kilbeggan	
	The Erry Way		Doghill (Dunard)
Ballycumber	Ballycumber		
	Boher	Moate	Moate
	Killaghintober		
Togher	Doon		
Ballaghurt	Pilgrim’s Road		
Clonmacnoise	Clonmacnoise		Athlone

	Coolumber		Cornafulla
	Cloonburren		
	Clonfad		
Ballinasloe	Ballinasloe		Ballinasloe
Aughrim	Knockroe		
	Knockglass		
	Cappagh		
Kilconnell	Kilconnell		Kilconnell
	New Inn		
Bellafa	Bellafa		
	Killescragh		
Kiltullagh	Kiltullagh		Kiltullagh
	Slieveroe		Athenry
	Slievaun		
Clarinbridge	Clarinbridge		Clarinbridge

6.3.3 Slighe Dála

The *Slighe Dála* was the principle route from Tara to West Munster, and was said to have acted as a boundary of North Munster (O' Lochlainn 1940, 471) and of the diocese of Killaloe (FitzPatrick et al. 1998, 6). Its *discovery* was associated with Setna Serc-derg, son of Durbaide, before the Druids of Irmumhain. Its name comes from Dála, whom in some accounts was the son of Umhóir (ibid.), while according to the *Dindshenchas* poem, he was a Scythian and the son of Edlec (Gwynn 1903d, 277). The alternative name of *Bealach Muighe Dála* was sometimes used, and the name of Ballaghmore, Co. Offaly, is derived from it (FitzPatrick 2003).

O' Lochlainn once again suggested two potential routes (Fig. 62). He favours a southerly route which passes central Kildare, Laois and North Tipperary, terminating at Tarbert in Co. Limerick. His second option skirts the northern border of Kildare, before entering Offaly and joining the southern end of the Midland Corridor at Ballyboy and returning to his preferred route at Nenagh. The Bronze Age origins of the northern route have been discussed previously (Chapter 5), and in fact, both of these routes were described as prehistoric in the North Munster Project (Fig. 31) (Grogan 2005b, 27). In Counties Laois and Offaly, a road known locally as the *Old*

Munster Road passed by Clonaslee and the 6th century monastery of Letter, meeting the northern route at Ballyboy (O' Brien 2006, 205). It is associated with the *Slighe Dála* and sometimes known by that name. This path through the region of the Slieve Bloom Mountains appears to have been a regional road which was unlikely to have been the *Slighe Dála* proper when more appropriate lowland terrain is available beyond the uplands. The most likely interpretation is that it absorbed the name of the *Slighe Dála* as it connected to it.

Other authors produce itineraries which are most compatible with O' Lochlainn's southerly route, and the evidence which pointed him to the northerly route was later expanded on by Smyth (1982) to identify the Midland Corridor. Perhaps, as with the Old Munster Road, this route was sometimes known as the *Slighe Dála* because it led to the *Slighe Dála* proper. Accounts such as St. Carthage's travels to Lynally compound the problem, as he is said to have travelled along the *Slighe Dála* to his destination. Having come from Co. Kerry, the *Slighe Dála* would indeed have been the appropriate route to leave Munster, but I suggest that the account simplifies the journey and that he would have diverged from it as he reached the Midlands.

A number of features which are thought to have been the *Slighe Dála* were visible up until quite recently (FitzPatrick 2003, 170). One portion was visible c. 200m southeast of Ballaghmore Castle, Co. Laois, and was illustrated on the Cassini 6 inch map. Another portion, also illustrated on the Cassini map, can be found 7km to the southeast, running past Brandybush Fort in the townland of Cashel. This would create a northward curving route between Aghaboe and Ballamore, skipping Borris in Ossory from O' Lochlainn's route. A possible portion identified by FitzPatrick at Clonfert-Molua would fit into this projection.

Smyth (1982, 71–73) deviates slightly from O' Lochlainn, with a route which takes a more direct path from Monasterevin to Roscrea. In so doing, he similarly concludes that the *Slighe Dála* ran through Clonfert-Molua and Ballaghmore on *Bealach Mór Maige Dála*. While O' Keeffe's (2001, 82–85) route is generally more southerly than all of the other authors, he converges with O' Lochlainn near Abbeyleix and ultimately with all of the other authors at Ballaghmore.

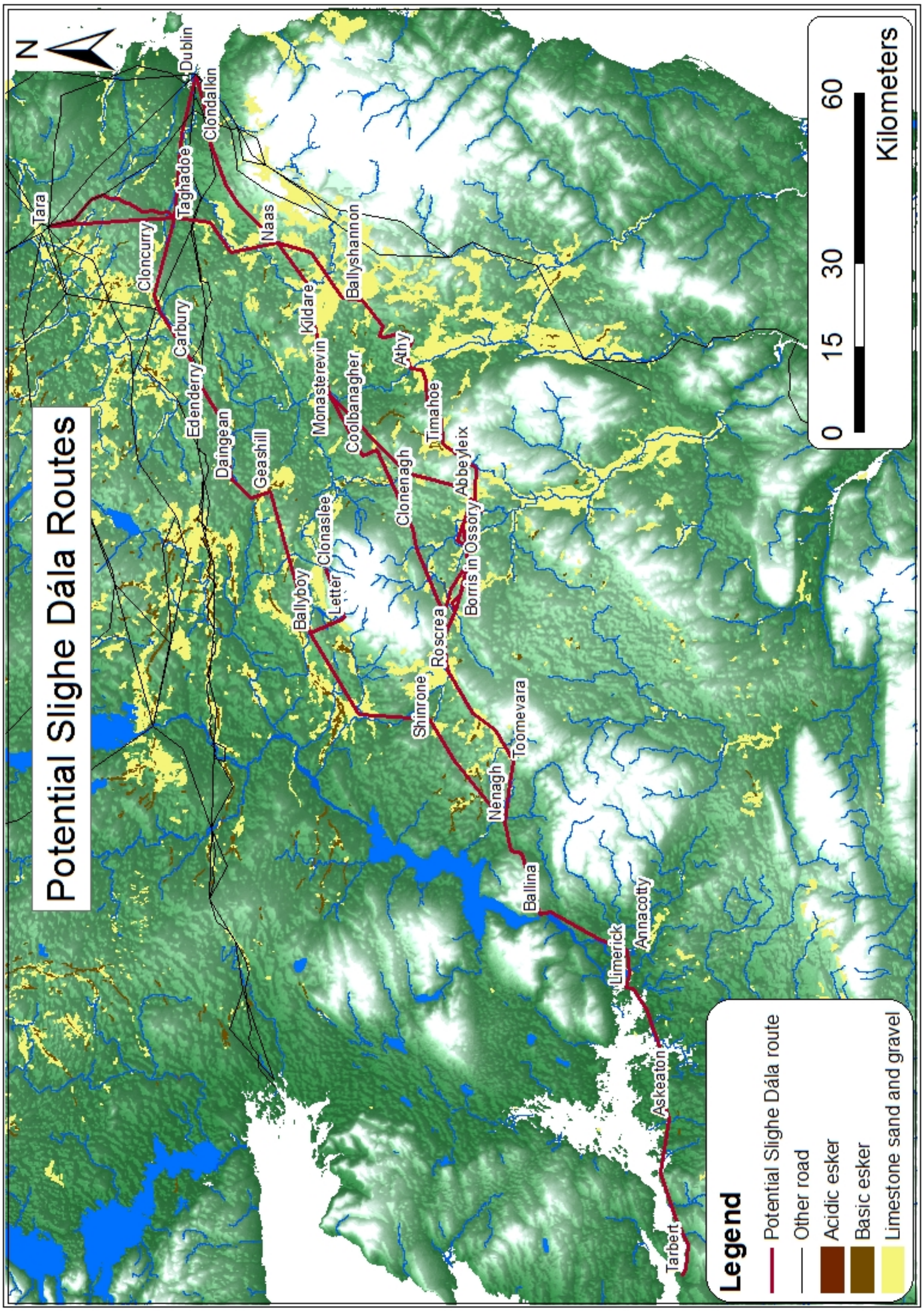

Figure 62 Potential routes suggested for the Slighe Dála. (O' Lochlainn 1940, Smyth 1982, O' Keeffe 2001, Fitzpatrick 2003, O' Brien 2006)

Table 2 Suggested courses of the Slighe Dála

O' Lochlainn	O' Lochlainn 2	Smyth	O' Keeffe	Fitzpatrick
Dublin	Dublin		Tara	
Drimnagh	Castleknock		Dunshaughlin	
Clondalkin			Parsonstown	
Newcastle			Blackhall Big	
Oughterard	Maynooth		Maynooth	
	Cloncurry		Taghadoe	
			Clane	
Naas			Naas	
Newbridge	Johnstown		Stephenstown	
			Ballysax	
Kildare	Carbury	Kildare	Ballyshannon	
Monasterevin	Edenderry	Monasterevin	Athy	
Togher	Ballyleakin	Coolbanagher	Timahoe	
Rathleague	Daingean	The Great Heath of Maryborough	Knockamoe	
Ballyroan	Ballinagar		Monks' Bridge / Knapton Bridge	
Abbeyleix	Geashill		Abbeyleix Old Town	
Shanahoe		Clonenagh	Shanahoe	
Aghaboe		Mountrath	Aghaboe	Aghaboe
			Knockroe	Cashel
Borris-in-Ossory		Clonfert Molua	Derrin	Clonfert-Molua
Ballaghmore	Ballyboy	Ballaghmore	Ballaghmore	Ballaghmore
Roscrea		Roscrea	Roscrea	
Dunkerrin	Birr			
Moneygall	Shinrone			

Toomevara	Cloghjordan			
Shanbally				
Nenagh	Nenagh			
Kilcolman				
Carraigatogher				
Ballina (Killaloe)	Ballina (Killaloe)			
Castleconnell				
Annacotty				
Limerick				
Mungret				
Kildimo				
Kilcornan				
Askeaton				
Foynes				
Tarbert				

A notable intersection of routes is where it meets the River Shannon at Ballina / Killaloe, the ford which was so important in this region in the Bronze Age and as far back as the Neolithic period (See Chapter 5). The road continued along the east side of the river, passing the fords at O'Briensbridge and Castleconnell which were also in use in prehistory. Thus, while the route was primarily one which connected Counties Limerick and Tipperary with the Central Eastern Plain, the proximity of the road to these fords would have also allowed it to service movement from Co. Clare.

6.3.4 Slighe Assail

The *Slighe Assail* connected the eastern region to the Connacht royal site of Rathcroghan. Its mythological *discovery* was made by Asal, son of Dordomblas or of Dor Donn (Petrie 1839, 228; Gwynn 1903d, 281). It is associated with *Fan na gCarbat* (The Slope of the Chariots) at Tara, and connected that royal site to Tailten and Uisneach. It was also said to have formed a dividing line between North Meath and South Meath (O' Lochlainn 1940, 472).

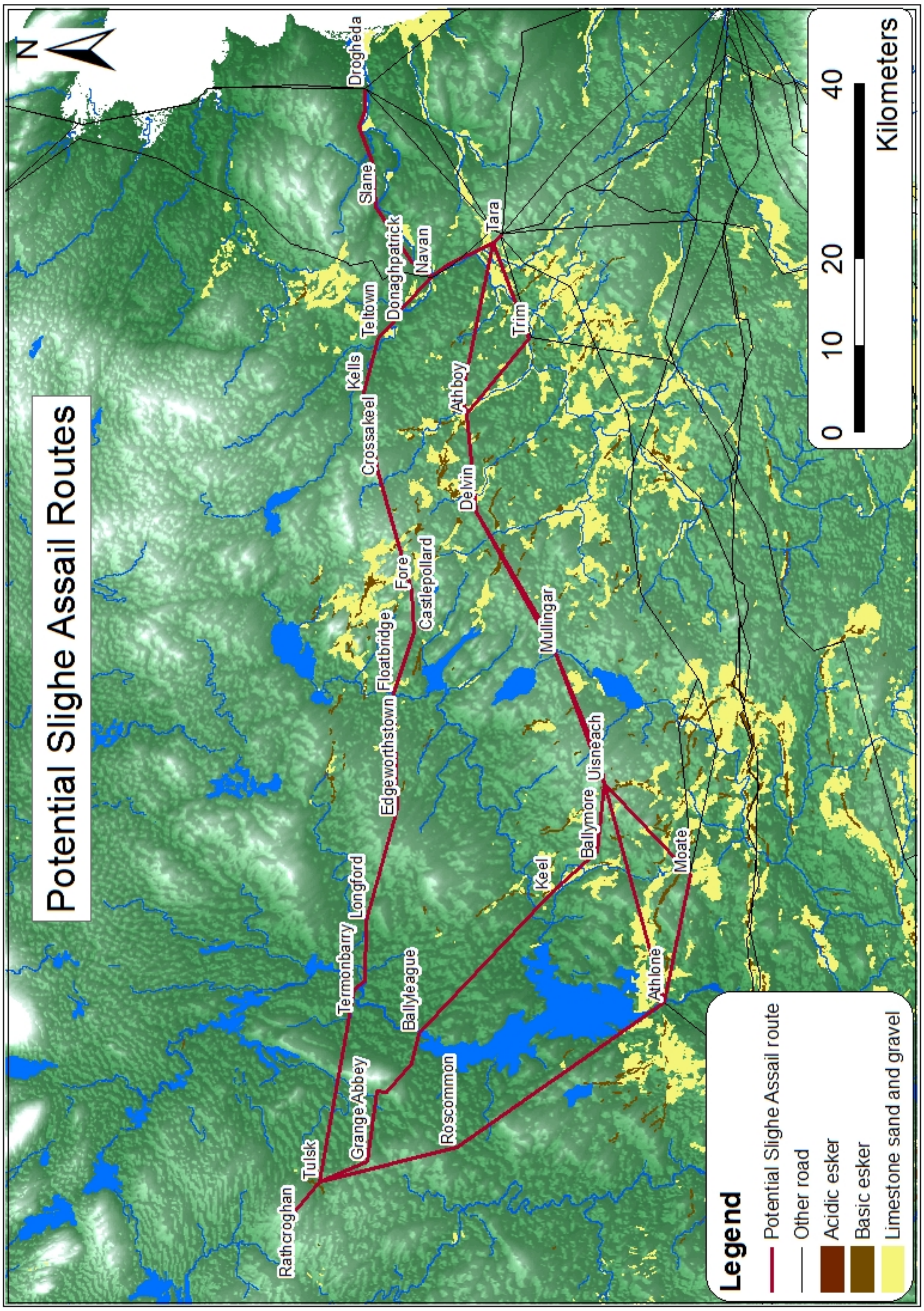

Figure 63 Potential routes suggested for the Slighe Assail (Petrie 1839, O' Lochlainn 1940, Smyth 1982, O' Keeffe 2001)

O' Lochlainn described the course of the road as diverging from the *Slighe Midhluachra* at Drogheda, before travelling through Meath, the north of Westmeath, and Longford, and terminating at Rathcroghan (Fig. 63). He also suggested a second route, although he does not assign the name of *Slighe Assail* to it. This road takes a more southerly course, passing Tlachtga and Uisneach before fording at Athlone. This appears to have been the option favoured by Smyth (1982, 154–155) and by O' Keeffe (2001, 71), who goes on to describe two possible paths diverging at Uisneach. One option crosses the Shannon at Athlone as O' Lochlainn does, while the second takes a northerly course from Uisneach to cross the Shannon north of Lough Ree at Ballyleague, and he suggests that the Iron Age trackways of Corlea 1 and Derraghan More may have been part of the route.

Immediately obvious is the contradiction of a road of the same name connecting Tara to Tailten, to the northwest, and Uisneach, to the southwest, before terminating at Rathcroghan. Doran (2004) has produced a coherent study of communication routes in medieval Longford and Roscommon, where she itemised a number of secondary routes which connected the *Slighe Assail* to other important sites and to link with the *Slighe Mór*, forming a latticework of roads. It is conceivable that some of these roads were known locally as the *Slighe Assail*, because they ultimately led to that route. As to which of them is the most promising route, the southern option of O' Lochlainn, Smyth and O' Keeffe is of such close proximity to the *Slighe Mór*, indeed coinciding with some itineraries for that road, that the northern option would be more effective as a radiating communication route.

Table 3 Suggested courses for the Slighe Assail

O' Lochlainn	O' Lochlainn 2	O' Keeffe	O' Keefe 2
Drogheda			
Slane			
Navan	Tara	Tara	
Donaghpatrick		Trim	
Teltown	Tlachtga		
Kells	Athboy	Athboy	
Crossakiel	Delvin	Delvin	
Fore	Rath Connell		
Kinturk (Castlepollard)	Ath Cinn Conn	Ath Cinn Conn	
Floatbridge	Lochanvally		

Edgeworthstown	Uisneach	Uisneach	Uisneach
		Ballymore	
Longford	Moate	Keel	
Cloondara			
Termonbarry	Athlone	Ballyleague	Athlone
		Cloondara	
		Aghamuck	
		Clooncah	
		Grange Abbey	Roscommon
Tulsk		Tulsk	Tulsk
Rathcroghan		Rathcroghan	

6.3.5 Slighe Midhluachra

The *Slighe Midhluachra* was a coastal road, connecting the Central Eastern Plain to the north of Ireland and to the royal site of Eamhain Macha. It was named after Midluachair, son of Damairne, and is described in the stories of *Togail Bruidne Dá Derga* and *Caithreim Conghail Clairinghnigh*.

O' Lochlainn (1940) concluded that the route ran from Dublin northwards along the coast to Dundalk and Newry, before terminating at Dunsverick (Fig. 64). This route would have required a connecting road to Eamhain Macha, and while he described a number of other potential connecting roads in Ulster, he did not provide a suitable suggestion for travelling to this location. Petrie (1839, 230) suggested that the *Slighe Midhluachra* ran from Tara to Duleek and Drogheda, and he labelled the existing road northeast from Tara as such. This opinion was shared by Hamilton (1913), who went on to explain that the road continued along the coast to Dundalk, where it diverged into two separate roads. One roughly followed O' Lochlainn's itinerary northwards, while the other, known as the *Bealach Mór an Fheadha*, terminated at Eamhain Macha, thereby providing the desired connection to the royal site.

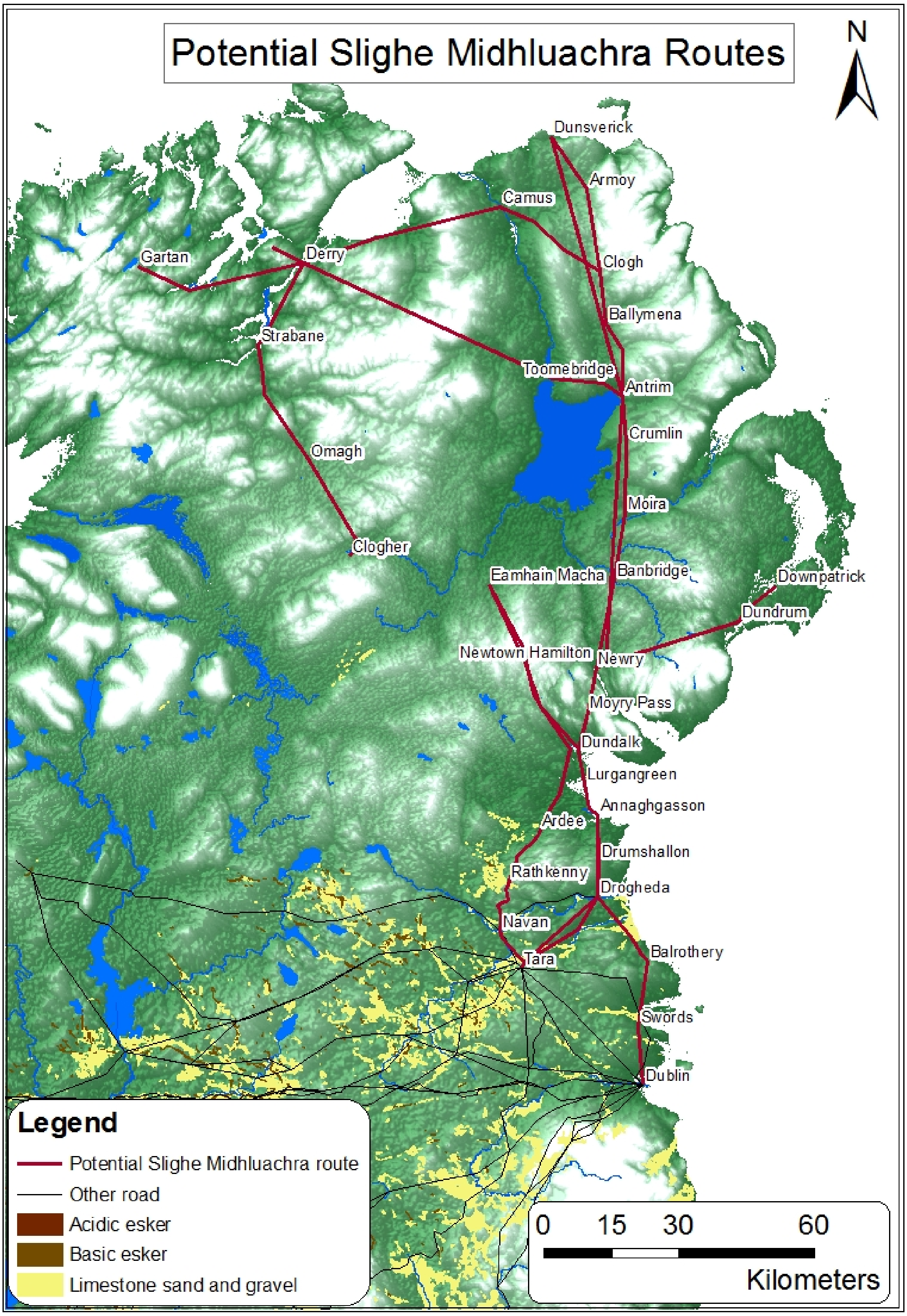

Figure 64 Potential routes suggested for the Slighe Midhluachra (Petrie 1839, Hamilton 1913, O' Lochlainn 1940, O' Keeffe 2001)

O' Keeffe (2001, 67–68) devises a very different route from Tara, maintaining an inland course through Counties Meath and Louth, before following a route similar to the *Bealach Mór an Fheadha* to *Eamhain Macha*. He consulted *Caithreim Conghail*

Clairinghnigh, in which Congal marched north from Tara to Benna Breag. He concludes that this must be Slieve Breagh, north of Slane, believing that this would rule out Hamilton's route, but confirm his own. On a closer reading of the text, however, it is evident that Congal passed a number of other locations (*Ath fuar* / *Ath in Oighe*, *Críoch Rois*, *Magh Temil Mhara* / *Fochaird Mhór Muirthemhne*) before he reached "the Rough Way, called the Great Way of Miodhluachra" (MacSweeney 1902, 31). In short, it seems that the inland route from Tara taken by Congal was not known as the *Slighe Midhluachra*, and that it was not until *Fochaird Mhór Muirthemhne*, which Hamilton suggests is Faughert, 4km north of Dundalk, that Congal joined up with the *Slighe Midhluachra*. Similarly, in *Togail Bruidne Dá Derga*, Conaire travels righthandwise around Tara, and lefthandwise around Bregia, but it is not until he reaches the coast, somewhere in the vicinity of Howth, that the *Slighe Midhluachra* is named as a potential road (Stokes 1902, 33–34). It would appear from this story, therefore, that the road ran from the Dublin coast northward.

Table 4 Suggested courses for the Slighe Midhluachra

O' Lochlainn	Hamilton	Petrie	Hamilton 2	O' Keeffe
Dublin	Tara	Tara		Tara
Swords				Dowdstown
Balrothery		Duleek		Kilcarn
Clonard				Pollboy Bridge (Navan)
Gormanstown				Batterstown
				Proudstown
				Castletown
				Kilberry
Drogheda	Drogheda	Drogheda		Scottstown
				Windy Harbour
				Mullaghmore
				Rathkenny
				Mullaghreggan Cross
				Mountain House Cross

Drumshallon				Footstown
				Cusack’s Cross
				Purcellstown Cross
				Oberstown
				Ardee
Anagasson	Annaghgasson			Maplestown Bridge
				Darver
Lurgangreen	Lurgangreen			Affane Bridge
Dundalk	Dundalk		Dundalk	Castletown
Moyry Pass	Moyry Pass		Silverbridge	Silverbridge
Newry	Newry			The Dorsey
Banbridge	Crown Bridge		Newtown Hamilton	Fews Blackbanks
Moira			Navan Fort	Navan Fort
Crumlin				
Antrim				
Kells / Connor				
Ballymena				
Donaghy (Clogh)	Dunloy			
Armoy				
Dunsverick	Dunsverick			

6.3.6 Slighe Chualann

The *Slighe Chualann* was the road south from the Central Eastern Plain, which the Book of Leacan attributed to Fingin, son of Eogabail (Petrie 1839, 229). The story of *Togail Bruidne Dá Derga* describes it as a coastal road. Most authors, however, agree on a more inland route through the Dublin foothills, West Wicklow and along the Barrow Valley.

O’ Lochlainn (1940) suggests such a route, joining the Barrow valley at Leighlinbridge as far as New Ross, before tracing the course of the existing R704 to Waterford (Fig. 65). This route included St. Mullins, which was part of the Leinster border, fitting into the scheme whereby these principle roads are so often are associated with boundaries. It also formed a crossroads, as this point of the River Barrow was a ferry point (Smyth 1982, 63). Morris (1938) similarly suggested an inland route from Dublin, along the River Dodder and through the foothills on the west side of the Dublin mountains to the Ballinascorney Gap. His motivation for settling on this route rests with the names of Bothercolyn and Bothar na Breena either side of the River Dodder.

Petrie (1839, 229) suggested that Tara was connected via a road through Ratoath and Dublin, proposing a path due East past Tara Hall (Fig. 59). Morris (1938, 114) dismissed this as he believed the land between Tara and Ratoath too swampy to accommodate chariots. Apart from the former lake at Dunshaughlin, however, this is untrue. The land in this area is moderately well-drained limestone till which would require only the digging of ditches to facilitate a good quality road, an intervention which the law tracts tells us would have been practiced (See Chapter 6.4.2). As well as this, the crannóg at Lagore and the ecclesiastical site at Dunshaughlin were important sites which would have required a means of communicating with Tara. The best way to accomplish this would have been to take the existing road south from Tara, which Petrie labelled the *Slighe Dála* (1839, 230), to follow the contours past Killeen Castle, Dunshaughlin, Lagore and Ratoath. A route past Ratoath would also have been the most direct path to Howth, which is mentioned in the *Togáil Bruidne Dá Derga*.

Morris suggests an alternative course, based on an itinerary which he does not disclose, from Tara due east to Hollywood, before moving southwards to Dublin. This seems an unusual choice to reach the Dublin coast from Tara, as it requires a descent into the Gabhra Valley, before a steep ascent to Skryne and another descent towards the Hurley River. It would, however, make sense to pass the Garristown / Hollywood region if a route had been taken between Tara and Brega towards the coast, as per Conaire’s travels in *Togáil Bruidne Dá Derga*. O’ Keeffe (2001, 82) proposes a route from Tara via Killeen, Dunshaughlin and Clonee to Dublin, and suggests that there is no evidence that the road went further than Oldbawn before AD 350. After this time, he suggests a route which runs parallel to O’ Lochlainn, before merging at Baltinglass for a time and terminating at Bealach Gowran, which is another boundary location for the kingdom of Leinster (Smyth 1982, 11).

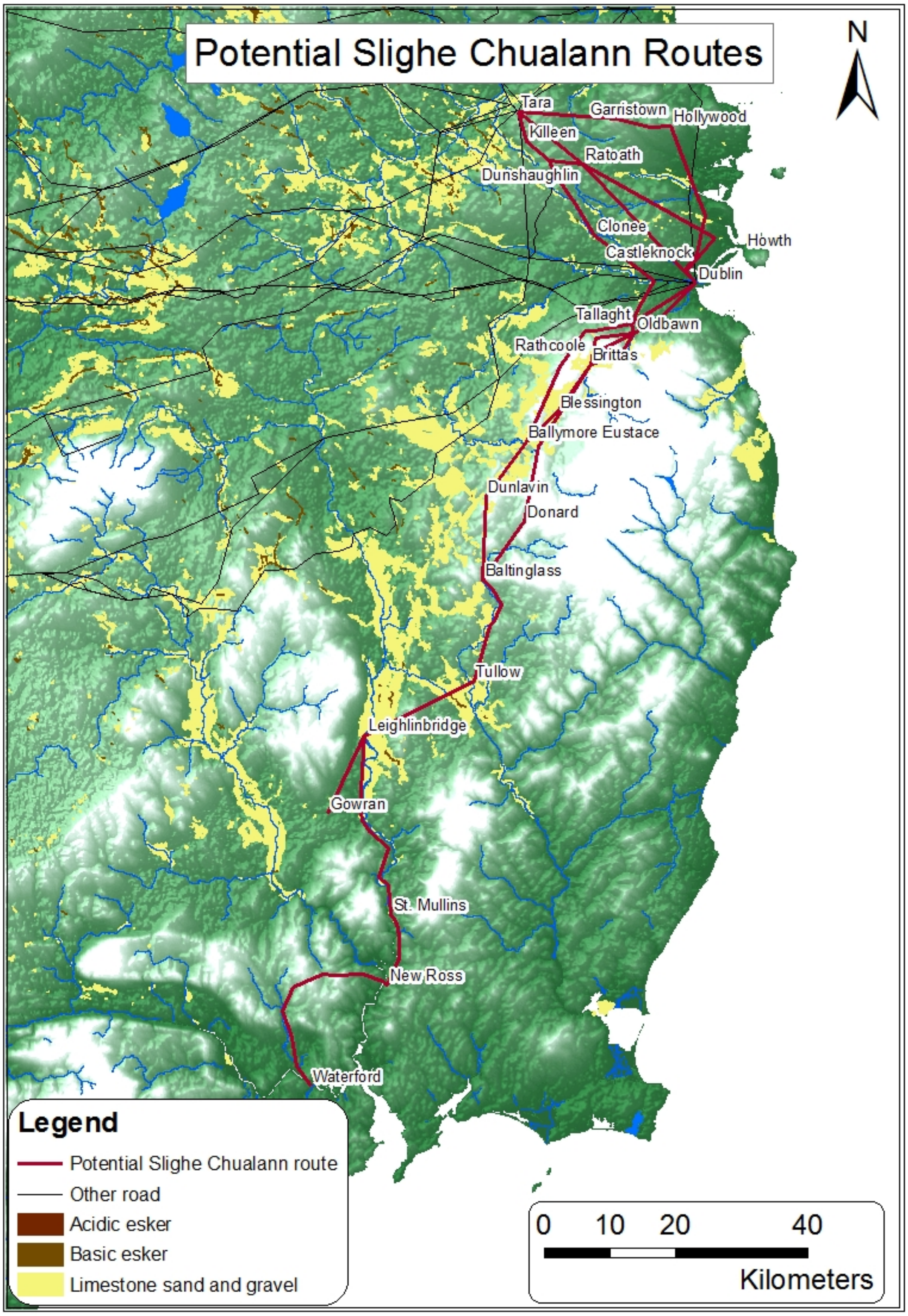

Figure 65 Potential routes suggested for the Slighe Chualann (Petrie 1839, Morris 1938, O' Lochlainn 1940, Smyth 1982, O' Keeffe 2001)

Table 5 Suggested courses for the Slighe Chualann

O’ Lochlainn	Petrie	Morris	O’ Keeffe
	Tara	Tara	Tara
		Garristown	Killeen
	Ratoath	Mallahow	Dunshaughlin
		Hollywood	Piercetown
		Feltrim	Clonee
		Artane	Castleknock
Dublin	Dublin	Dublin	Dublin
		Butterfield	Grenhills Road
Tallaght		Oldbawn	Tallaght
Saggart		Knockannavea Hills	Oldbawn
Rathcoole			Ballinascorney Gap
Kilteel		Brittas	Brittas
		Blessington	
Ballymore Eustace		Ballymore Eustace	Horsepass
Dunlavin			Donard
Baltinglass			Baltinglass
Rathvilly			Rathvilly
Tullow			Tullow
Leighlinbridge			Leighlinbridge
Goresbridge			Gowran
Ullraid			
Graigmanagh			
St. Mullins			
Ross			
Rossbercon			
Waterford			
Saggart			

Leaving aside the route from Tara to the coast, it appears from *Togail Bruidne Dá Derga* that Congal did not meet the *Slighe Chualann* until he was at the coast and had the option of choosing either it or the *Slighe Midhluachra*…

> 'Great fear then fell on Conaire because they had no way to wend save upon the Road of Midluachair and the Road of Cualu. So they took their way by the coast of Ireland southward.' (Stokes 1902, 27)

He had not travelled in the proper way from Tara, but the fact that the name is only used when he approaches the coast may indicate that the *Slighe Chualann* proper began on the coast, where it diverged from the *Slighe Midhluachra*.

O' Lochlainn (1940, 473) was not of the opinion that it was a coastal route, suggesting that the idea came from the etymology of Booterstown (*Baile an bhóthair* or the place of the road). His route thus goes inland along the western side of the Dublin and Wicklow Mountains as he concludes that;

> 'all of the warfaring and most of the wayfaring of early times followed the inland route, and there is a singular lack of any coastal road in the hilly region of E. Wicklow'.

Moreover, Smyth (1982, 26) raises the issue of the lack of ecclesiastical settlements or knowledge of any dynasty between the coast at Arklow and Moyacomb on the Carlow / Wicklow border, and he concludes that the area was an uninhabited wilderness of woodland and bog, which would have no need for a road and no way to maintain it. He suggests (ibid, 52) that the confusion lies in the difficulty of early topographers in identifying the region of Chualu, which lies in the foothills of South Dublin. This appears at first to be inconsistent with the coastal description in *Togail Bruidne Dá Derga*, but the story only described a journey south as far as Dá Derga's hostel, which is said to have been at Bohernabreena, near Oldbawn in South Dublin (Morris 1938, 117; Smyth 1982, 11). Conaire had been seen from the Hill of Howth, suggesting his route was nearby as he travelled south. A journey from Howth to Oldbawn would have involved 8-10km of coastal route before turning inland to the supposed hostel, making it a true description in the context of the story.

6.3.7 Summing up the Slighe

The description of these entities as *roads* must be addressed. The records name them as roads, and the law tracts below (Chapter 6.4) describe the modern understanding of a road. Prior to this, passes and wetland trackways would have been defined spaces of movement, but most inter-regional movement would have made use of vaguer *routeways,* informed by piloting and the use of cognitive mapping. Territoriality and the enclosing of land may have encouraged the move towards roads, as we see in the use of the *Eiscear Riada* and the *slighe* as boundaries, but the mode of travel may have been equally as important. These roads are understood to have been royal, and would have been used by elites who travelled by horse or chariot, which would have required suitable surfaces.

It would be foolish, however, to attempt to identify on the landscape the exact courses of these roads. Roads are entities in flux which wax, wane and are altered in response to current requirements, settlement patterns and modes of travel. There may even have been seasonal alternatives with winter routes and summer routes. In addition to this, other roads may have been conflated with the idea of principle roads, if they were part of a branched system which ultimately connected to the inter-regional road. Smyth (1982, 72) cautions against too rigid an attempt to define the course of an ancient road, and any areas of open landscape would have allowed all manner of options for movement in a period before systematic enclosure of land. The potential obstacles, such as woodland, rivers and bogs, are the areas that deserve the most attention in this regard. It is evident that accounts of the courses of these roads are not always consistent, and as we rely on mythologies and itineraries of early clerics, caution must be exercised.

Morris (1938, 113) was of the belief that the *slighe* fell out of use and became downgraded to less important roads because of the decline of Tara as a political centre and the end of the use of war chariots. The latter reason does not hold up to scrutiny, as movement by other wheeled vehicles and by horses would have persevered, both of which require roads. Some portions of the *slighe* would indeed have fallen out of use as political structures and settlement patterns changed; a prime example being the decline of Clonmacnoise and the rise of Athlone causing the principle westward movement to take a more northerly route. Moreover, the maintenance of Gaelic roads had relied on Gaelic power structures and adherence to Brehon law (See Chapter 6.4.2). The landscape dynamics would still have accommodated easy routes in the same locations, however, and new settlement would naturally gravitate towards them, even through periods of invasion and plantation, so many portions would have continued in use. It is clear from O' Lochlainn's (1940) itineraries and map that he believed many existing regional roads were part of the system of royal roads. Meanwhile, early cartographers recorded roads and causeways in an attempt to understand the landscape, as we see in the 1563 'Map of Leis and Offalie' (Fig. 17). Thus, we are left with a system whereby some roads have been abandoned at different points in time, while others have had continuous use, such that all traces of the original road have been obscured or realigned within our contemporary system of movement.

6.4 Movement and the law

The Brehon law tracts, wisdom texts and triads provide valuable insight into Early Medieval lifestyles, covering a wide range of topics from mundane, everyday circumstances, to the rules surrounding exceptional events. This section will discuss the legal classifications of the different types of roads, as well as the responsibilities for maintenance and repair. This information points to the realities and experiences of people travelling in the Early Medieval period, illustrating how movement was performed. In particular, it shows the influence which political and ecclesiastical elites had over the system of movement.

6.4.1 Road quality

There were five major categories of road in Early Medieval Ireland. This hierarchy of roads made up a branched and latticed system of coherent paths suitable for a variety of traffic types, allowing the discussion of movement to move from the more ambiguous *routeways* to tangible *roadways*. The most important of these roads were the *slighe*, which functioned as royal roads or highways. They were followed by the *rout* (road), *lámraite* (byroad), *tógraite* (curved road) and *bóthar* (cow track). The *sét* (one animal track) and *rámat* (open space) are also mentioned in Cormac's Glossary. Kelly (1997, 538–539) provides a translation of the text relating to roads from Trinity College Dublin manuscript H 3.18 (no. 1337). It describes the five road categories above and their maintenance.

The *slighe* had to be large enough for two chariots to pass each other, and particular mention is made of the *slighe* accommodating a king and bishop passing each other (Kelly 1997, 538). These are inter-regional roads and the association with kings and bishops implies some sort of centralised control over a wide area, requiring some degree of agreement between regions and neighbouring kings in order to make coherent roads of such length under the agreed regulations. A *rout* was required to accommodate a chariot and two horsemen passing. The document (H 3.18) specifies that these roads were constructed as horse-roads of the locality (Kelly 1997, 538), while it is described in *Di Chetharshlicht Athgabálae* as a small road with a ditch (ibid, 544). The use of chariots and horses in the definition show it to have been used by those of high status, used as part of local power structures on a regional scale.

The *lámraite* lay between two *slighe* and was used for errands and winter visits by lords (Kelly 1997, 538). Connecting highways in this manner creates a network and improves access to a wider range of destinations. It would have been the responsibility of the local lord to order the maintenance of these roads. The *tógraite* was a private road belonging to someone of wealth, leading to a wood or mountain. These roads were tolled, and for every herd that passed, an animal had to be paid every second year. A *bóthar* was required to accommodate two cows, of which one was lengthways and the other widthways.

With the tumultuous relationship between neighbouring kingdoms at this time, it may have been difficult to maintain road quality over wide areas. However, given the association of bishops with these roads, as well as the preponderance of ecclesiastical sites along the *slighe,* perhaps the church may have played some role in this. Major monastic foundations were often located on these roads in border areas, maximising their access to patronage and facilitating communication. Cogitosus' *Life of St. Brigit* describes the construction of a road under the direction of a king (Connolly et al. 1987, 23–24), but an intervention by Brigit may hint at church involvement in this process. The road in question was due to cross a boggy area, and it was required to be solid and wide, capable of bearing the weight of chariots, wheels, horses and people. This was accomplished with a foundation of branches, rocks and earth. People were called from a seemingly wide territory of *túatha* for this project, and the account describes how they organised themselves into kinship groups and households so that each household could build its own section, allotted to them by draw. A powerful group had been assigned a portion made difficult by the course of the river, and they forced a weaker *túath* to take the difficult section in their stead. In response, St. Brigit performed a miracle by moving the course of the river away from the weaker *túath* to the group who originally had responsibility for it.

The hierarchy of roads illustrates how minor roads were connected to major inter-regional ones as part of a system of locally created and maintained roads. Of note here is how the *lámraite* were specifically intended to cover ground between the *slighe*. As we have seen, there are a number of competing suggestions for the courses of the *slighe*, some of which may have been no more than local connections to gain access to the major roads, essentially acting as *lámraite*.

6.4.2 Road maintenance

A road system requires maintenance to remain a safe and viable means of movement and communication. Some of this would be fulfilled simply through consistent use, but regular interventions were required to ensure standards and the suitability of the roads for wheeled vehicles. The types and occasions of maintenance are recorded within the law texts, and they reinforce the hierarchical nature of roads and their oversight, as well as revealing the occasions in which roads were used. Kings were responsible for ensuring their subjects made and repaired roads to a certain level of quality, with maintenance focussed in particular at times when a heavier volume of traffic was expected.

The manuscript H 3.18 (no. 1337) lists the three occasions on which a road must be cleared; the time of a rush of horses, the time of winter-visiting, and the time of battle (Kelly 1997, 539). The time of a rush of horses is sometimes interpreted as horse racing, but more commonly accepted to refer to the large volumes of traffic converging on assemblies. The reference to horses would be understood to imply elite members of society were among the traffic. Winter-visiting was practiced by lords, in which they would visit their clients in expectation of hospitality. A time of battle would involve the rapid movement of large amounts of horsemen and footmen. Thus, road maintenance was required during times of increased traffic, to ensure safe travel and to facilitate rapid movement.

The elite nature of these occasions is evident. Horses were associated with elite movement (Chapter 6.5), and the road repairs would ensure that their riders could arrive at assemblies unsoiled. Travel during winter could be treacherous and travellers would be easily soiled with mud, so by ensuring roads were maintained in advance of winter-visiting, easy and relatively clean passage was possible for lords. At times of battle, the task of getting fighting men to battle safely and swiftly would have been crucial, so a good surface was required to limit wasted energy and prevent riders from being thrown or horses becoming lame on poor surfaces.

Figure 66 Vegetation has made the Rahugh Ridge almost impassable

The word *slighe* means to cut, and this offers some hint as to how this maintenance took place. The manuscript describes the three types of clearing done during maintenance, one of which is ‘clearing its wood’ (Kelly 1997, 539). The Rahugh ridge is an excellent example of how thick vegetation can grow without frequent movement. This ridge is thought to have served as the *Slighe Mór*, but the vegetation is now so thick in places as to be all but impassable (Fig. 66). Other types of clearing involved ‘clearing its water’, referring to the repair of potholes, and ‘clearing’ of ditches, which would need occasional re-cutting.

Technology continued to improve in the Iron Age, with the development of iron working producing cheaper and more effective tools. This made "clearing" easier, and contributed to carpentry techniques throughout the Iron Age and Early Medieval period. As far as construction techniques are concerned, there is little more to add to the previous discussion on the construction of *toghers*. Some of the most famous trackways in Ireland are from this period, including the corduroy trackway of Corlea 1, Co. Longford, dating to 148 BC (Raftery 1996), and the multi-period trackway in Bloomhill Bog, Co. Offaly, dating from the 6th-13th centuries AD (Breen et al. 1988; McDermott 1995). In Europe, timber trackways began to be replaced by stone ones from c. 500 BC onwards, although monumental corduroy examples continued to be made. This is not the case in Ireland, where timber trackways continued to be produced, but there was an increasing amount of gravel and sand being used from as early as the Late Bronze Age.

The documentary evidence allows us to expand on previous discussions of trackways, and the mythologies and Saints' *Lives* provide us with glimpses of how these projects were managed. As discussed above, the 7th century *Life of Saint Brigit*, described the construction of a road through a bog as directed by a king. It consisted of branches, rocks and earth, and was expected to support the weight of chariots, mounted horses, wagons and pedestrians. In the story of *Tochmarc Étaíne*, dating to the 8th or 9th century AD, a *tóchar* of tree-trunks and branches, surfaced with clay, gravel and stones, was constructed at the Bog of Lamraige. It was suggested in Chapter 5 that level surfaces were becoming more important, with corduroy constructions allowing easier movement for wheeled vehicles. Cogitosus' description makes it clear that some wetland trackways would have needed suitably level surfaces for wheels and horses. The trackway described in *Tochmarc Étaíne* would have also been sufficiently robust and level for this function. This would imply that some trackways which traversed bogs were important roads which accommodated a range of traffic similar to their dryland counterparts. Many of the secular and ecclesiastical settlements which emerged in this period relied on trackways to communicate and to access major routeways. The ability to produce a trackway was valued such that the honour price of a wright who could construct a *togher* was increased by two cows (Kelly 1997, 393).

Construction was also used in order to cross rivers. Natural fording points were the earliest available solution to this problem, while safe ferry points also facilitated movement. The best and safest option, however, would have been the construction of causeways or bridges. The construction of hurdles (*cliath*), using the same technology seen in the wetland toghers, made the fords more reliable. Áth Cliath, or Dublin, was one of the locations of such a ford. Some of these fords were unreliable and unsafe, and there were occasions where armies were decimated because of a failed attempt to ford a river, such as the drowning of a Ciannachta army at Áth Cliath in AD 770 (Smyth 1982, 10). Even at relatively safe fords where pedestrians and horses might pass with ease, travel across rivers in wheeled vehicles must have been unwieldy, if not impossible.

As carpentry techniques improved, the erection of bridges became a possible solution to this problem. Many bridges are located next to natural fords, making use of the existing pattern of movement which had developed around the river crossing, but creating a safer and more suitable surface for traffic across the river. There were three types of wooden bridge in use in Ireland; a *cesaigh droichet* (wicker bridge), *cliath droichet* (hurdle bridge) and a *clar droichet* (plank bridge). Bridge construction was a highly valued skill which would add two cows to the honour price of a wright (Kelly 1997, 393). The presence of a bridge would have allowed control of the intersections of rivers and roads, as the use of the bridge could be easily monitored, while the span of the bridge may have restricted the use of the river.

The oldest known bridge in Ireland was discovered in 1994 at Clonmacnoise, Co. Offaly. The river at this point is shallow, but not sufficiently shallow for a ford. The discovery of a number of submerged boats during the same underwater survey showed that it was used as a ferry point, but the bridge allowed wheeled vehicles to cross the river safely. The oak construction was dated dendro-chronologically to AD 804, and the surveyed remains included a number of upright posts which supported longitudinal and transverse beams and planks, measuring 120m long by 5m wide. The bridge was erected using accomplished carpentry techniques and joinery, which was achieved using a toolkit of axes, saws, mallets and nails. It is suggested that it is most comparable to early bridges from Denmark, which were raised walkways supported by such a frame, dating from the 8th to 10th centuries (Moore 1996; excavations.ie 2015, 97E0243).

The political changes brought about by the Anglo-Norman invasion seem to have left roads in a state of disrepair. The Brehon law had compelled the people of the *túath* to practice maintenance on the roads, under the authority of their lords, but this system lapsed under the new Anglo-Norman regime. There was eventually an act passed relating to roads in Ireland in 1297, which detailed how the King's Highway had become overgrown such that the Gaelic Irish could disappear into the woodland and bogs with ease after an attack (O' Keeffe 2001, 27–28). It stated that, 'scarcely any person, even on foot, can pass through them [the King's Highways]', illustrating the extent of disrepair and the importance of regular maintenance as detailed in the law tracts. In many respects, it would have suited the Gaelic lords to allow the roads to fall into disrepair, as it allowed them to use the landscape to their advantage in mounting attacks and escaping to safety, owing to the intimate knowledge they had through generations of shared knowledge and cognitive mapping.

To summarise, the character and maintenance of roads appear from the law tracts to have been well regulated, and the archaeological evidence shows that accomplished techniques were in use. In particular, local and regional elites were essential to ensuring the adequate upkeep of communication routes. Wetland trackways appear to have formed a vital part of this system of movement, as the network of *slighe* and other inter-regional roads had to be augmented with paths which facilitated movement on a local level. Meanwhile, bridges allowed powerful dynasties to extend their control over wider territories, as the traditional barriers and boundaries of rivers had to be overcome to exert and maintain control. Roads and structures such as these allowed longer journeys to be made in elite vehicles such as chariots, which were associated with kings, bishops and warriors. These power structures were almost certainly associated with the emergence of this road system in the first place, accounting for the many personal names which are relayed in the topographical accounts of the *slighe*. The occasions which the roads were used tell us about the elite nature of movement at this time, and the value of fast and safe travel to exert control over wider areas.

6.5 Elite movement and the horse

For most people in Early Medieval Ireland, the right to travel was only available under limited circumstances, such as gatherings, warfare, or pilgrimage. The ability to move beyond one's own *túath* was a right reserved for the elite, the clergy, and professional classes such as poets. The privilege of travel allowed high ranking figures access to knowledge and resources, with the potential to forge relationships over a wide area, thereby reinforcing their positions at home. While the wider population would have typically employed most of their time on the mundane tasks of farming and survival, it is evident from the material culture and the replicated architectural motifs from royal sites that communication existed among the elites from as early as the Bronze Age and Iron Age, and that they travelled to cultivate relationships. The mythologies would also indicate this, if they can be credited as sources. As seen in the maintenance regulations above, the rank of the road users had an effect on the quality of roads. Apart from the ability to move, the mode of travel was also an indicator of prestige, particularly the use of horses and chariots, and their use would have necessitated a minimum quality of road. Such was the impact of horses in providing fast, long-distance movement for elites that a horse cult developed including deposition and horse deities, and involving strong equine motifs in sacral kingship and inauguration ceremonies.

By the Late Bronze Age, horse culture is thought to have become part of elite society, with evidence of some possible horse trappings appearing at Moynagh Lough, Co. Meath, Moynalty Lough, Co. Monaghan, and Inis Cealtra, Co. Clare (Waddell 2010, 289). Ritual deposition of high quality metal horse harness and accessories took place from c. 300 BC, suggesting that these items, and the horse culture which accompanied them, were highly valued. Indeed, the equine motifs from the mythologies illustrate the importance of horses not just as important means of communication, but in religious terms. These stories allude to female horse figures, and there are often associations between horses and elite figures, such as kings and warriors, who have enjoyed divine favour. The elite associations with horses are therefore more intricate than simply the use of horses for movement, but are entangled with religious concepts where one's power is divinely invested; culminating is strong equine elements in the inaugurations of sacral kings.

One example is the story of the death of Macha, the Otherworldly woman who placed the curse on the men of Ulster from which they suffered in the course of *Táin Bó Cuailnge*. Her husband, Crunniuc, had become wealthy and prosperous since her appearance, but she died after being forced to race against the king's horses. She may have been a version of the Welsh Rhiannon, also associated with horses, and figures such as these may have been re-imaginings of the Gaulish horse goddess Epona (Waddell 2015, 89–92). Similarly, the birth of Cú Chulainn has horse associations which reinforce the importance of this character. His birth involved an elaborate series of conceptions and births, with the first involving the birth of a boy to Deichtire at the same moment that a mare birthed a pair of foals. The god Lug visited Deichtire to explain that the foals had been for the child. The law tracts have requirements for high ranking individuals to own horses, and with Deichtire being the sister of the king Conchobar, this would have applied to the boy. The birth of the foals and the visit from Lug suggests that the ownership of horses would have been a divine right for the elite.

In Giraldus Cambrensis' account of inauguration in his *Topography of Ireland*, he described a scene whereby the would-be king must perform a sex act with a mare, after which the horse was killed and eaten by the king and his people. The account itself is quite derogatory, and was not written from any personal experience on Giraldus' part, but based on stories he had heard of the past. Comparisons have been drawn between this and a similar equine / fertility ritual in Hindu kingship (Doherty 2005, 17–23; Waddell 2015, 102–104), suggesting that the use of horses was ritualised across a wide area and was particularly associated with kingship.

The relationship between kingship and horses also extends to the characteristics of a number of kings. King Labraid Loingsech was said to have had horses' ears, for example (Fig. 67). Giraldus' description of inauguration also stipulated that the king 'embraces the animal before all, professing himself to be a beast also'. Oral tradition surrounding St. Brigit describes an encounter with King Ladhraic Lom Luirc, another name for Labraid Loingsech, whom she cured of horses' ears (Ó Briain 1991). The stories describe it as an affliction, and he would kill anyone who ever mentioned his ears. Another well-known story tells of how he kept the secret of his horses' ears by having his hair cut only once a year, and that he would kill whomever cut it for him, implying that there was shame in the condition. A number of versions of the Labraid Loingsech story exist with various versions of his name, with at least one version with a different character entirely. A version from Offaly describes this character, a horse-eared king named Eochaidh of the Uí Failge. Ó Briain (1991, 91–95) points out the linguistic relationship between the name *Eochaidh* and *ech*, or horse. This version of the story similarly used the hair motif, and his desire to keep the secret of his ears. Horse-eared kings are not confined to Ireland, with the same concept appearing in the case of Ovid's *Metamorphoses*, as well as the Welsh king March ap Meirchion, and a Breton king named Porzmarch or Marc'h. Linguistic relationships to the horse can also be drawn from these examples (Porter 1931; Ó Briain 1991).

Figure 67 Carving of Labraid Loingsech, Armagh Cathedral (Porter 1931)

Ó Briain (1991, 97–98) suggests that the Irish versions are borrowed from Britain, where they may have arrived during the Roman period. There is also the possibility that it is a very ancient Indo-European story, which hints at the equine rituals and kingly associations with horses. By the time the versions above were told, around the 6th century AD, perhaps the spread of Christianity had found the horse rituals unpalatable. St. Brigit's appearance in the stories of Ladhraic Lom Luirc and Eochaidh may have been an attempt to rewrite king / horse associations where a figure from the new Christian religion successfully removes the pagan affliction from a grateful king. The Church disapproved of sex acts of the kingship ceremony and this abhorrence extended to Christian repulsion of the consumption of horsemeat. This is aptly demonstrated in *Geinemain Moling acus a Betha* (The Birth and Life of St. Moling), where St. Moling miraculously turned horseflesh in a cauldron that was about to be served to him to more suitable mutton (Doherty 2005, 18, 23). Given the relationship between kingship and horse deities, or figures such as Macha and Rhianonn, where kings owe some of their success to these pagan figures, it is reasonable that the Church would seek to reinvent equine ritual as abhorrent.

The genesis of this association must be discussed. From the point of view of Bronze Age people who had never before seen a horse, much less a person mounted on one, it must have been an exotic sight to behold and it may have appeared from a distance that a horse and its rider was one creature. The rider would have had to learn how to ride and control the horse, acting as one mind. The possession of this skill and knowledge, and indeed access to horses, would have continued to impress, even as horse culture developed in later centuries and horses became more common. This is evident in another aspect of inauguration practiced at Tara, as described in *De Shíl Chonairi Móir* (Of the Seed of Conaire Mór). The potential king would have had to pass a series of trials, one of which was fastening two untrained horses to a chariot and controlling them as he approached Tara (Gwynn 1912, 138–139).

Horses would have revolutionised control, not only in terms of the symbolism of controlling a wild animal, but because of the potential for swift and long-distance movement which they offered to elites. This provided ruling elites with the means to extend and command their territory more effectively, and allowed the opportunity to travel over long distances and forge relationships with distant contacts. Remote support would protect their positions from internal disturbances, and the knowledge and material culture which they could access through movement would reinforce their positions at home. Just as in the stories involving Macha and Rhianonn, where their husbands owed their wealth and prosperity to these female horse figures, the early owners of horses would have owed their success to horse culture.

In the Early Medieval Period, horses were imported as prestige animals to be used as *ech immrimme*, or horses for riding. Britain was the most logical source of these animals, as the term *ech bretanach* (British horse) shows, and they would have been used to improve the size of existing breeds in Ireland. Mares in particular were imported, and Kelly (1997, 90–91) attributes this to the small size of Irish mares making it difficult to carry foals from imported stallions. The aesthetic quality of a rider on horseback, physically elevated above those on foot, would undoubtedly have been one of the desirable qualities associated with their use, and the larger breeds would have accentuated this elevation. People of rank were expected to own a number of horses and accessories fitting of their position, with a typical lord, or *aire déso*, owning five horses, including a saddle horse with a silver bridle and four with unornamented bridles. Meanwhile, higher ranking lords would have had horses fitted with bridles of silver and gold (Kelly 1988, 28; Kelly 1997, 89).

Fleming (2011) describes the system of roads across Devon and Cornwall in England as instruments of elite control, which were used to facilitate military and political functions from as least as early as the 8th century AD. He argues that the roads were designed with horse travel in mind and that such horseworthy roads ‘were adjuncts of a ‘horse culture’’ (ibid, 27). The etymology of the word *road*, supports this, as it is derived from the Old English *rād*, which refers to *rīdan*, or riding on horseback (Fleming 2010). The same can be argued for Irish roads, as we have already seen that the quality of roads was legislated for to accommodate elite movement and the rushing of horses. There is also a similar linguistic relationship, with the Irish words *ród* and *riada*, which we see in the *Eiscear Riada*, referring to horse riding. From this evidence, it appears that roads and horses were very much linked, and the rise in roads at this time must have emerged from the demands of safe and swift horse travel as practiced by elite members of society who used the developing road network to facilitate their control.

Outsiders of the *túath*, or *deorad* as they were known, were arranged into categories which support this notion of travel as the domain of the elite. There was a particular sub-group of *deorad* called *ambue*, essentially a non-person. Kelly (1988, 5) concludes from their legal standing that it would not have been an offence to kill an outsider of this description, essentially meaning that non-elite travellers would have enjoyed no protection. In addition to the privilege of travel for elites, the safety of road users was ensured by the law. The road was counted among the *lands* of the king, and a crime committed there was an offence against the king. In Anglo-Saxon law, a fine of £5 was imposed on any attacker on a royal road (Lambert 2012), and homicide in this context became the more serious crime of *morð,* or murder. In a society where travel is an undertaking of the elite and roads are a tool by which to exert control and influence, safety on the roads would have been a concern; and it follows that the ruling classes would devise a system of laws to ensure their safety. Conversely, those who travelled off-road were viewed with suspicion as possible brigands, and no such protection was extended to them.

Thus, the pattern that emerges at this time is one in which access to horses and the right to travel was the preserve of the elite, with insinuations that these rights were originally seen as being bestowed by otherworldly or cult figures. The privilege of horse ownership and access to roads was protected through law, and the system of movement which horses and roads allowed was the means by which ruling dynasties were able to enforce and maintain control locally and further afield.

6.6 Hospitality

If the ruling elite were to effectively use the road system to extend their influence, then long journeys of over a day would have to be undertaken. Come nightfall, wolves and other animals would have been cause for worry, and despite legal protection, brigands must also have been a threat. A system of hospitality was practiced where accommodation would be provided to travellers on the road, which tells us that long journeys that took place over a number of days were common place. Thus, the safety and comfort of travellers, whom we know must have been of elite or professional status, was ensured through law.

A traveller who found themselves still on the road at nightfall could seek hospitality at any household they encountered. The refusal of hospitality was considered an offence against a person’s honour, and householders were particularly bound to provide hospitality to one’s own lord (Kelly 1988, 139). Apart from the general obligation of the wider population, professional *briugu* or *bíattach* were hospitallers who provided food and shelter to travellers at their *brug* or hostel. They were quite high ranking individuals whose status came from their ability to provide unlimited hospitality. For instance, in *Togail Bruidne Dá Derga*, Dá Derga welcomes King Conaire saying,

> 'Though the bulk of the men of Erin were to come with thee, they themselves would have a welcome'. (Stokes 1902, 57)

The cauldron was an item of value to a *briugu*, and Dá Derga's cauldron was said to have never been taken from the fire, as it boiled food continuously for the men of Erin. A *brug* would have to be situated on a public road, and the *briugu* could not refuse hospitality without forfeiting their positions. If their property was twice that of their lord, they would acquire equal rank, with the wealthiest *briugu* attaining equal rank to that of the lowest kings. Those with a herd of one hundred cattle had a hundredfold wealth, and were called *briugu cétach*. Their rank was also determined by the positions of their house, with those located at the meeting of three roads having the potential to provide hospitality to a wider audience. These roads had to be of high enough quality for wheeled vehicles to drive on and, provided they had twice the property of the *briugu cétach*, they would acquire the more prestigious rank of *briugu leitech* (Kelly 1988, 36–38; Kelly 1997, 543). With the rise of the Church, monastic settlement also offered hospitality, and many of the itineraries which record travels cite ecclesiastical locations as accommodation. As with secular cases, there was a penalty if a monastery refused guests, in this case the loss of its legal status (Kelly 1988, 140).

Geissel (2006, 67–70) attempted to identify potential sites of *brug* in his search for the route of the *Slighe Mór*, suggesting that Stout's Cluster 4 ringforts may have functioned as such. These wide, univallate enclosures appear to have been high status, and are frequently located at strategic boundary locations. Of all the clusters identified, this category had the highest percentage in close proximity (less than 0.5km) to a routeway (Stout 1998, 42–43). Geissel's (2006) suggestions are preoccupied with identifying evenly spaced *brug* at Clondalkin, Dunmurraghil, Monasteroris, Mullagharush, Killaghtintober and Clonmacnoise. In an effort to fit Clonmacnoise into this arrangement, he placed the *brug* for Clonmacnoise across the River Shannon in Faltia, Co. Roscommon, meaning all of his potential hostels were 20-28km from each other. This would be well within the limits of what a person could comfortably travel in one day on foot, and a rider on horseback could have completed even longer distances with ease. It was more important, however, to be well situated than to be evenly spaced. As seen above, crossroad positions were more prestigious and would have a wider catchment, so intersections of routeways are likely locations to discover houses of hospitality.

Sites such as these were essential in facilitating the use of the road system for long distance travel, allowing people to safely make journeys of longer than a day. This would create better communication and contribute to the abilities of elites to exert influence and control. It would also have served as a resting place for traveling merchants or bards, impacting on the spread of material culture and the transmission of oral histories. The wealth which some of these *briugu* managed to accrue indicates that their services were in demand, suggesting that long distance travel was quite a frequent undertaking.

6.7 An ecclesiastical monopoly on movement

One of the most valuable sources for identifying ancient roads and systems of movement are the itineraries of early clerics. These people enjoyed the privilege of moving freely outside of their own *túath*, in the first place because of their positions as clerics, and in the second because so many of the early Irish saints were from established political dynasties. As such, our re-creation of early routeways relies heavily on the monastic sites that these figures visited. As will become clear in the detail of the present study below, early ecclesiastical sites were often cleverly situated on important routeways, and within boundary zones between kingdoms. This simultaneously created opportunities for patronage from competing dynasties, as well as allowing the foundations to benefit from the economic value of being located on a major routeway. Access to an important routeway guaranteed regular visits by merchants with whom to trade, quick access to other settlements, and the ability to promote monastic sites as ideal places to hold gatherings. Monasteries became known as places of hospitality on journeys, places of refuge for kings nearing death, and places of pilgrimage for a cross section of society. This was all made possible by mapping onto the existing system of movement and essentially monopolising it.

The nature of continuity between pre-Christian journeys to pagan sites and Christian pilgrimage is poorly understood. The Christian pilgrimage to the summit of Croagh

Patrick makes use of a route dating to the Bronze Age or Neolithic period, and ritual movement may have been performed through the ascent to the summit by night in prehistory (Corlett 1998). Similarly, many of the Christian *turasanna*, patterns and pilgrimages are performed around natural places, such as holy wells. There were intermittent efforts by the Roman Church to put an end to this sort of outdoor worship, and to encourage instead worship from which the Church could benefit. The presence of monastic sites on major routeways provided an opportunity to do this.

The first known example of Christian pilgrimage in Ireland was as early as AD 606, as recorded by the Annals of Tigernach, when Aedh died on pilgrimage at Clonmacnoise (O' Brien 2006, 84). Pilgrimage appears to have risen in popularity in the next few hundred years, with the popularity of saints' relics from the 7th century onwards increasing the draw of certain monasteries to potential pilgrims. Cogitosus recorded 'the different crowds and numberless peoples flocking from all the provinces' to the feast of St. Brigit in Kildare (Connolly et al. 1987). This quote mentions the different types of people that would converge for pilgrimage, and this could be interpreted as hierarchical differences or geo-political ones. Since pilgrimage was one of the occasions in which it was possible for people to leave the confines of their local area, we ought to expect a cross-section of society would take part in the practice. Such events would also attract social and political rivals, and the ban on violence on saints' days suggests that fighting had become a problem (O' Sullivan et al. 2008, 333).

While a popular notion prevails of early foundations, such as Glendalough, Co. Wicklow, or Inishmurray, Co. Sligo, as isolated hermitages, this is not true of all of these sites. Many monasteries were well situated on inter-regional routes that maximised their reach across a wide population, sometimes transcending political boundaries through their strategic locations. The patronage from competing dynasties allowed well-sited ecclesiastical settlements to grow in wealth, becoming major political entities unto themselves. This proximity to routeways was also vital to support the practice of pilgrimage, as viable routeways would be necessary for pilgrims to make their ways to these locations. Ideally, this should involve roads of good repair, capable of accommodating large volumes of traffic on foot, horseback or in wheeled vehicles. Thus, many ecclesiastical sites were founded along the *slighe*, which locals were legally required to maintain to a certain standard and to repair them prior to particular occasions.

This not only guaranteed exposure to the elite members of society for whom these roads were intended, but by placing themselves along a major inter-regional routeway, the founders of these sites were tapping into an existing network of roads which covered much of the country. By additionally providing hospitality to travellers on these roads, these foundations had access to a wider catchment area of pilgrims, merchants carrying wine and ceramics from Rome, bards who could relay lore to be recorded by the scribes, and the ruling class who could share important political information with the nominally neutral foundations.

Thus, while the origins of many of the most important Early Medieval roads predate the Christian foundations, the early clerics were politically and logistically shrewd in the strategic locations of their monasteries and their efforts to capitalise on their positions. They successfully exploited the road system to attract visitors from a wide catchment area, particularly from elite members of society and the professional classes. This would impact on the experiences of travellers, and many of the itineraries are chunked into sections separated by monasteries, indicating that cognitive maps were being formed around these sites. This is due to the hospitality which was offered at these places, in much the same way it was at the *brug*. In many respects then, the Church had successfully monopolised the system of Early Medieval movement in Ireland.

6.8 Summarising movement in Iron Age and Early Medieval Ireland

The emergence of a coherent system of roads from as early as the Iron Age was in large part due to the increase in the use of horses and wheeled vehicles. The result was that it facilitated swift long distance movement, to the benefit of political dynasties and the Early Medieval Church. The complexity and success of these political entities is due in many respects to the ability to communicate with distant regions to forge relationships and reinforce their authority at home, and it is no wonder then that the courses of the *slighe* should connect the royal sites, or that early monasteries would similarly seek to exploit such a system.

Fleming (2011, 43) has described a 'dendritic hierarchy of major roads which reflected the socio-political hierarchy' and it is evident that the classifications of Irish roads fit into that reality. Major inter-regional roads would principally serve elites, but the regional and local roads were just as essential, providing a means to access the major roads, allowing winter visits, facilitating the mundane movements of locals, and essentially connecting the wider landscape to the central nodes which the roads developed around. The mythology describes the *slighe* as the roads to Tara, with the implication that this royal site was the central node which was connected through these routes to the rest of Ireland. This chapter has questioned that concept, suggesting instead that the natural landscape dynamics would create routeways which adhered to the easiest course, but that connecting roads would be created to allow important places to exploit the naturally emergent system of routeways. The routeways from which these *slighe* would have emerged appear to have led quite naturally to the Central Eastern Plain, which was a convenient arrangement for the rise of Tara as a major sacral and political centre.

While the emerging network of roads and routeways empowered high ranking individuals who could access them, they sometimes acted as vulnerable points in their territories. If they were a means to extend one's territory then the opposite is also true. Leinster was vulnerable to attack from the Uí Néill at Cloncurry, between the steep Liffey valley and the Bog of Allen, where O' Lochlainn's northerly *Slighe Dála* passes (Smyth 1982, 10–11). Similarly, Bealach Gowran on the *Slighe Chualann* was often attacked by enemies from Munster and Ossory. Tradition holds that the Loígis of Mag Réta were foreign mercenaries that were deliberately settled along the *Slighe Dála* by the Uí Failge to protect them from invasion by the people of Munster and Ossory (Smyth 1982, 76). The Midland Corridor was clearly an arena where competing forces from Leinster, Munster and Meath met, with the Uí Néill ultimately extending their influence from Meath through the channel of the Corridor.

Thus, the system of roads and means of travel which emerged at this time was intrinsically linked to the nature of the landscape, and had a profound impact on the socio-political climate. Routeways were closely related to boundary zones, meaning they were simultaneously a means to communicate with outside areas, but also a feature which ought to be defended. These locations were often used for ecclesiastical settlement, with the monasteries exploiting the competitive rivalries to increase potential patronage. The rules governing the freedom to move guaranteed that any benefits to be had from the evolving road network were the preserve of the elite. In addition, elite members of society had better access to horses and vehicles, making long journeys significantly easier. The most powerful kin groups gained such prestige in part due to their expertise in negotiating Irish terrain, using the natural landscape dynamics to their advantage, and the ability to use horses to this end. In contrast, later Anglo-Norman and English occupiers were sometimes confounded by the landscape, and movement could consequently prove to be difficult and unsafe for them.

6.9 Iron Age and Early Medieval movement in North Offaly

While the Late Bronze Age saw a flourish of activity in the study area, the archaeological evidence for the Iron Age suggests a period of low population when agriculture lapsed, very few construction projects were undertaken, and there was a climatic downturn, with the result that we can make little comment on systems of settlement and movement in North Offaly at that time. From AD 400 onwards, however, there was a dramatic resurgence of clearance, farming and trackway construction, and within a century, ecclesiastical settlements were founded across the Midlands area. This would have had an impact on the visibility of landmarks for wayfinding and the emergence of suitable routeways for the use of horses and vehicles. Meanwhile, many of the bogs had matured to better accommodate trackways, which were essential elements providing local access to major routeways. The monasteries were clearly associated with routeways, and they are excellent examples of the importance of the consideration of movement in studies of landscape and settlement. What follows is a summary of the environment of North Offaly at this time, followed by a discussion of the wetland activity and settlement practices and what they tell us about the practice of movement through this region in the Iron Age and Early Medieval period.

6.9.1 Bog development

By the Iron Age, many of the wetlands in the study area had become well-developed raised bog systems, the nature of which varied between bogs, and indeed within bogs. This resulted in occasions when it was far too wet to attempt a bog crossing, compared with other occasions when relatively dry periods allowed movement between hummocks with the help of trackways.

The bogs of the Lemanaghan complex have been the focus of substantial environmental research, including studies of peat stratigraphy, palynological analysis, coleopteran analysis, tephra and testate amoebae (Casparie 2006; Reilly 2009; Bermingham 2005; Weir 2006), with particular emphasis on the Early Medieval period to coincide with the formation of a major ecclesiastical site on the dry island of Lemanaghan in the mid-7th century. These bogs were quite wet, but the water level at Kilnagarnagh dropped rapidly, producing locally dry conditions c. 850 BC in the southern portion and as late as AD 100-600 in the northern area. There is no evidence of a bog burst, and the change in hydrology may have originated in another bog of the Lemanaghan system (Bermingham 2005, 205–208). This desiccation would have slowed down bog growth, and the dry conditions made the bog significantly easier to negotiate before a return to wet conditions between the 1st and 6th centuries AD.

The dangers of the bog are demonstrated at Tumbeagh, where the Late Bronze Age bog lake persisted throughout the Iron Age before a catastrophic burst c. AD 240. Bursts such as this would have caused enormous damage to surrounding settlements, and the results of a notorious example of Knocknageeha, Co. Kerry, were witnessed by Praeger in 1896 (1937, 373–377). The water and wet peat was released with such force that it caused the death of a family in the valley, and only stopped flowing when it reached the Lower Lake in Killarney some 22km away. At Tumbeagh, the burst allowed a brief period of Sphagnum peat growth, followed by a return to lake conditions.

At Clonearl Bog, peat stratigraphy was described by Plunkett et al. (2009), but it was limited to sampling from the immediate area of the recovery of the *Oldcroghan Man* bog body. Despite the limited sampling, however, it was found to cover the transitions from lawn conditions (c. 370-170 BC), to a dry period (c. 170-50 BC) and the development of a hummock-hollow system (c. 50 BC – AD 30), illustrating how rapidly an active bog landscape could change conditions.

These studies demonstrate the variety of conditions which can exist between different bogs and time periods, and even within localities of the same bogs. The changing conditions would impact the challenges of negotiating the wetlands, as wet phases may render a previously viable crossing point useless, while potential crossing points could re-emerge in drier periods. The bog burst at Tumbeagh is also a stark reminder of how dangerous these features could be, and during wet climatic downturns, there would have been an increased danger in living close to bogs which were at risk of bursting.

6.9.2 Vegetation

The Iron Age has often been described as a period of climatic downturn, and Baillie's (1991) narrow tree ring events have been instrumental in identifying with precision when these periods occurred. These events often coincided with a few exceptional, monumental projects, juxtaposed against a broader pattern of a lull in settlement and agricultural activity. This agricultural hiatus is evident from the pollen cores from the study area, and this would have caused woodland to encroach on previously open areas, obscuring visibility and making movement more difficult. In contrast, the founding of several influential monasteries within the study area in the Early Medieval period was part of a process of intensification of agriculture in the 1st millennium, which would have opened up large portions of the landscape and facilitated the complex road network which emerged at that time.

Settlement, clearance and agriculture expanded within the study are throughout the Bronze Age (Chapter 5), and this appears to have continued at Tumbeagh, where ribwort plantain, grass and sedge were well represented until c. AD 50 (Weir 2006). In contrast, there was a reduction in anthropogenic activity early in the Iron Age at Clonearl Bog (c. 580-270 BC) and at Mongan Bog (c. 550-300 BC) (Plunkett et al. 2009; Parkes et al. 2000). Plunkett (2009, 268) cautions, however, that Clonearl was still an active landscape, albeit a less intensively farmed one, with occasional occurrences of cereal pollen. Agriculture resumed at Clonearl in c. 270 BC, at which time Tumbeagh and Clara were undergoing agricultural downturns, with a period of stable pastoral and arable agriculture until the 1st century AD.

This was followed by a hiatus in agriculture which seems to have impacted all of the sampled areas from the 1st to 5th centuries AD. Weir (2006, 178) has suggested that the Iron Age woodland regeneration may have resulted from a decline in population or a change in agricultural practices, while Crushell (2008, 96) observes that it coincides with a change to unhumified peat in Clara bog, suggesting wet conditions may have led to a lapse in agriculture. Woodland clearance and agriculture resumed in the 5th century AD, intensifying with the foundations of the monasteries such as Lemanaghan, Clonmacnoise, and Clonfert (Weir 2006; Crushell et al. 2008; Parkes et al. 2000; Plunkett et al. 2009; Hall 2006). This would have been principally pastoral in nature, but cereals were identified at Tumbeagh, Mongan and Clonfert, and *Cannabis* was produced at Clonmacnoise for textile production. Hall (2006, 11) notes that there was very little difference between cereal pollen counts at bogs close to monastic sites and those by secular sites in the mid-1st millennium AD, suggesting that there was little difference in the type of agriculture being practiced at these locations.

These examples show that while the most dramatic hiatuses impacted all of the sites where pollen analysis took place, there were some occasions when a lull in one area was mirrored by an uptake in farming someplace else. This suggests that climate was not the only factor involved, and local conditions may also have impacted on settlement patterns. Changing hydrology, bog bursts and declining soil fertility may have precipitated the abandonment of a certain site, and encouraged intermittent relocation.

Quercus remained the principle species of mature woodland, and while its pollen levels suffered during times of increased agriculture, it shows less fluctuation than the more sensitive species of *Ulmus*. The prevalence of oak gradually reduced throughout this period, and typically dropped at times of increased anthropogenic markers. The Iron Age lulls in agriculture subsequently allowed the species to recover, as seen at Mongan (Parkes et al. 2000, 39) and Clonearl (Plunkett et al. 2009). There was a decline in oak c. 270 BC at Clonearl, where agriculture resumed at that time, and a marked decline across the board as agriculture intensified from the 1st century AD onwards (Parkes et al. 2000; Hall 2006; Weir 2006; Crushell et al. 2008). Despite this, there were still areas where oak was a major component of the woodland, recovering to levels of c. 13% at Clara around AD 800 (Crushell et al. 2008, 96). The insect remains from the trackways of Lemanaghan and Castletown Bog also indicate oak-dominated woodland in the 7th century (Reilly 2009).

Ulmus had very much declined by the Iron Age, but it was still one of the principle woodland species and it underwent intermittent declines and regenerations, some of which were related to anthropogenic factors and occur at times when *Quercus* and *Fraxinus* levels also fell. Pollen cores indicate that, along with oak, it would have been one of the main canopy species early in the Iron Age, but it was heavily impacted on during periods of agriculture. At Tumbeagh, where we know agriculture was practiced until c. AD 50, *Ulmus* levels fell to less than 1-2% in the 2nd century BC. There were small localised rises in numbers around the 1st-2nd centuries AD at Mongan, the 1st-4th centuries at Clara and the 4th century at Tumbeagh and Clonfert, but the intensification of agriculture in the 7th, 8th and 9th centuries saw the species fall to as low as 1%, and it never recovered to its former levels (Parkes et al. 2000; Weir 2006; Hall 2006; Crushell et al. 2008; Plunkett et al. 2009).

Fraxinus levels generally mirror that of *Quercus* and *Ulmus* during this period, but like elm, it did not recover to the same extent as oak in woodland regeneration phases. While it suffered during the Iron Age agricultural phase at Tumbeagh, it presented with very stable numbers throughout the Iron Age at Mongan. It expanded during the Iron Age lull, peaking between 600-300 BC at Clonearl, 300-100 BC at Mongan, c. 60 BC at Tumbeagh, and c. AD 100-200 at Clara. It decreased substantially in the Early Medieval period in a similar vein to elm (Parkes et al. 2000; Weir 2006; Hall 2006; Crushell et al. 2008; Plunkett et al. 2009).

Corylus dominates the pollen diagrams owing to its suitability for growth on the verges of the bogs which have been cored. It is also less affected by agricultural clearances because of its marginal locations, and suffers less than *Quercus*, *Ulmus* and *Fraxinus* in periods of agriculture, while being quick to colonise unused farmland during lapses in farming activities. Thus, it is a species which can thrive when other woodland species are in decline, and some of the fluctuations in its pollen numbers from the 1st century BC to the 2nd century AD at Mongan are the inverse to the rises and falls in *Quercus* and *Ulmus* (Parkes et al. 2000). Similarly, while *Ulmus, Quercus* and *Fraxinus* numbers were suppressed at the end of the 1st millennium BC at Clonearl Bog, *Corylus* expanded substantially (Plunkett et al. 2009). It is not unaffected by agriculture, however, and it suffered a drop in numbers at Tumbeagh around the 5th century BC, and again in the Early Medieval period, corresponding with increases in agricultural activity (Weir 2006).

Betula levels varied between low consistent numbers at Tumbeagh, and the high levels of up to 10% during the Iron Age woodland regeneration phase at Mongan. There was substantial fluctuation in this species at Clara, roughly corresponding with similar fluctuations in *Quercus* and *Ulmus*, indicating phases of clearance and regeneration (Parkes et al. 2000; Weir 2006; Hall 2006; Crushell et al. 2008; Plunkett et al. 2009).

Alnus was well represented in the earlier phases at Tumbeagh, but declined throughout the Iron Age. It suffered only a minor decline at Clara early in the Iron Age, but increased in numbers at Mongan at this time, along with other species. When other species began to decline at Mongan, *Alnus* performed well, possibly because of its preference for wetter areas. This may have allowed its numbers to swell at the beginning of the Mongan woodland regeneration, where it accounted for up to 15% of the tree pollen. Meanwhile, at Clonearl, it was poorly represented, with a small increase from c. 120 BC – AD 30. At Clara, *Alnus* declined rapidly in the 1st century while *Quercus*, *Ulmus* and *Fraxinus* levels improved, but it recovered over the next few centuries, peaking in the 6th and 7th centuries as *Ulmus* declined (Parkes et al. 2000; Weir 2006; Hall 2006; Crushell et al. 2008; Plunkett et al. 2009).

To sum up, the general pattern was of a significant woodland regeneration in the Iron Age, coinciding with an agricultural hiatus, followed by a return to agriculture in the Early Medieval period which involved more widespread clearance than had ever taken place in this region. The exact dates of these trends vary between areas, with farming continuing at Tumbeagh while Mongan and Clonearl were experiencing periods of woodland regeneration, but the ultimate result was a more open landscape by the 5th century AD. The woodland regeneration phases may have made movement more difficult, as the early phases would include difficult-to-penetrate scrub, and the mature phases would obscure lines of sight. This would have made previously viable paths and routeways difficult to negotiate and potentially dangerous. The 6th, 7th and 8th centuries saw an intensification of agriculture, coinciding with a drop in oak and the rise of monastic foundations. The monasteries and secular settlements farmed large areas of land requiring large scale clearance. In addition, the law tracts governing the maintenance of roads required regular clearance of scrub to ensure a good quality surface. The increase in settlement therefore had a profound effect on woodland vegetation and the ability to move through the landscape and establish a coherent road network.

6.9.3 The Midland Corridor

The Midland Corridor is a name coined by Smyth (1982, 86) to describe the natural corridor of movement formed by a tract of land, approximately 40km long and 5-10km wide, which is dominated by limestone till and limestone sand and gravel. Apart from a few rivers which had to be forded, the area is clear of wetland obstacles which dominate so much of the Midlands in the form of raised bogs. It extended from Clonfad in the Cenél Fiachach territory of Meath, to Rahugh where it intersected with the *Slighe Mór*, and through the kingdom of the Fir Chell towards North Munster. This corridor housed a number of important early ecclesiastical sites, who benefitted from their locations on a major routeway and access to patronage from competing dynasties.

The use of the Midland Corridor as a routeway is demonstrated by the itineraries of the early clerics through this region. Carthage's journey along the *Slighe Dála* and the Midland Corridor to Lynally is described below (Chapter 6.9.6.7), for example. After his expulsion, his route southward was evidently along the same corridor, with stops at Drumcullen, Sierkieran and Roscrea (Smyth 1982, 87). The story of Mesca Ulad describes a journey from Durrow to Rahan, Ballyboy, Kinnity and Roscrea which similarly follows this corridor of movement, leading O' Lochlainn (1940) to illustrate it in his map of ancient roads (Fig. 58).

Geissel (2006, ix) observes that the *Slighe Mór* was not well-located for military activity, as most major conflicts were between the Uí Néill with Leinster and Munster. The Midland Corridor, meanwhile, was ideally situated to facilitate military movement in this regard. Leinster tradition indicates that the royal seat of that kingdom would once have been at Tara, before being driven back by the Uí Néill (Smyth 1982, 9). This would have put the Midland Corridor and many of the *slighe* within Leinster control, but access to routeways can also be a vulnerability, and it is through the Midland Corridor that Uí Néill influence successfully extended further south. This in turn brought them into contact and conflict with Munster, and the area became an arena for these dynastic rivalries.

This routeway, situated close to the meeting points of four provinces, and intersecting with the ancient division of *Leath Chuinn* and *Leath Mogha* was an ideal place to hold major gatherings. The topographical liminality, coupled with the nominal (though not actual) neutrality of the churches, meant it was well positioned for political, social and cultural assemblies. Notably, one of the three major *óenach*, or fairs, was held at Lynally, which was midway along the Midland Corridor and within a short distance of the *Slighe Mór* and O' Lochlainn's (1940) northern course for the *Slighe Dála*. Smyth (1982, 88–89) lists a number of other events which point to the importance of this area for inter-regional communication, including the Synod of Mag Lena in c. AD 629, which was held to argue the discrepancy of the date of Easter between the Irish and Roman churches. There was a difference of opinion on this topic which was roughly divided between the northern and southern portions of Ireland, making a Midland venue the perfect location to discuss the matter.

The prehistoric origins of this route have been discussed previously (Chapters 4 & 5), but its use in the Iron Age is something of an enigma, as with much of our knowledge of that period. It may have entered a period of decline during the woodland regeneration and probable low population density, but it emerged as a major communication corridor by the 6th century. Settlement seems to have been predominantly ecclesiastical in character, with very few ringforts in this area, possibly because of the tribal tensions of this boundary zone. This allowed the monasteries to be the principle places of hospitality on this routeway, increasing their wealth and prestige.

6.9.4 Wetland movement in Iron Age and Early Medieval Offaly

In Chapter 5, the locations and orientations of trackways were used to suggest which areas of the study area may have been used for settlement, in the absence of many settlement sites, and a number of dryland routeways were suggested, based on trackways, deposition and fording points. There is remarkably little known of Iron Age settlement in Ireland in general and in particular in this study area, so the locations of trackways must similarly be used in the discussion of this period to hypothesise settlement locations. By the Early Medieval period, however, we have the benefit of both secular and ecclesiastical settlement sites to contribute to interpretations in this chapter. Many of the trackways below are contemporary with nearby monastic settlements, and they allow an otherwise isolated settlement to communicate with the wider world. These stretches of trackway, measuring at most only a few hundred metres in length, are the local components which lead to the trunk roads which make up the dendritic network of the Early Medieval road system (Fig. 68). Below is a description of the arrangement of trackways in surveyed bogs within the study area which have been dated to the Iron Age and Early Medieval periods.

6.9.4.1 *Toar Bog*

Toar Bog is in Co. Westmeath, 6km northwest of Croghan Hill (Fig. 68, 69). The bog is surrounded on the north, south and western sides by the substantial areas of limestone sand and gravel which make up the northern extent of the Midland Corridor, and a number of eskers, including the Rahugh Ridge, are accessible from this area. This bog is therefore at the edge of an area that was associated with movement from as early as the Neolithic period. The evidence from Toar demonstrates that this continued as an active landscape in the Iron Age and Early Medieval period.

The Iron Age is represented by two distinct distributions in Rathgarret and Pallasboy. At Rathgarret, a hurdle panel (WM-TOR068) consisted of three sails arranged in a NE-SW orientation. It dated to 411-283 BC and had been placed over a wet pool (excavations.ie 2015, 14E0296). It is located only 67m from a 3.2m long brushwood structure of north-south orientation (WM-TOR067) dating to 356-110 BC (excavations.ie 2015, 14E0295). These sites are both close to the dryland in Rathgarrett, and while too short to suggest they represent any movement across this section of bog, they may represent activity around the edges of the wetlands.

In Pallasboy, WM-TOR055 was an irregular arrangement of brushwood and roundwood which had been deposited in a pool. The simple construction, dating from 39 BC - AD 83, had only one piece showing any evidence of woodwork (excavations.ie 2015, 14E0289). This structure seems to have performed a similar function to the Rathgarret sites, filling in a particularly wet area. It was positioned deeper in the bog, however, and in the same area that the Early Medieval structures later occupied; suggesting that perhaps an axis of movement predated the Early Medieval trackways.

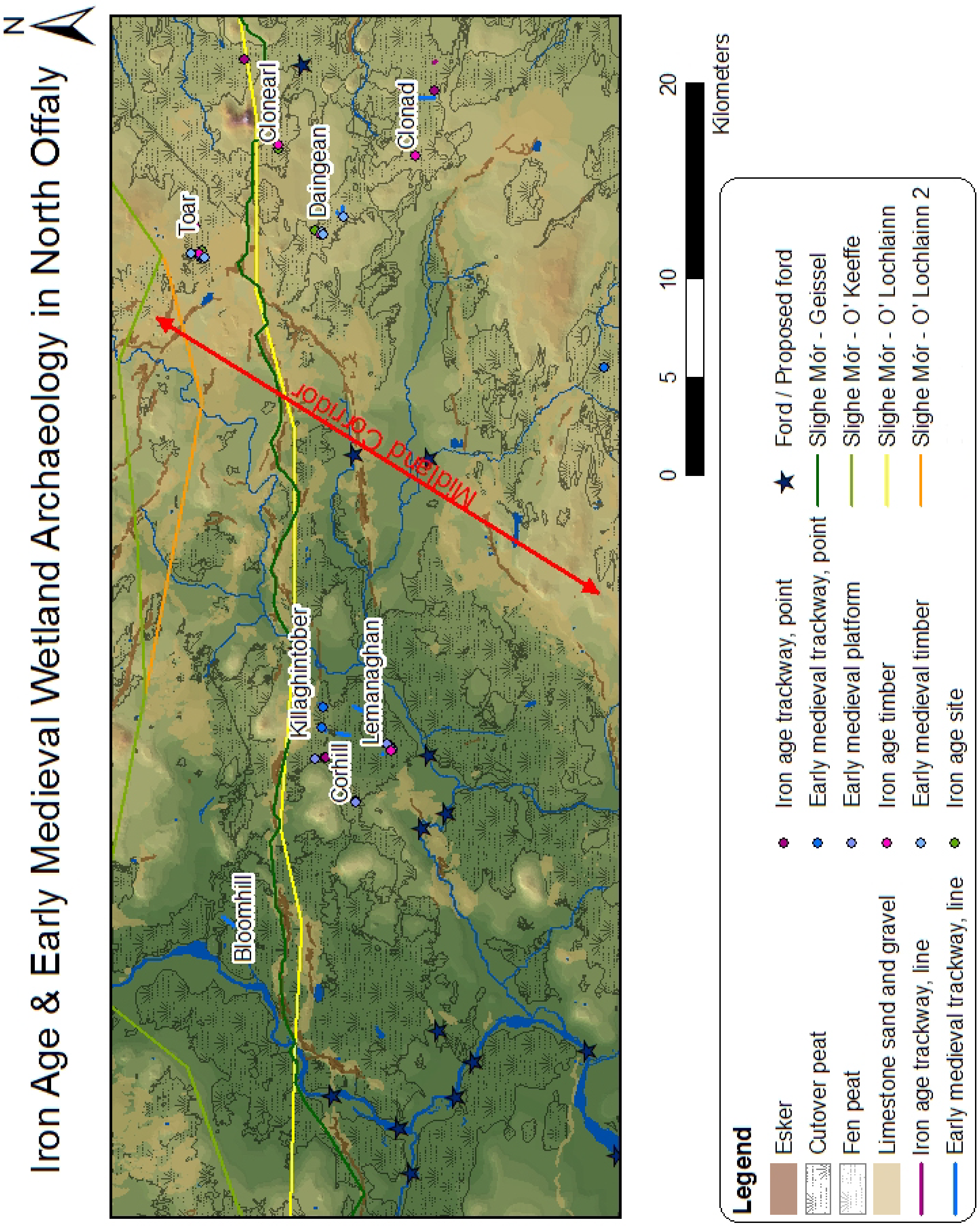

Figure 68 Iron Age and Early Medieval archaeology of North Offaly

The Pallasboy Vessel (WM038-201) is an item of unknown function which was found resting on a bed of reeds in Toar Bog. It had been held in place with pegs, one of which dated to 197 BC - AD 68, and tied with withies in a poorly humified area of peat. It is 1.29m long, carved from alder with a block handle on both ends beneath an everted rim (Murray 2000; excavations.ie 2015, 00E0536). Such a vessel could have been used for towing cargo, being too small to function as a boat (Gregory 2015b), but it has also been suggested that the finely carved vessel was a prestigious item, used for bathing, feasting or the display of food (O' Sullivan 2015). O' Sullivan (ibid) reminds us of Giraldus Cambrensis' account of inauguration, which would require such a vessel. The discovery of an Iron Age bog body in nearby Clonearl Bog alludes to kingship (Chapter 6.9.4.2), and this evidence may point to a ritual landscape associated with kingship centred on Croghan Hill. This hill would have continued to serve as an important landmark because of its visibility, but the burial mound may have continued to attract ritual activity. It was reused as an inauguration mound by the O' Conors of Uí Failge in the 5th century AD (O' Brien 2006, 10), and it is possible that its associations with kingship are contemporary with these Iron Age sites.

There may have been a hiatus of over 300 years in this bog before the next phase of activity in the Early Medieval period, the earliest being WM-TOR012. This was a simple deposit of north-south orientated brushwood, dating to AD 426-608 (excavations.ie 2015, 14E0279). This was close to the dryland of Kilavally, and may represent local access around the bog margins.

Movement deeper in the bog is found at WM-TOR013, an east-west secondary togher of brushwood construction which dated to AD 688-888 (excavations.ie 2015, 14E0280). Considering the central location of this trackway, it is an unusual orientation along the long axis of the bog, and it may indicate a complex of trackways in this area. Indeed, what appeared to be a platform was found nearby (WM039-209, WM-PBY 067), dating to AD 775-1000 (excavations.ie 2015, 06E0517; National Monuments Service 2015, WM039-209). Further activity was noted at a deposit of brushwood dating to AD 783-989 (WM-TOR046), where a stave-built vessel was found (excavations.ie 2015, 14E0288).

This cluster of sites seems to have facilitated movement and activity within a localised area of the bog, perhaps indicating collection of resources or hunting. Their size, locations and orientations suggest local movement, and while they do not appear to traverse the bog or feed into larger scale movement, this bog is well situated for nearby inhabitants to have easily accessed major inter-regional routes.

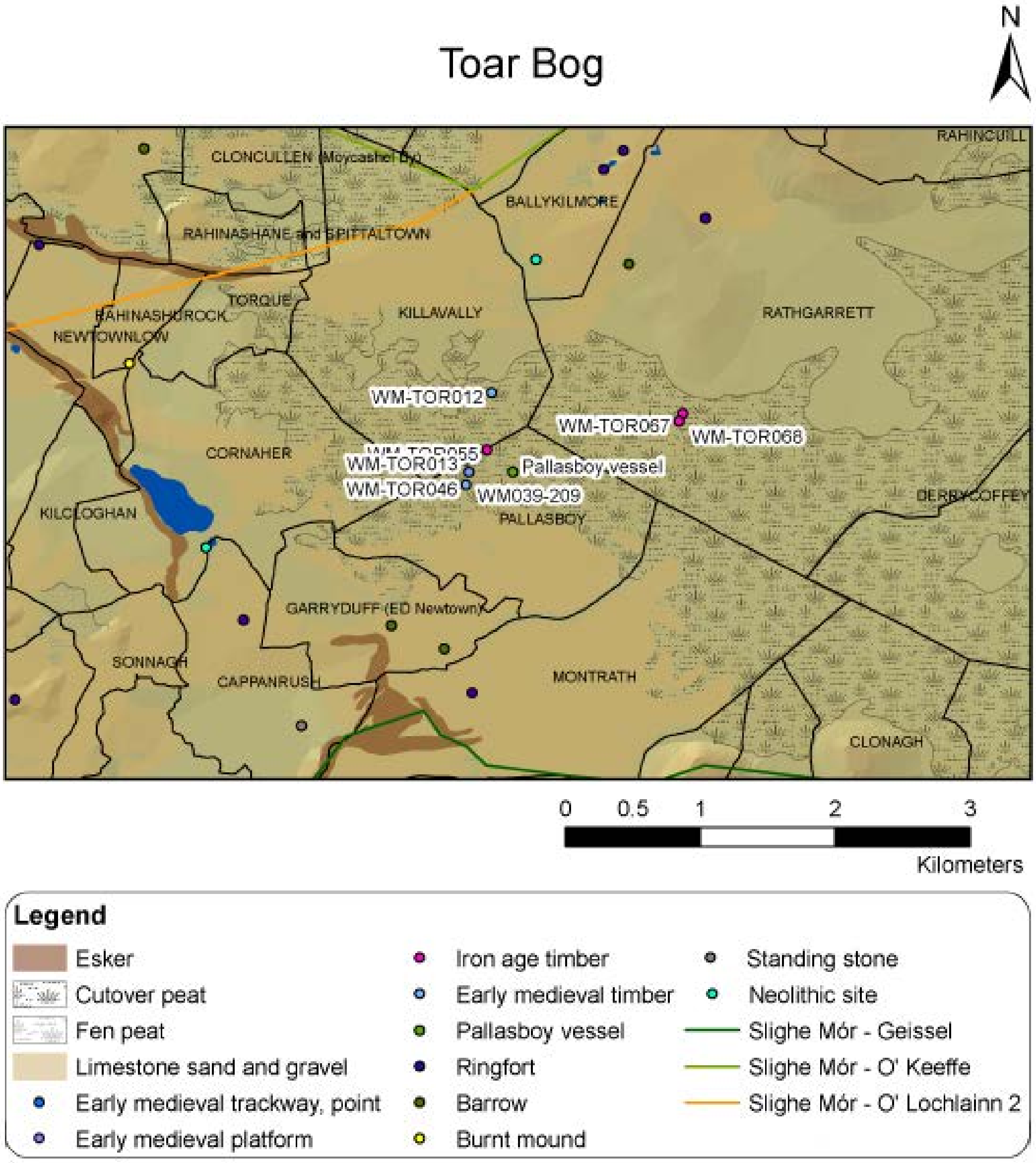

Figure 69 Iron Age and Early Medieval archaeology of Toar Bog. Note distribution of local prehistoric archaeology and medieval ringfort settlement.

6.9.4.2 *Clonearl Bog*

Clonearl Bog is located southeast of Croghan Hill, and was the site of the discovery of the Iron Age *Old Croghan Man* bog body (Fig. 68, 70). The individual was killed sometime in the period 361-115 BC, when he was restrained with withies and mutilated through decapitation, the removal of his nipples and being severed across the torso, before being deposited in a pool (Kelly 2006; Plunkett et al. 2009). Kelly (ibid) has argued that bog bodies are related to sacral kingship. The well-manicured hands of this individual suggest he was elite and unaccustomed to physical labour, while the removal of his nipples would have prevented aspects of an inauguration ceremony. The deposition was quite centrally located in the bog, and it would be reasonable to expect that there may have been structures to facilitate this ritual. In a brief survey of this area, the IAWU found that two deposits of archaeological wood (OF-OCN 0001 and OF-OCN 0003) were within 150m of the bog body. They had flat tool marks consistent with the use of an iron tool, and they may date to the Iron Age or Early Medieval period (Irish Archaeological Wetland Unit 2003e).

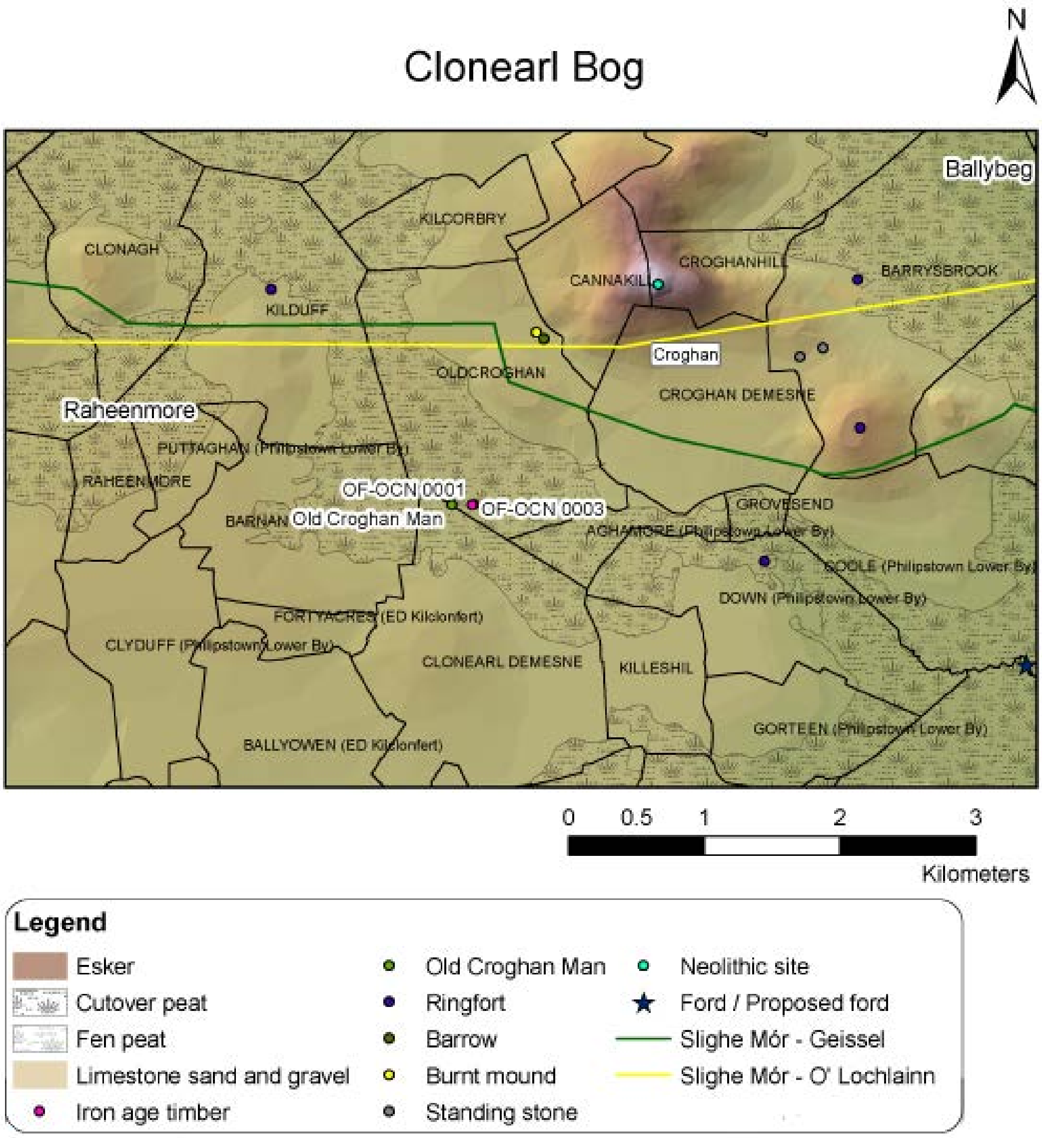

Figure 70 Iron Age archaeology of Clonearl Bog

While these sites are not especially informative as to how movement was performed in this area during the Iron Age, it demonstrates that the landscape was active in the Iron Age and that the bogs continued to be accessed. The proximity of this ritualised sacrifice to Croghan Hill shows that the highly visible landmark was an important landscape feature and *persistent place* which would have been a major node in cognitive mapping.

6.9.4.3 *Daingean Bog*

Daingean Bog is located 6km southwest of Croghan Hill, flanked by Ballylennon and Barnaboy on the northeast, and Rathdrum on the southwest (Fig. 68, 71). It is situated within easy access of Rahugh Ridge and the Midland Corridor, and the profile of Croghan Hill assists in wayfinding through this area.

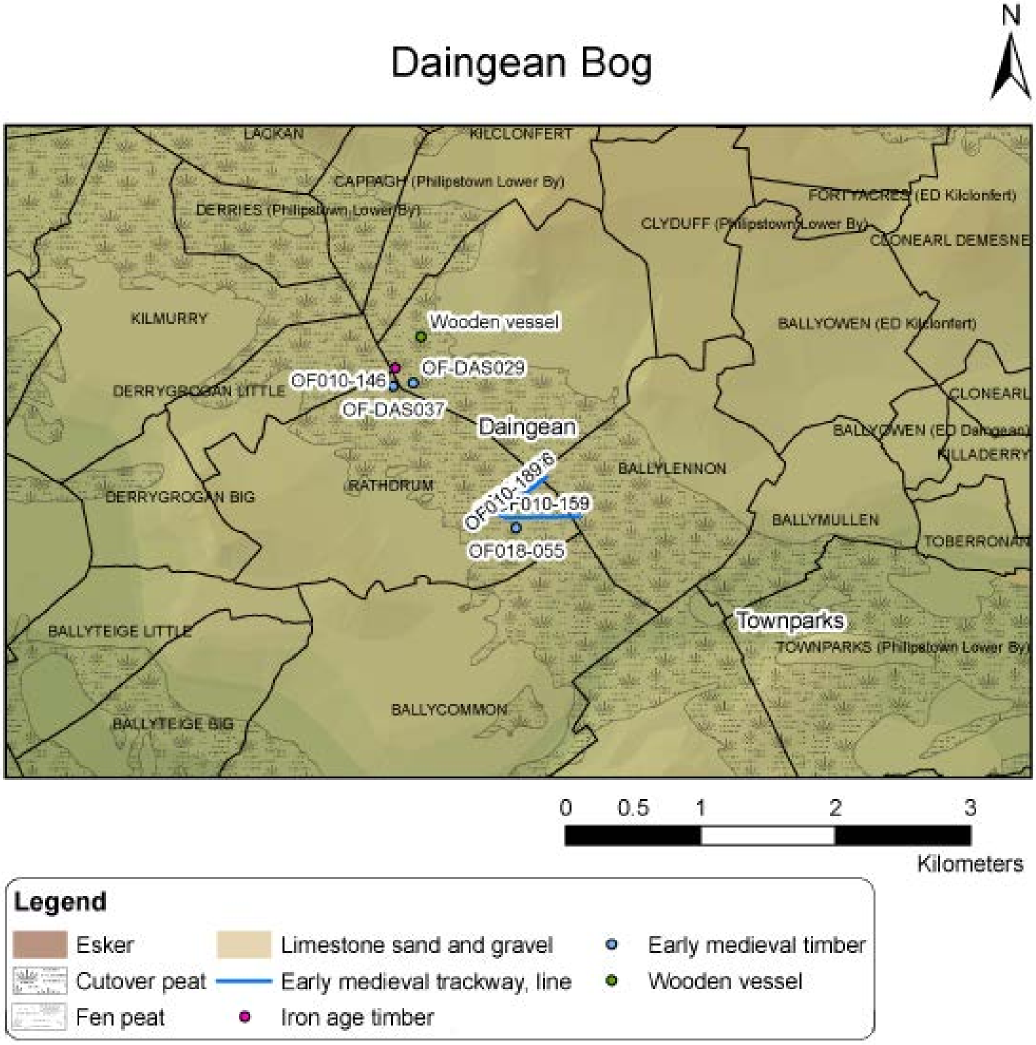

Figure 71 Iron Age and Early Medieval archaeology of Daingean Bog

The earliest site recorded from this bog is at Barnaboy (OF010-146, OF-BBY 0072). This deposit of brushwood and roundwood appeared to be of east-west orientation and dated to 15 BC - AD 213. The brushwood was of varying age, and not from managed woodland, suggesting opportunistic timber selection to overcome a wet point in the bog (Irish Archaeological Wetland Unit 2002c, 51; 2002e, 18). It falls within a narrow portion of the bog between Barnaboy and Derrygrogan Little, and while of modest construction; it may indicate a crossing point at this location. A wooden vessel was found nearby at a similar depth. It is stylistically consistent with Iron Age examples (Irish Archaeological Wetland Unit 2002c, 9–10, 45; 2002e, 19) and may indicate further activities at this narrow point of the bog.

Similar to Toar Bog, there may have been a hiatus of activity here until a new phase of activity in the 5th / 6th centuries AD. The first known example of this is a small structure dating to AD 423-554 (OF-DAS029) and a single piece of brushwood dating to AD 543-653 (OF-DAS037) (excavations.ie 2015, 14E0309, 14E0307). These sites were too ephemeral to comment on their original functions, but their proximity to the Iron Age site is of note, perhaps indicating an enduring attraction to this part of the bog.

South of this cluster, a series of primary toghers was constructed which would have facilitated movement between the dryland either side of the bog. The earliest (OF010-166, OF-RDM 0009) was a 458m longitudinal construction, stabilised with extremely long pegs, and dating to AD 544/545 (Irish Archaeological Wetland Unit 2002c, 8, 57; 2002e, 17–18; excavations.ie 2015, 05E0555). It was composed of *Betula*, *Fraxinus*, *Salix*, *Alnus*, *Corylus*, *Pinus* and *Taxus*, an unusually diverse selection for such a long trackway, suggesting the most conveniently available timber was used for an expedient construction.

On exactly the same axis and only 30m away, a secondary togher (OF010-189, OF-RDM 0047) measuring 213m long dated to AD 547 ± 9. It was predominantly composed of oak, suggesting more careful timber selection than its neighbour. The construction was on the interface between well-humified and poorly humified peat, perhaps indicating that it was built at the beginning of a wet phase to maintain an existing axis of movement (Irish Archaeological Wetland Unit 2002c, 8–9, 11, 64–65; excavations.ie 2015, 05E0557). The date range is so close to OF010-166 that it is in fact possible that this may have been the earlier trackway which was superseded by the primary togher. These trackways may indicate settlement in the surrounding regions of Rathdrum and Barnaboy / Ballylennon.

An 8th century primary togher (OF010-159, OF-RDM 0001) in Rathdrum, dating to AD 773 ± 9, changed the orientation of the crossing to an east-west axis. The single-plank trackway ran for 559m, with its western extent leading to the same point as the

6th century trackways, and the eastern objective possibly being an access route to the ecclesiastical site at Kilderry, 4km to the east (Irish Archaeological Wetland Unit 2002c, 8, 55; excavations.ie 2015, 05E0552).

These three trackways had a number of sites clustering around their western ends, including a piece of worked wood (OF018-055, OF-RDM 0015) dating to AD 560 ± 9, suggesting a particularly active part of the bog. It was observed that most of the single sightings of sites in this bog were found in moderately humified peat, and the report concludes that paths over drier portions of the bog were favoured, but construction would sometimes be required to overcome localised wet areas (Irish Archaeological Wetland Unit 2002c, 11, 13, 59).

The distribution of these sites is consistent with the pattern which emerged throughout the IAWU survey of Daingean Bog, which is a northern distribution of deposits of brushwood, as compared with a southern distribution of more substantial sites and toghers. The 6th century sites would have been constructed in the early decades of the monastery at Rahugh, founded in AD 537, and they indicate a development of the landscape at this time. This would have involved efforts to move around and communicate between ecclesiastical and secular settlements, and there were probably secular settlements either side of the bog on the limestone till to merit such trackways. On the western side, the path was clear of bogs to access Rahugh Ridge to exploit the major routeways of the area. It is also of note that the orientations of the 6th century trackways coincide with the position of Croghan Hill on the skyline, and this landmark must have played a role in maintaining orientation when traversing the landscape.

6.9.4.4 *Mountlucas Bog*

In Chapter 5, a Late Bronze Age / Iron Age tertiary togher (OF018-154) at Clonarrow was found to have been part of a cluster of sites, many of which date to the Iron Age, which were probably connected with hunting and resource collection (Fig. 68, 72). One such site (OF-CWR 0040) is a tertiary togher which dated to 400-118 BC. It was predominantly composed of brushwood, arranged in a longitudinal fashion in an east-west direction. The 10m trackway appeared to have been intended to cross a wet patch, as indicated by poorly humified peat (Irish Archaeological Wetland Unit 2003a, 16, 46; 2003c, 23, 25). Like the Late Bronze Age example, the east-west orientation is not consistent with crossing the bog, but it is positioned next to a house site (OF018-174) which is thought to be of Iron Age date, and the cluster of sites may have been intended to serve this house. Another tertiary togher (OF018-155, OF-CWR 0021) nearby was approximately contemporary at 391-63 BC. This site was of NE-SW orientation, and similarly appeared to be a short length of trackway to overcome a wet part of the bog (Irish Archaeological Wetland Unit 2003a, 16, 41; 2003c, 23, 25). Its orientation would have led to the house site, suggesting a relationship.

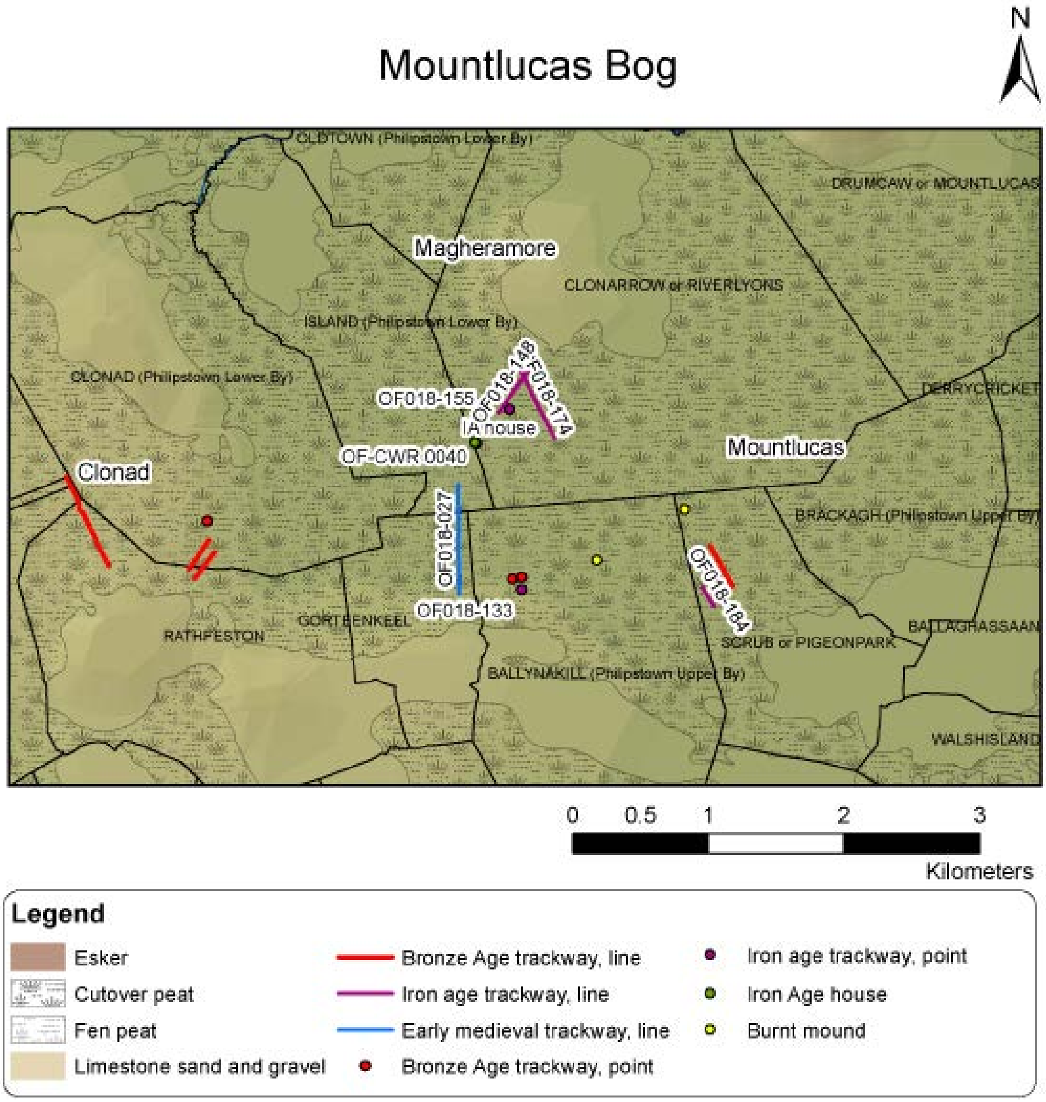

Figure 72 Iron Age and Early Medieval archaeology of Mountlucas Bog

Within a short time it appears that primary toghers were added to this cluster, with one site (OF018-148, OF-CWR 0013) dating to 122 ± 9 BC. It was of NE-SW orientation, and may have been designed to replace the tertiary OF018-155. It ran for up to 412m, with a width of 2.1-4.88m, constructed of transverse roundwood and brushwood up to 31cm in depth. Timber selection included *Corylus, Salix, Alnus, Pomoideae* and *Taxus,* which suggests it was quickly built with local wood. The condition of the timber indicates that it had been exposed to the air, and perhaps remained in use for a prolonged period (Irish Archaeological Wetland Unit 2003a, 16–17, 39; 2003c, 23–24). Another primary togher (OF018-174, OF-CWR 0045) lay above the level of OF018-148, and is thought to have been Iron Age or later. It had been discovered in the 1970s, but was no longer visible at the time of survey, precluding reliable dating. The NW-SE orientated trackway was of transverse plank construction, some of which were dressed with mortices (Irish Archaeological Wetland Unit 2003a, 47). It was probably associated with activities within the bog, as it is not efficiently positioned to operate as a bog crossing, nor did it lead to the house site.

The house itself (OF018-174, OF-CWR 0044) was also recorded in the 1970s, and it has been interpreted as Iron Age because of its stratigraphic relationship with the primary togher OF018-148. The plank construction was 4 sq. m in area and 2m in height, with a layer of heather representing either the floor or a collapsed roof (Irish Archaeological Wetland Unit 2003a, 46–47).

In another portion of the bog at Scrub / Pigeonpark, a primary togher (OF018-184, OF-SPP 0005) dated to 363-4 BC. It extended for 167.75m in a NNW-SSE direction, and was composed of longitudinal brushwood and roundwood, with occasional transverses and pegs. It was layered up to 15-25cm deep, suggesting conditions may have been quite wet, particularly on the east side, where most of the pegs were (Irish Archaeological Wetland Unit 2003a, 16, 53; 2003c, 23, 25). It was of the same orientation as the Middle Bronze Age togher OF018-180 nearby, and it may have been intended to act as a crossing between the dryland of Scrub / Pigeonpark and Clonarrow / Riverlyons. Alternatively, it would have been ideally positioned to access the complex of sites above, and it may have facilitated movement from Scrub / Pigeonpark to this area.

The Early Medieval evidence is represented by a single site at Gorteenkeel. The primary togher (OF018-027, OF-GNK 0002) dated to AD 543/544, and extended for 800m in a north-south direction across the bog. It was composed of two longitudinal planks, overlain on transverse roundwoods, with species including *Quercus*, *Taxus*, *Corylus, Ulmus* and *Alnus*. It may have continued northwards towards Magheramore Bog, where there are some gravel ridges from which the island of Clonarrow / Riverlyons could be accessed. Its purpose was interpreted to perhaps have been to maintain communication between the secular and ecclesiastical sites around Daingean and the dryland to the south (Irish Archaeological Wetland Unit 2003a, 12, 16, 18, 48; 2003c, 23, 25).

Mountlucas Bog appears then to have had continuous wetland activity until about the 1st century BC, focussing on movement around the Clonarrow area and a possible Iron Age house site. Conditions may have become wetter during this time, and the selection of timber species became more diverse, suggesting quickly built, practical constructions. There may then have been a hiatus of activity, lasting until the 6th century AD, at which time construction of trackways resumed. The single dated Early Medieval trackway suggests the act of traversing the bog became more of a concern, probably in order to facilitate communication between settlement sites. If members of a settlement in Clonarrow could cross to the southern fringes of the bog, it was an easy journey to access the Geashill esker and continue long distance movement.

6.9.4.5 *Clonad Bog*

Clonad Bog was seen in Chapter 5 to have been particularly active in the Late Bronze Age, with the construction of three primary toghers and the possible mining of a gravel ridge (Fig. 68, 73). The late date of OF018-079 (650 ± 9 BC) means it could have remained in use early in the Iron Age, but the evidence for Iron Age activity here is otherwise modest when compared with neighbouring Mountlucas. A single site (OF018-093, OF-CLO 0016) of two planks, dated to this period at 472 ± 9 BC. They were laid parallel to the gravel ridge which was accessed by the Late Bronze Age OF018-016 (Irish Archaeological Wetland Unit 2002d, 3, 15). The peat may have started to encroach on the ridge at this time, and the planks demonstrate that the area continued to be accessed.

Other examples of Iron Age activity in this area are in the form of recovered artefacts, including two quernstones (1974:104 & OF-RFN 0005 / 01E0424:1) of potential Iron Age date from Rathfeston. A wooden vessel (OF-CLO 0001, 2000:59, 2000:58) containing bog butter was recovered in Clonad which was of similar design to the one from Barnaboy in Daingean Bog. Both have been dated on stylistic grounds to the Iron Age (Irish Archaeological Wetland Unit 2002d, 2–3). Both of the artefacts discovered in the IAWU surveys were recovered close to the southeastern extent of the Bronze Age OF018-016, potentially indicating continuity in the use of this area of the bog for movement, as OF018-093 above would also suggest.

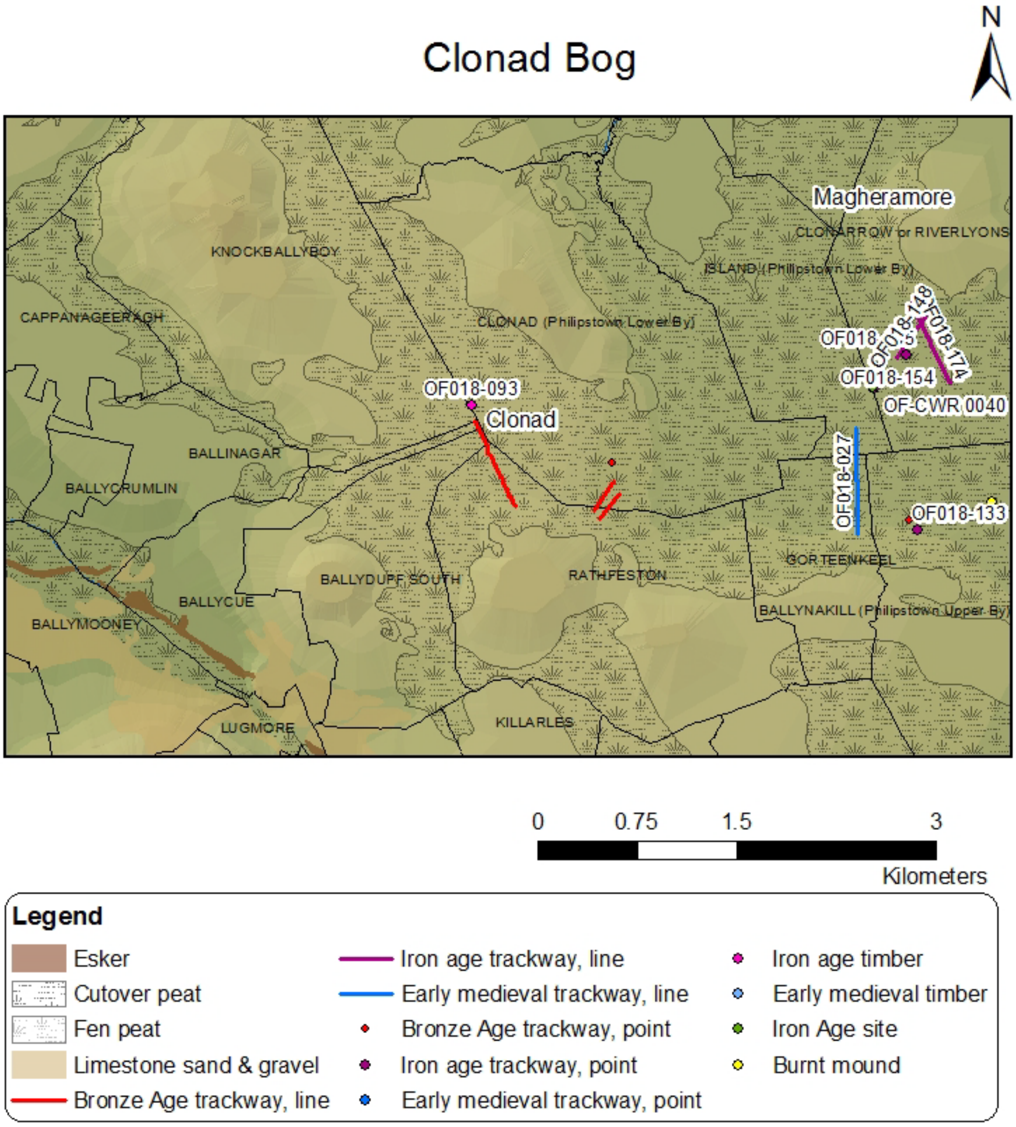

Figure 73 Iron Age archaeology of Clonad Bog

6.9.4.6 *Bloomhill Bog*

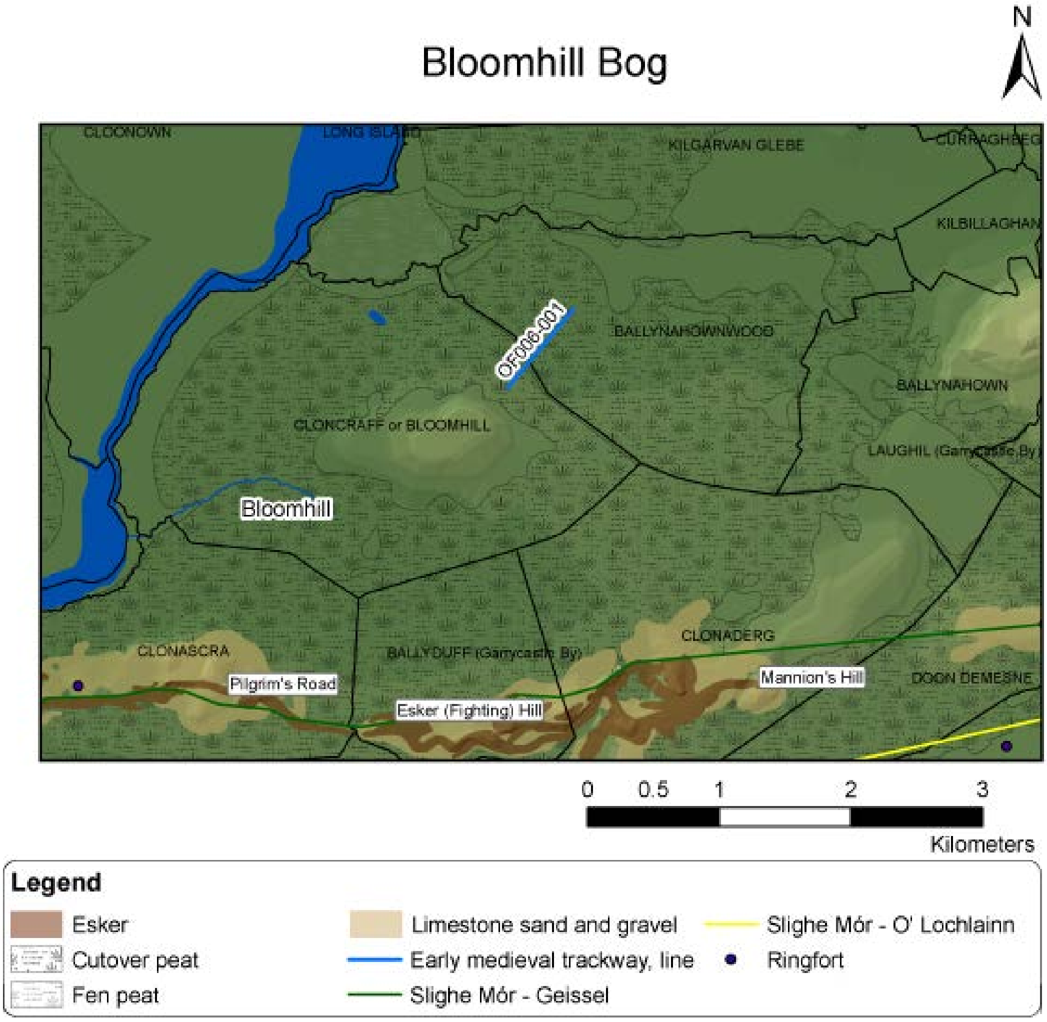

Figure 74 Early Medieval archaeology of Bloomhill Bog

Bloomhill Bog is located 6km northeast of Clonmacnoise, contained by the River Shannon on the west and the Clonmacnoise esker on the south, with the Bloomhill bog island located centrally within the bog (Fig. 68, 74). The most famous site from this bog is a 1.2km long flagged pathway (OF0006-001, OF-CBL 0001, WM-BDH 0021), possibly dating to the 13th century AD, which was excavated in the 1980s. There was evidence of a series of older structures beneath this construction, one of which dated to AD 566-770, making it roughly contemporary with the earliest phases of Clonmacnoise (Breen et al. 1988; Moloney et al. 1995, 17; McDermott 1995). The 13th century trackway ran in a NE-SW direction, and it appears to have maintained the orientation of this earlier version. It was composed of a layer of clay and stones with some timber. This trackway would have linked the dryland island of Bloomhill to Ballynahownwood to the northeast, and would have formed part of a wider system of communication by facilitating movement from the dryland region towards Clonmacnoise. Local memory associates it with pilgrims, but McDermott (1995, 66) proposes it is more likely to have been one of a number of routes which linked to the eskers. A similar multi-phase togher was found in Derrynagun in the Lemanaghan Bogs and, as will be discussed below, it formed part of a complex network of trackways which fed into more inter-regional routeways, with the ecclesiastical settlement of Lemanaghan at its centre. The same applies to this trackway, as it is part of a range of routeways in the form of trackways, esker ridges and the River Shannon which converge on Clonmacnoise.

6.9.4.7 *Lemanaghan Complex – Killaghintober Bog*

The Lemanaghan Complex is made up of a number of bogs surrounding the bog island of Lemanaghan at which a major ecclesiastical site was founded in the mid-7th century. These bogs are rich in wetland archaeology, with a particular concentration in the centuries when the monastery was at its height, and they show a deliberate attempt to connect the bog island to the wider world and to more inter-regional routeways.

Killaghintober Bog is bordered by an extensive area of limestone sand and gravel which can be used to access the Cooldorragh Hills and the *Slighe Mór* (Fig. 68, 75). While there was activity in this bog in the Late Bronze Age (OF007-296), there seems to have been a lapse in trackway construction throughout the Iron Age, only resuming again as late as the 6th century AD. This included a primary togher at Castlearmstrong (OF007-279, 99E0445, 98KTR0002), which ran for 450m in a NNE-SSW direction. The upper surface consisted of morticed oak planks laid end to end and pegged in place. This was supported by two layers of transverse timbers and longitudinal runners. The conditions of the bog had been quite wet in some areas, necessitating the three layers of construction and deep pegs, while other parts appeared to have been dry. A number of timbers were dated by dendrochronology to AD 501 ± 9, 505 ± 9, 594 ± 9 and 610 ± 9 (Whitaker et al. 2009, 53–60; National Monuments Service 2015, OF007-279; excavations.ie 2015, 99E0455).

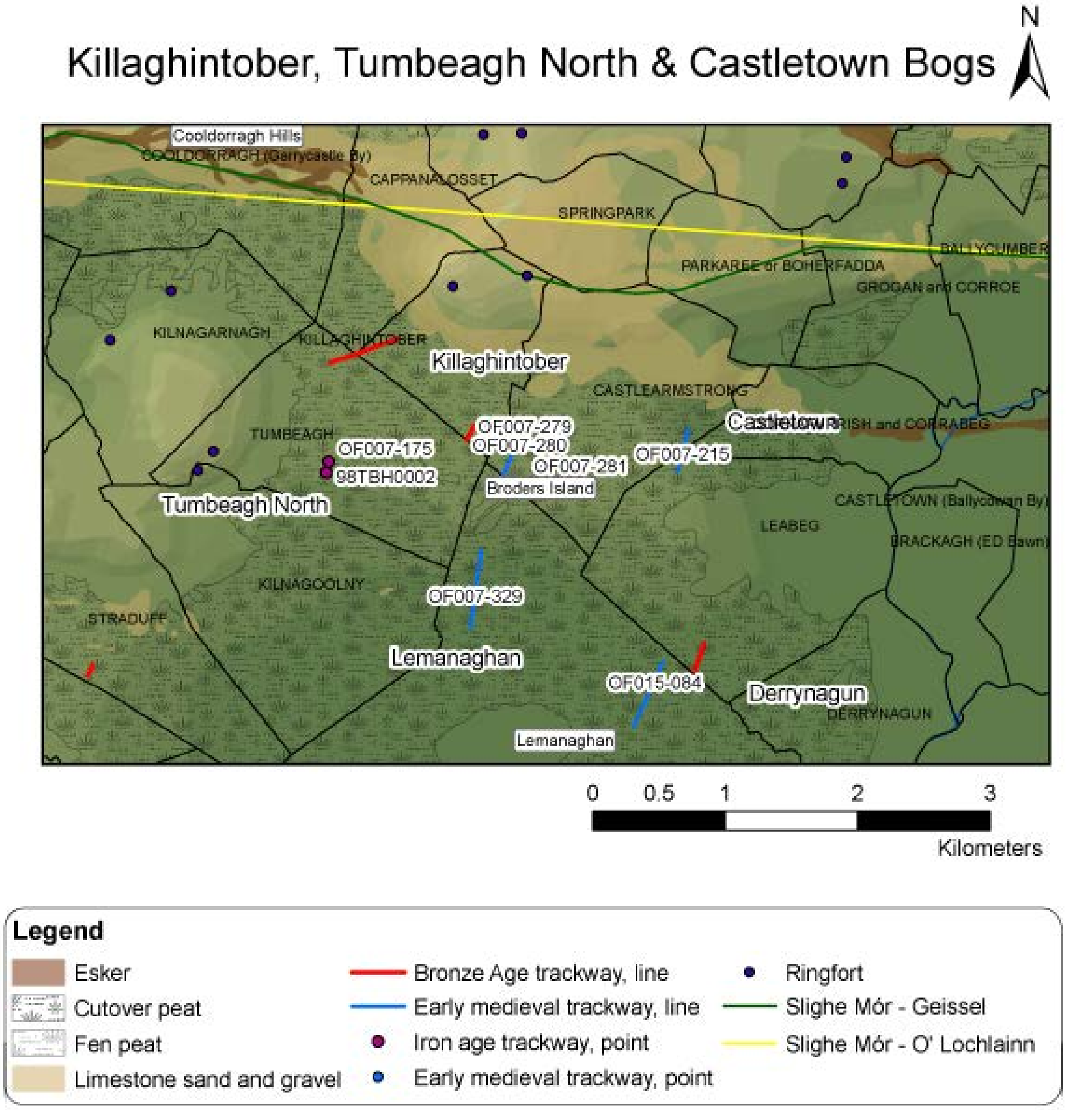

Figure 75 The Iron Age and Early Medieval archaeology of Killaghintober, Tumbeagh North and Castletown Bogs

Another primary togher (OF007-280, 98KTR0013, 99E0444) was located parallel to the first, dating to AD 602 ± 9. It ran for a distance of 225m, and was constructed from longitudinal oak planks, supported by roundwood transverses and pegs. The peat was poorly humified, indicating wet conditions (Whitaker et al. 2009, 50–53). A tertiary togher (OF007-281) of similar orientation was also found in this area, dating to AD 601 ± 9 (National Monuments Service 2015, OF007-281). These trackways would have enabled movement from the dryland of Castlearmstrong to Broder's Island, where rock protrudes above the peat to form a dry island. South of the island in Lemanaghan Bog, another trackway (OF007-329) provides access from this locality to Lemanaghan bog island, suggesting that the trackways above were part of a system linking dry areas across the bog with the contemporary ecclesiastical settlement. This is supported by the discovery at OF007-279 of a wooden crozier of *Ilex* (holly) which was decorated with a Greek cross on the tip of the crook, confirming Christian associations with the trackway (Whitaker et al. 2009, 120–122).

6.9.4.8 ***Lemanaghan Complex – Tumbeagh North Bog***

West of Killaghintober in Tumbeagh North Bog, a Late Bronze Age trackway had linked the dryland of Killaghintober to Tumbeagh / Kilnagarnagh (Fig. 68, 75). The evidence is more modest for Iron Age activity, at which time conditions were quite wet and the bog lake was still in existence. A tertiary togher (OF007-175, 99E0377, 98TBH0001) of east-west orientation was found to date to this period (356-355 BC). The longitudinal brushwood and roundwoods were of such a dispersed arrangement that it was concluded that it was not a formal togher, but that it acted as a guide to find a safe path through the bog (Whitaker et al. 2009, 32–33; National Monuments Service 2015, OF007-175).

Another Iron Age trackway (99E0378, 98TBH0002/4), dating to 357-348 BC, also ran in an east-west direction in this part of the bog. It was at least 32m long and of varying design along its length, incorporating brushwood, roundwood, hurdling and planks of up to three layers deep. It did not extend to the dryland margins, and it is suggested that it may have been associated with the collection of bog ore which was available at this location (Whitaker et al. 2009, 33–37). Meanwhile, Reilly (2009, 135) proposes that the fen peat on which the trackway was constructed may have been around the periphery of the lake edge, and these trackways may then have represented lakeside activities.

The Early Medieval period is represented by a single site here, with a platform (99E0404, 99TBN0008) dating to AD 738-983. It was an irregular arrangement of brushwood and pegs, measuring 2.5m by 2.8m, and was situated only 120m from dryland. There was a return to very wet conditions in Tumbeagh in c. AD 800, and it may have been very difficult to access areas deep in the bog for hunting etc. and this site may represent such an activity on the bog margins.

Thus, the activity in Tumbeagh Bog is quite modest and local in character, and it does not appear to have contributed to the network of trackways among neighbouring bogs serving movement to Lemanaghan. This is probably because of the extremely wet conditions in this area, perhaps coupled with local memory of the catastrophic bog burst in the 3rd century which would discourage movement in this area.

6.9.4.9 *Lemanaghan Complex – Castletown Bog*

Castletown Bog is located east of Killaghintober Bog, bordered by the limestone sand and gravel of Castlearmstrong and the limestone till of Leabeg (Fig. 68, 75). A primary togher (OF007-215, OF-CTN001, 98CET0013) of NE-SW orientation was discovered here extending for a length of 399m. It was of longitudinal oak plank construction, supported by a substructure of transverse planks, roundwood, brushwood and wood chips. A number of samples were dated, with results of AD 647 ± 9, 650 ± 9, 684 ± 9 and 685 ± 9. Most of the excavated areas were over moderately well humified peat, with some wet areas necessitating a more substantial substructure or additional timbers to maintain the trackway after it had begun to sink. One notable artefact from this site was a leather shoe whose heel was worn through, which was probably lost by an individual who had walked on the trackway in the 7th century (O' Carroll et al. 1999; Whitaker et al. 2009, 40–45; Whitaker 2014, 19–20; excavations.ie 2015, 99E0326). 115m to the west, a secondary togher (OF007-208) maintained the same orientation. This was a simpler structure, only 29m long and composed of roundwood. It dated from AD 473-765, potentially predating OF007-215 and eventually being replaced by it.

Reilly's (2009, 137) assessment of insect remains for the primary togher found a number of dung beetles, which she suggests originated from people transporting dung across the bog for cultivation. The trackway appears to have linked the limestone sand and gravel of Castlearmstrong to the bog margins of Leabeg, so perhaps the cultivation was in these margins. However it is also orientated towards Lemanaghan and it may also be part of the system of trackways which appear to converge on this site in the 6th and 7th centuries.

6.9.4.10 *Lemanaghan Complex – Corhill Bog*

Corhill Bog is located at the western extent of the Lemanaghan Complex, north of Ferbane (Fig. 68, 76). Two secondary toghers (OF015-316/7, OF-LTD0043/4) were identified at Lisdermot by the IAWU, but they were subsequently reinterpreted as a single structure with dates of AD 617 ± 9, 626 ± 9 and 650 ± 9. It was a linear plank trackway extending for a distance of 140m in a NE-SW orientation. The oak planks were laid end to end with pegs and mortices, and supported by occasional transverse supports (Whitaker et al. 2009, 45–49; National Monuments Service 2015, OF015-316, OF015-317). The trackway is too short to determine if it was intended to cross the bog, but it is suitably orientated for this. An alternative explanation would be that it was intended as a means to access the interior of the bog, which could be supported by the presence of three platforms (OF015-280, OF-LDT0006, 00E0461) nearby. Although they postdate the trackway at AD 780-1020 and AD 783-1149, they confirm that activity was taking place within the bog at this location (Whitaker et al. 2009, 49–50; National Monuments Service 2015, OF015-280; excavations.ie 2015, 00E0460, 00E0461).

6.9.4.11 *Lemanaghan Complex – Derrynagun Bog*

Derrynagun Bog is located east of the Lemanaghan Bog Island. A 750m long primary togher (OF015-084, 96E0151) was discovered here in a NE-SW orientation between the island of Lemanaghan and the dryland of Leabeg (Fig. 68, 76). The multiphase togher was composed of a variety of materials, of which the earliest was a longitudinal plank trackway, dating to AD 653 ± 9. Later phases included gravel, boulder clay and flagstones, which allowed the site to remain in use for over 600 years (excavations.ie 2015, 96E0151). This site is reminiscent of the multiphase trackway at Bloomhill, with both showing clear continuity, including reconstruction, in the use of a trackway over a prolonged period. Its orientation is towards a patch of dryland where the 10th or 11th century St. Mella's Cell is located, which is in turn linked to the main settlement at Lemanaghan by a flagstone pathway (FitzPatrick et al. 1998, 12–14). This would suggest that either the area of St. Mella's Cell was already important by the time this trackway was built, or that the oratory was positioned on a pre-existing routeway across the bog. The trackway would also fit into a wider system of movement, allowing access from Lemanaghan to the River Brosna, the Clonmacnoise esker, and a potential fording point where they converge at Cornafurrish / Corrabeg and Castletown.

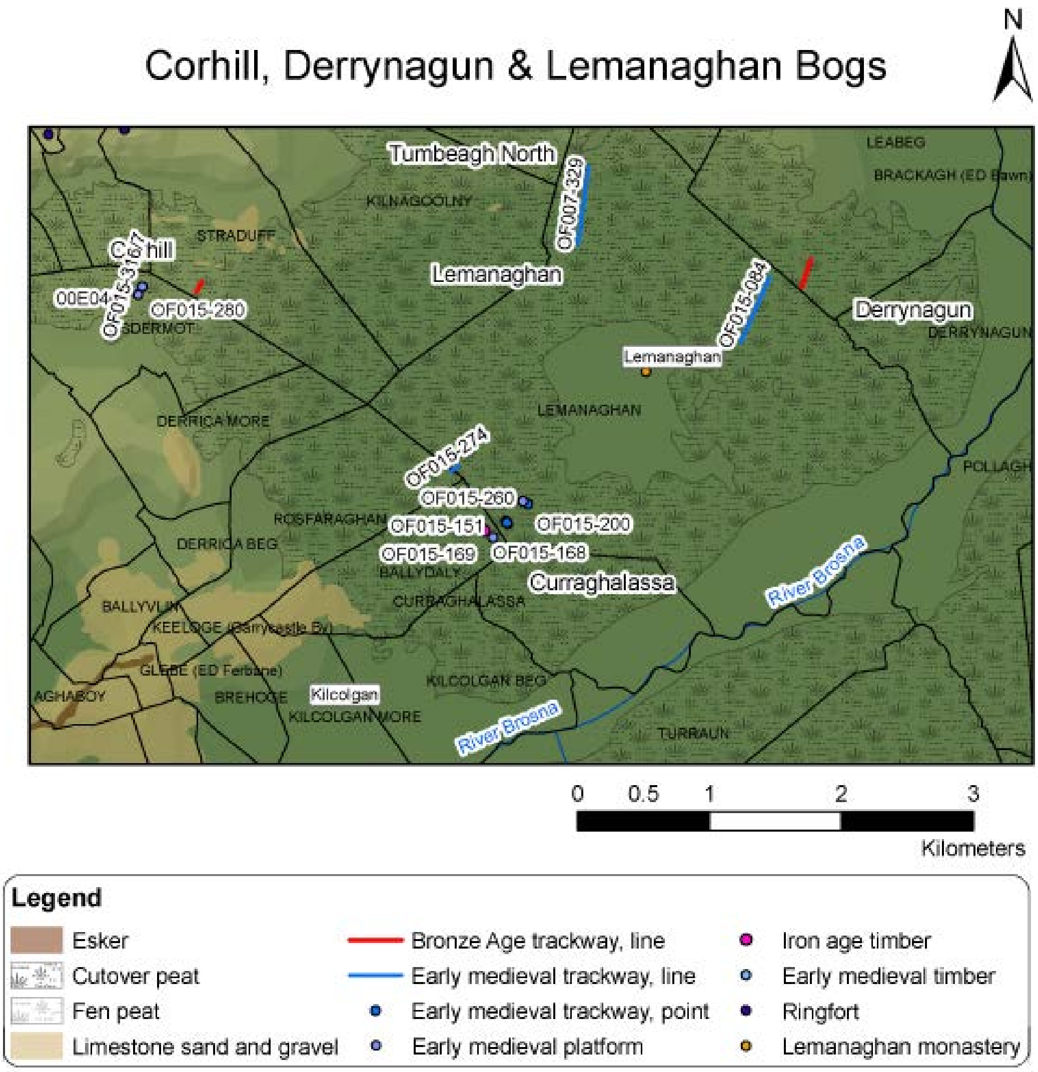

Figure 76 The Iron Age and Early Medieval archaeology of Corhill, Derrynagun and Lemanaghan Bogs

6.9.4.12 *Lemanaghan Complex – Lemanaghan Bog*

Lemanaghan Bog is the area west and southwest of the bog island of the same name, bordered on the southwest by the dryland and esker segment leading to Wheery and Gallen (Fig. 68, 76). The earliest known site is an Iron Age deposit of roundwood, brushwood and twigs (OF015-169), dating to 196 BC – AD 124. It is now classed as a redundant record, but a number of artefacts were recovered from this site, including an alder shaft, an alder barrel lid, an ash vessel base and stave fragments of ash (National Monuments Service 2015, OF015-169). This site is part of a cluster of sites occupying the narrowest crossing point between the island of Lemanaghan and the limestone sand and gravel of Ballydaly. All of the other dated examples in this area are Early Medieval, but this site suggests that there was movement taking place here at an earlier date. It was 85cm deep and may represent multiple structures, perhaps acting as a platform which was maintained and added to over a long period of time for the purposes of ritual deposition. Most importantly, it is the only site from the Lemanaghan Complex with dates between the 3rd century BC and the 4th century AD, during which time conditions were particularly wet, with bog bursts at Tumbeagh in the 3rd and 5th centuries AD. It suggests that a presence must have remained on the surrounding dryland, despite an absence of other structures and the lapse in agriculture from AD 50-400.

The cluster of Early Medieval sites includes a tertiary togher (OF015-247) of plank, roundwood and brushwood construction dating to AD 578-579. Another tertiary togher (OF015-253) lay 9m to the southeast, dating to AD 616 ± 9. Nearby OF015-250 was a simple plank dating to AD 587 ± 9. These sites are probably related and may represent a single trackway of NW-SE orientation (National Monuments Service 2015, OF015-247, OF015-250, OF015-253). This would be a right angle to the most appropriate crossing point, and it may have been part of a complex of structures within the bog.

A north-south band of brushwood and roundwood (OF015-260) was found nearby in moderately humified peat with rooty inclusions, and dated to AD 589 ± 9 (National Monuments Service 2015, OF015-260). While it was classed as a tertiary togher, it was observed during a re-assessment survey that some of the sites previously classed as *puddle toghers* were more likely to have been platforms, as the peat on site does not always indicate pool conditions (Whitaker et al. 2009, 50), and the peat conditions here may suggest a similar interpretation. The same may apply to a deposit of three planks (OF015-151) deeper in the bog which dated to AD 624 ± 9 (National Monuments Service 2015, OF015-151).

A tertiary togher (OF015-200) close to the island is the first structure with an orientation which might contribute to traversing the bog. The plank construction had a NE-SW orientation and dated to AD 594 ± 9 (National Monuments Service 2015, OF015-200). It is aligned towards the three sites above which may have formed a trackway (OF015-247, OF015-250, OF015-253) and may have contributed to a network of trackways within this zone. Although only a tertiary togher, its orientation would also have been suitable for movement between Lemanaghan Island and the dryland of Ballydaly. This would have allowed access to the esker segment leading to the Brosna, where the hard soils would have aided fording. The same orientation was found at OF015-168, a simple band of brushwood, roundwood and timber dating to AD 616 ± 9 (National Monuments Service 2015, OF015-168).

Beyond this cluster in Lemanaghan and Rosfaraghan, a secondary togher (OF015-274) ran in an ENE-WSW direction for 72m. It was dated to AD 669-995, post-dating the cluster of structures to the southeast (National Monuments Service 2015, OF015-274). The later date may suggest changing bog conditions, but it is a suitable alternative to move between the island and the neighbouring dryland. Part of this movement would have been alleviated by the presence of a small bog island between the trackway and dryland.

On the north side of Lemanaghan Island, a primary togher extended for a distance of 870m in a NNE-SSW direction towards Broder's Island. It was a well-built linear plank trackway over a substructure of transverse roundwood and longitudinal planks, held in place with occasional pegs and mortices. The substructure dated to AD 590 ± 9, with possible repair work in AD 621 ± 9 (National Monuments Service 2015, OF007-329; excavations.ie 2015, 98E0465). This trackway would have completed the journey from the dryland in Castlearmstrong, which incorporated the contemporary primary togher OF007-279 in Killaghintober Bog and the dry ground of Broder's Island.

The ecclesiastical site at Lemanaghan was founded in the mid-7th century, sometime between 645 and Manchán's death in 664. This would have the monastery post-dating most of these trackways, suggesting that there may have been a pre-existing settlement at this location. The wooden crozier from the primary trackway in Killaghintober (OF007-279) demonstrates an ecclesiastical use of the trackway, meaning either the trackways continued in use after the foundation of the monastery, or that there was Early Christian movement across this bog pre-dating the monastery. Reilly (2009, 137) noted a large number of ant remains from all of the Early Christian sites in this complex, which suggests that the timbers of the trackway had been exposed, and thus in use, for a long time. It is therefore likely that many of them remained in use in the earliest phases of the monastery. It has however been posed previously that there may have been an earlier church site at Lemanaghan that these trackways may have served (McDermott 2001, 23).

This island hopping would also have fit into a wider scale of movement, facilitating movement from the monastic site of Lemanaghan to the esker ridge and *Slighe Mór*. This would make the site easily accessible to pilgrims and other travellers, and allow communication with Clonmacnoise, Durrow and Rahugh, all of which are located along the *Slighe Mór* (Fig. 81). Similarly, the multi-phase togher at Derrynagun would have allowed access to the River Brosna and to the *Slighe Mór* from a different direction. Finally, the cluster of sites to the southwest would have provided access to the ecclesiastical settlements of Wheery and Gallen, as well as potential fording points at Wheery and Ferbane (See Chapter 5.5.3). These trackways show the settlement at Lemanaghan to have been centrally placed to take advantage of a number of existing routeways, despite its apparent isolation within the surrounding bogs. The construction of a number of trackways in the 6th and 7th centuries show a deliberate effort to build a network which would not only serve local movement, but facilitate communication in the wider region too.

6.9.4.13 *Summary of wetland movement*

To summarise, while there were a number of trackways dating to the Late Bronze Age in the study area, very little construction appears to have taken place in these bogs in the Iron Age. Clonad and Mountlucas Bogs may have had some element of continuity, but the general pattern throughout the Iron Age is that of fewer sites making use of a wider range of timber species, suggesting expedient constructions. Apart from the primary toghers at Mountlucas, the constructions are typically short lengths of trackway or platforms, indicating activities within the bogs, rather than serious attempts to cross them. Given the downturn in agriculture in the Iron Age this is unsurprising, and it is notable that there were two trackways discovered at Tumbeagh, where agriculture persisted until the 1st century BC. Sampling at Mountlucas may similarly reveal a continuity of agriculture through this period. There was a clear lapse in wetland constructions however from c. AD 200-500, at which time there was also woodland regeneration, two bog bursts at Tumbeagh and quite wet conditions across the wetlands. After this period, trackway construction and agriculture resumed alongside a major cultural shift which included the introduction of Christianity and the foundations of a number of important monasteries in this area.

The Early Medieval trackways include a number of long primary toghers which were designed to cross large sections of bog, in particular at Daingean, Mountlucas, Bloomhill and the Lemanaghan Bogs. Most of them would have facilitated easy access to major routeways, a phenomenon which had been established in the Late Bronze Age but is less evident in the Iron Age. This would have been crucial for the success of a growing population and the survival of the newly founded monasteries. Indeed, given the proximity of some of these trackways to ecclesiastical settlements, Lemanaghan in particular, the monasteries may have been the catalyst which precipitated such projects. The construction of these trackways would have required planning, mass felling, availability of labour and occasional maintenance, and this shows the growing political power which the monasteries held in order to harness such a workforce.

With a growing and dendritic network of roads and routeways emerging in the Early Medieval period, including the five ancient roads and the Midland Corridor, this study area demonstrates efforts on a local level to tap into this system of movement and communication through the construction of trackways. These efforts hint at the cognitive maps held by people at this time, who were capable of not only creating trackways to satisfy immediate and local concerns of moving around the local wetland sphere, but of designing a local network of paths that could ultimately connect to more distant places throughout Ireland.

6.9.5 Secular settlement in North Offaly

In previous chapters, the potential to discuss settlement within the study area was limited to a handful of habitation sites and speculation as to which areas of dryland may have accommodated settlement. We know very little of Iron Age settlement in Ireland in general, and in this region in particular, but the cultural shift which seems to have taken place from the 5th century AD provides us with a wealth of information regarding Early Medieval settlement, both in the form of secular and ecclesiastical settlement. The area was also quite important in the wider scheme of territorial divisions, as the wetland region provides a number of natural boundary places. This meant that the routeways of this area would have provided access to four of the five ancient provinces.

As discussed above, we know that agriculture persisted in the late centuries BC in the dryland around Tumbeagh Bog, supplemented by a number of timber structures in the bog (Fig. 75). The nature of the habitation which accompanied this practice is unknown, but it was probably situated on the elevated ground to the west and to the north, similar to the pattern of ringfort distribution in this area. The wetland site OF015-169 in Lemanaghan Bog (Fig. 76) may also indicate nearby settlement, possibly on the limestone sand and gravel area abutting the River Brosna. Although there are no nearby pollen cores from Mountlucas (Fig. 72) to illustrate agricultural practices, the construction of a variety of wetland structures, including two primary toghers, from 400-100 BC suggests an active population at that time. The surrounding dryland is predominantly made up of modestly sized patches of limestone till and bog islands, some of which is of slight elevation. The main cluster of sites is in Clonarrow / Riverlyons, pointing to possible settlement in the bog island of that townland. The house (OF018-174) from this cluster is thought to date to the Iron Age and its wetland location suggests marginal lands were being occupied and exploited at this time.

The evidence provided by wetland structures, depositions and the Old Croghan Man in Toar Bog, Clonearl Bog and Daingean Bog demonstrate activity in the shadow of Croghan Hill. The ritual components of this evidence allude to a royal landscape which developed in this area, no doubt influenced by the early prehistoric burial monument and natural landmark of Croghan Hill. The pollen evidence in this area suggests very little anthropogenic activity from 580-270 BC, and most of the Iron Age wetland evidence in this region dates to the period after 270 BC when there was a resurgence of agriculture, so the emergence of this area as a royal landscape may date to post-270 BC, and was fully realised in the 5th century by the O' Conors.

Most of the study area was initially part of Early Medieval Leinster (*Laigin*), but the southern Uí Néill defeated the Uí Failge in AD 516 and subsequently expanded the territories of Meath (*Mide*) into the Midland Corridor and as far west as the River Shannon (Fig. 77). West of the Shannon was the province of Connacht (*Connachta*), but influence from that area extended eastwards to certain sites such as Clonmacnoise, who received O' Conor patronage. The boundary to the province of Munster (*Muma*) was just outside of the study area on the southern extremity of the

Midland Corridor, and raids were occasionally carried out by the Munstermen into the Midland regions via this routeway. The location of this area at the meeting point of the provinces meant that it was bound to become an arena where rivalries were acted out by encroaching on each other's territory through the use of routeways.

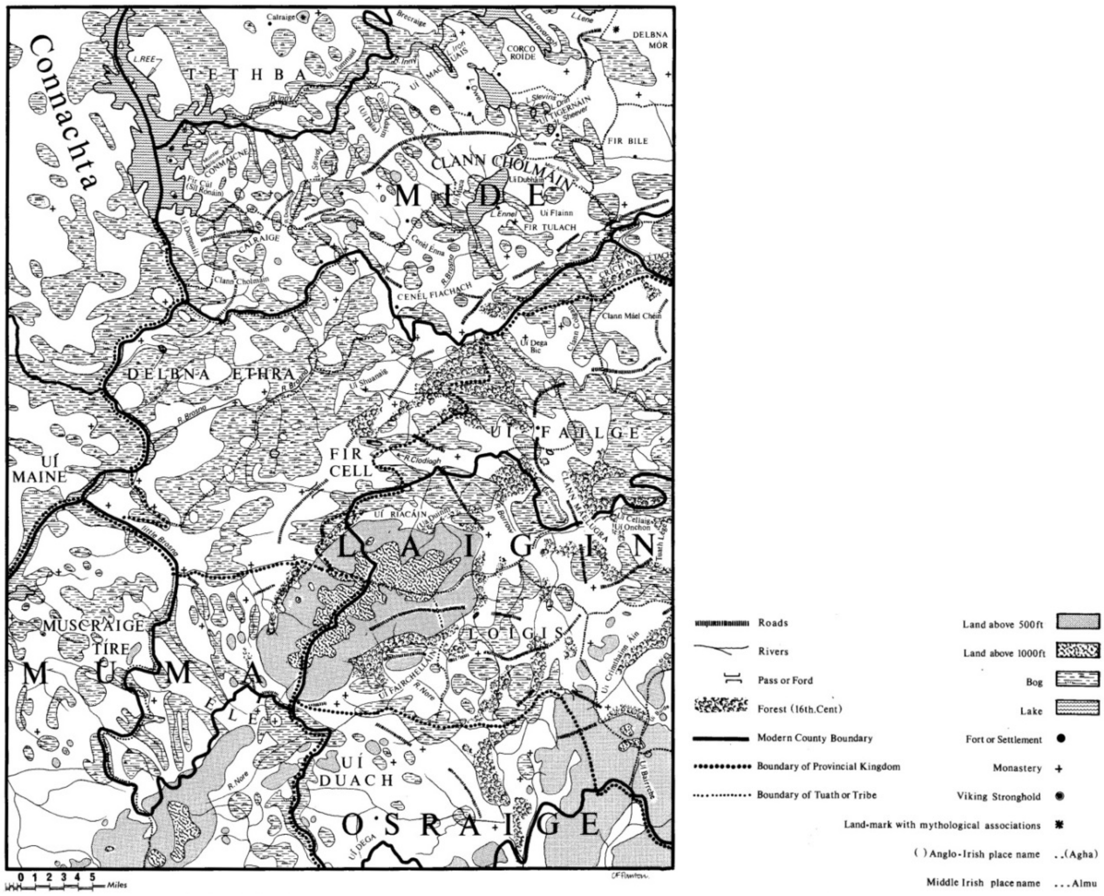

Figure 77 The kingdoms of Laigin, Mide, Connachta and Muma intersecting in the study area (Smyth 1982, 154)

Within these provinces were a number of smaller tribal territories or kingdoms. The Uí Failge, after whom Offaly is named, were one of the most important Leinster tribes, and they dominated the eastern portion of the study area. The Loíghis were traditionally known as foreigners (Smyth 1982, 13), and their territory included the small portion of modern Co. Laois in the study area. The Midhe tribes included Tethba and Cenél Fiachach where modern Co. Westmeath lies, with the Fir Chell controlling most of the fertile land of the Midland Corridor and the Delbna Bethra between it and the River Shannon. In Connacht, the Uí Máine controlled the land abutting the Shannon in this region, while the neighbouring Munster territory was part of the kingdom of Éle.

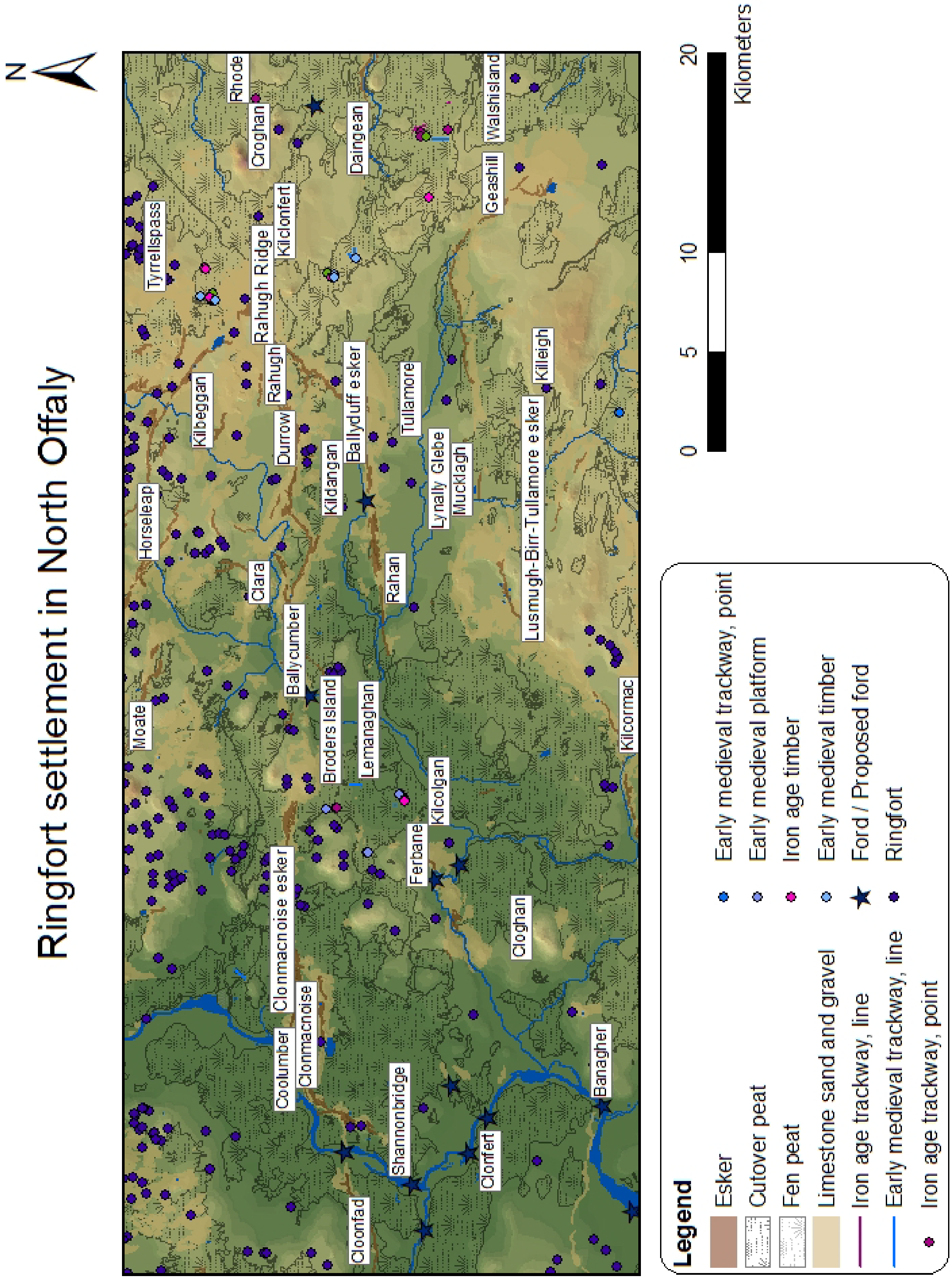

Figure 78 Ringfort settlement in North Offaly

Cities and towns did not exist apart from the monasteries, and the tendency among the Gaelic Irish was for dispersed settlement. Lords, briugu and strong farmers would have lived in ringforts, of which there were at least 235 in the study area (Fig. 78). Most of these are in the northern area which would have been part of the Cenél Fiachach and Tethba regions. A number are also found in the Midland Corridor of the Fir Chell, and in the elevated portions of dryland between the Blackwater and Lemanaghan Complexes where the Delbna Bethra were in control. Some are situated close to routeways, particularly Stout's (1998) Cluster 4 ringforts which Geissel (2006, 67) interpreted as houses of hospitality. These were univallate ringforts with a large internal diameter and low altitude, and Stout (ibid, 42) suggests that they controlled a wider hinterland than the high status mulitvallate ringforts. They typically adhere to slightly elevated ground, almost exclusively on limestone till and limestone sand and gravel areas, avoiding the low lying land which would have had heavier, less well-drained soils.

While there are a number of ringforts on the Midland Corridor, it is surprising that it is a substantially less dense distribution than the Cenél Fiachach / Tethba region, given the quality of the land and the presence of the routeway (Fig. 78). In contrast, there were a number of important ecclesiastical sites along this routeway, which perhaps affected secular settlement patterns. Stout's (1998, 36) statistical analysis of settlement in Co. Offaly confirmed that high density ringfort settlement occupies different regions to high density ecclesiastical settlement. In particular, he notes that ringfort builders preferred higher altitudes and gley soils and that the high status examples avoided ecclesiastical sites.

To summarise, while we know little of Iron Age settlement in this region, it appears that it was more modest than that of the Late Bronze Age, with less evidence of habitation and a trend towards woodland regeneration. The wetland surveys have provided some evidence of Iron Age activity pointing to nearby settlement which would probably have been on a small scale, and this would presumably have been the case in a number of localities throughout the region. There was a resurgence of settlement activity in the Early Medieval period, and this region was something of a battle ground between the Leinster and Meath people of this period, with strong influences from Connacht and Munster. This was facilitated by the natural routeways of this area, but while potential *brug* sites adhered to these routeways, most secular sites were associated more with altitude and soil type and were probably served by the lower orders of road discussed above (Chapter 6.4.1). The most significant type of settlement which occurred along these routes was ecclesiastical in nature, a situation which allowed these foundations to benefit from frequent high class travellers and attract the attention of political dynasties from the neighbouring regions.

6.9.6 Ecclesiastical settlement in North Offaly

As we have seen from pollen analysis and trackway construction, the North Offaly area underwent an extremely active period of settlement, construction and agriculture from c. AD 400 onwards. Part of this process involved the founding from the 5th to 7th centuries of what would become major ecclesiastical sites (Fig. 79). Indeed, Smyth (1982, 6) observes that,

> ‘we cannot hope to understand the geographical picture of settlement within the Midland Bogs… without understanding the function of the monasteries’.

In short, the patterns of settlement, movement, and geopolitical competition which emerged over the subsequent centuries are closely connected to the function that the monasteries performed in the landscape. While popular accounts may suggest that some of these sites were in isolated locations, it is becoming increasingly apparent that this landscape provided access to a network of routeways which the developing monastic settlements could capitalise on to become important destinations and waypoints.

The liminality of the bogs, as well as the tradition of the *Eiscir Riada* as a political boundary, made this region a border area, where Leinster, Meath, Connacht and Munster met. This contributed to the wealth and power of these monasteries, as rival political powers were eager to patronise important religious centres. Clonmacnoise, for instance, received donations from the O’ Conors of Connacht, despite being on the east side of the River Shannon in the province of Meath. The nominal neutrality of monasteries also made them ideal locations for synods or political meetings.

The landscape of North Offaly was eminently suitable for the new monastic foundations, providing islands of agricultural land flanked by bogs, which gave the illusion of isolation for those seeking reflection, but which in reality would have accommodated sizeable communities of clerics and labourers. Very few monastic sites across Ireland were higher than 150m OD (Smyth 1982, 3), so Offaly’s low-lying aspect fit very well within this scheme, and these sites would have formed well-connected, easily accessible nodes within a landscape of movement and communication. Below is a summary of the major ecclesiastical sites in the study area and how they fit into this system.

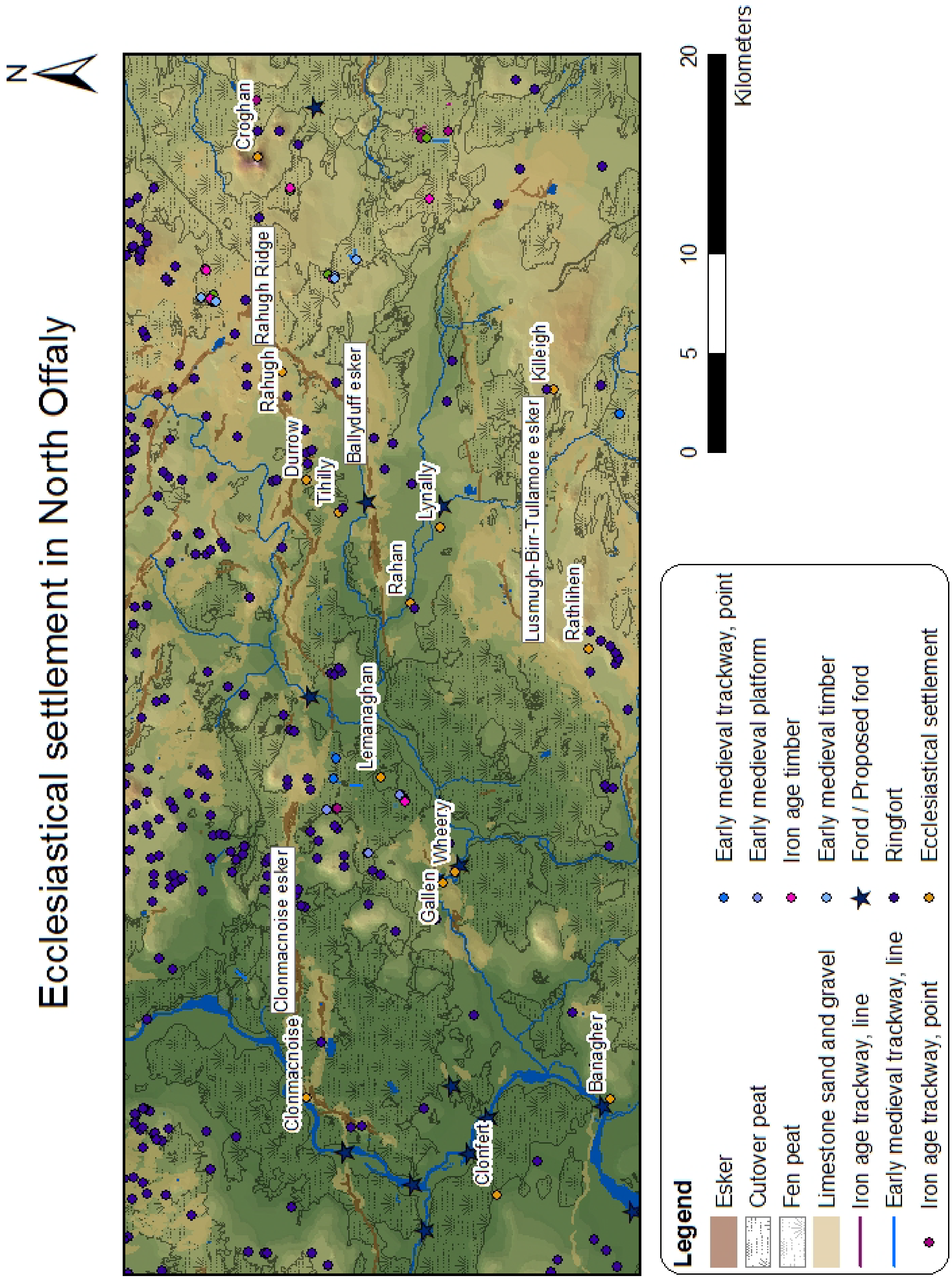

Figure 79 Ecclesiastical settlement in North Offaly

6.9.6.1 *Croghan*

Croghan, or *Cruachán Brí Éile*, was marked out as we saw with a cairn in the Neolithic or Bronze Age, and Clonearl Bog below was the place where the Iron Age

Old Croghan Man was found. With such pre-Christian ritual associations, as well as the impressive silhouette which makes the peak an ideal landmark to pilot by, it was an obvious site for Christian missionaries who routinely appropriated pagan centres as new Christian sites (Fig. 79, 80). It was also the inauguration place of the O' Conors of the kingdom of Uí Failge, making it a significant political site. Bishop Mac Caille established a church close to the summit of this hill sometime before his death in AD 489, capitalising on these pre-existing ritual and political associations.

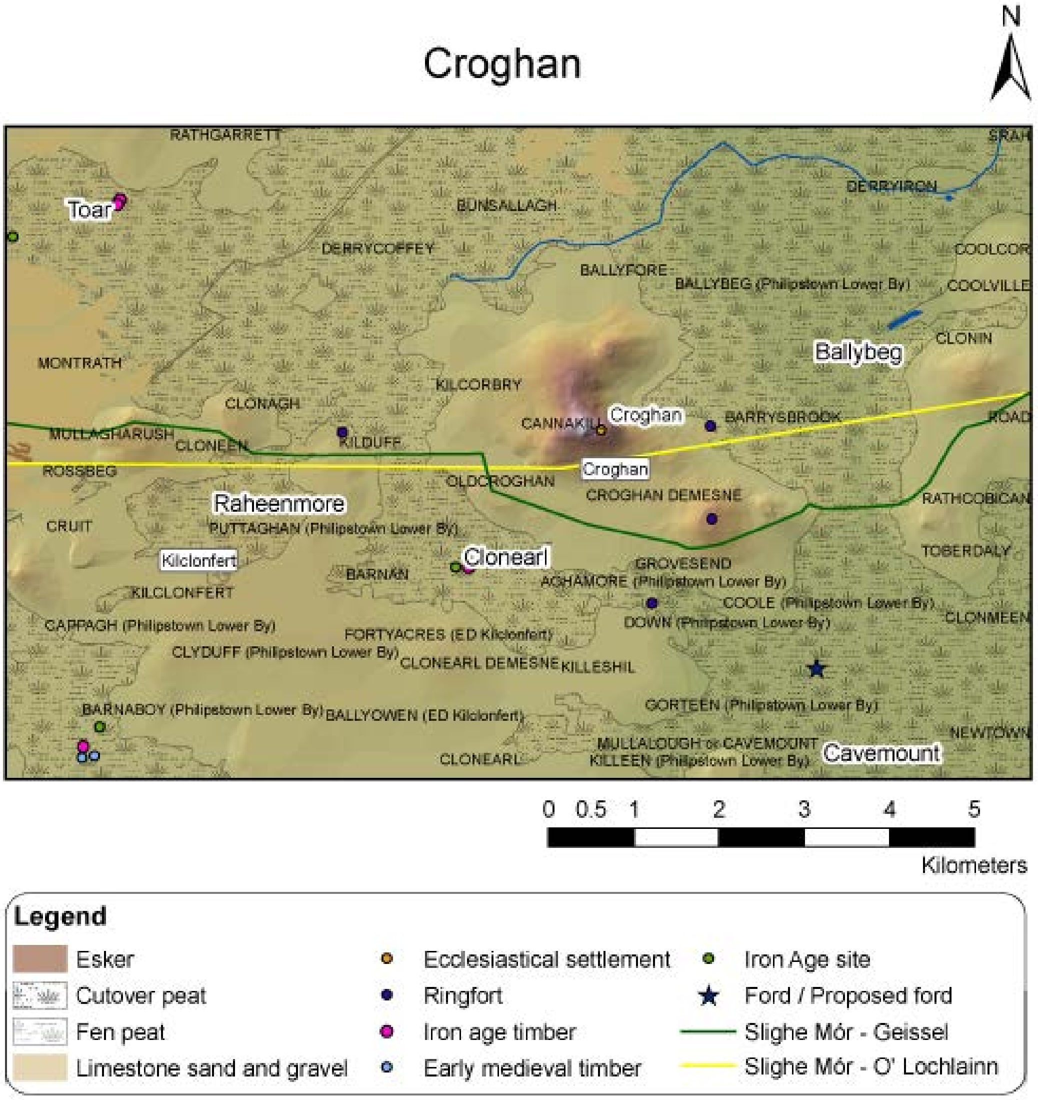

Figure 80 Ecclesiastical settlement at Croghan

This site would have overlooked the *Slighe Mór* and the *Tóchar Cruachain Brí Éile*, a togher crossing the narrow point of Ballybeg Bog, making it a well-connected site for east-west movement. While the hilltop site may have necessitated a diversion uphill, an early church site may have existed on the low-lying southwest slope where a number of east-west aligned burials have been discovered (excavations.ie 2015, 1997:449; National Monuments Service 2015, OF010-486). This site is likely to have been adjacent to the routeway through this area. The *Tóchar Cruachain Brí Éile* is mentioned in the Annals of the Four Masters in 1385 (Lucas 1985), but it is thought to have been in use much earlier. When St. Brigit visited Bishop Mac Caille, they were to travel on to Bishop Mel, but the way was blocked by a marshy landscape. A bridge is said to have appeared over this ground and it is thought that this tale refers to the *Tóchar* (O' Brien 2006, 7).

6.9.6.2 *Gallen and Wheery*

The River Brosna is flanked at Ferbane by limestone sand and gravel which made the area conducive to agriculture, movement and fording of the river. There were a number of stone axes recovered from Ferbane which show there was some activity here at least as early as the Neolithic period, but the monasteries at Gallen and Wheery, located either side of the River Brosna, are the first evidence of large scale settlement here (Fig. 79, 81). Gallen was founded by the Welsh monk Canoc Mochanog in AD 492, while Wheery was founded sometime in the late 5th or early 6th century by St. Rioc, making the two monasteries contemporary. Gallen maintained its Welsh connections, providing communication with the wider world. On a local and regional level, the River Brosna allowed water travel along its course further east, or west towards the River Shannon. The eskers and deposits of limestone sand and gravel allowed ease of movement on a NE-SW axis, and there was a clear route between bogs towards the fords at Banagher and Keelogue. A number of trackways in Lemanaghan Bog predate the presumed foundation date of the Lemanaghan monastery, but they would have been contemporary with the earliest phases of Gallen and Wheery. These trackways could have been used to provide access to Lemanaghan Island, which was possibly the site of an earlier church, and an island-hopping route could have been taken as far as the *Eiscir Riada* where the major communication route of the *Slighe Mór* could be accessed.

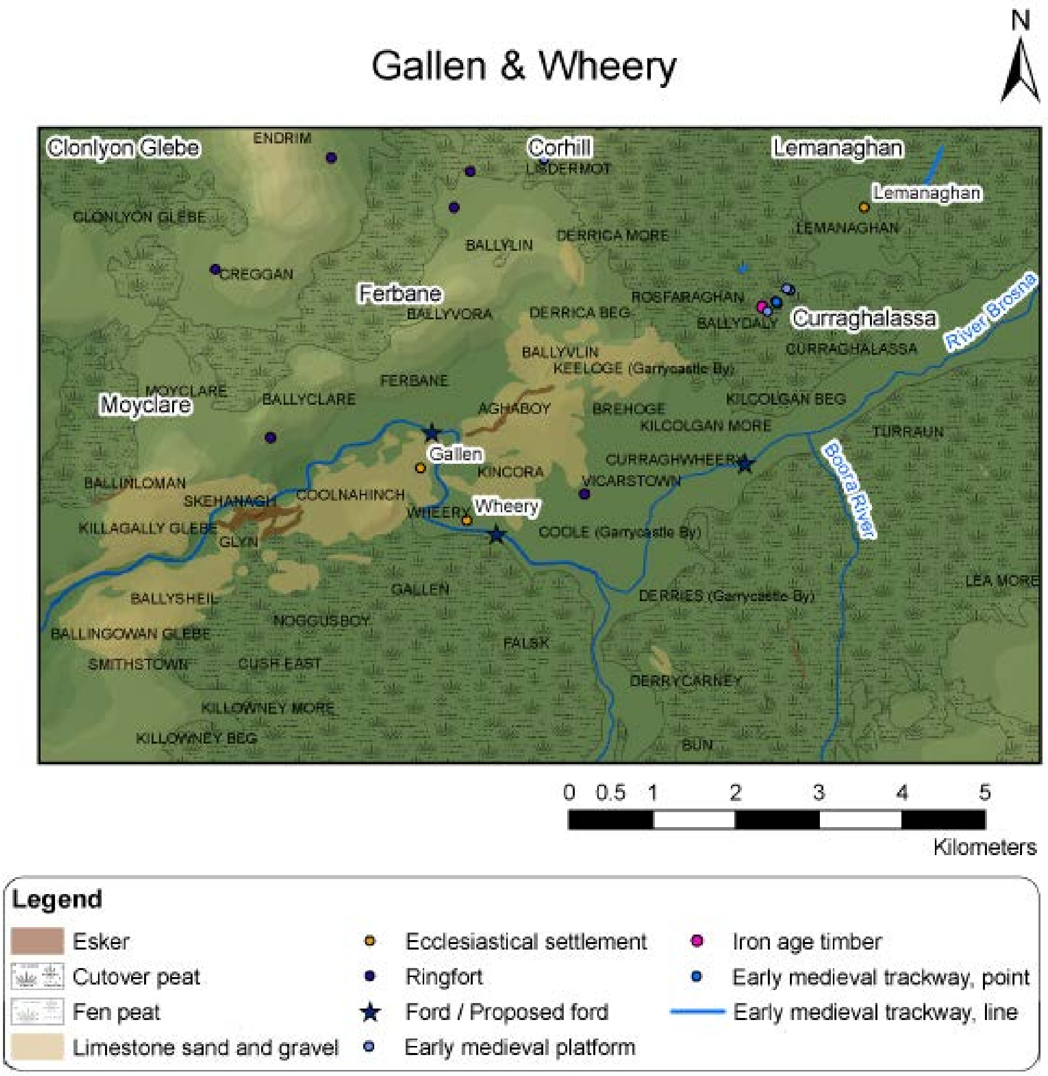

Figure 81 Ecclesiastical settlement at Gallen & Wheery

6.9.6.3 *Clonmacnoise*

Clonmacnoise was founded by St. Ciarán in the mid-6th century where the *Eiscir Riada* and the River Shannon meet (Fig. 79, 82). He is said to have died one year after establishing the monastery from the Justinian plague, which dates the foundation to either AD 544 or 548 (Bradley 1998, 42). The site itself is not a natural fording point, but the intersection of three eskers and the associated limestone sand and gravel would have supplied well-drained agricultural land in an area otherwise dominated by bog, and the Shannon Callows would have provided fertile seasonal pasturage. The siting of the settlement is on a slightly elevated spot overlooking the river, which mitigated against flooding while also allowing important access to the river. These factors arguably made it a better location for such a settlement than the natural fords downstream at Creevagh / Cloonburren and Shannonbridge.

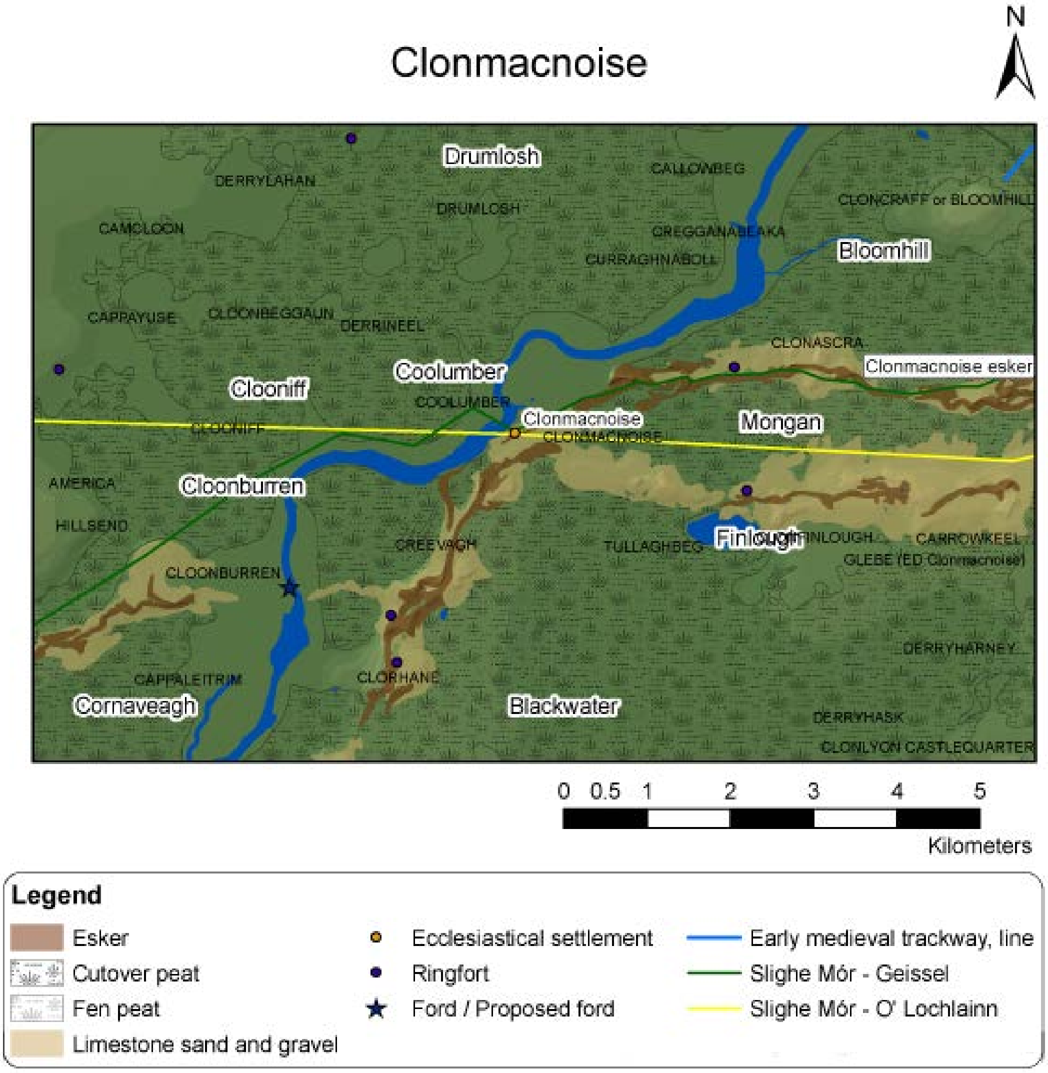

Figure 82 Ecclesiastical settlement at Clonmacnoise

The available routes made it an extremely well-connected settlement, with access to the water route of the River Shannon, the dryland routes along the eskers and the fording points downstream. The *Life of St. Ciarán* tells of the saint's close relationship with St. Senán, whose monastery was on Scattery Island on the Shannon Estuary, which would have been an important economic connection (Kehnel 1998, 13). Travel by boat along the River Shannon would have been the most appropriate way to communicate between the two settlements, suggesting the river was a major component of Clonmacnoise's communication with the wider world. Meanwhile, the site is usually seen as one of the major settlements along the course of the *Slighe Mór*, indicating elite movement through this landscape. Apart from the natural routeways available, the trackway from Bloomhill (Chapter 6.9.4.6) shows that efforts were being made to traverse the wetlands and move between bog islands to access this site.

The most impressive intervention to improve movement and communication in this area is the construction of a timber bridge across the Shannon which has been dendro-dated to AD 804, making it the earliest dated bridge in Ireland (See Chapter 6.4.2). It consisted of vertical posts supporting transverse and longitudinal timbers, and was approximately 120m in length and 5m wide (Moore 1996; excavations.ie 2015, 97E0243). This bridge expedited movement from Clonmacnoise to Connacht across the river, and facilitated the relationship that saw the kings of Connacht patronise the monastery at this time. At 5m wide, it complied with the required width of a *slighe*, making it a suitable design for chariot travel of kings and bishops. It ensured that travellers on the *Slighe Mór* did not have to divert downstream to find a suitable fording point, and allowed safe passage of wheeled vehicles across the river. It also offered a certain amount of control on the part of the monastery as to who could safely cross the river. Across the river, there are substantial areas of bog to cross, but a gravel trackway (RO055-005, ROCBR 0001) may have been contemporary. Survey found it extended in a NNW-SSE direction for 1km, apparently connecting the site of the bridge to the bog island of Nure in Drumlosh, a path that would have required over 2.2km of trackway at that time (Moloney et al. 1995, 119; Moloney 1998, 9). If the complex of trackways at Lemanaghan is any indication of how movement was orchestrated in the wetlands surrounding monastic settlements, then it is likely that there were further trackways connecting to the bog islands of Derrinneel and Cloonbeggaun, or south towards the esker. It is estimated that the bridge would only have been in use for c. 50 years, and it was not rebuilt in the same location again.

St. Ciarán had been the son of a carpenter, and like Jesus had also died at the age of 33. His associations with Jesus gave the monastery a reputation whereby burial there offered immediate entry to heaven. It became a destination for kings at the final stages of their lives who wished to be buried there, and was the site of the first known Christian pilgrimage in Ireland in AD 606, when the Annals of Tigernach recorded the death of Aedh while on pilgrimage there (O' Brien 2006, 84). A number of other early pilgrims are recorded, and itineraries show that it was a frequent overnight stop on longer journeys on the *Slighe Mór*. The path known as the Pilgrim's Road follows the more northerly of the eskers leading to Clonmacnoise, and has been suggested by some to have been part of the *Slighe Mór* (Geissel 2006).

Given that pilgrimage was one of only a few occasions that most people could leave their own *túath*, the use of this road as a *slighe* and a pilgrims' path would have meant a large cross section of society used the route and visited the site.

It was also the location of an *óenach*, which would attract people from a wide region and require the prior repair of roads. Doherty (1980, 81) cites AD 800 as the first reference to an *óenach* being held at a monastery, a date which conveniently coincides with the construction of the bridge at this location. This was another occasion that allowed the movement of lower classes, so it appears that Clonmacnoise was a destination that would be known among all the social classes over a wide area. This would make it a fixture of people's cognitive maps and an easy node to communicate when giving directions to other sites, facilitated by its central location within a network of inter-regional and local roads and routeways.

6.9.6.4 *Killeigh*

Killeigh was founded by St. Sinchell sometime before his death in AD 548. This site is nestled between Scrub Hill and the high ground of Pigeonhouse and Ballinvally in the former kingdom of Uí Failge (Fig. 79, 83, 84, 85). The route northwards is clear to gain access to the east-west orientated Geashill esker on the Lusmugh-Birr-Tullamore esker system, which provides a route southwest to the River Shannon and also intersects with the Midland Corridor. On a local level, two road segments (OF025-015002 & OF025-015001) are illustrated on the First Edition 6" Ordnance Survey map (Fig. 84) traversing the bog and leading towards the fording point in the River Clodiagh at Gorteen Bridge (FitzPatrick et al. 1998, 7). The date of this road is unknown, but it leads from the settlement at Killeigh as the shortest route to the bridge, and its width of 5m suggests a high quality path which would have been suitable for elite movement. The bridge is constructed at a natural ford where the river crosses deposits of limestone sand and gravel, so it could reasonably have been a route contemporary with the site. It was certainly present in 1563, as the Map of Leix and Offaly from that year shows a path from south of Killeigh, across the River Clodiagh towards Keleurine (Killurin) (Fig. 85). Having crossed this river, the Midland Corridor is readily accessible for movement to Meath or Munster.

One of O' Lochlainn's (1940) proposed routes for the course of the *Slighe Dála* moves from Geashill to Ballyboy, a trajectory that would also have serviced the settlement at Killeigh, and may have crossed the River Clodiagh at Gorteen Bridge. This would ensure the monastery was accessible for elite movement. Indeed, the monastery was so easily accessible from Munster that it was a target for attack from that quarter, and a raid was carried out by Munstermen in AD 937 (O' Brien 2006, 46). Smyth's maps of what he calls the North-Western region of Leinster (1982, 154–155) illustrate a routeway from Killeigh northwest across the bogs to join the Midland Corridor at Lynally. This would be easily achieved by the construction of trackways linking Killeigh to the bog island at Hawkwood and to the dryland at Clonagh West. This appears to have been a separate route to the road illustrated on the 1563 map.

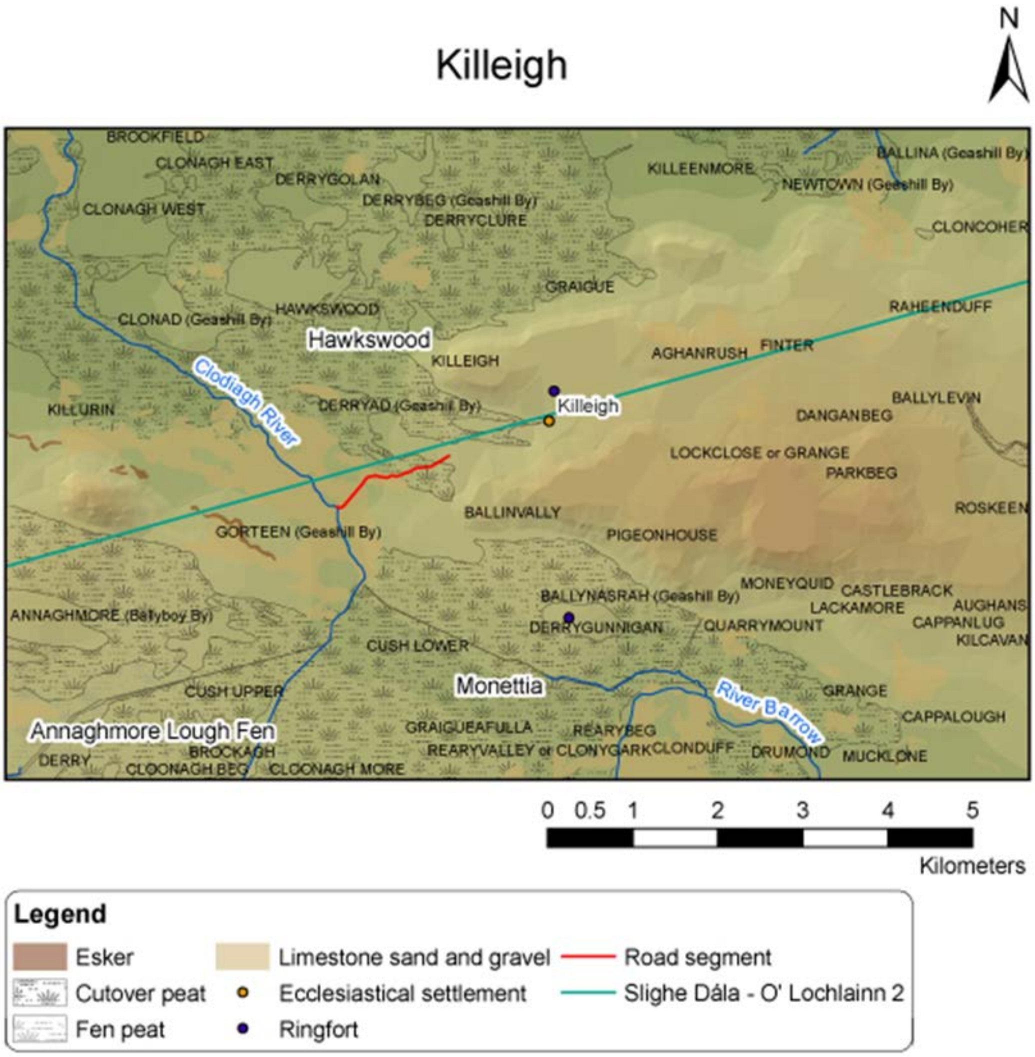

Figure 83 Eccesiastical settlement at Killeigh

It appears then that this was another well-connected monastery with access to several potential routeways from a bog-side location, including a road with *Slighe Dála* associations and a particularly wide surface, indicating that elite movement was being practiced in this location.

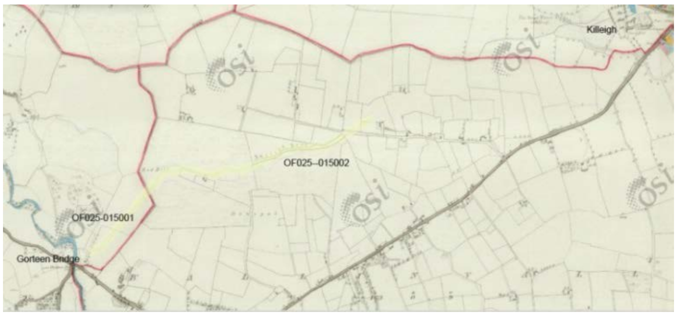

Figure 84 Paths leading from Killeigh to possible ford at Gorteen Bridge, First Edition Ordnance Survey 6" map

Figure 85 Path from Killeigh to Killurin Cotton Augustus MS I ii 40 1563

6.9.6.5 *Durrow*

Durrow Abbey was founded by St. Colmcille in c. AD 556, on the edge of the Midland Corridor and just off the *Eiscir Riada* (Fig. 79, 86). It was initially part of the Tethba territory, but later became part of the Fir Chell kingdom. This flux in dynastic control meant that Durrow enjoyed patronage from several quarters, including the kings of Meath, Tethba and Cenél Fiachach. O' Brien (2006, 116) also suggests that part of the popularity of Colmcille's foundations for royal patronage is due to his own royal connections as a member of the northern Uí Néill. It became one of the most important ecclesiastical sites in Offaly, rivalled only by Clonmacnoise with whom Durrow went to war in AD 764 over which monastery would hold the burial rights for the kings of Meath. The site of the foundation was strategically located to take advantage of the Midland Corridor and the *Slighe Mór*, making it accessible from every direction. This made it an ideal place for travellers to overnight, and it allowed quick communication between it and the other ecclesiastical sites along the Midland Corridor and the *Slighe Mór*. Meanwhile, the vast swathes of limestone sand and gravel and limestone till which made up this region provided excellent agricultural land for the monastery to preside over and increase its wealth.

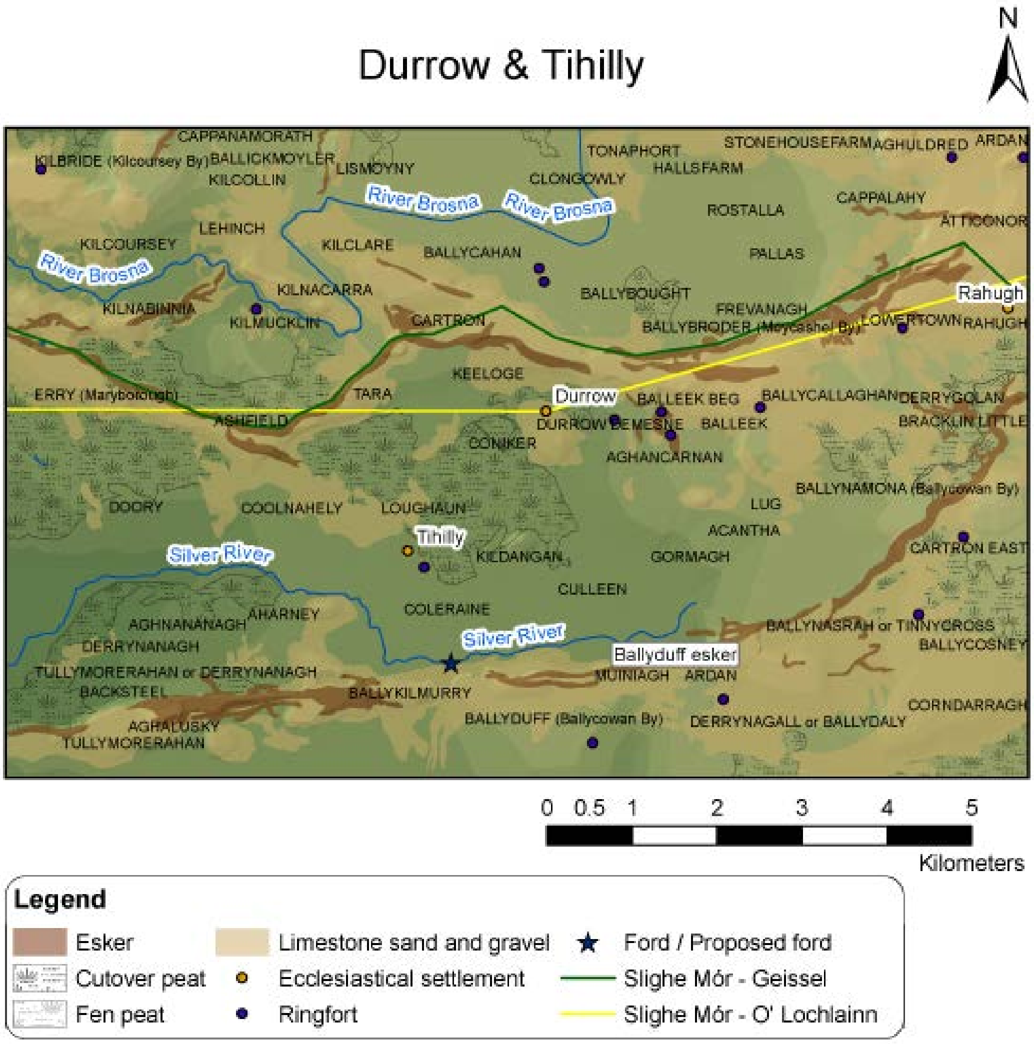

Figure 86 Ecclesiastical settlement at Durrow & Tihilly

6.9.6.6 *Clonfert*

Clonfert, Co. Galway, was founded by St. Brendan in c. AD 561. It is separated from the River Shannon by Kilmacshane Bog, and although the IAWU survey failed to identify structures between it and the river, it is sited next to the narrowest part of the bog (Fig. 79, 87). This potential crossing is also aligned on the ford at Clonfert North / Killaphort (GA101-026002 / OF013-039). A site was however recorded by the National Museum of Ireland in 1935 which was seen in a number of locations between Clonfert and the Shannon which could have occupied this crossing point. If so, it would have provided a means to access Meath and Leinster from this Connacht-based monastery. Failing that, a short dryland route south to the ford at Banagher could have served this function.

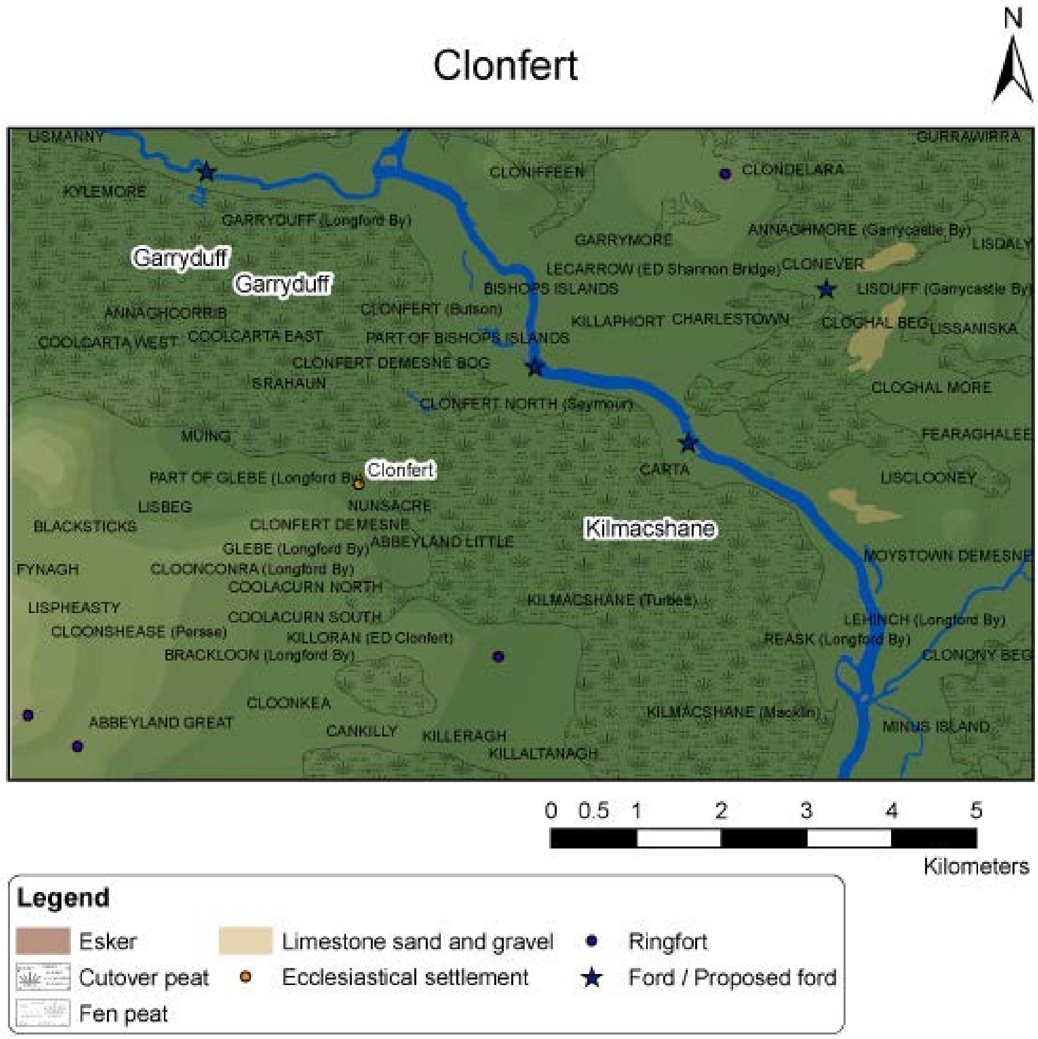

Figure 87 Ecclesiastical settlement at Clonfert

West of the site, limestone till subsoil extends in a northwest direction, which if cleared of vegetation could have provided a routeway towards Aughrim and the *Slighe Mór*. Similarly, a path southwest could be taken between the bog cover to reach the Kilmor esker and the monastery of St. Iomar (Hennessy et al. 2010, 141–169), as well as a number of other short esker segments. While this site does not seem as well connected to routeways as the examples east of the Shannon, it is still situated such that these routeways were accessible from the foundation.

6.9.6.7 *Lynally*

Lynally was founded by St. Colmán Eala in AD 590 in the *Fiodh Elo*, or Swan Wood, that gave him his name (Fig. 79, 88). It is situated on the limestone till overlooking the floodplain of the River Clodiagh, and while this location is on the Midland Corridor, the alluvials around the river would have been liable to flooding and would have impeded movement. An examination of the subsoils of the area would suggest a point 1km due east in Charleville Demesne as being a suitable fording point. Indeed, the First Edition 6” Ordnance Survey map illustrates what appears to have been a path leading through the grounds of Charleville Demesne to this point in the river. While the existing L6009 road through Lynally Glebe now turns sharply southeast to cross further upstream at Mucklagh Bridge, it appears as though its original orientation would have led to the potential fording point and the path from Charleville. A Neolithic polished stone axe was found from an unspecified site at Charleville on the banks of the River Clodiagh (Offaly County Council 2005), hinting that the river was being crossed in this locality from an early date. The Tullamore River may then have been crossed at Tullamore, after which the way north was dominated by limestone till, crossed by lines of eskers and limestone sand and gravel.

A curious story from the *Life of Colmán* records a project in which the monks constructed a causeway to link Lynally to Kilclare, 8.5km to the north (O’ Brien 2006, 149). The Midland Corridor is the best way to move between these two sites and this may reflect an effort to formalise this route into a coherent road. It may also refer to the difficulties which may have been faced because of the wide floodplain of the Clodiagh River. Lynally’s position on the Midland Corridor also enabled movement south, and St. Carthage is recorded in the *Life of Mochuda* as visiting Lynally from Munster. The account describes how he travelled on the *Slighe Dála* to meet St. Molua at Clonfert Molua in Co. Laois, and from there the obvious route would have been along the Midland Corridor to Lynally.

Lynally’s location on this routeway would have ensured frequent visitors, as the *Lives* would suggest. Like Clonmacnoise, Lynally was the site of an important *óenach*, and this would have attracted a range of social classes to the monastery. Thus, despite the descriptions of Lynally as being a place sheltered by woodland, it was part of a major routeway and likely located close to a ford which was used as early as the Neolithic period, and would have been visited by a cross-section of society.

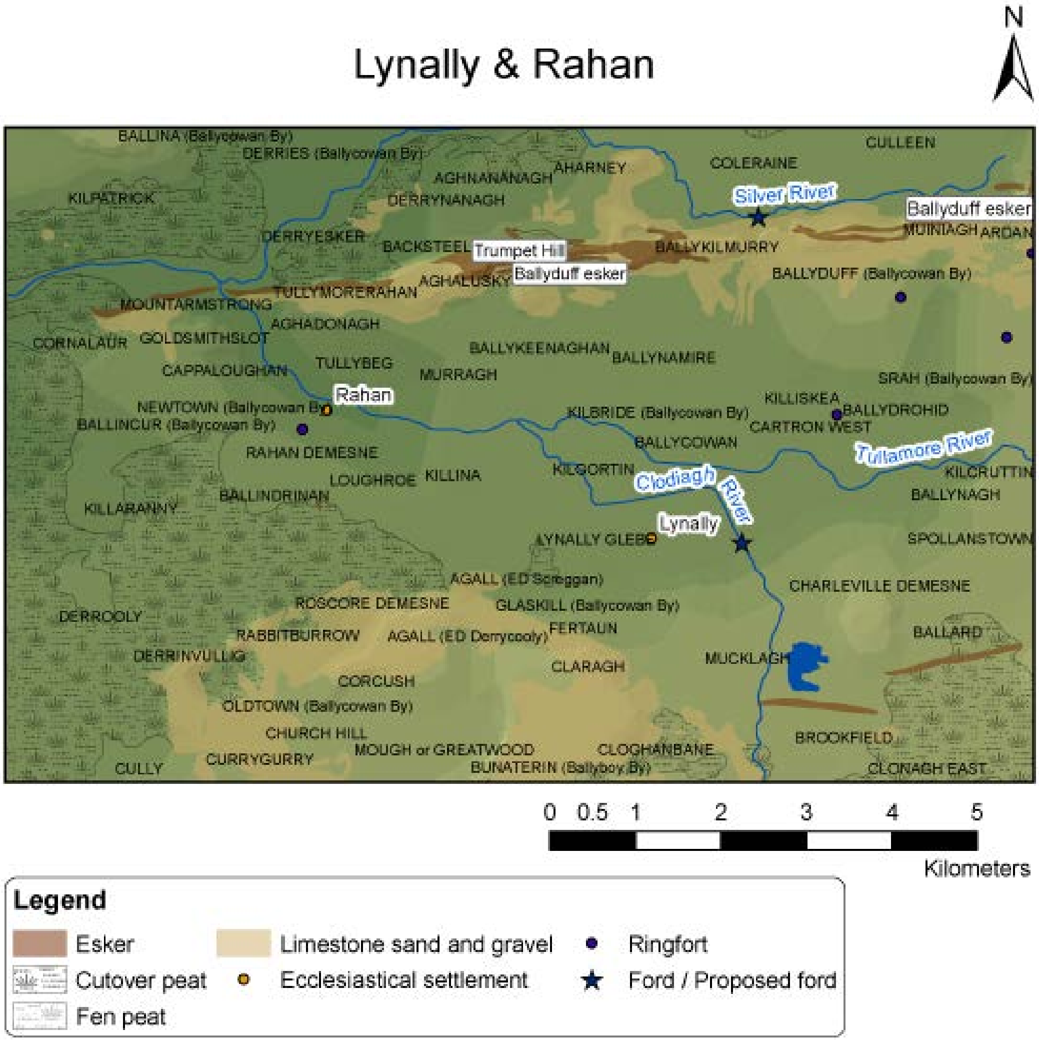

Figure 88 Ecclesiastical settlement at Lynally & Rahan

6.9.6.8 *Rahan*

The monastery at Rahan was founded by St. Carthage, also known as Mochuda, in c. AD 594 (Fig. 79, 88). According to the story of its foundation, Carthage first visited Lynally, where Colmán instructed him to create his own monastery at Rahan, 4km to the northwest. Both monasteries overlook the River Clodiagh, and communication by boat must have been a regular occurrence between them. A land route could also have been taken on the limestone till between the sites. Its location on the Midland Corridor would have given it the same advantages as Lynally, although it is not as well positioned to access a fording point and the river would have had to be crossed with a ferry or bridge.

While the monastery was in the kingdom of Meath, Carthage's Kerry origins attracted patronage from Munster, helped no doubt by its position on the Midland Corridor. His expulsion strengthened the Meath associations, however, and later patronage came from the O' Molloys of the Fir Chell.

6.9.6.9 *Rathlihen*

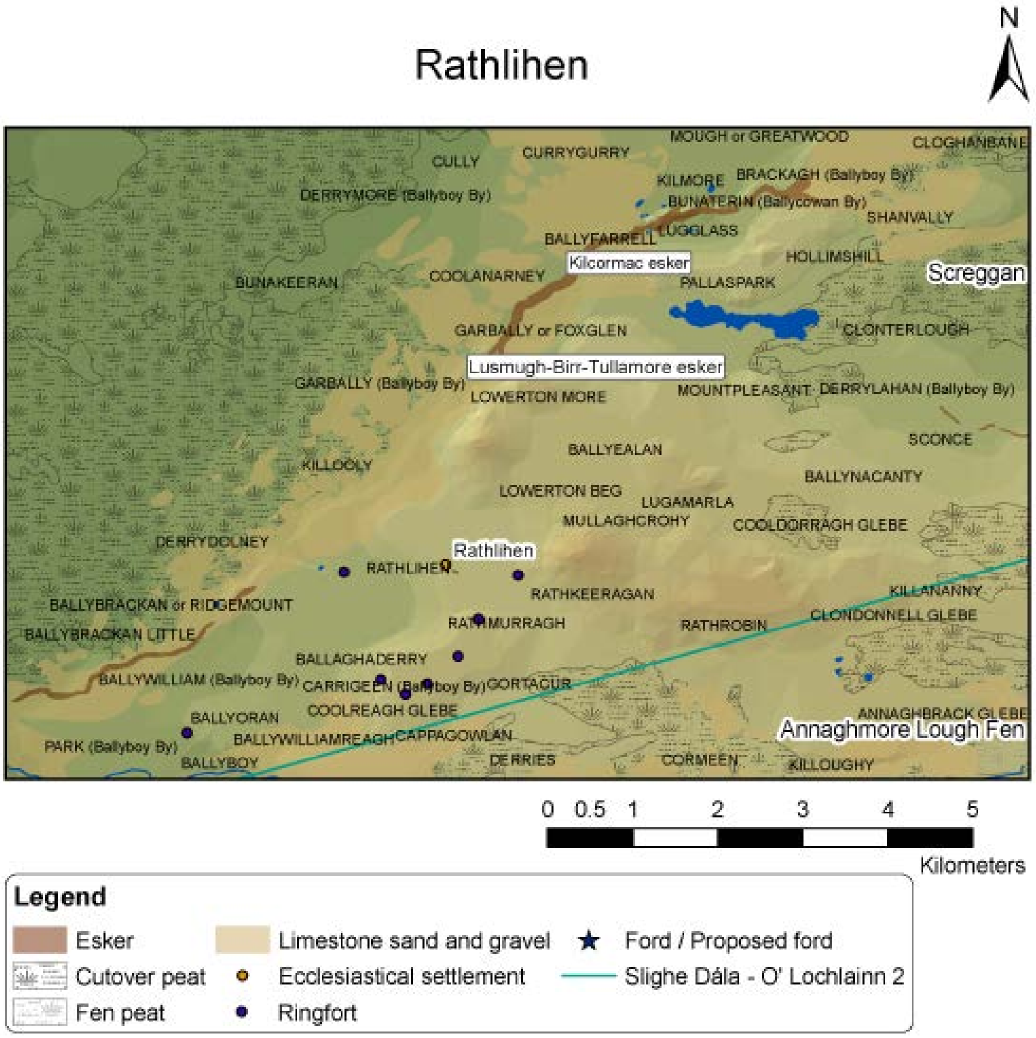

Figure 89 Ecclesiastical settlement at Rathlihen

Rathlihen was founded by St. Illand in the 6th century on an elevated area on the southern portion of the Midland Corridor in the territory of the Fir Chell (Fig.79, 89). The Corridor provided access north to Meath and south to Munster, and the foundations of Lynally, Rahan, Tihilly, Durrow and Rahugh would have been easily accessible on this route. Although evidence of early prehistory is sparse in this area, Rathlihen was founded next to a barrow, burnt mound and standing stone, suggesting the area was active in the Bronze Age. This is probably due to its position on the Midland Corridor and its proximity to the Lusmugh-Birr-Tullamore esker, which it was shown in Chapter 5 was probably in use in the Bronze Age, providing a path towards the River Shannon and the ford at Keelogue into Connacht. It was also less than 2km from O' Lochlainn's (1940) northern course for the *Slighe Dála*, which would have facilitated elite movement from Meath to West Munster, as well as more local destinations such as the monastery at Killeigh. Thus, this ecclesiastical settlement was cleverly situated to take advantage of a number of established routeways, some of which were in use since the Bronze Age.

6.9.6.10 *Rahugh*

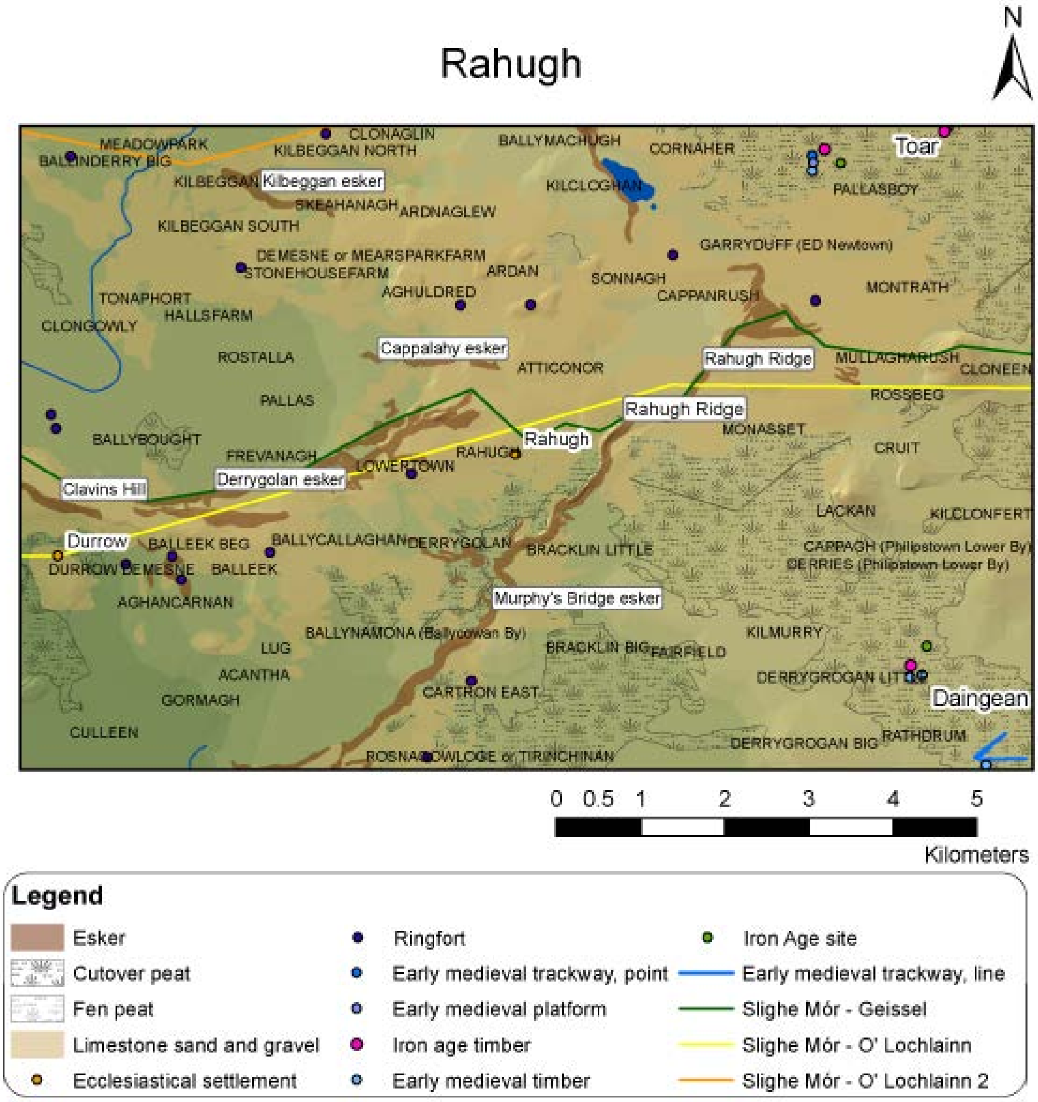

Figure 90 Ecclesiastical settlement at Rahugh

Rahugh, Co. Westmeath, was founded by Aodh Mac Bricc in the 6th century at an intersection of the *Slighe Mór* with the Midland Corridor (Fig. 79, 90). It was also located on the boundary zone between the Fir Chell and Cenél Fiachach, and its location allowed it to take advantage of both major routeways and the political relationships which they allowed access to. Aodh was of the Mac Geoghegans and, like Colmcille, was related to the Uí Néill, so his royal connections increased the prestige of his monastery. Having been raised in Tipperary, he travelled to Rahugh to make a claim on his father's lands following his death, and rested on his return journey at Rathlihen (Professor Stokes 1896, 328–329), a journey which clearly made use of the Midland Corridor. These North Munster associations were maintained through the use of this route.

6.9.6.11 *Banagher*

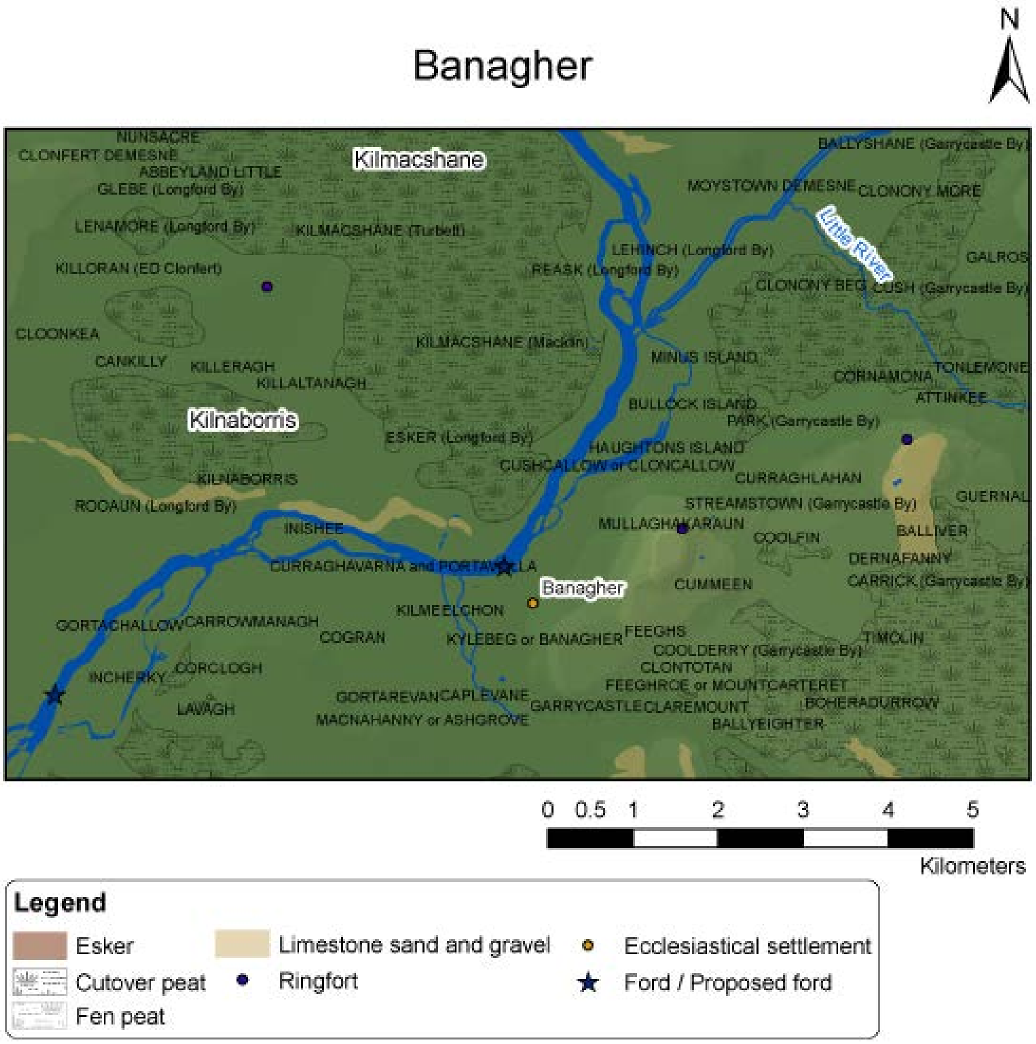

Figure 91 Ecclesiastical settlement at Banagher

The convent at Banagher was founded sometime in the 6th century by St. Rynagh (Fig. 79, 91). It was located close to the ancient borders of Meath, Munster and Connacht, maximising its potential for patronage. As discussed in Chapter 5, the ford at Banagher was in use from the Bronze Age and could be approached from the northeast or southeast, which allowed access to Meath, Leinster and Connacht. Meanwhile there was a clear line of limestone sand and gravel extending further into Galway from the fording point, and the same routeway which was described in relation to Clonfert can be used to access the *Slighe Mór* (Chapter 6.9.6.6).

On a local level, communication could be maintained with Clonfert and Kilmor west of the Shannon, while the river could be used to communicate with Clonmacnoise, and the River Brosna provided access to Gallen and Wheery. This would also have brought the settlement at Lemanaghan within reach via the togher constructions. Thus, we see a familiar pattern with these Midland monasteries, in which they are well positioned in relation to ancient routeways, bringing other ecclesiastical sites within easy reach.

6.9.6.12 *Tihilly*

The monastery at Tihilly was founded in c. AD 636 by St. Telli on the site of an early 7th century nunnery which had been established by St. Cera (Fig. 79, 86). As we have seen with a number of Meath monasteries on the Midland Corridor, this settlement had early associations with Munster, since Cera had come from Cork. It was part of the lands controlled by Durrow, which was situated 2.3km northwest. The related monasteries must have been in regular communication, and it is possible that the bog which separated them was traversed with the help of a trackway. Indeed, a short path is illustrated in the townland of Loughan on the First Edition 6" Ordnance Survey map, which may have performed this function. Apart from local access, the site is on the edge of the Midland Corridor, and conveniently located near the proposed ford on the Silver River at Coleraine where a palstave was recovered (Chapter 5.5.3). East/west movement would also have been achievable from this location with the help of the Clara and Derrygolan eskers of the *Slighe Mór* to the north, while the Ballyduff esker was also accessible to the south.

6.9.6.13 *Lemanaghan*

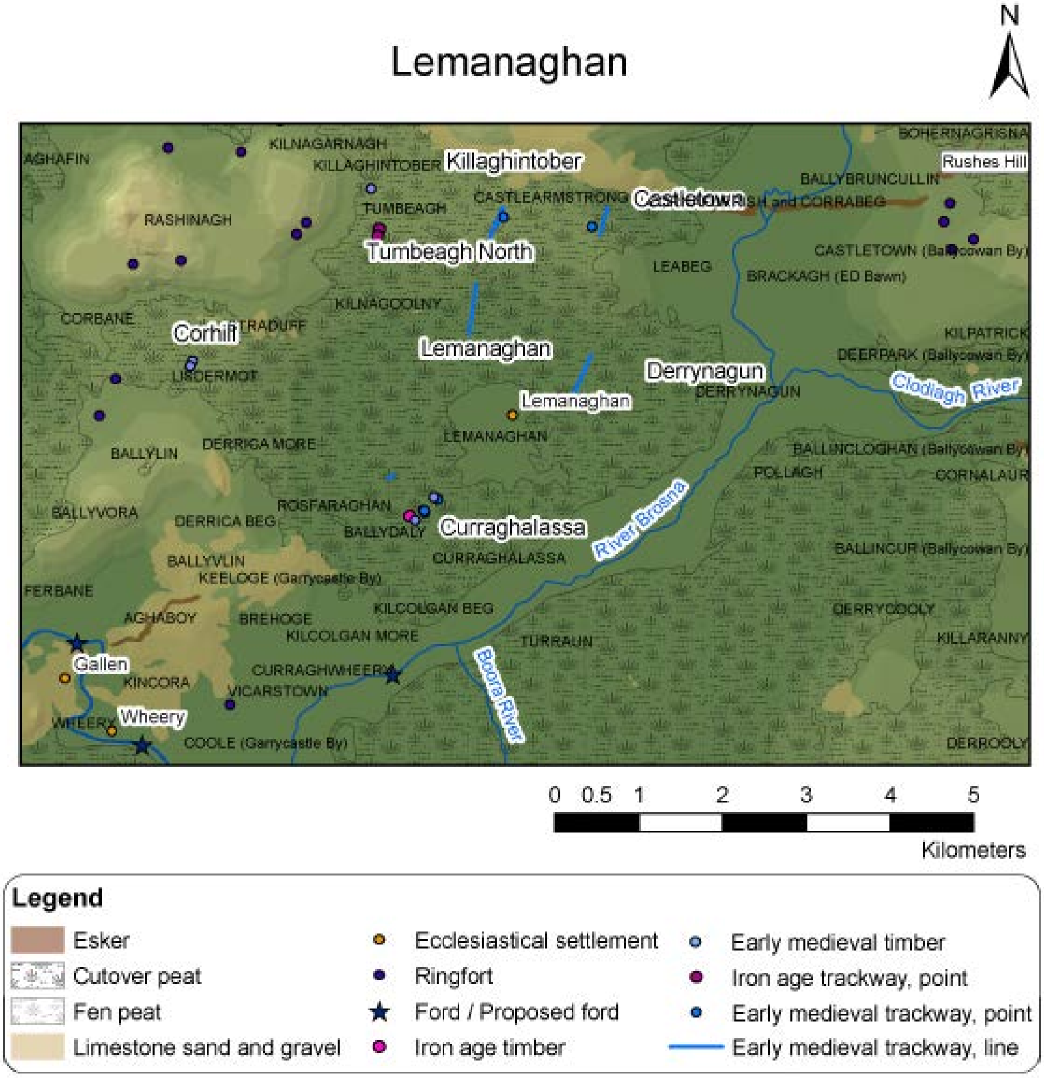

Figure 92 Ecclesiastical settlement at Lemanaghan

Lemanaghan was founded by St. Manchán in a place known previously as Tuaim-nEirc, which had been granted by King Diarmait Mac Áedo Sláine to Clonmacnoise (Fig. 79, 92). The foundation was established sometime between the Battle of Carn Conaill in AD 645 and the death of Manchán during the Yellow Plague of 664. O' Brien (2006, 180) suggests that the fresh water spring on the bog island may have had a pre-Christian ritual significance, which the monastery adapted towards Christian worship. As discussed above (Chapter 6.9.4.7-12), a number of trackways which converge on this island predate the mid-7th century foundation date, and it has been suggested that an earlier church at this location preceded it (McDermott 2001, 23). The trackways would have enabled local movement in and out of the bog island on at least three fronts, but most crucially, they allowed access to a number of inter-regional routeways. The Clonmacnoise Esker to the north provided a course for the *Slighe Mór*, while the River Brosna and River Shannon provided water based routes. This provided a means of communication with many of the important ecclesiastical sites of this area, including Clonmacnoise, Gallen, Wheery and Banagher.

6.9.6.14 *Summing up ecclesiastical settlement in North Offaly*

This brief summary of the ecclesiastical landscape of North Offaly from the 5th to 9th centuries shows a remarkably well-connected network of monastic sites with access to numerous local routes and important inter-regional ones (Fig. 79). Many of these foundations received patronage from outside kingdoms, facilitated no doubt by their geographical locations close to routeways and boundary zones, as well as the personal and family connections of their various founder saints, who often came to this region from outside areas. Among the monasteries discussed, we have seen Connacht influence extending east of the Shannon to Clonmacnoise, while a number of foundations on the Meath-controlled Midland Corridor were either affiliated with Munster or were subject to attack from southern regions. The Fir Chell kingdom which takes up most of the Midland Corridor aptly translates as the Men of the Churches, as this area is home to a particularly dense concentration of important early ecclesiastical sites, some of which were associated with the Uí Néill dynasty.

50% of the churches of pre-Norman Co. Offaly were situated on navigable rivers, showing that river movement was valued as much as dryland routeways (FitzPatrick et al. 1998, 6). When the rivers are considered alongside the dryland routeways, this region appears as a major crossroads with access to the Shannon, Brosna and Clodiagh Rivers, as well as the *Slighe Mór*, *Slighe Dála* and the Midland Corridor. This confluence of routeways enabled movement in every direction to the rest of Ireland, and it may have been what attracted so many early saints to establish church sites in this area (ibid.). The prevalence of bogs in this landscape could create the illusion of seclusion, which would have been a desirable quality for hermits or pilgrims seeking reflection, while offering a certain amount of protection from attack. The reality, however, was that ecclesiastical sites depended on routeways to attract pilgrims and patronage, and this seclusion had to be juxtaposed with access to a communication network. In particular, the early Irish church owed much of its success to its relationship with the ruling classes, and this relationship could be more effectively courted by establishing sites on the *slighe* system which was used for elite movement. Thus, these sites used local and inter-regional routeways to flourish into what Smyth (1982, 90) has termed a *monastic confederation*, which transcended territorial boundaries.

6.9.7 Conclusion

In Chapter 5, we saw numerous examples of this area being a transitional zone with competing northern and southern influences, perhaps best exemplified by the mix of Class 1 and Class 2 horns in the Dowris hoard. The Iron Age appears to have been a time of less intensive settlement with+ significant woodland regeneration, which would have had the effect of closing off routeways which had begun to emerge in the Bronze Age. By AD 400, however, we see a resurgence of agricultural activity and a reappearance of evidence of movement. Once again, this region was one of competing northern and southern influences, borne out by the mythological dividing line of the *Eiscear Riada* between *Leath Chuinn* and *Leath Mogha*. This rivalry is quite clear in the relationships of Meath and Munster dynasties with ecclesiastical sites along the Midland Corridor. Indeed, the high crosses from Durrow offer a 10th century parallel to the Dowris hoard, combining northern and southern features and reflecting its geographical location between competing influences (Smyth 1982, 99).

Smyth refers to the landscape in terms of a 'labyrinth of passes and roads' (1982, 104) which would have needed detailed knowledge to negotiate beyond the major routeways provided by the *slighe*, the Midland Corridor and the rivers. That is because movement outside of these routes involved island hopping through the bogs, the use of trackways and knowledge of fording points. The existence of major ecclesiastical sites, however, would have encouraged the spread of such landscape knowledge in order to visit such sites. The popularity of pilgrimage in this period demonstrates that this knowledge must have been transmitted for the pilgrims to have made it safely to their objectives.

Perhaps the preoccupation with travel accounts in the mythologies and various *Lives* contributed to this transmission of knowledge. The accounts relay the important sites which they encountered, establishing them in the cognitive maps of those who heard them. On a local level, involving the traversing of bogs etc, there are at least a few stories which record this level of movement, such as St. Brigit's causeway at

Croghan. The appeal of a saint, hero or king interacting with one's landscape would have encouraged an oral tradition which connected well-known individuals to local paths or trackways. Apart from this, the existence of houses of hospitality and monasteries on major routeways would have enabled transmission of knowledge through storytelling or simple directions which were told to travellers.

Chapter 7: Modelling Movement

7.1 Creating a digital landscape

This chapter will describe the use of computer modelling in the study of movement. Previous chapters made reference to the decision-making process involved in the practice of movement, and the combination of Least Cost Path and Agent-Based Modelling is used here to explore this process. If we can untangle the complexities of the emergence of routeways in this way, we ought to be better equipped to carry out landscape studies, understand settlement patterns and hypothesise as to the locations of routeways.

One of the challenges faced in exploring the landscape of North Offaly is in resolving the contemporary landscape, which consists of drained wetlands, deforested plains and modern roads, with the landscape which would have been encountered by people in the past. As discussed in previous chapters, this would have been a heavily wooded landscape in which islands of fertile farmland were flanked by wetlands of callow, fen and raised bog. Mapping programmes such as ArcGIS allow us to digitally render the landscape as best as the available datasets allow. In this study, the physical landscape was illustrated using the contour, boundary, river and lake data provided by the Ordnance Survey of Ireland[3], while the subsoil was illustrated from the Soils and Subsoils Database provided by the Environmental Protection Agency (Environmental Protection Agency 2013). Archaeological sites were then added with reference to the Record of Monuments and Places (National Monuments Service 2015) kept by the National Monuments Service, the excavations database (excavations.ie 2015) and wetland survey data provided by the Irish Archaeological Wetland Unit and Archaeological Development Services.

It is important to acknowledge that this was a landscape in flux; and that the extended time period of this study would have witnessed drastic changes in settlement, hydrology and vegetation. While this was addressed in Chapters 3 to 6, the simplified models below do not reflect changing patterns in woodland cover or the conditions of bogs. The pollen and peat studies demonstrate the range of conditions which existed across the landscape over prolonged periods of time, but

[3] *OSi Licence number NUIG230615*

they are not sufficient to recreate a highly detailed model of such a large landscape study over such an extended time period. While previous chapters outlined a number of examples for which there was ample vegetation and hydrological evidence, the modelling component of this study will simplify the variables involved.

One of the premises of modelling is that it takes place in a simplified version of reality where the variables are more carefully controlled. Thus, though some nuanced environmental information may be lacking, the variables are sufficient to create simple models in order to explore the performance of movement through the landscape. If further data becomes available in the future, then a further level of complexity can be added to these models to attempt a more detailed analysis which considers movement in flux with the changing environmental conditions.

The example used in this study is based on O' Lochlainn's (1940) itinerary of the *Slighe Mór* and the places through which he concluded the *Slighe Mór* passed. As discussed in Chapter 6, there are a number of competing theories as to the course of this route, and it is not the aim of this chapter to verify O' Lochlainn's route. Rather, O' Lochlainn's itinerary is used as a list of places, or nodes, between which movement is known to have taken place, and modelling is used to hypothesise how that movement might have been performed. The itinerary moves through the landscape as follows;

Rhode → Croghan → Kiltober → Durrow → Ballycumber → Togher → Ballaghurt → Clonmacnoise.

The Least Cost Path models assume a certain level of efficiency in how people approach movement. This is not necessarily realistic for an initial attempt to traverse a landscape, but discussion of agency below will describe how a multitude of individual movements over time will cumulatively approach efficiency. Thus an efficient path is reached over a period of time, supporting Least Cost Path analysis as an ultimately realistic approach in the long term.

7.2 Least Cost Paths

The most well-known digital methodology in approaching movement is the creation of Least Cost Paths using a GIS programme. In this study, the Least Cost Path was prepared using ArcGIS 9.3, and was later updated to version 10.2. The method involves the creation of a raster in which friction values are assigned to each cell relative to the topography encountered (Bell et al. 2000, 86–87; Wheatley et al. 2002, 151–159). Topography is the most important variable in movement, because not only does it determine which surfaces are suitable or otherwise for movement, but the social factors which also influence movement are ultimately derived from settlement systems which were originally influenced by topography.

This methodology is often criticised because of its shortcomings in modelling social phenomena etc. (Murrieta-Flores 2009, 250), but as Llobera (2000, 70) observes,

> ‘Topography is basic for it is always present and its influence is continuous in every landscape. Hence it constitutes the background on which other factors operate.’

The ancient taboos relating to movement are an excellent example of this. While they appear to be rooted in superstition, some may have been associated with genuine topographical reasoning. Smyth (1982, 107–111) refers to Richard II’s ill-fated campaign in Ireland, where he broke one of the taboos of the Kings of Leinster, “to make a circuit widdershins of Fortuatha Laigen” (Dillon 1951, 13). He observes how such a journey through Wicklow would require crossing numerous rivers and coastal swamps in an area that was highly wooded, making a very difficult and dangerous path. The social taboo here is intrinsically linked to the topographical reality, meaning modelling may provide a realistic conclusion even in the absence of social information, as topography is the starting point from which many other social structures are built.

There are multiple topographic aspects which determine suitability of terrain for movement. Slope is typically the most acknowledged variable, because of its obvious ramifications for energy consumption. Quantifying this depends on the gradient, aspect and direction of travel. Some programmes create isotropic models, whereby a friction value is assigned to each cell, regardless of the direction of approach. Meanwhile, ArcGIS creates anisotropic models, meaning they are direction dependent.

In reality, a combination of the two options is probably the most realistic. This is because of the influence agents have on each other in the landscape, even without actually encountering each other. As an individual moves through a landscape, they react to variations in slope, some of which is observable and obvious to the individual who might plan ahead to avoid a steep slope. Micro-changes in slope may however go unnoticed, and an individual's response is an unconscious reaction to gravity and speed. In the process of moving, the individual leaves behind evidence of their path, by flattening grass, leaving footsteps or pushing through undergrowth. This signature insinuates itself on other agents, similarly reacting to slope, and they are likely to follow the exact same path, given enough physical traces to follow. This is how *desire lines* emerge, or the *biographic encounter* described by Tilley (1994, 27).

When we consider the return journey, the direction of slope changes and the most efficient path may be different. It is not unusual for an individual to take a different return journey because of the effect of slope. In some cases, however, the desire line from the opposite direction of travel influences an individual seeking an easy path. This option removes the burden of clearing a path and reduces the amount of decision-making to be made in finding and creating a new path. On a steep gradient, for example, the most efficient path upslope is a direct approach, whereas a zigzag path is optimal for moving downslope in order to minimise the energy expenditure involved in braking to stay upright. The resulting zigzag path then presents itself as a cognitively easy option for those attempting to travel upslope (Murrieta-Flores 2009, 255). For this reason, this study includes Least Cost Paths which have been created in both directions when assessing paths between nodes. A realistic path would incorporate elements of both of these paths.

As we have seen, the type of subsoil was crucial in this landscape in defining natural routeways and obstacles to be negotiated. Bogs acted as obstacles to long distance movement, but not impenetrable ones. Indeed, it is quite clear that local people were well practiced in interacting with and exploiting these wetland environments, and would consequently possess the expertise to negotiate the bog when moving through the landscape. The construction of trackways greatly eased this process, and the abundant archaeological evidence of such *toghers* demonstrates that the energy cost of building a trackway was an acceptable expenditure over taking a circuitous route around a bog. This would involve an initial cost of material and labour, but would be quickly offset by the ability of the community to cross the bog quickly, rather than circling it on dry land. Similarly, esker ridges were ideal natural routeways which provided an elevated, well-drained path through a landscape dominated by bog, and which offered natural fording points when they transected rivers.

As such, a Cost Surface was created for this study which assigned a weighting of 75% to subsoil, with the remaining 25% devoted to slope. A value of one to ten was assigned to subsoils, with ten being the most difficult to traverse and one being the easiest. These values were admittedly subjective, but were assigned through fieldwork and experience with traversing such subsoils. Thus wetlands, being difficult to traverse, were allocated a high value, while the eskers and drier soils are more easily travelled over and were assigned low values. Made ground is made up of the surfaced areas of towns, and while some of this will have been drained etc. settlements are typically on dry areas, so a compromise value of 4 was used for this category.

Table 6 Subsoil values

Cutover peat	10	Fen peat	10
Water	10	Lake sediment	10
Alluvium	8	Rock	6
Marl	6	Kartified limestone	6
Made ground	4	Limestone till	2
Limestone sands and gravels	2	Sandstone till	2
Basic esker	1		

The Least Cost Path which this produces corresponds well with the existing road network and the archaeological evidence. This shows that the method is quite realistic in identifying the courses of existing and ancient roads. Critics of the method argue that it reduces the role of the individual to passive agents in the landscape, but the variables and values are defined based on what the researcher considers to be genuine factors in the decision-making process. In fact, it has the potential to be quite a subjective method in this regard, according to the researcher’s decisions as to how important a variable is (Gietl et al. 2008, 2).

For the purposes of this discussion, the primary failing in this method is that having input the data, variables and values, the programme then skips to the ultimate result of a path. This process has access to global information, which is to say that it is exposed to the landscape as a whole and can immediately create the most efficient path. In reality, an individual in the landscape is limited as to the landscape information available to them. They are exposed to local information, or the space immediately around them, augmented by landmarks on the skyline or locational information which has been communicated to them through place names and stories. In such a scenario, an individual's initial attempts to traverse a landscape include decisions which make sense within a local space, but may not reconcile with the Least Cost Path as it does not feed into an efficient path on a larger scale. Vague knowledge can also lead to what might be considered as aberrant behaviour to those with more complete landscape knowledge. Richard II's journey through Wicklow, for example, was based on his desire to reach the East Coast in a landscape which he found illegible, without the acquired knowledge to know that an appropriate course should avoid this area. This can only be learned through experience or shared knowledge, and a mistake such as this would typically cause a person to correct such behaviour in the future.

Given the similarities between ancient and existing roads with Least Cost Paths, it follows that people eventually come to an efficient conclusion, having accumulated decisions and landscape knowledge. The use of Agent-Based Modelling as described below allows us to examine this cumulative process. In essence, Least Cost Path creation *calculates* a routeway, while Agent-Based Modelling *grows* one.

7.3 Agent-Based Modelling

An Agent-Based Model is produced by creating a defined space in which autonomous, heterogeneous agents interact with their environment and each other, based on a number of conditions and behaviours defined by the programmer. In the absence of centralised control, the bottom-up actions of the agents create an emergent system or a stable macroscopic pattern (Epstein et al. 1996). Thus, we are able to predict outcomes of social experiments or explore the processes that lead to a system in need of study. In this study, the system is the pattern of movement, and agents are asked to traverse a landscape by reacting to their immediate surroundings and the actions of other agents. This method allows us to interpret routeways and road networks as an emergent system, borne out of the cumulative decision-making of a multitude of individuals over time.

The term *emergence* is used by generativists with Epstein and Axtell's (1996, 35) definition in mind. That is 'stable macroscopic patterns arising from local interactions of agents'. This is distinct from the classic use of the word, which comes from an anti-science background whereby emergence is an unexplainable phenomenon which is more than the sum of its parts. Many previously *unexplainable* phenomena are now well understood, such as the flocking behaviour of birds which was successfully simulated with the well-known "Boids" model (Reynolds 1987). Models such as this are built by assigning simple behaviours to the agents including responses to local information in which;

> 'the aggregate motion of the simulated flock is the result of the dense interaction of the relatively simple behaviors of the individual simulated birds' (Reynolds 1987, 25).

The attraction of Agent-Based Modelling as a method is that it offers the programmer the opportunity to isolate the behaviours and factors which build a system. In the case of this study, that means identifying the factors involved in movement and how a routeway emerges from cumulative individual decision-making.

The lack of top-down or centralised control does not mean that agents act in wholly unique ways. Individual behaviour is inextricably influenced by existing culture and structure, in the form of microstructures and macrostructures, daily activities and non-routine practices, or local movements and long-distance travel. Even given the independent thought which individuals possess, they have been conditioned by social norms, obligations and rules to interact with structures in ways that reinforce, reproduce or gradually reshape the macrostructures (Pred 1986, 7–9; Llobera 2000, 66–68; Murrieta-Flores 2009, 250). In this way, a robust and elegant system can be naturally occurring without being devised or monitored through centralised control. This phenomenon is clear in the emergence of paths and routeways, as *desire lines* attract movement, *topographical gossip* is dispensed and taboos are communicated, having the effect of reproducing and reinforcing the emerging system.

For this study, NetLogo 5.1.0 (Wilensky 1999) was used to construct two simple models using two segments from the O’ Lochlainn (1940) itinerary which were also assessed using the Least Cost Path methodology. The segments from Rhode to Croghan and Croghan to Kiltober, in the north east portion of the study area were used to this end. The world was constructed with the use of the NetLogo GIS extension, which allows the programmer to import shapefiles and ASCII raster data into the model. The space is made up of cells called *patches*, and the agents are referred to in NetLogo terminology as *turtles*. This model was similarly run in both directions to account for the effect of direction on movement. The model interface allows the programmer to easily run iterations of the model using different values or conditions, with a slider controlling the number of agents and their rate of release.

In this model, the turtles are released from one settlement, the origin, and instructed to travel to the target of the neighbouring settlement. The first turtle, which is defined in this model as the *leader*, is commanded to turn its heading towards the target. This assumes a level of intent in individuals within the landscape, with a plan to travel to a defined place. It also requires some knowledge of the direction the target lies in. As discussed in Chapter 3, anthropological studies have shown cognitive mapping abilities to be quite powerful in the absence of cartographic techniques. Dead reckoning is made possible through this process, particularly when there are visual landscape features to act as landmarks (Klatzky et al. 1990; Widlok 1997; Kelly 2003; Golledge 2003; O’ Leary et al. 2005). In this landscape, visual features such as Croghan Hill, eskers, bogs or clearances would be well known and undoubtedly form part of the cognitive maps. Thus, even if the destination is a novel one to which the agent has never travelled, it is possible to gauge the appropriate direction to move through topographical gossip, cognitive mapping and dead reckoning.

Having identified the target in the landscape, the leader then must attempt to move towards it. They are exposed to local information by defining a cone of vision with the use of sliders on the model interface. This limits the information which informs their behaviours to the conditions of patches within a certain distance and radius. Slope is the first variable encountered, and the leader is instructed to favour the patch of least slope within a cone of vision. It was found through a number of iterations that the most effective values for this exercise were a distance of two patches, which translates to c. 50m in this scale of model, and an angle of 80˚. This maintains a relatively straight course in the absence of obstacles. Each time step, or *tick*, the leader is instructed to return its heading to the target before any further deviation.

Rather than assigning values as in the Least Cost Path calculations, obstacles are defined in this model using Booleans. That means each patch is defined either as *obstacle* or *not obstacle*, with bogs acting as obstacles in this landscape. It does not follow that it is an obstacle in absolute terms in reality, as we have seen numerous examples of successful negotiation of bogs. Rather, when the obstacle is encountered, it triggers a set of instructions in which the leader must find a way to navigate the obstacle as easily as possible. For the bog, that requires identifying a suitable crossing point. In the absence of nuanced data describing local and temporal conditions in the bog, this suitable crossing point is simplified to the narrowest crossing point. As we have seen throughout the present study, this is realistic in a general sense. Local hydrology can cause trackways to fall out of use and be superseded by new versions in slightly different positions which typically maintain the general axis and location of the crossing point. The presence of a trackway has an obvious effect on decision-making, even when the trackway itself has been covered by encroaching peat. The course of a concealed bog road from Bloomhill, for instance, was visible by higher density of bog cotton which grew over it (Breen et al. 1988, 332), and this visibility would have continued to attract movement. Thus, trackways will typically cluster around the narrow points of bogs, adjusting for the current local environment and societal needs.

A cone of vision is used in which the turtle must find dry land within a user-defined distance and radius. A range of values was tested for these parameters. In the case of distance, it is possible to see c. 4.8km over flat land in the absence of visual obstacles, but this would be substantially less in a landscape of vegetation, uneven contours etc. Compared with the archaeological evidence, this would also be an unrealistically long crossing point. Within the study area, the longest bog crossing as supported by archaeological evidence is 2.15km, so an approximation of this distance, well within a realistic visual distance, was used for the field of vision. More complexity could potentially be added in the future to acknowledge the effects of different vegetation on vision and movement. The angle of vision is most effective when set to 170˚. Values below this were too restrictive and not effective at finding the narrowest point in the bog, while higher values can cause the turtles to move in circular motions. Using these instructions, the leader can successfully find a suitable crossing point, albeit in an inefficient manner.

The second and all subsequent turtles are defined in this model as *followers*. These turtles share all the same problem-solving abilities as the *leader*, but with the benefit of having had previous turtles work on the problem of finding a path to the target. This cumulative approach was simulated using the Ant Lines problem. The Ant Lines model (Wilensky 1997) is a rendering of the behaviour that is seen in nature where ants are observed to travel in cumulatively efficient lines (Fig. 93). It is created by releasing a series of agents just as this model does. The leading agent takes circuitous and jagged path in an attempt to find a food source, nest etc. Rather than following the exact path of the leading agent, each subsequent agent turns its heading to where its predecessor is at that moment. This has the effect of smoothing the path and making it more efficient over time.

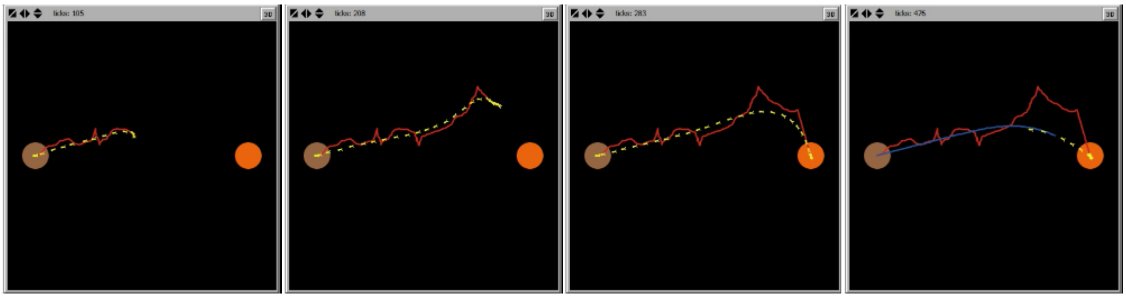

Figure 93 Progression of Ant Lines model (Wilensky 1997)

This is most observable among a group of hikers traversing a terrain without paths. The lead hikers are most active in making decisions, with the slower hikers following from behind with less cognitive responsibilities. When the leaders encounter an obstacle, such as a pool or a patch of blanket bog, they divert their paths around it. Their slower counterparts see that the leaders have changed direction and immediately reorient themselves to where the lead hikers are now, cumulatively smoothing the curve of the path and creating a more efficient solution. By applying this method to the landscape model, the inefficient path produced by the leader is cumulatively improved approaching an efficient solution. When compared with reality, this is akin to following a desire line insofar as it is an efficient option, but ultimately cutting corners and creating alternate, more efficient options over time.

7.4 Growing a routeway

7.4.1 Rhode to Croghan

The first two items on O' Lochlainn's itinerary (1940) as it travels through the study area are Rhode and Croghan, Co. Offaly. For the purposes of this study, a central point within the village of Rhode was chosen as one node, and the site of a 1997 excavation was used to mark the target in Croghan (excavations.ie 2015, 1997:449; National Monuments Service 2015, OF010-486). There were a number of human remains found at this site which were interpreted by the excavator as possibly forming part of the burial grounds of the original church foundation at Croghan (See Chapter 6.9.6.1). It was also considered illogical to set the target to the top of Croghan Hill, and a lower altitude location such as this was considered a more suitable target. This would provide some elevation for increased visibility, while minimising the climb when making longer journeys. Ballybeg Bog separates the two sites, with Rhode on the east overlooked by Clonin Hill, and Croghan dominated by the extinct volcano that forms Croghan Hill. Both of these hills would have been ideal landmarks to pilot by, and they were augmented in prehistory with a barrow on Clonin Hill and a cairn on Croghan Hill. These additions would have supported the use of these natural monuments in cognitive maps and would have been visual reminders to anyone making their way through the landscape of the longevity of the existing community there. Habitation and other activities dating to the Late Neolithic / Early Bronze Age have been found in Ballybeg Bog (Irish Archaeological Wetland Unit 2002a) (See Chapters 4.8.3.2 and 5.5.2.3), at which time it was a woody fen.

The Least Cost Paths in both directions cross the bog at the narrowest point where it is flanked by Madam's Hill on the east and Barrysbrook Hill to the west (Fig. 94). The paths skirt the lower slopes of these hills, which are elevated enough such that the soil is sufficiently dry, but maintaining a fairly level path with minimal climb. The paths are almost identical and are separated by only 100m as they take parallel paths west of the bog.

In the Agent-Based Model, the leading turtle from Rhode moves towards the bog, making minor corrections for slope (Fig. 95). It reaches the bog at a point where it would require a very wide crossing, so the *navigate obstacle* protocol is triggered and it attempts to find a more suitable crossing point. It successfully identifies the same crossing point as the Least Cost Path as the narrowest and most suitable place to traverse the bog. The followers cumulatively smooth the path and ultimately create a path that moves more directly towards the crossing point. Similarly, the leading turtle from Croghan first reaches the bog edge at a point where the crossing would be inefficient, but it successfully identifies the narrowest point in the bog. The followers then create a more efficient path to this crossing point.

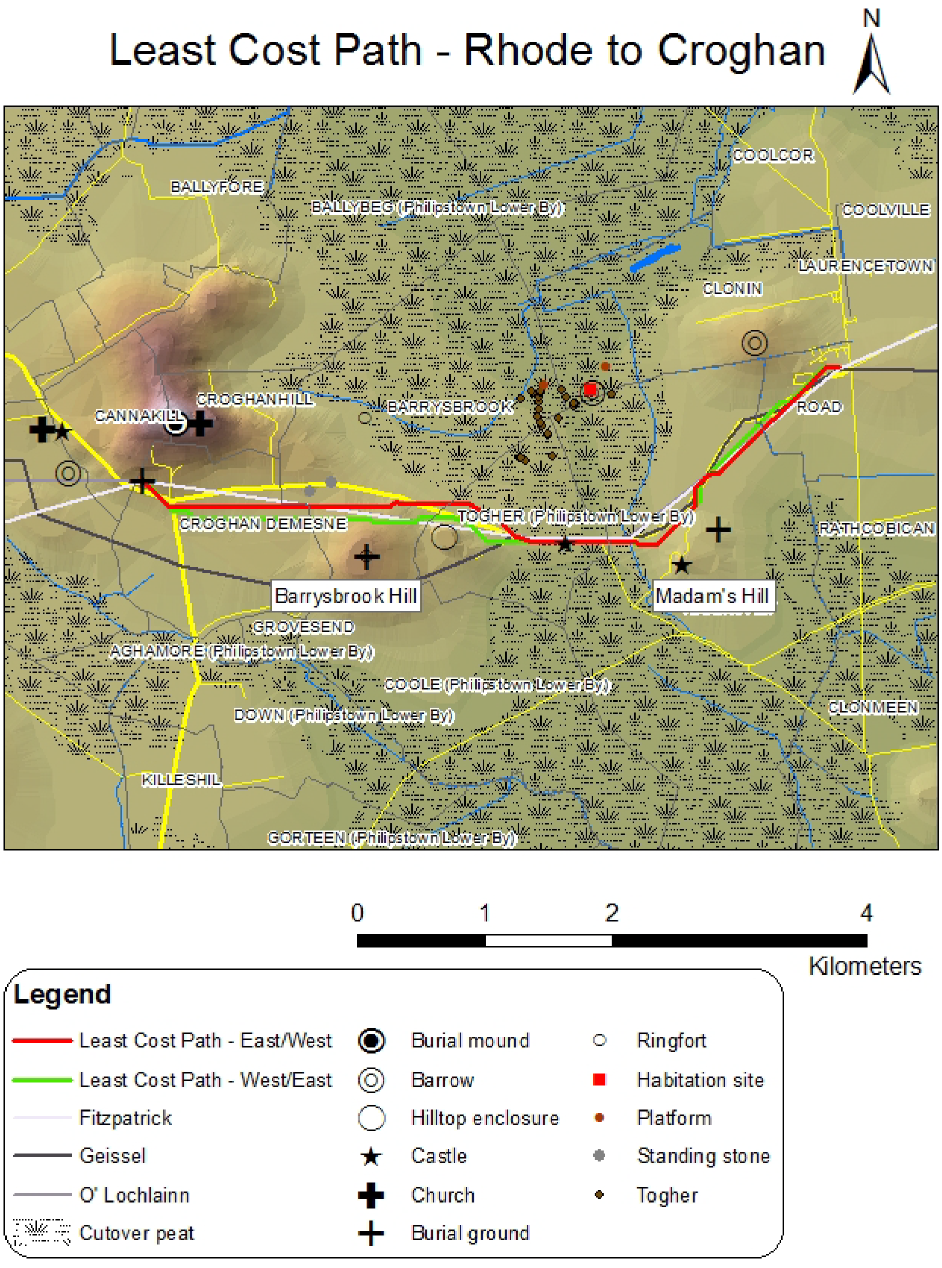

Figure 94 Least Cost Path - Rhode to Croghan

The biggest discrepancies between the generated paths are on the west side of the bog, owing to the different approaches the Least Cost Path and Agent-Based Model take towards slope (Fig. 96). They are remarkably similar however, and all of the models point to the same location in the bog as a crossing point. The paths are also consistent with the existing road system, which closely matches the dryland elements of the models and exactly reflects the wetland crossing point.

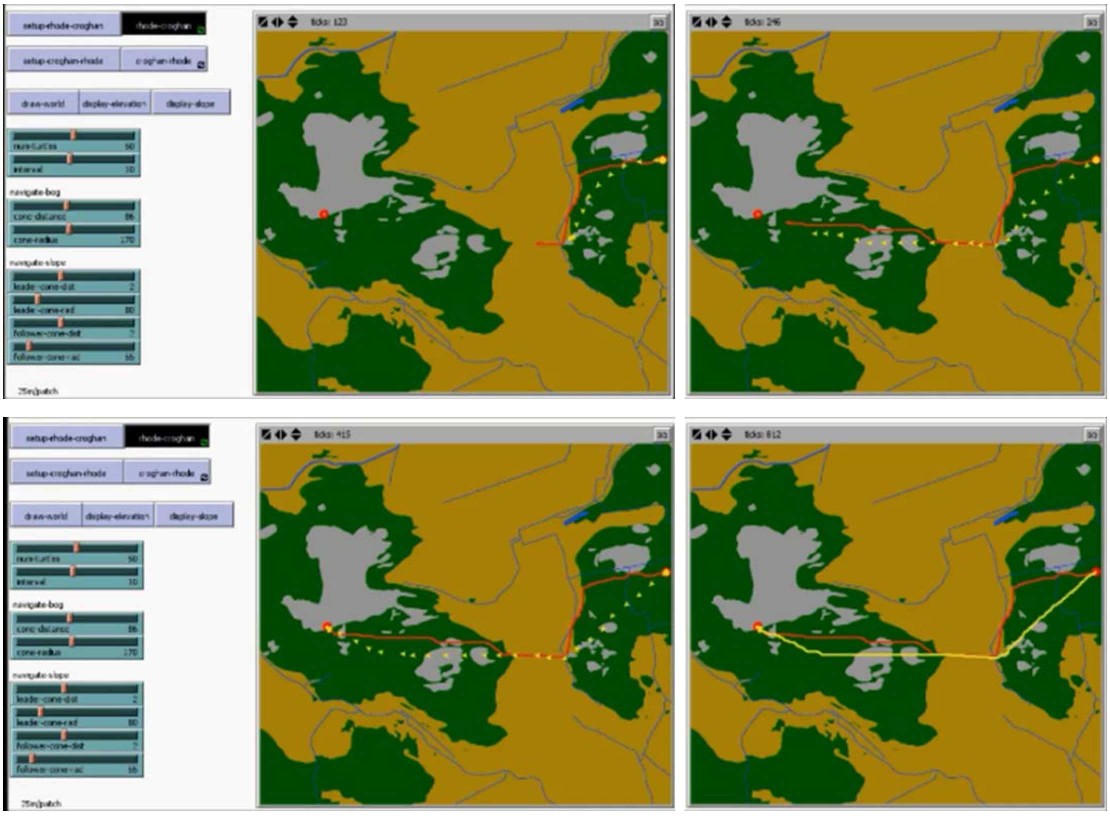

Figure 95 Progression of Agent-Based Model from Rhode to Croghan

The road over Ballybeg Bog is known as the Togher of Croghan, and is the *Tóchar Cruachain Brí Éile* described in the Annals of the Four Masters as early as 1385 (Lucas 1985), demonstrating the importance of this road. It must also have been a strategic road for English settlers, as it is one of only a few paths which were illustrated in the 1563 Map of Leis and Offalie (Fig. 97) (Cotton Augustus MS I ii 40 1563).

The early prehistoric remains in Ballybeg Bog north of this crossing are centred on a habitation site and palaeochannel, and are mostly associated with reasonably dry woody fen. These sites are of the type associated with the exploitation of the bog, rather than an attempt to traverse it. Any attempt to cross the bog, particularly as it moved towards sphagnum peat conditions, was probably along the axis of the existing road and the modelled paths. Unfortunately, any evidence of this path pre-dating the 1385 reference will have been concealed or obliterated by the road in its existing form.

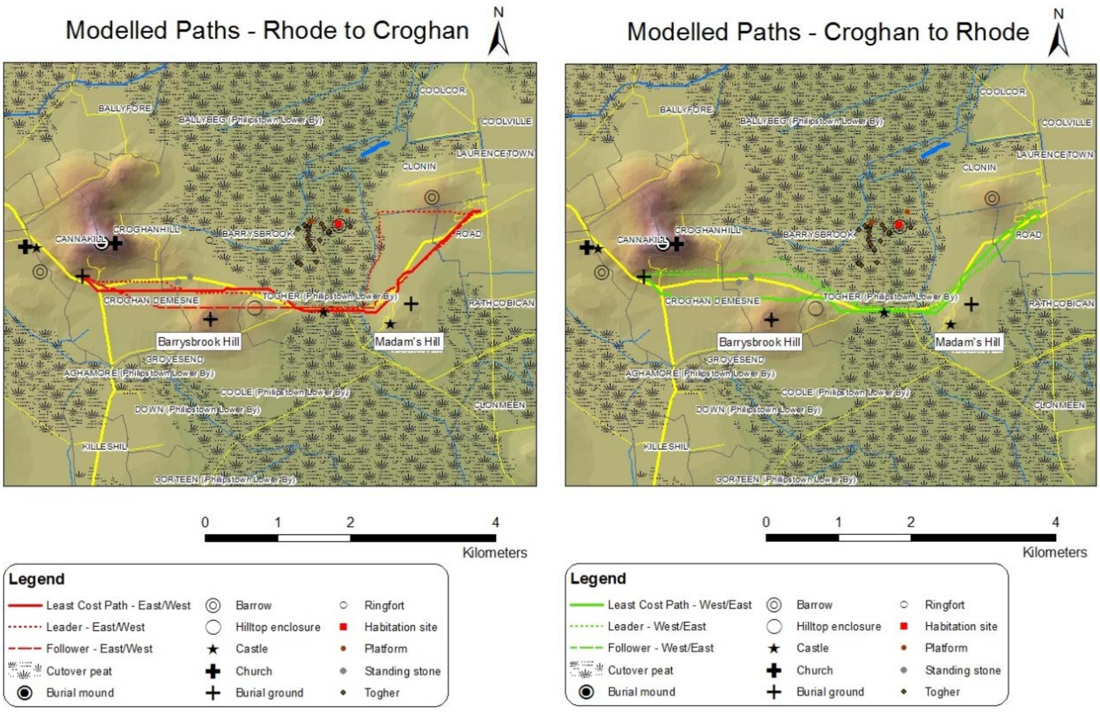

Figure 96 Least Cost Path and Agent-Based Model results between Rhode and Croghan

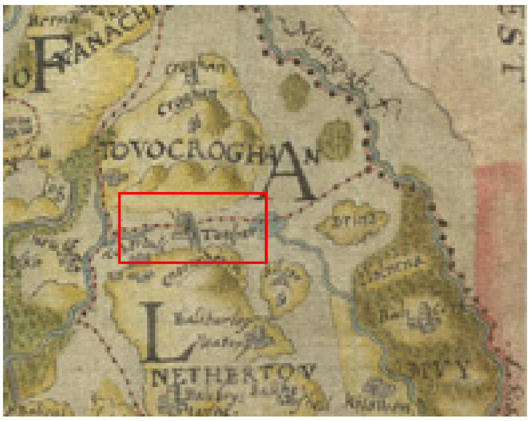

Figure 97 Detail of 1563 Map of Leis and Offalie illustrating a togher crossing Ballybeg Bog (Cotton Augustus MS I ii 40)

The path from the bog crossing to Croghan is overlooked by Croghan Hill itself from the northwest and the two hills at Barrysbrook and Togher. A cairn adorns Croghan Hill, with a ringfort and cillín on Barrysbrook Hill and a hilltop enclosure in Togher. These are all monument types associated with overlooking routeways and they would seem to point to a path which winds between the hills. Two standing stones are also recorded along this course, with one still extant (National Monuments Service 2015, OF010-014, OF010-015), further supporting the case for a path in this location, given their tendency to occur along routeways (Chapter 5.2.2).

In Geissel's (2006) suggestion for the course of the *Slighe Mór* in this area, he largely agrees with the paths set out here, typically adhering to the existing roads, but opts for the road south of Barrysbrook Hill and Croghan Demesne, bypassing the prehistoric archaeology to loop northwards again towards the complex at Croghan Castle. He suggests a second alternative along the west slope of Barrysbrook Hill to meet the standing stones and skirt the low contours of Croghan Hill. The road which leads from the west side of the bog to Croghan very conveniently coincides with the modelled paths (Fig. 96). This road dates to the 19th century however, and prior to its construction, traffic was obliged to divert to the road south of Barrysbrook Hill, which is no doubt why Geissel elected to take this route. It was quite common for existing roads and paths to be diverted around estate grounds as privacy became more prized for its residents than control of the route which originally attracted its presence, and here the road travels along the townland boundary of Barrysbrook and Croghan Demesne, the limit of what directing a road around an estate would entail. The peak of Croghan Hill provides an obvious line of site when travelling through this landscape, which was found during fieldwalking to attract movement in that direction. For these reasons and the nature of the archaeological distribution flanking the suggested paths, I propose that there may originally have been an axis of movement between the hills and past the standing stones, just as the modelled paths suggest.

7.4.2 Croghan to Kiltober

The landscape between Croghan and Kiltober is made up of raised bog, limestone till and limestone sands and gravels, with Kiltober positioned next to the northern extent of the Rahugh esker (Fig. 98). Clonearl Bog lies to the west of Croghan, with a cowl of limestone till almost completely surrounding Raheenmore Bog. This limestone till would easily accommodate movement south and west to Kilclonfert, which is considered by some to have been on the *Slighe Mór* (FitzPatrick et al. 1998, 6). The western extent of this segment is dominated by limestone sands and gravels abutting Rahugh Esker which is one of the finest examples in the country of a steep sided single-crested esker. A number of low hills occupy the dryland areas at Oldcroghan, Kilduff, Clonagh, Mullagharush, Cruit and Lackan. These hills act as interim landmarks between Croghan Hill and Rahugh esker by which to pilot.

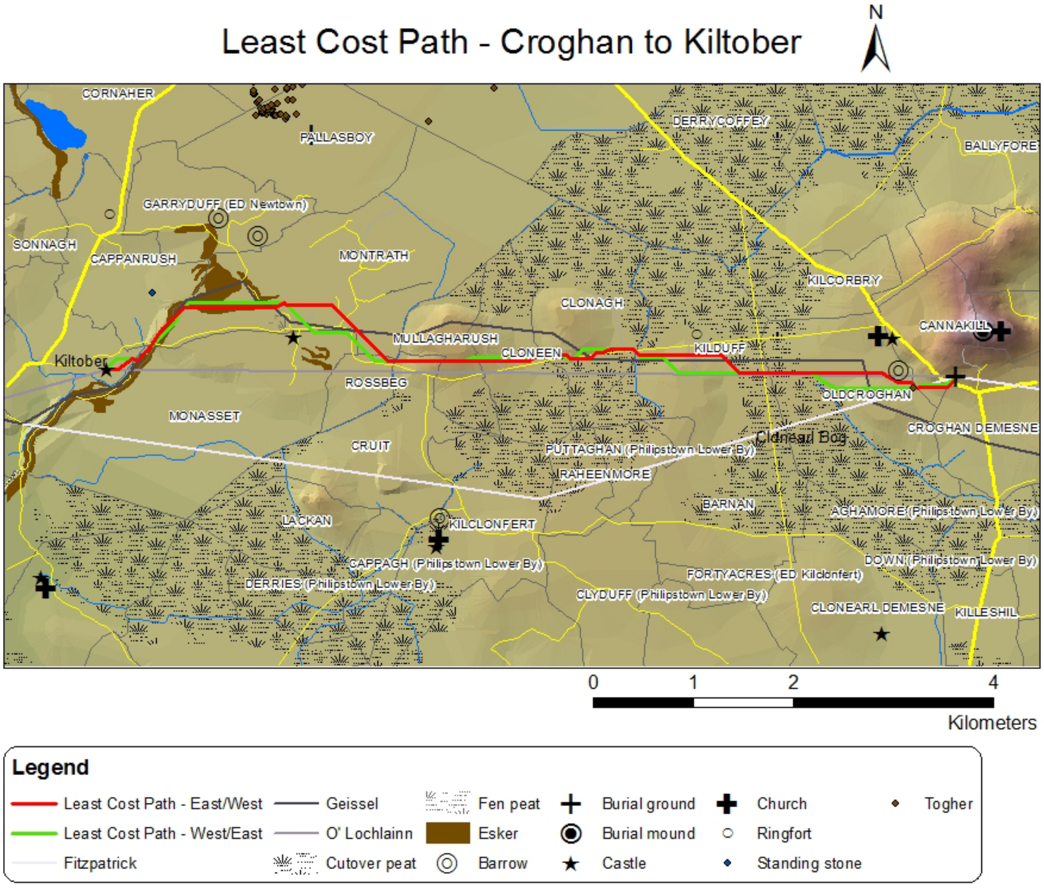

Figure 98 Least Cost Path - Croghan to Kiltober

The name of Kiltober suggests that there was an early church and holy well here, which would make it one of very many early church sites along the potential course of the *Slighe Mór*. There are no recorded early churches or holy wells in this townland, but neighbouring Rahugh has both of these features, which are attributed to St. Aodh, and was considered by Smyth (1982) as an intersection between the *Slighe Mór* and the Midland Corridor. In the interest of following O' Lochlainn's itinerary, a point in Kiltober had to be chosen for this model, and the tower house in this townland (WM038-043) was chosen for the simple reason that castles tended to be built on existing routeways.

The Least Cost Paths cross Clonearl Bog at its narrowest point and crosses Raheenmore Bog between the hills at Kilduff and Clonagh (Fig. 98). A deposit of limestone sand and gravel here means there is only 75m of peat to cross, and minimal effort would be required to negotiate this patch of wetland. The paths skirt the low contours of Clonagh Hill and Mullagharush Hill before turning northwest to climb the esker before following its course to the target in Kiltober.

The Agent-Based Models cross Clonearl Bog at exactly the same point and similarly use the deposit of limestone sand and gravel to cross the narrow point at Raheenmore Bog. A preference for eskers had not been embedded in the original code to determine if slope alone would account for historical and archaeological use of these features for movement. The turtles did not climb the esker at the same location as the Least Cost Paths, but the path from Croghan to Kiltober involved crossing the esker next to the intersection with the existing road. This implies that the historical preference for eskers as roads is more complex than simply slope. Most likely, it is the well-drained nature of eskers which make stable and dry walking surfaces that was the primary attraction, and the weighting of subsoils in the Least Cost Path simulates this. Social memory would also have been a factor, as Bell and Lock (2000, 92) observe with the similar example of the Ridgeway in Oxfordshire, England, where shared memory that the ridge connected destinations attracted intentional movement.

In an alternative version of the model, the turtles were assigned behaviour which preferred the surface of the esker (Fig. 99). If an esker appears within the turtle's cone of vision, it is instructed to turn its heading towards it. Given the topographical impact of an esker on the horizon, they are visible from a considerable distance. Sliders were used to test a range of distance and angle values, and this example uses a distance of c.2.5km and angle of 120˚. The results are much more similar to the Least Cost Paths, with the route from Croghan to Kiltober climbing the tip of the esker at the same location in Montrath. The path from Kiltober to Croghan dismounts the esker but keeps close to it.

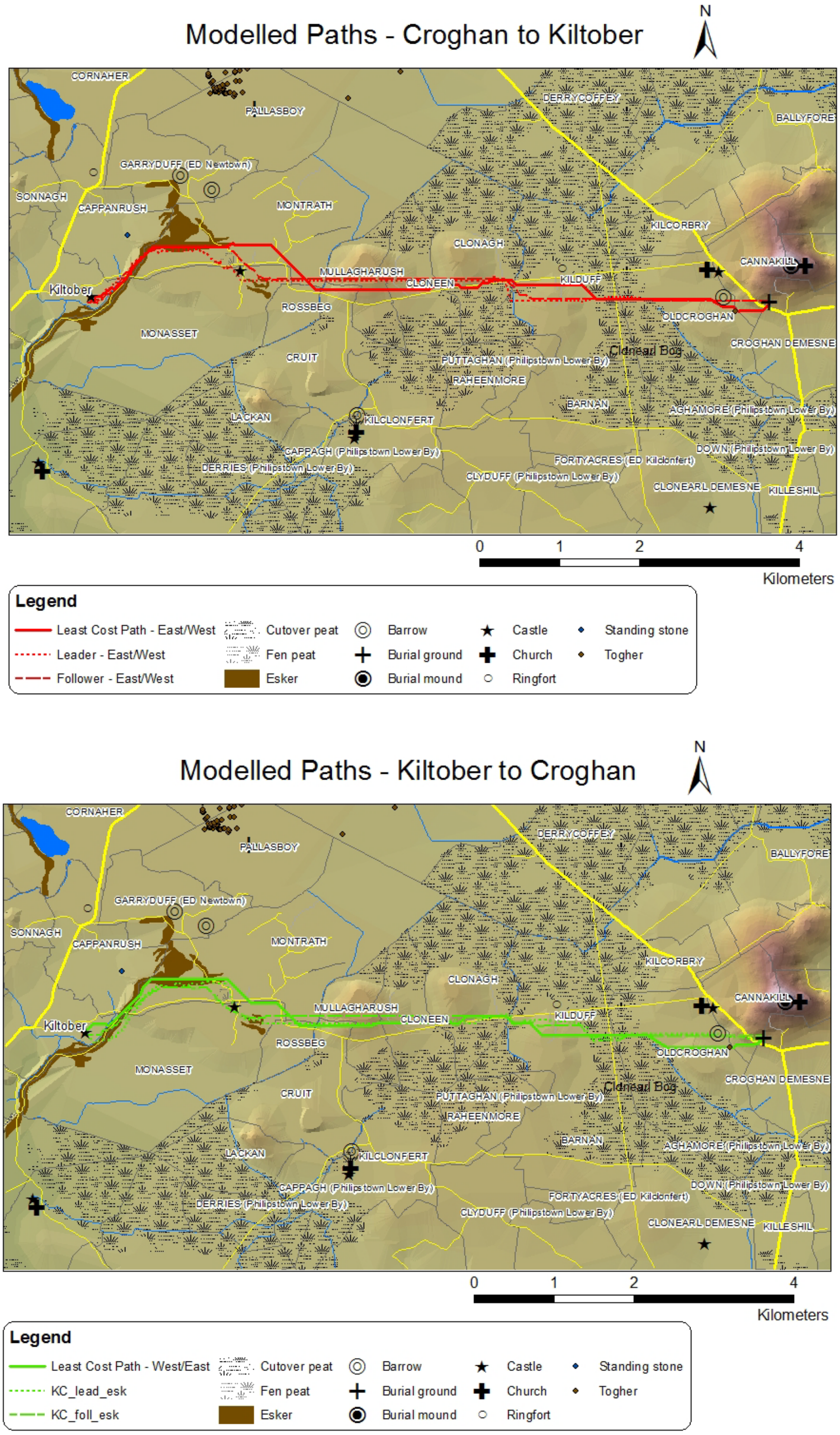

Figure 99 Least Cost Path and Agent-Based Model results between Croghan and Kiltober

There is less archaeological evidence in this segment to support the models. The paths pass a ringbarrow at Oldcroghan and a ringfort at Kilduff, but apart from a few enclosures, there are no other recorded monuments of note along this course, with most sites occurring in areas of well-drained limestone sand and gravel. The existing road network in this segment does however support the proposed paths from Kilduff to Montrath, as they skirt the lower contours of Clonagh Hill and Mullagharush Hill. The limestone sand and gravel flanking the esker was otherwise a suitable location for agriculture, and there are two tower houses and two ringforts in this area which were prudently situated to exploit this landscape. Settlements such as this would not have been placed in isolation, and their existence in sight of the esker and the paths created by the models support the assumptions made in their design. Furthermore, there are two barrows and a standing stone next to the esker, suggesting it was an important feature for movement in prehistory too.

7.5 Calculating the route

A series of Least Cost Paths was produced for the study area based on the nodes identified by O' Lochlainn (Fig. 100). In addition to the segments discussed above, this required analyses between Kiltober, Durrow, Ballycumber, Togher and Clonmacnoise. The Pilgrim's Road was substituted in place of O' Lochlainn's Ballaghurt, because it is traditionally remembered as part of the route to Clonmacnoise. As with the segments discussed in detail above, the results from either direction are extremely similar, adhering to the same landscape features with minor variations measuring only a few metres apart. This involves a path along the eskers as much as is practicable and frequently along or close to the course of existing roads.

The Least Cost Paths are very similar to the route proposed by Geissel (2006), who's methodology included consulting locals and maps, as well as a field-based search for roads which he believed to be of great age. The main departure from Geissel's route is between Ballycumber and Cooldorragh. Here the models take a northerly route through Bellair / Ballyard, while Geissel opts for a southerly route to use the road through Parkaree / Boherfada, attracted by the placename which translates as *long road*. As discussed in Chapter 6, there are potential problems involved in relying on the existing road system which is often Geissel's approach. Where the modelled pathways coincide with roads however, then that is a strong endorsement for the potential of those roads to be of some antiquity. As seen above, the decision-making process of people moving through the landscape will eventually approach a conclusion which is efficient. If movement took place between these sites in an efficient manner, then the roads which correspond with the modelled paths may date to the Early Medieval period, if not in the form of a physical road, then certainly as a more intangible routeway.

7.6 Walking the routes

Fieldwork was undertaken which involved walking the routes suggested by these models. No measuring equipment was necessary and it simply involved subjectively assessing the ease with which the path allows movement through the landscape and identifying landscape features on the horizon which can be used for piloting and cognitive mapping. The paths were not taxing to walk. Slopes were gentle and, thanks to the arrangement of eskers and other dry soils, bog crossings were only encountered at Ballybeg, Clonearl, Raheenmore and Doon Demesne. Evidence from wetland sites throughout the study area demonstrates that obstacles such as these were regularly negotiated.

The landscape of this region is low-lying, but the topography is perfectly suitable for piloting and cognitive mapping. Within the study area, peaks and low hills such as Croghan Hill, Mullagharush Hill, Bellair Hill or the Cooldorragh Hills are ideal interim points when wayfinding or memorising a landscape. The eskers are also highly visible features and naturally draw the attention and the footsteps of a traveller. Even beyond the study area, features such as the Slieve Bloom Mountains to the south, or the Bronze Age cemetery mound at Knockast, Co. Westmeath, are clearly visible on the skyline, and though they are not geographically part of the study area, they would have featured in the consciousness of people moving through it. With features such as this to navigate by, a traveller is left in no doubt as to what direction one is moving in, and the modern convenience of a compass would be unnecessary for someone who has spent time in the landscape and constructed a cognitive map of it.

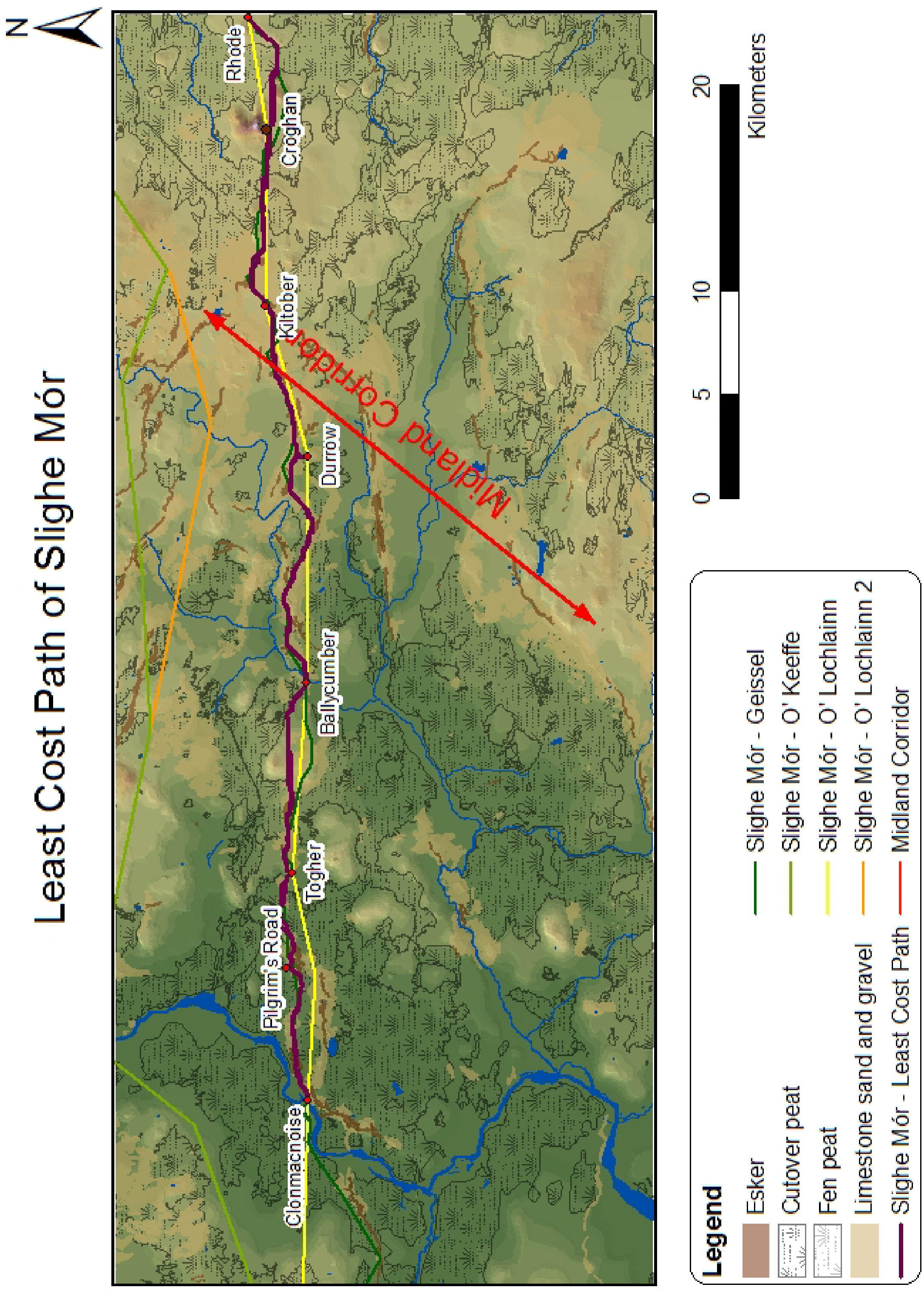

Figure 100 Least Cost Path of Slighe Mór compared with other authors' courses

7.7 Discussion

The risk with digital approaches such as Least Cost Paths is that it has the potential to remove human agency from the exercise, but it can be a very useful tool to direct attention to potential routeways in the physical landscape. By comparing the Least

Cost Path result with the archaeological evidence, existing road network and the Agent-Based Model, it is shown to be quite a robust method which agrees with both the physical evidence, and a method which explicitly defers to the decision-making of a multitude of individuals. The similarity between the modelled paths and the route proposed by Geissel (2006) shows very clearly that the path produced by this method is almost identical to one which was arrived at through fieldwork, local studies and map work. Thus, when used as part of a suite of methodologies, Least Cost Paths can be used to support hypothetical routes which have been arrived at by more conventional methods. It ought to be used to identify potential corridors of movement, rather than perhaps an exact path, which can be investigated further through fieldwork, aerial photography, geophysical survey and desk-based research (Gietl et al. 2008, 8).

The Agent-Based Modelling element of this research supports Least Cost Paths as an effective method to study landscape movement. The real value of this method, however, is not necessarily the result, but the process involved in producing a viable model. Following the rule of thumb that ‘if you didn’t grow it, you didn’t explain its emergence’ (Epstein 2006, 8), the variables involved in the growing of a model explain its emergence. Thus, the factors of slope, obstacles, the seeking out of eskers and the impact of one’s predecessors which create this model are part of the process which individuals engage in while they attempt to negotiate the real landscape. While an efficient and elegant path might be thought of as coming from centralised control, the exercise of growing it with these variables shows that it is the aggregate result of the actions of individuals responding to local perceptions and conditions. When moving through the real landscape or undertaking fieldwork in this landscape, these factors are foremost in our minds, so it is reasonable to incorporate them into the model. The importance of local information and perception to this method means it is a practical approach to landscape phenomenology.

As discussed, a model is necessarily an idealised and simplistic representation of the world, but it is a useful and cheap starting point for a more detailed study. The limitations of these models are that they may be missing a vital piece of data or behaviour. The crossing of a bog, as we have seen, is more nuanced than simply identifying the narrowest point and crossing it in a straight line. The paths hypothesised here are produced under ideal conditions, and the evidence supports these results in a general sense, but there may have been occasions in which alternative paths were required, either because of the conditions of the bogs, winter flooding and even social factors and taboos. New research into these areas can be used in the future to build more realistic models. In the case of the bogs, if studies in bog stratigraphy were used to build a model of bog conditions through time, then the effect of bog conditions on movement could be more adequately modelled.

Most important is our obligation to acknowledge that systems of movement were in flux, and paths could be reimagined and reinvented over time. Thus, the courses which the methods above illustrate ought to be thought of as high-probability paths within a given space (Llobera 2000, 69–70), which must be further examined through fieldwork and documentary evidence.

7.8 Conclusion

In conclusion, the use of digital methodologies has the potential to support hypothesised routeways and to identify areas that merit further investigation through fieldwork, documentary sources and cartography. They demand that the programmer explicitly identify the crucial factors involved in movement, thereby deconstructing the decision-making process involved in negotiating the landscape. Least Cost Paths and Agent-Based Modelling produce very similar results which correspond well with the available evidence, supporting their use as methodologies. While Least Cost Paths conclude a path by instantaneously *calculating* a routeway, Agent-Based Modelling allows us to observe the cumulative aspect of the emergence of a routeway by *growing* it.

While topographical concerns are not the only factors involved in movement, social structures which may affect it are likely to be similarly rooted in landscape. In this regard, the modelling process may produce similar results even if there is a lack of social data to consult. Conversely, modelling can help to explain taboos, settlement and other social structures in a rational way involving energy expenditure, economics and safety.

Possibly the most important factor which has been explored in these models is the impact of previous agents' activities on the decisions of their successors. This concept has been central to the structure of this research. Chapters 3 to 6 summarise the archaeology and practice of movement from 8000 BC to the 9th century AD as part of a diachronic study illustrating the continuity and appropriation of the structures surrounding movement. Part of this process is a reaction to the landscape in which we relieve ourselves of cognitive responsibilities by following desire lines or more established paths. In other cases, manmade monuments augment natural landmarks which had previously been used for piloting and wayfinding, reinforcing desire lines and routeways that emerge around such landmarks. Even beyond the physical traces on the landscape, we are influenced by the activities of our predecessors by the transmission of knowledge through stories and placenames. As the examples above show, the study of movement requires us to acknowledge the sum of archaeological evidence within a given landscape, with Neolithic cairns contributing to the discussion as much as 16th century cartographic sources, and the entire process begins with a single agent attempting to make their way across the terrain.

Chapter 8: Movement and Routeways – A Cumulative Phenomenon

8.1 A landscape of contradictions

As we have seen throughout this study, landscape is a complex environment on which we hunt, farm, build, live, settle, experience etc. These activities require us to move between different spaces, and the landscape itself provides the means to do this. Conversely, the landscape is also the medium which separates these spaces, sometimes in a fashion that restricts or impedes movement. Thus, landscape simultaneously connects and separates, facilitates and inhibits, and it requires negotiation to move between spaces as required for survival, agriculture, economy, communication etc.

Natural landscape dynamics create areas that slow or impede movement, such as steep gradients, wetlands, woodland or rivers which must be forded. Areas which are more conducive to movement, or natural routeways, are consequently favoured when travelling through the landscape, with routeways chosen for speed, safety and memorability. These include gentle slopes, dry soils, areas of high visibility, or water routes that can accommodate travel by boat.

This directly affects the emergence of regions, as topographical features which facilitate movement lead to more intensive communication between areas and greater symbolic transfer (Jones 2008). This is evident in the present study, where the Midland wetlands created a buffer zone between the northern and southern halves of Ireland, but simultaneously provided the means by which these regions could communicate via the Midland Corridor and the River Shannon. This was a region in which northern and southern influences impacted on the material culture, most aptly demonstrated by the contents of the Bronze Age Dowris Hoard. These competing influences continued to be evident in the Early Medieval period in the patronage of ecclesiastical settlements. On a regional scale, the boundaries of the Early Medieval kingdoms were heavily influenced by topographical features which facilitate or inhibit movement, with the region of the Midland Corridor, or the Fir Chell kingdom, separating the wetland dominated kingdoms of Delbna Bethra and Uí Failge, while the Cenél Fiachach roughly coincided with the area north of the esker chains (Fig. 77).

Among the topographical features which impact settlement, boundaries and movement, the underlying subsoil was discussed in this thesis as a particularly influential feature. The dry soils of the eskers and limestone sand and gravel offered suitably drained surfaces for movement within the study area, and attracted some of the earliest settlement activities in the region. Neolithic sites, such as Stonehousefarm 5 or Ballykilmore 4, were situated on the edges of these dry soils to access the wetlands, and many of the Bronze Age barrows and burnt mounds similarly targeted these soils. In particular, the Bronze Age house sites of Knockdomny, Tober and Ballinderry 2 suggest proximity to an esker was sought after, as these features not only provide a natural routeway, but they are typically flanked by well-drained soils for farming. As agriculture and woodland clearance intensified, the heavier but still relatively dry limestone till was increasingly exploited for settlement and movement, and many of the historic-era ringforts of this region can be found on this subsoil type. Essentially, many of the features which make an area suitable for movement, such as low gradient and well-drained soils, are similarly suitable for settlement. This means settlement and movement should be considered as intrinsically related.

Despite the impediments to travel sometimes imposed by the landscape, human ingenuity and invention has been used since early prehistory to overcome such obstacles. Boats and rafts were used in Ireland in the Mesolithic period, and trackways dating to the Neolithic period have been discovered throughout the wetlands. Indeed, one of the earliest, OF003-033, was from Derryarkin Bog in the study area (Fig. 27). The earliest known Irish bridge is similarly from the study area at Clonmacnoise. As technologies such as stone or metal axes advanced, so too could the carpentry skills which were necessary to carry out such projects. Many of these *natural* routeways eventually accommodated man-made roads. The law tracts describe the frequency of maintenance which was required to maintain them to the desired standard, including the clearing of scrub etc. This hints that roads, even when they adhered to natural routeways, required constant intervention to prevent nature from reclaiming them.

Thus, landscape dynamics are the initial factor which must be considered before attempting to engage in movement, and consequently before attempting to discuss movement. The characteristics of a landscape will attract movement and settlement in some areas, while simultaneously separating people in other regions. Humans are adept, however, at ensuring an obstacle is not absolute, and people have often intervened with the use of technology to counteract the effect of landscape obstacles and overcome them. In short, movement is ubiquitous, and people are capable not only of exploiting natural routeways, but are willing to go to considerable lengths to overcome or manipulate the landscape to enable movement and to suit their needs.

8.2 Cognitive mapping and persistent places

Much of the process of moving depends on our ability to develop cognitive maps in which the spatial reality is perceived, remembered and recalled to aid navigation. These maps are formed through a combination of physical experience and mnemonic aids such as placenames, stories and topographical gossip. Striking physical appearance or dramatic stories make a place more memorable, which is useful for successful navigation and wayfinding, and can be used to this effect even in the absence of a line of sight (Klatzky et al. 1990; Biesele 1993, 55–56; O’ Leary et al. 2005). The concept of cognitive mapping has been shown to be a fundamental physiological system in which space and place are perceived and experienced via a natural GPS system rooted in the hippocampus and the entorhinal cortex of the brain. The combination of Place Cells and Grid Cells allow us to build our cognitive maps, supplemented by Boundary Cells, Head Direction Cells and Speed Cells to create a spacio-temporal memory system (O’ Keefe et al. 1971; O’ Keefe 1976; Fyhn et al. 2004; Hafting et al. 2005; Sargolini et al. 2006). This allows us to navigate through a remembered space using novel routes. At the core of this process is the relationship of place to particular brain cells, and any practice which can make a place more memorable must consequently improve our capacity to construct a cognitive map around it.

It is no wonder then that the same places are so often targeted for settlement, burial, ritual etc. over the course of time. Places that are visually striking, such as peaks, lakes, headlands or rock outcrops, would be quickly incorporated into cognitive maps, which would attract continuity of activity. These conspicuous places improve the memorability and legibility of a landscape, and they are often the first attractions to new settlers (Donahue et al. 2006, 252; Lovis et al. 2006, 273). Croghan Hill in the study area is an excellent example of this. It appears as a distinctive profile in an otherwise low-lying landscape. A Bann flake from Derryarkin Bog in its shadow suggests that this area saw human activity from as early as the Mesolithic period, and we have seen from Chapters 3 to 6 that it continued to attract settlement and ritual activities throughout the periods discussed in this thesis. This is no doubt due to its mnemonic potential as a highly visible landmark and its unusual geology in a landscape dominated by limestone bedrock. Its striking visual appearance also made it an ideal feature for wayfinding and piloting, or for communicating directions.

Placenames, stories and personalities would be developed around these landmarks and persistent places to create a narrative-like cultural geography (Biesele 1993, 55–56; Tilley 1994, 18; Widlok 1997; Basso 1996; Kelly 2003, 47). By the Neolithic period in Ireland, this practice was supplemented by the augmentation of natural landmarks with constructed monuments, entities which are not only physical in nature, but which further act as mnemonic triggers for directions, stories and personalities. The construction of a cairn at the summit of Croghan Hill, for example, was part of this process. By imbuing places with identities through placenames, stories and monuments, they become recognisable nodes which can be communicated through topographical gossip.

Even places of note which are not immediately visually obvious can be incorporated into cognitive maps in this way. Fords were particularly important features for moving through the landscape, and the fact that they were at ground level would mean they were not especially visible from a distance. In the absence of a clear routeway and bridge, a ford would have to be found using cognitive mapping and wayfinding. The practice of deposition at fording points in prehistory would have reinforced the location and identity of the ford in cognitive maps, and the fords at Creevagh / Cloonburren, Shannonbridge, Keelogue, and a number of fords within the study area were subject to deposition from as early as the Neolithic period. This practice intensified in the Bronze Age, with Keelogue becoming the most important of the Middle Shannon fords. Mythologies would similarly have supplemented the ability to remember fording points. The ford at Creevagh / Cloonburren, for example, is thought to have been the legendary ford of *Snámh Dá Éan*, where Buide and Luan swam in the form of birds before being killed by Nar (Gwynn 1903e, 350–367; National Monuments Service 2015, OF005-068, RO056-011003).

It appears then that places which attract attention through striking visual appearance accumulate cultural importance as settlement, ritual, placenames and stories are inherited and appropriated over time to ensure they become persistent places which feature as central nodes in the cognitive map. The same practices can be used to imbue an identity on less visible nodes, such as fords, to ensure that important locations for successful movement are remembered. Having committed such places to memory and formed a comprehensive cognitive map, the process of navigating the landscape is then subject to the decision-making of individual agents.

8.3 The decision-making process

The decision-making process begins with the individual, and having decided to engage in movement, the way in which they perform it is a reaction to their perception of the landscape. This defers to the nature of the terrain, their existing cognitive maps and the received knowledge of the landscape via directions, taboos or perceived paths. Essentially, the most likely path which one will take is the one which requires least effort. This is often misinterpreted as meaning the least physically demanding path, but it is in fact the cheapest path in terms of energy expenditure combined with time, cognition, social structures, economics etc. While many of the other factors may ultimately defer to the physical characteristics of the landscape, it is incumbent on us to acknowledge that the path of least resistance is a complex and in-flux concept which depended on the changing natural, technological, social and political environment.

Thus, an initial path may be circuitous and inefficient, as the individual explores and learns the environment. Subsequent attempts will incorporate the knowledge of previous travels, or follow the desire lines of previous individuals through the landscape. This cumulatively improves the efficiency of a path, but sometimes the result is a path which is not the most efficient but simply *good enough*. This is because a cognitively easy path may trump a physically easy one, as it is easier to do what one has always done than to develop a new procedure. Additionally, the reinforcement of a path through repeated use creates an option which is of less immediate cost than one which would first require forging a way through vegetation. In other cases, multiple paths may exist within the same routeway, meeting, diverging and with many seemingly redundant paths in what Muir (2000, 95) describes as a swarm of trackways. As movement between two areas becomes more regular, the setup cost of actively developing a new efficient path may become an acceptable expenditure based on how often the journey is taken. Speed seems to have become more of a concern from the Middle to Late Bronze Age, which would require more efficient paths through obstacles like woodland and wetland.

In this way, construction projects may also be undertaken, as we see in the increasing amount of togher construction throughout the study area, particularly at times of increased agriculture, settlement and communication. The decision to expend energy in the construction of a path implies that a journey was being taken with sufficient frequency that the initial cost of construction was warranted. It seems from the present study that the earliest examples were often quickly-built, expedient structures which were constructed from a variety of light, local timbers that could be easily collected, such as the Early Bronze Age complex of OF018-104 at Clonad (Chapter 5.5.2.6), or the tertiary togher OF018-121 at Ballynakill in Mountlucas Bog (Chapter 5.5.2.5). As more ambitious projects were undertaken, however, the planning process would have become more complex, requiring skilled workers and access to more robust timber such as oak. The Bronze Age primary togher (GA100-168) from Annaghcorrib in Garryduff Bog, for example, must have required a very large workforce to fell c. 8 hectares of oak, cut it into morticed planks and assemble them over a 1750m long trackway (Chapter 5.5.2.14). Exceptional designs such as this may have been prestige projects designed for ostentatious display (Raftery 1996, 203; O' Sullivan 2007, 173–174), but a crucial part of the decision to undertake such a project would undoubtedly include the practical benefits of the trackway. In the case of the Annaghcorrib trackway, access to a ford on the River Suck seems to have factored into the decision to embark on the construction project.

The modelling component of this research was developed to explore some of the variables involved in the decision-making process. This method allows the researcher to explicitly defer to the decisions of individuals and the factors which influence their actions. By creating Agent-Based Models within the study area, the resulting paths could subsequently be assessed through more conventional methods of fieldwork and consultation of documentary sources. Standard criteria such as slope were a useful starting point for examining the decision-making process. Examples from the natural world, such as the growth patterns of slime mould, have also been used effectively in the past to simulate complex systems of movement and problem solving (Tero et al. 2010; Adamatzky 2010; 2012; Adamatzky et al. 2011), and the Ant Lines phenomenon was found to have been an appropriate approach in this regard to demonstrate the rendering of cumulative efficiency in the present study. The results were consistent with the Least Cost Path models and the archaeological and documentary evidence, suggesting that a cumulative approach is an effective way to approach movement and the decision-making process.

In summary, there are many factors involved in the decision-making process to identify the path of least resistance, including not just short term energy consumption, but long term energy savings and cognitive processes too. The cumulative result of this decision-making process is the emergence of paths, routeways and a system of communication. This is *emergence* in the sense that generative social scientists use the term, defined as 'stable macroscopic patterns arising from local interactions of agents' (Epstein et al. 1996), meaning the crucial aspect in these complex entities is fundamentally derived from the actions of individuals.

8.4 The emergence of routeways

While many of the routeways which have been discussed over the course of this thesis have been nominally *natural* in character, they are also human constructs insofar as they must be first used as routeways to be identified as such. They emerge out of the local interactions of agents as described above, and agents must be exposed to a potential *natural routeway* and make the decision to move over it for it to emerge as an authentic routeway. Rivers are often the earliest natural routeways when learning and navigating a landscape, requiring very little decision-making in terms of direction of travel. Terrestrial routeways are more complex, emerging out of cumulative decision-making of many individuals consistently moving over the same space. To put it in terms compatible with Agent-Based Modelling, routeways are part of a system which emerges from the interactions of independent heterogeneous agents, acting without centralised control in a bottom-up environment.

This has been apparent in the *natural routeway* of the Midland Corridor in the present study. It appears that this routeway began to emerge in the Neolithic period, at which time settlement began to develop in this region which acted as a gateway from the northern half of the country into the wetlands of North Offaly. By the Bronze Age, this routeway had evolved further and was used as a connection between the northern and southern halves of the country, with the Midland bogs acting as a buffer zone between two competing influences. Use of the Midland Corridor may have lapsed in the Iron Age, but it re-emerged as a major and strategic routeway in the Early Medieval period, which the Church exploited with several important ecclesiastical sites. This routeway has persisted to the present day in the form of the N52 primary road (Fig. 101).

Similarly, the esker ridges appear to have emerged as routeways in the Bronze Age, at which time the population seems to have increased in this region with habitation clustering around the Mount Temple / Moate esker, for example. These natural routeways formed a communication network which was supplemented on a local level by wetland trackways such as the Ballykean trackways which provided access to the Geashill esker (Chapter 5.5.2.7). The esker segments were the foundation for the emergence of the most famous of early Irish roads in the form of the *Slighe Mór*. This particular road fell out of use after the decline of Clonmacnoise and the Anglo-Norman invasion, and in more recent times was superseded by the N6 which adhered to the more northerly chain of eskers through Clonard and Moate. This road too has now been replaced by the M6 motorway. Many of the existing roads in this region are related to the courses of the eskers, and they have clearly impacted on the network of routeways that have emerged in this area. Those roads which are restricted by the widths of the eskers, however, no longer provide a suitable option for intensive movement (See Fig. 60), and the network has had to adapt to include roads of more suitable dimensions.

As natural routeways emerge, it is usual for monuments to develop alongside them, reinforcing and developing the routeway itself. There are many reasons for the placement of monuments in proximity to routeways, but the attraction of natural landmarks is undoubtedly one of the principle reasons for the origin of this practice. The appropriation of natural landmarks with early monuments meant they would have been used in wayfinding, and some monuments may have acted as idiosyncratic landmarks to mark out routeways, with standing stones perhaps occupying threshold points on routeways. Visibility is an important attribute of monuments, and even low profile monuments such as many of the Bronze Age barrows appear to have been intended as a familiar presence. Proximity to a routeway would facilitate this. This can be seen in the study area in the distribution of barrows across the northern extent of the Midland Corridor. This practice would have provided quite different experiences for audiences who were privy to the identity of the monuments and for those who were outsiders, attempting to make use of a routeway or common landmarks. Low profile monuments may have been intended to communicate cultural narratives, for instance, which would be lost on strangers who stumble across them while travelling on a routeway. Such monuments also reinforce a community's claim to a routeway, and consequently the surrounding landscape and economy. Crucially, the relationship of monuments with routeways demonstrates the importance which was attached to these features, not only in terms of the exploitation and control of a region, but as the framework through which the landscape was experienced and cognitive maps constructed.

This construction of monuments alongside routeways culminated in the Late Bronze Age with explicit statements of control in the form of hillforts overlooking routeways, as we see in the locations of hillforts at Clonlee and Ballycurragh at the southern extent of the Midland Corridor. This arrangement meant that what had begun as a natural routeway which emerged out of bottom-up development was eventually subject to centralised control and surveillance. Routeways would draw the attention of the ruling elite as a means to control movement, resources, territory etc. through the construction of strategically placed sites like hillforts or castles. They also adopted rules which limit the use of routeways to their own advantage. The Early Medieval law tracts provided clear instructions as to the expected quality of the *Slighe* and other roads, and who was permitted to travel beyond the confines of the *túath*, a right which belonged to the ruling elite and the professional classes. This allowed them to engage in swift movement and regular communication with outside areas, reinforcing their authority at home through knowledge, political relationships and access to goods and resources. The early church, which included a number of prominent figures from existing political dynasties, was made up of a number of cleverly positioned foundations, such as Durrow, Lynally and Clonmacnoise, that could similarly benefit from the system of movement. Thus, the natural routeways which had begun to emerge early in prehistory became a controlled framework from as early as the Bronze Age by which elites preserved and extended their influence.

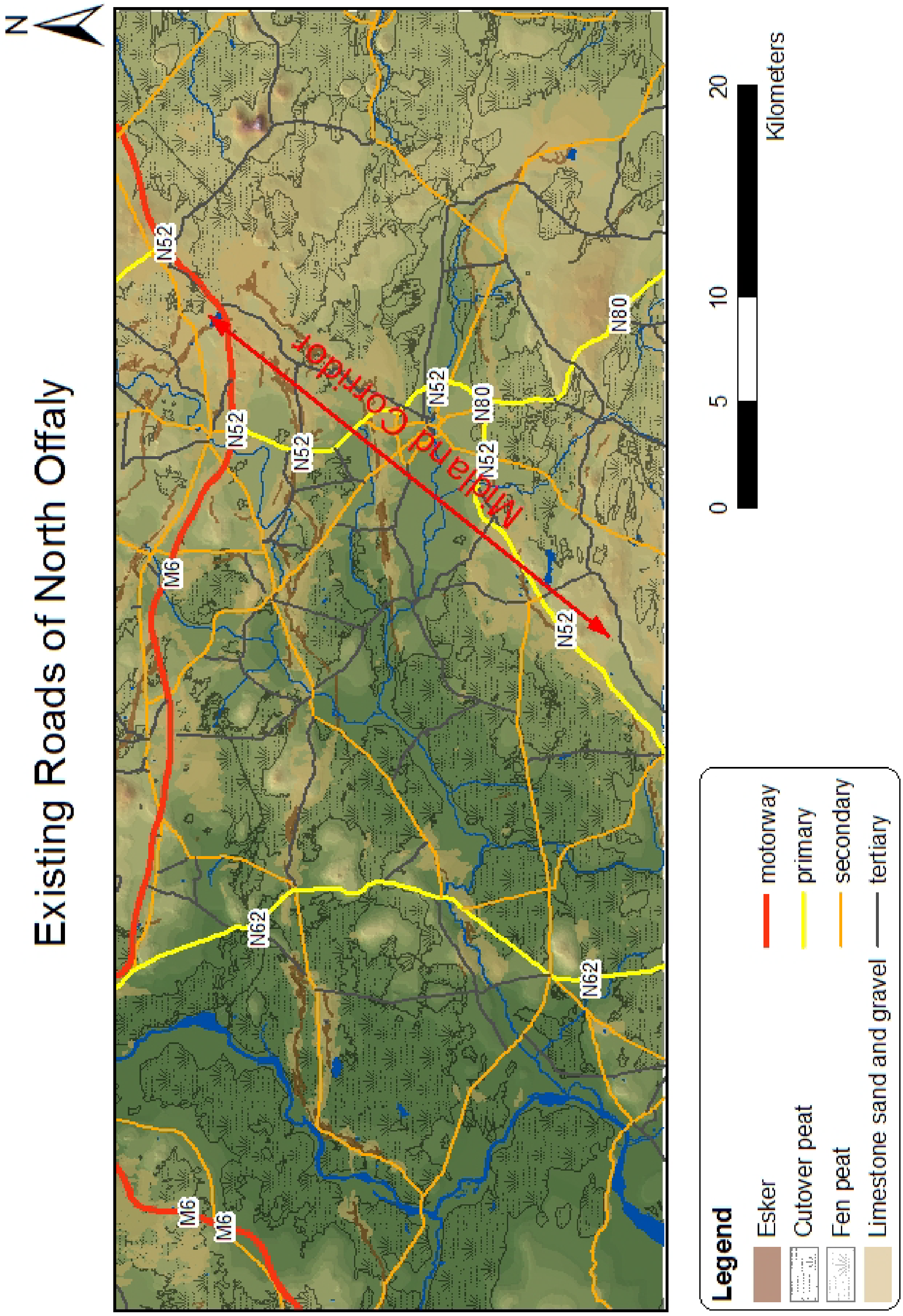

Figure 101 Existing road network of North Offaly

While natural routeways facilitated movement, human intervention and the use of technology contributed to the ease with which these routeways could be used. Water routes became viable through the use of boats and rafts, for instance, while axes were used in the clearance of woodland from which routeways like the Midland Corridor emerged. New tools facilitated more complex carpentry techniques which were used to construct robust trackways or to develop early wheeled vehicles. These vehicles required a suitable surface to move over, and this would have demanded that the vague entities known as *routeways* were properly defined into prescribed surfaces or *roads*, in another step in the process of the emergence of our road system. The combination of wheeled vehicles and suitable roads meant that greater loads could be transported to sites beyond the reach of navigable water courses. This would have resulted in large areas of land becoming viable places to settle, as they were now part of an increasingly comprehensive system of movement and communication, thereby having a profound impact on the spread of material culture, economy, territoriality and the emergence of elite social classes.

Thus, the emergence of routeways and the road system which exists still today is the result of a prolonged process of individuals learning and reacting to landscape. Their exposure to desire lines and monuments would have impacted their decisions, and they may have been primed by the transmission of knowledge and cultural geography to react in particular ways. Today's road system is a descendent of the initial routeways and desire lines which emerged out of the decision-making process of prehistoric people. The discussions of the routeways of the study area throughout this thesis demonstrate the appropriation of landmarks, continuity of routeways, intermittent replacement of *toghers* and strategic exploitation by which the roads of North Offaly have emerged and been adapted over time. The more a routeway is used, the more established it becomes, and the cumulative effect of siting monuments and settlements on routeways over the course of millennia reinforced this system. A significant change can also have a detrimental impact on the system however, as we see with the decline of Clonmacnoise, the Anglo-Norman invasion and the withdrawal of Gaelic elites in the maintenance of the roads. This resulted in less traffic to Clonmacnoise, a shift northwards towards Athlone as a principle fording point, and the decline of the *slighe* road system.

8.5 Movement as an archaeological theme

The investigation of movement in this thesis has required the discussion of a range of archaeological periods, monument types and concepts, which illustrates the ubiquity of movement for all aspects of the human past. The discussion of movement can give context to wide ranging themes such as landscape perception, settlement, socio-political structures or the biographies of artefacts. While the past is often simplified into a static landscape and moments in time, the incorporation of movement into its interpretation allows us to acknowledge the dynamic and active existence of the people of the past. Landscape is experienced in large part through our movement through it. This occurs in a complex feedback loop in which movement is shaped by landscape, with the resulting paths and roads in turn shaping the landscape and its people (Taylor 1979, ix). It is therefore an essential component in studies which seek to understand landscape and the past.

The practice of movement would have taken place on different scales depending on the lifeways, social position or profession of various individuals. The movements of a hunter/gatherer would have been quite different to those of a farmer, for example, or of an Early Medieval member of the horse-owning elite. This has been discussed at length from Chapters 3 to 6, and it is clear that types of movement were different not just across time, but across social, regional and political divisions among contemporary communities. Indeed, even further variation could be experienced on an individual level as occasion dictated. What is common for all but the most infirm or disabled is that movement of some description is habitually practiced, from the mundane but essential trips to exploit the hinterland and tend crops or animals, to the exceptional events of warfare or pilgrimage. While these movements manifest in different ways on the landscape, it has also been clear from the present study that many paths which were of local character ultimately feed into the wider system of movement by bridging the spaces between inter-regional routeways and roadways.

The network of wetland trackways has been particularly useful in this study in untangling different types of movement. Many trackways, such as the Bronze Age trackways of Mountlucas (Chapter 5.5.2.5) or the Iron Age constructions at Tumbeagh North (Chapter 6.9.4.8), were intended to access the bog. These were typically modest constructions whose orientations were not consistent with crossing the wetlands, but rather skirted around the edges or served internal complexes. These trackways were obviously intended for local movement, most likely associated with the mundane activities associated with exploiting the resources within the bog. While they would not necessarily feed into a wider scale of movement, they demonstrate that movement was taking place on a variety of scales throughout the landscape and away from the principle routeways.

Other trackways, often of more complex design and longer length, were created to cross the bog, acting as a method to link places and expedite movement. The trackways probably served a wider audience, and many in the study area seem to have fed into the wider system of movement. The trackways surrounding Lemanaghan Bog Island (Chapter 6.9.4.7-12), for instance, served the immediate function of accessing the island and the monastery it housed, but they also linked the site to the inter-regional routeways of the *Slighe Mór*, River Brosna and the River Shannon.

Aside from the interpretation of the past, movement is also an ideal medium through which to promote the past. The most effective way to encourage appreciation of the past is by allowing people to engage physically with it. While this is difficult to facilitate with artefact assemblages, many of which require careful curation, the continuity of routeways mean we have archaeological entities throughout the landscape which require only the dissemination of information to exploit for heritage purposes. Many are still maintained as public roads, requiring no additional expense, while others are semi-naturally maintained by walkers and hikers. Such paths offer an opportunity to literally walk in the footsteps of the ancestors and to recreate, as much as the existing landscape allows, the journeys, sights and experiences of the people of the past as they made their way along the routeway. As such, the preservation and curation of ancient paths, roads and holloways should be secured for public interaction with the past.

In conclusion, movement is a phenomenon that is central to the human experience and our interactions with the landscapes around us. It is present in every aspect of the archaeological record, from settlement, to ritual and material culture, and it is an essential theme to acknowledge in any thorough study of these subjects. The relationships which it has with various monument types was considered at length from Chapters 3 to 6, and the various scales of movement are evident from the complex network of natural routeways, fords and *toghers* throughout the study area, demonstrating how widespread and diverse movement can be. Yet as complex and sprawling as the theme of movement in the landscape can be, the role of the individual is central to its practice. As such, the perceptions and experiences of individuals as they learn and negotiate a landscape must be upmost in our minds as we explore the emergence of routeways and the topic of movement.

Chapter 9: Movement – A Conclusion

This research has been undertaken in an attempt to understand the practice of movement as a process which defers to both the physical aspects of the landscape, as well as the decision-making process of individuals in their negotiation of it. As such, the vegetation, soil cover, geology and glacial features of the study area have been discussed at length to understand the complexities of the landscape which people in this region would have been met with. The archaeological and documentary evidence was subsequently used to hypothesise how people interacted with this landscape and moved around it, always alluding to the role and experience of the individual, and how they reacted to landmarks, topographical gossip, desire lines and roads. Central to this was the use of computer modelling to simulate the decision-making process. To measure the success of this research, it is necessary to re-visit the aims which were outlined in the introduction as follows.

Aim 1: *To establish the decision-making process of individuals in their movement through the landscape with consideration of natural topography, social and cultural influences, and trace evidence of earlier movements.*

The decision-making process has been at the core of the approach of this research into movement. The factors which influence it have been discussed at length including the impact of landmarks, cognitive mapping, topographical gossip and the nature of obstacles. While the natural topography presents a landscape of natural routeways and obstacles, the experience and knowledge of the individual is fundamental to how they choose or are compelled to move around it. The experience of others can be transmitted verbally or through the evidence of desire lines, further impacting the decisions of individuals. As ritual and social structures evolve, the practice of movement may fall under centralised control, introducing taboos, rules and privileges. This may present decisions to some but exclude others from exercising their full decision-making potential.

This process was applied in this research through the use of digital modelling. Least Cost Paths were very useful in *calculating* a path which can result from a given set of variables, but Agent-Based Modelling explicitly defers to the decision-making process of individuals by *growing* a routeway. The models created with this methodology illustrate the cumulative aspect of decision-making from the sum of many individuals reacting to the landscape and the actions of others.

Aim 2: *To distinguish movement on inter-regional and local levels, in order to interpret exceptional and infrequent movements as well as mundane and frequent ones.*

The present study has revealed a number of inter-regional routeways such as the Shannon River, Midland Corridor, *Slighe Mór*, and several dryland routeways along the courses of eskers and limestone sands and gravels. It is clear that these routeways were the means by which material culture was exchanged, with many of the lithic, ceramic and metal artefacts of this region being consistent with types found throughout Ireland. Access to these major routeways was provided by a web of local trackways and roads. Several primary *toghers* from the wetlands were of sufficient length and suitable orientation to contribute to inter-regional movement by feeding into major routeways, particularly in the Late Bronze Age and Early Medieval periods when settlement and communication appears to have intensified in this region. Some of these constructions were of exceptional quality, and would have required a considerable work force, suggesting they were of some importance. The law tracts also point to a hierarchy of roads, with the *slighe* forming the principle roads, connected by *rout*, *lámraite*, *tógraite* and *bóthar*.

The study area also revealed the type of mundane movement which was frequently practiced to serve local needs. The many secondary and tertiary trackways throughout the study area would have facilitated these movements which were necessary for everyday activities and exploitation of the hinterland. They were generally expedient constructions of much simpler design, made to modest dimensions and incorporating a wider range of light, locally sourced timbers. The *bóthar* class of road would similarly have served local needs, and was of much narrower dimensions than principle roads. While roads and trackways such as these would have served a smaller audience than inter-regional routeways, they were crucial for the practice of mundane activities which were part of the survival of these communities, and some may have been used quite intensively.

Aim 3: *To demonstrate consistencies and changes in movement over time, a balance which contributes to the evolution of routeways.*

This thesis has demonstrated the cumulative nature of movement through the diachronic approach to the study area. While the *Slighe Mór* and the Midland Corridor have generally been thought of as medieval routeways, for example, this research has demonstrated the prehistoric use of esker chains for movement and the emergence of the Midland Corridor from as early the Neolithic period. Conversely, there were intermittent lapses in the use of bog crossings, while deposition at fords seems to indicate changes in the importance of fords at different times. Some of the changes which occur in the practice of movement may be a reaction to environmental conditions, with wetter conditions preventing safe passage through a bog, or coastal conditions creating or destroying sand passes. Other changes are human in origin, such as changes in settlement pattern, technological advances, or the lapse in anthropogenic activity that can lead to a path being absorbed by woodland regeneration. The decline of the *slighe* system, for instance, was due to a number of social and political factors which re-organised the system of movement. It is clear, therefore, that movement is an in flux system, simultaneously building on the past while adapting to new conditions and requirements.

Aim 4: *To show how movement can be inferred from any aspect of archaeology.*

Over the course of this thesis, the discussion has referred to a diverse range of topics including the distribution of polished stone axes, hilltop cairns, *fulachta fiadh*, horse cults, monastic settlement, dugout boats and timber trackways to name a few. The examples which were used to construct the argument are by no means exhaustive of the potential topics which can contribute to the study of movement. They are, however, sufficiently diverse to indicate the ubiquity of movement and its relationship with any part of the human past. The topics which appear in this research serve merely as examples of how movement can be inferred from any aspect of archaeology. Even less tangible aspects of the discipline, such as placenames or mythology, can be used in the discussion of movement, as they are instrumental in cognitive mapping, topographical gossip and the communication of directions.

In conclusion, this thesis has demonstrated that the two most important components of movement are the nature of the landscape and the decision-making process of the individual. Routeways are the culmination of many individuals over time reacting to the physical, cultural and political landscape, with reference to their accumulated knowledge which is transmitted through topographical gossip, placenames, mythologies and itineraries. Movement is necessary and pervasive, resulting in a complex network which reflects the variety of scales and purposes of movement, from major inter-regional routeways to short stretches of *puddle togher*. Movement is intrinsically related to settlement patterns, geo-political structures and the spread of material culture and as such, it ought to be considered in any study of the past in order to adequately provide one of the important contexts in which human activity occurred.

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