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# Brú na Bóinne World Heritage Site Research Framework Consultation Draft

December 2008

An aerial photograph of a rural landscape. A river flows through the center, surrounded by green fields and patches of trees. In the lower right, a large circular structure, possibly a stone circle or a modern building, is visible. The background shows rolling hills under a hazy sky.

# **Brú na Bóinne World Heritage Site Research Framework**

**Consultation draft December 2008**

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## Introduction

### The Research Framework

#### Why a Research Framework?

In 2006, the Heritage Council made a successful proposal to the Department of the Environment, Heritage and Local Government about the need for a research framework for the Brú na Bóinne World Heritage Site and in December 2007 a research officer was appointed to undertake this work.

The reasons for such a framework are two-fold: on an international level, UNESCO has recognised that knowledge and understanding are key to the proper management and monitoring of World Heritage properties. Moreover, ICOMOS guidelines for the management of World Heritage Sites recommend that a research co-ordination committee be set up. The suggested role of this committee is to devise research programmes and promote and co-ordinate research (Feilden & Jokilehto 1993) and the publication of a research framework for World Heritage Sites is widely seen as best practice in this regard. Of the current 878 World Heritage Sites worldwide, only two – The Stonehenge, Avebury and Associated Sites WHS and The Heart of Neolithic Orkney WHS - have a research framework (Chadburn and Pomeroy-Kellinger 2001; Darvill 2005; Downes et al. 2005; Avebury and Stonehenge each have a separate framework). The Brú na Bóinne framework thus represents a very important contribution to world heritage policy and management and places Ireland at the forefront of this rapidly developing discipline.

On a national level, it is hoped that the development of research frameworks will raise the research content of aspects of current Irish archaeological practice. A key recommendation of the Heritage Council's *Review of Research Needs in Irish Archaeology* (2007) was for the greater use of research frameworks for all aspects of archaeological practice. Furthermore, the National Development Plan 2007-13 includes a Built Heritage Sub-Programme which speaks of an '*...overarching aim of developing a relevant research agenda [for archaeology] and the broadest possible dissemination of knowledge in the most accessible manner*' (Government of Ireland 2007). Specifically, the *Brú na Bóinne World Heritage Site Management Plan* (Dúchas 2002) states that an important issue is '*to establish key priorities for research which will provide a greater understanding of the site's broad range of archaeological monuments*' (1.8.3).

#### What is a Research Framework?

A research framework is primarily concerned with academic and scientific research issues rather than management issues. However, research frameworks and management plans are generally closely intertwined, with one informing the other, and as such can form a broader universal framework (Olivier 1996).

The standard approach (Olivier 1996, 5-6) to drafting a research framework at the level of a site or area includes a Resource Assessment, a Research Agenda and a Research Strategy.

- Resource Assessment: a statement of the current state of knowledge and a description of the archaeological resource. Essentially this is a critical review of existing achievements linked to a series of maps and listings of key investigations and publications.
- Research Agenda: a list of the gaps in that knowledge. Essentially this is a statement of the main issues and priorities for investigation over the medium to long term.

- Research Strategy: a statement setting out priorities and methods, demonstrating how gaps in knowledge can be addressed.

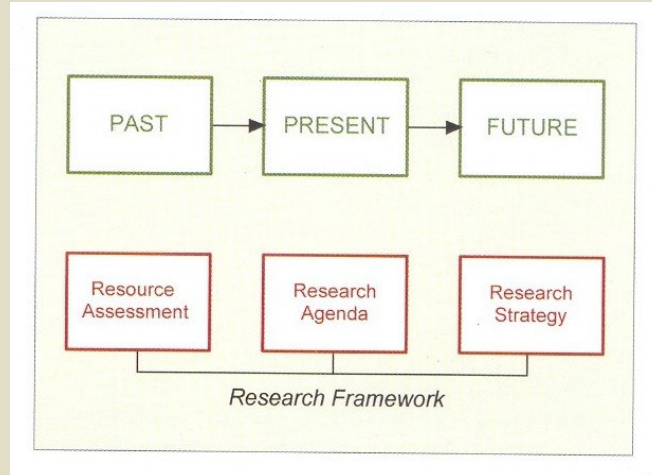


Figure 1. Representation of the main components of an archaeological research framework (from Darvill 2005)

While this standard approach provides a ‘tool kit’ for the commencement of a research framework, it should be noted that there is no rigid blueprint for the completion of the exercise. The Orkney and Avebury publications prefer to use the term ‘Research Agenda’ in the title (Downes et al. 2005; Chadburn and Pomeroy-Kellinger 2001), while the Stonehenge strategy utilises ‘Research Framework’ (Darvill 2005). Moreover, the Stonehenge and Avebury Research Frameworks adopt a chronological approach in which each period is reviewed in terms of assessment, agenda and strategy. On the other hand the Orkney Research Agenda uses a mixture of chronological and thematic approaches. As will be seen below, a mixture of chronological and thematic approaches have emerged organically for the Brú na Bóinne framework.

Five key principles can be suggested for the Brú na Bóinne Research framework:

- That the sustainability and longevity of the cultural resource for future generations should be at the heart of any research strategy for the World Heritage Site
- That any framework should place accessibility and inclusion of diverse audiences as key requirements for any new strategy
- That any future research strategy have the creation of knowledge as a core objective, be aimed at tackling ‘big questions’ but also to encourage multi-disciplinary/collaborative studies and that less well known aspects of the WHS may require more attention than previously accorded
- That any emerging research framework should allow for new and emerging research, should be reflexive and capable of revision

- Any future strategy must represent value for money

Furthermore it is important that any strategy should promote research on management issues, preservation, conservation and interpretation within the WHS. Another important goal of any research framework is the co-ordination of resources. Research is essentially another *land-use* and must be sustainable, with excavation and surface collection kept to a minimum.

### **The project**

The Brú na Bóinne Research Framework was compiled and edited by Jessica Smyth, in collaboration with a research co-ordination committee comprised of representatives from the State heritage agencies, the universities, Meath County Council and from the research community. Larger working groups were also assembled at key stages in the framework process (see Appendix I)

Phase 1 of the project produced a state-of-knowledge summary of the archaeology of the Brú na Bóinne WHS (Resource Assessment), as well as a history of research in the area, an inventory of radiocarbon dates and a bibliography of projects carried out in the WHS. Phase 2 involved seeking a series of critical position papers from a range of specialists to determine the gaps in research carried out to date and to identify a series of key questions for investigation (Research Agenda). Submissions were also sought from the wider research and archaeological community and from the general public. Phase 3 of the research framework focused on formulating a Research Strategy, i.e., a list of research priorities that would tackle the issues identified in Phase 2.

A key element of the process was public consultation and in addition to the circulation of draft texts to a range of interested parties each phase of the project was marked by a public information seminar. Seminars were held in The Conyngham Arms Hotel, Slane, Co. Meath in March, June and October 2008 and introduced the public to the range of research currently being carried out in the WHS, the draft research agenda and the draft research strategy, respectively (see Appendix II for more details on the consultation process).

## **Brú na Bóinne in context**

The Brú na Bóinne, or Bend of the Boyne, World Heritage Site is located in county Meath on the east coast of Ireland (National Grid Reference 3008 2727), 4.8km west of the medieval port of Drogheda and approximately the same distance east of the 18<sup>th</sup> century village of Slane (Map 1). The local geology is one of Carboniferous limestone lowlands with overlying shale hills and the site is centred on a dramatic loop in the lower course of the Boyne river on its way to the sea some 10km away. An 'island' effect is created by the course of a second river, the Mattock, which effectively encloses the area to the north of the Boyne. Within the bend itself, the land is dominated by an east-west shale ridge upon which the well-known large passage tombs of Newgrange, Knowth and Dowth are situated. An additional 90 recorded monuments - as well as an unknown quantity of as yet unrecorded sites - are also scattered across this ridge and over the low-lying areas and floodplain closer to (the present course of) the rivers (Map 2). Deep glacial deposits cover the area and have created a variety of fertile soils, which likely offered some protection from the excesses of rainfall or drought through the millennia (Mitchell in Eogan and Roche 1997, 6). Today, the WHS is a mosaic of mixed farmland ranging from intensive arable to permanent pasture, with many of the hedgerows and old field boundaries remaining in place alongside patches of deciduous woodland. The WHS also encompasses several Natural Heritage Areas (NHAs) - Crewbane Marsh, Rossnaree Riverbank, Dowth Wetlands and the Boyne River Islands. This last is one of 364 Special Areas of Conservation (SAC) sites in the country and one of the few examples in the State of alluvial wet woodland - a priority habitat under the EU Habitats Directive. The Boyne river has in addition been designated a Salmonid River under the EU Freshwater Fish Directive.

### **International importance**

The oldest recorded monuments in the Brú na Bóinne WHS are the Neolithic tombs and the Boyne area is widely seen as having one of the most significant complexes of passage tombs in Europe both in terms of the scale, complexity and numbers of the monuments themselves, and in terms of the wealth of material evidence that accompanies them. The Brú na Bóinne tombs, and in particular Knowth, contain the largest assemblage of megalithic art in Western Europe. While today these prehistoric monuments are nationally and internationally the most well known aspect of the WHS, we should not forget the central position the Brú na Bóinne area as a whole has occupied. From prehistory, to the arrival of Christianity and St. Patrick, and the power struggles of 17<sup>th</sup> century Europe, this landscape has come to reflect in microcosm many of the processes that have shaped society on the island and the wider world over the past millennia.

### **Background to inscription**

In December 1985, at the instigation of the Royal Irish Academy, a committee comprising representatives from Meath County Council, the Office of Public Works, Bord Fáilte, the National Museum and UCD recommended that an Archaeological Park be established at Brú na Bóinne, an initiative approved by the State in 1987. A specialist landscape and planning consultant, Anthony O'Neill, was commissioned to undertake a study of the planning issues involved, notably visitor facilities, access and interpretation (O'Neill 1989). A core area comprising land immediately within the bend of the river (approximately 780 hectares) and a buffer zone situated between the core area and the Mattock river to the north (an additional 700 hectares) had already been proposed by the committee. O'Neill recommended that a southern buffer zone be added to the boundary of the proposed Archaeological Park, extending to the ridgeline of an escarpment that overlooked the core area. The sun's alignment to Newgrange came over this ridgeline and the escarpment was an important visual landform when viewed from the core area. O'Neill also felt that the River Boyne was an integral part of Brú na Bóinne and should lie within a zone of development control and not on the edge of the park boundary. The total buffer zone was thus



extended to 2500 hectares, the boundary lines respecting carefully mapped views into and out of the core area. Sometimes these lines followed contours, watercourses or field boundaries, but mostly the modern routeways of the area were used, the line drawn some distance back from roads and junctions to discourage linear development. These boundaries of the Boyne Valley Archaeological Park, encompassing a total area of approximately 3300 hectares, were to become the boundaries of the future World Heritage Site (Map 2).

Ireland ratified the World Heritage Convention on the 16<sup>th</sup> September 1991, nominating the 'Archaeological ensemble of the Bend of the Boyne' for inscription on the World Heritage List a year later. Following an ICOMOS evaluation, the property was inscribed by the World Heritage Committee in December 1993. The 'Archaeological ensemble of the Bend of the Boyne' was judged to be of outstanding universal value, meeting three of the six criteria for cultural heritage ([i] represents a masterpiece of human creative genius; [iii] bears a unique or at least exceptional testimony to a cultural tradition or to a civilization which is living or which has disappeared; [iv] is an outstanding example of a type of building, architectural or technological ensemble or landscape which illustrates (a) significant stage(s) in human history). Specifically, the scale of passage tomb construction within the Bend of the Boyne, the important concentration of megalithic art, as well as the range of sites and the long continuity of activity were cited as reasons for the site's inscription.

### **Protection**

The Brú na Bóinne WHS is not covered by any statute specific to itself but the natural and cultural heritage situated within are legally protected through various statutes ranging from the National Monuments Acts 1930-2004 to the Wildlife (Amendment) Act 2000 and the Planning and Development (Amendment) Act 2002. The area in general is protected by statutory measures in the planning legislation and through the County Meath Development Plan 2007-2013. The Minister for Environment, Heritage and Local Government owns land around the main monument concentrations at Newgrange, Knowth and Dowth, together with some lands containing individual monuments and the Brú na Bóinne Visitor Centre complex. The house and grounds of the Oldbridge Estate are also owned as part of the Battle of the Boyne Site, developed as a north/south venture and opened formally in May 2008.

## History of research

On 14<sup>th</sup> August 1699, the lands of Newgrange were leased for ninety-nine years to Charles Campbell, a Williamite settler (see below). Campbell, it seems, immediately set about exploiting his new resources, as before the year was out workmen were quarrying stone from the side of a large grassy mound on his land. It was during this work that the carved entrance stone to a 'cave' was uncovered. Fortunately, the discovery was brought to the attention of the Welsh scholar and antiquary Edward Lhwyd who was touring Ireland at that time. He travelled to Newgrange and carefully recorded the structure and accounts of its discovery. His Irish fieldnotes were subsequently lost in a fire but letters from this period survive, as does the plan drawn up by his draughtsman, Will Jones – the first known plan of the tomb (FIG XX). Lhwyd came across a Roman coin during his survey work and astutely observed that *"the coin proving it ancients than any Invasion of the Ostmans or Danes, and the carving and rude sculpture, barbarous; it should follow, that it was some place of sacrifice or burial of the ancient Irish"* (Gunther 1945, 421-3). He also remarked upon a standing stone positioned on top of the mound; there is no trace of this feature today, although it was sketched by John Anstis (see below) shortly after Lhwyd's visit.

A contemporary of Lhwyd's, Sir Thomas Molyneux, visited the area a little later but published his observations more than a decade afterwards (Molyneux 1726). Molyneux considered the oldest human monuments to be products of the Danes and New Grange was, to him, a *Danes-Mount*. The recesses in the cruciform chamber, he writes, *"being three in number, shew they were dedicated to the deities of the three prime idols, religiously adored by all the nations of the north"* (Molyneux 1726). Molyneux was also the first to mention human remains, colourfully describing *"two dead bodies entire... in likelihood the reliques of a husband and his wife"* (1726, 204) lying on the tomb floor, along with a 'pyramidal shaped stone' which he believed had originally stood erect in the middle of the chamber. His measurements of the monument were relatively accurate, although there was no mention of Lhwyd's standing stone and like many early scholars he believed that the original mound extended right up to the Great Circle. Knowth and Dowth were considered to be the resting places of the extended family of those buried at Newgrange, perhaps *"a family monument for some great Danish prince, that chose to be interred near his country-dwelling, that might be hereabouts, as the word Grange seems to imply"* (Molyneux 1726).

Another early account of Newgrange is provided by John Antis, a younger contemporary of Lhwyd's, who travelled extensively in Britain and Ireland recording ancient monuments. His manuscript (BM Stowe 1024; FIG XX.X) includes a sketch of Newgrange, with a standing stone on its summit, as well as a number of nearby megalithic monuments, one of them possibly Site K or Site L (Ó Ríordáin and Daniel 1964, 78).

In 1769, the British colonial statesman Governor Thomas Pownall visited Newgrange in 1769, his experiences recounted in a letter read out to the Society of Antiquaries of London in 1770 and subsequently published (Pownall 1773). He held, among other things, that Newgrange represented the ruined remains of a once far greater structure and that its decorated orthostats had been brought from a more ancient structure, two ideas that remained popular right into the twentieth century. Despite these errors the visit produced the first accurate sections of the tomb as well as a description of ten of the kerbstones. Pownall also provided the first description of Dowth, a site he encountered on his way to Newgrange – *'a very large tumulus or barrow, under which (report says) there is a cove like that at New Grange. It is now improved into a garden mount, planted with trees; and on the top of it is a modern ornamental temple'* (1773, 239). This view of Dowth with its ornamental temple is captured approximately five years later by the French artist Gabriel Beranger, who notes it as an unopened sepulchral mound some 60ft in height (FIG XXX). Other Boyne monuments recorded by Pownall include *"a circle of unhewn stones set on end with the*

*remains of a Kistvaen forming the north side thereof...undoubtedly an erection of Druid superstition", which may have been Newgrange Site K, and "the vestigia of an oval camp which is certainly Danish", possibly one of the henges or similar earthworks (Pownall 1773).*

Throughout the eighteenth and nineteenth centuries many eminent antiquarians and travellers came to the area and documented the Boyne tombs (see Appendix III). However, a good deal of what they wrote was based on Lhwyd, Molyneux and Pownall. Moreover, none of the early visitors, with exception of Lhwyd, attributed the monuments to indigenous peoples. Colonel Charles Vallancey identified Newgrange as a Mithraic temple, *'works of the old Scotti, prior to the arrival of the Cymmerigh in Britain'* (1786). For Edward Ledwich (1790), Newgrange is constructed during Norse raids in the 9<sup>th</sup> century AD, the tomb built for a fallen principal commander. While Richard Colt Hoare does compare Newgrange to the earthen tumuli of Wessex, he attributes this *'singular temple'* to the *'Celtic or Belgic tribes who poured in upon us from the Continent of Gaul'* (1807).

### **'Puerile, and scarcely deserving of serious notice'**

In 1833 the antiquarian and artist George Petrie's article on Newgrange appeared in the Dublin Penny Journal. It was the first popular publication to stress the notion that the monument was built, not by Phoenicians, Egyptians or Danes, but by Irish people (Harvey 2005, 125). Petrie castigated earlier writers for their unwillingness to *'allow the ancient Irish the honour of erecting a work of such vast labour and grandeur'* (1833). During his time in the Historical and Place-Names department of the Irish Ordnance Survey, Petrie and his colleague John O'Donovan sought to re-establish the link between Newgrange and the myth and saga associated with Brú na Bóinne in the early Irish literature. As one of the field-officers for the Survey, O'Donovan was tasked with recording the placenames, legends and antiquities of the country and in several letters from the field to his supervisors in Dublin he speculates on whether the descriptions in early medieval texts of the royal cemetery of Brugh na Bóinne could be fitted to the Boyne tombs. In the end O'Donovan concluded that the ancient complex lay some distance upriver at Stackallen/Broadboyne and it was left to the antiquarian Sir William Wilde to correctly identify the location of Brugh na Bóinne, a term he popularised in his 1849 book *The beauties of the Boyne and its tributary, the Blackwater*. Drawing on the work of another contemporary, the artist William Wakeman (1848; see O'Kelly and O'Kelly 1983, 140), Wilde dedicates an entire chapter to the Boyne necropolis, or the 'Irish Memphis'. He identifies seventeen sepulchral mounds, estimates the weight, area and height of Newgrange and, in spite of Petrie's efforts, reiterates the comparisons between Newgrange and Mycenaean architecture. Wakeman and Wilde also provide the first detailed accounts of Knowth, the former producing a detailed illustration of the mound in 1848.

The mid-nineteenth century also saw exploration at Dowth, the first - and only - excavation campaign initiated by the Royal Irish Academy (Harbison 2007). Work began in 1847 under the direction of the engineer R. H. Frith. Two tombs were already known about (Wakeman 1848, 31-5) and accounts of finds of human and animal bone had been published up to a decade earlier (Lewis 1837, 496), the likely result of clearance by a local gentleman, William Wynne (Wilde 1849, 189). Frith thus concentrated on locating a central tomb, excavating a large horizontal cutting into the west side of the mound. His work only revealed the cruciform chamber of the larger tomb and its annexe, as well as the passage and chamber of an adjoining souterrain, while all of the finds related to the re-use of Dowth in the early medieval period. The venture was poorly subscribed to and investigations ceased after two seasons. The cutting moreover does not appear to have been backfilled and in the following decades its ruinous state was exploited by local tenants looking for a ready supply of stone (O'Kelly and O'Kelly 1983, 188-90).

At around the same time the entrance stone at Newgrange, which over a century and a half had disappeared beneath loose stone (Beranger FIG), was revealed once more (Wilde 1847, 733).

Renewed interest led to the discovery of features such as the closing stone (Wilkinson 1845, 53) and the decorated lintel of the roof-box (Wilde 1847), which was thought to mark the entrance to an additional chamber, and to speculation that the entrance stone was part of a buried kerb that delimited the original extent of the mound (Wilkinson 1845) - although subsequent writers continued to think that the original mound went as far as the Great Circle.

### **State care**

Growing public concern at damage to Newgrange, Knowth and Dowth led to the monuments being taken into State care under the provisions of the Ancient Monuments Protection Act 1882 and during the late nineteenth century repairs and conservation work was undertaken by the Board of Public Works. At Newgrange, orthostats and lintels were shored up with concrete and wooden beams and an iron gate at the entrance was probably also fitted at this time. The removal of earth from in front of the kerbstones including the large carved entrance stone created a bank and ditch effect that is still visible along parts of the monument. Repairs were also made to a drywall revetment on top of the kerb that seems to have been erected in the 1870s (O'Kelly 1982, 40). At Dowth, extensive conservation work included construction of a vertical shaft and iron ladder, supports in the northern tomb chamber and a concrete roof in the southern tomb.

At Brú na Bóinne the shift from the age of antiquarianism to one of modern archaeological practice was achieved in the work of George Coffey, Keeper of Irish Antiquities in the National Museum. He began his detailed study of Newgrange in 1890, publishing a number of papers (e.g. Coffey 1892-6) that culminated in his 1912 work *New Grange (Brugh na Bóinne) and other incised Tumuli in Ireland*. It was to become the standard monograph on the area for many decades after; the monuments of the wider Brú na Bóinne landscape were systematically listed for the first time and this labelling system, extended by Ó Ríordáin and Daniel in 1964 and by O'Kelly in 1982, remains in use today (FIG XX.X).

Modern excavations at Brú na Bóinne started in the 1920s, when the kerb at Newgrange was explored by R. A. S. Macalister and Robert Lloyd Praeger and Harold Leask. Beginning at the left of the entrance-stone, they worked clock-wise around the mound until they had exposed 54 stones (1935, 65; 1943, 149). Work on the remaining stones was suspended following an objection from the tenant farmer. Macalister suggested that these decorated stones might be grave markers, collected from the graves of an earlier people by the builders of the Newgrange. A cutting was opened beneath the exposed roof-box lintel, in an attempt to locate an additional chamber, but was subsequently backfilled. Also investigated at the time was the fallen orthostat (GC-10) from the Great Circle, an area revisited in the 1950s by Ó Ríordáin and Ó hEochaidhe (1956) who gained additional information on the sockets of the missing stones. In 1941 Macalister turned his attention to Knowth, focussing excavation on what he thought might be the entrance to the main tomb and on the kerbstones. He succeeded in uncovering half of the outer kerbstones of the main mound, a souterrain and what we now know to be the burial chamber of one of the satellite tombs (Macalister 1943).

### **The Bord Fáilte years**

Apart from the trial excavations mentioned above, research into and care of the monuments was neglected in the years following the Second World War. Bord Fáilte Éireann [Irish Tourist Board] had installed electric lighting in the Newgrange tomb in 1954 (Hartnett 1954, 181-2) and during this decade the numbers of visitors - still unsupervised - began to increase rapidly. Compounding this human wear-and-tear was the encroachment of scrub and farm animals. In the winter of 1961 a meeting of stakeholders convened by the Archaeological Officer for Bord Fáilte, P. J. Hartnett, recommended that an area of land surrounding Newgrange be acquired and put into State care. Approximately three hectares were subsequently purchased by Bord Fáilte and handed over to the Commissioners for Public Works. Prof. M. J. O'Kelly, present at the winter meeting, was

tasked to carry out exploratory excavations ahead of restoration work. In the summer of 1962, excavations began at Newgrange to the north of the entrance. In total, one third of mound was excavated and work was to continue until 1975. Prior to O'Kelly's campaign, very little was known about the monument; officially it was thought to be a Bronze Age monument of perhaps 1500 BC or later. Modern excavation provided the first reliable radiocarbon dates (c. 3200 BC) for its construction (see Appendix IV), as well as revealing the midwinter solstice alignment and the function of the roof-box.

In 1987 Bord Fáilte also funded a report on the Boyne Valley Archaeological Park (O'Neill 1989; see *Introduction*, above). While essentially a document on archaeological resource management, the report also represented one of the earliest attempts to define and explore the Brú na Bóinne landscape, containing important preliminary studies of landscape views and settings and of land use and ownership.

Excavation in 1982 and 1983 ahead of site management works at Newgrange (Sweetman 1985) revealed an extension of the arc of pits and postholes uncovered during O'Kelly's work around the southern perimeter of the tomb. Radiocarbon dates for these new features complemented earlier dates obtained by O'Kelly for his pits, confirming the existence of a large pit circle measuring nearly 70m in diameter dating to approximately the mid third millennium BC. Additional site management works in 1984 revealed another pit circle to the west of the passage tomb, smaller in size but of a similar date to the southern circle (Sweetman 1987). More recent work at Newgrange has involved the uncovering of additional kerbstones and the construction of a concrete shelf to shelter the stones from the worst effects of weathering (Lynch 1989; 1990a).

Whereas O'Kelly's Newgrange campaign arose out of site management and tourism issues, modern excavations at Knowth were more a product of curiosity-driven research. In the summer of 1960 and 1961, George Eogan and G. F. Mitchell had investigated a small passage tomb in Townleyhall townland at the northern edge of the current WHS (Eogan 1963). This tomb had a simple passage, very different to the plans revealed at Newgrange and Dowth. In order to examine further the typology and chronology of tomb types within the Boyne landscape, Eogan and Mitchell fixed to investigate additional smaller examples, some of which were located at Knowth. In the summer of 1962, Eogan began excavations, however, by the end of the third season it was apparent that Knowth was an extensive passage tomb complex and a comprehensive long-term project was planned. The next four decades were spent exploring the complex, Eogan discovering two passage tombs back to back under the main mound, nineteen smaller passage tombs as well as settlement evidence from nearly all periods of Irish prehistory and history (Eogan 1984; 1986; Eogan and Roche 1997; McCormick and Murray 2007; Byrne et al. 2008).

Little work has been carried out at Dowth since the disastrous 19th century explorations (see Harbison 2007), although the mound was comprehensively surveyed in the 1980s (O'Kelly and O'Kelly 1983). In 1989 a cutting was opened immediately west of the entrance shaft to the north tomb to facilitate the construction of a new entrance and steps (Lynch 1990b). Several stakeholes were revealed beneath a metre or more of slumped or redeposited cairn material and a possible displaced kerbstone was also uncovered.

Outside the area of the three mega-tombs, rescue excavation was undertaken in the spring of 1971 in Monknewtown in the northern buffer zone of the WHS on a henge threatened by agricultural development (Sweetman 1976). The interior of the monument contained a ring ditch, a Beaker structure associated with a large amount of pottery and flint, and as many as eleven cremation pits along the inner northern section of the enclosure (FIG XX). This monument remains the only one of its type excavated within the Boyne area. Additional research on the



three other examples within the WHS has indicated that the Boyne henges are characteristically constructed from material scarpred from the interior of the enclosure rather than from an enclosing ditch (Stout 1991; 2002, 34).

### **Recent research**

The excavation campaigns begun at Newgrange and Knowth in the 1960s were extra-ordinary in their extent and duration. Research undertaken in Brú na Bóinne since then has been on a decidedly smaller scale, reaching outwards into the landscape in an effort to examine the context of sites and the interconnectedness of the Brú na Bóinne area.

Over the last two decades the work of Geraldine and Matthew Stout has made an enormous contribution to our appreciation of the *longue durée* at Brú na Bóinne, culminating in the 2002 work *Newgrange and the Bend of the Boyne*. In addition to providing new perspectives on prehistoric monuments like Newgrange (Stout and Stout 2008a), and extensively researching the built and vernacular heritage of the WHS and the history of land ownership, they have also recently investigated the earthworks known collectively as Site M, revealing an extensive and long-lived burial ground that may tie in with the occupation of Knowth by the early medieval kings of Brega (Stout and Stout 2008b; see below).

Recent decades have also seen increased awareness of the wider astronomical significance of monuments within the WHS. Investigations to date have demonstrated a pivotal relationship between the entrance stone at Newgrange and the positioning of the stones of the Great Circle (Prendergast 1991a; 1991b), the standing stones throwing shadows on the entrance stone during such key times in the year as the winter and summer solstices and equinoxes. Other research in the WHS has reflected the growing interest in ploughzone archaeology and in mapping the extent of sub-surface 'off-site' remains (e.g. Brady 1996, 2002, 2007a, 2007b; Cooney et al. 2001). The development and refinement of additional remote sensing techniques such as magnetometry and electrical resistivity from the 1990s onwards has brought us closer still to quantifying the archaeological resource at Brú na Bóinne, although geophysical survey has yet to be systematically applied over the WHS. Targeted geophysical survey has taken place in the area of the possible cursus east of Newgrange and at a rectilinear enclosure at Rossnaree (see below), as well as in the context of site management works at the Brú na Bóinne and Battle of the Boyne visitor centres. The geophysical properties of lithic scatters identified through a recent large-scale fieldwalking programme are also currently being investigated (Conor Brady, pers. comm.). In 2007, one of the newer remote sensing technologies, LiDAR survey, was applied to the WHS landscape and the resulting bank of spatial data is already being used to map new sites and to build up models of landscape change (see Section 4, *Current Initiatives*).

Refinement of absolute dating techniques and the appearance of other techniques such as isotopic analysis have given new value to the material in older excavation archives, while dedicated publication programmes of institutions like the Royal Irish Academy are ensuring the results of four decades of excavation at Knowth are still steadily filtering through into the archaeological mainstream. Commercial excavation, while not tied into any specific research programme, is also furthering understanding of the WHS. Important evidence for Bronze Age funerary activity has been uncovered along the route of the Oldbridge-Sheephouse Bypass (Matthew Seaver, pers. comm.) and in nearby Stalleen ahead of the construction of a private dwelling (Kieran Campbell, pers. comm.). In 2008, extensive medieval remains including a stone gatehouse were also revealed in Stalleen (Mandy Stephens, pers. comm.). Immediately to the east of the WHS, the considerable body of data recovered from excavations along the M1 Drogheda Bypass, though largely unpublished, is already beginning to shed new light on past communities of the Brú na Bóinne area (e.g. Smyth 2007).

## Section 2 - Resource Assessment

Brú na Bóinne is internationally renowned for the Neolithic passage tombs of Newgrange, Knowth and Dowth, which contain the largest collection of megalithic art in Europe. However, the area has been an important ritual and social centre for thousands of years. The following section details the body of knowledge that has built up over the last 300 years on Brú na Bóinne and its successive communities.

### **Mesolithic**

Worked flint characteristic of the later Mesolithic was found during excavation of the Late Neolithic/Beaker levels at Newgrange (O'Kelly *et al.* 1983). The assemblage included Bann flakes, pointed and rounded flakes and backed forms (Lehane 1983, 142-46), although all of the material appears to have been found in secondary contexts (Brady 2007a, 118). A pilot fieldwalking study aimed at assessing the potential of ploughzone archaeology in the Boyne Valley area (Cooney and Brady 1998) recovered a number of butt-trimmed flakes from fields in Tullyallen townland, immediately outside the northern buffer zone of the WHS, which hints at some form of later Mesolithic activity in the area. However, a more intensive programme of fieldwalking across more than 600 hectares within the WHS produced only one possible later Mesolithic artefact: the heavily patinated distal end of a possible broad flake (Brady 2007a, 243). Further downriver, at Money more (just outside Drogheda), evidence of a Mesolithic platform was recovered from a pollen core (Weir 1996). In the opposite direction, along the route of the proposed M3 motorway, microliths have been recovered at Blundelstown and Castletown Tara (Eoin Grogan, pers. comm.), and stunning late Mesolithic fish baskets revealed at Clowanstown (Fitzgerald 2007a, 2007b).

### **Neolithic**

#### **Early Neolithic**

Fieldwalking, both non-systematic and systematic, within the WHS and the wider Boyne Valley has indicated that there are significant quantities of prehistoric lithic material in the ploughzone (O'Kelly 1968; Cooney and Brady 1998; Brady 1996, 2007a, 2007b). For the most part, undiagnostic lithics with a broad Neolithic to Bronze Age date range have been recovered. However, some of this lithic resource can be assigned more specifically to pre-passage tomb or early Neolithic activity. According to Eogan (2007b, 134), a programme of fieldwalking carried out by Frank Mitchell produced possible early Neolithic flint artefacts, some of which occurred in distinct concentrations. Recent fieldwalking south of the river Boyne has also produced a small number of early Neolithic diagnostics (Brady 2007a, 244-5). North of the Boyne, at Newgrange, early Neolithic pottery was found underneath the mound of Site L along with a number of pits, areas of burning and a charcoal-flecked habitation layer (O'Kelly *et al.* 1978). Nearby at Site Z, a small cobbled surface, several stakeholes and burnt flint and animal bone lay beneath the passage tomb. The most substantial evidence of early Neolithic activity within the WHS was uncovered during excavations at Knowth (Eogan 1984; Eogan and Roche 1997; Eogan and Roche 1998). Two discrete areas of occupation were identified running under the main mound, one concentration in the north-eastern area of the hilltop and another in the west. In the northeast, foundation trenches and postholes were interpreted as the remains of up to three rectangular houses. The area to the west of the main mound yielded evidence for at least two structures, along with pits, hearths and areas of paving. Two curved lines of palisade, possibly extending along the ridge to the west, may represent the remains of a hilltop enclosure. <sup>14</sup>C dates were obtained for the early Neolithic activity in Zones A and B at Knowth (see Appendix IV). The western area produced Carinated Bowl pottery with pronounced rims - generally accepted as a later development of the simple, undecorated bowls - and may have been occupied later (Brady 2007a, 119).

Apart from the remains at Knowth, evidence for early Neolithic settlement within the Brú na Bóinne WHS remains slight. Geophysical survey is being targeted at a number of lithic scatters identified south of the Boyne (see *Current Initiatives* below), some of which may be early Neolithic in date. However most of our information on early fourth millennium BC settlement has come from large-scale commercial and infrastructural projects outside the WHS, such as the M1 Northern Motorway Drogheda Bypass to the east and the Dundalk Western Bypass to the north. The material uncovered so far hints at various levels of settlement activity. Small shallow pits containing varying amounts of Carinated Bowl pottery, flint and burnt material have been found for example at Balgatheran, Mell and Oldbridge (Campbell 2002a, 2002b, 2002c). These pits may be the last visible remnants of temporary, shifting settlements (e.g. Pollard 2001, 316), or may represent more abstract and isolated acts of deposition in the landscape. Given that most of these features have been uncovered along relatively narrow road takes or pipeline corridors, we currently do not know how separate or isolated this activity really is. Rectangular timber houses have been uncovered in a number of locations outside the WHS: along the Boyne, at Coolfore, Lagavoreen and Cruicerath (Ó Drisceoil 2003, 2004; Moore 2003; Ellen O'Carroll, pers. comm.), along the River Dee at Richardstown and Newtown (Byrnes 1999, 2000; Halpin 1995), and in north Louth along the Castletown river, at Plaster and Aghnaskeagh (John Turrell, pers. comm.; NRA 2006). It has been argued that these types of buildings have a limited date range, approximately 3800 – 3600 cal BC (McSparron 2003, 2008; Smyth 2006), and as such must represent only part of the wider settlement picture of the early fourth millennium BC. Also of note is the apparent absence of early Neolithic megalithic architecture in the area (e.g. Eogan 2007b; see also Sheridan 2006). It may be that 'domestic' and 'ritual' activity occupied very separate physical and social spaces in the early Neolithic, although the recent discovery of houses at Plaster and Aghnaskeagh close to the early tombs at Aghnaskeagh (NRA 2006), and another house at Kilgobbin (Ines Hagen, pers. comm.) beside the Dublin/Wicklow court and portal tombs, would suggest that funerary and domestic activity and various group and individual/family tasks were not necessarily undertaken in isolation from one another.

### **Middle Neolithic**

Modern investigation of the Brú na Bóinne megalithic monuments began in 1960 with the excavation of a small passage tomb at Townleyhall, at the very edge of the current WHS (Eogan 1963). Excavation campaigns at Newgrange and Knowth followed and have dated the phase of passage tomb construction at Brú na Bóinne to the middle Neolithic. Twenty smaller passage tombs were uncovered at Knowth, some of which were found to pre-date the main central mound. Within Tomb 1 two passages had been laid out back-to-back along an east-west axis, the eastern passage terminating in a corbelled cruciform chamber (Eogan 1986). Evidence is also emerging of at least three different versions or phases of Tomb 1 (Kerri Cleary, pers. comm.). Single, multiple and successive human cremations had been placed in the Knowth tombs, along with a number of bone pins, beads and pendants and pottery. Newgrange was excavated between 1962 and 1975 by M. J. O'Kelly (O'Kelly 1982), the sod and stone mound covering a 19m long passage of orthostats terminating in a corbelled cruciform chamber. Material recovered included the cremated bone of four or five individuals, possibly originally placed in stone basins, and a number of stone beads, bone pins and stone balls. The excavation campaign also re-discovered the roofbox feature above the tomb entrance, which allowed the rays of the rising sun on the winter solstice to illuminate the passage and chamber (Patrick 1974; see below). A spread of quartz and granite found outside the tomb entrance was interpreted as a collapsed façade and was subsequently, and controversially, re-constructed (see Cooney 2006; Stout and Stout 2008a). Behind kerbstone K52 O'Kelly also found evidence for an earlier turf mound, which was again noted in excavations in the 1980s, and may have measured 35m in diameter (Stout and Stout 2008a, 13). To the east and west of Newgrange are three smaller, 'satellite' passage tombs (Sites

Z, K and L) that were excavated at the same time as the main mound (O'Kelly *et al.* 1978). Together they form a linear arrangement of monuments running along the ridge. Dowth, the third major passage tomb at Brú na Bóinne, has not seen major scientific excavation apart from a minor trial cutting in 1989, which was opened immediately west of the entrance shaft to the north tomb to facilitate the construction of a new entrance and steps (Lynch 1990b). Survey work (*e.g.* O'Kelly and O'Kelly 1983) has indicated that the mound covers at least two tombs, both on the western side. More tombs may lie undiscovered; Bergh (1995, 126) has noted that the north-eastern portion of the kerb is slightly flattened, similar to the entrances at Newgrange and Knowth.

Based on the current understanding of the stratigraphy of the Boyne tombs, four main phases of tomb construction have been suggested (Sheridan 1985/86; Cooney 2000, 153-8). Closely-spaced clusters of small mounds less than 15m in diameter seem to have appeared first, followed by more widely distributed mounds of larger size. The construction of the three 'mega' mounds took place after this, with the later addition of mounds at Newgrange and Knowth.

A large proportion of the materials used in the construction and decoration of the passage tombs at Knowth, Dowth and Newgrange was not extracted from the local Carboniferous bedrock. Most of the kerbstones and orthostats are of Lower Palaeozoic greywacke and a recent programme of visual identification, petrographic and geochemical analysis has revealed that the orthostats and kerbstones were most likely obtained from the coast close to Clogherhead, 16km northeast of the tombs (Philips *et al.* 2001; 2002). Additional geochemical analysis has indicated that the granite cobbles and possibly the quartz deposits found around the entrance at Newgrange were deliberately selected from sources in the Cooley peninsula and the Wicklow Mountains, approximately 50km and 75km to the north and south respectively (Mitchell 1992; Meighan *et al.* 2002; Meighan *et al.* 2003). Both of these investigations provide striking evidence in the middle Neolithic for the connections between relatively distant places (and for the desire to reference these connections). Cooney (2004, 200) has recently commented on the links in the middle Neolithic between Lambay Island and Knowth, both places producing the only examples of cushion maceheads from a secure Irish context. Additional links with the wider world, in this case the heavens, were also attested through O'Kelly's observational rediscovery of the winter solstice alignment of the main Newgrange mound, which initiated the first modern scientific archaeoastronomical investigation of an Irish archaeological monument.

All three 'mega'-tombs, and some of the smaller Knowth tombs, were incised with motifs before, during and probably after their construction, most of which have been studied in detail over the decades (*e.g.* Eogan 1996; 1997; O'Kelly 1982; O'Sullivan 1995; Shee Twohig 1981, 2000). The main mound at Knowth contains the greatest concentration of megalithic art from Brú na Bóinne - indeed, from all of western Europe - and a detailed volume dedicated solely to this assemblage is forthcoming.

A number of other monuments within the WHS may also date to the middle Neolithic, among them a long mound (Site G) at Dowth (Brady 2007a, 124) and possibly the enclosure at Monkenstown (Brady 2007a, 136; Eogan and Roche 2001). At the latter site, the position of a Carrowkeel Bowl cremation in relation to the line of the bank suggests that the bank was constructed before the burial was deposited. A middle Neolithic date for an early phase of use of this site is supported by the recent identification of more than twenty Broad Rimmed bowls from contexts partly sealed by material from the construction of an embanked enclosure at Balregan, on the Dundalk Bypass (Grogan and Roche 2005; Eoin Grogan, pers. comm.). The possible cursus monument located approximately 100m east of Newgrange has traditionally been assigned to the late Neolithic (*e.g.* Condit 1997b, 26-7; Stout 1997a, 9; 1997b, 301-3; 2002, 33), although evidence



emerging from Britain places the main phase of construction of major earthwork cursuses in the mid to late fourth millennium BC (Barclay and Bayliss 2009).

While analysis carried out on turves used in the Newgrange mound revealed levels of phosphate indicative of human activity (Gardiner and Walsh 1966), and attempts have been made to calculate the carrying capacity and resulting population density of the Boyne Valley in the Neolithic (Cooney 1991; Mitchell 1986, 114), evidence for the society that erected the Boyne tombs has remained elusive. On those few sites that do yield middle Neolithic structural evidence, there is often a lack of clearly defined building forms. At Townleyhall 1 and Townleyhall 2, the clusters of stakeholes uncovered lacked a coherent pattern and could only be interpreted as the remains of a series of temporary, perhaps light, structures erected on the same spot over a period of time (Eogan 1963; Liversage 1960; although see Leon 2005, 17). At Knowth, a dark habitation layer overlay the early Neolithic remains and was partially covered by the main passage tomb. This layer contained a number of hearths and several concentrations of stakeholes associated with sherds of decorated globular bowls. Some of the stakeholes formed arcs that were interpreted as the partial remains of circular houses and at least ten middle Neolithic dwellings were identified in this way. Many more stakeholes from across the area could not be tied into any logical plan but were thought to represent successive phases of house-building (Eogan and Roche 1997, 65). At Newgrange, a concentration of postholes in the Grooved Ware/Beaker area of activity was interpreted as two buildings, 7m and 3m in diameter, and tentatively assigned to the middle Neolithic on the basis of their resemblance to the Knowth structures (Eogan and Roche 1997, 90). Recent discoveries along the Dundalk Bypass to the north, *e.g.* at Donaghmore and Littlemill (Ó Donnchadha 2002; Ryan and Bailey 2006a; 2006b), do seem to indicate that these scatters of stakeholes, occupation layers and hearths from the WHS are common signatures of middle Neolithic settlement activity, although at Newgrange an oval structure defined by a wall trench and postholes was found beneath the Beaker horizon to the west of the main tomb entrance (O'Kelly 1982: 76-7) and in the excavator's opinion was probably contemporary with, or a little later than, the primary use of the tomb.

Despite nearly a half-century of research targeting the early prehistory of Brú na Bóinne, attempts to reconstruct the landscape in which the tomb builders and their predecessors lived have had limited success. Poor preservation of organic remains in this, one of the driest parts of Ireland, has been an undoubted hindrance, while much of the initial analysis of the palaeoenvironmental record was undertaken when sampling strategies and dating techniques were at an early stage of refinement. At Knowth, a number of soil samples were taken from possible natural sod layers beneath the tombs, from mound material itself, and from the Beaker habitation layers. Fifteen of these samples were examined for pollen and seed remains and the results published in the first Knowth monograph (Groenman-van-Waateringe 1984). While much of the pollen was corroded, and pollen analysis of the Beaker layers gave no results whatsoever, a large variety of herb-type pollen was identified indicating a largely open local landscape at the time of tomb construction. Patches of oak and elm forest may have remained on higher ground but real forest vegetation was thought to have been limited to the river valley (Groenman-van-Waateringe 1984, 328). Apart from a small number of cereal seeds, which complemented the traces of cereal pollen identified, results of seed analysis (on the same fifteen soil samples) were deemed "too meagre" to give any detailed picture of vegetation in the area (*ibid.*).

At Newgrange, pollen and seed analysis was undertaken on soils from the old turf layer and mound. However, owing to corrosion only seven of the "many" pollen samples prepared were suitable for analysis and were subsequently published (Groenman-van-Waateringe and Pals 1982, 219). Relatively high levels of cereal pollen indicated that crops were being grown close to the place where the turves were cut (*ibid.*, 222). Wet-sieving (2mm – 0.2mm) appears to have produced results from only a single seed sample. The species recovered were indicative of damp



pasture, complementing the pollen record and leaving “little doubt that the turves used as building material were cut in the river valley” (*ibid.*, 223). Seed analysis carried out on an additional small moss sample from turves in the north cutting of the mound broadly supported the above interpretation (Monk 1982). Analysis of land molluscs sampled from the mound material was also generally inconclusive (van der Spoel 1982; Mason and Evans 1982), with most species favouring the shelter, shade and moisture that can be provided by cairn material as well as a wooded environment.

Approximately 4km south of Newgrange, at Thomastown Bog, a number of corings were taken as part of a project to assess the palaeoenvironmental potential of the Brú na Bóinne area (Weir 1996). Nearly seven metres of an 8.3m deep coring were prepared, sampled at 4cm intervals, and while not dated appeared to span over six thousand years of activity. Neolithic levels appeared to show discrete and intensive episodes of woodland clearance with a phase of forest regeneration possible contemporary with the passage tombs. Signs of clearance and human activity gradually increased through the profile, although later activity did not appear to be much more intense than that in early prehistory. Additional pollen cores taken from sites between 15km and 30km from Brú na Bóinne (Brooks and Farrell 2005; Mitchell 1942; Stewart 1996; Weir 1995) are of limited value. Sampling should ideally be undertaken no more than 1-2 km from the areas of interest, and preferably even less, if it is to provide any meaningful picture of the local landscape (Nicki Whitehouse, pers. comm.).

Plant macrofossil analysis was also carried out on soil samples from the 1989-1992 seasons at Knowth. Two litre subsamples from the 1989/1990 material and all of the 1991 and 1992 samples were processed (through 2mm down to 0.3mm sieves), the latter including samples as large as 34kg (Collins 1997, 299). Early Neolithic, ‘Decorated Pottery’, Grooved Ware and Beaker contexts all produced cereal remains although the very small amounts recovered were generally poorly preserved and indeterminate to species with no evidence of chaff or cereal weeds in any of the samples processed. Hazelnut shell, blackberry and elderberry seeds were also identified.

The small amount of faunal remains from early-middle Neolithic Knowth came from a variety of contexts and is of limited statistical use. An assortment of faunal remains including dog, rabbit, ovicaprid, bird and amphibian bone was recovered from the tomb chamber and passage at Newgrange (van Wijngaarden-Bakker 1982). Mostly unweathered and in good condition the assemblage was not considered to be prehistoric in origin although the material was not independently dated. Attempts have also been made to reconstruct the former land use patterns around the Boyne Valley tombs based on drainage and aspect (Cooney 1991, 2000). It has been argued that this mixed-use landscape would have required some form of enclosure, perhaps in the form of field hedges. A scenario of crop and livestock management is certainly not contradicted by the blackberry and crab apple seeds identified in environmental samples (Collins 1997; Monk 1982; Groenman-van-Waateringe 1978, 138-40; 1981, 288) and the small amounts of cattle and pig bone recovered from Knowth (McCormick 1997, 301).

### **Late Neolithic**

There is significant evidence for continuity over the centuries spanning the Late Neolithic/Early Bronze Age transition. Current research is indicating that this is an island-wide phenomenon and not just limited to Brú na Bóinne (Neil Carlin and Jo Brück, pers. comm.). Many of the same places acted as foci for activity; Grooved Ware and Beaker ceramics were both employed in similar forms of depositional practice, and pit and post circles appear to have been constructed and used throughout this period. At Newgrange, a large pit and post circle was erected immediately southeast of the tomb entrance (O’Kelly 1982; O’Kelly *et al.* 1983; Sweetman 1985). Deposits of burnt material including cremated animal bone had been placed in the pits/postholes. Approximately 50m to the west of the mound a smaller 20m pit and post circle

was uncovered (Sweetman 1987). Small amounts of Beaker pottery were recovered from both sites. The two structures produced very similar radiocarbon dates (see Appendix IV), although the presence of Grooved Ware sherds on the former site (Sweetman 1985, 209; Roche 1995, 57) and their absence on the latter may indicate that one predates the other (Roche and Eogan 2001, 133). Magnetic gradiometry and susceptibility surveys carried out in 1999 and 2000 in the field immediately to the east of Newgrange, have revealed what appears to be the full extent of the larger Newgrange circle as well as a number of distinct elements composed of regularly spaced, double and single rows of pits (McCarthy 2002; Kevin Barton, pers. comm.). At Knowth, a timber circle was erected twelve metres from the entrance to the eastern tomb. It comprised a square, four post setting enclosed by a ring of 33 posts with an entrance defined by a 'porch' of four large posts. Structured deposits of Grooved Ware, lithics and other material had been placed in the post-pits (Eogan and Roche 1997; Roche and Eogan 2001). Evidence emerging from across Ireland (e.g. Ballynahatty, Co. Antrim [Hartwell 1998]; Balgatheran, Co. Louth [Ó Drisceoil 2003]; Bettystown, Co. Meath [J. Eogan 2000]; Whitewell, Co. Westmeath [Grogan *et al.* 2007]), from the Orkney Islands [Richards 2003] and most recently from Durrington Walls in southern England (Parker Pearson 2007) suggests that this four-post or square setting within a larger circle is a very widespread and deeply embedded element of Grooved Ware architecture. We cannot as yet tell if similar activities took place in the immediate vicinity of Dowth, although a large earthen henge was constructed on the eastern edge of the Dowth ridge approximately 1km from the passage tomb. The Dowth henge (Site Q) is one of four earthen embanked enclosures identified within the WHS (Stout 1991). Site A is located on a river terrace below Newgrange: originally c.175m in diameter, the surviving section of bank was levelled in the 1960s (O'Kelly 1968). Resistivity survey revealed a linear feature inside the western portion of the monument (Stout 1991). Site P is located 370m to the southwest of Site A, at a steep point on the northern river bank, while Monknewtown henge lies south of the River Mattock, in the northern WHS buffer zone. Monknewtown was partially excavated in 1971 ahead of agricultural development (Sweetman 1976) and produced Beaker habitation evidence and a number of cremations possibly dating to the Late Bronze Age (Roche and Eogan 2001, 135; although see above). It has been noted, e.g. Stout 2002, 35, that many of these 3<sup>rd</sup> millennium enclosures reference earlier monuments. Passage tombs Z and Z<sub>1</sub>, for example, would have been enclosed within the larger Newgrange pit circle, while Site A encloses another possible passage tomb. There are also hints of a more direct engagement with the earlier tombs: two Grooved Ware burials were found to have been placed into two of the smaller Knowth passage tombs, and the flint macehead from the main mound is considered a later Neolithic deposit (Eogan and Richardson 1982, 123-38; Eogan and Roche 1997, 220).

Excavation of the main mound at Newgrange uncovered a number of features relating to mid to late 3<sup>rd</sup> millennium BC settlement. A series of hearths, some stone-lined, and associated living floors were revealed, although very few structural remains were recorded. Large quantities of Beaker pottery (Cleary 1983) were found in the same layers as Grooved Ware sherds, and indeed some middle Neolithic pottery, and there was a temporally-mixed lithic assemblage of over 11,000 pieces. The exact sequence of occupation is difficult to determine but it is clear that the area in front of the tomb entrance remained a focus of activity through the late Neolithic/early Bronze Age (O'Kelly *et al.* 1983; Cooney and Grogan 1994, 79-81; Cooney 2006). At Knowth, five separate occupation spreads associated with over 3000 sherds of Beaker pottery and nearly 1500 lithics were identified (Eogan and Roche 1997, 223-60). A number of hearths, shallow pits and postholes were also excavated. This Beaker habitation phase was shown to overlie/postdate the Knowth timber circle. Probably contemporary is the cremated remains of an adult and child that were found with a Beaker vessel in the passage of one of the smaller Knowth tombs (Tomb 15; Eogan 1976, 262-64). Other apparent late 3<sup>rd</sup> millennium BC settlement evidence includes the Beaker structure and associated material from inside the Monknewtown enclosure (Sweetman 1976).

The large faunal assemblage from the area of the Beaker settlement at Newgrange, if from a single chronological horizon, offers a very rare glimpse of livestock economy and management in prehistoric Ireland. The 12,000 fragments of animal bone analysed (van Wijngaarden-Bakker 1974; 1986) point to a meat economy dominated by domesticated species, with pig representing over 60% of the animals slaughtered. There was a very low incidence of sheep, which suggested that wool was not being actively farmed, and the assemblage also produced the earliest (although not directly dated) evidence for domesticated horse in Ireland (McCormick 2005; McCormick 2007). A change in land use and agricultural practice in the Beaker period has been suggested (van Wijngaarden-Bakker 1986, 101) – a subsistence strategy now based on mixed farming, with an emphasis primarily on the breeding of cattle and pigs rather than crop husbandry. The latter was badly impacted by the large-scale turf stripping needed for the three main passage tombs, although Cooney (1991, 134) has argued that desodding was by no means a catastrophic process and may in fact have aided the conversion of mature grassland to cultivated fields. Seed analysis from Beaker levels at Newgrange and Knowth (Caspari 1983; Groenman-van Waateringe 1984) shows no appreciable change in vegetation composition, the seed taxa fitting in with a general picture of arable and/or pastoral land. A rise in the importance of pig in the late 3<sup>rd</sup> millennium has been noted in Britain, at ceremonial enclosures such as Durrington Walls and Mount Pleasant (*e.g.* Albarella and Serjeantson 2002). It may be that pig was the preferred species for ritual feasting (*e.g.* Mount 1992, 1994) and in this respect the fact that all of the pig bone recovered was cremated is significant.

In the wider WHS, recent systematic fieldwalking (Brady 2007a, 2007b) has produced a large quantity of late Neolithic/early Bronze Age lithics, both north and south of the Boyne. Moreover, results from commercial archaeological projects undertaken mainly outside the WHS strongly suggest that the area was well populated in the 3<sup>rd</sup> millennium BC. Grooved Ware sherds have been found associated with pits and stakeholes at Rathmullan and Hill of Rath (Bolger 2003; Duffy 2002), while Grooved Ware structures similar to that uncovered at Knowth have been excavated a few kilometres north of the WHS at Balgatheran, Co. Louth (Ó Drisceoil 2003) and at Slieve Breagh, Co. Meath, c. 12km to the northwest (Grogan 2002, 524; 2004, 111). Beaker material has been discovered at Hill of Rath and Mell, the latter producing a Beaker inhumation (McQuade 2005), and at a number of sites in Rathmullan townland (Nelis 2003; Bolger 2002; 2003). At the eastern edge of the WHS, excavation ahead of a proposed drainage scheme and new road bypass at Oldbridge/Sheephouse revealed a midden containing Beaker pottery and Food Vessels (Matt Seaver, pers. comm.).

### **Bronze Age**

In apparent contrast to the wealth of evidence for Grooved Ware and Beaker activity, there is relatively low visibility of early Bronze Age material within Brú na Bóinne. A Killaha phase bronze flat axe and a number of objects that may have been used by a metal-worker (hammerstones, a polishing stone and a possible anvil) were recovered from the Beaker settlement at Newgrange (O'Kelly *et al.* 1983: 16; O'Kelly and Shell 1978). However, early Bronze Age diagnostics are almost totally absent from fieldwalking assemblages within the WHS (Brady 2007a, 297). In the 19<sup>th</sup> century, two cist burials were uncovered in the grounds of Oldbridge House, in the east of the WHS (Coffey 1895; Haddon 1897). The first was a segmented cist described as being in a mound and contained a Food Vessel in its northern chamber. Another compartment contained a jet disc and fusiform bead necklace. The second, a short cist, contained an inhumation with a Food Vessel. A cist burial containing cremated bone and a Food Vessel has also been recorded in Monknewtown townland (Waddell 1970, 122), while Molyneux (1726) mentions a stone urn found with burnt bones in a cist in a mound at Knowth (FIG of urn NMI?).

Fulachta fiadh, extremely common in the archaeological record of the Bronze Age, have so far been found in only one location within the WHS. A group of three were uncovered during monitoring of a quarry extension in Sheephouse townland (Campbell 1995) in a natural basin above the south bank of the Boyne.

It has been asserted that one of the stones in the Great Circle around Newgrange overlay a pit from the southeastern timber circle (Sweetman 1985, 208; Stout and Stout 2008a), and post-dates it, although the exact sequence of activity is far from clear (see O’Kelly 1982: 79-84; Sweetman 1985; Bradley 1998; Cooney 2006). While many stone circles seem to be relatively late developments in Irish and British prehistory, the circle at Newgrange still made direct reference to the design/alignment of the earlier tomb, the standing stones casting shadows on the entrance stone at solstices and equinoxes (Prendergast 1991a, 1991b). Two additional standing stones, Site C and Site D, are located to the southeast of the main mound at Newgrange, at the break in slope of the lowest river terrace and sky-lined for traffic moving west along the river. Excavation of Site C in 1965 did not yield any conclusive dating evidence (Shee and Evans 1965) and Cooney (1996, 29-30) has suggested that these stones are Neolithic in date as they have the same petrology as the tomb orthostats. Moreover, they are positioned at what appears to be a natural landing stage on the river, possibly used by tomb builders transporting greywacke from the coast.

Recent development in Oldbridge and Sheephouse townlands has uncovered what appears to be a concentration of middle/late Bronze Age funerary monuments at the eastern end of the river bend. On the Oldbridge estate, work on the Battle of the Boyne site has brought to light a series of ring ditches, some revealed in geophysical survey, others visible in aerial photographs of fields on the terrace to the south of Oldbridge House (Cooney *et al.* 2001). Excavation along the route of the nearby Oldbridge/Sheephouse Bypass (see above) revealed a number of features dating to the Bronze Age, including part of a double ring ditch and associated ditches (O’Connor 2007; Matt Seaver, pers. comm.). On the northern river terrace immediately opposite these sites, a further three barrows were excavated during construction of the M1 Drogheda Bypass (Chapple 2002, 2003; Campbell 2002d). Similar monuments identified within the WHS include a small ring ditch containing three urn cremations excavated at Stalleen, across the river from Dowth (Campbell 2007); anomalies interpreted as ring ditches revealed during geophysical survey work at Newgrange in the early 1990s (Noel and Hale 1993); and possible ring ditches at Rossnaree visible as cropmarks in aerial photographs (Conor Brady, pers. comm.). A ring ditch was also excavated inside the henge at Monkenewtown (Sweetman 1976). The burial within the ring ditch was accompanied by pottery now thought to be late Bronze Age in date (Roche and Eogan 2001, 135) and it has been suggested that eleven of the remaining twelve burials uncovered within the henge date to the same period (*ibid.*). A short distance to the southwest is another possible late Bronze Age site, a water-filled enclosure that has drawn comparisons with the late Bronze Age King’s Stables ritual pond near Eamhain Macha, Armagh (Condit 1997a).

A few kilometres east of the WHS, substantial evidence for Bronze Age settlement and funerary activity has been uncovered. A residential development in Tullyallen townland revealed an extensive spread of Bronze Age structural and ditch features with associated pits, as well as two urn cremations (Murphy 2002; Stephen Linnane, pers. comm.). Most settlement evidence however has surfaced along the route of the Drogheda Bypass, at Kilsharvan, Lisdoranan and Rathmullan, with substantial enclosures excavated at Lagavooren and Sheephouse (Niall Roycroft, pers. comm.). Excavations on a rock promontory known as Platin Fort, also on route of the Drogheda Bypass, recovered a miniature Bronze Age flat axe, lignite bracelets and middle-late Bronze Age pottery (Seaver 2001; 2002; Conway 2003a; 2003b). These relatively large clusters of settlement activity are matched in some cases by equally large-scale funerary and ceremonial activity, *e.g.* the urnfield site at Hill of Rath (PRIA 1840-5: 259-61; Duffy 2002).



## Iron Age

As yet, nothing of early Iron Age date has been uncovered within the WHS, although it remains possible that some of the ring ditches identified at Oldbridge and Newgrange (see above) may have been constructed in the late 1<sup>st</sup> millennium BC. Excavations at Knowth revealed thirty-five inhumations around the base of Tomb 1 (Eogan 1968, 365-73; 1974, 68-87), four aligned east-west in cists and the remainder in pits. Material sampled from the burials yielded up to six Iron Age dates as well as a number of later determinations (see Appendix IV). Grave goods, mainly items of personal adornment, were found with eleven of the burials and most of the inhumations were female, although there was a notable double burial of adult males, both decapitated and laid head to toe and accompanied by gaming paraphernalia (Eogan 1977; 1990; 1991; Raftery 1997). A small number of Roman pottery sherds and toilet implements have also been recovered from Knowth (Bateson 1973, 80).

A small Iron Age burial mound also lies on the river terrace at Rossnaree, northeast of Rossnaree House. This site, reputed to be the resting place of High King Cormac Mac Airt, was disturbed during WWII for the construction of a 'pillbox' (gun shelter). The remains of a woman and an infant, the former wearing a silver finger ring, were recorded at the time. Recent re-examination of the remains has identified an additional two adult females and the main burial has been radiocarbon dated to AD 250-540 (Maevé Sikora, pers. comm.).

Through the centuries, Late Iron Age/Roman coins and ornaments have regularly been found in the vicinity of the Newgrange mound, in particular around the entrance (Carson and O'Kelly 1977). Coins had already been recovered in Edward Lhwyd's time (Ó Riordáin and Daniel 1964, 32; Molyneux 1726, 206), while a series of discoveries were made in the 19<sup>th</sup> century including the unearthing of the Conyngham hoard of gold jewellery in 1842 (Conyngham 1844; Wilde 1847, 740). Additional coins and gold objects were uncovered during O'Kelly's excavations in the 1960s and 1970s. Most of these objects have been interpreted as votive offerings made by travellers, tourists or pilgrims in the early centuries AD (Topp 1956; Carson and O'Kelly 1977; Stout 2002), with many individuals apparently able to deposit items of high value. The Boyne Valley (Bouvinda) is recorded by Claudius Ptolemaeus in his 2<sup>nd</sup> century AD survey of the known world and Newgrange may well have served as a cult site for late Iron Age/Roman populations (Raghnall Ó Floinn, pers. comm.). In this regard it may be significant that Newgrange is the only one of the three large passage tombs not re-used for settlement-related activity in the early historic period. Outside the WHS, excavation along the M1 Drogheda Bypass at Claristown has revealed the remains of an Iron Age roundhouse, built around 50BC to 50AD, as well as a late Iron Age inhumation (c. 4<sup>th</sup> century AD) and possible ring cairn (Niall Roycroft, pers. comm.).

Very little is known about economy and land use in the Iron Age. An early and possible pre-Christian reference in the *Annals of the Four Masters* (AFM 5160) describes the seasonality of fishing and gathering on the Boyne (Stout 2002, 63), while a beehive quern found on an exposed river bed at Newgrange, near the north bank of the Boyne (Kelly 1984), provides some indication of arable farming close to the Boyne in the early centuries AD (Stout 2002, 63).

## Early Christian period

Early medieval texts such as the Brehon Laws and the *Annals of the Four Masters* and the *Annals of Ulster* (the last two compiled in the late medieval period but incorporating earlier records) have provided scholars with important information on the political landscape of the Boyne area in the mid to late 1<sup>st</sup> millennium AD. The lower Boyne valley was part of the kingdom of Brega in the Early Christian period and from the late sixth/early seventh century AD ruled by the Aed Sláine dynasty. When the kingdom was split in two in the late 7<sup>th</sup> century AD, Knowth appears to



have become the centre of northern Brega. The kings of northern Brega style themselves *Rí Cnogba* (Kings of Knowth) and a royal centre is established at or near Knowth passage tomb (Byrne in Eogan 1968, Byrne 1987). This historical evidence accords quite well with the archaeological record: there is a large ringfort at Knowth, approximately 500m from the passage tomb cemetery, which is located at the edge of a ravine above the Boyne with good views to the northwest and south. Its siting was very likely linked to the defence of the river crossing into Brega. The relatively large size of this ringfort, and the ringfort at Newgrange (see below), suggests that the occupants had a high status within early Irish society (Stout 2002, 77). At Knowth itself, two concentric pennannular ditches were dug around the main mound (Eogan 1977; 1990; 2007a). The first ditch enclosed an area 40m in diameter around the summit, while the second ditch was dug just inside the line of kerbstones. The resulting monument, effectively a bivallate ringfort, is dated by animal bone and a small number of finds from the 6<sup>th</sup> to 8<sup>th</sup> centuries AD. Any structural remains associated with these ditches would have been removed by 19<sup>th</sup> century quarrying activity on top of the mound.

Six additional ringforts have been identified within the Brú na Bóinne WHS - two upstanding examples at Newgrange and Rathmullan and four that appear as cropmarks in the townlands of Gilltown, Oldbridge and Sheephouse (Stout 2002, 78). Placename evidence such as Cruicerath and Listervan (Stout 2002, 78) points to many more now levelled monuments both within and around the WHS. Ringforts are generally viewed as the farmsteads of an early medieval rural society (e.g. Kelly 1997; McCormick 1995; McCormick and Murray 2007, 108-11; M. Stout 1997), although their construction does continue into the 2<sup>nd</sup> millennium AD in some parts of the country. In the Boyne area, these farmsteads tend to be sited on ridges and have artificially raised interiors, something Stout (1984) suggests is an adaptation to the low-lying Meath landscape. The faunal evidence from the Knowth ringfort shows that beef accounted for over 80% of meat consumed, a figure replicated across many sites of the period. Such evidence, coupled with the references to milk cows and calves in the law tracts of the seventh and eighth centuries AD, points to the existence of a countrywide value system in which dairy cows were the basis of wealth (McCormick and Murray 2007). It is thus likely that the ringfort developed out of the need to protect livestock from raiders (McCormick 1995).

The ringfort at Knowth is abandoned around the end of the eighth century and after an apparent hiatus in activity is re-occupied in the 10<sup>th</sup> century when a large unenclosed settlement represented by at least fifteen houses and nine souterrains as well as a number of metalworking areas, paved surfaces and hearths is established. The eastern passage tomb is also re-used as a souterrain. This 10<sup>th</sup> century community at Knowth was smelting iron, working gold and bronze and enamelling objects, as well as working stone, bone and antler. Contact with Hiberno-Norse communities is suggested by exotic finds such as scales, and perhaps also by the shape of the buildings, which are similar to those from Viking Dublin (Eogan 2007a, 4). Analysis of the faunal material from this unenclosed settlement shows an increase of over 10% in the numbers of pig consumed and a decline in the relative importance of cattle (McCormick and Murray 2007, 41) and it has been suggested that the inherent limitations of a cattle currency combined with the influence of Scandinavian value systems based on silver bullion and slaves resulted in a move towards more intensive arable farming as a way of accumulating wealth (McCormick and Murray 2007, 112-15). Certainly, the layout of this later Early Christian settlement indicates that the protection of livestock was no longer a primary factor in the organisation of the site (*ibid.*, 110). Within the Boyne area in general unenclosed settlements far outnumber ringforts (Stout 2002, 81) and it may be that in this part of the country ringforts went into decline earlier than in other parts due to their proximity to Viking Dublin (McCormick and Murray 2007, 112; see also Clinton 2001, 45).

Contemporary activity within the WHS is indicated by additional souterrains in Dowth, Oldbridge, Rossnaree, Sheepbridge, Littlegrange and Clonlusk townlands (Stout 2002, 81), most of which have been uncovered during ploughing or the reclamation of farmland. Their strong association with unenclosed settlements, in the Meath area at least (Clinton 2001, 45), suggests that they provided an element of the protection previously afforded by ringforts. References to souterrains in the annals certainly indicate that these sites were used as refuges (Lucas 1971-3), something supported by the complex layout of many examples (Buckley 1988/89). Clinton (2001, 64) has argued that their construction may also be linked to the increase in slave-taking and trading at this time, noting that many of the internal chambers were designed to be sealed from the outside. The large number of souterrains uncovered at Knowth is so far unique within the WHS, and generally rare within Ireland, although a dense concentration of souterrains containing domestic and personal objects, faunal remains and querns was unearthed north of the WHS, at Marshes Upper, near Dundalk (Gowen 1992).

In a marshy basin immediately downslope of Knowth lies a complex of earthworks labelled Site M. Excavation carried out between 2002 and 2004 (Stout and Stout 2008b) revealed three main phases of activity, the first associated with a number of linear trenches and pits, the second with a cemetery enclosed by two sub-circular ditches in use from the 6<sup>th</sup> to 10<sup>th</sup> century, and a final phase marked by a later external earthwork. Evidence for agricultural and manufacturing activity within the enclosures was also identified. The excavators interpret Site M as an early medieval 'secular' cemetery, *i.e.* with no apparent ecclesiastical associations, and compare it to a number of similar sites discovered in recent years in north-east Leinster, such as Balriggeran, Co. Louth (Delaney 2007; Delaney and Roycroft 2003) and Raystown, Co. Meath (Seaver 2006; 2007).

The earliest surviving descriptions of the arrival of St. Patrick in Ireland, the 7<sup>th</sup> century Muirchíú's *Life of Patrick* and Tírechán's *Collectanea* (see Bieler 1979), have the saint landing at the mouth of the Boyne and travelling up into the valley where he lights the Paschal fire. Since the 17<sup>th</sup> century this deeply symbolic act has been associated with the Hill of Slane (Swift 1996, 11) although more recently scholars have questioned the connection, placing the event within the Bend of the Boyne (Stout 2002, 74), perhaps at Knowth itself (Eogan 1990, 26-7; 1991, 119), or even further afield at Trim, 25km to the southwest of Slane (Swift 1996, 9-13). Wherever the true location, it is clear that the Boyne area was sufficiently important in the eyes of the Early Irish Church to feature prominently in founding narratives.

While perhaps not playing a large part in the Patrician mission (see Stout 2002, 74), the monastic foundation at Slane quickly becomes a prominent ecclesiastical site in its own right, significant enough for the death of its first Bishop, Erc, to be recorded in the annals in the early 6<sup>th</sup> century. A house-shaped shrine in the later medieval graveyard at Slane is associated with this early church figure. The patronage of the local SílnaAedo Sláine dynasty from the seventh century AD onwards makes Slane the most important, and probably the wealthiest, early church site in the Brú na Bóinne area and there are frequent mentions of the site in the annals, including several records of attacks in the ninth to eleventh centuries (Stout 2002, 75). Within the WHS itself, there were smaller ecclesiastical sites at Dowth (Stout 2007) and possibly at Stalleen and Monknewtown, where holy wells and a number of inhumations have been recorded (Stout 2002, 76). The 19<sup>th</sup> Ordnance Survey letters for county Meath (Herity 2001) also record an association with St. Columkille who was said to have built a church at Rossnaree.

It would also appear that medieval society at Brú na Bóinne was conscious of the prehistoric monuments in their midst. As a place name in the Boyne Valley, brug had a topographical identity by the 10<sup>th</sup> century; a poem of the period by Ó hArtagain refers to a cemetery at *Brug* (a mansion or palace in old Irish). In the 12<sup>th</sup> century history of the royal cemeteries of Ireland, *Senchus na Relec*, an origin tale is provided for the cemetery at *Brug*. The 12<sup>th</sup> century Book of

Leinster also preserves a *dindshenchas* (placelore) poem for *Brug*, as does the 14<sup>th</sup>/15<sup>th</sup> century *Book of Ballymote*. There is some consistency between the different versions of placelore for Brú na Bóinne and some monuments such as the main Newgrange tomb, Sites K and L, and the cursus can be fairly securely identified (Stout 2002, 64-5).

Raiding, both for material and political gain, appears to have been a relatively common occurrence along the Boyne Valley from the middle of the 1<sup>st</sup> millennium AD onwards, the annals recording a series of attacks mounted by Anglo-Saxon, Norse and native Irish. Wealthy churches, both within Brega and in the midlands beyond, appear to have been the main target, although the annals also record the plunder of dwellings and souterrains. Stout (2002, 81) has emphasised to the scale of some of these incursions, such as the 120 Norse ships on the Boyne and Liffey rivers in AD 837 and the Norse naval force at Rosnaree recorded in year 842 of the *Annals of the Four Masters*.

### **Continental monasticism**

Brú na Bóinne was again at the centre of change in the mid twelfth century when the Cistercians, one of the great Continental monastic orders, founded a daughter house on the banks of the River Mattock in 1142 on a site granted by Donnchadh Ó Cearbhaill, king of Airghialla. The new foundation, the first in Ireland, was also granted considerable lands along the newly-conquered southern fringes of Airghialla (Colmcille 1953). A series of royal charters and grants issued from the late 12<sup>th</sup> century onwards provide information about this changing and expanding landscape (see Colmcille 1953, 1958) and allow us to estimate that at its full extent the Mellifont estate comprised approximately 20,235ha in Meath and Louth, incorporating a large portion of land now in the WHS (Stout 2002, 85). The Cistercians brought radically different styles of monasticism, land management and architecture to Ireland, transforming the rural landscape (Stalley 1987). The lower Boyne Valley in particular was dominated by Cistercian farms or granges, the names of some now fossilized in the townlands of Littlegrange, Sheepgrange, Newgrange and Roughgrange.

While the Cistercians came to control most of the land within Brú na Bóinne, the Augustinian priories of Llanthony Prima in Monmouthshire and Llanthony Secunda in Gloucestershire were also granted extensive lands in north county Meath, attached to their daughter cell at Duleek. The priory charters (Hogan 2008) detail that the lands included parts of Gilltown, Lougher, Roughgrange, Platin and Donore townlands, on the south bank of the Boyne. The priory of Llanthony also held a small parcel of land around the church at Dowth although most of this large townland remained in secular hands throughout the middle ages (see below).

Knowth was for a short time held by the Norman knight Richard Fleming, who fortified it in an effort to secure his recently acquired lands around Slane. Annal entries indicate that a motte was constructed here in 1175/1176 and two stone-lined ditches and the remains of a bastion have been uncovered on the south-eastern side of the main mound (Byrne in Eogan 1968: 399; Ó hInnse 1947; Eogan 1991, 121-2). By at least 1185 however, Knowth lay at the centre of a new Cistercian farm, and grange buildings were erected on the top of the mound. Excavations have revealed a rectangular walled courtyard with lean-to buildings and a possible oratory or chapel (Eogan 1984, 7). To the northeast of the Knowth mound (Moore 1987: 123, 126), the complex of earthworks now known to include the remains of an early medieval cemetery (Stout and Stout 2008b; see above) also contains features such as enclosures, field boundaries, cultivation ridges, and a possible pond that may relate to medieval farming activity associated with the grange (Stout 2002, 87).

In 1329 the lands of Monknewtown were granted as a grange to the Cistercians, while Newgrange became the 'new grange' of Mellifont sometime before 1348 when it was separated from the parent grange of Knowth (Bradley 1997, 33). These granges and others like them saw

intense agricultural activity centred on grain cultivation and sheep and cattle rearing and linked to an export industry put in place by the Cistercians. Huge quantities of wheat, barley and oats, for example, were exported to England at this time. There is a 1309 reference in the Llanthony rolls to a William O'Kelly who was granted permission to transport one hundred crannocs of wheat to England in 1309 (Tresham 1828, 12b, no. 26; Hogan 2008, 146-7). The shipping of grain back to mother houses was an essential part of the canons' administration in Ireland (Hogan 2008, 132), and the monks made ready use of the fertile land so close to a major river and the nearby developing port town of Drogheda. At the time of the dissolution of Mellifont Abbey in 1540 some 90% of lands held were recorded as being good for arable agriculture (White 1943). The scenario of widespread tillage is also attested in the archaeological record. At Newgrange, plough pebbles have been found over a wide area from the main mound down to Site A, while the excavation of Site Z uncovered an extensive ridge-and-furrow cultivation (O'Kelly *et al.* 1978; O'Kelly 1976). Seventeen plough pebbles were found with thirteenth century pottery at Knowth and additional examples have also been recovered from Balfeddock, Townleyhall, Littlegrange, Oldbridge and Donore townlands (Brady 2002, 11; Brady *et al.* 2007, 74; N. Brady 1986, 1988; O'Carroll 2002).

The rearing of livestock also appears to have been on a similar scale, as entries in the Statute Rolls for 1245 detail the taking of 600 cattle from Mellifont lands to maintain the king's army in the war against Hugh de Lacy (Sweetman 1875, 189; see below). Wool was also an important commodity at the time (see Colmcille 1953: xxviii), its significance, and that of sheep husbandry, reflected in the townland names of Sheepgrange and Sheephous. Relatively large numbers of 15<sup>th</sup>/16<sup>th</sup> century sheep and cattle bone have also been recovered from buried field boundaries close to the stone circle at Newgrange (Van Wijngaarden-Bakker 1974, 367-8).

The Boyne provided fresh water and fish, drove millwheels and gave easy access both inland to the heart of Meath and outwards through Drogheda to the Irish Sea. The Cistercians exploited both the Boyne and the Mattock for processing grain and wool and mills and millponds are mentioned in the charters of 1185 and 1203 (Colmcille 1953). At the abbey's dissolution there were three monastic mills recorded at Stalleen, Browe and Rossnaree (White 1943, 253, 257-8). The remains of later mills survive at Stalleen and Rossnaree and it is likely that these are on the sites of medieval structures (Stout 2002, 89). The Cistercians at Mellifont were also instrumental in the development of the fishing industry along the Boyne (Stout 1997c), manipulating the water flow and installing weirs to increase the harvest of fish, which supplied the markets of Dublin and Drogheda. The value of these fish weirs is reflected in the frequency with which the abbey's rights to them are asserted and re-asserted in various charters and legal documents from the 12<sup>th</sup> century onwards (Colmcille 1953; Went 1953, 22). The interests of fish farmers and other river users often clashed however, as repeated efforts were made throughout the medieval period to maintain the navigability of the Boyne. Walter de Lacy's 1194 charter to the burgesses of Drogheda stated that they should have the right to free passage on the Boyne from the sea to the bridge at Trim, and that weirs and all other obstacles were to be removed (Mac Niocaill 1964: ii, 172-3; Curtis and McDowell 1943: 27-8), and in 1366 the abbot of Mellifont was reprimanded for obstructing navigation by erecting a weir at Oldbridge (Went 1953: 39). In 1435, a weir built at Proudfootstown by John Proudfoot was appropriated and dismantled by the king's officers for causing obstruction (Tresham 1828: 261b, no. 9), while in 1537 an act was passed for the removal of certain 'werres, purprestures, milpoundes, ingens and other obstacles' from the River Boyne (Connolly 2002, 289-91).

The detailed records kept by monastic houses of their holdings often provide the only link left to landscapes now completely hidden from view. One example is the village of Lougher, described in detail in the cartularies of Llanthony (Hogan 2008; Stout 2002, 100-1). At the centre of the complex stood a moated manor house with a separate small hall, cowhouse and gatehouse. There



was a small vill with at least fifteen tenants, each with a cottage, curtilage and croft. In a separate grange stood two pigsties, a bakery, a malt-house and a dovecot. The village's meadows, fisheries, pastures, and thickets are also listed (Hogan 2008, 327). None of the above is visible in Lougher today although traces of the settlement may lie beneath a large farmhouse and farmyard within the townland (Michael Potterton, pers. comm.)

In accordance with their vow of poverty, the Cistercians were forbidden to acquire tithes, rents or tenants, and instead farmed their land directly and solely to maintain themselves. However, no more than a few decades after the foundation of the Mellifont house, in 1208, the renting of lands on certain conditions was being permitted by the general chapter of the Cistercian order (Colmcille 1958, xxxiii) and by the fifteenth century, lay brothers had all but disappeared from the farms. The monks became powerful landlords and the records show that their main income now came from rents (Colmcille 1958, xxxiv). These changes in land holdings naturally affected the character of settlement and monastic granges such as Monknewtown developed into small villages housing growing secular communities (White 1943, 217; Graham 1974, 53; Kenny in Byrne *et al.* 2008). Excavations in 2008 at Stalleen, on what would have been abbey lands, have revealed a 14th century gate structure, associated ditches and industrial features. This later medieval settlement possibly functioned as a grange (Mandy Stephens, pers. comm.).

### **The Anglo-Normans**

In 1172, following successful military campaigns in Leinster, the newly-declared Overlord of Ireland King Henry granted Hugh de Lacy the kingdom of Meath, then a vast tract of land stretching from the coast and Boyne Valley into the centre of the country (Stout 2002, 93). There followed almost twenty years of campaigns and counter-campaigns as de Lacy attempted to assert Anglo-Norman control over those local kings that refused to recognize his authority (Carey 1998) and his efforts are documented by Giraldus Cambrensis, nephew of Robert fitzStephen, one of the first Anglo-Normans to land in Ireland (Scott and Martin 1978; Dimock 1867). Giraldus and the annals record a series of castles rapidly erected throughout Meath and Leinster and within Brú na Bóinne, at Knowth (see above) and possibly Dowth (D'Alton 1844, 43; Graham 1974, 51; O'Kelly and O'Kelly 1983, 149). These latter do not appear to have been front-line structures like those erected on principal land grants or seigniorial manors such as Slane, Duleek and Drogheda, but were secondary mottes, i.e. structures without baileys that were built to secure a manorial village (Stout 2002, 95). The development of a manorial village around a motte was a common occurrence in county Meath, although the manor at Dowth appears to be the only example within Brú na Bóinne (Graham 1980, 54; Stout 2002, 96).

Various legal documents reveal how, through the process of subinfeudation, the lands at Dowth are already connected with several families by the mid thirteenth century (Smith 1993, 29-43; 1999, 38; Sweetman 1875, 406; Stout 2007, 336-7). An official enquiry into the land holdings of one Ralph de Picheford on his death in 1253 (Sweetman 1877, 27-8) provides an important description of manorial land use at this time. His demesne included 132 (medieval) acres, a garden and a dovecot, two mills and a fishery. The list of free tenants who held land on the manor included Irish as well as English names and these tenants paid rent in both money and labour services. The largest tenant in 1253 was Alan Prutfot, his holdings roughly corresponding to the modern townland of Proudfootstown, and the Proudfoot family continued to live at Proudfootstown until at least the 1650s (Stout 2002, 98). The longest-standing owners of the manor were the Nettervilles, who held Dowth from the end of the thirteenth century, superseding the de Pichefords, until the last in the family line died in 1826 (Paston 1900, 2). A number of documents record the various legal disputes involving the Nettervilles and their neighbours through the centuries over assets like fish weirs, livestock and land (Mills 1905-14, vol 1, 281; Smith 1999, 81; D'Alton 1844, 433).

An Anglo-Norman church was also erected at Dowth and dedicated to St. David. Very soon after its construction it was granted to the Augustinian priory of Llanthony (see above) in whose hands it remained until the Reformation. The present church is mostly fourteenth or fifteenth century in date (Moore 1987, 134); on high ground at the centre of the parish, it is almost certainly on the site of the twelfth-century building, and therefore probably on the site of the church associated with the pre-Anglo-Norman ecclesiastical centre (Stout 2007, 343; Herity 2001, 43). An entry for 1381 in the Llanthony cartularies mentions a cottage and curtilage associated with Dowth church, as well as a number of 'decayed' ancillary cottages and courtyards which were probably in the adjoining townland of Glebe (Hogan 2008, 191, 199, 352, 359; Stout 2002, 99).

Constant attacks on both church and Anglo-Norman lands by the surrounding Gaelic population led the English government in 1429 to offer subsidies for the construction of castles at the edge of the English-controlled lands, essentially the counties of Louth, Meath, Dublin and Kildare. This area, called the Pale, was formally assigned a boundary by parliament in 1488/1489, and from 1494 onwards physically marked by a fortified ditch and rampart (O'Keeffe 1992). Both within and without, fortified residences, or towerhouses, were constructed to defend households and their lands. While Brú na Bóinne lay at the centre of the Pale, the construction of towerhouses did not occur on the nucleated settlements on church-held lands, leaving a very different pattern of settlement remains in the two areas (Stout 2002, 102). Two towerhouses were constructed within Dowth manor, one on the Dowth ridge on a good vantage point above the river (Galway 1985/1986, 57-8; Moore 1987, 170), the second in Proudfootstown, probably constructed by the Proudfoot family themselves (Galway 1985/1986, 29-30; Moore 1987, 174; Stout 2007, 348-9). This latter structure, while recorded in the Civil Survey of Meath of the 1650s (see below), had completely collapsed by the end of the nineteenth century (Balfour 1890; Stout 2002, 100).

Today at Dowth, a sunken roadway can be discerned running between the church and towerhouse and the passage tomb, as can a series of cultivation ridges of unknown date that are earlier than the modern field boundaries around them (Moore 1987, 122). A field survey here has also identified possible traces of house sites, paths and gardens (Stout 2002, 97; Stout 2007, 338-9).

### **Reform and rebellion – the 16<sup>th</sup> and 17<sup>th</sup> centuries**

There was a radical change in colonial policy in Ireland in the 16<sup>th</sup> century, as the English government sought to take control of crown land, dissolving the monasteries and establishing an English-manned and military-based administration at Dublin with regional officers and garrisons posted at places like Drogheda (Stout 2002). Within the Pale, confiscation was not as pronounced and a high percentage of Old English Catholic families remained in the south Louth/east Meath region. The Nettervilles of Dowth are one such example who held onto their lands through the turbulent sixteenth and seventeenth centuries. Like the Darcys of Platin, the Nettervilles were dispossessed of their lands for a short time, but managed to have them restored (Stout 2002, 109; Simington 1940, 17, 350-1). However, there was no such continuity in land-ownership where the religious houses were concerned. Church properties were confiscated and in 1566 the lands formerly held by Mellifont (including Balfeddock, Donore, Knowth, Monknewtown, Newgrange, Oldbridge, Rathmullan, Sheephouse and Stalleen) passed to Edward Moore (Bradshaw 1974, 114; Colmcille 1958, 198; Simington 1940, 13-14, 351-2). Significantly, the Moores were the only Protestant landowners in Brú na Bóinne in the mid-seventeenth century – in addition to the above-mentioned Nettervilles (Dowth and Proudfootstown) and Darcys (Platin), other Catholic landlords included the Draycotts of Roughgrange and the Allens of Lougher (Simington 1940). After the Williamite victory at the Battle of the Boyne there were further changes in land-ownership and the Darcys were again dispossessed of Platin. The estate was sold to John Graham and he built a new house on the site of the castle c.1700 (Stout 2002, 123).

One of the most important sources of information about land-ownership, agriculture, industry and settlement in 17<sup>th</sup> century Brú na Bóinne is the 1654 Civil Survey of County Meath (Simington 1940), recording at Dowth for example, a castle, a stone house, a stable and other out-houses, a church, a farm-house, a malt-house, a bawn, a corn-mill, a tuck-mill, a salmon weir and a dovecot (Simington 1940, 351). No trace of these buildings survives above ground level. The prevalence of arable land noted by the Civil Survey was matched by an increase in the number of recorded mills from three in 1540 to eight in 1654 (Stout 2002, 111–12). The presence of a tuck mill at Dowth is an indicator that sheep-farming continued to be practised in the mid-seventeenth century (Simington 1940, 351). The survey also records minor nucleated settlements at Oldbridge, Sheephouse, Donore and Platin. Stout has noted how the settlement landscape must have changed between say 1540 and 1650, during which time the villages at Monknewtown, Sheephouse, Balfeddock, Rosnaree and Giltown had dwindled and, in most cases, disappeared entirely (Stout 2002, 111–12). The survey recorded just a church, a farmhouse and a stone bridge at Monknewtown (Simington 1940, 352). An undeniable factor in this shift was the post-1540 change in land-ownership and local influence from the religious houses to secular landlords (see Jenkins in Byrne *et al.* 2008). In terms of the economy of the region, almost 75% of the land in Brú na Bóinne was recorded as ‘arable’ in the Civil Survey (Simington 1940; Stout 2002, 112). Most of the rest of the land was pasture, and there were smaller acreages of meadow, bog and woodland. The Down Survey maps of the area show stone buildings at Dowth, Proudfootstown, Roughgrange, Lougher and Platin (Stout 2002, 112–13), but the overall picture is one of fewer buildings than in previous centuries.

The seventeenth century in Brú na Bóinne was punctuated with major conflicts – the Rebellion of 1641, the Cromwellian campaign in nearby Drogheda in 1649, and the Battle of the Boyne in 1690. The 1640s in particular were a tumultuous time and damage was done to many buildings including the churches at Dowth and Monknewtown (Ellison 1973, 5, 7). In the 1620s Archbishop Ussher noted that Dowth church was in reasonable repair (Stout 2007, 340), but in the early 1680s, it was recorded that it had been ruinous since 1641 (Ellison 1973, 5).

The events and aftermath of the Battle of the Boyne of 1690 are well recorded (*e.g.* Story 1693; Lenihan 2003; McNally 2005) and do not need to be repeated here. Contemporary written accounts note that this was a fertile plain with cornfields running down to the river, the fields being divided by fences and stone walls (Stout 2002, 118). These accounts and sources such as paintings and sketches have also been used to identify the locations of fords, bridges, passes, roads, settlements and dwellings and allow for a relatively detailed reconstruction of the seventeenth-century landscape of the area (Stout 2002, 113–23). In the intervening years, a number of stray coins, cannon balls and other weaponry probably contemporary with the battle have been picked up in Brú na Bóinne (Stout 2002, 117–18, 120). Much of the conflict took place on the Oldbridge Estate and after this was bought by the Irish state in 2000 a pilot study was commissioned to investigate the archaeology of the Battle of the Boyne (Cooney *et al.* 2002; Brady *et al.* 2007). This important study included archival research, field-walking, geo-chemical analysis, remote sensing, a sonar survey of the river, metal-detecting and test-excavation. Results included the identification of the location of the ‘lost’ village of Oldbridge, confirmation of the scene of the first military engagement on the day of the battle and clarification of some of the theories relating to the river crossings. For the first time, a wide range of artefacts associated with the battle were systematically collected and recorded.

### **Economy and industry: the 18th century onwards**

The Irish landscape changed dramatically in the 18<sup>th</sup> century, and the landscape of Brú na Bóinne is no exception. A period of stability and relative prosperity followed the Williamite wars and a new system of estates created new demesnes, farms and fields along the Boyne, all of which has been documented in detail by Stout (2002, 124-143). The three major estates lay within Brú na Bóinne – the Nettervilles of Dowth, the Campbells, and later the Caldwells, of Newgrange and Knowth and the Coddingtons of Oldbridge and Sheephouse. All three landowners erected large mansions on their estates set in newly planted and landscaped settings (demesnes), while other parts of the estates were divided up and leased to tenant farmers, in part to finance the new ‘improvements’. The main source of information about this 18<sup>th</sup> century landscape comes from the Registry of Deeds, established in 1707 to monitor the transfer of property between Protestants and Catholics. Marriage agreements and deeds between landowners and tenants make reference to arable fields, meadows, paddocks, new lanes, ditches and walks, as well as mills, barns and stables. These provide *termini ante quos* for many features in addition to hinting at land use and agricultural practices. Estate papers also contain important information about the rapidly changing Brú na Bóinne landscape and include, in some cases, estate maps drawn up to identify tenants and farm boundaries. Charles Caldwell commissioned one such map in 1766, while another map drawn up in 1781 records those parts of his property damaged by the construction of the Boyne canal (see below). For most of Brú na Bóinne however, the 1837 first edition Ordnance Survey map provides the first detailed cartographic record of the new walled gardens, tree plantations and road networks of the improving landlords.

Relaxed trade barriers in England in the 18<sup>th</sup> century provided Ireland with important markets for woollen goods and cattle, the latter supported by a network of fairs set up by landlords (Whelan 1997). With only modest growth in the early 1700s, commercial tillage in Ireland expanded rapidly in the second half of the century due to subsidies granted by the Irish parliament. Meath was one of the first counties to respond to the subsidies on grain transported to Dublin with the construction of large industrial mills, the first erected at Slane. This was followed by mills at Monknewtown and Proudfootstown, many times the size of the pre-existing vernacular mills that serviced the local community. The introduction and spread of the potato as a subsistence crop supported the growing cottier community within Brú na Bóinne, as in other places, and freed up land for flax, the cultivation of which was being actively promoted by the newly-established Linen Board. Brú na Bóinne lay at the southern margin of linen-weaving zone, between Drogheda, a prosperous linen town, and the burgeoning linen cottage industry at Slane. Free access to British markets and the premiums offered by the Linen Board for the growing of flax and the construction of flax (or scutch) mills meant that by the end of the 18<sup>th</sup> century mills were in every parish in Brú na Bóinne (Ellison 1983). The contemporary accounts of Arthur Young in his 1780 *Tour of Ireland* provide perhaps the most comprehensive guide to late 18<sup>th</sup> century Irish agricultural practices, and those at Brú na Bóinne, e.g. the organisation of John Baker Holroyd’s Monknewtown estate, are well-documented.

Crucial to the continued growth of this industrial and commercial activity was the improvement of the road and river network. Road repair and construction was initially financed through tolls and later through the tenant farmers, with monies levied per acre of land leased (Killen 1997). Between 1748 and 1790 the River Boyne was canalised in order to encourage trade with Dublin and to facilitate the transportation of corn to the port at Drogheda from inland markets. The Minutes & Proceedings of the Boyne Navigation Commissioners (held in the National Library) document this process and record the noblemen and gentry appointed to oversee the works, some of whom were prominent landowners within Brú na Bóinne. The canal is also mapped in Caldwell’s 1766 and 1781 maps (see above).



Following the Williamite victory in 1690, the Anglican Church was established by law in Ireland. However, with no additional infrastructural support and no organisational change, pre-existing churches now in Church of Ireland hands quickly fell into disrepair and the Catholic faithful secretly continued their worship at mass houses, mass rocks and holy wells. Within Brú na Bóinne, the Catholic Nettervilles appear to have been particularly loyal patrons of the outlawed faith and despite a series of proclamations against Mass houses in Meath in the first quarter of the 18<sup>th</sup> century, over 100 of these buildings and over 100 priests are documented for 1731 (Corish 1981; McCracken 1986). Many examples are recorded in diocesan archives as well as recounted in oral traditions, local histories and monuments (see Stout 2002, 143).

19<sup>th</sup> century life in Brú na Bóinne is brought into focus again through the extensive documentary analysis and fieldwork of Stout (2002), who has reconstructed the socio-economic conditions of the area using the field-notes made by valuers in the preparation of the *Primary Valuation of Property*, or *Griffith's Valuation*, of 1854. These 'Field Books' and 'House Books', compiled for the Brú na Bóinne area between 1837 and 1839, contained information on the size and value of land holdings and on the type, size and value of buildings, and along with the published *Griffith's Valuation* enable a classification of rural society from the nobleman down to the casual labourer. Also recorded in *Griffith's Valuation* were ecclesiastical and industrial buildings and national schools. The first half of the 19<sup>th</sup> century saw an explosion in church building, which was accelerated by the Catholic Emancipation process. The earliest and strongest Catholic communities emerged in areas with Catholic landlords who encouraged the construction of educational and institutional buildings in the locality with villages often developing around them (Whelan 1983). Contemporary commentators like James D'Alton (1844) and Samuel Lewis (1837) record an area busy with corn growing, milling and cattle-grazing, as well as fishing, linen production and even quarrying, all greatly facilitated by the Boyne Navigation.

Generally speaking, the Great Famine of 1845-49 did not affect the Brú na Bóinne as severely as other parts of the country. Sources such as the Census of Ireland and the Perambulation Books (similar to Field Books but containing extra information such as the date of initial tenure) record hardship in the area although this was alleviated in certain places by landlords who reduced or suspended rents. In the post-famine period there was an overall consolidation of landholdings and increased prosperity and security amongst stronger tenants. It is their properties that survive today – Stout's fieldwork in the late 1990s showed that the dwellings of the 19<sup>th</sup> century cottiers and labourers were an extreme rarity and were in danger of disappearing completely (Stout 2002, 155-6). In the late 19<sup>th</sup> century and early 20<sup>th</sup> century the enactment of the Labourers (Ireland) Acts resulted in the replacement of some of the decaying labourers' housing with stone cottages, which are a distinctive feature of Brú na Bóinne, designed by a local architect, P. J. Dodd of Drogheda. Other distinctive modern architecture within the WHS includes the concrete artillery emplacements or 'pillboxes' that were erected during WWII (the 'Emergency' in Ireland). The Boyne and Blackwater rivers formed the main line of resistance in Ireland's defence against the perceived threat of overland invasion by British forces (seeking deep water ports) and Stout (2002, 169) has recorded thirty-seven examples between the Boyne estuary at Baltray and Navan.

## Section 3 - Research Agenda

### Developing an agenda

Moving research forward in the WHS involves having a clear vision of the missing puzzle pieces or gaps in our knowledge. To achieve this, a number of working groups covering a range of chronological and thematic areas were established (see Appendix I), each group tasked with critically evaluating what was important and worth pursuing in each respective period or area. The resulting list of research questions formed the basis of our research agenda. However it soon emerged that different groups were asking many of the same basic questions, e.g., what was the past environment like? What is the extent of the sub-surface archaeology? What was the role of the Boyne river? To avoid such repetition and in an effort to tease out some of the wider issues relating to the WHS, these research questions have been shuffled around and grouped according to a smaller number of themes:

- People
- Politics and Power
- Landscape and Environment
- Legacy
- The Living WHS

These themes also reflect the interests of many of the participants at the public seminars (see Appendix II), who were keen to get to grips with the more social or human-level aspects of their heritage rather than be presented with more traditional and abstract treatments of the past. For ease of reference only the research questions below are numbered 1-42. No attempt has been made to privilege one question over another.

### People

#### 1. Who were the first people to occupy the Brú na Bóinne landscape and what was the nature of this presence?

To date, no evidence for Early Mesolithic activity has been uncovered within the Brú na Bóinne WHS. Despite the likely attraction of the early Holocene Boyne Valley for incoming groups, there may not have been any human presence in the area between 8,000 and 6,500 BC. Alternatively, past survey and excavation may have focused on parts of the landscape that were not extensively used during the early Mesolithic and new material may lie undiscovered in areas away from the later passage tombs or in fields that are currently in pasture. Methodologies need to be designed that are appropriate to the identification of Early Mesolithic material. While surface collection survey offers good potential, the small size of lithic artefacts manufactured during this period makes their identification more difficult than material from other periods. The use of test-pitting or shovel-test surveys with sieving of spoil could be considered to ensure good landscape coverage and also to improve rates of recovery of artefacts.

In terms of a Late Mesolithic presence, material is known from Newgrange and Knowth and additional lithics have been recovered during field survey. However, the level of activity seems to be low, given the amount of material recovered from the wider region. Once again, field survey offers the best potential for identifying Late Mesolithic sites. The lithic tools of this period are relatively large and distinctive, and recognition of this material should not be as difficult as for the Early Mesolithic. As yet unidentified material may even exist in older excavation and surface collection assemblages. The immediate channel of the river offers significant potential for

the identification of material from both the Early and Later Mesolithic periods, as do recent excavations along the routes of M1 and M3 motorways, to the east and west of the WHS respectively.

**2. How were people disposing of their dead in Brú na Bóinne in earlier prehistory?**

We know very little about the funerary practices accompanying the early Neolithic presence in Brú na Bóinne. Given the apparent lack of megalithic monuments in the area, we need to explore the possibility of early fourth millennium non-megalithic funerary practices. What is the date of the cremated human material inside the Carrowkeel bowl at Monknewtown, and how would this date compare with those obtained at Tara for Carrowkeel ware? Detailed examination of the aerial photographic record as well as topographic and geophysical survey may help identify traces of potential non-megalithic mounds, such as Site G at Dowth. Excavation across the wider landscape, particularly sites from the M1 motorway, may help us to understand the character of the early Neolithic both in Brú na Bóinne and in other focal areas such as the Cooley peninsula, where rectangular houses have been found in close proximity to early stone monuments.

**3. Where did the passage tomb builders live?**

The scale of the passage tomb cemetery at Brú na Bóinne and in particular that of the three 'mega' tombs implies a sizeable labour pool within the Brú na Bóinne area. However, we have very little idea of where and how these middle Neolithic groups lived. Systematic surface collection followed up by geophysical and geochemical survey and excavation provide the best means to identify the extent and nature of settlement during this period. Such work would eventually yield dating material and environmental evidence. As already mentioned, analysis of contemporary material from the nearby M1 and M3 motorways will prove particularly useful in attempting to characterise middle Neolithic settlement in the Brú na Bóinne area.

**4. Who was occupying and using the Brú na Bóinne landscape during the Bronze Age?**

Despite the relatively large amount of Beaker material that has been uncovered at Newgrange, Knowth and Monknewtown, we have puzzlingly little evidence for the early Bronze Age in Brú na Bóinne and consequently little idea of how the changes in social practice and material culture that must have accompanied the introduction of metal were played out. Do the apparent lack of remains mean that the area declined in importance in the early Bronze Age? The bronze flat axe and remnants of the large stone circle in front of Newgrange provide some tantalising glimpses of society in the late third and second millennium BC. However, much of what various authors have written about different aspects of the Final Neolithic/early Bronze Age activity at Newgrange is contradictory. Renewed, targeted excavation in the vicinity may provide ways to understand the existing archive. Resolution of the question of the dating and extent of the Great Circle would also be a worthwhile project, as would re-analysis of the Beaker remains from Monknewtown in the light of more recent material from commercial excavation. The water-filled enclosure at Monknewtown has been compared with the King Stable's ritual pond near Eamhain Macha (Navan fort) in county Armagh, which dates from the Later Bronze age. Sword moulds, animal bones and human remains were recovered from the county Armagh site. Similar investigations at Monknewtown could yield similar results. Within the WHS as a whole we need to ascertain if the current archaeological record is truly reflective of activity during the Bronze Age. Some sites possibly dating to this period have recently been identified; are there more lying undiscovered in the Brú na Bóinne landscape? Ring-ditch cemetery. What was the role of the existing megalithic and earthen monuments during this later period? Were any monuments reused in the same way as the Mound of the Hostages on the Hill of Tara?

**5. What was the nature of the Iron Age (including Roman) presence in Brú na Bóinne?**

The later prehistoric period stands in sharp contrast to the wealth of information uncovered about earlier prehistory. George Eogan often referred to it anecdotally as the 'long lonely years of

Knowth'. This period has left little in the way of visible markers in the landscape. Identifying the homes and settlements of Iron Age communities is notoriously difficult; the evidence outside of Brú na Bóinne suggests that we should be looking for the remains of small, timber-built hut sites. This research gap can only be addressed with a systematic landscape-mapping programme using geophysics and aerial photography including LiDAR, such as that recently embarked upon by researchers from NUIG, George Eogan and Richard Warner who completed a fourth season of archaeological investigations on a sub-rectangular enclosure of possible Iron Age date near Rossnaree ford. There are also ringbarrows in the area appearing as upstanding monuments and cropmarks. Recent excavations at Knowth Site M indicate that this enclosed, medieval, multiple inhumation cemetery may have developed out of a ring-barrow tradition. We are on firmer ground when we talk about later prehistoric burial in Brú na Bóinne, which shows some considerable diversity.

So far, the only evidence for a farming presence in the later prehistoric period is a beehive-type quern found near the north bank of the Boyne at Newgrange. In order to gauge the human impact of the landscape in this period we need to take some pollen cores at locations such as Ballyboy lake and Crewbane.

The Boyne valley was identified in Ptolemy's map of mid-second century AD as Buvinda. There is much artefactual evidence that the Boyne was a key contact point for the Roman world, most of which has come from the excavations at Knowth and Newgrange. To judge from the prestige offerings deposited at Newgrange, pilgrims of high social status visited the mound, which seems to have functioned as a shrine over a prolonged period from the first to the late fourth century AD. Roman coins of high value and personal ornaments of silver and gold, including finger rings, brooches, glass beads and earrings, were placed as votive offerings in front of the main tomb at Newgrange in the vicinity of the three tall stones of the stone circle. Ragnall O' Floinn's work has identified a distinct military assemblage indicating that the donors may have been high-ranking officials. Postgraduate research on Roman hoards and metalwork in Ireland is also ongoing in the Dept of Archaeology, NUIG.

#### **6. How can we make the human (and animal) remains speak?**

Published information on the human and animal remains from the World Heritage Site varies greatly in detail and extent. This is largely due to the limited range and precision of the post-excavation techniques employed when many sites were first excavated, although the recently excavated human and animal bone from Site M could not be radiocarbon dated due to insufficient protein/carbon content. Of the human remains so far uncovered within Brú na Bóinne, the Neolithic and Iron Age burials at least appear to represent the remains of a very restricted number of persons. It is important that the sex and age profiles of these persons are established. Do they conform to what one would expect for family burial places or are they restricted to persons of certain age or sex? Is there a difference in the age and sex profiles between those who were cremated and inhumed?

Analysis of human remains has the potential to provide important information concerning the health of the people buried within Brú na Bóinne. Metabolic diseases, including cribra orbitalia and dental enamel hypoplasia, can provide information about childhood health. Evidence for degenerative joint disease can reveal insights about past occupational activities, while evidence of trauma can inform us also inform us about past physical activities, not to mention interpersonal violence. Analysis of dental remains can provide evidence for calculus, abscesses, ante-mortem tooth loss and caries, this last an important indicator of a diet rich in carbohydrates.

The use of stable isotope analysis on bone from the WHS could contribute greatly to the study of past diets, offering important insights into the relative value of different foodstuffs. New techniques also offer the potential to establish whether people were heavily manuring crops



through the concurrent effects of isotope signatures of human bone. Isotope levels also carry information on the geological signature of the place where humans and animals originated or spent a large amount of time and analysis of such can help track past population movements. Faunal remains from the WHS have been identified to species and in the case of the early medieval assemblages from Knowth have been rigorously analysed, dated and compared with similar material from around the island. The small amounts of surviving prehistoric material however have not been independently dated. Where unburnt human and animal bone survives there is a value-added factor in the ability to measure both radioactive and stable isotopes, in other words, to obtain both dating and dietary information from the same specimens. In addition to informing on the use of prehistoric and later monuments such data will contribute towards a greater understanding of human diets and farming practices. The recently developed ability to date cremated bone offers great potential in dealing with chronology of the WHS sites as well as improving our understanding of the relationship between inhumation and cremation as alternative burial rites.

**7. What was the nature of medieval and post-medieval tenant populations and how were they settled within the landscape?**

Who were the tenants living in Brú na Bóinne during this time? What was their ethnic make-up? What can be said about the demography of the area? What was the degree of continuity from earlier times? How did the religious make-up of the tenantry change over time, if at all? Where did these tenants live? Documents of the day are full of references to features such as mills, gardens, castles and dovecots and there are recorded settlements, such as the village of Oldbridge and the hamlets at Dowth and Monknewtown. The seventeenth century Cromwellian surveys, the Civil Survey and Down Survey, also list stone buildings at places like Proudfootstown, Roughgrange, Lougher and Platin. To what degree is it possible to reconstruct a picture of settlement patterns through the medieval and post-medieval periods? Are hierarchies of settlement identifiable? Who occupied the various recorded buildings and what were they used for? Can any trace of them be found now? Many undocumented buildings and sites of course remain unquantified and unidentified; can traces of some of these be located on the ground and further investigated? We might also usefully explore how the few surviving buildings of this period, e.g., Dowth church, Dowth towerhouse and Monknewtown church, fit into to this settled landscape. Might the earthworks visible in the vicinity of these monuments yield evidence for associated or neighbouring buildings or structures - fields, gardens, orchards, yards etc - and the people that worked them?

## **Politics and Power**

**8. When are passage tombs first built in Brú na Bóinne and what is their sequence of construction?**

Who built these tombs - the descendants of early Neolithic farmers or new arrivals from elsewhere? The appearance of passage tombs seems to be accompanied by a number of changes in the archaeological record such as new pottery styles and a switch from rectangular to circular houses. How and why these changes took place need to be examined and the models of development suggested for the tombs need to be tested. Sites provisionally identified as passage tombs and the full extent of tombs such as Dowth could be usefully explored with remote sensing techniques such as ground penetrating radar. What is the possible significance of the tri-partitioning of the Brú na Bóinne passage tomb cemetery, mirrored to an extent at other passage tomb cemeteries? What were the processes behind the siting of individual tombs? How do the Brú na Bóinne monuments fit within our overall distribution and chronology of passage tombs in

Ireland and beyond? Exploration of these issues would bring us to a closer understanding of the fundamental aims of the builders and of how the Brú na Bóinne complex was intended to function. New techniques now make close dating of many of these monuments possible, subject to the availability of suitable organic material. Cremated and uncremated human remains excavated from the tombs also offer very significant potential.

**9. At what scales did the Brú na Bóinne megalithic complex operate?**

From present evidence it seems likely that Brú na Bóinne functioned at a range of different scales. At one level there is the scale of local settlement, perhaps the area where the tomb-builders lived. The next scale might be the wider region from which the raw materials for the construction of the monuments came and where other passage tomb cemeteries exist. This area has been reasonably well defined by geological studies (see above) with a possible northern limit in the Cooley/Mourne Mountains and a southern edge in the Wicklow Mountains. Significant use was also made of the eastern coastal zone from where the structural stones for some of the tombs came, as well as lithic raw material. The western, inland edge of such a region is less distinct but may have extended as far as the Loughcrew passage tomb cemetery, which contains another important collection of passage tomb art. How can we better define the extent of this region and explore the relationships between Brú na Bóinne and other ritual foci in the wider area? A third scale would seem to connect Brú na Bóinne with certain overseas areas, such as the eastern edge of the Irish Sea, the Orkney Islands, Brittany and Iberia, where similar monuments were constructed and very similar art styles were sometimes used, and areas like Ballynahatty and Wessex, where there are several shared elements of Grooved Ware 'culture'. There is a need for an up-to-date, authoritative statement on the evidence for and nature of these links, as well as a relative chronology of the monuments that are cited as comparanda. The examination of the full range of artefactual material from sites in Brú na Bóinne and the wider region will be critical in exploring how the monument complex functioned within these nested scales and over time.

**10. When and why did the focus of activity switch from the passage tombs to large open-air enclosures?**

The appearance of open-air timber and earthen enclosures and Grooved Ware pottery has been traditionally viewed as marking the beginning of the late Neolithic in Ireland. However, we currently have a poor understanding of the chronology of changes that occur during the late fourth and early third millennium BC, i.e. the transition between the middle and late Neolithic. There is a need to clearly identify monuments dating to the latter period and establish the degree of chronological overlap between the two phases. While there is continued use of certain passage tombs and a continued focus on the area of these earlier monuments, the change in monument styles is dramatic and may signal significant social developments. When are the first earthen enclosures built? What is the sequence of construction of these enclosures and what is their relationship to the timber circles discovered in the area?

The nature of settlement may also have shifted during this period, with perhaps some change in the level and composition of the population. Surface collection survey, geophysics, geochemistry and excavation can be used to identify and explore the non-monumental aspects of late Neolithic society - settlement, burial, economy and material culture - which to date have received relatively little attention. Answers are not likely to be gleaned from the occupation material excavated in front of Newgrange, an area of so-called 'Beaker' settlement that in fact contains a mix of material dating from the middle Neolithic through to the early Bronze Age. The collation and review of comparative, securely dated sites is also crucial; emerging data from sites like the Stones of Stenness in Orkney or, closer to home, late Neolithic sites along the M1 and M3 motorways will undoubtedly bring us closer to answering questions about the arrival and origin of Grooved Ware in Brú na Bóinne and the period of overlap with earlier material culture.

**11. What was the political and strategic significance of this area in the early historic period?**

The SílnAedo Sláine dynasty was prominent in the seventh century as kings of Brega, a territory that comprised the present county of Meath and north county Dublin. Excavations of the main passage tomb at Knowth have provided extensive for its fortification by two concentric ditches. There was no evidence for contemporary structures or occupation except for animal bones and some finds in the ditch fill. Assuming that Knowth was the residence of the kings of Brega, the royal site complex may have incorporated the earthwork on the bank of the river Boyne and the recently excavated secular cemetery at Knowth Site M. A narrowly focused excavation similar to that recently undertaken at Knowth Site M could finally enlighten us as to its date, function and role during this important period of Brú na Bóinne history.

In the early historic period the Brú na Bóinne area incorporated a major overland route, a highway between Tara and Ulster known in early medieval 'place lore' as the *Slighe Midluachra*. This highway crossed the Boyne by the ford of Brow (Brúgh) just below Newgrange and near the old Rossnaree mill. Early texts trace its route from Tara to Ulster via the ford of Newgrange (*Brúgh Meic an Oigh*), Rossnaree (*Dubhros*), and onto *Sliabh Bregha* near Mellifont. More research needs to be carried out on these main routeways and crossing points at the heart of the WHS. Did the strategic position of this putative royal demesne give rise to more defensive domestic enclosures, i.e. ringforts?

**12. What is the evidence for and significance of early ecclesiastical sites?**

We know relatively little about the pre-Norman ecclesiastical sites within Brú na Bóinne. Slane was undoubtedly the main ecclesiastical centre in the area but there were smaller ecclesiastical sites at Dowth and possibly at Stalleen, Rossnaree and Monknewtown. Dowth is particularly intriguing, with its long unbroken settlement history. A reference to the slaying of Oenghus of Slane by the airchennach of Dubad (Dowth) (AU 1012) indicates that there was a pre-Norman church at Dowth and listed in the *Genealogies* is Senchan, the saint associated with Dowth. The Annals of the Four Masters also list this church at Dowth amongst those burnt by Diarmait Mac Murchada in AD 1170. Further documentary evidence for an early foundation at Dowth is found in a twelfth-century missal. A number of re-used architectural fragments have been identified in the make-up of the church, indicating a possible Hiberno-Romanesque pilaster in the gatepost of the graveyard, and a worn arch stone used as a step. The historical sources indicate at least three different building phases of the church at Dowth. A multi-disciplinary study of this ecclesiastical site is long overdue.

When the story of Patrick came to be written, the Boyne Valley was chosen as the location for its symbolic if not actual beginning and the Hill of Slane, three kilometres west of the Brú na Bóinne, has traditionally been associated with the saint's earliest deeds. However, this identification has recently been questioned. There is, for example, an intriguing reference linking Patrick with Newgrange from the *dindshenchas* of *brug* (Newgrange) contained in the *Book of Ballymote*: "The grave of Esclam, the Dagda's brehon, which is called now Fert-Patric". What was the relationship between the early foundation at Slane, their patrons the SílnAedo Sláine dynasty and Brú na Bóinne?

Future research could also usefully explore how the archaeology of early medieval foundations such as Dowth changed from monastic church to medieval parish with the restructuring of the Church in the twelfth century.

**13. What was the nature of the Viking presence and the associated political changes between the ninth and twelfth century?**

It is possible that a Norse longphort existed on the Boyne, perhaps at Rossnaree, in the ninth century AD. This argument is based on the numerous references in the annals to Norse incursions into the Boyne valley, repeated attacks on localities within the Brú na Bóinne, and the presence of a naval force of Norsemen on the Boyne at Linn Rois (Rossnaree) in AD 842. That entry also notes the plundering of Birr and Saighir by the foreigners of the Bóinn and it appears that the Norse were using the Boyne as a base from which to attack monasteries in the midlands. Between AD 837 and AD 1032, there were several major Norse incursions into the Boyne. The scale of these incursions is highlighted in the annals which record a naval force of sixty Norse ships on the Bóinn in AD 837. These forces plundered the plain of Bréga, including 'churches, forts and dwellings'. Underwater investigations could yield valuable information on these Norse occupants.

In the ninth century the Síl nAedo Sláine made alliances with the Norse against the Clann Cholmain. Maelmithig Mac Flannacain became a powerful overlord in AD 918, as did his son Congalach Cnogba, in the mid tenth-century. The period of their reign coincides with a major re-settlement phase at the main mound at Knowth. The construction of souterrains may point to the rise of the slave trade as a significant economic pursuit and suggest that Brú na Bóinne had become incorporated in the economy of Viking Dublin. How did the rise of feudalism and the ever-increasing centralisation of power impact on the homes and lives of relatively independent commoners in the ninth and tenth centuries? Did it lead to the abandonment of most of the ringforts in the area and the enlargement of others?

**14. How was medieval Brú na Bóinne connected?**

In what ways did the foundation and development of Drogheda impact on the landscape and environment of Brú na Bóinne? Similarly, what were the connections with Slane? Can any roads and routeways dating to this period be identified on the ground? What was the nature of these communication routes? What was the role of rivers in terms of trade and transport? What was the extent and nature of Brú na Bóinne's inland and overseas trade? What other roles did the rivers have, especially the Boyne (in terms of milling, fishing, defence, provision of water etc)?

**15. Is it possible to chart land ownership in detail from the medieval period to the present day?**

The arrival of continental monastic orders and the Anglo-Normans in the 12th century undoubtedly brought significant administrative change. However, we know relatively little about the degree of continuity from the early historic period in terms of land ownership, administrative boundaries, land organisation, land use, agriculture, industry and economy. Who were the land-holding lay families in medieval Brú na Bóinne? Where did they come from and what were their inter-relationships? What was the role of religious houses and how did this fit into a wider national and international context? What, for example, are the comparisons and contrasts between the management of Llanthony properties in the Boyne Valley and those in Wales? What was the background to the land grants to the Cistercians and the Augustinians in the area and what effect did the dissolution of the monasteries have on land ownership? Has there been continuity of ownership over time? Have holdings been enlarged or subdivided? Who currently owns the land? The records kept by Church, Crown and ultimately State on the various land holdings and dealings within Brú na Bóinne and around should in theory provide us with a picture of land ownership from the twelfth century onwards. Cartographic analysis, and the examination of later maps such as the Down Survey, the Ordnance Survey and estate, may also help us explore earlier land-holding and settlement patterns.

**16. How can we expand our knowledge of the Battle of the Boyne?**

The pilot survey of the archaeological potential of the Oldbridge Estate identified a number of directions for future research in the area (see above). Targeted diving in the river and a combined



detailed topographic survey were suggested, as well as the extension of the geophysical survey in the area of Oldbridge village to establish its extent, followed by excavation aimed at elucidating the character of the settlement and its role during the battle. Systematic large-scale metal detector survey across the full extent of the Oldbridge estate would identify further areas of potential. Beyond the estate, further work could usefully take in the wider landscape, especially those areas that are known to have figured in the battle, such as the Hill of Donore and Platin. There are strong oral traditions in the area regarding some buildings and their connection with the Battle of the Boyne and more detailed research is needed on specific sites such as the farmhouses at Fennor and Stalleen and buildings at Sheephouse. The key and sensitive question of the burial places of the casualties of the day, if they exist, also needs to be addressed.

## **Landscape and Environment**

### **17. What is the current status of biodiversity and geodiversity?**

While considerable data on the natural heritage of the WHS already exists, there is still a need for additional baseline data for the Brú na Bóinne area, such as a habitat survey and map (in accordance with Heritage Council guidelines on habitat mapping) and an inventory of terrestrial and aquatic plants as well as a tree survey. Other areas of inquiry include the conservation status on Annex I Habitats and Annex II species (otter, salmon and lamprey) as well as protected species of flora and fauna. A general survey of mammals, small mammals, otters, birds, bats, invertebrates and aquatic fauna is also needed, this latter detailing the conservation status of fish stocks within the Boyne. A preliminary survey of invasive species along the Boyne has been undertaken but much more information on terrestrial and aquatic invasive species is required.

A project to provide an integrated, comprehensive GIS model of landscape evolution and land-use history in the Boyne Valley has been given funding in 2008 by the INSTAR (Irish National Strategic Archaeological Research) programme. Complementary avenues of research include investigating post-glacial sea level patterns and how they influenced the landscape of the WHS; examining the geology of the Upper Carboniferous Shales and Sandstones; determining the geometry and extent of rock outcrop around the monuments, as well as the exact soil drainage characteristics of the regions around the monuments.

### **18. What are the threats to biodiversity and geodiversity? What actions can be taken to manage, enhance and protect biodiversity and geodiversity?**

A study of land use to include historical, current and possible future land use with changing agricultural practices (such as the switch to energy crops) would be very valuable in assessing the impact of changing land use, invasive species, climate change and development pressure. More work needs to be carried out on the ways in which natural heritage can be protected and enhanced in the Brú na Bóinne area. This could include research into the control of invasive species and examining how biodiversity can be increased on state-owned land, initiatives which would need regular monitoring.

### **19. How has the Brú na Bóinne environment changed over the last six millennia?**

What is the earliest evidence for human interference with the natural woodland in the Brú na Bóinne area? Were the Neolithic passage tombs built in an open or wooded landscape, and was farming activity conducted in the vicinity? Were the passage tombs central or peripheral to settlement and everyday life? To answer questions like these, it is first essential to establish what the natural environment was like from the early prehistoric period onwards. The demise of Ireland's primary forests seems to have begun in the Neolithic and has been accompanied by a decline in biodiversity in general. On the other hand, new plant and animal species have been introduced deliberately and inadvertently as a result of human activity. The existing palaeo-

environmental record for Brú na Bóinne is poor. New, systematic palaeoenvironmental research will have a key role in piecing together the vegetational history of this traditionally agriculturally-productive area of Ireland. Understanding this aspect of the Brú na Bóinne WHS is also critical to the presentation of the extent and nature of settlement and landuse strategies across all time periods.

Detailed, local-scale palynological analysis can facilitate a reconstruction of the development of woodland in the area, providing information on the changing character and ultimate demise of woodland cover, the floristic diversity of farmed land and the development of hedgerows. By examining continual records of vegetation cover provided by the pollen sequences, it will be possible to establish if and when levels of human activity in the Brú na Bóinne area dropped in intensity and possibly by comparing local-scale records, whether the focus of human activity shifted from one area to another over time. Sampling of small wetland basins will be particularly useful for detecting evidence for arable agriculture. Coleopteran analysis from palaeochannel deposits can also provide important insights into habitat loss and biodiversity. Strong chronological control, obtainable through close interval radiocarbon dating, is essential for understanding the timing of human impact on the landscape and enabling specific periods of significant change to be identified.

#### **20. How did the plant and livestock economy evolve through prehistory and during the medieval period and later?**

The substantial amounts of animal bone from the late Neolithic/Early Bronze areas of activity in front of Newgrange and from the medieval occupation of Knowth have provided detailed information on the livestock economy and meat diet of the area during the Early Bronze Age and Early Medieval periods. There are however large gaps in our knowledge for other periods. Moreover, without knowing how comprehensively plant remains were sampled at sites it remains extremely difficult to calculate the importance of wild and domesticated plant resources. The visibility of bone remains is much higher than plant remains and can often achieve an apparently higher significance in the economy of a site. It is important not to make such an assumption. Future research should endeavour to retrieve substantial samples of both bone and plant remains to allow us to fill these knowledge gaps.

Related areas of research could include investigating the evidence for ritual feasting or deposition in Brú na Bóinne during the prehistoric period, given the nature of the activity so far uncovered. Ritual activity in many early societies included blood sacrifice and/or ritual feasting. This can often be identified in the archaeological record by the unusual deposition of food remains, i.e. animal bones. In later periods, one might also usefully explore how the presence of large urban centres affected the livestock economy of the area. Brú na Bóinne lies close to the large Anglo-Norman town of Drogheda. There have been numerous studies of faunal assemblages from urban areas of this period including Drogheda, Dublin, Waterford, Cork, Limerick, and Galway. There has been very little opportunity to study assemblages from the hinterlands of these towns however. Such analysis would allow us to ascertain how the presence of a large urban population influenced the livestock economy of a surrounding rural area. Brú na Bóinne would be an excellent location for such a study. We also have little idea how farming was affected by the arrival of new monastic orders during the 12th century, in particular livestock farming which would have changed radically with the commercialisation of wool production occasioned by the arrival of the new monastic orders. The establishment of the Cistercian monastery at nearby Mellifont is likely to have caused such change. Faunal remains from this period need to be studied in order to investigate this hypothesis.

#### **21. How can we better understand the River Boyne?**

Brú na Bóinne is one of the most studied archaeological landscapes in Ireland. However, the very feature around which many of the sites are focused, the river, has largely been ignored from an archaeological perspective. We do not, for example, have a map of the riverbed. Palaeochannels have been identified in a number of locations and may have influenced the siting of monuments and settlement sites. Flooding and changes in the line of these channels may also have influenced human activity. The tidal extent of the river at various times has implications for subsistence strategies and the nature of travel and communication within the wider area. The Boyne is a river of very high archaeological potential, with historical and archaeological evidence indicating that it was a major focal point throughout time and was used for a variety of different purposes, including travel, transport, communication, fishing, natural resources and religious veneration. Future studies of Brú na Bóinne should take into consideration the underwater archaeological potential of the river and put in place appropriate methodologies for a multidisciplinary approach to assessing that potential. The geomorphological development of the wider river valley is also critical to our understanding of the archaeological potential of this landscape.

Overall, the aim of future work should be to try to obtain a better appreciation and understanding of the role and relevance of the river throughout prehistory and into the early medieval period. Any future programme of research should include exploration of the sacred nature of the river and its ritual uses in the past. In Celtic mythology for example the river Boyne was considered to be a supernatural being, appearing as the female deity Boann, and was associated with passing into the underworld. In the 19th century Wilde recounts a tradition of swimming cattle across the river as a charm against fairies and certain diseases.

**22. When does the transition to farming take place in Brú na Bóinne and what changes does it bring about?**

The earliest Neolithic remains so far uncovered within Brú na Bóinne are the rectangular houses at Knowth. Do these structures represent the first Neolithic presence in the landscape? If not, where in Brú na Bóinne do Neolithic groups first settle and what is the level of interaction with Late Mesolithic populations? What is the environmental impact on the area of the arrival of the first farmers? How quickly is the landscape cleared of its woodland cover? How extensive are the clearances and are they permanent? Surface collection survey followed by geophysical survey, geochemical survey and excavation will be important in identifying the extent and nature of settlement during this period, hopefully providing appropriate material for detailed dating, including Bayesian analysis, and evidence to facilitate environmental reconstruction. Consideration also needs to be given to how this early Neolithic activity in Brú na Bóinne fits within our broader understanding of the period in Ireland as a whole.

**23. What is the archaeoastronomical significance of the Brú na Bóinne monuments?**

O'Kelly's observation of the winter solstice alignment of the main Newgrange tomb initiated the first modern scientific archaeoastronomical investigation of an Irish archaeological monument. Subsequent research has made it clear that astronomical factors were important considerations in the world view of people in the Boyne Valley during the Neolithic and Bronze Age, and current thinking is shifting towards acceptance of the symbolic nature, use and power of astronomy rather than its use as a precision tool - which is not to dismiss the idea that the apparent movement of the sun on the horizon may also have been used to divide the year into culturally meaningful segments of time. What additional monuments within the WHS might be tied into the astronomical alignments recorded at Newgrange? What is the archaeoastronomical potential of the pit and post circles, the henges, and the so-called 'cursus' monument?

Current research is also beginning to reveal the wider occurrence of solar alignments at Irish passage tomb sites outside of Brú na Bóinne. There is additional evidence to support the hypothesis that sites and tombs were apparently 'linked' - both visually and tangibly - across

their distribution range. Importantly, therefore, the Boyne Valley should not be considered as a stand-alone landscape but as one that is a component part of a wider whole. Future multi-disciplinary research initiatives need to fully explore these astronomical and other alignments, as well as recording the visibility of passage tombs in the prehistoric landscape. What is the level of intervisibility between tombs and what might this say about prehistoric social networks? Are there any correlations between the astronomical and spatial characteristics of tombs and their morphology and passage tomb art?

**24. How was land used during the medieval and post-medieval periods and can we gauge the environmental impact?**

The medieval and post-medieval periods saw intensive agricultural production in the area. What were the main land uses (arable, meadow, pasture, woodland etc)? Where were these practised and how did this change over time? To what degree did monastic farms or granges operate in the area (where was the grange of Newgrange, for example)? What was the nature and extent of field boundaries? To what degree did ownership of the land by religious houses influence the type of agriculture that was practised and the techniques and technologies involved? What was the impact of medieval and later peoples on the environment of Brú na Bóinne?

**25. What is the extent of the aerial photographic resource for Brú na Bóinne?**

Both vertical and oblique, in public and private collections, exist for the Brú na Bóinne landscape. The photographs are particularly useful in prospecting for previously unknown sites and in sharpening appreciation of the sites. They have assisted in the identification of low-relief earthworks and sites that manifest themselves as differential growth in crops (cropmarks). Repeated oblique coverages can be valuable in identifying cropmark sites that may only be visible at certain times of the year, depending on the climate and crop growth factors. Over time, repeated coverages can provide a valuable historical record of the area and assist in the mapping of threats and changes to the landscape. Vertical photographs provide not just a tool for drawing accurate maps but also an easily understood visual map of the area or site—a snapshot at the time the image was taken.

Given the value of existing aerial photographs, it is important that all available examples are collated and an archive of aerial photographic libraries is created. Amongst other things, the rectification and mapping of data on these images would be of very significant help in the analysis of changes to the landscape in the recent past.

**26. What could be achieved by further geophysical survey?**

To date, geophysical investigations have been carried out in connection with specific projects related to research and the mitigation of development impacts. Given the piecemeal nature of the application of geophysical methods in Brú na Bóinne, it is felt that the potential of geophysical survey to map and record on a wide scale the subsurface landscape at Brú na Bóinne has not been realised. Furthermore, accessing the results from surveys carried out to date is difficult.

Future geophysical surveys at Brú na Bóinne should include a systematic geophysical survey from a regional to a local scale to define and characterise the resource; the acquisition of previous/ongoing survey data; the completion and publication of unfinished surveys; the setting up of a GIS-compatible database; the provision of technical guidelines for new surveys. As well as mapping 'hidden' landscape and site elements and confirming new sites arising from concentrations and distributions of lithic scatters, geophysical survey could help measure environmental impacts on known sites.



## Legacy

### 27. What more can be done with the megalithic and rock art of the Boyne Valley?

A detailed analysis of the 350+ carved stones with megalithic art from Knowth is well under way and will be published in conjunction with the archaeology of the main mound. Particular attention has been paid to the sequence of art application and the different techniques utilised, as well as the importance of examining the 'hidden' art in terms of the structural sequence of the tomb. The cultural significance of the geology of the carved stones has also been explored, as has the wider context of the carvings, both within Brú na Bóinne and abroad.

Laser scanning of the Brú na Bóinne megalithic art would create another level of recording to accompany the existing drawings and photographs. This technique could be particularly useful in detecting subtle underlays and overlays of motifs. The creation of a master database of all megalithic art in the Boyne Valley would also be a useful research tool. This has been undertaken for the Knowth material and could be extended to incorporate all relevant material in the World Heritage Site. A significant amount of megalithic art may yet lie undiscovered in the unexplored sections of Newgrange and, in particular, Dowth although the investigation of such would require highly invasive research methods. Less invasive avenues of research could include examining how the megalithic art in Brú na Bóinne connects to the art from Tara and Loughcrew, or how – if at all – it relates to cup-and-ring rock art elsewhere in the local area and beyond.

### 28. The past in the past - what was the role of the prehistoric sites in the later periods?

Within Brú na Bóinne there is consistent evidence for the re-use of the major prehistoric monuments. The main mound at Knowth, for example, became a focus of extensive domestic settlement and there was also domestic and ecclesiastical activity at and near the main passage tomb mound at Dowth. At Knowth (Site M) a secular cemetery of sixth to tenth century date appears to have developed out of a ring-barrow tradition. Interestingly, Newgrange passage tomb does not seem to have been re-used for settlement in the Iron Age and early medieval periods. What was the motivation for this adoption (or avoidance) of the prehistoric centres by early historic society?

### 29. What survives of the place lore and folklore of Brú na Bóinne and what light can it shed on past events?

Brú na Bóinne has a rich place lore and folklore, some of which can be traced to the late pre-historic or proto-historic period and which has been added to by successive generations up to the early modern period and later. The area is associated with some of the chief figures in early Irish mythology. Pre-Patrician annals, sagas and placelore such as *Cath Ruis na Ríg* (which describes a battle at Rosnaree) frequently contain topographical and geographical detail on the early Boyne landscape. Early medieval place lore or *dindshenchas*, written down in the tenth to twelfth centuries, mentions *brug*, describing the graves of particular individuals still visible at the time of writing and listing individuals known to have been buried there beginning at the top of the ridge and working downhill to the river. The *dindshenchas* texts also record monuments that have not been identified. There are references to a fulacht Fiachach Sraiptine, mentioned in AFM 276AD, and boat-shaped burials at Newgrange such as Barc braineach.

Research also needs to be carried out on the townland names and field names in Brú na Bóinne, most of which probably originated in the later medieval and post-medieval periods. What are the connections between surviving buildings and more recent folklore, relating, for example, to the Battle of the Boyne? Tradition has it that the derelict building complex at Sheepphouse functioned as a field hospital for the Battle of the Boyne, while the thatched farmhouse at Stalleen baked bread for the troops. In what ways can local knowledge be accessed, gathered and interpreted? Research into and recording of the oral traditions linking vernacular building with the Battle and

other important events would be of considerable interest locally and add another layer to cultural tourism.

**30. What is the value of material/artefact assemblages from old excavations and surveys?**

Reassessment of old artefact assemblages and environmental samples in the light of more recent theories, ideas and discoveries should be an ongoing process. Given the pace of technological change, it is likely that there is a range of new techniques now available which could usefully be applied to material recovered during old excavations. Advances in dating techniques in particular offer a key source of new information. The possibility exists for the identification of material that may have been overlooked or misclassified originally because of the particular research questions being pursued or methodologies being employed at the time. Any detailed programme of dating of excavated sites and monuments will have the additional effect of providing detailed dates for particular contexts and the artefacts recovered from them facilitating the creation of detailed characterisation and typological sequencing of various artefact classes. There is a need for an assessment of archive material in order to determine how well understood assemblages of artefactual material, including pottery, lithics and other material, are from each phase of activity. Key questions relate to typological and stylistic changes, the range and sources of raw materials used during each phase and possible additional knowledge from the application of modern analytical and scientific techniques.

An inventory of all known artefacts from the World Heritage Site is also badly needed. Later prehistoric material from the area, for example, is held in a number of institutions in Ireland and abroad and its proper recording is crucial given we know very little about the material culture of people in later prehistoric Brú na Bóinne.

**31. What is the nature, date and current condition of the recorded monuments within Brú na Bóinne?**

Some 93 Recorded Monuments lie within the bounds of the World Heritage Site. They include passage tombs, henges, fulachta fiadh, cist burials, ringforts and souterrains. Many of these monuments have been surveyed in the past at different times and there is much ambiguity and confusion relating to their classification. Research should be directed towards the better identification and classification of such sites using whatever techniques are required, up to and including excavation. A key priority should be the recovery of dating material. Such a programme would be very informative in relation to the development of monument construction in the area and could provide data where gaps in our knowledge currently exist, particularly monuments of the Early Neolithic and the Bronze Age. There is also an urgent need to assess the condition of all of the monuments in the WHS, to include the sites themselves as well as their settings.

Monuments outside the WHS should also be examined in order to address questions of wider regionality. For example, the mound at Millmount in Drogheda has often been described as a possible passage tomb and it is also possible that the motte on the top of the Hill of Slane is also a remodelled prehistoric monument. A range of techniques could be used to address this question including detailed topographical survey including aerial photography and LiDAR, geophysical survey, geochemical survey and excavation.

**32. What is the built heritage of the area and is it stylistically representative of the country as a whole or has it any unique characteristics?**

Only a handful of upstanding buildings dating to the medieval period are known, although an additional number may survive as cores within later structures. We know relatively little about who owned these buildings through time or their architectural history, including the date of their construction and of subsequent alterations. For buildings erected in the 19<sup>th</sup> century, Stout (2002) has recently estimated that 58% of nineteenth century housing stock disappeared between 1854

and 1998. While good examples of the larger house types survive, the remaining smaller buildings are critical to provide a representative sample of the built heritage of the area. Vernacular buildings are most at risk as evidenced by the recent destruction by fire of the roof of Boyne Valley Cottage, east of the village of Donore.

A comprehensive inventory of all structures in the area should be carried out. This might initially be confined to pre-1963 buildings with the locations of post 1963 buildings merely mapped and noted. This inventory should identify all elements of the built heritage that is considered of importance within the area and should include industrial buildings, ecclesiastical and institutional buildings, the canal, mills, bridges, the big houses and the cottages. With additional resources more detailed recording should follow, which might include condition surveys where there is a danger of losing a structure considered to be of importance and/or irreplaceable. This survey work will inform recommendations for the protection, and if necessary, adaptive re-use of these structures to ensure their survival. Another outcome of this inventory and recording should be a map of all upstanding structures in the area by period of building.

**33. How has conservation impacted the Brú na Bóinne monuments, in particular Knowth and Newgrange?**

Major programmes of excavations and conservation have occurred at both Newgrange and Knowth. While excavation revealed features in and around the tombs, the work has also exposed them to new threats such as pollution, weathering and human impact. The approaches taken to the conservation works at both monuments reflect the twin, and sometimes conflicting, needs to conserve the monuments and present them to the public. An accurate knowledge of past alterations and interventions is also central to any understanding of the authenticity of the currently existing monuments. While the Boyne valley has a generally very good publication record, there is a serious deficit of information with regard to the post-excavation presentation of the monuments and the justification and recording of this aspect of the site's history.

The importance of access to these records is also evident in the recent discussion (Cooney 2006) on the presentation of Newgrange and the degree to which the presentation of the remains post-excavation corresponded to the excavated evidence. Record keeping is not only essential to conservation work but will also play a crucial role in the interpretation of the monuments in the future.

**34. How can existing and future data generated within the WHS be better integrated, managed and archived?**

The Brú na Bóinne area has been subject to research and investigation over many centuries, inspiring artists and poets. Following an audit of all existing research and research archives, there is a need to bring all of this material on the World Heritage Site together in one place where it could form important resource for future research. The 2002-2007 Brú na Bóinne Management Plan proposed that Knowth House beside Knowth National Monument be developed as a research centre and WHS library. It was also proposed that an educational centre and research offices be located there.

The establishment of a detailed online GIS-based database of the Brú na Bóinne region would greatly facilitate archaeological research at all levels. Such a database should include: a detailed classification of all known monuments and sites discovered through field survey, remote sensing or excavation, cross referenced to a database of all pre-existing and ongoing archaeological work related to each site; a listing of all known artefactual material and its current location; a listing of sources and detail of all palaeo-environmental data; a listing of other environmental data relating to the archaeology of the area e.g. geology, soils etc.; an inventory of all radiocarbon dates for the area. Given the regional importance of the Brú na Bóinne area, such a database should not be

restricted to material from within the boundaries of the WHS. Relevant material must be drawn from a wide area, e.g. the excavations from the M1, the M3 and other locations in the region.

## The living WHS

### 35. How do different farming techniques impact on different types of monuments and cultural heritage?

The imposing monuments of Brú na Bóinne are set in a rural landscape with a farming tradition that spans 6000 years. Their survival is testament to the tradition of respect shown by countless generations of farmers in the area.

As farming changes and as new crops are grown, there is a need to research which farming techniques have less impact on the archaeology and biodiversity of the area. There is also a need to protect the built heritage from the cumulative small changes that can erode its character. Do we want to protect features such as hedgerows, laneways and field patterns and how might we do this? While the area is a designated World Heritage Site, there is no control over works being carried out within the site which are deemed exempted development under the Planning and Development Acts, such as the addition of extension up to 40 sq m in floor area, insertion of uPVC windows, and landscape changes created by new farming practices.

18<sup>th</sup> and 19<sup>th</sup> century demesne landscapes are an important part of the cultural and architectural heritage of Brú na Bóinne. Alterations to the setting of buildings, both large and small, including the widening of roads, removal of field hedges and roadside ditches, insertion of post and rail or ranch style fencing, planting of unsuitable screening such as tall *leylandii* hedgerows can all have a significant impact on the landscape setting. The most effective, easily-administered method of achieving control over such changes should be investigated and recommendations made for putting this in place.

### 36. How much new residential development has there been in the area in the last 10 - 20 years and how can it be better managed?

There has been considerable demand for new one-off houses in the Brú na Bóinne area in the last 10 years. There are varying perceptions that the area has been subjected to excessive development, or alternatively, that it is impossible for children of the area to get permission to build there. Are either of these perceptions correct? It is suggested that all planning applications for developments in the area should be recorded statistically on an on-going basis.

How can we design new houses that fit into the landscape? Many designs for houses have been less than sensitive to the rural setting and it would be useful to prepare guidelines, or even typical plans for buildings that would be more appropriate to their rural setting, where it is considered that a suitable site has been found. Meath County Council has commissioned guidelines for rural housing in the county, which should be broadly relevant to the area. If necessary an additional section could be added to ensure that they are applicable to the World Heritage Site, and other locations in the county that are particularly sensitive to unsympathetic development, such as Tara and Loughcrew.

Are there sites where these can be most easily accommodated, or are there areas that can accommodate clusters of buildings? What is the capacity of the landscape to absorb further development without damage to the character of the area? The first edition (1836) OS mapping shows areas with clusters of cottages. These historic cluster sites should be investigated to determine the survival of structures in the area and such sites might form the basis of small nucleated housing clusters. Early mapping also indicates a number of laneways, particularly in Monknewtown. An investigation of the survival of these might form the basis of walking routes around the area.



**37. Can derelict or underutilized buildings be adapted and re-used?**

The largest losses in the built heritage of the area are that of 18th and 19th century cottages. These have either fallen into dereliction, been demolished and replaced by new bungalows and houses, or have had their character altered beyond recognition by the removal of original features and the addition of unsympathetic extensions. The remaining early cottages should be identified, even where ruinous, and proposals put forward for their sensitive adaptation and re-use. The State might produce guidelines, including typical plans for the adaptation of such cottages. A pilot scheme, i.e. taking on a derelict house, would be particularly beneficial by way of providing a walk-in example of such a design.

**38. How was the core area of the World Heritage Site defined? Is this designation adequate?**

Where exactly are the boundaries of the World Heritage Site, for example, does the core area end on the north bank of the Boyne, the south bank of the Boyne or does it end in the middle of the river? Are the boundaries as set out now adequate or is there a need to re-examine the core area and the buffer zone? Should the buffer zone relate only to the vicinity around the core area or should activities that occur outside the buffer zone but which possibly could have an impact on the WHS be taken into account?

**39. How can we assess the impact of large developments outside the borders of the area?**

Some of the more unforeseen impacts on the character of the area can come from large-scale developments outside the site, such as the cement factory at Platin. An investigation into the strategic long distance views into and out of the area is needed, for example, the arc of the winter solstice where the sun rises over Redmountain and hits the light box at Newgrange. The recent LiDAR survey of the area can be worked up to assist with this and a map provided to show areas where development should not occur.

**40. What are the changes in legislation that have occurred since 2002 that are relevant to the management of the WHS?**

Many different bodies such as the Office of Public Works, the Department of the Environment, Heritage and Local Government and Meath County Council have an input into the management of the WHS. However, these are not the only bodies. Other groups such as the National Parks and Wildlife Service and the Environmental Protection Agency, to mention but two, also have an influence. When the last Management Plan for the WHS was published in 2002, it included a full audit of the legal and protective measures in existence then which had an impact on the WHS. Developments in many of these areas may have occurred since 2002 and these may need to be examined.

**41. How are visitors interpreting, enjoying and accessing the monuments?**

In 2007, nearly quarter of a million visitors came to see Newgrange, Knowth and Brú na Bóinne Visitor Centre. Where did they come from? What were their expectations? How is their experience evaluated? What could be done to improve the experience? Are visitors coming away with an understating of the need to protect the monuments for future generations? Is there an appropriate balance being struck between access and conservation? There is a need for an independent tourism research project as part of the Boyne Valley research project using modern best practice.

**42. How can research be used in a positive way to involve the local community in the management of the World Heritage Site?**

The local community is proud to live and work in or near the World Heritage Site. They have always supported the excavations and research that has taken place. How can the proposed

research framework involve the local community – farmers, landowners and residents - in a positive way?

To assist people living in the locality it is suggested that a publication for landholders and owners in the area should be produced, explaining the designation of the site, its international importance and how they and the state can work together to maintain their inheritance for future generations. A field monument guide that maps and interprets all of the WHS archaeology and places it in its landscape setting would help promote more sensitive development and conservation and a local pride of place. Linking such material in with an updatable web resource would also help keep an interested local, national and international public informed.

## Section 4 - Research Strategy

### Creating objectives

The following section sets out a plan for addressing the research questions contained in Section 2. A list of eighteen objectives have been drawn up which over the next few years will either form the basis of projects to tackle specific problem-orientated research, or will provide a context for the support of curiosity-driven research. There is no one-to-one relationship between research questions and objectives; some objectives may address more than one research question while other questions are addressed through several objectives. The objectives have been arranged here under four main headings –

- The big gaps
- The mega-tombs and related monuments
- Integrating monuments and landscape
- Research infrastructure

Unlike the research questions, which are effectively a ‘wish-list’ from stakeholders and interested parties, the objectives are components of a strategy that can be aimed for and realistically achieved in a reasonable time. A balance must also be struck between setting out a route to specific research goals and allowing enough flexibility to respond to unexpected discoveries and opportunities. Objectives have thus been drawn up with a number of key questions in mind: *e.g.*, how will objectives be achieved and by whom? In what contexts will they be undertaken and what priority do they have? It should also be noted that several of the research objectives are being addressed wholly or partly by a number of current projects. These are listed below.

### Current Initiatives

#### **Investigation of geophysical properties of lithic scatter sites at Brú na Bóinne, Co. Meath**

Funded by the Heritage Council, a programme of targeted geophysical survey is underway in Brú na Bóinne which builds the results of a large-scale fieldwalking survey. This research had the systematic identification and mapping of prehistoric settlement evidence in the wider Brú na Bóinne landscape as its focus and has revealed extensive evidence of earlier prehistoric (primarily Neolithic and Early Bronze Age) activity in the form of a continuous blanket of lithic material. Dense scatters of material within this distribution may represent focal points in this landscape. The aim the current programme of survey is to explore the geophysical properties of some of these lithic scatters in an attempt to better understand what activities they represent and, where possible, to identify possible residential settlement locations (*contributed by Conor Brady*).

#### **Knowth Publication Project**

To date four Royal Irish Academy volumes have been published on the excavations at the Knowth passage tomb complex. The first focused on the archaeology of the small tombs; this was followed in 1997 by an examination of the Neolithic settlement evidence and the Beaker/Early Bronze Age activity; the third volume dealt comprehensively with the faunal remains assemblage from the Early Christian period of occupation and the most recent

publication explored the historic hinterland of the site. Work on a further three volumes is currently in progress. The fifth installment will deal specifically with the archaeology of the first and second millennia AD, incorporating the burials from the later prehistoric period. This volume will examine the eighth century double-ditched enclosure, the numerous souterrains and houses uncovered and will include an extensive finds catalogue. The sixth volume in the series will present the archaeology of the large mound, passage tomb 1, including an extensive dating programme, re-analysis of the burials, a closer look at the geology and environmental evidence and an examination of the conservation and reconstruction methodology employed at the site. This book will have a companion volume that will specifically present the large corpus of megalithic art uncovered at Knowth. All seven volumes will encapsulate the complexity of the archaeology uncovered and the longevity of the site's occupation (*contributed by Kerri Cleary*).

### **SHARE IT Project**

The aim of the Spatial Heritage & Archaeological Research Environment I.T (SHARE IT) project is to investigate spatial archaeological landscape data in Ireland and to develop a WebGIS tool pilot for its exploration for use in further research. The key research challenges will be: assessing current levels of spatial data content and standards within the Irish archaeology sector, identifying suitable digital archiving strategies for spatial landscape data, developing and testing a suitable WebGIS for the exploration of spatial archaeological landscape data and the promotion of this data to the archaeological research community. Initially the WebGIS tool will host geophysical, aerial and LiDAR data, together with their associated interpretations. This project has obvious potential for the management and dissemination of data relating to the World Heritage Site, of use to both the interested public and the research community (*contributed by Anthony Corns*).

### **Boyne Catchment GIS Project**

This INSTAR funded project aims to develop an integrated and comprehensive landscape archaeological model for the history of the River Boyne, with a focus on linking changing land use and environment to the known landscape of ancient monuments and settlement. The aims of the project are to collate all extant landscape and environmental data available today into a GIS database for modelling purposes, and to use this database to identify zones of likely change in the natural and cultural landscapes. Groundtruthing of 2-3 specific zones of the river system against the model developed from the GIS database is to be carried out, and then integrated into the GIS, providing a comprehensive dataset for and model of landscape and river history in the River Boyne valley which can be made available for public use (*contributed by Helen Lewis*).

### **The Brugh na Bóinne Research Project**

This project, under the direction of Joe Fenwick (NUI Galway), Richard Warner (Belfast) and George Eogan (Dublin), is part of an ongoing research initiative designed specifically to address the nature and function of selected monuments within the broader landscape of the Brugh na Bóinne World Heritage Site through the exclusive use of non-invasive survey techniques. This project also serves as a vehicle for the instruction of postgraduate students from NUI Galway in the use and application of scientific survey techniques and associated software. Since 2004, integrated magnetometer, electrical resistance and micro-topographical survey have been conducted on and in the vicinity of a sub-rectangular enclosure in Newgrange townland. In the 2007 programme of fieldwork magnetometer survey was expanded beyond the confines of the



earthwork in order to map the full extent of the sub-surface archaeological remains and electrical resistance survey was extended over the western rampart. In addition, a magnetic susceptibility survey was conducted over selected features of the site (contributed by Joe Fenwick).

### **Meath Field Name Survey**

There are approximately 100,000 fields spread across 44 parishes and 1,600 townlands in the county of Meath. A survey of these, to include names, lore, legends, features and any known historical connections, was launched in May 2008 by Meath Archaeological and Historical Society, the Irish Farmers Association and the Meath County Library Service. The survey, overseen by an elected steering committee, is expected to run for the next two years. To undertake a survey of this magnitude the co-operation, support and active engagement of a large number of people across the county will be required (*contributed by Martin Dier*).

## **Research Objectives**

### **The big gaps**

#### **1. Reconstruction and modelling of palaeoenvironment and landscape development**

The wider landscape of County Meath in which the World Heritage Site sits has a paucity of bog or wetland environments and opportunities for the retrieval of traditional palaeoenvironmental data from the WHS, and from the vicinity of the main monuments in particular, are few and far between. Some preliminary attempts have been made to locate potential waterlogged sites (David Weir, pers. comm.; see *Section 2* above) and such work could at the least be followed up by a more robust feasibility study of wetland palaeoenvironmental sampling sites. However, of perhaps greater relevance to the WHS is the palaeoenvironmental data available from dryland sites. There are many opportunities to retrieve data from soils and sediments both within the WHS and the monuments themselves. Studies of dryland data are crucial to understanding ancient land use practices and changes in specific locations and feed directly into the landscape-scale models developed from more classic wetland locations. Material from both wetland and dryland deposits could potentially reveal much about the past landscapes of Brú na Bóinne from prehistory to the present day. Analyses include palynology, diatom and coleopteran analysis, beetle and molluscan analysis, macrobotanical analysis as well as analysis of pedological, sedimentological and hydrological data from dryland, monumental and fluvial locations.

Suitable environmental material may also survive in older excavation archives and appropriate environmental sampling strategies put in place for any future excavation in the WHS, whether development or research-related, is crucial. A recently established research project aims to model landscape and land use history in the river valley through the collation of pre-existing spatial and environmental data and the sampling of soils, alluvial and colluvial sediments (see *Current Initiatives* above). This programme of mapping and modelling could easily and valuably be extended across the Boyne flood plain and terraces and around the various monuments. The mapping of subsurface deposits through techniques such as augur survey will give us a better idea of landscape and land-use change over time, perhaps even identifying areas of colluvial material and buried landscapes. Systematic waterborne geophysical survey is also needed to define and characterise the river itself (and other important waterways such as the River Mattock). As well as providing a much-needed map of the current riverbed, techniques such as swath bathymetry, sub-bottom profiling and marine LiDAR can contribute to the assessment and

characterisation of areas of high archaeological potential along waterways including the mapping of former shorelines or land surfaces now submerged off the modern coast. Central to any reconstruction of the palaeogeography of Brú na Bóinne is an understanding of the sea level history of the area. Mitchell (1995) has speculated on the tidal extent of the river during the Neolithic but this needs to be followed up by directed investigation. Virtually no reliable sea level data exist for this part of Ireland and the latest models (see Brooks et al. 2008) provide only an approximation of sea level change on the east coast. There is a key need to ground truth this model by coring for sediments from the coast at the mouth of and adjacent to the Boyne.

## **2. Produce a master chronology for the WHS**

Over 110 radiocarbon dates currently exist for the WHS (see Appendix IV), nearly 90 of those coming from the monuments at Knowth and Newgrange. More recently, dates have been returned for Bronze Age remains uncovered along the route of the Oldbridge/Sheephouse Bypass and from Geraldine Stout's excavations at the multi-phase but primarily early medieval cemetery at Site M, Knowth. The spread across chronological periods and monument types is very uneven and affords little insight into the sequence of activity within the WHS. Targeted investigation of key monuments such as the Great Stone Circle, Dowth henge, the Newgrange cursus, Knowth ringfort and Monknewtown pond, as well as re-investigation of the passage tomb complex, is needed. For radiocarbon dating, the sampling of single entity, short-life material is crucial. Suitable material may already exist in older site archives and these need to be re-assessed (see Objective 6, below). An application has recently been made for AHRC funding for the dating of mainly Irish passage tombs, with a decision expected in early 2009. Environmental material recovered from schemes close to the WHS, such as the M1 excavations, is another extremely important resource and can provide comparative dates for sites within the WHS that it may not be feasible to disturb in the short to medium term. Post-excavation analysis for the Drogheda Bypass section of the M1/Northern Motorway scheme is currently incomplete and its future resolution would provide an ideal opportunity for maximising the potential of sampled environmental material through for example the processing of multiple radiocarbon dates. It goes without saying that any future excavation within or in the vicinity of the WHS should have in place rigorous sampling methodologies for the retrieval of suitable dating material.

## **3. Understanding settlement**

Most of the research that has taken place in the Brú na Bóinne area has been site-based, especially that of the later twentieth century. Settlement evidence has been identified during these investigations but such discoveries have generally been accidental, coming to light only as a by-product of the excavation of more prominent ritual and ceremonial monuments. As a result we have only been getting narrow glimpses of the wider settlement histories of the WHS from prehistory up to the post-medieval period. In order to understand the complex sequence of development of the settlement history of this area, a much more systematic and extensive landscape-based approach is required. A variety of desk-top studies, e.g. the examination of the aerial photographic record, LiDAR data, cartographic data, a HLC (see below), are of obvious value for early medieval landscapes and later. The settlement remains of earlier periods are perhaps best understood through a combination of systematic field-walking and geophysical survey along with targeted excavation (see *Current Initiatives* above). Follow-on excavation could take place in promising areas, while earlier areas of investigation, e.g. the 'Western Neolithic' complex at Knowth, or the Late Neolithic/Early Bronze Age settlement in front of Newgrange, could be revisited to define the extent and chronology/phasing of remains. Much existing settlement data from a variety of periods was uncovered along the Drogheda Bypass section of

the M1 Northern Motorway, only a few kilometres from the eastern edge of the WHS, and if properly analysed and fully published this archive would be extremely valuable for understanding settlement in Brú na Bóinne.

Hand in hand with the examination of the physical remains of settlements and activity areas is an investigation of diet and food procurement practices – what people ate and cultivated or gathered, what animals were reared and how farming was carried out. Older excavation archives can be examined for suitable environmental samples while all future work in the WHS should include rigorous multi-disciplinary environmental sampling methodologies. Detailed palaeoenvironmental analysis (see above) could inform us on variety of flora and fauna being exploited through time, as well as providing information on land-use and clearance. Isotope analysis on human and animal bone will help us understand the diets of people in the area, and possibly their origins. Strontium and oxygen analysis is already being carried out on some of the multi-phase burials at Knowth (Kerri Cleary, pers. comm.).

While immediate very worthwhile goals would be the detailed analysis of the M1 Drogheda Bypass archive, or an assessment of excavated material suitable for isotope analysis, understanding the settlement history of the WHS is also a more long-term objective involving a gradual accumulation of source data. This could occur in the context of future property development or land-use change, or initiative-based programmes of investigation and research undertaken by university departments, institutions or individual researchers.

#### **4. Establish the nature and extent of later prehistoric activity**

Bronze Age monuments are much less visible in the Brú na Bóinne landscape and this has given the impression that there was a decline in importance of the area during this period. However, the discovery in recent years of several ring-ditches in the east of the WHS and possibly also in the vicinity of Newgrange and Site M (see *Section 2* above) suggests that Bronze Age remains, and sub-surface remains in particular, are more extensive than previously thought. Analysis of the aerial photographic record for the WHS, complemented by systematic programmes of geophysical survey, could identify additional ring ditches, field systems or settlement enclosures, which of course will need to be ground-truthed. The same techniques can be used to prospect for sub-surface Iron Age features – the home bases perhaps of those individuals buried at Knowth and Rossnaree – although Iron Age material could only be identified as such through excavation. Osteological and isotope analysis of the Iron Age skeletal material could provide us with information on the origins and lifestyles of these individuals. Skeletal material of possible Bronze Age date from Monknewtown and Newgrange should also be assessed to determine their suitability for absolute dating and isotope analysis. Other useful initiatives include the survey, coring and test excavation of the possible Bronze Age/Iron Age ponds such as that at Monknewtown. There is also a need for early Irish historians to engage with this later prehistoric area through the examination of proto-historical sources such as the *dindshenchas* and early myths and legends.

#### **5. Understanding continuity and change in the historic period**

This is a more general objective, and one which overlaps with several others in this list, but is at the heart of the Brú na Bóinne WHS designation. Indeed, in recommending the site for inscription, the reporting committee noted that “...*the long continuity from prehistory to the late medieval period make this one of the most significant archaeological sites in Europe*”. To date however acknowledgement of this aspect of the WHS has been negligible. The two interpretative centres in the WHS – the Brú na Bóinne Visitor Centre and the Battle of the Boyne Visitor Centre – relate the Neolithic and the 17<sup>th</sup> century history of the area with little acknowledgement of the detail in

between. If we are to successfully present this to the wider public, then more, multi-disciplinary, research needs to be focussed on key junctures in the history of Brú na Bóinne, e.g. the impact of the early medieval church on Iron Age society, the influence of new Viking communities and economies, the administrations of Anglo-Norman lords, the Cistercians, Augustinians and the modern English parliament. Such research may take place at a landscape scale, looking at changes in land use and farming practice across the WHS, or at the scale of single sites – as has been undertaken on animal bone from the different phases of medieval occupation at Knowth. Primary historical research also has an essential role to play. The recent work of Geraldine Stout on the long-lived early medieval cemetery at nearby Site M also demonstrates the effectiveness of individual or curiosity-driven research projects in tackling questions of continuity and change.

## **The mega-tombs and related monuments**

### **6. The structural sequence, phasing and interpretation of the passage tombs**

The current programme of publication for Knowth Tomb 1 will clarify certain issues of phasing within the main mound, as will an ongoing programme of radiocarbon dating of bone and wood samples from the tomb. Surviving skeletal and other environmental assemblages from the Newgrange excavations might also provide suitable samples for a targeted programme of dating. Other aspects of the passage tomb complex, such as the full extent and date of Dowth and other unclassified or possible passage tombs will likely require further excavation to resolve, although as much pre-existing archive material as possible should be used in establishing a sequence for the tombs. Remote sensing techniques might also be used to obtain profiles of the many unexplored or partially explored mounds. Laser scanning of the tombs' decorated stones could further our understanding of the sequence of carving, particularly on the kerbstones which are exposed to the elements and which are liable to deteriorate further through weathering.

### **7. Investigating the essential importance and distinctiveness of the passage tomb complex past and present**

The relative scale of the three mega-passage tombs and the extraordinary concentration of megalithic art at Brú na Bóinne would suggest that the complex was at least as important in the Neolithic as we consider them to be today. Future research needs to examine more explicitly and more accurately the scales at which the monuments operated and how wide-reaching their influence was. What were the inter-relationships between the three mega-tombs? What was the nature of the contact that existed between Brú na Bóinne and nearby passage tomb cemeteries like Bremore/Gormanstown, Fourknocks and Loughcrew, as well as those across the rest of the island? Beyond Ireland, what was the interplay between places like Orkney, Wessex and Brittany, for example? At each of these scales we should be assessing the evidence for and nature of influences, as well as the relative chronology of the monuments that are cited as comparanda. The midwinter (and perhaps other) observances at Brú na Bóinne are central to our present appreciation of the passage tombs and were probably also important at other points in the past. In addition to investigating the changes in use and interpretation of the Boyne tombs through time, we should endeavour to build a more interpretative and probing approach to the religious belief that must have suffused these structures and the communities that erected them.

Much of the above could be accomplished through a series of interlinked parallel investigations focusing on different aspects of the problem. Individual researchers (archaeologists, historians, anthropologists) working in different areas could be brought together through workshops and



seminars. A research network formally established between centres such as Brú na Bóinne, Avebury/Stonehenge, Orkney and Brittany would facilitate the exchange of ideas and expertise as well as providing a strong platform for funding opportunities.

#### **8. Investigating the Great Stone Circle and the sequence of the other monuments in front of Newgrange**

Excavations at Newgrange and Knowth have demonstrated that at least some of the passage tombs remained as foci for activity into the late Neolithic and beyond. In the immediate vicinity of Newgrange in particular there is a large amount of multi-phase activity – pit and post circles, hearths, burials and occupation debris – that is poorly understood chronologically. In front of and running around the mound is a partial circle of monumental standing stones, probably originally a complete circle, which has neither been accurately dated nor fully mapped. Small-scale excavation of the Great Circle could be carried out to obtain radiocarbon or OSL dates from the stone sockets while geophysical techniques such as electrical resistivity tomography survey could establish how many stones were originally erected around Newgrange. Magnetic gradiometry and susceptibility surveys carried out in 1999 and 2000 in the field immediately to the east of Newgrange have revealed what appears to be the full extent of the larger Newgrange pit circle as well as a number of distinct elements composed of regularly spaced double and single rows of pits. Small-scale invasive and non-invasive techniques on such features combined with data from previous investigations would help us understand the sequence of late Neolithic/early Bronze Age activity at Newgrange and very likely at Knowth and Dowth as well.

### **Integrating monuments and landscapes**

#### **9. Obtaining blanket coverage of the WHS using a combination of remote sensing techniques**

The strategic position of the east coast of Ireland for communications and defence coupled with the renown of the passage tomb complex has resulted in a large aerial photographic archive for the area. Coverage dates from the 1920s at least, with the material held by various national and international institutions, from the Irish Air Corps to the National Archives in Washington DC, as well as private individuals and commercial bodies. Aerial photographs are particularly useful in prospecting for previously unknown sites and in sharpening appreciation of known sites, in particular low-relief earthworks and cropmarks. Repeated oblique coverages can be valuable in identifying cropmark sites that may only be visible at certain times of the year, depending on the climate and crop growth factors. Over time, repeated coverages can provide a valuable historical record of the area and assist in the mapping of threats and changes to the landscape. Proper recording and collation of this photographic archive is thus essential, as is a systematic programme of rectification and mapping of data on aerial images.

Other forms of remote sensing carried out in the WHS have been far less extensive and systematic. To date, geophysical survey has been carried out on a relatively small scale. However, the land use and land cover at Brú na Bóinne make the area suitable for a variety of geophysical techniques, which have been employed very successfully in recent large-scale projects such as road developments and pipelines. Necessary projects include the acquisition of previous and ongoing survey data, the completion and publication of unfinished surveys and the provision of technical guidelines for new surveys. Systematic surveys should be undertaken to define the spatial extent of Brú na Bóinne, individual complexes and individual sites and to map hidden landscape and site elements, e.g. the pit alignments between the cursus and Newgrange passage

tomb (see above). Geophysical survey can also be usefully employed alongside field walking programmes to investigate the sub-surface signature of lithic scatters (see *Current Initiatives* above). Basic LiDAR survey has been carried out at Brú na Bóinne with a resolution of 0.5m and has allowed for detailed 3D mapping of the area. The use of high resolution airborne LiDAR and hyperspectral imaging could be employed to extend the understanding of the WHS. This data can be incorporated into a GIS to provide the base map for the area and readily provide maps and illustrations of the landscape from various perspectives. Future 3D survey could be carried out at ground level to accurately record inscribed stones and the interiors of buildings, or structures.

## **10. Understanding land-use change**

Brú na Bóinne is a living landscape that has been home to a succession of peoples since Neolithic times. That landscape, although forged by geological, climatic and biological forces, has been altered and adapted by the people who made it their home. It is still home to a rural community who principally make their living by farming, and more recently, from tourism. It is hoped that future palynological and related analyses (see above) will provide detailed information on past vegetation, climate and, indirectly, on crop and animal husbandry. This palaeoenvironmental research needs to be supported by a Historic Landscape Characterisation (HLC) to show changing patterns of population distribution and land enclosure etc. Current land use within Brú na Bóinne needs to be recorded, monitored and managed so as to avoid damage to the irreplaceable asset that the WHS designation represents. A full map of all landholdings within Bru na Boinne will be a necessary practical tool in the formation of future policy. One such map, detailing farm sizes and activities, was drawn up in the 1980s (O'Neill 1989). This needs to be updated and made available to all agencies involved in the care and protection of the WHS. All planning applications for developments in the area and their outcomes should also be mapped on an ongoing basis. This kind of research will help identify areas under particular pressure from development such as housing but also agricultural/industrial.

Understanding how Brú na Bóinne has been shaped by human activity over the millennia also means understanding the area's biodiversity and geodiversity and how it has been affected over time. Threats to the natural heritage within the WHS include climate change, invasive species and development pressure. A significant amount of data on the natural heritage of the WHS exists, however this information first needs to be collated in an accessible and GIS-compatible format (see below). A baseline survey and habitat map, an inventory of terrestrial and aquatic plants and a tree survey, as well as air and water pollution monitoring, are crucial in establishing the current status and loss of biodiversity and geodiversity in the WHS.

## **11. Mapping the Battle of the Boyne**

Prior to the development of Oldbridge House and part of its demesne as an interpretative centre, an important pilot study on the archaeology of the Battle of the Boyne was carried out. This short project was able to fix the location of the village of Oldbridge, confirm the scene of the first military engagement on the day of the battle and clarify some of the theories relating to the river crossings. However much more remains to be understood about the battle, its participants and how it played out across the Boyne landscape. Recommendations for future work included additional geophysical survey, combined with detailed topographic survey and excavation, in the area of Oldbridge village to establish its extent and character as well as its role during the battle; systematic large-scale metal detector survey across the full extent of Oldbridge estate to identify the exact locations of engagements as well as the siting and extent of each encampment; and targeted diving in the river to retrieve artefacts possibly lost during the crossings. In the wider landscape, key locations such as the Hill of Donore and Platin should be investigated for

their archaeological potential, while research designed to identify the burial places of battle casualties could also be carried out.

## **12. Investigating the archaeology of the River Boyne**

Brú na Bóinne is one of the most studied archaeological landscapes in Ireland. However, the very feature around which many of the sites are focused, the river, has largely been ignored from an archaeological perspective. Future studies of Brú na Bóinne need to take into consideration the underwater archaeological potential of the river and put in place appropriate methodologies for a multidisciplinary approach to assessing that potential. The aim of future work should be to try to obtain a better appreciation and understanding of the role and relevance of the river throughout prehistory and into the early medieval period. LiDAR survey, sidescan sonar, multibeam sonar, ground-penetrating radar and sub-bottom profiling can all be used along different parts of the Boyne to map river sediments and morphology as well as areas of archaeological potential/archaeological features. Magnetic survey could also be carried out on and in the water to detect ferrous objects. Any areas of high archaeological potential identified can then be followed up by targeted and focused diver surveys.

## **Research infrastructure**

### **13. Create multiple inventories of material relating to the WHS**

At least 6000 years of human activity, centuries of administration by Church and Crown, together with over 300 years of antiquarian and archaeological interest have generated an enormous body of artefactual, architectural, cartographic and documentary data, not to mention a rich onomastic and folkloric tradition. Much of this material is spread across different government departments, universities and other institutions, and among commercial archaeological companies and private individuals and researchers. The effectiveness of future research in Brú na Bóinne is dependent on a proper understanding of the information already collected, its location and condition. Inventories could be undertaken by any number of parties or individuals as long as the results were centrally stored and accessible (see below). Certain key information, e.g. the condition of upstanding buildings within the WHS, the amount of human and animal skeletal material from excavations, the extent of aerial photographic coverage, on which future dating, mapping or management programmes were based would need to be collected systematically within a managed timeframe. Other, curiosity-driven work could be completed on a more *ad hoc* basis.

### **14. Build a Spatial Data Infrastructure (SDI) that can store, connect and display all current and future information relating to the WHS and make this accessible as a web-based database/interface**

The significance of SDI for future research at Brú na Bóinne cannot be overstated. Work to date in the WHS has generated an enormous amount of information and this needs to be properly archived, analysed and accessed if it is to remain of use to future generations of researchers. A pilot web programme for displaying and storing and searching archaeological data has recently been developed (see *Current Initiatives* above). This could very usefully be extended and developed, with the relevant licensing and permissions, to display a variety of information (primary spatial data, images, excavation reports, artefact inventories, datelists etc.) to a variety of users (interested members of the public to academic specialists). Future work in this area

should also include the designation of a suitable body to administer a Brú na Bóinne SDI as well as the issuing of standards for information and geo-referenced data contributed by researchers.

**15. Develop a setting and landscape use strategy for the protection and management of the WHS**

The current boundaries of the WHS were set out in the Boyne Archaeological Park report (O'Neill 1989), the core area defined in part by the location of three main passage tombs and the prominent bend in the Boyne river, and the northern and southern buffer zones established in large part to protect views into and out of the core area, in particular along the ridgeline from which the midwinter sun rises. The report also included a chapter on views and prospects within the WHS. This work should be revisited and built upon to provide a robust setting and landscape use strategy to aid future planning and management within the WHS. This should be informed by an examination of definitions in existing policy documents, legislation and planning inquiry case studies from Ireland and abroad. A 2008 report commissioned by Historic Scotland to provide an objective description of the setting of the Heart of Neolithic Orkney World Heritage Site could be a useful comparative document. While the setting of each World Heritage Site is of course unique, some of the critical setting elements established for Orkney are of direct relevance to Brú na Bóinne, *i.e.*, an undeveloped ridgeline providing a direct visual link back to the landscape that the builders of the monuments probably experienced; the strong rural but working character of the landscape in which the monuments are situated; the view from the entrance of Maeshowe chambered tomb and its midwinter solstitial alignment; visual linkages between the monuments within the WHS and modern views from roads, paths and settlements around the WHS that structure people's experience of the WHS and often parallel the visual archaeological links; the links (both tangible and intangible) evidenced through archaeological research.

**16. Study of visitor (local and non-local) expectations and experiences of the WHS**

In 2007, nearly a quarter of a million visitors came to see Newgrange, Knowth and the Brú na Bóinne Visitor Centre. Little systematic evaluation of visitor profiles and experiences has been carried out, neither has any formal investigation of the needs and expectations of the local community living in and close to the WHS been conducted. Detailed research carried out in 2004 by Angela McClanahan (University of Manchester) for the Heart of Neolithic Orkney World Heritage Site aimed to build knowledge and understanding of visitor perceptions and expectations of the WHS, assessing the impact of WHS status on visitors' desire to visit the monuments and looking at visitor patterns both between and within individual sites. McClanahan's work also addressed how archaeological monuments figured in the daily practices of the local community and how WHS status, heritage organisations and cultural tourism impacted upon their daily lives. Twelve months of fieldwork using methods such as participant observation, behavioural observation and interview-based research provided in-depth analysis of the WHS in its contemporary contexts. A similar project could be planned for the Brú na Bóinne WHS. A periodic, perhaps biennial, follow-up visitor survey on a smaller scale could be undertaken to monitor any changes in demographic and any changes in perceptions or 'valuing' the WHS as a response to research undertaken.

**17. Establish a Brú na Bóinne Research Centre and associated education network**

The 2002 Brú na Bóinne Management Plan recommended that a feasibility study be undertaken on the adaptation and future use of the Knowth House complex, beside Knowth passage tomb. This has been completed and planning permission has been granted for a research centre at Knowth, permission which is due to lapse in 2009. Such a research centre, complete with a

library, an educational centre and research spaces, would form a physical focus for ongoing research programmes and the dissemination of information and research results to land owners, the general public and the archaeological community. It could be built and supported by the visitor centre operators and run in conjunction with the Brú na Bóinne research steering group (see below). The centre could also store paper and digital archives relating to the WHS and material from new investigations might be displayed here on a temporary basis. The focus of the centre would be very much orientated towards ongoing research, providing lecture space and classrooms for educational events, meeting space for steering/management groups and an operational base for those carrying out research in the area.

#### **18. Create a steering group to implement and progress the framework**

If the interest and momentum generated by the drafting of the Research Framework is not to be lost, a research steering group must be put in place to drive the issues and objectives outlined here. Such a group would comprise representatives from state bodies, universities and other institutions and local groups/administrative bodies and could meet annually or bi-annually to assess the progress of research objectives, recommend action and to organise funding opportunities. Certain more measurable research objectives could be framed in terms of Key Performance Indicators. For example, *'Increase hectares of land surveyed geophysically in the WHS from existing number to 3300ha by end of year 2015'*, where *'Number of hectares surveyed each year'* is the KPI.



## Appendix I

### Research committee and working groups

In December 2007, a research co-ordination committee was convened to help co-ordinate and steer the framework process. The research committee comprised representatives from the State heritage agencies, the universities, Meath County Council and from the research community. Committee meetings were held in February, March, May and September 2007. Eight committee members also acted as chairs of eight working groups.

#### Research committee

Prof. Gabriel Cooney (chair)	Heritage Council member; UCD School of Archaeology
Dr. Stefan Bergh	Lecturer, Dept of Archaeology, NUI Galway
Dr. Conor Brady	Lecturer, Dundalk Institute of Technology
Ms. Mary Cahill	Assistant Keeper, National Museum of Ireland
Ms. Jill Chadwick	Meath Conservation Officer
Mr. Tom Condit	Archaeologist, National Monuments Service
Ms. Ana Dolan	Senior Conservation Architect, Office of Public Works
Dr. Jane Downes	Head of Dept of Archaeology, Orkney College UHI
Mr. Ian Doyle	Head of Conservation Services, Heritage Council
Prof. George Eogan	Knowth Excavations Project
Dr. Loreto Guinan	Heritage Officer, Meath County Council
Dr. Finbar McCormick	Senior Lecturer, Dept of Archaeology, QUB
Ms. Fionnuala Parnell	Office of Public Works
Dr. Michael Potterton	Discovery Programme/UCD School of Archaeology
Dr. Jessica Smyth	Archaeological Research Officer, Heritage Council
Dr. Geraldine Stout	Archaeologist, Archaeological Survey of Ireland
Ms. Clare Tuffy	Manager, Brú na Bóinne Visitor Centre
Dr. Elizabeth Twohig	Research Associate, Dept. of Archaeology, UCC
Mr. Oliver Ward	Secretary, Meath Archaeological and Historical Society

#### Working groups

In March 2007, eight working groups were established to examine the perceived gaps in research carried out to date in Brú na Bóinne and to produce a series of key questions for future investigation. These research questions were to form the Research Agenda section of the framework document.

##### Brú na Bóinne in earlier prehistory

Conor Brady (chair)  
Stefan Bergh  
Gabriel Cooney  
George Eogan  
Elizabeth Twohig  
Tom Condit  
Eoin Grogan  
Helen Roche  
Kerri Cleary  
Mary Cahill

##### Brú na Bóinne in later prehistory/the early historic period

Geraldine Stout (chair)  
Ian Doyle  
Richard Warner  
Karl Brady  
Matthew Stout  
Kay Muhr

**Brú na Bóinne in the medieval and post-medieval period**

Michael Potterton (chair)  
Margaret Murphy  
Jim Galloway  
John Bradley  
Gillian Kenny  
William Jenkins  
Matt Seaver  
Padraig Lenihan

**Vernacular/Built Heritage**

Jill Chadwick (chair)  
Ana Dolan  
Marc Ritchie  
Grainne Shaffrey  
Geraldine Stout

**Spatial Data**

Tom Condit (chair)  
Anthony Corns  
Kevin Barton  
Karl Brady  
Abigail Walsh

**Palaeoenvironment and palaeogeography**

Finbar McCormick (chair)  
Nicola Whitehouse  
Gill Plunkett  
Eileen Murphy  
Steve Davis  
Helen Lewis  
Meriel McClatchie

**Natural Heritage**

Loreto Guinan (chair)  
Cliona O'Brien  
Tom Hayden  
Joe Caffrey  
Maurice Eakin  
Robbie Meehan  
Declan Murray  
George Sevastopulo

**Management and Interpretation**

Clare Tuffy (chair)  
Gabriel Cooney  
Tom Condit  
Ana Dolan  
Fionnuala Parnell  
Rosanne Meenan  
Jane Downes  
Oliver Ward

**Appendix II**  
**Consultation process**

**Appendix III**  
**Investigations carried out in the WHS**





**BM-1075**      2515±50 BP      798-504 cal BC (91.5%)  
493-489 cal BC (0.4%)  
462-450 cal BC (1.2%)  
441-417 cal BC (2.4%)

Charcoal

From fill of Neolithic trench, western side, under Tomb 8  
(Kerri Cleary, pers. comm.)

**BM-1076**      4852±71 BP      3792-3508 cal BC (91.6%)  
3427-3381 cal BC (3.8%)

Charcoal

From Pit 6 in sub-rectangular House B, under Kerbstone 10 of Tomb 8  
(Burleigh et al. 1976, 34; Eogan 1984, 215)

**GrN-12358**      4490±60 BP      3365-3010 cal BC (93.5%)  
2980-2959 cal BC (1.3%)  
2951-2942 cal BC (0.6%)

Hazel charcoal

Spread underlying basal sod layer of Tomb 1, behind orthostats 6 and 7 of the eastern passage  
(Eogan 1991, 130; Kerri Cleary, pers. comm.)

## **Tomb 1**

**UB-358**      6835±110 BP      5981-5943 cal BC (3.5%)  
5926-5557 cal BC (91.9%)

Humic acid

From basal redeposited sod-like layer of mound of Tomb 1, Cutting 36.  
(Smith *et al.* 1971, 453)

**OxA-7786**      4890±40 BP      3769-3635 cal BC (95.4%)

Charcoal

From the basal structural layer of Tomb 1  
(Bronk Ramsey *et al.* 2002, 62-3)

**GrN-12357**      4405±35 BP      3312-3295 cal BC (1.4%)  
3287-3275 cal BC (0.9%)  
3266-3239 cal BC (4.4%)  
3108-2913 cal BC (88.7%)

Hazel charcoal

In basal sod-like layer of the mound of Tomb 1, behind orthostats 19 and 20 of the eastern passage  
(Eogan 1991, 130; Kerri Cleary, pers. comm.)

**GrN-12827**      4465±40      3348-3115 cal BC (95.4%)

Wood fragments

Basal sod layer of Tomb 1, behind orthostat 75 of the eastern passage  
(Eogan 1991, 130; Kerri Cleary, pers. comm.)







**GrN-13576**      1255±30 BP                      672-829 cal AD (89.6%)  
837-867 cal AD (5.8%)

Animal bone

From Outer Ditch Layer 4, section between C24/25, sample 2  
(Kerri Cleary, pers. comm.)

**GrN-13577**      1200±30 BP                      712-746 cal AD (6.4%)  
766-895 cal AD (87.7%)  
925-937 cal AD (1.3%)

Animal bone

From Outer Ditch Layer 1, section C30/31, sample 1  
(Kerri Cleary, pers. comm.)

**GrN-13578**      1354±30 BP                      632-711 cal AD (89.5%)  
746-767 cal AD (5.9%)

Animal bone

From Outer Ditch Layer 2, section C30/31, sample 2  
(Kerri Cleary, pers. comm.)

**GrN-13579**      1170±30 BP                      776-901 cal AD (79.4%)  
917-966 cal AD (16.0%)

Animal bone

From Outer Ditch Layer 4, section C30/31, sample 4  
(Kerri Cleary, pers. comm.)

**UB-4248**            1227±20 BP                      694-748 cal AD (23.9%)  
765-880 cal AD (71.5%)

Animal bone

(K90 AB87, sample 5) from ditch layer 11 (PRIA), W Quad C21/22  
(Kerri Cleary, pers. comm.)

**UB-4249**            1145±20 BP                      782-789 cal AD (1.3%)  
812-845 cal AD (7.2%)  
857-974 cal AD (86.9%)

Animal bone

(K93 AB85, sample 6) from ditch in front of eastern Tomb 1  
(Kerri Cleary, pers. comm.)

**UB-4244**            1350±20 BP                      645-688 cal AD (95.4%)

Animal bone

(K75 AB31) from C43, Ditch, upper fill under fireplace No.2, above shale ditch slip  
(Kerri Cleary, pers. comm.)

**UB-4245**            1295±17 BP                      666-724 cal AD (60.3%)  
739-772 cal AD (35.1%)

Animal bone

(K75 AB10) from C42, Ditch, upper 30cm of basal fill, a natural slip layer  
(Kerri Cleary, pers. comm.)



<b>UB-4246</b>	1332±19 BP	651-695 cal AD (86.5%) 700-707 cal AD (1.4%) 747-765 cal AD (7.6%)
Animal bone (K75 AB21) from C42, Ditch, below first 30cm of naturally accumulated ditch fill (Kerri Cleary, pers. comm.)		
<b>UB-4251</b>	1185±19 BP	778-890 cal AD
Animal bone (K95 AB8) from lower fill of ditch, behind kerbstones 70-71 (Kerri Cleary, pers. comm.)		
<b>UB-4247</b>	1255±17 BP	680-780 cal AD (92.9%) 792-805 cal AD (2.5%)
Animal bone (K75 AB6) from C42, Ditch, beneath spread of charcoal (Kerri Cleary, pers. comm.)		
<b>UB-4250</b>	1203±20 BP	730-735 cal AD (0.7%) 771-889 cal AD (94.7%)
Animal bone (K94 AB92, sample 7) from ditch, above area of paving, behind kerbstones 73-72 (Kerri Cleary, pers. comm.)		
<b>UB-4119</b>	1182±17 BP	778-891 cal AD
Animal bone (K95 AB9) from area in front, behind kerbstone 74, Sq7, stony fill in bottom layer of outer ditch (Kerri Cleary, pers. comm.)		
<b>GrN-15368</b>	4375±40 BP	3261-3258 cal BC (0.3%) 3097-2902 cal BC (95.1%)
Human bone From Burial 1 (Kerri Cleary, pers. comm.)		
<b>GrN-15369</b>	1830±30 BP	86-109 cal AD (3.7%) 119-253 cal AD (91.7%)
Human bone From Burial 4 (Kerri Cleary, pers. comm.)		
<b>GrN-15370</b>	1920±30 BP	2-137 cal AD (94.9%) 199-206 cal AD (0.5%)
Human bone From Burial 7 (Kerri Cleary, pers. comm.)		
<b>GrN-15371</b>	1960±30 BP	40-88 cal AD (91.5%) 104-121 cal AD (3.9%)
Human bone From Burial 8/9 (Kerri Cleary, pers. comm.)		

<b>GrN-15372</b>	2095±20 BP	175-50 cal BC
Human bone From Burial 10 (Kerri Cleary, pers. comm.)		
<b>GrN-15384</b>	1355±20 BP	645-685 cal AD (95.4%)
Human bone From Knowth 11/12 (Kerri Cleary, pers. comm.)		
<b>GrN-15385</b>	1120±30 BP	784-787 cal AD (0.3%) 823-842 cal AD (1.9%) 862-994 cal AD (93.2%)
Human bone From Knowth 24/25 (Kerri Cleary, pers. comm.)		
<b>GrN-15371</b>	1270±25 BP	668-780 cal AD (94.6%) 795-800 cal AD (0.8%)
Human bone From Burial 14, at base of ditch (Kerri Cleary, pers. comm.)		
<b>GrA-13595</b>	1920±50	38-10 cal BC (4.1%) 3 cal BC -219 cal AD (91.3%)
Bone carbonate Burial 21(?) - crouched burial of adult female and child with large number of beads (Lanting and Brindley 1998, 6)		
<b>GrA-13334</b>	1880±40	53-235 cal AD (95.4%)
Bone carbonate Burial 7(?) - unburnt bone (Lanting and Brindley 1998, 4)		
<b>GrA-13335</b>	1260±40	668-870 cal AD (95.4%)
Bone carbonate Burial 14(?) - unburnt bone (Lanting and Brindley 1998, 4)		
<b>OxA-3324</b>	470±70	1306-1364 cal AD (11.8%) 1385-1528 cal AD (69.9%) 1554-1633 cal AD (13.7%)
Bone collagen Burial 25, located between Tombs 1 and 13 in pit dug through slip from the mounds. All three of the Burial 25 dates appear contaminated by later bone as the dates don't match the Late Iron Age grave goods (Hedges <i>et al.</i> 1993, 315; Kerri Cleary, pers. comm.)		

**OxA-3325**      430±70      1333-1337 cal AD (0.3%)  
1398-1643 cal AD (95.1%)

Bone collagen  
Repeat of OxA-3324. See above  
(Hedges *et al.* 1993, 315)

**GrN-14717**      1380±50 BP      568-718 cal AD (89.6%)  
743-769 cal AD (5.8%)

Bone collagen  
Burial 25. See above  
(Hedges *et al.* 1993, 315)

## Newgrange

### Main tomb

**GrN-5462**      4500±45 BP      3358-3087 cal BC (91.2%)  
3061-3030 cal BC (4.2%)

Charcoal  
From burnt soil used to pack and seal interstices at each end of Roof-Slab 3 in passage  
(Vogel and Waterbolk 1972, 73; O'Kelly 1972, 226)

**GrN-5462-C**      4425±45 BP      3331-3214 cal BC (24.6%)  
3187-3156 cal BC (4.5%)  
3128-2918 cal BC (66.3%)

Charcoal  
From caulking of Roof-Slab 3  
(O'Kelly 1972, 226)

**GrN-5463**      4415±40 BP      3327-3230 cal BC (15.8%)  
3225-3219 cal BC (0.6%)  
3176-3159 cal BC (1.8%)  
3121-2916 cal BC (77.2%)

Charcoal  
From burnt soil used to pack and seal interstices between roof slabs, 3.30m below surface of tumulus  
(Vogel and Waterbolk 1972, 74; O'Kelly 1972, 226)

**GrN-9057**      4480±60 BP      3361-3010 cal BC (91.9%)  
2981-2936 cal BC (3.5%)

Peat  
From transported turves under north side of cairn, covering possible earlier passage tomb  
(O'Kelly 1982, 230)



<b>UB-2393</b>	3985±45 BP	2623-2396 cal BC (90.5%) 2385-2346 cal BC (4.9%)
Charcoal From pit containing pottery in 'multiple arc of pits' (pit circle), southeast of tomb. (Eogan 1991, 130; O'Kelly <i>et al.</i> 1983, 12-13, 21)		
<b>UB-2394</b>	3875±90 BP	2578-2125 cal BC (92.8%) 2091-2043 cal BC (2.6%)
Charcoal From pit containing pottery in 'multiple arc of pits' (pit circle), southeast of tomb. (Eogan 1991, 130; O'Kelly <i>et al.</i> 1983, 12-13, 21)		
<b>GrN-11800</b>	4070±40 BP	2859-2810 cal BC (13.8%) 2752-2722 cal BC (4.7%) 2701-2486 cal BC (76.8%)
Charcoal From animal cremation deposit (Burial 7) inserted into south side of Pit 14, inner arc of pits, Cutting 1 (Sweetman 1985, 200-201, 218)		
<b>GrN-11801</b>	4070±60 BP	2867-2804 cal BC (15.3%) 2777-2473 cal BC (80.1%)
Charcoal From clay-lined Pit 11, Cutting 1 (Sweetman 1985, 199, 218)		
<b>GrN-11802</b>	4030±35 BP	2832-2821 cal BC (1.8%) 2631-2471 cal BC (93.6%)
Charcoal From Pit 6, outer arc of pits, Cutting 1 (Sweetman 1985, 218)		
<b>GU-1617</b>	4050±65 BP	2872-2801 cal BC (12.9%) 2792-2787 cal BC (0.3%) 2780-2463 cal BC (82.2%)
Charcoal From Pit 1, outer arc of pits, Cutting 1 (Sweetman 1985, 218)		
<b>GU-1618</b>	3980±75 BP	2856-2812 cal BC (3.6%) 2748-2724 cal BC (1.2%) 2698-2282 cal BC (89.6%) 2249-2232 cal BC (0.8%) 2218-2214 cal BC (0.2%)
Charcoal From Pit 2, inner arc of pits, Cutting 1 (Sweetman 1985, 218)		



**GU-1619**                      3885±70 BP                      2567-2522 cal BC (4.3%)  
2498-2195 cal BC (88.5%)  
2176-2145 cal BC (2.6%)

Charcoal  
From Pit 3, outer arc of pits, Cutting 1  
(Sweetman 1985, 218)

**GU-1620**                      4000±65 BP                      2853-2812 cal BC (4.3%)  
2746-2726 cal BC (1.2%)  
2697-2335 cal BC (88.4%)  
2324-2301 cal BC (1.5%)

Charcoal  
From animal cremation deposit in burial hole (Burial 5), Cutting 1  
(Sweetman 1985, 218)

**GU-1621**                      3890±75 BP                      2573-2512 cal BC (6.4%)  
2505-2191 cal BC (85.8%)  
2181-2141 cal BC (3.2%)

Charcoal  
From animal cremation deposit in burial hole (Burial 25), Cutting 3  
(Sweetman 1985, 218)

**GU-1622**                      3905±70 BP                      2574-2199 cal BC (94.9%)  
2161-2153 cal BC (0.5%)

Charcoal  
From occupation spread inside pit circle, Cutting 1  
(Sweetman 1985, 200-218)

**GU-1771**                      3935±70 BP                      2620-2203 cal BC (95.4%)

Charcoal  
From charcoal deposit in clay-lined Pit 18, Cutting 3  
(Sweetman 1985, 206-7, 218)

**GU-1772**                      3900±60 BP                      2566-2524 cal BC (4.5%)  
2497-2203 cal BC (90.9%)

Charcoal  
From clay-lined Pit 23, Cutting 4.  
(Sweetman 1985, 207, 218)

**GU-1773**                      3975±60 BP                      2834-2818 cal BC (1.1%)  
2663-2648 cal BC (0.8%)  
2636-2290 cal BC (93.5%)

Charcoal  
From large charcoal deposit near top of fill of Pit 28, Cutting 2  
(Sweetman 1985, 205, 218)

<b>GU-1774</b>	3965±65 BP	2834-2818 cal BC (1.0%)
		2663-2647 cal BC (0.8%)
		2636-2281 cal BC (92.4%)
		2250-2231 cal BC (0.9%)
		2219-2212 cal BC (0.3%)

Charcoal

From animal cremation deposit in burial hole (Burial 31), Cutting 3  
(Sweetman 1985, 205-6, 218)

### Western pit circle

<b>GrN-12828</b>	4000±30 BP	2577-2468 cal BC (95.4%)
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Charcoal  
From top fill of Pit 1, also containing flint and Beaker pottery fragment  
(Sweetman 1987, 286)

<b>GrN-12829</b>	3930±35 BP	2562-2536 cal BC (4.9%)
		2492-2299 cal BC (90.5%)

Charcoal

From fill of Pit 6, also containing burnt clay, pottery and stone bowl fragment.

### Site M

<b>UB-6566</b>	1448±31 BP	561-652 cal AD
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Unknown material  
From posthole feature A31, Square A  
(Stout and Stout 2008, 156)

<b>UB-6569</b>	1301±31 BP	660-773 cal AD
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Unknown material  
From charcoal spread feature F11c, Square F  
(Stout and Stout 2008, 156)

<b>UB-6571</b>	1396±32 BP	595-675 cal AD
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Unknown material  
From grave B84, Square B  
(Stout and Stout 2008, 156)

<b>UB-6573</b>	1224±32 BP	690-751 cal AD (25.2%)
		762-886 cal AD (70.2%)

Unknown material

From trench feature E70, Square E  
(Stout and Stout 2008, 156)

<b>UB-6578</b>	1130±32 BP	782-790 cal AD (1.3%) 810-849 cal AD (6.8%) 855-990 cal AD (87.2%)
Unknown material From grave H14, Cutting H (Stout and Stout 2008, 157)		
<b>UB-6579</b>	1467±31 BP	548-646 cal AD
Unknown material From trench feature D17, Square D (Stout and Stout 2008, 157)		
<b>UB-6580</b>	1461±33 BP	548-649 cal AD
Unknown material From posthole feature A31, Square A (Stout and Stout 2008, 157)		
<b>UB-6581</b>	1980±32 BP	48 cal BC-82 cal AD
Unknown material From basal layer of ditch 2, Square K (Stout and Stout 2008, 157)		
<b>UB-6587</b>	1198±31 BP	712-746 cal AD (6.1%) 767-896 cal AD (87.3%) 924-939 cal AD (1.9%)
Unknown material From curved trench feature B21, Square B (Stout and Stout 2008, 158)		
<b>UB-7018</b>	1112±30 BP	712-746 cal AD (6.1%) 767-896 cal AD (87.3%) 924-939 cal AD (1.9%)
Unknown material From upper fill of curved trench feature B21, Square B (Stout and Stout 2008, 158)		
<b>UB-7019</b>	1427±32 BP	571-660 cal AD
Unknown material From layer 7, ditch 2, Cutting 1 (Stout and Stout 2008, 158)		
<b>UB-7020</b>	1277±30 BP	662-780 cal AD (93.5%) 792-805 cal AD (1.9%)
Unknown material From layer 3, ditch 2, Cutting 1 (Stout and Stout 2008, 158-9)		







## Field 7, Oldbridge-Sheephouse Bypass

<b>Wk-23576</b>	2858±31 BP	1125-926 cal BC
Hazel charcoal		
From charcoal-rich deposit F28 in pit F29 (Matthew Seaver, pers. comm.)		
<b>Wk-21776</b>	2908±48 BP	1263-974 cal BC (94.0%) 956-941 cal BC (1.4%)
Burnt sheep metapodial and phalange		
From charcoal-rich deposit F28 in pit F29 (Matthew Seaver, pers. comm.)		

**Appendix V**  
**Select bibliography for the WHS**

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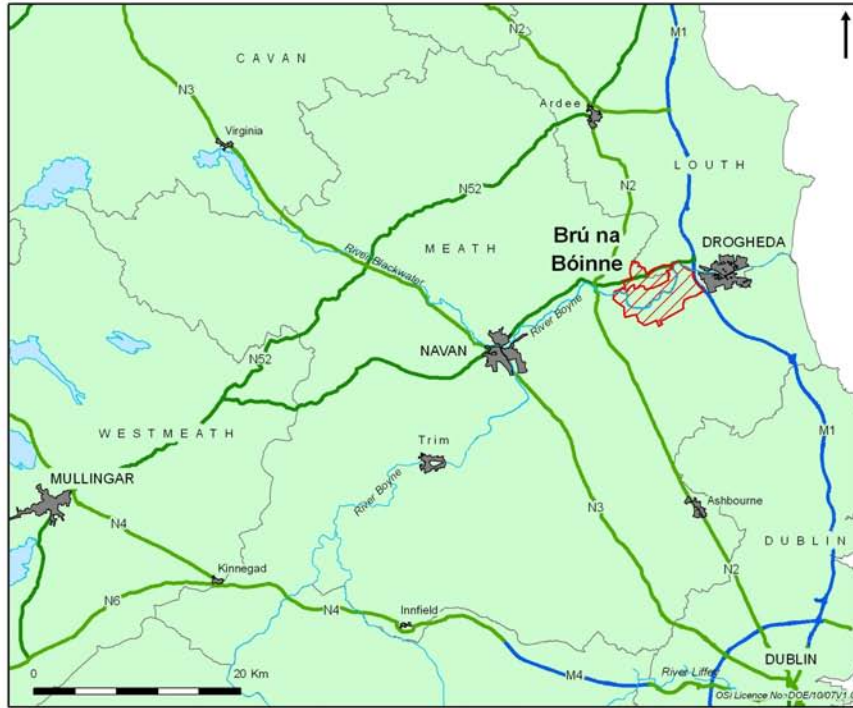
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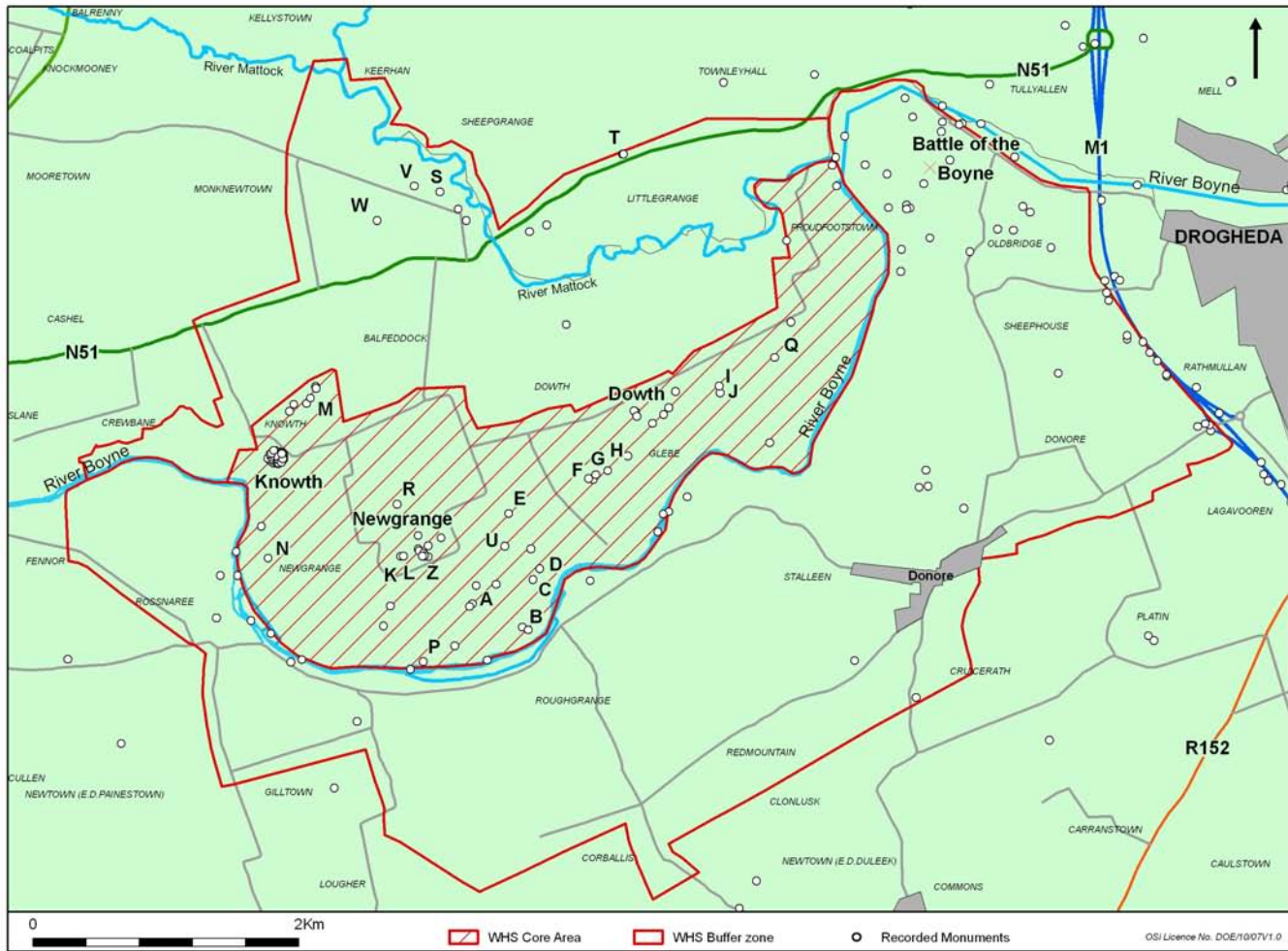


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Map 1



Map 2