An Chomhairle Oidhreachta
The Heritage Council

Brú na Bóinne World Heritage Site

Research Framework

Consultation Document June 2008

Executive summary

The Bend of the Boyne, or Brú na Bóinne, is internationally renowned for its elaborate Neolithic passage tombs, containing the largest assemblage of megalithic art in Europe. The area has been an important ritual, social and economic centre for thousands of years and its universal value was recognized in 1993 when it was designated a World Heritage Site, only one of three on the island of Ireland.

In recent years there has been a growing international trend towards the use of research frameworks for World Heritage Sites, and while a considerable body of research has already been completed within Brú na Bóinne, many key research questions need to be addressed such as the dating and development of monuments, changes in the settlement record, and how perceptions of the complex changed through time. Related management issues, preservation, conservation and interpretation within the WHS can also be seen as key issues. Accordingly, the Heritage Council in collaboration with Department of the Environment, Heritage and Local Government has begun drafting a Research Framework for the site, re-assessing key priorities and examining where future research should be directed.

Presented here is a state-of-knowledge summary of the archaeology of the Brú na Bóinne WHS (Resource Assessment) as well as a list of research questions identifying the gaps in that knowledge (Research Agenda). Submissions are invited on both, to be received by the Heritage Council before **1st August 2008**.

Introduction

Brú na Bóinne and the World Heritage Committee
The Bend of the Boyne, or *Brú na Bóinne*, is internationally renowned for its elaborate Neolithic passage tombs, containing the largest assemblage of megalithic art in Europe. The area has been an important ritual, political and economic centre for thousands of years. 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. This was followed by a Government-commissioned study of the planning issues involved and in 1987, the State approved establishment of the Boyne Valley Archaeological Park. The core area, focussing on the passage tombs of Newgrange, Knowth and Dowth, was about 780 ha in extent with a buffer zone of an additional 2500ha (total= 3300 ha). These boundaries were to become the boundaries of the future World Heritage Site.

Ireland ratified the World Heritage Convention on the 16th 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.

A considerable body of research has been completed to date in the WHS involving large scale programmes of excavations at Newgrange and Knowth, field walking surveys, study of the megalithic art, and Stout's 2002 monograph on the landscape of the WHS. Nonetheless many key questions remain un-addressed such as the dating of monuments, changes in the settlement record, and how perceptions of the complex changed through time. Accordingly, it is an opportune time to re-assess what the key priorities are for the WHS and where future research should be directed.

Why a research framework?
The reasons for the Brú na Bóinne Research 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. 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 in this area (Feilden & Jokilehto 1993 and the publication of a research framework for World Heritage Sites is widely seen as best practice in this regard (e.g. Chadburn and Pomeroy-Kellinger 2001; Darvill 2005; Downes et al. 2005). 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 2007 Heritage Council report on *Research Needs in Irish Archaeology* 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*'. Specifically, the *Bru na Boinne 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).

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 framework, which will be completed in January 2009, aims to re-assess key priorities and examine where future research should be directed.

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.
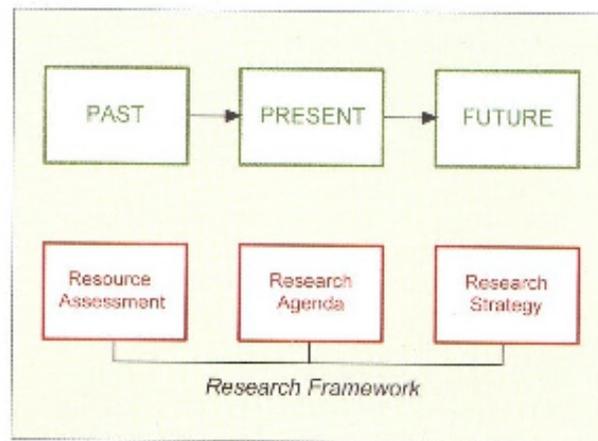

Figure 1. Representation of the main components of an archaeological research framework (from Darvill 2005)

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 (Pomeroy and Kellinger 2001; Downes et al. 2005), while the Stonehenge strategy utilises 'Research Framework' (Darvill 2005). Moreover, the Stonehenge and Avebury Research Frameworks adopt a chronological approach whereby 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. So far, a mixture of chronological and thematic approaches have emerged organically for the Brú na Bóinne framework and as the project progresses these will be subject to review and discussion.

At this stage 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 is being drafted by Dr. 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. A full list of committee members can be seen at www.heritagecouncil.ie/archaeology/bru_na_boinne/index.html.

Phase 1 of the project has already been completed, producing 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 of the project is currently under way. A series of critical position papers have been sought 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). Both the draft Resource Assessment and the draft Research Agenda are

presented below. It must be stressed that neither are exhaustive and while largely complete will be added to and developed as the framework process advances. Submissions are sought from the wider research and archaeological community and from the general public up until **1st August 2008**. Phase 3 of the research framework will then focus on formulating a Research Strategy, i.e., a list of research priorities that will tackle the issues identified in Phase 2.

A key element of the process is public consultation and addition to the circulation of draft texts to a range of interested parties each phase of the project is being marked by a public information seminar. Phase 1 and Phase 2 seminars were held in Slane, Co. Meath in March and June 2008 and introduced the public to the range of research currently being carried out in the WHS and the draft research agenda, respectively. The next seminar will take place on 28th October 2008 and will present the draft Research Strategy.

Resource Assessment

Palaeoenvironmental research

Some of the earliest palaeoenvironmental work in the area was carried out by Mitchell (1940; 1941; 1942) on two lake basins near Dunshaughlin, Co. Meath, approximately 20km south of the Bend of the Boyne. Analysis of both the pollen record and plant macrofossils enabled a basic reconstruction of the local vegetation pattern during the late Devensian and early Holocene.

During excavations at Knowth, a series of pollen samples were taken from possible natural sod layers beneath the tombs (Groenman-van-Waateringe and Pals 1984). Although much of the pollen was corroded 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 and Pals 1984: 328). Similar results were obtained from samples taken from the old turf layer and mound at Newgrange, with relatively high levels of cereal pollen indicating that crops were being grown in the vicinity (Groenman-van-Waateringe and Pals 1982: 222-3). Small numbers of cereal grains (mostly wheat) were recovered from both the 'Earlier Western Neolithic complex' and the 'Decorated Pottery' layers at Knowth, although there was no evidence of chaff or cereal weeds in any of the samples processed (Collins 1997: 299).

Twenty to thirty kilometres north of Brú na Bóinne, in north Louth, pollen analysis was carried out at three sites: a large raised bog at Redbog, which provided a ^{14}C-dated chronology, and two former lake sites, Essexford Lough and Whiterath Bog (Weir 1995). Fifth and early fourth millennium BC levels were analysed at Redbog only and these showed relatively slight woodland disturbance during early prehistory. However, from the Early Bronze Age onwards woodlands appear to come under increasing pressure, indicated by the increase in number and range of light-demanding arboreal taxa in the pollen record. During the Middle-Late Bronze Age all three sites show a general increase in signs of agricultural activity with Late Bronze Age levels at Essexford Lough showing a grass pollen peak at 35%. Grass pollen values do not rise above this until c. AD 900, although cereal pollen values often do, suggesting that *arable* agriculture had a larger role in the economy from the early historic period onwards.

A pollen core was also taken at Moynagh Lough, Co. Meath, just over 20km northwest of Brú na Bóinne (Stewart 1996). The profile spanned a period from

about 9000 BP to c. 100 years before present. Neolithic activity in the area of Moynagh was shown by a sharp elm decline accompanied by associated weed and herb taxa, although there may also have been humanly-caused vegetational disturbance prior to 7000 BP. A period of extensive pastoral activity with some arable farming was identified during the Bronze Age with a short phase of scrub regeneration in the Iron Age. There appeared to be renewed arable farming activity in the Early Christian period which intensified through the historic period.

Closer to the WHS, a pollen core was taken from a site just 4km south of Newgrange, in Thomastown Bog, as part of a project to assess the palaeoenvironmental potential of the Brú na Bóinne area (Weir 1996). A six metre profile was recovered, dating from approximately 4500 BC to AD 1700. 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.

More recently, a number of sites along the planned route of the M3 have been selected for exploratory coring (Brooks and Farrell 2005). Three sites, between 15 and 30km southwest and northwest of the WHS (Drumree, Clowanstown and Newrath Big), produced substantial peat/organic sediment horizons with good potential for reconstructing the Holocene environment of the area. Sampling has also been carried out at Emlagh Bog within the Wilkinstown bog complex in Co. Meath as part of an integrated study into the history of land use in the Blackwater Valley. The site, approximately 20km northwest of Brú na Bóinne, produced a detailed Holocene pollen profile. A section of this profile has recently been analysed (Newman *et al*. 2007) and shows a number of peak and troughs in farming activity, in particular arable activity, from the end of the 3rd century BC to the mid 8th century AD.

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, pig and sheep bone recovered from Knowth and Newgrange (McCormick 1997: 301; Van Wijngaarden-Bakker 1982).

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 2007). Two chert broad flakes were also recovered from the Knowth excavations (Helen Roche, pers. comm.). 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 proximal end of a possible broad flake (Brady 2007: 243). Further along the Boyne, at Moneymore (just outside Drogheda), evidence of a Mesolithic platform was recovered from a pollen core (Weir 1996), while to the west, a number of microliths have been found at Blundelstown ahead of construction on the M3 (Eoin Grogan, pers. comm.).

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 1987?; 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 (2007: 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 2007: 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. [14]C dates were obtained for the early Neolithic activity in Zones A and B at Knowth – 5040±15 BP (GrN-20180)/5080±20 BP (GrN-20179) and 5345±20 BP (GrN-20181) respectively (Eogan and Roche 1997: 39). The western area produced carinated pottery with more pronounced rims - generally accepted as a later development of the simple, undecorated bowls - and may have been occupied later (Brady 2007: 119).

Apart from the remains at Knowth, evidence for early Neolithic settlement within the Brú na Bóinne WHS remains slightMost 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 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 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, Lagavooren, Cruicerath and Simonstown (Ó Drisceoil 2003, 2004; Moore 2002a, 2003; Ellen O'Carroll, pers. comm.; Kelly 1977), along the River Dee at Richardstown and Newtown (Byrnes 1999, 2000; Gowen and Halpin 1992; Halpin 1995), and in north Louth along the Castletown river, at Plaster and Aghnaskeagh (John Turrell, pers. comm.). It has been argued that these types of buildings have a limited date range, approximately 3800 – 3600 cal BC (McSparron 2003; 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). 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 (John Turrell, pers. comm.), 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. Up to nineteen small passage tombs were uncovered at Knowth, some of which were found to pre-date the main central mound. Within this main mound 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). Single, multiple and successive human cremations had been placed in the Knowth tombs, along with a small 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. 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). 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 although 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 were 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). 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 also 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.

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 1990, 1997, 1997; 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 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 2007: 124) and possibly the enclosure at Monknewtown (Brady 2007: 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 at least the first phase of the Monknewtown monument is supported by the recent identification of more than twenty Broad Rimmed bowls from an embanked enclosure at Balregan, on the Dundalk Bypass (Grogan and Roche 2005). The cursus monument approximately 100m east of Newgrange has traditionally been assigned to the late Neolithic (*e.g.* Condit 1997: 26-7; Stout 1997a: 9, 1997b: 301-3, 2002: 33), although evidence emerging from Britain places their main phase of construction in the mid to late fourth millennium BC.

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 & Roche 1997a: 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.

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 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, though none from any of the pits. The two structures produced very similar radiocarbon dates, although the presence of stray Grooved Ware sherds on the former site 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 (ref; 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 (Larsson and 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 3rd millennium enclosures reference earlier monuments. Passage tombs Z and Z_1, 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 3rd 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 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 (Site 15). Other apparent late 3rd millennium BC settlement evidence includes the Beaker structure and associated material from inside the Monknewtown enclosure (Sweetman 1976).

The large faunal assemblage from the Beaker settlement at Newgrange 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 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 analyses from Beaker levels at Newgrange and Knowth (Caspari 1983; Groenman-van Waateringe 1984) show no appreciable change in vegetation composition, seed taxa fitting in with a general picture of arable and/or pastoral land. A rise in the importance of pig in the late 3rd 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 a large quantity of cremated pig bone was recovered is significant.

In the wider WHS, recent systematic fieldwalking (Brady 2007) 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 3rd millennium BC. Grooved Ware sherds have been found associated with pits and stakeholes at Rathmullan and Hill of Rath (Bolger 2002, 2003; Duffy 2002), while Grooved Ware structures similar to that uncovered at

Knowth have been excavated north of the WHS at Balgatheran, Co. Louth (Ó Drisceoil ref) and at Slieve Breagh, Co. Meath, 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 (D. Nelis 2002; Bolger 2001a; 2001b). 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 2007: 297). In the 19th century, two cist burials were uncovered in the grounds of Oldbridge House, in the east of the WHS (Moore 1987). The first was a segmented cist described as being in a mound and contained a Food Vessel in its northern chamber. 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). 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 argued that one of the stones in the Great Circle around Newgrange is stratigraphically later than pits associated with the large timber circle (Sweetman 1985: 208), and can thus be dated to the Bronze Age, although the exact sequence of activity is far from clear (see O'Kelly 1982: 79-84; Sweetman 1985; Bradley 1998a; Cooney 2006). While stone circles are now generally regarded as 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 may be Neolithic in date as they have the same petrology as the tomb orthostats. Moreover, they are positioned at 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*. 2002). 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 2002). 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 n.d.); 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 Monknewtown (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 few metres 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. No other enclosures were found on either the M1 or M3 motorways (Niall Roycroft, pers. comm.), which may mean that this particular area east of Brú na Bóinne was a centre of some importance in the Bronze Age. These relatively large clusters of settlement activity are matched by equally large-scale funerary and ceremonial activity, *e.g*. the urnfield site at Hill of Rath (Moore 1987; 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 1st millennium BC. Excavations at Knowth revealed thirty-five inhumations around the main mound (Eogan 1968: 365-73, 1974: 68-87), four aligned east-west in cists and the remainder in pits. Material sampled from the burials yielded four dates between 190 BC and AD 250 as well as a number of later determinations. 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 paraphenalia (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).

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 (O'Kelly 1971; Molyneux 1726, 206), while a series of discoveries were made in the 19th century including the unearthing of the Conyngham hoard of gold jewellery in 1842 (Conyngham 1844, 137; 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 (Carson and O'Kelly 1977; Stout 2002), many of them able to deposit items of high value. The Boyne Valley (*Bouvinda*) is recorded by Claudius Ptolemaius in his 2nd 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.

Other possible pre-Christian sites within the WHS include a small mound 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 were found, the former wearing a silver finger ring that has been dated to the 6th century AD. 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. 4th 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 1st 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 7th 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 on a high riverbank 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 bi-vallate ringfort, is dated by animal bone and a small number of finds from the 6th to 8th centuries AD. Any structural remains associated with these ditches would have been removed by 19th 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 2nd 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 10th 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 10th 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. 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 several 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).

Immediately downslope of Knowth, in a marshy basin, lies a complex of earthworks labelled Site M. Excavation carried out between 2002 and 2004 (Stout and Stout 2008) 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 6th to 10th 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 Balriggan, Co. Louth (Delaney 2007) and Raystown, Co. Meath (Seaver 2007).

The earliest surviving descriptions of the arrival of St. Patrick in Ireland, the 7th century Muirchiú'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 17th 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 6th century. A house-shaped shrine in the later medieval graveyard at Slane is associated with this early church figure. The patronage of the local Síl nAedo 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 19th 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.

Raiding, both for material and political gain, appears to have been a relatively common occurrence along the Boyne Valley from the middle of the 1st 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 Rossnaree 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 Airgialla (Colmcille 1953). A series of royal charters and grants issued from the late 12th 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 1984). 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 2008; 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 patent and close 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). A picture 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: 234).

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). 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 Sheephouse. Relatively large numbers of 15th/16th 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 12th 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' form 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). 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 Eogan forthcoming).

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 1967). 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: 57-77). 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; DoEHLG SMR file MH 20:18).

Reform and rebellion – the 16th and 17th centuries
There was a radical change in colonial policy in Ireland in the 16th 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 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 140, 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 17th 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 Gilltown 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 Eogan forthcoming). 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

There were dramatic changes in the Irish landscape in the 18th century, and 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 18th 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 18th 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 18th 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 18th 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 famers, 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 18th 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).

19th 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 19th 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 however, 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 19th century cottiers and labourers were an extreme rarity and were in danger of disappearing completely (Stout 2002: 155-6). In the late 19th century and early 20th 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.

Research Questions

Brú na Bóinne in earlier prehistory

Conor Brady with the Earlier Prehistory Working Group

When did people first come to the Brú na Bóinne landscape and what was the nature of this first presence – transitory or more permanent?
As there is currently no data known relating to this period in Brú na Bóinne a number of possibilities may exist. Despite the probability that the environment of the Boyne Valley would have been attractive during this time, there may have been no activity in this area between 8,000 and 6,500 BC. There may be evidence in the landscape that has not yet been discovered. Excavations and other investigations to date may have focused on particular landscape types that were not extensively used during this period. Excavations have concentrated on monuments and surface collection surveys have concentrated on areas of the landscape currently used for tillage. Certain other parts of the landscape have not been examined. Their locations need to be examined in order to ascertain whether locations of good potential have, in fact been examined. 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 recognition more difficult than for 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. The immediate channel of the river may offer potential for the identification of material from this period. What is the environment like in the area during this period? Do the excavations on the M1 and M3 and elsewhere in the wider landscape inform this question?

What was the nature of the activity in Brú na Bóinne during the Later Mesolithic?
While material is known from Newgrange and Knowth dating to this period and additional material has been recovered during field survey, the level of activity seems to be low, given the likely attractiveness of the environment of the Boyne Valley to foragers and levels of activity in the wider region. Once again, field survey offers the best potential for identifying this activity and given that the lithic tools of this period are relatively large and distinctive, recognition of this material should not be as difficult as for the Early Mesolithic. Material may exist in excavation and surface collected assemblages that has not been identified. The river offers significant potential for identifying material relating to this period. Does the environment change in the area from the Early Mesolithic? Do the

excavations on the M1 and M3 and elsewhere in the wider landscape provide data relevant to this question?

When does the transition to farming take place in Brú na Bóinne and how is it characterised?
The earliest evidence for Neolithic activity currently known from the area are the rectangular houses at Knowth. Do these structures represent the first Neolithic presence in the landscape? Do similar structures exist in the wider Brú na Bóinne landscape? Are these, in fact, representative of the earliest presence in the area? Do people arrive any earlier? Where in the landscape do they first settle and how extensive is the occupation of the landscape at this time? What is the relationship with the people of the Later Mesolithic? 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 up 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 and evidence to facilitate environmental reconstruction. What are the connections between Brú na Bóinne and other focal areas at the time, e.g. the Cooley peninsula where court and portal tombs are associated with rectangular houses. The excavations on the M1 and M3 and elsewhere in the wider landscape have produced sites from this period that may help us to understand the transition in the Brú na Bóinne area.

What is the evidence for burial in Brú na Bóinne during the Early Neolithic?
Given the lack of monuments dating to this period what were the burial practices employed? Is Site G a prehistoric feature? If so, does it have any relationship with court or portal tombs which are more commonly associated with a long mound or cairn? Detailed topographic and geophysical survey should take place here to be followed up by excavation if warranted. There may be evidence from the excavations on the M1 and M3 and elsewhere in the wider landscape which will help exploration of this question.

When are passage tombs first built in Brú na Bóinne and what is the sequence of construction of the monuments of the passage tomb cemetery?
Who built these tombs, the descendants of the Early Neolithic farmers or new arrivals from elsewhere? A transition takes place between the Early and Middle Neolithic. Monuments are constructed, house shapes change significantly from substantial rectangular structures to less impressive circular stake and post-built structures and new pottery styles appear. How and why these changes took place need to be explored. Models of development of passage tombs have been suggested which need to be tested for the area. New dating techniques now make close dating of many of these monuments possible, subject to the

availability of suitable organic material. Human remains excavated from the chambers of the tombs offer very significant potential.

What is the possible significance of the tripartitioning of the Brú na Bóinne passage tomb cemetery?
This question is closely related to the previous one which explores the sequencing of the construction of the individual monuments in the cemetery. As outlined above, the complex is divided into three elements or areas at Newgrange, Knowth and Dowth, mirroring to an extent the arrangement at other passage tomb cemeteries. Why the tomb builders chose to do this and the processes behind the siting of individual tombs are major questions. Exploration of these issues would bring us to a closer understanding of the fundamental aims of the builders and how the complex was intended to function.

Where did the builders of the monuments live and how did they use the landscape?
The implication of the construction of the cemetery and especially the three large tombs are that there was a sizeable population living in the area around Brú na Bóinne. As outlined above, surface collection survey followed up by geophysical survey, geochemical survey and excavation are ideal techniques in identifying the extent and nature of settlement during this period. Such work would eventually provide dating material and environmental evidence. The excavations on the M1 and M3 and elsewhere in the wider landscape have produced sites from this period which may help us to understand Middle Neolithic settlement in the Brú na Bóinne area.

At what scales did Brú na Bóinne operate in the wider landscape?
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 well defined by the geological studies with a possible northern limit in the Cooley/Mourne Mountains, a southern edge in the Wicklow Mountains. Significant use was made of the Irish Sea coastal zone from where the structural stones for some of the tombs came as well as lithic raw material. The inland edge of such a region is less distinct because of lack of evidence and extended at least to the Hill of Tara where the Mound of the Hostages is located and perhaps as far as the Loughcrew passage tomb cemetery. Can we define the exact extent of this region and explore the relationships between Brú na Bóinne and other focal areas in the region? The area seems also to have had contacts beyond this zone as evidenced by the importation of flint from the north-east of the country. Additionally, clear links exist between Brú na Bóinne and certain overseas areas like the eastern side of

the Irish Sea, the Orkney Islands, Brittany and Iberia where similar monuments were constructed and, more specifically, very similar art styles were sometimes used. To what extent was there overseas communication as evidenced by elements within the art? To what extent do comparisons and contrasts exist between Brú na Bóinne and other 'core' areas like Orkney and Wessex? How did the monument complex function within these nested zones? The nature of external contacts seems to have changed over time and could be explored. The excavations on the M1 and M3 and elsewhere in the wider landscape will be of major importance in exploring this issue. The examination of the full range of artefactual material from sites in Brú na Bóinne and the wider region will be critical in exploring this question.

Why and how did the transition between the Middle Neolithic and the Later Neolithic/Early Bronze Age take place?
Another major transition occurs in the Brú na Bóinne landscape from *c*. 3,000 BC with the introduction of new monument types and material culture. There is a need to clearly identify monuments dating to the later period and establish the degree of chronological overlap between the two phases. 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 the earthen enclosures and what is their relationship to the timber circles discovered in the area? While there are significant changes, a degree of continuity is also apparent with the continued use of certain passage tombs and the continued focus on the existing monuments. The nature of settlement during this period may have shifted its focus within the landscape and there may have been some change in the levels and perhaps also the composition of the population. Survey and excavation of monuments needs to be undertaken to establish the chronology of their development and surface collection survey, geophysics, geochemistry and excavation can be used to identify and explore settlements of the period. The excavations on the M1 and M3 and elsewhere in the wider landscape have produced sites from this period which may help us to understand the transition in the Brú na Bóinne area.

How did the environment of the Brú na Bóinne area change over the course of the Earlier Prehistoric period?
Environmental evidence and palynology in particular is central to our understanding of how human activity impacted upon landscapes and give us information on the management and subsistence strategies used by past societies. While this is the focus of another working group, this issue is central to the study of the area over all time periods. Understanding of this aspect of the Brú na Bóinne landscape is critical to the presentation of the extent and nature of settlement and landuse strategies during each of the sub-periods. Such data is also essential in exploring the processes of transition between each period.

Excavated evidence from the M1, M3 and elsewhere in the wider landscape from this period has come to light recently which may help us to understand the transition in the Brú na Bóinne area.

What was the role of the Boyne River during the Earlier Prehistoric period?
Many other research questions draw to some extent on the potential of the river as a source of information but as it is a constant feature running through and defining this special landscape, it is worthy of study in its own right. Data is required on the evolution of the river since the last ice age in order that we can better understand the way in which the landscape was used over time. Palaeochannels have been identified in a number of locations which 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 and needs to be established. To what extent is it possible to explore the sacred nature of the river? The geomorphological development of the wider river valley is also critical to our understanding of the archaeological potential of this landscape. The sites discovered on the M1 and M3 and elsewhere in the wider landscape will be critical to our understanding of the roles of the river as a focus for settlement and ritual activity over the Earlier Prehistoric period.

To what extent was the Brú na Bóinne landscape occupied and used during the Bronze Age?
Did the area actually a decline in importance in importance after the Early Bronze Age as is often assumed because of the apparent lack of remains dating to this period? Resolution of the question of the dating of the Great Circle of standing stones at Newgrange would be a worthwhile project. Some sites possibly dating to this period have recently been identified; are there more undiscovered in the Brú na Bóinne landscape? To what extent is the current archaeological record truly reflective of activity during this period? 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? What was the environment of the time like? The excavations on the M1 and M3 and elsewhere in the wider landscape have produced sites from this period which may help us to understand activity in the Brú na Bóinne area during this period.

Can the known sites and monuments of the area be more accurately described and classified?
As discussed above, there is much ambiguity and confusion relating to the classification of monuments in the Brú na Bóinne area. Research work should be directed towards correctly identifying and classifying 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 monuments of the Bronze Age. 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.

Establishment of a detailed online GIS-based database of the Brú na Bóinne region.
This is not so much a research question but a tool that would greatly facilitate archaeological research at all levels in the area. Such a database should list the following:
- Detailed classification of all known monuments and sites whether upstanding or low visibility from excavation, aerial photography, geophysical survey, LiDAR survey, surface collection survey etc. cross referenced to a database of further archaeological work carried out.
- Listing of all known artefactual material
- Listing of sources and detail of all palaeo-environmental data.
- Listing of other environmental data relating to the archaeology of the area e.g. geology, soils etc.
- Detailed listing 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.

What is the value of material/artefact assemblages from old excavations and surveys?
Reassessment of old material 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 have been alluded to above and 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.

What more can be done with the megalithic art of the Boyne Valley?
A detailed analysis of the megalithic art uncovered at Knowth is currently underway. This study will be published in conjunction with the archaeology of the large mound, Tomb 1. The publication (Volume 7 in the series) will provide a description of all 350+ stones with megalithic art from Knowth, together with drawings and photographs. This corpus will include structural stones from all the tombs, together with other carved stones such as the stone basins, flagstones and the 'set stones' or baetyls. Particular attention will be paid to the sequence of art application and the different techniques utilised. The cultural significance of the geology of the carved stones will also be explored, as will the importance of examining the 'hidden' art in terms of the structural sequence of Tomb 1. The art will be examined in its wider Brú na Bóinne context and discussion will draw on analogous carvings across Western Europe.

Laser scanning of the Brú na Bóinne megalithic art would create a 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.

Brú na Bóinne in the later prehistoric/early historic period
Geraldine Stout with the Later Prehistoric/Early Historic Period Working Group

What were people doing in Brú na Bóinne in later prehistory?
We know that the Neolithic–Early Bronze Age was a time of intense activity in Brú na Bóinne with the construction of passage tombs, followed by henge monuments and industrial activity. Many years of research on the part of Prof Eogan and Prof. O'Kelly have provided an incredible book of evidence for this

period. The later prehistoric period stands in sharp contrast. Prof. 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.

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.

What genetic evidence could be obtained from the Knowth burials?

We are on firmer ground when we talk about later prehistoric burial in Brú na Bóinne, which shows some considerable diversity. There are Iron Age inhumation burials at Knowth, the most notable being a double burial of adult males, both decapitated who were laid head to toe, accompanied by a number of gaming pieces and bronze rings. It would be important to extract genetic evidence from these burials. A burial mound known locally as 'Cormac's grave' at Rossnaree, contained a female with a silver ring and child, has recently produced some early (Iron Age) radiocarbon dates. 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.

What were the ritual practices of people? Is there a ritual use of water?

The river Boyne itself was considered to be a supernatural being in Celtic mythology, appearing as the female deity Boann. It is associated with passing into the Underworld. The Celts were well known for their veneration of water, viewing it as essential to life and fertility, for having healing qualities and as a means to travel, both for people and ideas. It is also associated with ritual deposition. Weapons account for a large number of artefacts found in rivers and lakes and appear to have resulted, at least in part, from deliberate ritualistic deposition made to river or water gods, perhaps in gratitude for success in battle. Deposition may also have taken place in thanksgiving to a water god or the Celtic God Lugh for a good harvest or good weather. Wilde in the 19th century recounts a tradition of swimming cattle across the river as a charm against fairies and certain diseases.

The water-filled enclosure at Monknewtown may be a ritual pond dating from the later prehistoric period. It has been compared with the King Stable's 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. Future research within Brú na Bóinne should take into consideration the underwater archaeological potential of the river and other sites and put in place appropriate methodologies for a multi-disciplinary approach to assessing their potential.

What light can proto-historical sources shed on this period?
The Brú na Bóinne has a rich placelore and is associated with some of the chief figures in early Irish mythology. The *Dindshenchas* preserves legends in prose and poetry, which attempt to explain the origin and background of the names of the most prominent natural and man-made features in Ireland. Many of these early stories contain topographical and geographical detail, which allow one to locate the places described. This includes pre-Patrician annals, sagas and placelore such as *Cath Ruis na Rig* which describes a battle at Rossnaree in which Conchubor Mac Nessa and his Ulster warriors as vengeance for his loss of the bull to Meadbh, queen of Connacht. Rossnaree was obviously considered to be a very strategic place. The 'inventory style' *dindshenchas* poems for Brúg describes the graves of particular individuals still visible at the time of writing and proceeds to list individuals known to have been buried there beginning at the top of the ridge and working downhill to the river. The *dindshenchas* also mentions 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 brainech*.

Was there a Roman incursion into Brú na Bóinne? What was the nature of the Roman presence?
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 neighbourhood of the three tall stones of the stone circle. Raghnall 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.

What were the main routeways and crossing points in the area?
Communication by sea and river is an important element in the development of society. 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. The fording point at Rossnaree and its immediate environs would be a suitable focus for a programme of underwater archaeology because of its position on a major crossing along a major north-south overland route known as the *Slighe Midluachra*. Large quantities of artefacts from every period have been recovered from fording points. People crossing at fords may have dropped objects or fords may have had some ritual significance, with artefacts having been deliberately deposited at these sites. Fording places, due to their shallow nature, could also have acted as catchment areas for artefacts that may have been washed down-river. Fords may also have been altered and evidence for such works may still be visible or identified through fieldwork.

What light can the archaeological evidence shed on the political and strategic significance of this area?
Assuming that Knowth was the residence of the kings of Brega, how did this impact on the archaeology of the area? Was the Bend of the Boyne a royal demesne. Did its strategic position give rise to more defensive domestic enclosures, i.e. ringforts?
Later prehistoric artefacts from Brú na Bóinne are held in a number of institutions in Ireland and abroad and an inventory of all known objects from the area is badly needed as we know very little about the material culture of people in later prehistoric Brú na Bóinne.

What was the importance of the early history of Slane and its relationship to Brú na Bóinne?
When the story of Patrick came to be written, the Boyne Valley was chosen as the location for its symbolic if not actual beginning. According to the Annals of Ulster, Patrick arrived in AD 432. For the earliest descriptions of his arrival in Ireland, we are largely dependent on two texts from the second half of the seventh century, Muirchú's Life of Patrick, a saga text dealing with Patrick's initial activity in Ireland, and Tírechán's Collectanea, a collection of traditions and origin legends about churches which claimed to have been founded by Patrick. The location of *Fertae fer Feic* has usually been associated with the hill of Slane three kilometres west of the Brú na Bóinne. This identification first appears in the work of John Colgan in the seventeenth century, which he based on an

annalistic reference in AFM 512, which records the death of Erc of Slane, bishop of Lilcach and Ferta fer Feic. However, this identification has recently been questioned. There is, for example, an intriguing reference linking Patrick with Newgrange. *Fert-Patric* in the *dindshenchas* of Brúg (Newgrange) contained in the Book of Ballymote states: 'The grave of Esclam, the Dagda's brehon, which is called now Fert-Patric". What was the relationship between the Síl nAed Sláine dynasty and Brú na Bóinne ?

What was the nature of the royal site complex at Knowth?
The Síl nAed 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. But 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.

What is the evidence for early ecclesiastical sites?
We know relatively little about the pre-Norman ecclesiastical sites in 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. 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.

What was the role of the prehistoric sites in the Early Historic period?
In Brú na Bóinne there is consistent evidence for re-use of the major prehistoric monuments; the main mound at Knowth 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. What was the motivation for this adoption of the prehistoric centres by Early Historic society?

What was the nature of the Viking presence?

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.

What was the nature of political changes between the ninth and twelfth century?

In the ninth century the Síl nAed 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 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? Did the archaeology of the Early Medieval church change with the restructuring of the Church in the twelfth century? The change from monastic church to medieval parish may be detected from the architecture and archaeology of Dowth.

Brú na Bóinne in the medieval and post-medieval periods (to *c*.1700)

Michael Potterton with the Medieval and Post-Medieval Working Group

Continuity and change in the medieval and post-medieval period

To what degree is there continuity from the early historic period, in terms of land ownership, administrative boundaries, land organisation, land use, agriculture, industry and economy? What were the major changes that occurred in the twelfth century? To what degree were early historic and prehistoric sites, buildings and structures re-used and modified in later periods and did their functions change?

Is it possible to chart land ownership in detail from c.1170 to c.1700?

Who were the land-holding lay families, 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 was the background to the land-grants to the Cistercians and the Augustinians in the area? What was the effect of the dissolution of the monasteries on land ownership?

What was the nature of medieval and post-medieval populations?

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? From the sixteenth century, what was the religious make-up of the tenantry?

How was settlement within Brú na Bóinne organised?

Where did these tenants live? To what degree is it possible to reconstruct a picture of settlement patterns in the thirteenth century (for instance)? What was the nature of this settlement? Are hierarchies of settlement identifiable? In what ways did the settlement landscape change between, say, 1540 and 1650?
–   Documented settlements: The village of Oldbridge, for example. Where exactly was it, what was its form and extent, and what was its role during the Battle of the Boyne? What was the nature of the known settlements at Dowth and at Monknewtown during the middle ages and beyond?
–   Documented buildings: There are references to buildings such as Proudfootstown tower house and Lougher moated castle (1381). Where were these buildings and what did they look like? Can any trace of them be found on (or in) the ground? What of the other buildings and structures mentioned at Lougher in 1287 and 1381? Where were the garden, dovecot, mills and fishery recorded at Dowth in 1253? Can the location of the buildings recorded in the seventeenth-century Civil Survey be traced on the ground? The Down Survey

maps of the area show stone buildings at Dowth, Proudfootstown, Roughgrange, Lougher and Platin – what were these and can any trace of them be found now?
–   Undocumented buildings and sites: is it possible to quantify and identify the range of buildings that existed in the area during this period? Can traces of some of these be located on the ground, and further investigated?
–   Are the earthworks that can be seen at Knowth (near Site M), Monknewtown, Dowth and elsewhere, medieval in date? If so, what do they represent?

What do we know about the upstanding buildings of this period?
Some buildings dating to this period survive (e.g. Dowth Church, Dowth Tower House and Monknewtown Church). Who owned these buildings through time? What is the architectural history and the buildings? When were they originally built and what is the evidence for alteration, expansion etc? What are their notable characteristics and features? How do the buildings fit into their wider landscape setting? Is there any evidence for associated or neighbouring buildings or structures (including fields, gardens, orchards, yards etc)?

How was land used during this period and can we gauge the environmental impact?
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? 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 people on the environment of Brú na Bóinne?

How did trade and communication operate during this period?
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)? 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?

What survives of the place-lore and folklore of this period?
What is the derivation and history of the townland names and the field names in Brú na Bóinne? How can place-name evidence and folklore be used to inform understanding of the area in the medieval and post-medieval periods? In what ways can local knowledge be accessed, gathered and interpreted?

Can cartographic analysis enhance our knowledge of this period?
What is the potential for later maps (Down Survey, OS, estate maps…), for investigating earlier land-holding and settlement patterns?

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 (Brady et al. 2007, 75). The proposals were 'targeted diving in the river, a combined detailed topographic survey and extension of the geophysical survey in the area of the village to establish its extent, followed perhaps 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 estate would identify further areas of potential'. The authors also proposed that '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. The key and sensitive question of the burial places of the casualties of the day, if they exist, also needs to be addressed'.

Vernacular and built heritage

Jill Chadwick and the Vernacular and Built Heritage Working Group

Who owns the land?
Maps of the landholdings are useful tools. Has there been continuity of ownership over time? Have these holdings been enlarged or have they been subdivided ?

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? What is the nature of its industrial structures, ecclesiastical and institutional buildings, big houses, cottages?
What is the condition of these buildings? Are we in danger of losing any that might be irreplaceable?
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 heritage buildings, the canal, mills, bridges, lock-keepers 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.

The studies carried out by Geraldine Stout (2002) suggest 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 while the 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.

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.

What is the connection between surviving buildings and folklore relating to the Battle of the Boyne? Is there documentary or physical evidence of a field hospital at Sheephouse? Was bread for the troops baked in the farmhouse at Stalleen?
More detailed research is needed on specific sites, such as the derelict building complex at Sheephouse, which probably has an early core. Tradition has it that this functioned as a field hospital for the Battle of the Boyne. There is a strong oral tradition in the area regarding other buildings and their connection with the Battle of the Boyne such as the thatched house at Staleen, and a farmhouse at Fennor. Research into and recording of the oral traditions linking vernacular building with the Battle would be of considerable interest locally, and add another layer to cultural tourism.

Can derelict or underutilized buildings be adapted and re-used? How can small historic cottages be upgraded to provide comfortable homes for today without losing their essential character?
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.

How much new development has there been in the area in the last 10 – 20 years?
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 which fit into the landscape ? Are there sites where these can be most easily accommodated ? Where are the 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?
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 which 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
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.

How do we protect the built heritage from the cumulative small changes that can erode its character? What is the impact of changing farming practices or climate change on the landscape? 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.
The architectural heritage is considered to include demesne landscapes, and the wider landscape setting of the area that is characteristic of this part of the Boyne Valley. 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. It may be that a further layer of planning control such as designation of an Architectural Conservation Area, a Landscape Conservation Area, or an Area of Special Planning Control, would be a method for ensuring that such changes does not have a cumulatively negative effect on the character of the area. The most effective, easily-administered method of achieving control over such changes should be investigated and recommendations made for putting this in place.

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.

How can we better inform people about the importance of the area?
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.

We might also consider the development of guidelines regarding the "setting" of archaeological monuments and the damage that can be done to that setting by inappropriately designed or poorly located developments.

Natural heritage
Loreto Guinan with the Natural Heritage Working Group

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.

What are the threats to 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.

What actions can be taken to manage, enhance and protect biodiversity and geodiversity?
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.

Palaeoenvironment and palaeogeography
Finbar McCormick with the Palaeoenvironment and Palaeogeography Working Group

What was the natural environment of the Boyne valley like prior to its domestication?
To provide a context for understanding the impact of humans on the landscape, it is first essential to establish what the natural environment was like in the early prehistoric period. Pollen analysis will facilitate a reconstruction of the development of woodland in the area, but coleopteran analysis from palaeochannel deposits could potentially provide more detailed insights into the character of the woodland.

Were the passage tombs part of the initial domestication of the landscape in this area or is there evidence for Neolithic, i.e. farming, activity prior to the construction of the monuments?

Local-scale pollen analysis can help to establish the earliest evidence for human interference with the natural woodland in the Brú na Bóinne area. This will provide a context for the passage tomb phase of activity, identifying if there was a Mesolithic presence in the area, whether the area was first settled by early Neolithic farmers, or whether the passage tomb builders were the first to occupy the area. Strong chronological control, obtainable through close interval radiocarbon dating, is essential for understanding the timing of human impact on the landscape.

What was the nature of the landscape during the period in which the monuments were constructed and used?

A combination of local-scale pollen studies and palaeochannel reconstructions will help build up a picture of how the landscape looked when the monuments were in use. Of particular interest will be the question of whether the sites were built in an open or wooded landscape, and whether farming activity was conducted in the vicinity of the sites or not. This will contribute to the understanding of whether the monuments were central or peripheral to settlement and everyday life. It will also be possible to establish whether any such activity in the area was of a short-term or longer nature.

Can we detect periods of abandonment of the area, or was human activity sustained over a long time period?

Evidence for woodland regeneration in pollen records is indicative of a change in the nature of human activity, and possibly represents abandonment of an area. 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 at any time. By comparing local-scale records, it may also be possible to identify if the focus of human activity shifted from one area to another over time.

How does the landscape use change over time? Can we see evidence for shifts in the importance of different subsistence strategies?

Using detailed pollen analysis, it may be possible to ascertain the nature of subsistence strategies in the area. Small wetland basins will be particularly useful for detecting evidence for arable agriculture, and coleopteran analysis of palaeochannel sediments would also be valuable.

How has the biodiversity of the area changed over the last six millennia?

The demise of Ireland's primary forests began from the beginning of 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 vegetational history of the Brú na Bóinne area will contribute to our understanding of how this agriculturally-productive area of Ireland has changed, enabling specific periods of significant change to be identified. Through local pollen records, it will be possible to consider issues such as the changing character and ultimate demise of woodland cover, the floristic diversity of farmed land and the development of hedgerows. Coleopteran analysis can also provide important insights into habitat loss and biodiversity.

Who were buried in the tombs and cemeteries?
The Neolithic tombs clearly contain the remains of a very restricted number of persons. They are not the burial places of entire communities. 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? The same questions can be addressed to the Iron Age Burials in the Knowth mound and the Early Medieval Cemetery at the Knowth enclosure M.

What was the state of their health?
Morphological analysis of the remains has the potential to provide important information concerning the health of the people buried at Brú na Bóinne. Different diseases leave specific markers on the bones. 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.

What was their diet?
Morphological analysis of dental remains can provide evidence for calculus, caries, abscesses and ante-mortem tooth loss amongst other lesions. Caries are important for indicating that people consumed a diet rich in carbohydrates. Dietary evidence can also be obtained using carbon and nitrogen stable isotope analysis and can help determine if people were consuming high quantities of marine as opposed to terrestrial foodstuffs.

Were they locals or outsiders?
Recent studies of prehistoric grave and tombs outside Ireland have shown that the persons present were not from the immediate vicinity of the site. Strontium isotope analysis allows one to ascertain the geological signature of the place where persons originated. Groundwaters can contain different levels of the

substance and this is reflected in the chemical make-up of the bone. Buried remains from Brú na Bóinne should be subjected to this type of analysis.

Is there a difference between cremated and un-cremated remains?
Both cremations and inhumations have been noted in some of the Neolithic passage tombs at Brú na Bóinne. Different methods of body disposal can reflect different belief systems. Is there a difference in the age and sex profiles between those who were cremated and inhumed? We know that some megalithic tombs were used over a considerable period of time. Are the two methods of disposal of different date?

How did the livestock economy of Brú na Bóinne evolve and change between Neolithic and Medieval times?
We have detailed knowledge of the livestock economy and meat diet of the area during the Early Bronze Age and Early Medieval period. There are large gaps in our knowledge for other periods. Future research should endeavour to retrieve substantial animal bone samples to allow us to fill these knowledge gaps.

Is there evidence for ritual feasting or deposition during the prehistoric period?
It is clear that that the Brú na Bóinne landscape is no ordinary prehistoric landscape. It was a focus of ritual practice that has accounted for the construction of some of the largest megalith tombs in Europe. Ritual activity in most 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. Efforts should be made to identify such activity.

How was livestock farming affected by the arrival of new monastic orders during the 12th century?
Livestock farming changed radically during the Anglo-Norman period especially 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.

How did the presence of large urban centres affect 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.

Spatial data
Tom Condit with the Spatial Data Working Group

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.

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.

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. For example, we do not have a map of the riverbed. 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 aim of future work would 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. Systematic geophysical survey from a regional to a local scale is needed to define and characterise the river. Systematic waterborne geophysical survey can contribute to the assessment and characterisation of areas of high archaeological potential along waterways. This includes the mapping of areas that have been influenced by dredging and dumping.

Management and interpretation
Clare Tuffy with the Management and Interpretation Working Group

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?

Is there a need to examine developments and changes in legislation that have occurred in since 2002 which 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.

What is the state of condition of all of the monuments in the WHS?
Some 93 Recorded Monuments lie within the bounds of the World Heritage Site. They include passage tombs, henges, fulacta fiadh, cist burials, ringforts and souterrains. Many of these monuments have been surveyed in the past at different times. Is there a need for a new up to date comprehensive survey, which includes all of the monuments and their settings?

Should there be a monitoring programme of the impact of the conservation works at the monuments of 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.

How do different farming techniques impact on different types of monuments?
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, is there a need to research which farming techniques have less impact on the archaeology and biodiversity of the area?

Should there be an audit of existing research and of existing archives that would form an important research resource?
The Brú na Bóinne area has been subject to research and investigation over many centuries. It has inspired artists and poets. There is a need to bring all of the research and writings on the monuments together in one place where it could form the basis for further research.
The last Management Plan (2002-2007) proposed that Knowth House beside Knowth National Monument be developed as a research centre with a library located there that would inform future research. It was also proposed that an educational centre and research offices be located there.

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?

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 agenda involve the local community in a positive way?

Conclusion

It is hoped that the above document will stimulate discussion on the future of research in the Brú na Bóinne World Heritage Site. After more than 300 years since its re-discovery by antiquarians, the prehistoric monuments at the core of the WHS have made Brú na Bóinne the most intensively studied landscape on the island. However, one thing that should be evident from the Resource Assessment above is the central position Brú na Bóinne has maintained throughout the millennia. From prehistory to the arrival of Christianity to the early modern period, this landscape has come to reflect in microcosm the processes that have shaped society on the island since first contact. This consultation document clearly demonstrates the range and depth of research that has already taken place but equally how much more there is left to uncover, discoveries that will invariably inform not only the archaeology of Ireland but of Britain and continental Europe as well.

The drafting of the Research Framework for Brú na Bóinne provides an unique opportunity to shape the next major phase of archaeological research in Ireland at a time when continuing advances in techniques such as remote sensing and isotopic analysis allow us to unravel extensive landscapes as well as the small details of past lives.

Bibliography

Albarella, U. and Serjeantson, D. 2002. A passion for pork: meat consumption at the British late Neolithic site of Durrington Walls. In P. Miracle and N. Milner (eds), *Consuming passions and patterns of consumption*: 33-48. Cambridge: McDonald Institute Monographs.

Bateson, J. 1973. Roman material from Ireland: a re-consideration. *Proceedings of the Royal Irish Academy* 75C: 21-97 (see page 80).

Bergh, S. 1995. *Landscape of the Monuments*. Stockholm: Riksantikvarieämbet Arkeologiska Undersöknigar.

Bieler, L. 1979. *The Patrician texts in the Book of Armagh,* Scriptores Latini Hiberniae X. Dublin: Dublin Institute for Advanced Studies.

Bolger, T. 2002. Three sites on the Northern Motorway at Rathmullan, County Meath. *Ríocht na Midhe*.

Bolger, T. 2003. Site 13, Rathmullan. In Bennett (ed.), *Excavations 2001: Summary accounts of archaeological excavations in Ireland*: 327-8. Bray: Wordwell.

Bradley, J. 1997. Brú na Bóinne c.500–c.1600AD. In *Brú na Bóinne: Newgrange, Knowth, Dowth and the River Boyne*, supplement to Archaeology Ireland **11(3)**: 32–3.

Brady, C. 1996. Surface collected flint from Site A, Newgrange, County Meath. *Trowel* **VII**: 41-5.

Brady, C. 2002. Earlier prehistoric settlement in the Boyne Valley. *Archaeology Ireland* **16(3)**: 8-12.

Brady, C., Byrnes, E., Cooney, G., and O'Sullivan, A. 2007. An archaeological study of the Battle of the Boyne at Oldbridge, Co. Meath. *Journal of Conflict Archaeology* **3(1)**: 53–77.

Brady, N. 1986. The plough in early historic and medieval Ireland. Unpublished MA thesis, University College Dublin.

Brady, N. 1988. The plough pebbles of Ireland. *Tools & Tillage* **6**: 47–60.

Brooks, A. and Farrell, A. 2005. Assessment of Palaeoenvironmental

Research Potential on the route of the M3 Clonee – North of Kells. Report prepared for Meath County Council. (http://www.m3motorway.ie/RelatedContent/file,2075,en.pdf [accessed 19 March 2008]).

Byrne, F. J. 1987. *Irish Kingship and High Kings* (Rev. 2nd edition). London: Batsford.

Buckley, V. 1988/89. Meath souterrains: some thoughts on Early Christian distribution patterns. *Ríocht na Midhe* **8**: 64-7.

Campbell, K. 1995. Sheephouse. Fulachta Fiadh. In I. Bennett (ed.), *Excavations 1994: Summary Accounts of Archaeological Excavations in Ireland*. Bray: Wordwell.

Campbell, K. 2002. Tullyallen 6. Prehistoric enclosure. In I. Bennett (ed.), *Excavations 2000: Summary accounts of archaeological excavations in Ireland*. Bray: Wordwell.

Campbell, K. 2007. Staleen. Ring-ditch with burial urns. In I. Bennett (ed.), *Excavations 2004: summary accounts of archaeological excavations in Ireland*. Bray: Wordwell.

Carson, R. and O'Kelly, C. 1977. A catalogue of the Roman coins from Newgrange, Co. Meath. *Proceedings of the Royal Irish Academy* **77C**: 35-55 (see page 45).

Caspari, W. A. 1983. Appendix II: Identification of seeds. In M. O' Kelly, R. Cleary & D. Lehane (eds) 1983. *Newgrange, Co. Meath, Ireland. The Late Neolithic/Beaker Period Settlement*, BAR International Series 190: 57. Oxford: British Archaeological Reports.

Chadburn, A. and Pomeroy-Kellinger, M. (eds) 2001. *Archaeological Research Agenda for the Avebury World Heritage Site*. Salisbury: Wessex Archaeology for English Heritage.

Chapple, R. 2002. Tullyallen 1. Ring barrow. In I. Bennett (ed.), *Excavations 2000: Summary accounts of archaeological excavations in Ireland*. Bray: Wordwell.

Chapple, R. 2003. Mell 2. Ring-ditch and ditched enclosure. In I. Bennett (ed.), *Excavations 2001: Summary accounts of archaeological excavations in Ireland*. Bray: Wordwell.

Clinton, M. 2001. *The souterrains of Ireland*. Bray: Wordwell.

Collins, B. 1997. Plant remains. In G. Eogan & H. Roche, *Excavations at Knowth II*: 295-300. Dublin: Royal Irish Academy.

Colmcille, Fr. 1953. Seven documents from the old abbey at Mellifont. *County Louth Archaeological and Historical Journal* **13**: 35-67.

Colmcille, Fr. 1958. *The story of Mellifont*. Dublin: M. H. Gill.

Condit, T. 1997a. Monknewtown ritual pond. In T. Condit & G. Cooney (eds), *Brú na Bóinne: Newgrange, Knowth, Dowth and the River Boyne*, supplement to *Archaeology Ireland*:

Condit, T. 1997b. The Newgrange cursus and the theatre of ritual. In T. Condit & G. Cooney (eds), *Brú na Bóinne: Newgrange, Knowth, Dowth and the River Boyne*, supplement to *Archaeology Ireland*: 26-7.

Cooney, G. 1990. The place of megalithic tomb cemeteries in Ireland. *Antiquity* **64**: 741-53.

Cooney, G. 1991. Irish Neolithic landscapes and land use systems: the implications of field systems. *Rural History* **2(2)**: 123-139.

Cooney, G. 2000. *Landscapes of Neolithic Ireland*. London: Routledge.

Cooney, G. & Brady, C. 1998. The Red Mountain Transect: a pilot fieldwalking study. Unpublished report, University College Dublin.

Cooney, G., E. Byrnes, C. Brady and A. O'Sullivan. 2002. The archaeology of the battle of the Boyne at Oldbridge, Co. Meath. *Archaeology Ireland* **16(4)**: 8–12.

Corish, P. 1981. *The Catholic community in the seventeenth and eighteenth centuries*. Dublin: Helicon.

Curtis, E. and McDowell, R. B. (eds) 1943. *Irish historical documents, 1172-1922*. London.

D'Alton, J. 1844. *The history of Drogheda with its environs and an introductory memoir of the Dublin and Drogheda railway*, 2 vols. Dublin.

Darvill, T. 2005. *Stonehenge World Heritage Site: An Archaeological Research Framework*. London and Bournemouth: English Heritage and Bournemouth University.

Delaney, S. 2007. Site 121, Balriggan 1, Balriggan. Early medieval enclosures. In I. Bennett (ed.), *Excavations 2003: summary accounts of archaeological excavations in Ireland*. Bray: Wordwell.

Downes, J., Foster, S. M. and Wickham-Jones, C. R. with Callister, J. (eds) 2005. *The Heart of Neolithic Orkney World Heritage Site: Research Agenda*. Edinburgh: Historic Scotland.

Dúchas The Heritage Service and Department of the Environment and Local Government. 2002. *Brú na Bóinne World Heritage Site Management Plan*. Dublin: The Stationery Office.

Duffy, C. 2002. Hill of Rath. Prehistoric complex. In I. Bennett (ed.), *Excavations 2000: Summary accounts of archaeological excavations in Ireland*: 231-3. Bray: Wordwell.

Ellison, C. C. 1973. Bishop Dopping's visitation book, 1682–1685. *Ríocht na Midhe* **5(3)**: 3–11.

Ellison, C. 1983. *The waters of the Boyne and Blackwater*. Dublin: Blackwater Press.

Eogan, G. 1961. Excavations at Townleyhall: preliminary report. *County Louth Archaeological and Historical Journal* **15**, 11-12.

Eogan, G. 1963a. A Neolithic habitation-site and megalithic tomb in Townleyhall Townland, Co. Louth. *Journal of the Royal Society of Antiquaries of Ireland* **92**: 37-81.

Eogan, G. 1963b. A new passage grave in Co. Meath. *Antiquity* **37**: 226-228.

Eogan, G. 1967. The Knowth (Co. Meath) excavations. *Antiquity* **41**: 302-304.

Eogan, G. 1968. Excavations at Knowth, Co. Meath, 1962-65, with historical note by F. J. Byrne. *Proceedings of the Royal Irish Academy* **67C**: 299-400.

Eogan, G. 1969. Excavations at Knowth, Co. Meath. *Antiquity* **43**: 8-14.

Eogan, G. 1973. A decade of excavations at Knowth, Co. Meath. *Irish University Review* **3**: 66-78.

Eogan, G. 1974. Report on the excavations of some passage graves, unprotected inhumation burials and a settlement site at Knowth, Co. Meath. *Proceedings of the Royal Irish Academy* **74C**: 11-112.

Eogan, G. 1976. Beaker material from Knowth. In C. Burgess and R. Miket (eds), *Settlement and economy in the third and second Millennia BC*, BAR British Series 33: 251-166. Oxford: British Archaeological Reports.

Eogan, G. 1977a. The Iron Age-Early Christian settlement at Knowth. In V. Markotic (ed.), *Ancient Europe and the Mediterranean*: 69-76. Warminster: Aris and Phillips.

Eogan, G. 1977b. Two decorated stones at Knowth. *Antiquity* **51**, 48-49.

Eogan, G. 1978. The entrance stones at Knowth. *Antiquity* **52**, 134-135.

Eogan, G. 1979. Objects with Iberian affinities from Knowth, Ireland. *Revista de Guimarães* **89**: 275-279.

Eogan, G. 1983. A flint macehead at Knowth, Co. Meath, Ireland. *Antiquity* **57**: 45-46.

Eogan, G. 1990. The archaeology of Brugh na Bóinne during the early centuries A.D. *Seanchas Ard Mhacha: Journal of the Armagh Diocesan Historical Society* **14(1)**: 20-34.

Eogan, G. 1991. Prehistoric and Early Historic culture change at Brugh na Bóinne. *Proceedings of the Royal Irish Academy* **91C**: 105-132.

Eogan, G. 1996. Pattern and Place: A preliminary study of the decorated kerbstones at Site 1, Knowth, Co. Meath and their comparative setting. In J. L'Helgouach, C.T. Le Roux and J. Lecornec (eds) *Art et Symboles du Megalithisme European*, 97-104. Rennes: Revue Archéologique de l'Ouest, Supplement 8.

Eogan, G. 1997. Overlays and Underlays: Aspects of Megalithic Art Succession at Brugh na Bóinne, Ireland. In J.M. Bello and B. Bs López (eds), *Proceedings of III Colloquio Internacional de Arte Megalitico*, Brigantium 10, 217-234. La Coruña.

Eogan, G. 1998. Knowth before Knowth. Antiquity 72, 162-172.

Eogan, G. 2004. Knowth, 40 years on. Ríocht na Midhe 15, 1-11.

Eogan, G. 2007a. Knowth in the Early Christian Period: the cultural and chronological context of the animal bone assemblage. In F. McCormick and E. Murray 2007. *Excavations at Knowth 3: Knowth and the Zooarchaeology of Early Christian Ireland*: 1-6 Dublin: Royal Irish Academy.

Eogan, G. 2007b. Culture and cult: some aspects of passage tomb society in the Boyne region, Ireland. In D. Barrowclough and C. Malone (eds), *Cult in Context. Reconsidering Ritual in Archaeology*: 134-9. Oxford: Oxbow.

Eogan, G. and Richardson, H. 1982. Two maceheads from Knowth, Co. Meath. *Journal of the Royal Society of Antiquaries of Ireland* **112**, 123-138.

Eogan, G. and Aboud, J. 1990. Diffuse picking in Megalithic Art. *La Bretagne et L'Europ Préhistoriques. Mémoire en homage à Pierre-Roland Giot*, Revue Archéologique de L'Ouest, Supplément No. 2: 121-140.

Eogan, G. and Roche, H. 1994. A Grooved Ware wooden structure at Knowth, Boyne Valley, Ireland. *Antiquity* **68**, 322-330.

Eogan, G. & Roche, H. 1997a. *Excavations at Knowth 2*. Dublin: Royal Irish Academy.

Eogan, G. & Roche, H. 1997b. Pre-tomb Neolithic house discovered at Knowth, Co. Meath. *Archaeology Ireland* **11(2)**: 31.

Eogan, G. and Roche, H. 1998. Further evidence for Neolithic habitation at Knowth, Co. Meath. *Ríocht na Midhe* **9(4)**, 1-9.

Eogan, G. and Roche, H. 1999. Grooved Ware from Brugh na Bóinne and its wider context. In R. Cleal and A. Mac Sween (eds), *Grooved Ware in Britain and Ireland*, 98-111. Oxford: Oxbow Books.

Eogan, G. and Roche, H. 2001. Late Neolithic activity in the Boyne Valley, Co. Meath. In C.T. Le Roux (ed.), *Revue Archéologique de L'Ouest*, Supplément No.9, 125-140.

Feilden, F.M. & Jokilehto, J. 1993 *Management Guidelines for World Cultural Heritage Sites*. Rome: ICCROM.

Galway, F. 1985/1986. Meath tower houses. *Ríocht na Midhe* **7(4)**: 28–59.

Gardiner, M. J. and Walsh, T. 1966. Comparison of soil materials buried since Neolithic times with those of the present day. *Proceedings of the Royal Irish Academy* **65C**: 29-35.

Government of Ireland. 2007. *National Development Plan 2007-13*. Dublin.

Gowen, M. 1992. Excavation of the souterrain complexes at Marshes Upper, Dundalk, county Louth. *Proceedings of the Royal Irish Academy* **92C**: 55-120.

Graham, B. J. 1974. Medieval settlements in County Meath. *Ríocht na Midhe* 5(4): 40–59.

Graham, B. J. 1976. The evolution of the settlement pattern of Anglo-Norman Eastmeath. In R. H. Buchanan, R. A. Butlin and D. McCourt (eds), *Fields, farms and settlement in Europe*: 38–47. Belfast.

Graham, B. J. 1980. The mottes of the Norman liberty of Meath. In H. Murtagh (ed.). Irish midland studies: essays in commemoration of N. W. English, pp 39–56. Athlone.Groenman-van Waateringe, W. 1984. Appendix two. Pollen and seed analyses. In G. Eogan, *Excavations at Knowth 1*: 325-9. Dublin: Royal Irish Academy.

Groenman-van Waateringe, W. 1978. The impact of Neolithic man on the landscape of the Netherlands. In S. Limbrey and J. G. Evans (eds), *The Effect of Man on the Landscape: The Lowland Zone*, Council for British Archaeology Research Report 21: 135-46. London: CBA.

Groenman-van Waateringe, W. 1981. Field boundaries in Ireland. In D Ó Corráin (ed.), *Irish Antiquity*: 285-9. Cork.

Groenman-van Waateringe, W. and Pals, J. 1982. Pollen and seed analysis. In O'Kelly, M., *Newgrange. Archaeology, art and legend*: 219-223. London: Thames and Hudson.

Grogan, E. 1991. Appendix: radiocarbon dates from Brugh na Bóinne. In G. Eogan, Prehistoric and early historic culture change at Brugh na Bóinne. *Proceedings of the Royal Irish Academy* **91C**: 126-7.

Grogan, E. and Roche, H. 2005. The prehistoric pottery from Balregan 1, Co. Louth (03E0157). Unpublished report for Irish Archaeological Consultancy Ltd.

Herity, M. (ed.) 2001. *Ordnance Survey letters: Meath*. Dublin.

Hogan, A. 2008. *The Priory of Llanthony Prima and Secunda in Ireland, 1172-1541: lands, patronage and politics*. Dublin: Four Courts Press.

Jenkins, W. Forthcoming. Post-Reformation settlement and society in Brugh na Bóinne. In G. Eogan, *Excavations at Knowth 4: Historical Knowth and its hinterland*. Dublin: Royal Irish Academy.

Kelly, E. 1984. Two quernstones from county Meath. *Ríocht na Midhe* **7**: 104-11.

Kelly, F. 1997. *Early Irish farming*. Dublin: Dublin Institute for Advanced Studies.

Kenny, G. Forthcoming. Late medieval Brugh na Bóinne, 1142-1541. In G. Eogan, *Excavations at Knowth 4: Historical Knowth and its hinterland*. Dublin: Royal Irish Academy.

Killen, J. 1997. Communications. In F. H. A. Aalen, K. Whelan and M. Stout (eds), *Atlas of the Irish Rural landscape*: 206-19. Cork: Cork University Press.

Lehane, D. 1983. The flint work. In M. O' Kelly, R. Cleary & D. Lehane, *Newgrange, Co. Meath, Ireland. The Late Neolithic/Beaker Period Settlement*, BAR International Series 190: 150-3. Oxford: British Archaeological Reports.

Lenihan, P. 2003. *1690 Battle of the Boyne*. Stroud: Tempus.

Lucas, A. 1971-3. Souterrains: the literary evidence. *Béaloideas* **39-44**.

Lynch, A. 1989. Newgrange. In I. Bennett (ed.), *Excavations 1988: Summary Accounts of Archaeological Excavations in Ireland*: 33. Dublin: Wordwell.

Lynch, A. 1990a. Newgrange. In I. Bennett (ed.), *Excavations 1989: Summary Accounts of Archaeological Excavations in Ireland*: 42-3. Bray: Wordwell.

Lynch, A. 1990b. 'Dowth', Dowth. In I. Bennett (ed.), *Excavations 1989: Summary Accounts of Archaeological Excavations in Ireland*: 42. Bray: Wordwell.

MacCarthy, M. 2002. A preliminary geophysical report on the reputed cursus at Newgrange, Co. Meath. Unpublished report for Dúchas: The Heritage Service.

Mac Niocaill, G. 1964. *Na Buirgéisí XII-XV aois*, 2 vols. Dublin.

McCormick, F. 1995. Cows, ringforts and the origins of Early Christian Ireland. *Emania* **13**: 33-7.

McCormick, F. 1997. Animal bone analysis from Neolithic and Beaker complexes. In G. Eogan & H. Roche, *Excavations at Knowth II*: 300-307. Dublin: Royal Irish Academy.

McCormick, F. 2002. The distribution of meat in a hierarchical society: the Irish evidence. In P. Miracle and N. Milner (eds), *Consuming passions and patterns of consumption*: 25-31. Cambridge: McDonald Institute Monographs.

McCormick, F. 2005. Archaeology: The horse in Early Ireland'. In M. McGrath and J. C. Griffith (eds), *The Irish draught horse: a history*: 17-29. Cork: Collins Press.

McCormick, F. 2007. The horse in Early Ireland. Anthropozoologica **42(1)**.

McCormick, F. and Murray, E. 2007. *Excavations at Knowth 3: Knowth and the Zooarchaeology of Early Christian Ireland*. Dublin: Royal Irish Academy.

McCracken, J. 1986. The ecclesiastical structure, 1714-60. In T. W. Moody and W. E. Vaughan (eds), *A new history of Ireland IV*: *the eighteenth century, 1691-1800*: 84-104. Oxford: Clarendon Press.

McNally, M. 2005. *Battle of the Boyne 1690: the Irish campaign for the English crown*. Oxford: Osprey Publishing Ltd.

McQuade, M. 2005. Archaeological excavation of a multi-period prehistoric settlement at Waterunder, Mell, Co. Louth. *County Louth Archaeological and Historical Journal* **26(1)**: 31-66.

McSparron, C. 2003. The Excavation of a Neolithic house and other structures at Enagh, County Derry. *Ulster Journal of Archaeology* **62**: 1-13.

Mills, J. (ed.) 1905-14. *Calendar of justiciary rolls, Ireland, Vols i and ii*. Dublin and London.

Mitchell, G. F. 1940. Studies in Irish Quaternary Deposits: Some lacustrine deposits near Dunshaughlin, Co. Meath. *Proceedings of the Royal Irish Academy* **46B**: 13-37.

Mitchell, G.F. 1941. Studies in Irish Quaternary Deposits. No.2 – Some lacustrine deposits near Ratoath, Co. Meath. *Proceedings of the Royal Irish Academy* **46B**: 173-182.

Mitchell, G. F. 1942. A composite pollen diagram from County Meath, Ireland. *New Phytologist* **41**: 257-261.

Moore, M. J. (ed.) 1987. *Archaeological inventory of County Meath*. Dublin: Stationery Office.

Mount, C. 1992. Animals and Ritual in the Beaker Period at Newgrange. *Trowel III*.

Mount, C. 1994. Aspects of ritual deposition in the Late Neolithic and Beaker Periods at Newgrange, Co. Meath. *Proceedings of the Prehistoric Society* **60**: 433–43.

Mulvin, L. 2006. *Roman & Byzantine antiquities in the National Museum of Ireland: a select catalogue*, National Museum of Ireland monograph series 3. Bray: Wordwell/National Museum of Ireland

Newman, C., O'Connell, M., Dillon, M. and Molloy, K. 2007. Interpretation of charcoal and pollen data relating to a late Iron Age ritual site in eastern Ireland: a holistic approach. *Vegetation History and Archaeobotany* **16**, 349-365

Noel M. J. and Hale D. N. n.d. Geophysical Survey in Newgrange townland. Unpublished report for Archaeological Development Services and GeoQuest Associates on behalf of the Office of Public Works.

O'Carroll, F. 2002. Littlegrange. In Isabel Bennett (ed.), *Excavations 2000: summary accounts of archaeological excavations in Ireland*: 234. Bray: Wordwell.

O'Connor, D. 2007. Sheephouse and Oldbridge. Testing. In I. Bennett (ed.), *Excavations 2003: summary accounts of archaeological excavations in Ireland*. Bray: Wordwell.

Ó Donnchadha, B. 2002. M1 Dundalk Western Bypass. Donaghmore Excavations: Sites 108, 109, 110 and 131. Unpublished Report for Irish Archaeological Consultancy Ltd.

Ó Donnchadha, B. 2003b. M1 Dundalk Western Bypass. Site 103: Littlemill 4 and 5. Unpublished Report for Irish Archaeological Consultancy Ltd.

Ó Drisceoil, C. 2004. A preliminary report concerning the archaeological excavation of Neolithic houses at Coolfore, Co. Louth. *County Louth Archaeological and Historical Journal* **25(4)**: 360-85.

Ó hInnse, S. (ed.) 1947. *Miscellaneous Irish annals (A.D. 1114–1437)*. Dublin: Dublin Institute for Advanced Studies.

O'Keeffe, T. 1992. Medieval frontiers and fortifications: the Pale and its evolution. In F.H.A. Aalen and K. Whelan (eds.), *Dublin city and county from prehistory to the present: studies in honour of J.H. Andrews*: 57-77. Dublin.

O'Kelly, M. 1968. Surface collected flints from two sites in the Boyne valley, County Meath. *Journal of the Cork Historical and Archaeological Society* **LXXIII**:114-19.

O'Kelly, M. 1976. Plough pebbles from the Boyne Valley. In C. Ó Danachair (ed.), *Folk and farm: essays in honour of A.T. Lucas*: 165-75. Dublin: Royal Society of Antiquaries of Ireland.

O' Kelly, M., Cleary, R. & Lehane, D. 1983. *Newgrange, Co. Meath, Ireland. The Late Neolithic/Beaker Period Settlement*, BAR International Series 190. Oxford: British Archaeological Reports.

O'Kelly, M., Lynch, F. & O'Kelly, C. 1978. Three passage-graves at Newgrange, Co. Meath. *Proceedings of the Royal Irish Academy* **78C**: 249-352.

O'Kelly, M. & O'Kelly, C. 1983. The tumulus of Dowth, County Meath. *Proceedings of the Royal Irish Academy* **83C**: 135-90.

O'Kelly, M. J. and Shell, C. A. 1978. Stone objects and a bronze axe from Newgrange, Co. Meath. In M. Ryan (ed.), *The origins of metallurgy in Atlantic Europe*, Proceedings of the Fifth Atlantic Colloquium: 127-44, Dublin.

Olivier, A. 1996. *Frameworks for our Past: A review of research frameworks, strategies and perceptions*. London: English Heritage.

O'Sullivan, M. 1989. A stylistic revolution in the megalithic art of the Boyne Valley. *Archaeology Ireland* **3(4)**: 138-42.

O'Sullivan, M. 1995. *Megalithic art in Ireland*. Dublin: Country House.

Paston, G. (ed.) 1900. *Mrs Delany (Mary Granville): a memoir, 1700-1788*. New York and London.

Richards, C. 2003. *Dwelling Among the Monuments: The Neolithic Village of Barnhouse, Maeshowe Passage Grave and Surrounding Monuments at Stenness, Orkney*, McDonald Institute Monographs. Cambridge: McDonald Institute for Archaeological Research.

Roche, H. 1997. Prehistoric settlement in Brú na Bóinne. In *Brú na Bóinne: Newgrange, Knowth, Dowth and the River Boyne*, supplement to Archaeology Ireland **11(3)**.

Ryan, P. and Bailey, F. 2006a. M1 Dundalk Western Bypass. Site 101: Littlemill 1. Stratigraphic report. Unpublished report for Irish Archaeological Consultancy Ltd.

Ryan, P. and Bailey, F. 2006b. M1 Dundalk Western Bypass. Site 103: Littlemill 4 & 5, Stratigraphic report. Unpublished Report for Irish Archaeological Consultancy Ltd.

Seaver, M. 2007. Raystown. Early medieval settlement complex. In I. Bennett (ed.), *Excavations 2004: summary accounts of archaeological excavations in Ireland*. Bray: Wordwell.

Shee Twohig, E. 1981. *The megalithic art of western Europe*. Oxford: Clarendon Press.

Shee Twohig, E. 2000. Frameworks for the megalithic art of the Boyne Valley. In G. Johnson, M. McCarthy, J. Sheehan & E. Shee Twohig (eds), *New agendas in Irish prehistory: papers in commemoration of Liz Anderson*: 89-105. Bray: Wordwell.

Sheridan, A. 1985/6. Megaliths and megalomania: an account and interpretation of the development of passage tombs in Ireland. *Journal of Irish Archaeology* **3**: 17-30.

Smith, B. 1993. The de Pitchford family in thirteenth-century Ireland. *Studia Hibernica* **27**: 29–43.

Smith, B. 1999. *Colonisation and conquest in medieval Ireland: the English in Louth, 1170-1330*, Cambridge Studies in Medieval Life and Thought, Fourth Series. Cambridge: Cambridge University Press.

Smyth, J. 2006. The role of the house in early Neolithic Ireland. *European Journal of Archaeology* **9(2/3)**: 229-257.

Stalley, R. 1987. *The Cistercian Monasteries of Ireland*. London and New Haven: Yale University Press.

Story, G. 1693. *An impartial history of the wars of Ireland*. London.

Stout, G. 1984. *Archaeological survey of the barony of Ikerrin*. Roscrea: Roscrea Heritage Society.

Stout, G. 1997a. *The Bend of the Boyne: an archaeological landscape*. Dublin: Country House.

Stout, G. 1997b. The Bend of the Boyne, County Meath. In F. H. A. Aalen, K. Whelan and M. Stout (eds), *The Atlas of the Rural Irish Landscape*: 229-315. Cork: Cork University Press.

Stout, G. 1997c. Fishing at Brú na Bóinne. In *Brú na Bóinne: Newgrange, Knowth, Dowth and the River Boyne*, Supplement to *Archaeology Ireland* **11(3)**: 34–5.

Stout, G. 2002. *Newgrange and the Bend of the Boyne*. Cork: Cork University Press.

Stout, G. 2007. The church and tower house at Dowth, County Meath. In C. Manning (ed.), *From ringforts to fortified houses: studies on castles and other monuments in honour of David Sweetman*, 335–51. Bray: Wordwell.

Stout, G. and Stout, M. 2008. *Excavation of a secular cemetery at Knowth Site M, County Meath, and related sites in north-east Leinster*. Bray: Wordwell.

Stout, M. 1997. *The Irish ringfort*. Dublin: Four Courts Press.

Sweetman, H. S. (ed.) 1875. *Calendar of documents relating to Ireland, Vol. 1, 1171–1251*. London.

Sweetman, H. S. (ed.) 1877. *Calendar of documents relating to Ireland, Vol. 2, 1252–1284*. London.

Swift, C. 1996. Pagan monuments and Christian legal centres in early Meath. *Ríocht na Midhe* **9**: 1-26.

The Heritage Council of Ireland. In press. *Strategic Plan 2007-13*.

The Heritage Council. 2007. Research Needs in Irish Archaeology, paper submitted to the Minister for Environment, Heritage and Local Government.

Tresham, E. (ed.) 1828. *Rotulorum patentium et clausorum cancellariae Hiberniae calendarium*. Dublin.

Van Wijngaarden-Bakker, L. H. 1974. The animal remains from the Beaker settlement at Newgrange, Co. Meath: First report. *Proceedings of the Royal Irish Academy* **74C**: 318-83.

Van Wijngaarden-Bakker, L. H. 1982. The faunal remains. In M. J. O'Kelly, *Newgrange: Archaeology, art and legend*: 214-217. London: Thames and Hudson.

Van Wijngaarden-Bakker, L. H. 1986. The animal remains from the Beaker settlement at Newgrange, Co. Meath: Final report. *Proceedings of the Royal Irish Academy* **86C**: 17-111.

Waddell, J. 1970. Irish Bronze Age cists: a survey. *Journal of the Royal Society of Antiquaries of Ireland* **100**: 91-139.

Weir, D. 1996. Brú na Bóinne Palaeoenvironmental Project: Assessment of Potential and Proposals for Further Work. Unpublished report for the Knowth Research Project.

Whelan, K. 1983. The Catholic church, the Catholic chapel and village development in Ireland. *Irish Geography* **16**: 1-15.

Whelan, K. 1997. The modern landscape: from plantation to present. In F. H. A. Aalen, K. Whelan and M. Stout (eds), *Atlas of the Irish Rural landscape*: 67-103. Cork: Cork University Press.

Went, A. 1953. Materials for a history of the fisheries of the River Boyne. *County Louth Archaeological and Historical Journal* **13**: 18–33.

White, N. B. (ed.) 1943. *Extents of Irish monastic possessions, 1540-1541, from manuscripts in the Public Record Office, London*. Dublin: Stationery Office.

Woodman, P. 1985. Prehistoric settlement and environment. In K. Edwards and W. P. Warren (eds), *The Quaternary History of Ireland*: 251-78. London.