

Brú na Bóinne World Heritage Site

Research Framework



Comhshaol, Oidhreacht agus Rialtas Áitiúil
Environment, Heritage and Local Government

An Chomhairle Oidhreachta
The Heritage Council



United Nations
Educational
Scientific and
Cultural
Organisation



Brú na Bóinne World Heritage Site

Research Framework

Compiled and edited by Jessica Smyth

with contributions from

Conor Brady, Jill Chadwick, Tom Condit, Gabriel Cooney, Ian Doyle,
Loreto Guinan, Michael Potterton, Geraldine Stout and Clare Tuffy

i

An Chomhairle Oidhreachta
The Heritage Council



An Chomhairle Oidhreachta The Heritage Council 2009

© An Chomhairle Oidhreachta / The Heritage Council 2009

All rights reserved.

No part of this publication may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopying, recording, or any other information storage and retrieval system, now known or hereafter invented, without either the prior written consent of the publishers or licence permitting restricted copying in Ireland issued by the Irish Copyright Licensing Agency Ltd
The Writers' Centre
19 Parnell Square, Dublin 1

Compiled and edited by Jessica Smyth with contributions from
Conor Brady, Jill Chadwick, Tom Condit, Gabriel Cooney, Ian Doyle,
Loreto Guinan, Michael Potterton, Geraldine Stout and Clare Tuffy

ii

Published by The Heritage Council

Designed and Produced by
B+H Magee Design Ltd

Editorial Consultant: Roberta Reeners
Index: Hugh Brazier

ISBN 978-906304-06-5

Contents

Foreword	iv	Section 3 — Research Agenda	64
Acknowledgements	v	3.1 Developing an Agenda	64
Executive Summary	vi	3.2 Research Questions	64
Achoimre Feidhmiúcháin	viii	3.2.1 People	64
List of Figures	x	3.2.2 Politics and Power	68
		3.2.3 Landscape and Environment	74
		3.2.4 Legacy	80
		3.2.5 The Living World Heritage Site	84
Section 1 — Introduction	1	Section 4 — Research Strategy	90
1.1 Introduction	1	4.1 Creating Objectives	90
Why a Research Framework?	1	4.1.1 The Big Gaps	90
What is a Research Framework?	2	4.1.2 The Mega-Tombs and Related Monuments	93
The Project	3	4.1.3 Integrating Monuments and Landscapes	95
1.2 Brú na Bóinne in Context	3	4.1.4 Research Infrastructure	97
1.3 History of Research	8	4.2 Mapping Research Capacity	100
		4.2.1 Current Initiatives	102
Section 2 — Resource Assessment	25	Section 5 — Recommendations	108
2.1 The Mesolithic	25	Appendices	109
2.2 The Neolithic	25	I. Research Committee and Working Groups	110
2.3 The Bronze Age	37	II. Consultation Process	112
2.4 The Iron Age	39	III. Investigations Carried Out in the WHS	114
2.5 The Early Medieval Period	41	IV. Radiocarbon Dates from the WHS	117
2.6 Continental Monasticism	46	V. Areas for Further Reading	130
2.7 The Anglo-Normans	49		
2.8 Reform and Rebellion: The Sixteenth and Seventeenth Centuries	51	References Cited in the Text	134
2.9 Economy and Industry: The Eighteenth Century Onwards	54		
2.10 Modernisation to the Present Day	60	Index	145

Foreword

World Heritage Sites are vast storehouses of information about human and natural history. Thus stewardship of a World Heritage Site should be directed towards evocation and education, where research strives to release the knowledge and lessons such places have to teach us about the natural world and our place in it, both now and in the past.

There has been a long history of archaeological and historical research in the Boyne Valley, without which its true importance would have remained unknown to us. The contribution of Professor George Eogan in this regard has been outstanding. Indeed, it was he who first championed the case for an integrated research plan, observing that if the Boyne Valley is one cultural landscape, then this is the responsible approach to its research. This next phase in the analysis of the Boyne Valley aims to achieve just that by pulling together – under one banner – the past, current and future research initiatives.

Focusing on agreed outstanding questions, this Research Framework aims to fill some of the gaps in our knowledge, whilst inevitably identifying new ones.

The knowledge acquired from researching the Boyne Valley contributes to awareness, appreciation and understanding, all of which are vital ingredients of sustainable management. Cultural landscapes, like the Boyne Valley, are typically living landscapes where sustainable management is concerned not just with conservation of the historical character of the landscape but also its natural habitats, ecosystems and human communities. The long-term well-being of such a landscape is measured by the successful, sustainable integration of all of these factors, by the extent to which competition between resources is replaced by complementarity of resources. The research initiatives contained in this Research Framework will lead the way in achieving this goal.

Conor Newman
Chairperson
The Heritage Council

Michael Starrett
Chief Executive
The Heritage Council

Acknowledgements

Brian Duffy and all in the Department of the Environment, Heritage and Local Government are warmly thanked for their support and patience with the project. Ian Doyle and Gabriel Cooney provided constant encouragement and advice throughout the framework process, and the members of the Research Committee gave much-needed input and guidance. Thanks also to all of the individuals in the working groups who kindly donated their time and expertise in seminars and symposia; to the Discovery Programme for their enthusiasm and technical expertise; to George Eogan and Kerri Cleary for regular Knowth updates; to Clare Tuffy for her hospitality and to Barbara and Anthony O'Neill for discussing their vision of the Boyne Valley Archaeological Park. Access to unpublished site archives and information on current research was generously provided by several individuals, including Conor Brady, Kevin Barton, Kieran

Campbell, Joe Fenwick, Matthew Seaver and Mandy Stephens. Illustrations have a crucial role in the framework document and thanks are due to the many institutions and private individuals that gave permission to reproduce various images of the WHS, in particular Geraldine and Matthew Stout, Con Brogan and Ann Lynch. Special thanks to all those who submitted comments and criticisms during the consultation periods, and to Robin Coningham and Tim Darvill, who formally reviewed the document and the framework process.

Finally, the people of the Brú na Bóinne area are thanked for their enthusiasm and support of the project. It is very much hoped that this framework document and the strategy it outlines will help create a better understood and more accessible World Heritage Site.

v

Jessica Smyth
Project Coordinator

Executive Summary

The Bend of the Boyne, or Brú na Bóinne, has been an important ritual, social and economic centre for thousands of years. Its universal value was recognised in 1993 when it was designated a UNESCO World Heritage Site, only one of three on the island of Ireland.

The international significance of Brú na Bóinne has been gradually revealed through a process of discovery and research which began over 300 years ago. In 1699, the Welsh antiquary and scholar Edward Lhwyd first wrote about the newly discovered tomb at Newgrange. His accounts initiated investigations of the area by a succession of antiquarians and travellers in the eighteenth, nineteenth and early twentieth centuries. Into the twentieth century and up to the present day, a considerable amount of research has been undertaken, including large-scale excavations at Newgrange and Knowth, analysis of the megalithic art, and extensive field survey of the wider landscape. However we still lack an in-depth understanding of the site's broad range of archaeological monuments, from the Neolithic passage tombs to the Battle of the Boyne battlefield, and the landscape and communities that shaped them.

People were living at Brú na Bóinne by at least the early Neolithic, c. 4000 BC, when a series of dwellings and possibly a hilltop enclosure were constructed on top of the ridge that the middle Neolithic passage tombs were later to occupy. The Brú na Bóinne passage tombs marked a significant phase of human skill and endeavour, with as many as 40 examples located within the bend in the river, and these contain the largest assemblage of megalithic art in Europe. This desire for large-scale ceremonial

architecture continued into the late Neolithic with the construction of vast earthen and timber circular enclosures in the vicinity of the tombs. In contrast, the footprint of Bronze Age communities is far less prominent, although the analysis of aerial photography, geophysical survey and occasional excavation is slowly building up a picture of activity in this period. Likewise, traces of an Iron Age occupation of the area are not immediately visible above ground, but the high-status Roman offerings uncovered at Newgrange, as well as the early first millennium AD burials found around the base of the Knowth mound hint at some sort of presence. The Boyne features prominently in the story of St Patrick and the arrival of Christianity to Ireland. Early annals also list the exploits of the powerful early medieval dynasties of northern Brega, their royal seat close to, if not on top of, Knowth itself. In the later medieval period, Brú na Bóinne lay at the centre of lands held by the formidable Cistercian order operating out of their first Irish foundation at Mellifont. In the following centuries and through Ireland's turbulent relationship with the English crown, the productive fields, farms and waters of Brú na Bóinne were also claimed by successive generations of Anglo-Norman, Cromwellian and Williamite soldiers of fortune. Its proximity via the River Boyne to the coast, and to Drogheda and Dublin, have given it a central role in many of the economic and political events in Irish modern history, from the industrial boom of the eighteenth century to the defence of the island during World War II, the development of tourism and even the Northern Ireland peace process.

Internationally, the publication of a Research Framework for UNESCO World Heritage Sites is seen as best practice. The greater use of research frameworks was also a key recommendation of the Heritage Council's 2007 *Review of Research Needs in Irish Archaeology*, while the development of a 'relevant research agenda' for archaeology is an aim of the *National Development Plan 2007-13*. The Research Framework set out in the following pages consists of a Resource Assessment, a Research Agenda and a Research Strategy, each section compiled through a process of public engagement, consultation and international peer review. The Resource Assessment summarises the current state of knowledge of more than 6,000 years of activity at Brú na Bóinne. The Research Agenda highlights the gaps in that knowledge, presented as a series of research questions — 38 in total. While these questions cover various aspects of Brú na Bóinne's long history, there are certain gaps in knowledge common to all periods. These include the nature and extent of settlement, the character of the natural environment, the level of people's interactions regionally, nationally and internationally, as well as the exact date and function of the many archaeological monuments within the World Heritage Site. The Research Strategy puts forward a plan for addressing these unanswered questions in the short to medium term. Eighteen objectives have been established, all of which recognise the need for the *systematic* collection and archiving of data for the WHS, as well as the effective dissemination of all current and future research.

Other key issues that have emerged during the course of the framework process include:

- the need for a more proactive management presence on the ground that liaises with the local community, the academic community and the local authority, and communicates new initiatives regarding research and management.
- support for a shift in research focus away from sites and towards landscape, in particular those landscapes that sustained and were closely associated with the Brú na Bóinne monuments.
- the promotion, to include funding, of a vibrant research culture in Brú na Bóinne and for research co-ordination to be within the remit of an agency or body.
- the creation of a research and learning infrastructure within the World Heritage Site, to include investment in a research and education centre at Knowth House and greater web-based learning and information management resources.
- re-stating the rationale behind the 1989 O'Neill report, which laid out the boundaries of the existing WHS, and putting in place a robust setting and landscape use strategy to ensure that the living landscape of the WHS can be managed in a beneficial way.

Achoimre Feidhmiúcháin

Tá tábhacht le Brú na Bóinne leis na mílte bliain mar ionad deasghnátha, sóisialta agus eacnamaíochta. Tugadh aitheantas sa bhliain 1993 don suntas atá ann don domhan uile nuair a ainmníodh ar Shuíomhanna Oidhreachta Domhanda UNESCO é, nach bhfuil ach trí cinn acu ar oileán na hÉireann.

Tá an tábhacht atá le Brú na Bóinne á fhoilsiú de réir a chéile do dhaoine trí phróiseas fionachtana agus taighde ar cuireadh tús leis níos mó ná 300 bliain ó shin. Ba sa bhliain 1699 a scríobh an t-ársaitheoir agus an scoláire ón mBreatain Bheag, Edward Lhwyd, an chéad chuntas ar an tuamba a bhíodh tar éis a fháil sa Ghráinseach Nua. Bhí cuntas Lhwyd ina shiocair le scrúdú ar an gceantar ina dhiaidh sin ag ársaitheoirí agus taistealaithe i ndiaidh a chéile i rith an ochtú céad déag, an naoú céad déag agus tús na fichiú aoise. Is díol suntas a ndearnadh de thaighde an chuid eile den fichiú aois agus anuas go dtí an lá atá inniu ann nuair a thugtar san áireamh an tochailt mhór a rinneadh ar Shí an Bhrú agus ar Chnóbha, an anailís a rinneadh ar an ealaín ón ré meigiliteach agus an tsuirbhéireacht leitheadach a rinneadh ar láthair an taobh tíre máguaird. Ina ainneoin sin, níl tuiscint dhomhain ar fáil go fóill ar an réimse leathan séadchomharthaí seandálaíochta atá ar fáil ar an suíomh, ó thuamaí pasáiste ón ré Neoiliteach anuas go dtí láthair Chath na Bóinne, ná ar an taobh tíre agus na pobail daoine ar díobh iad.

Bhí cónaí i mBrú na Bóinne faoi thús an ré Neoilitigh ar a dheireanaí, c. 4000 RC, nuair a tógadh sraith tithe agus, b'fhéidir, dún ar bharr an chnoic chéanna ar ann a cuireadh na tuamaí pasáiste Neoiliteacha ina dhiaidh sin i lár na ré céanna. Is teist na tuamaí pasáiste i mBrú na Bóinne ar chéim suntasach d'inniúlacht agus de chumas an duine. Tá suas le 40 sampla díobh ar fáil sa réimse talún a lúbann an abhainn thart air agus is iontu seo atá an cnuasach is fairsinge den ealaín mheigiliteach san Eoraip ar fáil. Is léir gur

lean an fonn tógála céanna maidir le foirgníocht shearmanais ar mhórsála go dtí deireadh na ré Neoilití agus gur tógadh struchtúir ollmhóra imfhálaithe créafóige agus adhmaid i ngaobhar na dtuamaí. I gcomórtas leis sin, is lú go mór an lorg atá fágtha ag pobal daoine ó ré an Chré-Umha, cé go bhfuiltear ag teacht de réir a chéile ar thuiscint ar a dtarlaíodh le linn na ré sin trí anailís ar ghrianghrafanna anuas ón aer, suirbhéireacht geoifisice agus bearta tochailte ó am go chéile. Ar an gcaoi chéanna, ní léir ar an bpointe aon lorg ó mhuintir Ré an Iarainn ar droim talún ach is nod an t-ábhar oifrála ardstádais de chuid na Róimhe a dtángthas air i Sí an Bhrú, chomh maith leis le láithreacha adhlactha ó thús an chéad mhílaois AD thart ar íochtar an ardáin i gCnóbha go raibh daoine i láthair ag an am. Tá an Bhóinn i gceist go mór sa scéalaíocht faoi Phádraic Naofa agus teacht na Críostaíochta go hÉirinn. Tugtar cuntas sna hannála luatha freisin ar imeachtaí na dteaghlach ríoga mBré Thuaidh a raibh lárionad na ríochta i ngar do Chnóbha murar i mullach an chnoic féin. Sa tréimhse deireanach den mheánaois, bhí Brú na Bóinne i gceartlár na dtailte a bhí faoi cheannas ord dhiongbháilte na gCistéirseach a raibh an chéad mhainistir in Éirinn acu sa Mhainistir Mhór. Le linn na gcianta ina dhiaidh sin agus ar feadh chaidreamh thrioblóideach na hÉireann le rithe Shasana, bhí éileamh ag saighdiúirí Angla-Normánacha, saighdiúirí in arm Chromaill agus saighdiúirí in ar an Rí Liam ar pháirceanna méithe, feirmeacha torthúla agus uiscí Bhrú na Bóinne. Fágann a chónagaráí agus atáthar don chósta, ar abhainn na Bóinne, agus do bhailte Dhroichead Átha agus Bhaile Átha Cliath go raibh tábhacht leis i gcuid mhór eachtraí polaitíochta agus imeachtaí eacnamaíochta i stair na hÉireann, idir an borradh tionsclaíochta san ochtú aois déag, cosaint an oileáin le linn an dara cogadh domhanda, forbairt na turasóireachta agus an

próiseas síochána maidir le Tuaisceart Éireann.

Feictear ar fud an domhain gur den sárchleachtas creat taighde a fhoilsíú mar gheall ar Shuíomhanna Oidhreachta Domhanda UNESCO. Bhí úsáid níos forleithne as creata taighde ar cheann de na príomh-mholtaí chomh maith in Review of Research Needs in Irish Archaeology na Comhairle Oidhreachta sa bhliain 2007 agus tá ar cheann de na cuspóirí a luaitear sa Phlean Forbartha Náisiúnta 2007-13 go dtabharfaí clár oibre fiúntach taighde chun cinn maidir le cúrsaí seandálaíochta. Tugtar cuntas achoimre sa Mheasúnacht ar Acmhainní mar gheall ar an eolas faoi láthair ar bhreis agus 6000 bliain de bheartaíocht an duine i mBrú na Bóinne. Léirítear leis an gClár Oibre Taighde an áit a bhfuil séanas maidir leis an eolas sin, agus sin á chur i láthair le sraith ceisteanna taighde – 38 ceist ar fad. Cé go mbaineann na ceisteanna sin le gnéithe faoi leith den stair fhada atá ag baint le Brú na Bóinne, tá roinnt den easpa eolais a bhaineann le gach tréimhse den stair sin. Tagann i gceist leis sin, cineál agus oiread an chónaithe san áit, tréithríocht na timpeallachta nádúrtha, oiread an chaidrimh agus na hidirbheartaíochta a bhí ag muintir na háite ar fud an réigiúin, ar fud an oileáin agus thar lear, chomh maith le dáta cruinn agus feidhm an iliomad séadchomhartha seandálaíochta taobh istigh den Suíomh Oidhreachta Domhanda. Leagtar amach sa Straitéis Taighde, a cuireadh le chéile trí phróiseas comhchaidrimh leis an bpobal, comhairleacháin agus breithniú chomhscoláirí agus chomhghleacaithe thar lear, plean d’fhonn dul i ngleic leis na ceisteanna sin atá gan freagra go fóill sna blianta beaga amach romhainn agus go ceann tréimhse is faide ná sin. Tá ocht gcinn déag d’aidhmeanna leagtha síos agus glactar leis i leith gach ceann acu go bhfuil gá le tiomsú agus aircíviú córais ar shonraí maidir leis an SOD, chomh maith le craobhscaoileadh

éifeachtúil ar thoradh na taighde go dtí seo agus ar thoradh na hoibre san am atá ag teacht.

I measc na gceisteanna mórthábhachta eile a tháinig chun cinn le linn an phróisis maidir leis an gcreat, tá siad seo a leanas:

- tá gá le lucht bainistíochta níos forghníomhaí ar an láthair a dhéanfadh caidreamh leis an bpobal go háitiúil, leis an aos léinn agus leis an údarás áitiúil agus a chuirfeadh bearta nua i ndáil le hobair thaighde agus le cúrsaí bainistíochta in iúl.
- treisiú le hathrú béime ó thaobh na taighde de ó na suíomhanna go dtí an taobh tíre, go háirithe aon taobh tíre a bhain go dlúth le séadchomharthaí Bhrú na Bóinne nó leis an áit a chothú.
- cultúr bríomhar taighde a chur chun cinn i mBrú na Bóinne, cúrsaí cistíochta san áireamh, agus comhordú maidir leis an obair thaighde a thabhairt faoi scáth aon ghníomhaireacht nó comhlacht amháin.
- bonneagar i ndáil le taighde agus foghlaim a chruthú taobh istigh den Suíomh Oidhreachta Domhanda, lena mbainfeadh infheistíocht maidir le hionad taighde agus oideachais i dTeach Chnóbha agus breis foghlama bunaithe ar an idirlíon agus breis acmhainní bainistíochta eolais.
- athrá ar an mbunús atá le tuarascáil O’Neill 1989, inar leagadh amach teorainneacha an SOD mar atá agus lenar leagadh síos straitéis dhaingean maidir le húsáid suíomh agus taobh tíre d’fhonn cinntiú gur féidir bainistíocht den tairbhe a dhéanamh i ndáil le dreach na tíre sa SOD.

List of Figures

Fig. 1.1:	Newgrange Winter Solstice Draw at the Brú na Bóinne Visitor Centre	1	Fig. 1.22:	<i>Macalister's plan of Knowth Tomb 14, Knowth</i>	15
Fig. 1.2:	Schematic representation of a research framework	2	Fig. 1.23:	Tree and scrub growth over Newgrange	15
Fig. 1.3:	The Bend of the Boyne, County Meath	4	Fig. 1.24:	Excavation and restoration at Newgrange	16
Fig. 1.4:	Location of the Brú na Bóinne World Heritage Site	5	Fig. 1.25:	The 1989 Boyne Valley Archaeological Park report	16
Fig. 1.5:	Recorded monuments within the World Heritage Site	5	Fig. 1.26:	Sweetman's plan of the south-eastern pit circle at Newgrange	17
Fig. 1.6:	Land use within the Brú na Bóinne World Heritage Site	6	Fig. 1.27:	The sequence of excavations at Newgrange	17
Fig. 1.7:	Proposed Natural Heritage Areas (pNHAs) within the WHS	6	Fig. 1.28:	Excavations at Knowth, 1969	18
Fig. 1.8:	Proposed area of the Boyne Valley Archaeological Park	7	Fig. 1.29:	The discovery of the eastern tomb at Knowth	19
Fig. 1.9:	Megalithic art on kerbstone K52, Newgrange	7	Fig. 1.30:	Excavations at Dowth in 1989/1990	19
Fig. 1.10:	State-owned land within the WHS	8	Fig. 1.31:	Features excavated at Monknewtown embanked enclosure	19
Fig. 1.11:	Edward Lhwyd's 1699 plan of the Newgrange tomb interior	9	Fig. 1.32:	The complex of earthworks at Site M	20
Fig. 1.12:	Molyneux's drawings of Newgrange	10	Fig. 1.33:	Shadow-casting phenomena at Newgrange, c. 2000 BC	20
Fig. 1.13:	Early eighteenth-century copies of Lhwyd's drawings made for John Anstis	11	Fig. 1.34:	Prehistoric lithic material from the WHS ploughzone	21
Fig. 1.14:	Gabriel Beranger's 1775 watercolour of Dowth passage tomb	11	Fig. 1.35:	Results of magnetic gradiometry survey east of Newgrange	22
Fig. 1.15:	George Petrie's article in the <i>Dublin Penny Journal</i>	12	Fig. 1.36:	Digital surface model of the WHS	23
Fig. 1.16:	William Wakeman's sketch of the mound at Knowth	12	Fig. 1.37:	Bronze Age ring ditch excavated at Stalleen	24
Fig. 1.17:	Gabriel Beranger's 1775 watercolour of Newgrange	13	Fig. 1.38:	The M1 Drogheda Bypass at the eastern edge of the WHS	24
Fig. 1.18:	Nineteenth-century graffiti inside Newgrange	13	Fig. 2.1:	Late Mesolithic lithics from Newgrange	25
Fig. 1.19:	Notice forbidding damage to the tomb at Newgrange	13	Fig. 2.2:	Early Neolithic settlement at Knowth	26
Fig. 1.20:	Nineteenth-century conservation at Newgrange	13	Fig. 2.3:	The early Neolithic settlement at Coolfore, County Louth	27
Fig. 1.21:	The labelling system for the major Brú na Bóinne monuments	14	Fig. 2.4:	Passage tombs within the WHS	28
			Fig. 2.5:	Artefacts from the Newgrange interior	28
			Fig. 2.6:	The façade of Newgrange under construction	28
			Fig. 2.7:	The turf mound beneath Newgrange	29
			Fig. 2.8:	Plan of the mound at Dowth	29

Fig. 2.9:	Eriksen's six stages of activity at Newgrange	30	Fig. 2.37:	Description of brug in the twelfth century <i>Senchas na Relec</i>	45
Fig. 2.10:	Megalithic art on Kerbstone 15, Knowth	30	Fig. 2.38:	Mellifont Abbey, County Louth	46
Fig. 2.11:	The cursus monument east of Newgrange	31	Fig. 2.39:	Grange buildings, Knowth Tomb 1	47
Fig. 2.12:	The circular houses at Knowth	32	Fig. 2.40:	Medieval plough pebbles from Brú na Bóinne	47
Fig. 2.13:	Environmental sampling at Newgrange	33	Fig. 2.41:	Rossnaree mill	48
Fig. 2.14:	The western pit circle at Newgrange	34	Fig. 2.42:	Fish weir, Dowth	48
Fig. 2.15:	The Knowth timber circle	35	Fig. 2.43:	The modern farm complex at Lougher	49
Fig. 2.16:	Dowth henge (Site Q)	35	Fig. 2.44:	Medieval gate structure at Stalleen	50
Fig. 2.17:	Monknewtown henge and nearby passage tomb	36	Fig. 2.45:	Dowth church	50
Fig. 2.18:	Site A henge/embanked enclosure	36	Fig. 2.46:	Dowth towerhouse	51
Fig. 2.19:	The flint macehead from the Knowth Tomb 1	36	Fig. 2.47:	Earthworks at Dowth manor	52
Fig. 2.20:	The Western Area, Newgrange	37	Fig. 2.48:	The Down Survey map of Dowth	53
Fig. 2.21:	Grooved Ware structures at Balgatheran, County Louth	37	Fig. 2.49:	Monknewtown church	53
Fig. 2.22:	Early Bronze Age axe <i>in situ</i> at Newgrange	38	Fig. 2.50:	<i>The Battle of the Boyne</i> , by Jan Wyck	54
Fig. 2.23:	Bronze Age cist, Oldbridge	38	Fig. 2.51:	Musketballs from the Battle of the Boyne	54
Fig. 2.24:	Stone urn from Knowth	38	Fig. 2.52:	Dowth Hall	55
Fig. 2.25:	<i>Fulacht fiadh</i> uncovered at Sheephouse	38	Fig. 2.53:	Bernard Scalé's map of the Caldwell Estate	56
Fig. 2.26:	Site C standing stone under excavation	39	Fig. 2.54:	1836 Ordnance Survey map of Dowth demesne	57
Fig. 2.27:	Circular cropmarks at Oldbridge House	40	Fig. 2.55:	Slane mill	57
Fig. 2.28:	Double ring ditch along the Oldbridge/Sheephouse Bypass	40	Fig. 2.56:	The Lower Boyne Navigation	58
Fig. 2.29:	<i>The water-filled enclosure at Monknewtown</i>	40	Fig. 2.57:	Eighteenth-century stone pedestal, Donore church	58
Fig. 2.30:	Burial 9, Knowth	41	Fig. 2.58:	Housing in the WHS in the mid nineteenth century	59
Fig. 2.31:	Roman finds from Newgrange	41	Fig. 2.59:	Church of the Nativity of Mary Immaculate, Donore	59
Fig. 2.32:	Knowth ringfort	42	Fig. 2.60:	Strong farmer's house at Donore	59
Fig. 2.33:	Ogham inscription from Knowth	42	Fig. 2.61:	Labourer's cottage, Donore village	59
Fig. 2.34:	The upper beehive chamber, Dowth souterrain	43	Fig. 2.62:	Labourer's cabin, Redmountain	60
Fig. 2.35:	Excavations at Site M	44	Fig. 2.63:	Local Authority cottage, Knowth	60
Fig. 2.36:	The Hill of Slane	44	Fig. 2.64:	Land Commission house, Knowth	60
			Fig. 2.65:	World War II pillbox	60

Fig. 2.66: Housing types in Brugh na Bóinne c. 1995	61	Fig. 3.20: Geophysical anomalies, Oldbridge Estate	80
Fig. 2.67: The Brú na Bóinne Visitor Centre; Photography exhibition, Visitor Centre	62	Fig. 3.21: Close-up of the motifs on kerbstone K52, Newgrange	80
Fig. 2.68: Demonstrators at Newgrange, April 1992	63	Fig. 3.22: Early medieval burial, Knowth	81
Fig. 2.69: Orangemen at the opening of the Battle of the Boyne Centre	63	Fig. 3.23: Former miller's house, Stalleen	82
Fig. 2.70: Predicted climate change vulnerabilities for Brú na Bóinne	63	Fig. 3.24: Beaker pottery from Monknewtown embanked enclosure	82
Fig. 3.1: The Boyne river valley	64	Fig. 3.25: Boyne Valley Cottage, Donore, before and after recent fire	83
Fig. 3.2: The Carrowkeel bowl cremation from Monknewtown	65	Fig. 3.26: Reconstruction at Newgrange	84
Fig. 3.3: The early Bronze Age flat axe from Newgrange	66	Fig. 3.27: Oilseed rape fields in the area around the WHS	85
Fig. 3.4: Claudius Ptolemaeus' map of Ireland	67	Fig. 3.28: Refurbishment of a traditional cottage at Roughgrange	86
Fig. 3.5: Unburnt human bone from Newgrange	68	Fig. 3.29: The cement factory at Platin	87
Fig. 3.6: Earthworks around the mound at Dowth	68	Fig. 3.30: Visitors to Newgrange, past and present	87
Fig. 3.7: Passage tomb Site B on the Boyne floodplain	69	Fig. 3.31: Anthony O'Neill's proposals for the Boyne Valley Archaeological Park	88
Fig. 3.8: Sources of exotic stones at Brú na Bóinne	69	Fig. 4.1: Oldbridge village in the late seventeenth century	92
Fig. 3.9: The late Neolithic/Bronze Age enclosures at Newgrange	70	Fig. 4.2: Simple cist burial, Monknewtown embanked enclosure	92
Fig. 3.10: Early historic routeways through Brú na Bóinne	71	Fig. 4.3: Site E, Newgrange	93
Fig. 3.11: Transport and communication along the Boyne	72	Fig. 4.4: Moon over the Great Stone Circle	94
Fig. 3.12: Monastic possessions and settlement in the WHS c. 1540	73	Fig. 4.5: Geophysical survey in Heart of Neolithic Orkney World Heritage Site	96
Fig. 3.13: The landscape of the Battle of the Boyne	74	Fig. 4.6: River survey along the Boyne	97
Fig. 3.14: Red deer herd at Dowth	75	Fig. 4.7: The SHARE I.T. pilot WebGIS programme	99
Fig. 3.15: Coring within the WHS	75	Fig. 4.8: Landform and views within the Boyne Valley Archaeological Park	100
Fig. 3.16: The modern farming landscape around Newgrange	76	Fig. 4.9: Knowth House	101
Fig. 3.17: Salmon fishing in coracles on the River Boyne	77	Fig. 4.10: Relationships between research questions and proposed objectives	102
Fig. 3.18: The shadows cast by GC-2, GC-1 and GC1 onto the kerb at Newgrange	78	Fig. 4.11: Research capacity of various stakeholders in the WHS	104
Fig. 3.19: German air reconnaissance along the Boyne, December 1940	79	Fig. 4.12: Possible Neolithic enclosure at Rosnaree	105
		Fig. 4.13: Central and Eastern transects, Boyne Catchment GIS Project	106
		Fig. 4.14: Geophysical anomalies within the sub-rectangular enclosure, Newgrange	107

Section 1 – Introduction

1.1 Introduction

The Brú na Bóinne World Heritage Site in County Meath contains one of the world's most significant complexes of Neolithic passage tombs — both in terms of the scale, complexity and numbers of the monuments themselves, and in terms of the wealth of material evidence that accompanies them. The Brú na Bóinne tombs, particularly Knowth, contain the largest assemblage of megalithic art in western Europe. Today these prehistoric monuments are nationally and internationally the most well-known aspect of the WHS. The Brú na Bóinne Visitor Centre attracted nearly 250,000 visitors in 2008, and there were 34,107 entries to the annual Winter Solstice Draw for one of 100 places in the Newgrange chamber (Fig. 1.1). On 21 December 2007, over 300,000 people attempted to connect to the first live webcast of the solstice event, overwhelming the server and causing the host website to crash. This enduring popularity of Newgrange has tended to overshadow the central position that the Brú na Bóinne area as a whole has occupied. From prehistory to the arrival of Christianity and St Patrick, and the power struggles of seventeenth-century Europe, this landscape reflects in microcosm many of the processes that have shaped society on the island and the wider world over the past six millennia.



Fig. 1.1: The annual Newgrange Winter Solstice Draw at the Brú na Bóinne Visitor Centre, Donore, County Meath [Clare Tuffey]

Why a Research Framework?

In 2006, the Heritage Council made a 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. In December 2007, a research officer was appointed to undertake this work.

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

On a national level, it is hoped that the development of research frameworks will raise the research content of aspects of current Irish archaeological practice. A key recommendation of the Heritage Council's *Review of Research Needs in Irish Archaeology* (2007) was for the greater use of research frameworks for all aspects of archaeological practice. Furthermore, the National Development Plan 2007-13 includes a Built Heritage Sub-Programme which speaks of an '...overarching aim of developing a relevant research agenda [for archaeology] and the broadest possible dissemination of knowledge in the most accessible manner' (Government of

Ireland 2007). Specifically, the *Brú na Bóinne World Heritage Site Management Plan* (Dúchas 2002) states that an important issue is 'to establish key priorities for research which will provide a greater understanding of the site's broad range of archaeological monuments' (1.8.3). The excavation campaigns begun at Newgrange and Knowth in the 1960s were extraordinary in their extent and duration. Research undertaken since then has been on a decidedly smaller scale and more *ad hoc* in nature, while reflecting a growing concern with landscape, the context of sites and the interconnectedness of the Brú na Bóinne area. It is hoped that this framework document and the process that produced it will not only help structure research in the World Heritage Site, identifying priorities and justifying resources, but will also inform the Management Plan for the Brú na Bóinne WHS, due to be updated in 2009.

The drafting of a Research Framework also provides an opportunity to promote an integrated understanding of the WHS, incorporating the area's rich architectural heritage and the many important natural resources that do not and should not exist in isolation from one another. Nor can all of these elements be separated from the living, working landscape of the WHS. If the Research Framework is to remain a durable, relevant document, it must take account of the pressures of change which exist in the area, the role of cultural tourism, agriculture and development, as well as the experiences and expectations of local communities.

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 (Fig. 1.2).

- **Resource Assessment:** a statement of the current state of knowledge and a description of the archaeological resource. This is essentially 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. This is essentially 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.

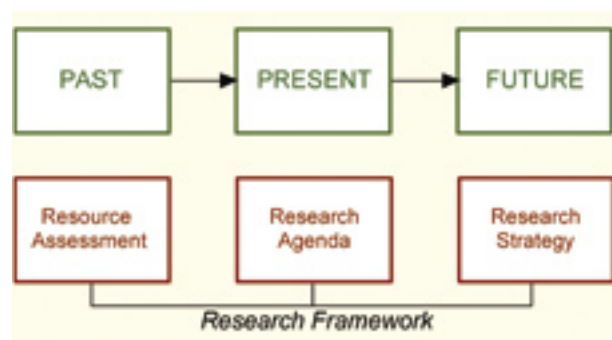


Fig. 1.2: Schematic representation of a Research Framework [from Darvill 2005]

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

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

- The sustainability and longevity of the cultural resource for future generations should be at the heart of any Research Framework for the World Heritage Site.
- Any framework should place accessibility and inclusion of diverse audiences as key requirements for any new strategy.
- Any framework should have the creation of knowledge as a core objective and be aimed at tackling ‘big questions’. It should also encourage multi-disciplinary/ collaborative studies, with less well-known aspects of the WHS requiring more attention than previously accorded.
- The framework should allow for new and emerging research. It should be reflexive and capable of revision.
- Any future strategy must represent value for money.

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

Phase 1 of the project produced a state-of-knowledge summary of the archaeology of the Brú na Bóinne WHS (Resource Assessment), as well as a history of research in the area, an inventory of radiocarbon dates, and a list of projects carried out in the WHS. Phase 2

involved seeking a series of critical position papers from a range of specialists to determine the gaps in research carried out to date and to identify a series of key questions for investigation (Research Agenda). Submissions were also sought from the wider research and archaeological community and from the general public. Phase 3 of the Research Framework focused on formulating a Research Strategy, *i.e.* a list of research priorities that would tackle the issues identified in Phase 2.

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

1.2 Brú na Bóinne in Context

On the east coast of Ireland, in the lower valley of one of the island’s major watercourses, geological and glacial processes have created a dramatic loop in the river channel — the Bend of the Boyne (Fig. 1.3). The course of a second river, the Mattock, further encloses the area to the north, forming a distinctive river bend or ‘island’ that has attracted people to it for thousands of years. No doubt prehistoric settlers had a name for the place. Medieval texts preserve the term *Brug na Bóinde* (‘mansion/place of hospitality of the Boyne’) which seems to have encompassed a complex of sites in the immediate vicinity of Newgrange, although originally it may have referred exclusively to the Newgrange mound (Stout and Stout 2008a, 94-5). When the link between the medieval place lore and the landscape was re-established in the nineteenth century, *Brugh na Bóinne* was taken to mean all of the monuments within the river bend, including Knowth and Dowth. This meaning, with its modern spelling, has become established

in the popular literature. Today, the area around the river bend is commonly referred to as Brú na Bóinne (e.g. the Brú na Bóinne Visitor Centre). For this reason the name Brú na Bóinne will be used throughout this document when referring to the World Heritage Site, even though the site has the official title of ‘Archaeological ensemble of the Bend of the Boyne’ (see below).

The WHS is centred on this river bend and, as mentioned above, is located on the east coast of Ireland, predominantly in County Meath but also in a part of County Louth (National Grid Reference 3008 2727). It lies approximately 7km west of the medieval port of Drogheda and 5-6km east of the eighteenth-century village of Slane (Fig 1.4). The local geology is one of Carboniferous limestone lowlands with overlying shale hills. Within the bend itself, the land is dominated by an east-west shale ridge upon which the well-known large passage tombs of

Newgrange, Knowth and Dowth are situated. An additional 90 recorded monuments — as well as an unknown quantity of as yet unrecorded sites — are also scattered across this ridge and over the low-lying areas and floodplain closer to (the present course of) the rivers (Fig 1.5). Deep glacial deposits cover the area and have created a variety of fertile soils, which likely offered some protection from the excesses of rainfall or drought through the millennia (Mitchell in Eogan and Roche 1997, 6). Today, the WHS is a mosaic of mixed farmland ranging from intensive arable to permanent pasture, with many of the hedgerows and old field boundaries remaining in place alongside patches of deciduous woodland (Fig 1.6). The WHS also encompasses several proposed Natural Heritage Areas (pNHAs) — Crewbane Marsh, Rossnaree Riverbank, Dowth Wetlands and the Boyne River Islands. The latter is one of the few examples in the State of alluvial wet woodland — a priority



Fig. 1.3: The Bend of the Boyne, County Meath [Ordnance Survey of Ireland]



Fig. 1.4: Location of the Brú na Bóinne World Heritage Site [Map: Abigail Walsh]

habitat under the EU Habitats Directive. It is also part of a much larger Candidate Special Area of Conservation (cSAC) incorporating the entire Boyne and Blackwater river valleys (Fig 1.7). The Boyne itself has been designated a Salmonid River under the EU Freshwater Fish Directive. Nearly 30 structures located within the WHS, from eighteenth-century thatched cottages to the late twentieth-century Brú na Bóinne Visitor Centre, are listed in the Record of Protected Structures for Meath, while Oldbridge Estate has been designated an Architectural Conservation Area.

Background to Inscription

In December 1985, at the instigation of the Royal Irish Academy, a committee comprising representatives from Meath County Council, the Office of Public Works, Bord Fáilte, the National Museum and UCD recommended that a Boyne Valley Archaeological Park be established, an initiative approved by the State in 1987. A specialist landscape and planning consultant, Anthony O'Neill, was commissioned

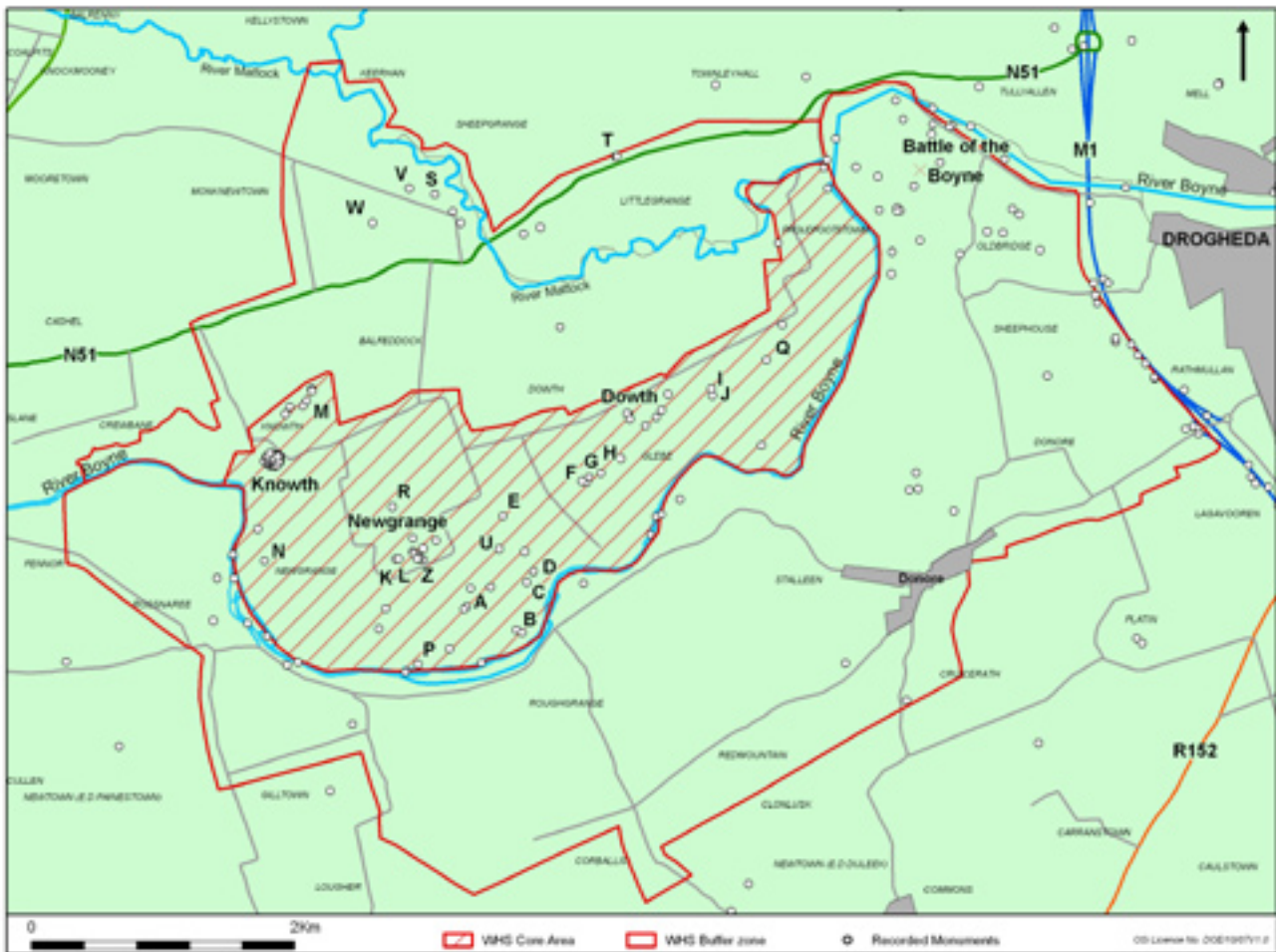


Fig. 1.5: Recorded monuments within the World Heritage Site [Map: Abigail Walsh]



Fig. 1.6: Land use within the Brú na Bóinne World Heritage Site [Con Brogan, DoEHLG]

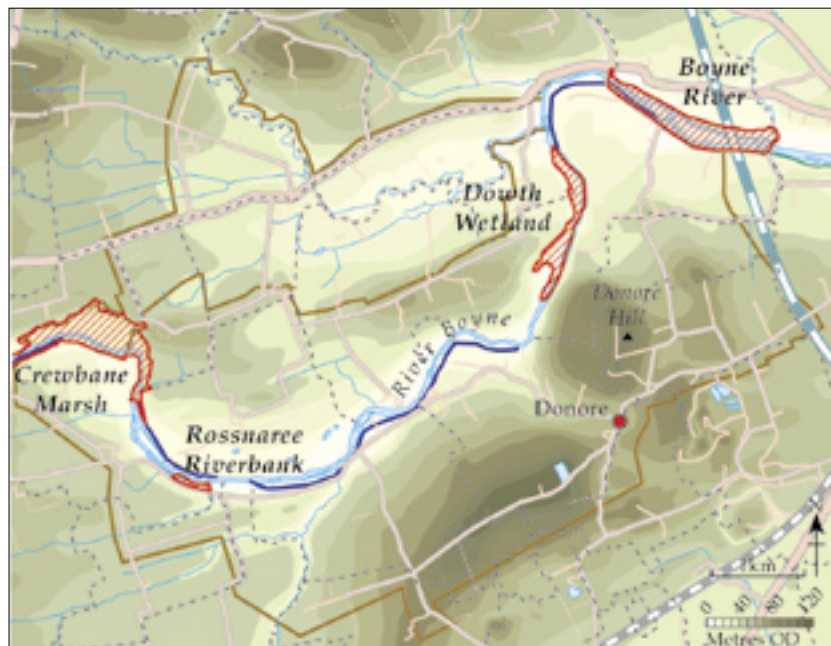
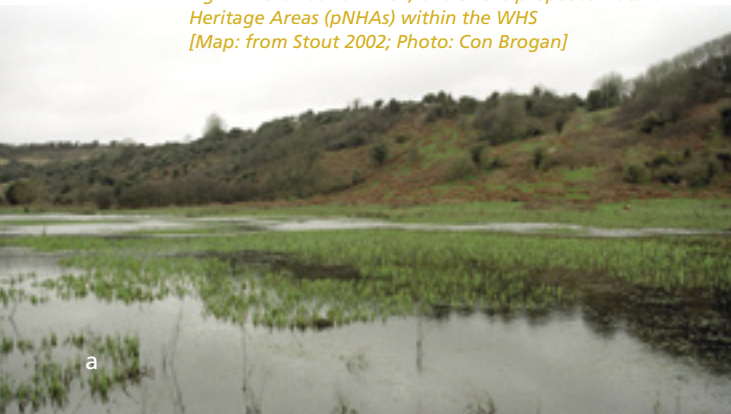
to undertake a study of the planning issues involved, notably visitor facilities, access and interpretation (O'Neill 1989). A core area comprising land immediately within the bend of the river (approximately 780 hectares) and a buffer zone situated roughly between the core area and the River Mattock to the north (an additional 700 hectares) had already been proposed by the committee. O'Neill recommended that a southern buffer zone be added to the boundary of the proposed Archaeological Park, extending to the ridgeline of an escarpment that overlooked the core area (Fig. 1.8). The sun's alignment to Newgrange came over this ridgeline and the escarpment was an important visual landform when viewed from the core area. O'Neill also felt that the River Boyne was an integral part of Brú na Bóinne and should lie within a zone of development control and not on the edge of the park boundary. The total buffer zone was thus extended to

2,500 hectares, the boundary lines respecting carefully mapped views into and out of the core area. Sometimes these lines followed contours, watercourses or field boundaries, but mostly the modern routeways of the area were used, the line drawn some distance back from roads and junctions to discourage linear development. These boundaries of the Boyne Valley Archaeological Park, encompassing a total area of approximately 3,300 hectares, were to become the boundaries of the future World Heritage Site.

Ireland ratified the World Heritage Convention on 16 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

Fig. 1.7: Crewbane Marsh, one of the proposed Natural Heritage Areas (pNHAs) within the WHS [Map: from Stout 2002; Photo: Con Brogan]



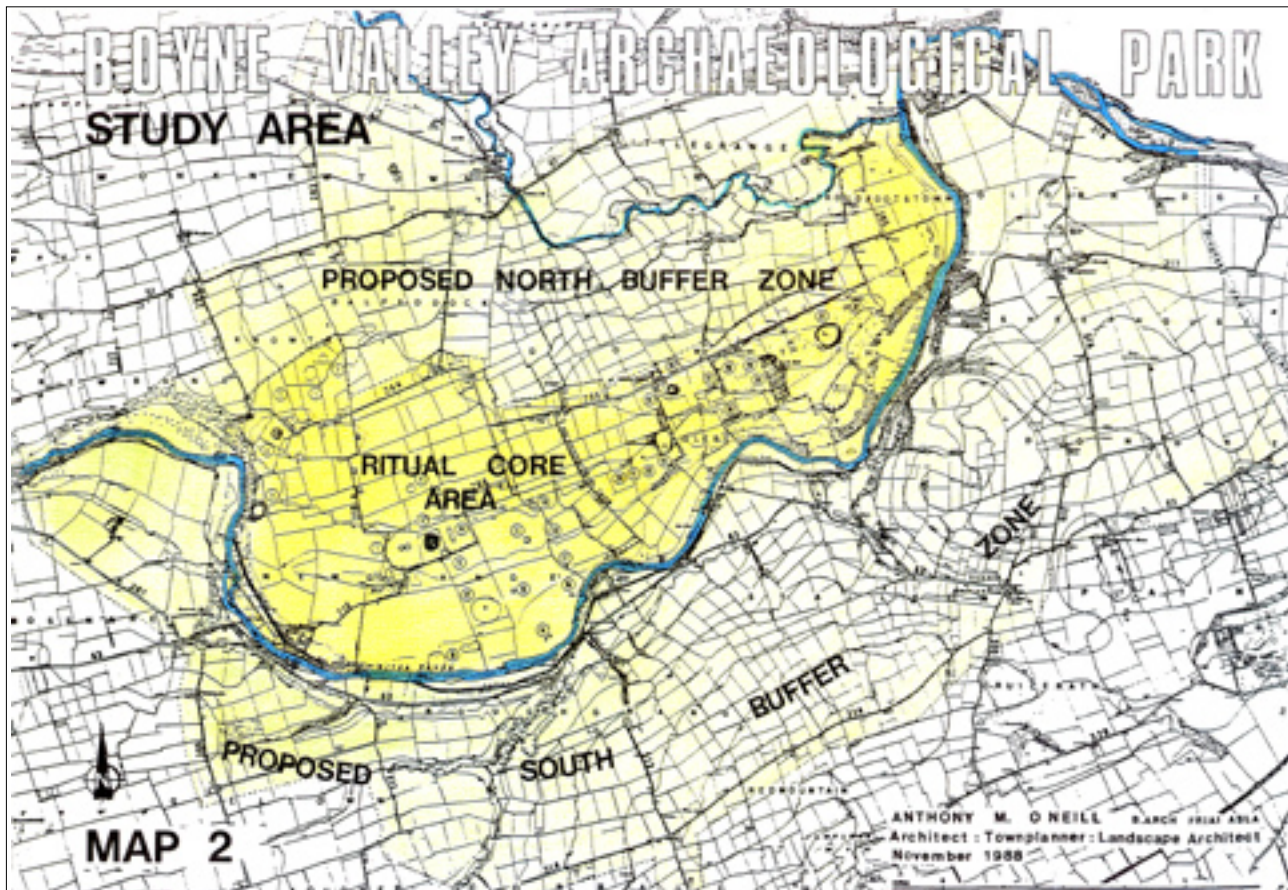


Fig. 1.8: Proposed area of the Boyne Valley Archaeological Park [from O'Neill 1989]

- [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 (Fig. 1.9).



Fig. 1.9: Megalithic art on kerbstone K52, Newgrange [Con Brogan, DoEHLG]

Protection

The Brú na Bóinne WHS is not covered by any statute specific to itself, but the natural and cultural heritage situated within are legally protected through various statutes ranging from the National Monuments Acts 1930-2004 to the Wildlife (Amendment) Act 2000 and the Planning and Development (Amendment) Act 2002. The area in general, including a number of key views and prospects, is protected by statutory measures in the planning legislation and through the County Meath Development Plan 2007-2013. The Minister for Environment, Heritage and Local Government owns land around the main monument concentrations at Newgrange, Knowth and Dowth, together with some lands containing individual monuments and the Brú na Bóinne Visitor Centre complex. The house and grounds of the Oldbridge Estate are also owned as part of the Battle of the Boyne site, developed as a North/South venture and opened formally in May 2008 (Fig. 1.10).



Fig. 1.10: State-owned land within the WHS [DoEHLG]

1.3 History of Research

On 14 August 1699, the lands of Newgrange were leased for 99 years to Charles Campbell, a Williamite settler (see 2.9). Campbell, it seems, immediately set about exploiting his new resources, as before the year was out, workmen were quarrying stone from the side of a large grassy mound on his land. It was during this work that the carved entrance stone to a 'cave' was uncovered. Fortunately, the discovery was brought to the attention of the Welsh scholar and antiquary, Edward Lhwyd, who was touring Ireland at the time. He travelled to Newgrange and carefully recorded the structure and accounts of its discovery. His Irish fieldnotes were subsequently lost in a fire but letters from this period survive, as does the plan drawn up by his draughtsman, Will Jones — the first known plan of the tomb (Fig. 1.11). Copies of his drawings were also made for his contemporaries John Anstis and Thomas Molyneux, a number of which survive (see below). These indicate that Lhwyd recorded other passage tombs in the vicinity, such as Sites K, L and possibly Site E (O'Kelly *et al.* 1978, 329). Lhwyd came across a Roman coin during his survey work and astutely observed that *'the coin proving it ancients than any Invasion of the Ostmans or Danes, and the carving and rude sculpture, barbarous; it should follow, that it was some place of sacrifice or burial of the ancient Irish'* (Gunther 1945, 421-3). He also remarked upon a standing stone positioned on top of the mound.

Sir Thomas Molyneux visited the area a few years after Lhwyd but published his observations more than a decade later (Molyneux 1726). Molyneux considered the oldest human monuments to be products of the Danes and Newgrange was, to him, a Danes-Mount. The recesses in the cruciform chamber, he writes, *'being three in number, shew they were dedicated to the deities of the three prime idols, religiously adored by all the nations of the north'* (Molyneux 1726, 204). Molyneux was also the first to mention human remains, colourfully describing *'two dead bodies entire... in likelihood the reliques of a husband and his wife'* (1726, 204) lying on the tomb floor, along with a *'pyramidal shaped stone'* which he believed had originally stood erect in the middle of the chamber (Fig. 1.12). His measurements of the monument were relatively accurate, although there was no mention of Lhwyd's standing stone and, like many early scholars, he believed that the original mound extended right up to the Great Circle. Sites K and L were considered to be the resting places of the extended family of those buried at Newgrange, perhaps *'a family-monument for some great Danish prince, that chose to be interred near his country-dwelling, that might be hereabouts, as the word Grange seems to imply'* (Molyneux 1726, 207). Another early account of Newgrange is provided by John Anstis, a younger contemporary of Lhwyd's, who travelled extensively in Britain and Ireland recording ancient monuments. His manuscript contains copies of Lhwyd's drawings, including a sketch of Newgrange with a standing stone on its summit (Fig. 1.13).

In 1769, the British colonial statesman, Governor Thomas Pownall, visited Newgrange, his experiences recounted in a letter read out to the Society of Antiquaries of London in 1770 and subsequently published (Pownall 1773). He held, among other things, that Newgrange represented the ruined remains of a once far greater structure and that its decorated orthostats had been brought from a more ancient structure, two ideas that remained popular right into the twentieth century. Despite these errors, the visit produced the first accurate sections of the tomb as well as a description of

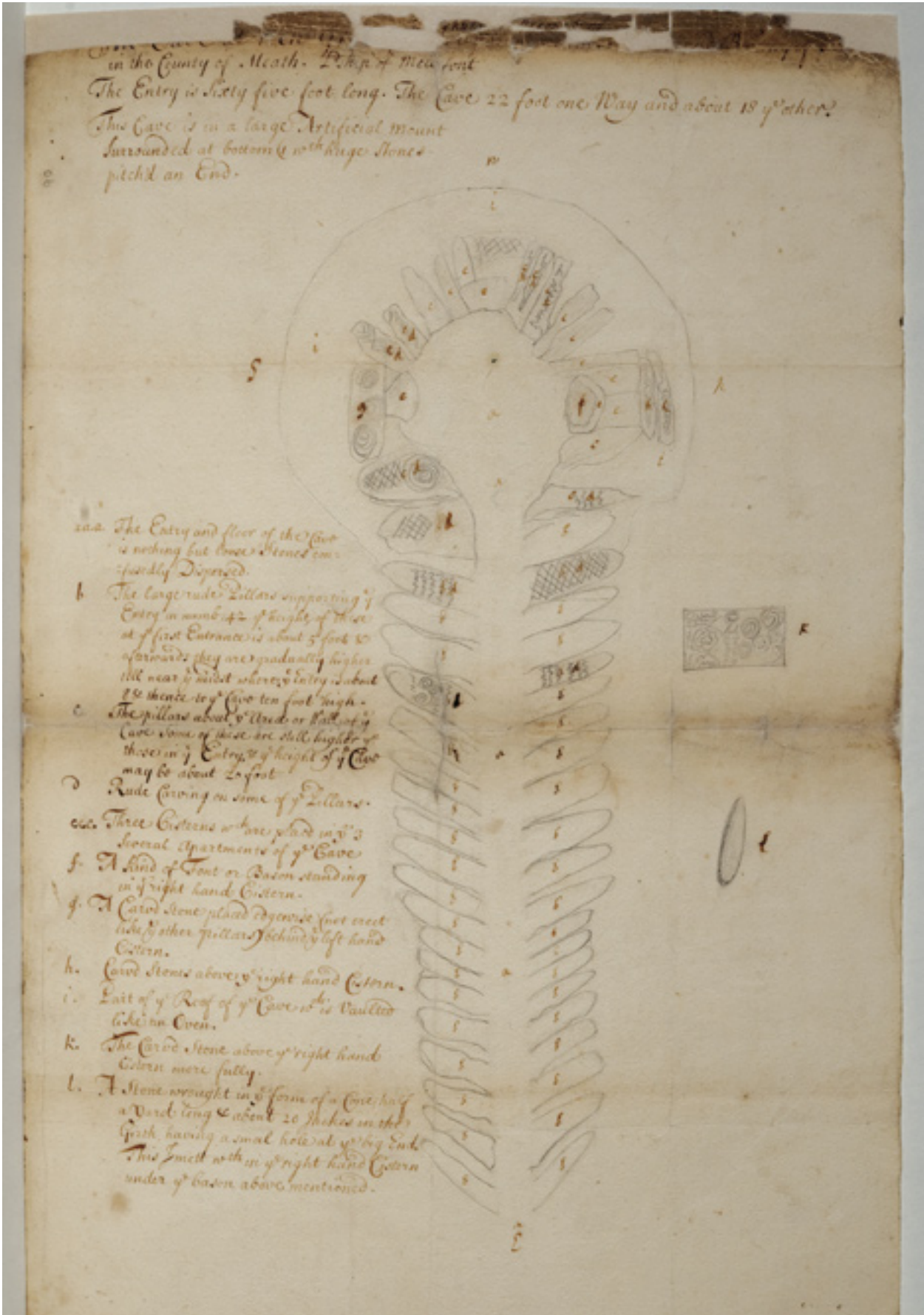


Fig. 1.11: Edward Lhwyd's plan of the Newgrange tomb interior, drawn by Will Jones c. 1699 (TCD MS 888/2 fol 89) [Board of Trinity College Dublin]

the kerbstones. Pownall also provided the first description of Dowth, a site he encountered on his way to Newgrange: *'a very large tumulus or barrow, under which (report says) there is a cave like that at New Grange. It is now (like the Mount at Marlborough) improved into a garden mount, planted with trees; and on the top of it is a modern ornamental temple'* (1773, 239). This view of Dowth with its ornamental temple is captured approximately five years later by the French artist, Gabriel Beranger, commissioned by William Conyngham of Slane Castle to sketch all three mounds. Beranger notes it as an unopened sepulchral mound some 60ft in height (Fig. 1.14). Other Boyne monuments recorded by Pownall include *'a circle of large unhewn stones, set on end; with the remains of a Kistvaen forming the north side thereof...undoubtedly an erection of Druid superstition'*, which may have been Newgrange Site K, and *'the vestigia of an oval camp which is certainly Danish'* (Pownall 1773, 239), possibly one of the henges or similar earthworks.

Throughout the eighteenth and nineteenth centuries, many eminent antiquarians and travellers came to the area and documented the Boyne tombs (see Appendix III). However, a good deal of what they wrote was based on Lhwyd, Molyneux and Pownall. Moreover, none of the early visitors, with the exception of Lhwyd, attributed the monuments to indigenous peoples. Colonel Charles Vallancey identified Newgrange as a Mithraic temple: *'Grange I take to be a corruption of Grein-uagh, that is, the uagh, cave or den of Grian, i.e. Mithras or the Sun'*, and considered it the work of *'the old Scoti, prior to the arrival of the Cymmerigh in Britain'* (1786, 211). For Edward Ledwich (1790, 319), Newgrange is constructed during Norse raids in the ninth century AD, the tomb built for a fallen principal commander. While Richard Colt Hoare does compare Newgrange to the earthen tumuli of Wessex, he attributes this *'singular temple'* to the *'Celtic or Belgic tribes who poured in upon us from the Continent of Gaul'* (1807, 256).



Fig. 1.12: Thomas Molyneux's drawings of Newgrange, published in 1726. His original captions read as follows: Fig. 6 — 'A is the entrance, from A to B the long narrow gallery or passage, eighty feet in length, leading to the cave C. DDDDD the great flag-stones that make the sides or wall both of the cave and entrance. EEE the three cells or apartments let into the sides of the cave, for the convenient reception of the three altars or shallow cisterns, FFF G a second altar, raised upon the lower altar in the right hand cell. H a pyramid stone now fallen, but formerly set up erect in the middle of the cave'; Fig. 7 — 'shews more particularly the manner and contrivance of the altar in the right hand cell, consecrated to the deity of Thor, expressing all the rudeness of its wor'; Figs. 8 and 9 — 'shews Valentinian's coin with its reverse... [and] that of Theodosius, both taken from the coins themselves, but larger than the originals, that the inscriptions might be better express' [Image reproduced courtesy of Special Collections, UC'D]

'Puerile, and scarcely deserving of serious notice'

In 1833, an article on Newgrange by antiquarian and artist George Petrie appeared in the *Dublin Penny Journal* (Fig. 1.15). It was the first popular publication to stress the notion that the monument was built, not by Phoenicians, Egyptians or Danes, but by Irish people (Harvey 2005, 125). Petrie castigated earlier writers for their unwillingness to *'allow the ancient Irish the honour of erecting a work of such vast labour and grandeur'* (1833, 306). During his time in the Antiquities Division of the Topographical Department of the Irish Ordnance Survey, Petrie and his colleague John O'Donovan sought to re-establish the link between Newgrange and the myth and saga associated with Brú na Bóinne in the early Irish literature. As one of the field-



Fig. 1.13: Early eighteenth-century copies of Lhwyd's drawings made for John Anstis. (a) Newgrange [Stowe. 1024 f127]; (b) decorated stone from Site L [Stowe. 1024 f129]; (c) probably Sites K and L [Stowe. 1024 f126]; (d) two monuments near Newgrange, the top example possibly Site E [Stowe. 1024 f162] [Copyright © The British Library Board, All Rights Reserved]



Fig. 1.14: Gabriel Beranger's 1775 watercolour of Dowth passage tomb [Image courtesy of the Royal Irish Academy]

officers for the Survey, O'Donovan was tasked with recording the placenames, legends and antiquities of the country and in several letters from the field to his supervisors in Dublin, he speculates on whether the descriptions in early medieval texts of the royal cemetery of 'Brugh na Bóinne' could be fitted to the Boyne tombs. In the end, O'Donovan concluded that the ancient complex lay some distance upriver at Stackallen/Broadboyne and it was left to the antiquarian Sir William Wilde to correctly identify the location of Brugh na Bóinne, a term he popularised in his 1849 book *The beauties of the Boyne and its tributary, the Blackwater*. Drawing on the work of another contemporary, the artist William Wakeman (1848; see O'Kelly and O'Kelly 1983, 140), Wilde dedicates an

entire chapter to the Boyne necropolis, or the 'Irish Memphis'. He identifies 17 sepulchral mounds, estimates the weight, area and height of Newgrange and, in spite of Petrie's efforts, reiterates the comparisons between Newgrange and Mycenaean architecture. Wakeman and Wilde also provide the first detailed accounts of Knowth, the former producing the first illustration of the mound (Fig. 1.16).



Fig. 1.15: George Petrie's Newgrange article in the Dublin Penny Journal, 23 March 1833



Fig. 1.16: William Wakeman's nineteenth-century sketch of the mound at Knowth [from Stout 2002]

The mid nineteenth century also saw exploration at Dowth, the first — and only — excavation

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

At around the same time, the entrance stone at Newgrange, which over a century and a half had disappeared beneath loose stone (Fig. 1.17), was revealed once more (Wilde 1847, 733). Renewed interest led to the discovery of features such as the closing stone (Wilkinson 1845, 53) and the decorated lintel of the roof-box (Wilde 1847), which was thought to mark the entrance to an additional chamber, and to speculation that the entrance stone was part of a buried kerb that delimited the original extent of the mound (Wilkinson 1845) — although subsequent writers continued to think that the original mound went as far as the Great Circle.

State Care

Growing public concern at damage to Newgrange, Knowth and Dowth led to the monuments being taken into State care under the provisions of the Ancient Monuments Protection Act 1882. During the late nineteenth century, repairs and conservation work was undertaken by the Board of Public Works (Fig. 1.18, Fig. 1.19). At Newgrange, orthostats

and lintels were shored up with concrete and wooden beams; an iron gate at the entrance was probably also fitted at this time. The removal of earth from in front of the kerbstones, including the large carved entrance stone, created a bank and ditch effect that is still visible along parts of the monument (Fig. 1.20). Repairs were also made to a drywall revetment on top of the kerb that seems to have been erected in the 1870s (O’Kelly 1982, 40). At Dowth, extensive conservation work included construction of a vertical shaft and iron ladder, as well as supports in the northern tomb chamber and a concrete roof in the southern tomb.

Fig. 1.19: Notice forbidding damage to the tomb at Newgrange (N.A. OPW 7724/99) [Image courtesy of the Director of the National Archives of Ireland]

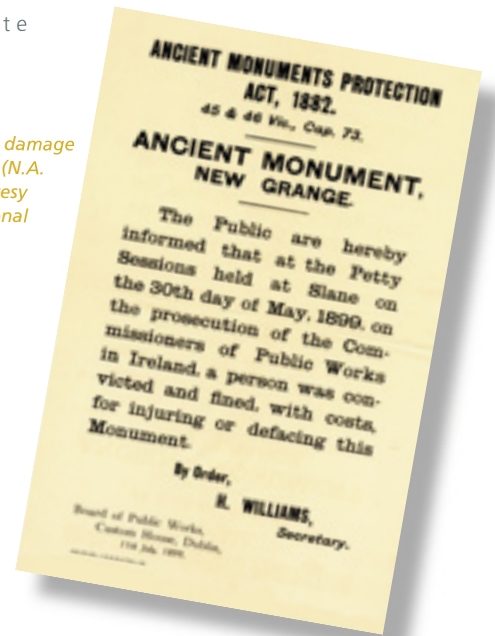


Fig. 1.17: Gabriel Beranger's watercolour of Newgrange in 1775 [Image courtesy of the Royal Irish Academy]



Fig. 1.20: The bank and ditch effect created during the removal of earth from in front of the Newgrange kerbstones in the nineteenth century. Most of the drystone revetment above the kerb also appears to date to the nineteenth century [O’Kelly archive, DoEHLG]



Fig. 1.18: Nineteenth-century graffiti inside the tomb at Newgrange [Con Brogan, DoEHLG]

At Brú na Bóinne, the shift from the age of antiquarianism to one of modern archaeological inquiry was achieved in the work of George Coffey, Keeper of Irish Antiquities in the National Museum. He began his detailed study of Newgrange in 1890, publishing a number of papers (e.g. Coffey 1892-6) that culminated in his 1912 work *New Grange (Brugh na Bóinne) and other incised Tumuli in Ireland*. It was to become

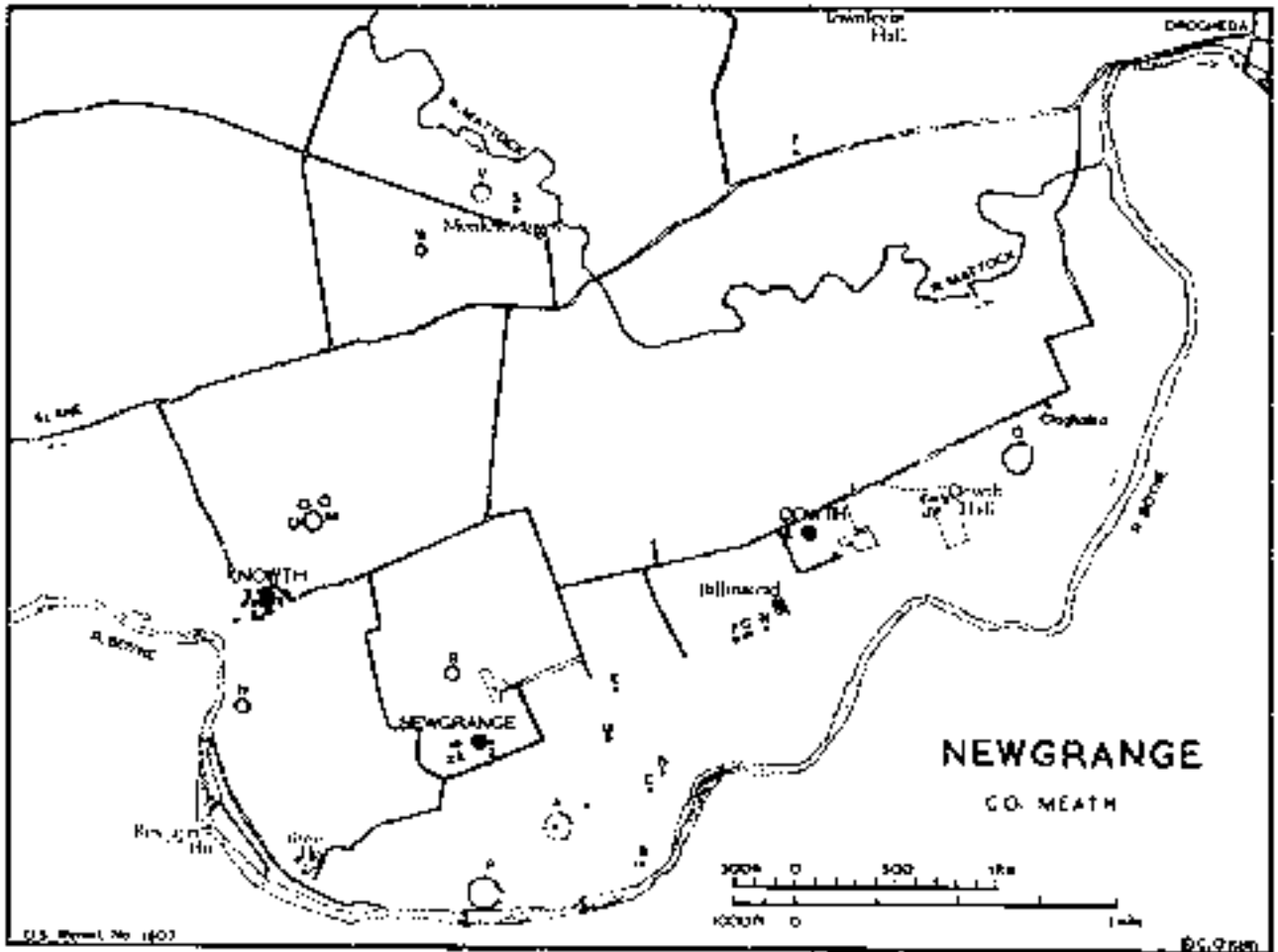


Fig. 1.21: The labelling system for the major Brú na Bóinne monuments devised by Coffey and extended by Ó Ríordáin and Daniel and O'Kelly [from O'Kelly 1982]

the standard monograph on the area for many decades after; the monuments of the wider Brú na Bóinne landscape were systematically listed for the first time and this labelling system, extended by Ó Ríordáin and Daniel in 1964 and by O'Kelly in 1982, remains in use today (Fig. 1.21).

Modern excavations at Brú na Bóinne started in the 1920s, when the kerb at Newgrange was explored by R. A. S. Macalister, Robert Lloyd Praeger and Harold Leask. Beginning at the left of the entrance-stone, they worked clockwise around the mound until they had exposed 54 stones (1935, 65; 1943, 149). Work on the remaining stones was suspended following an objection from the tenant farmer. Macalister suggested that these decorated stones might be

grave markers, collected from the graves of an earlier people by the builders of Newgrange. A cutting was opened beneath the exposed roof-box lintel, in an attempt to locate an additional chamber, but was subsequently backfilled. Also investigated at the time was the fallen orthostat (GC-10) from the Great Circle, an area revisited in the 1950s by Ó Ríordáin and Ó hEochaidhe (1956) who gained additional information on the sockets of the missing stones. In 1941, Macalister turned his attention to Knowth, focussing excavation on what he thought might be the entrance to the main tomb and on the kerbstones. He succeeded in uncovering half of the outer kerbstones of the main mound, a souterrain, and what we now know to be the burial chamber of one of the satellite tombs, Tomb 14 (Macalister 1943; Fig. 1.22).

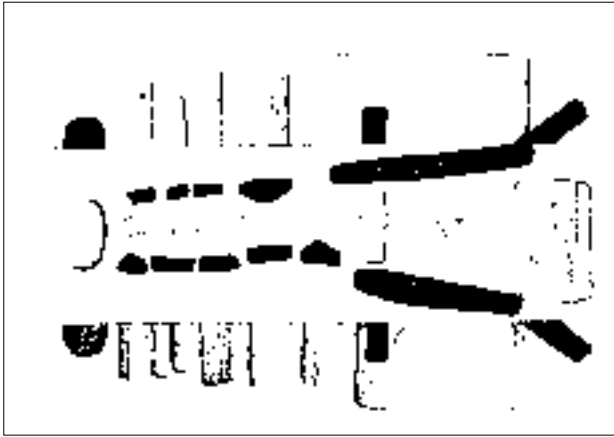


Fig. 1.22: Macalister's plan of Tomb 14, Knowth, excavated in the 1940s [from Macalister 1943]

The Bord Fáilte Years

Apart from the trial excavations mentioned above, research into and care of the monuments was neglected in the years following World War II. Bord Fáilte Éireann (the Irish Tourist Board) had installed electric lighting in the Newgrange tomb in 1954 (Hartnett 1954, 181-2). It was during this decade that the numbers of visitors — still unsupervised — began to

increase rapidly. Compounding this human wear-and-tear was the encroachment of scrub and farm animals (Fig. 1.23). In the winter of 1961, a meeting of stakeholders convened by the Archaeological Officer for Bord Fáilte, P. J. Hartnett, recommended that an area of land surrounding Newgrange be acquired and put into State care. Approximately three hectares were subsequently purchased by Bord Fáilte and handed over to the Commissioners for Public Works. Prof. M. J. O'Kelly, present at the winter meeting, was tasked to carry out exploratory excavations ahead of restoration work. In the summer of 1962, excavations began at Newgrange to the north of the entrance. In total, one-third of the mound was excavated, with work continuing until 1975 (Fig. 1.24). Prior to O'Kelly's campaign, very little was known about the monument; officially it was thought to be a Bronze Age monument of perhaps 1500 BC or later. Modern excavation provided the first reliable radiocarbon dates (c. 3200 BC) for its construction (see Appendix IV), as well as revealing the midwinter solstice alignment and the function of the roof-box.



Fig. 1.23: Tree and scrub growth over Newgrange passage tomb prior to excavation by O'Kelly [O'Kelly archive, DoEHLG]



Fig. 1.24: Kerbstones 49-53 on the north side of the Newgrange mound before being raised to the vertical [O'Kelly archive, DoEHLG]

In 1987, Bord Fáilte also funded a report on the Boyne Valley Archaeological Park (O'Neill 1989; see 1.2; Fig. 1.25). While essentially a document on archaeological resource management, the report also represented one of the earliest attempts to define and explore the Brú na Bóinne landscape, containing important preliminary studies of landscape views and settings and of land use and ownership.

In 1982 and 1983, excavation ahead of site management works at Newgrange (Sweetman 1985) revealed an extension of the arc of pits and postholes uncovered during O'Kelly's work around the southern perimeter of the tomb. Radiocarbon dates for these new features complemented earlier dates obtained by O'Kelly for his pits, confirming the existence of a large pit circle measuring nearly 70m in diameter and dating to approximately the mid third millennium BC (Fig. 1.26). Additional site management works in 1984 revealed another pit

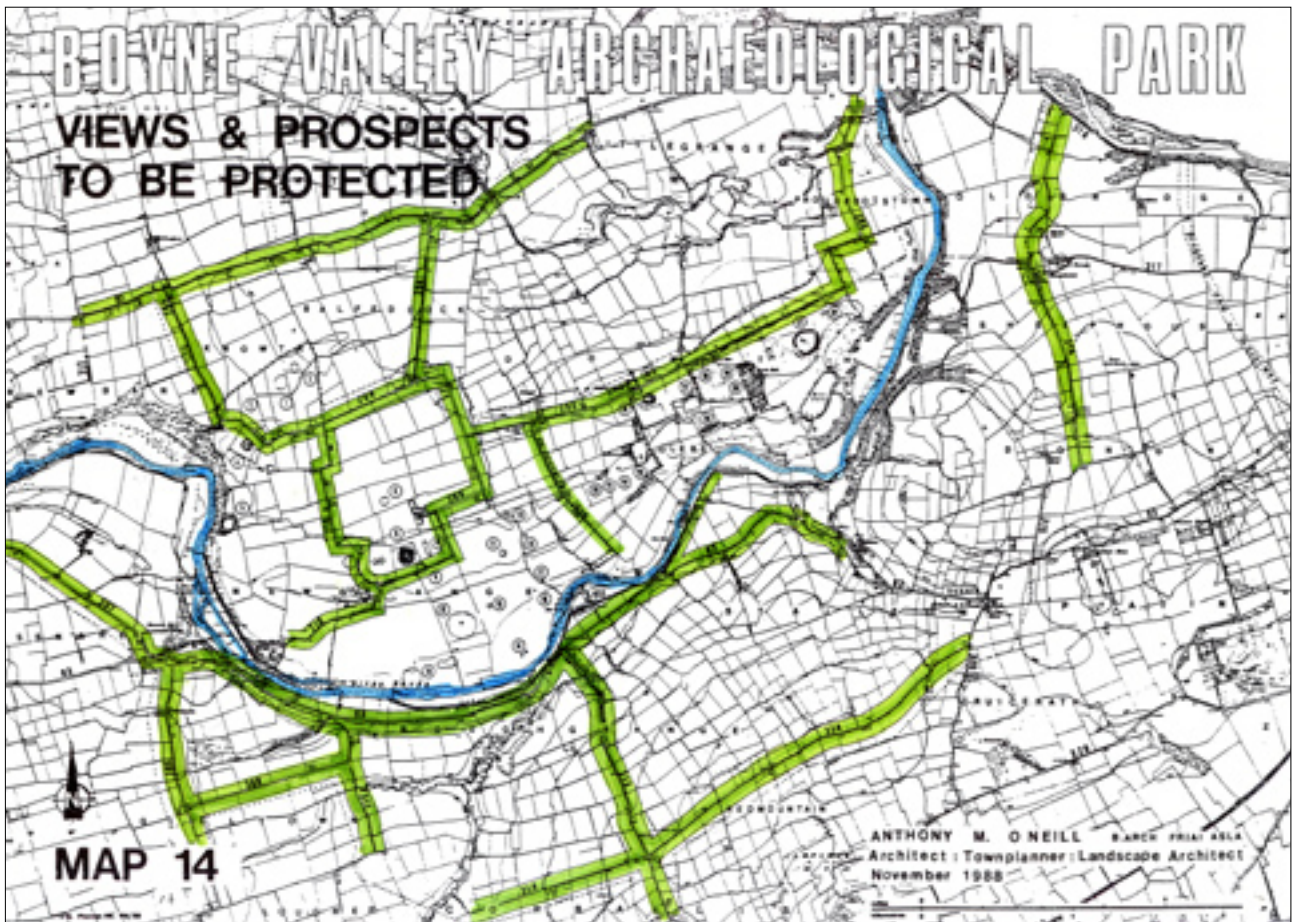


Fig. 1.25: The 1989 Boyne Valley Archaeological Park report, commissioned from landscape architects Anthony and Barbara O'Neill, represented the first attempt at archaeological resource management within Brú na Bóinne

circle to the west of the passage tomb, smaller in size but of a similar date to the southern circle (Sweetman 1987). More recent work at Newgrange has involved the uncovering of additional kerbstones and the construction of a concrete shelf to shelter the stones from the worst effects of weathering (Lynch 1989; 1990a; Fig. 1.27).

Whereas O’Kelly’s Newgrange campaign arose out of site management and tourism issues, modern excavations at Knowth were more a product of curiosity-driven research. In the summers of 1960 and 1961, George Eogan and G. F. Mitchell had investigated a small passage

tomb in Townleyhall townland at the northern edge of the current WHS (Eogan 1963). This tomb had a simple passage, very different from the plans revealed at Newgrange and Dowth. In order to examine further the typology and chronology of tomb types within the Boyne landscape, Eogan and Mitchell decided to investigate additional smaller examples, some of which were located at Knowth. In the summer of 1962, Eogan began excavations. However, by the end of the third season, it was apparent that Knowth was an extensive passage tomb complex and a comprehensive long-term project was planned. The next four decades were spent examining the complex, Eogan discovering two

passage tombs back to back under the main mound, 20 smaller passage tombs, as well as settlement evidence from nearly all periods of Irish prehistory and history (Eogan 1984; 1986; Eogan and Roche 1997; McCormick and Murray 2007; Byrne *et al.* 2008; Fig. 1.28 and Fig. 1.29).

Little work had been carried out at Dowth since the disastrous nineteenth-century explorations (see Harbison 2007), although the mound was comprehensively surveyed in the 1980s (O’Kelly and O’Kelly 1983). In 1989, a cutting was opened immediately west of the entrance shaft to the north tomb to facilitate the construction of a new entrance and steps (Lynch 1990b). Several stakeholes were revealed beneath a metre or more of slumped or redeposited cairn material and a possible displaced kerbstone was also uncovered (Fig. 1.30).

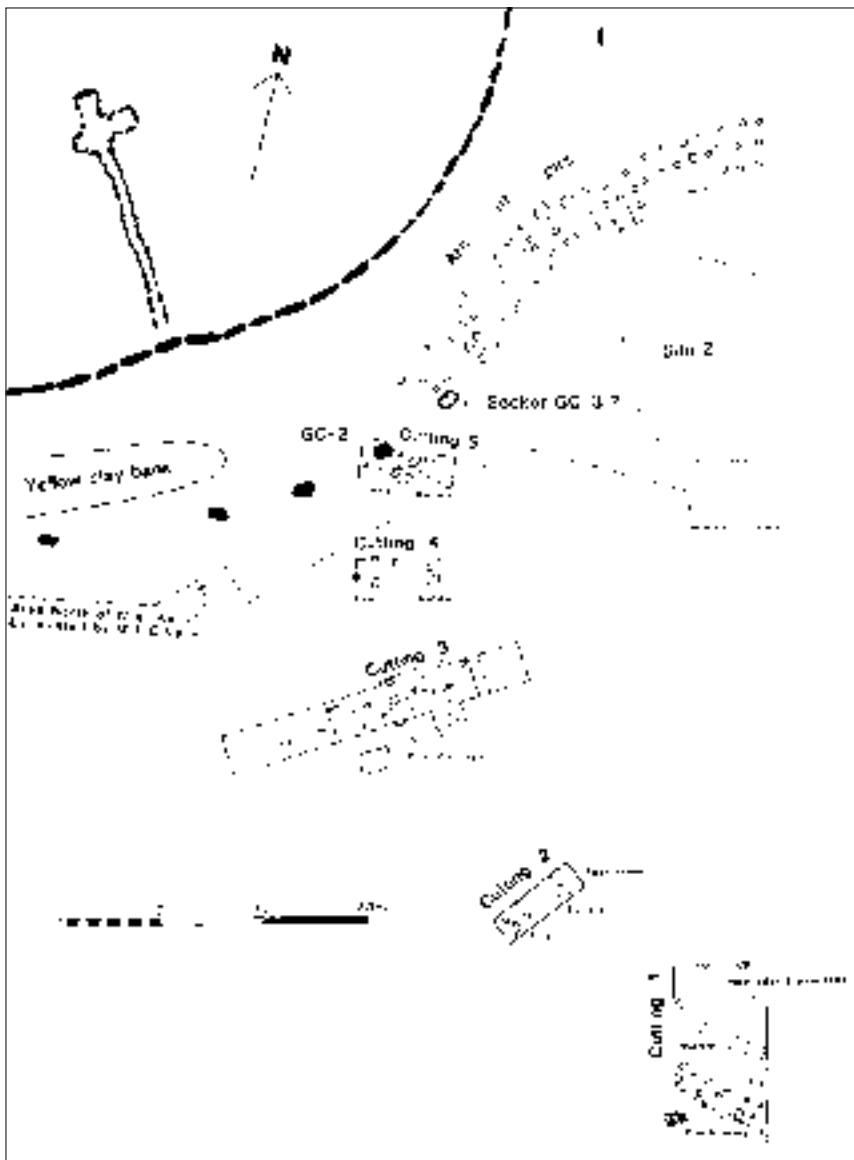


Fig. 1.26: Sweetman's composite plan of the south-eastern pit circle at Newgrange [from Sweetman 1985]

Outside the area of the three mega-tombs, rescue excavation was undertaken in the spring of 1971 in Monknewtown in the northern buffer zone of the WHS on a henge threatened by agricultural development (Sweetman 1976; Fig. 1.31). The interior of the monument contained a ring ditch, a Beaker structure associated with a large amount of pottery and flint, and as many as 11 cremation pits along the inner northern section of the enclosure. This monument remains the only one of its type excavated within the Boyne area. Additional research on the three other examples within the WHS has indicated that the Boyne henges are characteristically constructed from material scaped from the interior of the enclosure rather than from an enclosing ditch (Stout 1991; 2002, 34).

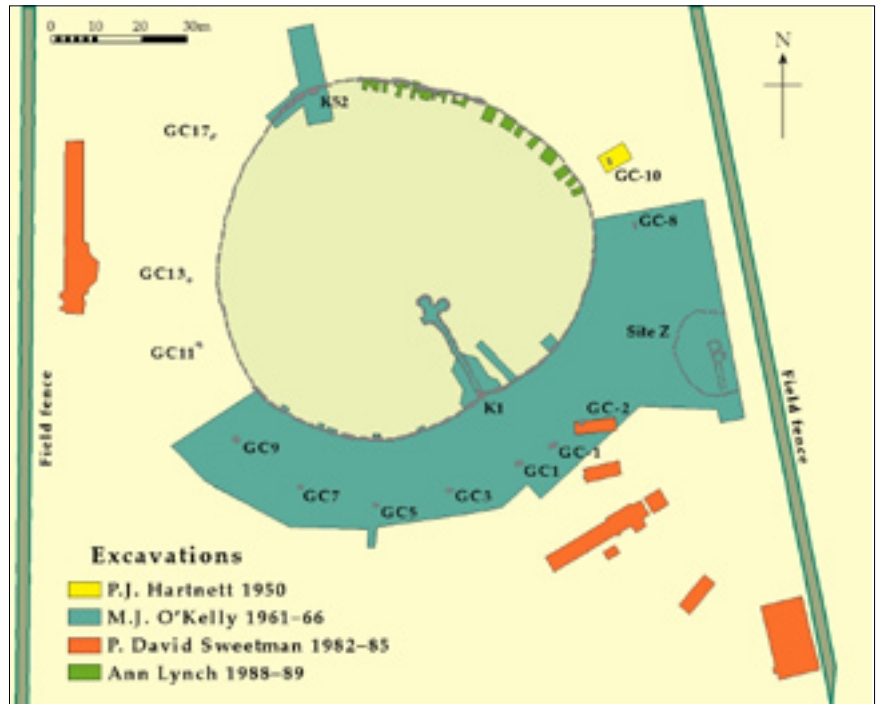


Fig. 1.27: The sequence of excavations at Newgrange [from Stout and Stout 2008a]

Fig. 1.28: Excavations under way at Knowth, 1969 [Leo Swan]



Recent Research

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

Over the last two decades, the work of Geraldine and Matthew Stout has made an enormous contribution to our appreciation of the *longue durée* at Brú na Bóinne, culminating in the 2002



Fig. 1.29: The discovery of the eastern tomb at Knowth, 31 July 1968. Right to left: George Eogan, Ann Gannon and Tom Fanning [Jim Bambury]



Fig. 1.30a: Excavations at Dowth 1989: west section face showing kerbstone F9 [Ann Lynch]



Fig. 1.30b: Excavations at Dowth 1990: kerbstone F9 being lifted [Ann Lynch]

Fig. 1.31: Plan of features excavated at Monknewtown embanked enclosure [from Stout 2002]

work Newgrange and the Bend of the Boyne. In addition to providing new perspectives on prehistoric monuments like Newgrange (Stout and Stout 2008a), and extensively researching the built and vernacular heritage of the WHS and the history of land ownership, they have also recently investigated the earthworks known collectively as Site M, revealing an extensive and long-lived burial ground that may tie in with the occupation of Knowth by the early medieval kings of Brega (Stout and Stout 2008b; see Fig. 1.32).

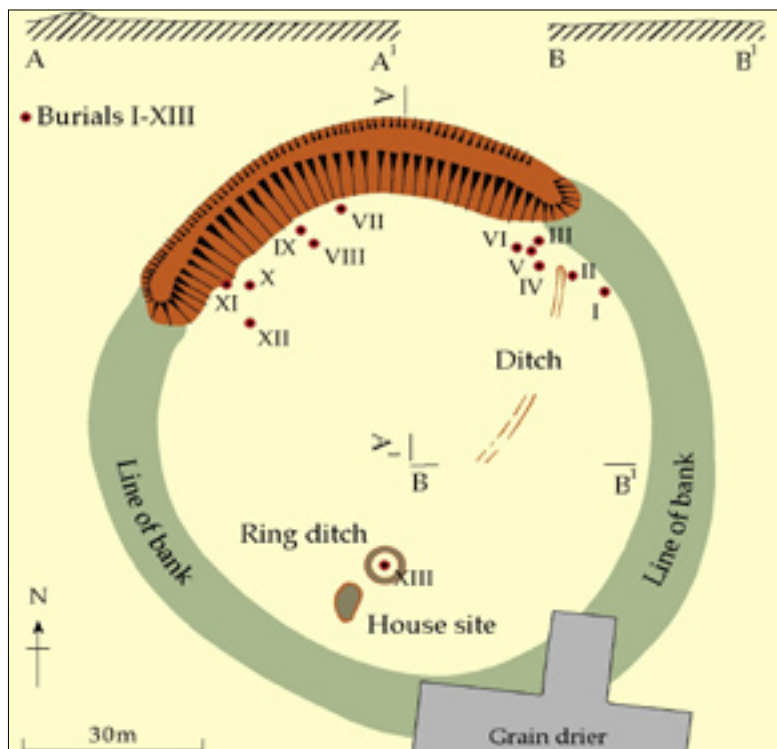




Fig. 1.32: The complex of earthworks at Site M, north-east of Knowth [Con Brogan, DoEHLG]

Recent decades have also seen increased awareness of the wider astronomical significance of monuments within the WHS. Investigations to date have demonstrated a pivotal relationship between the entrance stone at Newgrange and the positioning of the stones of the Great Circle (Prendergast 1991a; 1991b), the standing stones throwing shadows on the entrance stone during such key times in the year as the winter and summer solstices and the mid-points between (Fig. 1.33). An archaeoastronomical investigation of the passage orientations at Knowth Tomb 1 has also been completed recently (Frank Prendergast pers. comm.). Other research in the WHS has reflected the growing interest in ploughzone archaeology and in mapping the extent of sub-surface 'off-site' remains (e.g. Brady 1996, 2002, 2007a, 2007b;

Cooney *et al.* 2001; Fig. 1.34). The development and refinement of additional remote sensing techniques such as magnetometry and electrical resistivity from the 1990s onwards has brought us closer still to quantifying the archaeological resource at Brú na Bóinne, although geophysical survey has yet to be systematically applied over the WHS. Targeted geophysical survey has taken place in the area of the possible cursus east of Newgrange and at a rectilinear enclosure close to Rossnaree ford (Fenwick *et al.* 2009), as well as in the context of site management works at the Brú na Bóinne and Battle of the Boyne visitor centres (Fig. 1.35). The geophysical properties of lithic scatters identified through a recent large-scale fieldwalking programme are also currently being investigated (see Section 4.2.1). In 2007, one of the newer remote sensing technologies, LiDAR survey, was applied to the WHS landscape and the resulting bank of spatial data is already being used to map new sites and to build up models of landscape change (Fig. 1.36; see Section 4.2.1).

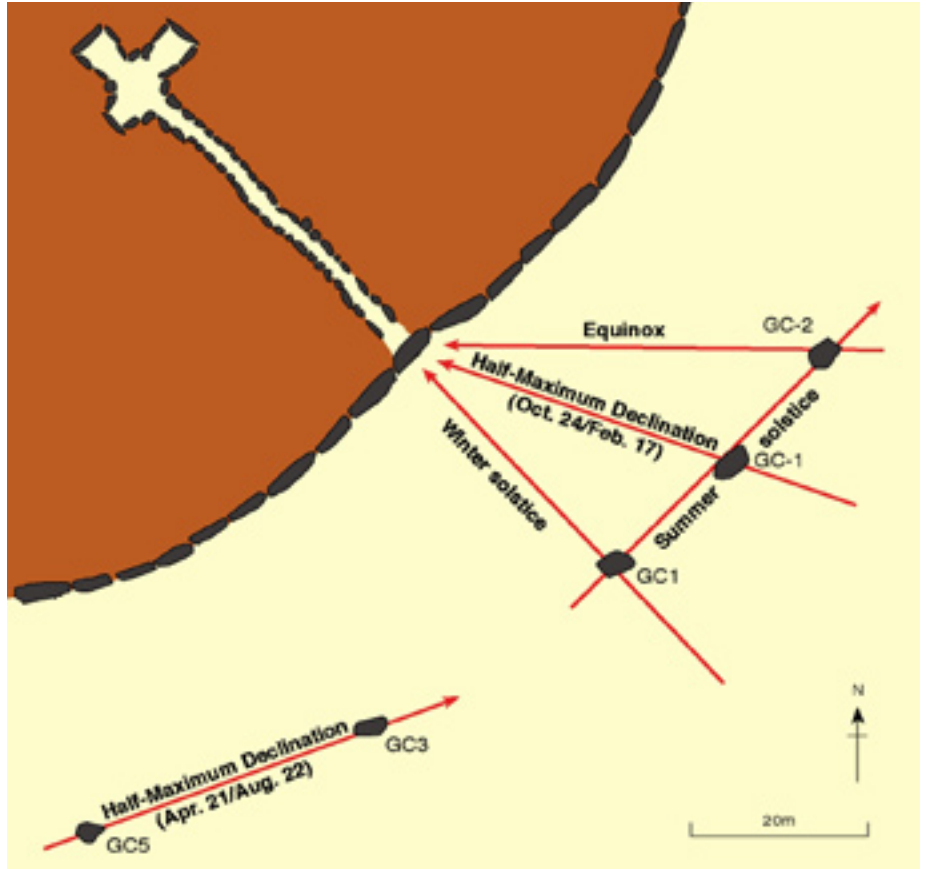


Fig. 1.33: Diagram showing the shadows thrown by stones in the Great Circle at key points in the year, c. 2000 BC [from Stout 2002, after Prendergast 1991b]

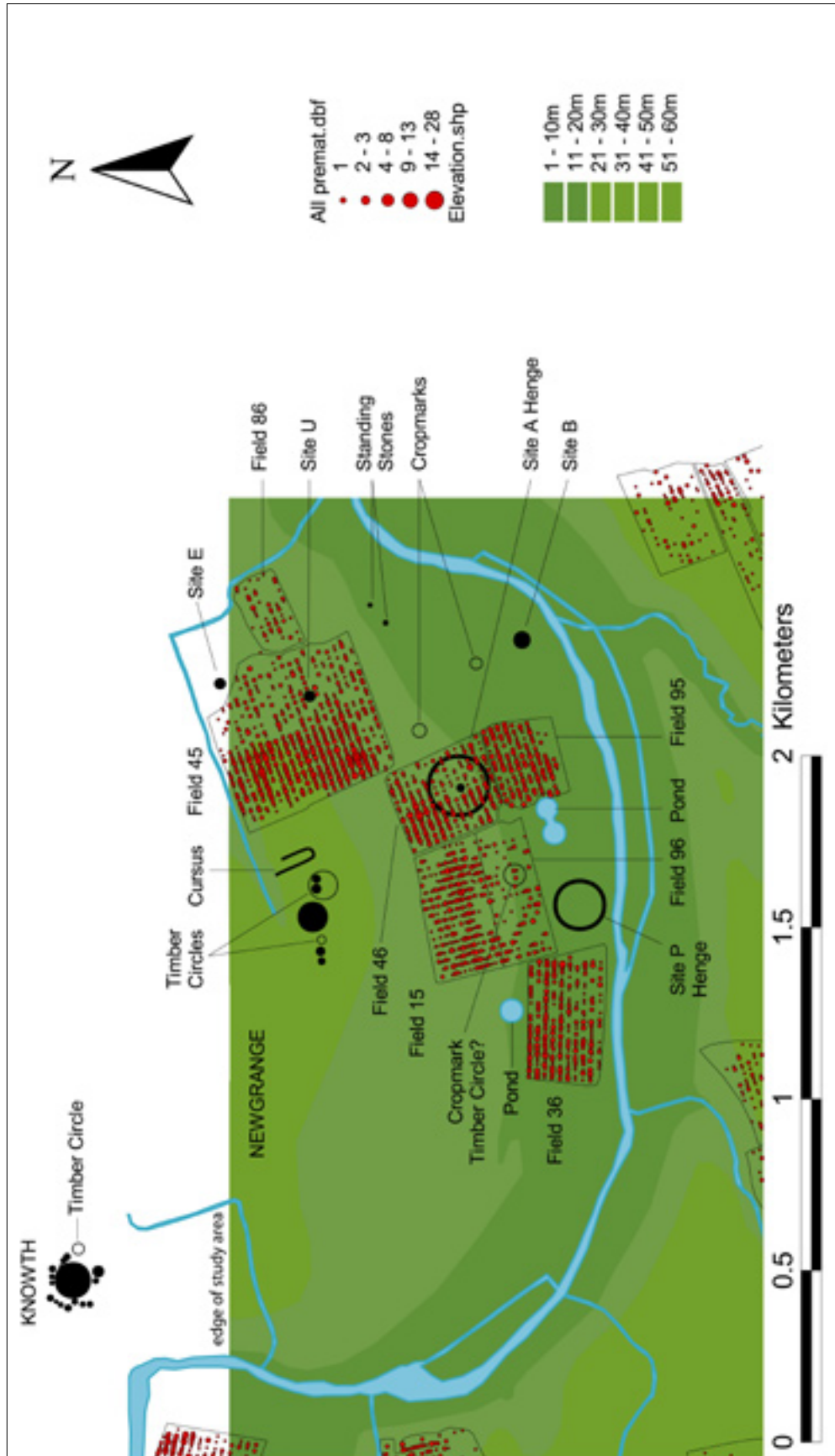


Fig. 1.34: Distribution of prehistoric lithic material from the ploughzone in the WHS Core Area. Results from a recent fieldwalking programme conducted across the Brú na Bóinne area [Conor Brady]

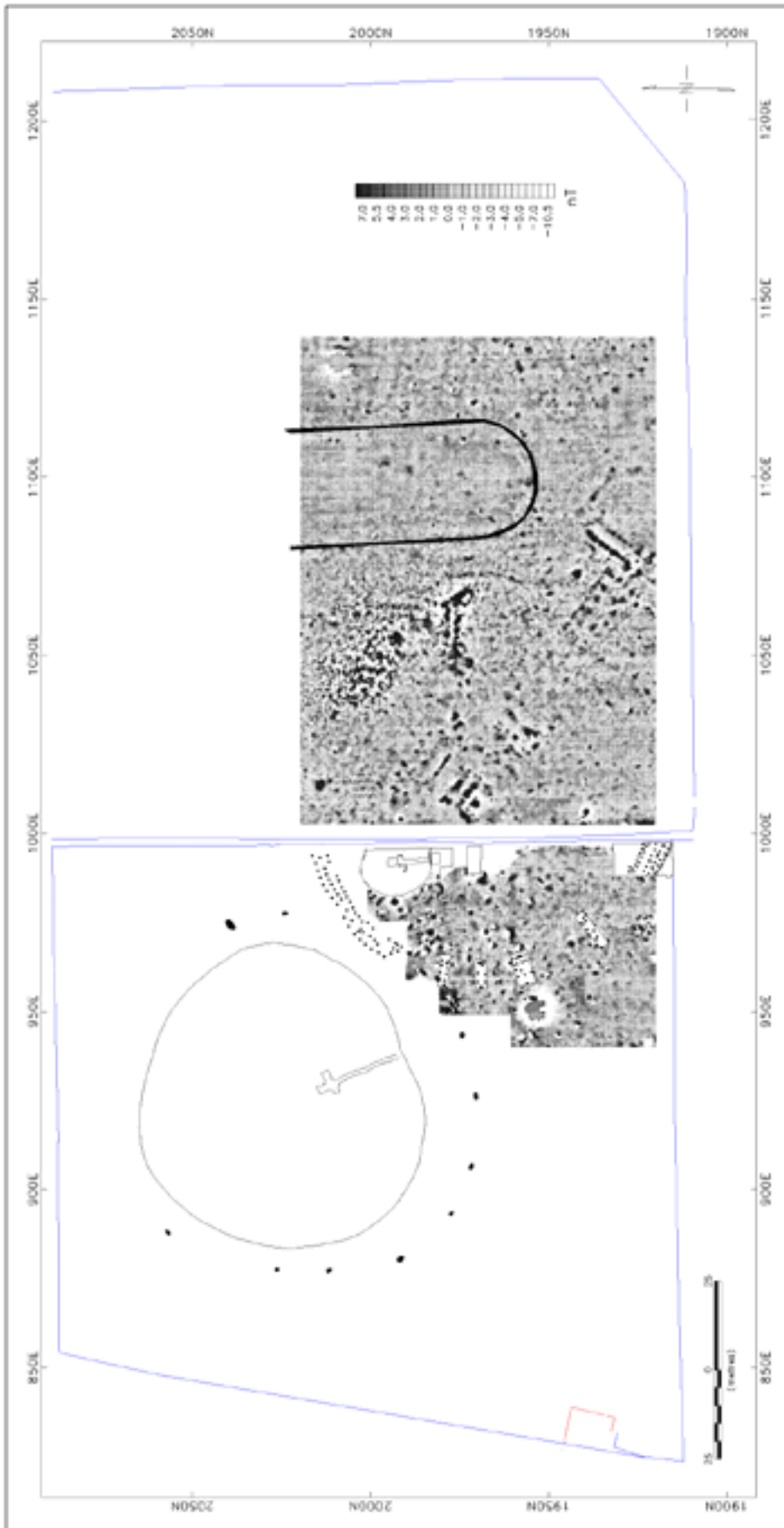


Fig. 1.35: Magnetic gradiometry survey eastwards from Newgrange passage tomb. Major excavated site elements from west to east are: the Great Circle, Newgrange passage tomb, the south-eastern pit circle and Site Z. A newly discovered alignment of pits extends from the south-west of the cursus in the direction of Site Z [from Barton et al., in prep]

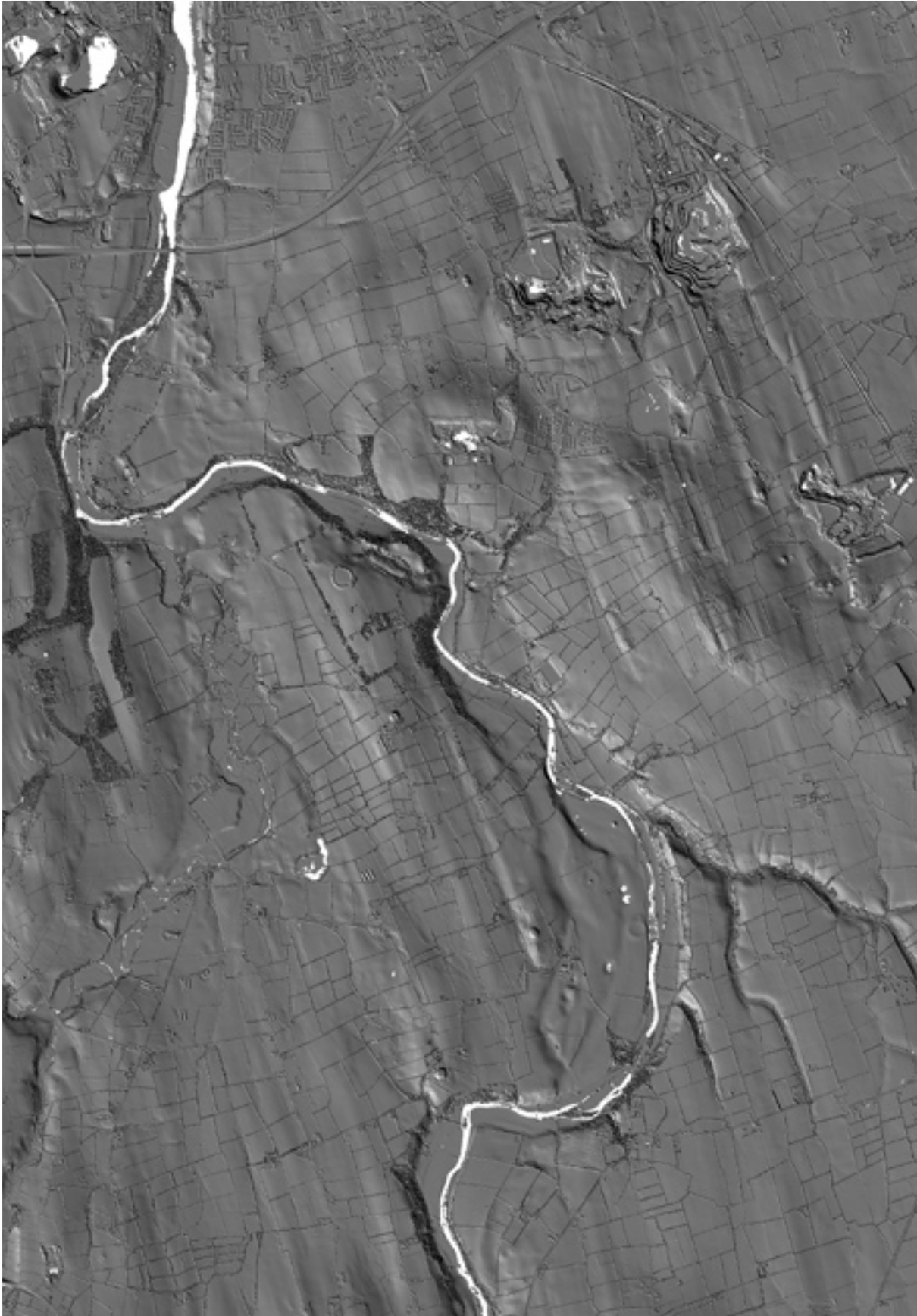


Fig. 1.36: Digital surface model (DSM) of the Light-Detection and Ranging (LiDAR) survey carried out over the WHS in November, 2007 [Meath County Council/The Discovery Programme]

Refinement of absolute dating techniques and the appearance of other techniques such as isotopic analysis have given new value to the material in older excavation archives, while the dedicated publication programmes of institutions like the Royal Irish Academy are ensuring the results of four decades of excavation at Knowth are steadily filtering through into the archaeological mainstream.



Fig. 1.37: Bronze Age ring ditch excavated on the site of a proposed private dwelling in Stalleen townland in the southern buffer zone of the WHS [Kieran Campbell]

The most recent monographs — volumes 3 and 4 — deal with the extensive early medieval faunal assemblage and the historic hinterland of Knowth, respectively (McCormick and Murray 2007; Byrne *et al.* 2008). Commercial excavation, while not tied into any specific research programme, is also furthering understanding of the WHS. Important evidence for Bronze Age funerary activity has been uncovered along the route of the Oldbridge-Sheephouse Bypass (Matthew Seaver, pers. comm.) and in nearby Stalleen ahead of the construction

of a private dwelling (Kieran Campbell, pers. comm.; Fig. 1.37). In 2008, extensive medieval remains including a stone gatehouse were also revealed in Stalleen (Mandy Stephens, pers. comm.). Immediately to the east of the WHS, the considerable body of data recovered from excavations along the M1 Drogheda Bypass (Fig. 1.38), though largely unpublished, is already beginning to shed new light on past communities of the Brú na Bóinne area (e.g. Smyth 2007).



Fig. 1.38: Opened in 2003, the M1 Drogheda Bypass skirts the eastern edge of the WHS. At the centre of the photograph, spanning the River Boyne, is the Boyne Cable Bridge [National Roads Authority]

Section 2 — Resource Assessment

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

2.1 The 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; Fig. 2.1). The assemblage included Bann flakes, pointed and rounded flakes and backed forms (Lehane 1983, 142-46), although all of the material appears to

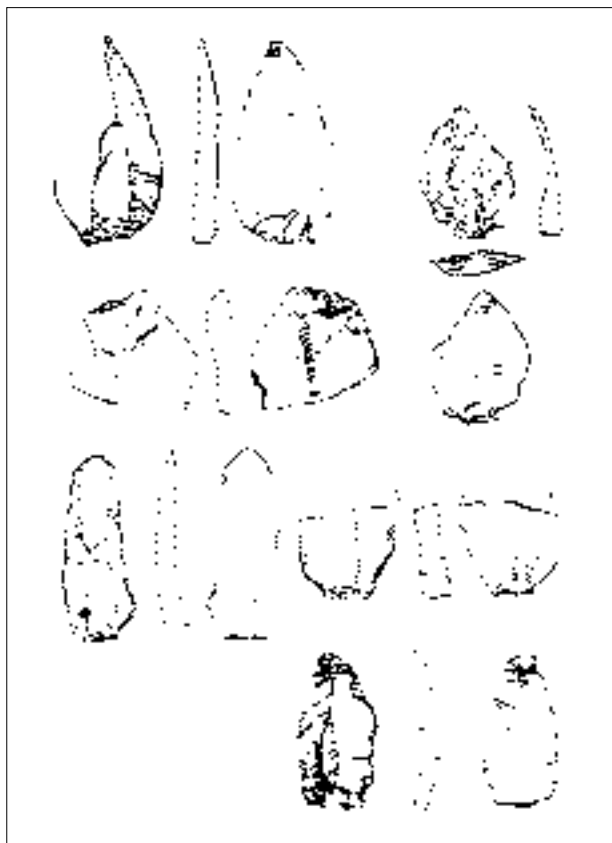


Fig. 2.1: Late Mesolithic butt-trimmed flakes from the Late Neolithic/Beaker period horizon at Newgrange [from O’Kelly *et al.* 1983]

have been found in secondary contexts (Brady 2007a, 118). A pilot fieldwalking study aimed at assessing the potential of ploughzone archaeology in the Boyne Valley area (Cooney and Brady 1998) recovered a number of butt-trimmed flakes from fields in Tullyallen townland, immediately outside the northern buffer zone of the WHS, which hints at some form of later Mesolithic activity in the area. However, a more intensive programme of fieldwalking across more than 600 hectares within the WHS produced only one possible later Mesolithic artefact — the heavily patinated distal end of a possible broad flake (Brady 2007a, 243). Further downriver, at Moneymore (just outside Drogheda), evidence of a Mesolithic platform was recovered from a pollen core (Weir 1996). In the opposite direction, along the route of the proposed M3 motorway, microliths have been recovered at Blundelstown and Castletown Tara (Eoin Grogan, pers. comm.), and stunning late Mesolithic fish baskets revealed at Clowanstown (Fitzgerald 2007a, 2007b).

2.2 The Neolithic

Early Neolithic

Fieldwalking, both non-systematic and systematic, within the WHS and the wider Boyne Valley has indicated that there are significant quantities of prehistoric lithic material in the ploughzone (O’Kelly 1968; Cooney and Brady 1998; Brady 1996, 2007a, 2007b). For the most part, undiagnostic lithics with a broad Neolithic to Bronze Age date range have been recovered. However, some of this lithic resource can be assigned more specifically to pre-passage tomb or early Neolithic activity. According to Eogan (2007b, 134), a programme of fieldwalking carried out by Frank Mitchell produced possible early Neolithic flint artefacts, some of which occurred in distinct concentrations. Recent fieldwalking south of the River Boyne has also produced a small number of early Neolithic diagnostics (Brady 2007a, 244-5). North of the Boyne, at Newgrange, early Neolithic pottery was found underneath the mound of Site L along with a number of pits, areas

of burning and a charcoal-flecked habitation layer (O’Kelly *et al.* 1978). Nearby at Site Z, a small cobbled surface, several stakeholes and burnt flint and animal bone lay beneath the passage tomb. The most substantial evidence of early Neolithic activity within the WHS was uncovered during excavations at Knowth (Eogan 1984; Eogan and Roche 1997; Eogan and Roche 1998). Two discrete areas of occupation were identified running under the main mound, one concentration in the north-eastern area of the hilltop and another in the west. In the north-east, 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 (Fig. 2.2). The western area produced Carinated Bowl pottery with pronounced rims — generally accepted as a later development of the simple, undecorated bowls — and may have been occupied later (Brady 2007a, 119).

Apart from the remains at Knowth, evidence for early Neolithic settlement within the Brú na Bóinne WHS remains slight. Geophysical survey

is being targeted at a number of lithic scatters identified south of the Boyne (see Section 4.2.1), some of which may be early Neolithic in date. However most of our information on early fourth millennium BC settlement has come from large-scale commercial and infrastructural projects outside the WHS, such as the M1 Northern Motorway Drogheda Bypass to the east and the Dundalk Western Bypass to the north. The material uncovered so far hints at various levels of settlement activity. Small shallow pits containing varying amounts of Carinated Bowl pottery, flint and burnt material have been found, for example, at Balgatheran, Mell and Oldbridge (Campbell 2002a, 2002b, 2002c). These pits may be the last visible remnants of temporary, shifting settlements (e.g. Pollard 2001, 316), or may represent more abstract and isolated acts of deposition in the landscape. Given that most of these features have been uncovered along relatively narrow road takes or pipeline corridors, we currently do not know how separate or isolated this activity really is. Rectangular timber houses have been uncovered in a number of locations outside the WHS: along the Boyne, at Coolfore, Lagavooren and Cruicerath (Ó Drisceoil 2003, 2004; Moore 2003; Ellen O’Carroll, pers. comm.); along the River Dee at Richardstown and Newtown (Byrnes 1999, 2000; Halpin 1995); and in north Louth along the Castletown River at Plaster and Aghnaskeagh (John Turrell, pers. comm.; NRA 2006). It has been argued that these types of buildings have a limited date range, approximately 3800–3600 cal BC (McSparron 2003, 2008; Smyth 2006), and as such must represent only part of the wider settlement picture of the early fourth millennium BC (Fig. 2.3). Also of note is the apparent absence of early Neolithic megalithic architecture in the area (e.g. Eogan 2007b; see also Sheridan 2006). It may be that ‘domestic’ and ‘ritual’ activity occupied very separate physical and social spaces in the

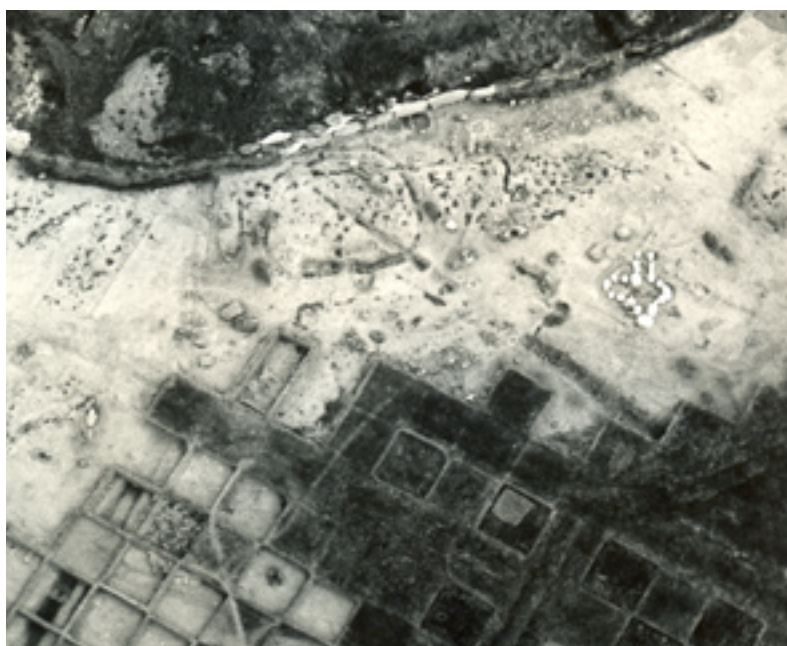


Fig. 2.2: The western area of early Neolithic settlement at Knowth. The line of one of the palisades can be seen running left to right immediately below the kerb of the main mound [Leo Swan]



Fig. 2.3: The early Neolithic settlement at Coolfore, County Louth, uncovered along the route of the M1 Drogheda Bypass. House 1 is shown in the foreground, House 2 in the background [Cóilín Ó Drisceoil]

early Neolithic, although the recent discovery of houses at Plaster and Aghnaskeagh close to the early tombs at Aghnaskeagh (NRA 2006), and another house at Kilgobbin (Ines Hagen, pers. comm.) beside the Dublin/Wicklow court and portal tombs, would suggest that funerary and domestic activity and various group and individual/family tasks were not necessarily undertaken in isolation from one another.

Middle Neolithic

Modern investigation of the Brú na Bóinne megalithic monuments began in 1960 with the excavation of a small passage tomb at Townleyhall, at the very edge of the current WHS (Eogan 1963) (Fig. 2.4). Excavation campaigns at Newgrange and Knowth followed and have dated the phase of passage tomb

construction at Brú na Bóinne to the middle Neolithic. Twenty smaller passage tombs were uncovered at Knowth, some of which were found to pre-date the main central mound. Within Tomb 1, two passages had been laid out back-to-back along an east-west axis, the eastern passage terminating in a corbelled cruciform chamber (Eogan 1986). Single, multiple and successive human cremations had been placed in the Knowth tombs, along with a number of bone pins, beads and pendants and pottery. Newgrange was excavated between 1962 and 1975 by M. J. O’Kelly (O’Kelly 1982), the sod and stone mound covering a 19m long passage of orthostats terminating in a corbelled cruciform chamber. Material recovered included the cremated bone of four or five individuals, possibly originally placed in stone

basins, and a number of bone and pottery beads, bone pins and stone balls (Fig. 2.5). The excavation campaign also re-discovered the roof-box feature above the tomb entrance, which allowed the rays of the rising sun on the winter solstice to illuminate the passage and chamber (Patrick 1974; see below). A spread of quartz and granite found outside the tomb entrance was interpreted as a collapsed façade and was subsequently, and controversially, 'reconstructed' (see Cooney 2006; Eriksen 2004; 2006; 2008; Stout and Stout 2008a; Fig. 2.6). Behind kerbstone K52, O'Kelly also found evidence for an earlier turf mound, which was again noted in excavations in the 1980s, and may have measured 35m in diameter (Stout and Stout 2008a, 13; Fig. 2.7). To the east and west of Newgrange are three smaller, 'satellite' passage tombs (Sites Z, K and L) that were excavated at the same time as the main mound (O'Kelly *et al.* 1978). Together they form a linear arrangement of monuments running along the ridge. Dowth, the third major passage tomb at Brú na Bóinne, has not seen major scientific excavation, apart from a minor trial cutting in 1989, which was opened immediately west of the entrance shaft to the north tomb to facilitate the construction of a new entrance and steps (Lynch 1990b). Survey work (e.g. O'Kelly and O'Kelly 1983) has indicated that the mound covers at least two tombs, both on the western side. More tombs may lie undiscovered; Bergh (1995, 126) has noted that the north-eastern portion of the kerb is slightly flattened, similar to the entrances at Newgrange and Knowth (Fig. 2.8).

Based on the current understanding of the stratigraphical relationship between the various tombs, four main phases of construction for the Boyne 'cemetery' 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. Re-investigation of the internal stratigraphy of the large mounds is posing interesting questions



Fig. 2.4: Passage tombs within the WHS [from Stout 2002]



Fig. 2.5: Pottery pendants, pottery and bone beads and chalk balls from the Newgrange burial chamber [National Museum of Ireland]



Fig. 2.6: The façade of Newgrange under construction in the 1970s [O'Kelly archive, DoEHLG]

on the life of these monuments; evidence is emerging for two phases of construction at Knowth Tomb 1, an interpretation based on observations relating to the hidden archaeology of both the stone core and the internal megalithic art (Kerri Cleary, pers. comm.). Eriksen (2004; 2008) has also suggested that the turf layers within the mound at Newgrange represent pauses or phases in the construction process and that the original passage tomb was smaller and ringed by a low stone wall, much like Fourknocks I (Fig. 2.9). Dowth too may have started out as a series of smaller tombs that were later incorporated into a larger mound (Eogan 2009).



Fig. 2.7: Probable extent of the earlier turf mound beneath Newgrange [from Stout and Stout 2008a]

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. 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 north-east of the tombs (Philips *et al.* 2001; 2002). Additional geochemical analysis has indicated that the granite cobbles and possibly



Fig. 2.8: Plan of the mound at Dowth [after Stout 2002]

the quartz deposits found around the entrance at Newgrange were deliberately selected from sources in the Cooley Peninsula and the Wicklow Mountains, approximately 50km and 75km to the north and south respectively (Mitchell 1992; Meighan *et al.* 2002; Meighan *et al.* 2003). Both of these investigations provide striking evidence in the middle Neolithic for the connections between relatively distant places (and for the desire to reference these connections). Cooney (2004, 200) has recently commented on the links in the middle Neolithic between Lambay Island and Knowth, both places producing the only examples of cushion maceheads from a secure Irish context. Further links with the wider world and with the heavens were also attested through O'Kelly's observational rediscovery of the winter solstice alignment of the main Newgrange mound, which initiated the first modern scientific archaeoastronomical investigation of an Irish archaeological monument (Patrick 1974).

More than 80% of the stones known to feature megalithic art in Ireland are to be found in County Meath, and the overwhelming majority of these are clustered in the Boyne Valley (600+ stones). With c. 400 decorated stones, the passage tomb at Knowth was clearly at the centre of this phenomenon; a detailed volume dedicated solely to this assemblage is forthcoming (Fig. 2.10). The modern phase of

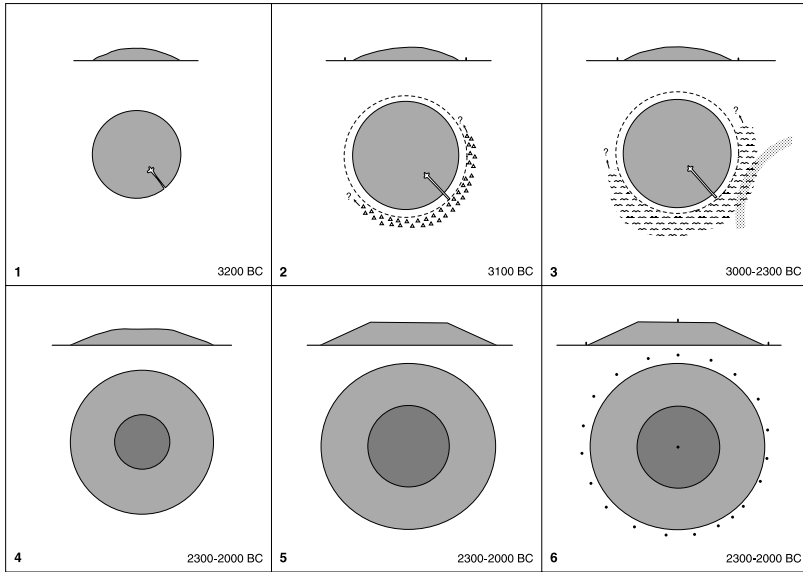


Fig. 2.9: The six phases suggested for Newgrange: 1. Passage tomb mound without kerbstones; 2. Mound is enlarged and kerbstones are erected. The quartz/granite layer accumulates; 3. A new cultural layer accumulates over the quartz. The pit-circle is erected; 4. The passage tomb and kerbstones are covered by a great mound; 5. The Great Mound is enlarged and given a flat top; 6. The mound is encircled by large standing stones. An additional stone is possibly erected on the summit [illustration by Louise Hilmar; from Eriksen 2008]

cataloguing the Brú na Bóinne megalithic art began with Claire O’Kelly’s work at Newgrange and Dowth (O’Kelly 1973; 1982; O’Kelly and O’Kelly 1983) and Eogan’s early work at Knowth (1974; 1984). Much work has been carried out on examining sculpting techniques and on quantifying motifs (e.g. Shee Twohig 1981; O’Sullivan 1995), and on how the form of the stone has influenced the designs (O’Sullivan 1986). Most recently, the study of megalithic art has been concerned with the origins and social function of the art, its relationship with rock art, and with the experience of megalithic art in its architectural and landscape setting (e.g. Dronfield 1995; O’Connor 2007; O’Sullivan 2006; Shee Twohig 2000), although these developments in approach have yet to be fully and systematically applied to the Brú na Bóinne assemblages. The very detailed and highly sensitive draughtsmanship that developed during the recording of the Knowth art is similarly being replaced by digital technologies that can record the art in its architectural setting (e.g. Robin 2008).

A number of other monuments within the WHS may also date to the middle Neolithic, among them a possible long mound (Site G) at Dowth (Brady 2007a, 124) and the enclosure at Monknewtown (Brady 2007a, 136; Eogan and Roche 2001). At the latter site, widely seen as dating to the late Neolithic, 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. An earlier, middle Neolithic phase of use for this site is also supported by the recent identification of more than 20 middle Neolithic Broad Rimmed bowls from contexts partly sealed by material from the construction of a similar monument at Balregan, on the Dundalk Bypass (Grogan and Roche 2005; Eoin Grogan, pers. comm.). The possible cursus monument located approximately 100m east of Newgrange (Fig.2.11) has traditionally been assigned to the late Neolithic (e.g. Condit 1997b, 26-7; Stout 1997a, 9; 1997b, 301-3; 2002, 33), although evidence emerging from Britain places the main phase of construction of major earthwork cursuses in the mid to late fourth millennium BC (Barclay and Bayliss 1999; see also Thomas *et al.* 2009).



Fig. 2.10: Megalithic art on Kerbstone 15, Knowth [George Eogan]



Fig. 2.11: The cursus monument in the field immediately east of Newgrange [Con Brogan]

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 overlays 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 — at least ten middle Neolithic dwellings were identified in this way (Fig. 2.12). Many more stakeholes from across the area could not be tied into any logical plan but were thought to represent successive phases of house-building (Eogan and Roche 1997, 65). At Newgrange, a concentration of postholes in the Grooved Ware/Beaker area of activity was interpreted as two buildings, 7m and 3m in diameter, and tentatively assigned to the middle Neolithic on the basis of their resemblance to the Knowth structures (Eogan and Roche 1997, 90). Recent discoveries along the Dundalk Bypass to the north, e.g. at Donaghmore and Littlemill (Ó Donnchadha 2002; Ryan and Bailey 2006a; 2006b), do seem to indicate that these scatters of stakeholes, occupation layers and hearths from

the WHS are common signatures of middle Neolithic settlement activity. At Newgrange, however, 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). In the excavator's opinion, this was probably contemporary with, or a little later than, the primary use of the tomb.

Despite nearly a half century of research targeting the early prehistory of Brú na Bóinne, attempts to reconstruct the landscape in which the tomb builders and their predecessors lived have had limited success. Poor preservation of organic remains in this, one of the driest parts of Ireland, has been an undoubted hindrance, while much of the initial analysis of the palaeoenvironmental record was undertaken when sampling strategies and dating techniques were at an early stage of refinement. At Knowth, a number of soil samples were taken from possible natural sod layers beneath the tombs, from mound material itself, and from the Beaker habitation layers. Fifteen of these samples were examined for pollen and seed remains and the results published in the first Knowth monograph (Groenman-van-Waateringe 1984). While much of the pollen was corroded, and pollen analysis of the Beaker layers gave no results whatsoever, a large variety of herb-type pollen was identified, indicating a largely open local landscape at the time of tomb construction. Patches of oak and elm forest may have remained on higher ground but real forest vegetation was thought to have been limited to the river valley (Groenman-van-Waateringe 1984, 328). Apart from a small number of cereal seeds, which complemented the traces of cereal pollen identified, results of seed analysis (on the same 15 soil samples) were deemed 'too meagre' to give any detailed picture of vegetation in the area (*ibid.*).

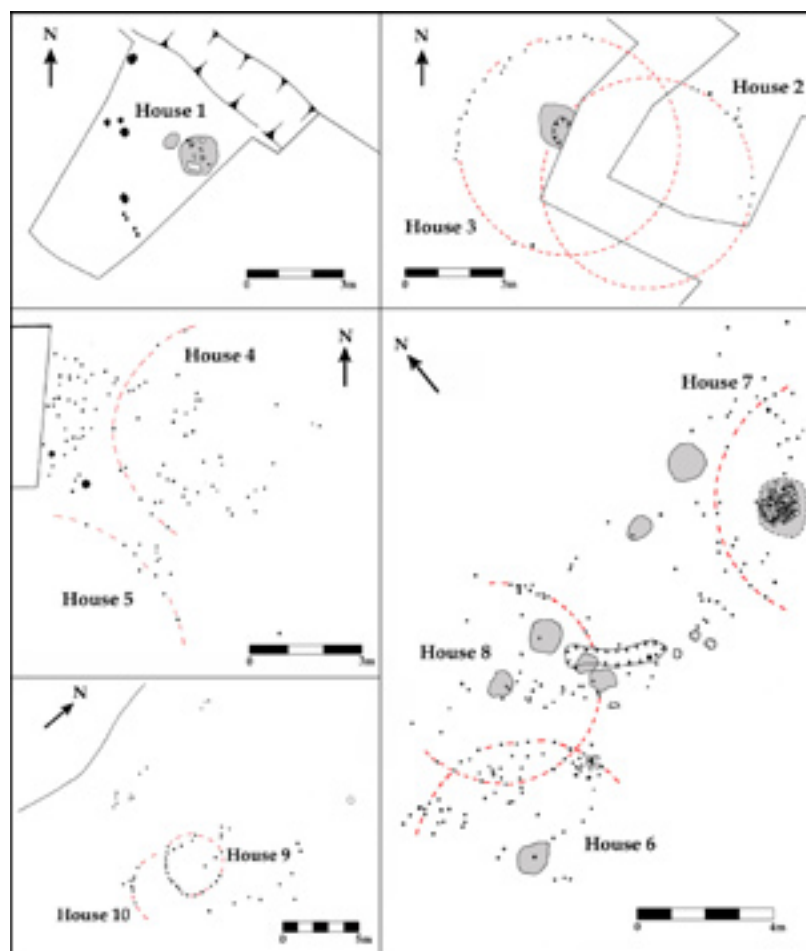


Fig. 2.12: The circular 'Decorated Pottery complex' houses at Knowth [after Eogan and Roche 1997]

At Newgrange, pollen and seed analysis was undertaken on soils from the old turf layer and mound (Fig. 2.13). Owing to corrosion, however, only seven of the 'many' pollen samples prepared were suitable for analysis and were subsequently published (Groenman-van-Waateringe and Pals 1982, 219). Relatively high levels of cereal pollen indicated that crops were being grown close to the place where the turves were cut (*ibid.*, 222). Wet-sieving (2mm – 0.2mm) appears to have produced results from only a single seed sample. The species recovered were indicative of damp pasture, complementing the pollen record and leaving 'little doubt that the turves used as building material were cut in the river valley' (*ibid.*, 223). Seed analysis carried out on an additional small moss sample from turves in the north cutting of the mound broadly supported the above interpretation (Monk 1982). Analysis of land molluscs sampled

from the mound material was also generally inconclusive (van der Spoel 1982; Mason and Evans 1982), with most species favouring the shelter, shade and moisture that can be provided by cairn material as well as a wooded environment.

Approximately 4km south of Newgrange, at Thomastown Bog, a number of corings were taken as part of a project to assess the palaeoenvironmental potential of the Brú na Bóinne area (Weir 1996). Nearly 7m of an 8.3m deep coring were prepared and sampled at 4cm intervals. While not dated, they appeared to span over 6,000 years of activity. Neolithic levels appeared to show discrete and intensive episodes of woodland clearance, with a phase of forest regeneration possibly contemporary with the passage tombs. Signs of clearance and human activity gradually increased through the profile, although later activity did not appear to be much more intense than that in early prehistory. Additional pollen cores taken from sites between 15km and 30km from Brú na Bóinne (Brooks and Farrell 2005; Mitchell 1942; Stewart 1996; Weir 1995) are of limited value. Sampling should ideally be undertaken no more than 1-2km from the areas of interest, preferably

even less, if it is to provide any meaningful picture of the local landscape (Nicki Whitehouse, pers. comm.).

Plant macrofossil analysis was also carried out on soil samples from the 1989-92 seasons at Knowth. Two-litre subsamples from the 1989-90 material and all of the 1991 and 1992 samples were processed (through 2mm down to 0.3mm sieves), the latter including samples as large as 34kg (Collins 1997, 299). Early Neolithic, 'Decorated Pottery', Grooved Ware and Beaker contexts all produced cereal remains, although the very small amounts recovered were generally poorly preserved and indeterminate to species, with no evidence of chaff or cereal weeds in any of the samples processed. Hazelnut shell, blackberry and elderberry seeds were also identified.

The small amount of faunal remains from the areas of Neolithic settlement at Knowth came from a variety of contexts and is of limited statistical use (although additional faunal material from the mound of Tomb 1 is coming to light; Kerri Cleary, pers. comm.). An assortment of faunal remains including dog, rabbit, ovicaprid, bird and amphibian bone was

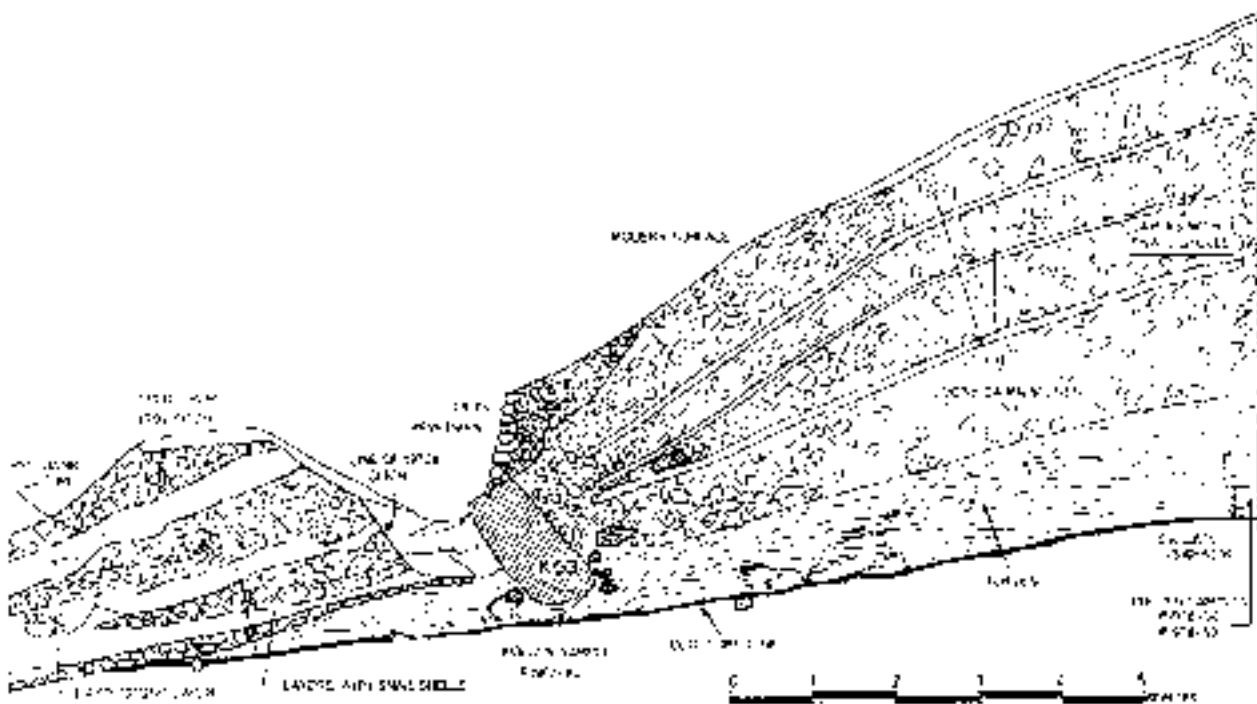


Fig. 2.13: Profile through kerbstone K53 in the north cutting at Newgrange, showing positions of C14 and pollen samples [from O'Kelly 1982]

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

Late Neolithic

There is significant evidence for continuity over the centuries spanning the late Neolithic/early Bronze Age transition. Current research is indicating that this is an island-wide phenomenon which is not just limited to Brú na Bóinne (Neil Carlin and Jo Brück, pers. comm.). Many of the same places acted as foci for activity; Grooved Ware and Beaker ceramics were both employed in similar forms of depositional practice, and pit and post circles appear to have been constructed and used throughout this period. At Newgrange, a large pit and post circle was erected immediately south-east 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; Fig. 2.14). Small amounts of Beaker pottery were recovered from both sites. The two structures produced very similar radiocarbon dates (see Appendix IV), although the presence of Grooved Ware sherds on the former site (Sweetman 1985, 209; Roche 1995, 57) and their absence on the latter may indicate that one predates the other (Roche and Eogan



Fig. 2.14: The pit circle discovered by David Sweetman to the west of Newgrange [David Sweetman]

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.; Fig. 1.34). At Knowth, a timber circle was erected 12m from the entrance to the eastern tomb. It comprised a square, four-post setting enclosed by a ring of 33 posts with an entrance defined by a 'porch' of four large posts. Structured deposits of Grooved Ware, lithics and other material had been placed in the post-pits (Eogan and Roche 1997; Roche and Eogan 2001; Fig. 2.15). Evidence emerging from across Ireland (e.g. Ballynahatty, County Antrim [Hartwell 1998]; Balgatheran, County Louth [Ó Drisceoil 2003]; Bettystown, County Meath [J. Eogan 2000]; Whitewell, County Westmeath [Grogan *et al.* 2007]), from the Orkney Islands [Richards 2003] and most recently from Durrington Walls in southern England (Parker Pearson 2007) suggests that this four-post or square setting within a larger circle is a very widespread and deeply embedded



Fig. 2.15: The timber circle discovered in front of the entrance to the eastern tomb at Knowth [George Eogan]

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 (Fig. 2.16). 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 south-west 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; Fig. 2.17) 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 third millennium BC enclosures reference earlier monuments. Passage tombs Z and Z₁, for example, would have been enclosed within the larger Newgrange pit circle, while Site A encloses another possible passage tomb (Fig. 2.18). 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, while the flint macehead from the main mound is considered a later Neolithic deposit (Eogan and Richardson 1982, 123-38; Eogan and Roche 1997, 220; Fig. 2.19).

Excavation of the main mound at Newgrange uncovered a number of features relating to mid to late third 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, as well as some middle Neolithic pottery. There was a temporally mixed lithic assemblage of over 11,000 pieces. While the exact sequence of occupation is difficult to determine, 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; Fig. 2.20). At Knowth, five separate occupation spreads associated with over 3,000 sherds of Beaker pottery and nearly 1,500 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 are the cremated remains of an adult and child that were found



Fig. 2.16: Dowth henge (Site Q) — one of four earthen embanked enclosures identified within the WHS [Con Brogan]

with a Beaker vessel in the passage of one of the smaller Knowth tombs (Tomb 15; Eogan 1976, 262-64). Other apparent late third millennium BC settlement evidence includes the Beaker structure and associated material from inside the Monknewtown enclosure (Sweetman 1976).



Fig. 2.17: The remains of Monknewtown henge visible to the right of an industrial corn-drying kiln built in the early 1970s. A passage tomb is visible in the foreground [Con Brogan]

The large faunal assemblage from the area of the Beaker settlement at Newgrange, if from a single chronological horizon, offers a very rare glimpse of livestock economy and management in prehistoric Ireland. The 12,000 fragments of animal bone analysed (van Wijngaarden-Bakker 1974; 1986) point to a meat economy dominated by domesticated species, with pig representing over 60% of the animals slaughtered. There was a very low incidence of sheep, suggesting that wool was not being actively farmed.



Fig. 2.18: The henge or embanked enclosure Site A encloses a possible passage tomb on the Boyne floodplain, south of Newgrange [Leo Swan]



Fig. 2.19: The Maesmawr-type flint macehead from Knowth Tomb 1 [National Museum of Ireland]

The assemblage also produced the earliest (although not directly dated) evidence for domesticated horse in Ireland (McCormick 2005; McCormick 2007). A change in land use and agricultural practice in the Beaker period has been suggested (van Wijngaarden-Bakker 1986, 101) — a subsistence strategy now based on mixed farming, with an emphasis primarily on the breeding of cattle and pigs rather than crop husbandry. The latter was badly affected by the large-scale turf stripping needed for the three main passage tombs, although Cooney (1991, 134) has argued that desodding was by no means a catastrophic process and may in fact have aided the conversion of mature grassland to cultivated fields. Seed analysis from Beaker levels at Newgrange and Knowth (Caspari 1983; Groenman-van Waateringe 1984) shows no appreciable change in vegetation composition, the seed taxa fitting in with a general picture of arable and/or pastoral land. A rise in the importance of pig in the late third millennium BC has been noted in Britain at ceremonial enclosures such as Durrington Walls and Mount Pleasant (e.g. Albarella and Serjeantson 2002). It may be that pig was the preferred species for ritual feasting (e.g. Mount 1992, 1994) and in this respect the fact that all of the pig bone recovered was cremated is significant.

In the wider WHS, recent systematic fieldwalking (Brady 2007a, 2007b) has produced a large quantity of late Neolithic/early Bronze Age lithics, both north and south of the Boyne. Moreover, results from commercial archaeological projects undertaken mainly

outside the WHS strongly suggest that the area was well populated in the third millennium BC. Grooved Ware sherds have been found associated with pits and stakeholes at Rathmullan and Hill of Rath (Bolger 2003; Duffy 2002), while Grooved Ware structures similar to that uncovered at Knowth have been excavated a few kilometres north of the WHS at Balgatheran, County Louth (Ó Drisceoil 2003; Fig. 2.21) and at Slieve Breagh, County Meath, c. 12km to the north-west (Grogan 2002, 524; 2004, 111). Beaker material has been discovered at Hill of Rath and Mell, the latter producing a Beaker inhumation (McQuade 2005), and at a number of sites in Rathmullan townland (Nelis 2003; Bolger 2002; 2003). At the eastern edge of the WHS, excavation ahead of a proposed drainage scheme and new road bypass at Oldbridge/Sheephouse revealed a midden containing Beaker pottery and Food Vessels (Matt Seaver, pers. comm.).



Fig. 2.20: Western Area in front of Newgrange, looking to west. Hearth 12 visible in foreground. Inset: close-up of Hearth 12 [O'Kelly archive, DoEHLG]



Fig. 2.21: Grooved Ware structures at Balgatheran, County Louth, along the route of the M1 Drogheda Bypass. Centre right: the circular Structure C; left foreground: the four-post Structure A [Cóilín Ó Drisceoil]

2.3 The 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; Fig. 2.22). However, early Bronze Age diagnostics are almost totally absent from fieldwalking assemblages within the WHS (Brady 2007a, 297). In the ninth century, two cist burials were uncovered in the grounds of Oldbridge House, in the east of the WHS (Fig. 2.23). The first was a segmented cist described as being in a mound and containing a Food Vessel in its northern chamber. Another compartment contained a jet necklace (Coffey 1893-6). The second, a short cist, contained an inhumation with a Food Vessel (Anon. 1895; Haddon 1897). A cist burial containing cremated bone and a Food Vessel has also been recorded in Monknewtown townland (Waddell 1970, 122), while the National Museum of Ireland has in its collections a stone urn recorded as coming from Knowth (Fig. 2.24). *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 was uncovered during monitoring of a quarry extension in Sheephouse townland (Campbell 1995; Fig. 2.25) in a natural basin above the south bank of the Boyne.

It has been asserted that one of the stones in the Great Circle around Newgrange overlies a pit from the south-eastern timber circle (Sweetman 1985, 208; Stout and Stout 2008a), and thus post-dates it, although the exact sequence of late Neolithic/early Bronze Age activity is far from clear (see O’Kelly 1982: 79-84; Sweetman 1985; Bradley 1998; Cooney 2006). While many stone circles seem to be relatively late developments in Irish and British prehistory, the circle at Newgrange still made direct reference to the design/alignment of the earlier tomb, the standing stones casting shadows on the entrance stone at solstices and equinoxes (Prendergast 1991a, 1991b). Two additional standing stones, Site C and Site D, are located to the south-east of the main mound at Newgrange, at the break in slope of the lowest river terrace and sky-lined



Fig. 2.23: Bronze Age cist discovered in the nineteenth century on the grounds of Oldbridge House [Con Brogan]

for traffic moving west along the river (Fig. 2.26). Excavation of Site C in 1965 did not yield any conclusive dating evidence (Shee and Evans 1965). Cooney (1996, 29-30) has suggested that these stones are Neolithic in date as they have the same petrology as the tomb orthostats. Moreover, they are positioned at what appears to be a natural landing stage on the river, possibly used by tomb builders transporting greywacke from the coast.



Fig. 2.22: Early Bronze Age axe in situ in the area of Beaker settlement at Newgrange [O’Kelly archive, DoEHLG]



Fig. 2.25: Fulacht fiadh uncovered in Sheephouse townland [Kieran Campbell]



Fig. 2.24: Stone urn reported to have come from Knowth [National Museum of Ireland]



Fig. 2.26: Site C standing stone being excavated in 1965. Newgrange is visible in the background [O'Kelly archive, DoEHLG]

Recent development in Oldbridge and Sheephouse townlands has uncovered what appears to be a concentration of middle/late Bronze Age funerary monuments at the eastern end of the river bend. On the Oldbridge estate, work on the Battle of the Boyne site has brought to light a series of ring ditches, some revealed in geophysical survey, others visible in aerial photographs of fields on the terrace to the south of Oldbridge House (Cooney *et al.* 2001; Fig. 2.27). 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.; Fig. 2.28). On the northern river terrace immediately opposite these sites, a further three barrows were excavated during construction of the M1 Drogheda Bypass (Chapple 2002, 2003; Campbell 2002d). Similar monuments identified within the WHS include a small ring ditch containing three urn cremations excavated at Stalleen, anomalies interpreted as ring ditches revealed during geophysical survey work at Newgrange in the early 1990s, and small circular cropmarks at Rossnaree visible in aerial photographs (Campbell 2007; Noel and Hale 1993; 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). It has been suggested that 11 of the remaining 12 burials uncovered within the henge date to the same period (*ibid.*). A short distance to the south-west 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; Fig. 2.29).

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 Donore, Kilsharvan, Lisdornan and Rathmullan, with substantial enclosures excavated at Lagavooren and Sheephouse (Niall Roycroft, pers. comm.). Excavations on a rock promontory known as Platin Fort, also on the route of the Drogheda Bypass, recovered a miniature Bronze Age flat axe, lignite bracelets and middle-late Bronze Age pottery (Seaver 2001; 2002; Conway 2003a; 2003b). These relatively large clusters of settlement activity are matched in some cases by equally large-scale funerary and ceremonial activity, e.g the urnfield site at Hill of Rath (Smith 1840-44; Duffy 2002).

2.4 The 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 first millennium BC. Excavations at Knowth have revealed a large number of inhumations around the base of Tomb 1 (Eogan 1968, 365-73; 1974, 68-87), four aligned east/west in cists and the remainder in pits. Material sampled from the



Fig. 2.27: Circular cropmarks in the fields below Oldbridge House [Ordnance Survey of Ireland]



Fig. 2.28: Double ring ditch uncovered along the route of the Oldbridge/Sheephouse Bypass [Matthew Seaver/CRDS Ltd]

burials yielded up to six Iron Age dates as well as a number of later determinations (see Appendix IV). Grave goods, mainly items of personal adornment, were found with 11 of the burials and most of the inhumations were



Fig. 2.29: The water-filled enclosure at Monknewtown [Con Brogan]

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; Fig. 2.30). A small number of Roman pottery sherds and toilet implements have also been recovered from Knowth (Bateson 1973, 80).

A small Iron Age burial mound also lies on the river terrace at Rosnaree, north-east of Rosnaree House. This site, reputed to be the resting place of High King

Cormac Mac Airt, was disturbed in 1942 for the construction of a 'pillbox' (machine gun post). The remains of a woman and an infant were recorded at the time, the former recently radiocarbon dated to AD 250-540. Re-examination of the remains has also identified an additional two adult females from the grave (Mary Cahill, pers. comm.; see Appendix IV).

Through the centuries, late Iron Age/Roman coins and ornaments have regularly been found in the vicinity of the Newgrange mound, particularly around the entrance (Carson and O'Kelly 1977). Coins had already been recovered in Edward Lhwyd's time (Ó Ríordáin and Daniel 1964, 32; Molyneux 1726, 206), while a series of discoveries was made in the nineteenth century, including the unearthing of the Conyngham

hoard of gold jewellery in 1842 (Conyngham 1844; Wilde 1847, 740). Additional coins and gold objects were uncovered during O’Kelly’s excavations in the 1960s and 1970s. Most of these objects have been interpreted as votive offerings made by travellers, tourists or pilgrims in the early centuries AD (Topp 1956; Carson and O’Kelly 1977; Stout 2002), with many individuals apparently able to deposit items of high value (Fig. 2.31). The Boyne Valley (Buvinda) is recorded by Claudius Ptolemaius in his second-century AD survey of the known world; Newgrange may well have served as a cult site for late Iron Age/Roman populations (Ragnall Ó Floinn, pers. comm.). In this regard, it may be significant that Newgrange is the only one of the three large passage tombs not re-used for settlement-related activity in the early historic period. Outside the WHS, excavation along the M1 Drogheda Bypass at Claristown has revealed the remains of an Iron Age roundhouse, built around 50 BC to AD 50, as well as a late Iron Age inhumation (c. fourth century AD) and possible ring cairn (Niall Roycroft, pers. comm.).



Fig. 2.31: Roman finds from Newgrange include two finger rings, a gold torc fragment and several gold coins (National Museum of Ireland)

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).

2.5 The Early Medieval 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 first millennium AD. The lower Boyne Valley was part of the kingdom of Brega in the early medieval period, and from the late sixth/early seventh century AD was ruled by the Aed Sláine dynasty. When the kingdom was split in two in the late seventh 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; Swift in Byrne et al. 2008). Whereas



Fig. 2.30: Burial 9 from the late Iron Age double burial at Knowth. The grave goods associated with Burial 8 still lie in situ to the right of the scale bar [George Eogan]

no specific land units are linked to the rulers of Knowth in the sources, the ecclesiastical records suggest that at its widest extent, their kingdom stretched from the Fewes Mountains in Armagh to the Liffey Valley (Swift in Byrne *et al.* 2008, 21). This historical evidence accords quite well with the archaeological record. There is a large ringfort at Knowth, approximately 500m from the passage tomb cemetery, which is located at the edge of a ravine above the Boyne with good views to the north-west and south (Fig. 2.32). 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, suggest that the occupants had a high status within early Irish society (Stout 2002, 77). At Knowth passage tomb, two concentric pennannular ditches were dug around the mound (Eogan 1977; 1990; 2007a). The first ditch enclosed an area 40m in diameter around the summit, while the second ditch was dug just inside the line of kerbstones. The resulting monument, effectively a bivallate ringfort, is dated by animal bone and a small number of finds from the sixth to eighth centuries AD. Any structural remains associated with these ditches would have been removed by nineteenth-century quarrying activity on top of the mound. Inside the mound, in the western passage tomb, ogham inscriptions have been found on some of the orthostats (Fig. 2.33). These inscriptions are difficult to date and their purpose is obscure, but they imply the existence of literate individuals in and around Knowth in the early Christian period (Swift in Byrne *et al.* 2008, 15).



Fig. 2.32: The large ringfort at Knowth [Con Brogan]



Fig. 2.33: One of the ogham inscriptions from Knowth [Con Brogan]

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 Giltown, 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 second 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 Tomb 1 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 Tomb 1 is abandoned around the end of the eighth century. After an apparent hiatus in activity, it is re-occupied in the tenth century when a large unenclosed settlement represented by at least 15 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 tenth-century community at Knowth was smelting iron, working gold and bronze and enamelling objects, as well as working stone, bone and antler. Contact with Hiberno-Norse communities is suggested by exotic finds such as scales, and perhaps also by the shape of the buildings, which are similar to those from Viking Dublin (Eogan 2007a, 4). Contemporary annals also contain regular accounts of both clashes and alliances with Vikings (Byrne *et al.* 2008). 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); 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 medieval 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, Sheepgrange,

Littlegrange and Clonlusk townlands (Stout 2002, 81; Fig. 2.34), most of which have been uncovered during ploughing or the reclamation of farmland. Their strong association with unenclosed settlements, in the Meath area at least (Clinton 2001, 45), suggests that they provided an element of the protection previously afforded by ringforts. References to souterrains in the annals certainly indicate that these sites were used as refuges (Lucas 1971-3), something supported by the complex layout of many examples (Buckley 1988/89). Clinton (2001, 64) has argued that their construction may also be linked to the increase in slave-taking and trading at this time, noting that many of the internal chambers were designed to be sealed from the outside. The large number of souterrains uncovered at Knowth is so far unique within the WHS, and generally rare within Ireland, although a dense concentration of souterrains containing domestic and personal objects, faunal remains and querns was unearthed north of the WHS, at Marshes Upper, near Dundalk (Gowen 1992).



Fig. 2.34: View into the upper beehive chamber, Dowth souterrain [Mark Clinton]

In a marshy basin immediately downslope of Knowth lies a complex of earthworks labelled Site M (Fig. 2.35). Excavation and geophysical survey carried out between 2002 and 2004 (Stout and Stout 2008b; James Bonsall, pers. comm.) 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 sixth to tenth centuries, and a final phase marked by a later external earthwork. Evidence for agricultural

and manufacturing activity within the enclosures was also identified. The excavators interpret Site M as an early medieval 'secular' cemetery, *i.e.* with no apparent ecclesiastical associations, and compare it to a number of similar sites discovered in recent years in north-east Leinster, such as Balriggeran, County Louth (Delaney 2007; Delaney and Roycroft 2003) and Raystown, County Meath (Seaver 2006; 2007).

The earliest surviving descriptions of the arrival of St Patrick in Ireland, the seventh-century Muirchú'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 seventeenth century, this deeply symbolic act has been associated with the Hill of Slane (Swift 1996, 11; Fig. 2.36). More recently, however, 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 south-west 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 sixth century. A house-shaped shrine in the later medieval graveyard at Slane is associated with this early Church figure. The patronage of the local Síol 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; 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



Fig. 2.35: Excavating burials at Site M [Hugh McElveen]

holy wells and a number of inhumations have been recorded (Stout 2002, 76). The nineteenth-century Ordnance Survey letters for County Meath (Herity 2001) also record an association with St Columcille who was said to have built a church at Rosnaree.

It would also appear that medieval society at Brú na Bóinne was conscious of the prehistoric monuments in their midst. As a place name in the Boyne Valley, *brug* had a topographical identity by the tenth century; a poem of the period by Ó hArtagain refers to a cemetery at *Brug* (a mansion or palace in old Irish). In the twelfth-century history of the royal cemeteries



Fig. 2.36: The Hill of Slane: the ecclesiastical remains on the hill today date from the later medieval period [Con Brogan]

of Ireland, *Senchas na Relec*, an origin tale is provided for the cemetery at *Brug* (Fig. 2.37). The twelfth-century *Book of Leinster* also preserves a *dindshenchas* (place lore) poem for *Brug*, as does the fourteenth/fifteenth century *Book of Ballymote*. There is some consistency between the different versions of place lore for Brú na Bóinne, and monuments such as the main Newgrange tomb, Sites K and L, and the cursus can be fairly securely identified (Stout 2002, 64-5). Brú na Bóinne is firmly associated with the god Oengus, and is seen as his home in many early Irish myths. The Boyne area in general and the Brú in particular is seen as one of the entry points to the Otherworld. The Brú is one of the places where the Tuatha Dé Danann are said to have gone underground when the Irish arrived in Ireland. Cú Chulainn's first incarnation as a child is also said to have taken place near Brú na Bóinne (Tadhg Ó Dúshláine, pers. comm.).

There is a growing body of ceramic evidence for foreign contact in the area of north Leinster, between the rivers Liffey and Boyne, in the early historic period. The presence of fine tableware bowls (PRSW) and amphorae (Bi/LRA2 and Bii/LRA 1) of the fifth-sixth centuries AD from the eastern Mediterranean, as well as sixth-seventh century Gaulish E ware vessels on sites such as Colp West, Randalstown, Stalleen and Collierstown, County Meath, provide important information on trade, exchange, and the use and distribution of imported commodities. E ware is also known from the early medieval occupation of the main passage tomb at Knowth, as well as from the excavation of the cemetery at Site M (Doyle 2008). At least two potential importation points near the coast have been discovered: at Colp West and at Ninch. In 1988, a gas pipeline project uncovered a series of burials and enclosures at Colp West near the mouth of the

Boyne. While this archaeological complex was only partly excavated, a series of enclosing ditches, an annular gully and over one hundred extended burials were revealed. Sherds from three Mediterranean amphorae and five to six E ware vessels were found within an enclosure. References to Colp can be cited from the seventh-century Muirchú's *Life of Patrick*, which refer to 'Inber Colpa/Inber Colpidi' (Gowen 1989; Charles-Edwards 2000, 16; Doyle 2001). These historical references appear to suggest a landing point at Inber Colptha. Sherds were also recovered during the

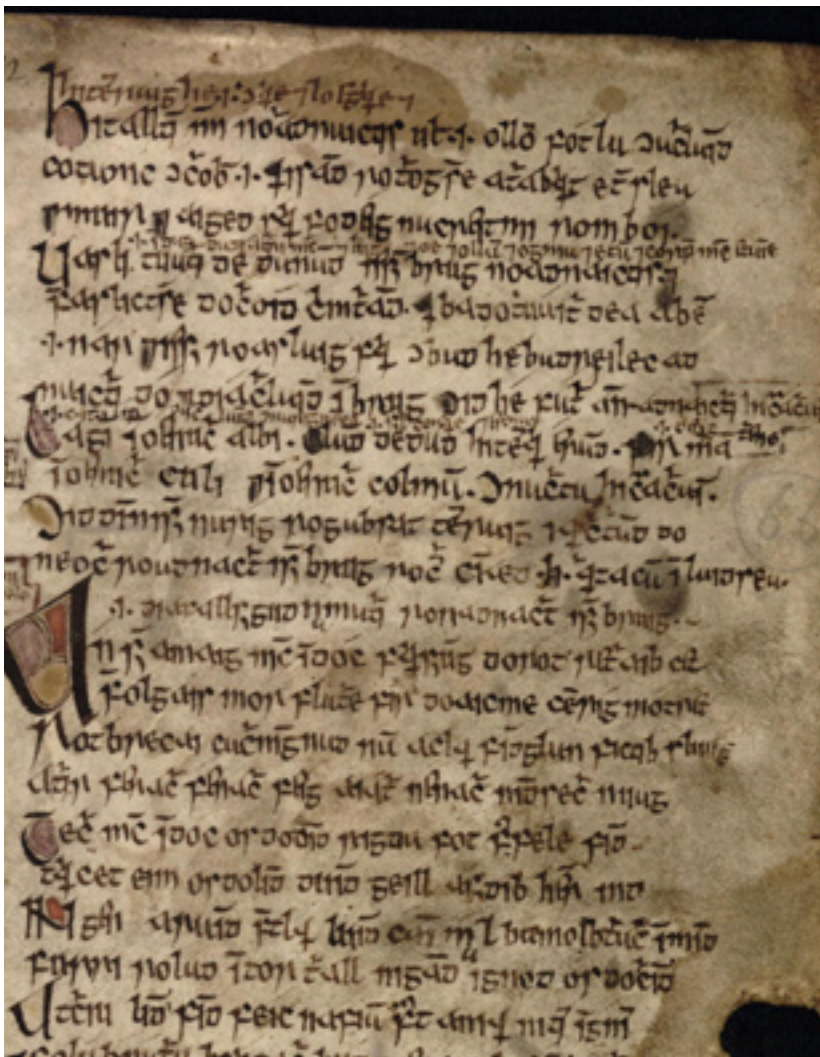


Fig. 2.37: Description of brug from the twelfth-century *Senchas na Relec* (*The History of the Cemeteries*) contained in the *Lebor na hUidre* (Book of the Dun Cow). *Senchas na Relec* lists the most important burial places in Ireland, such as Crúachu, Tailtiu, Óenach Ailbe and Brug na Bóinne (LU folio 51b lines 4115ff) [Image courtesy of the Royal Irish Academy]

excavation of a sequence of enclosures near the coast at Ninch near Laytown (Mc Conway 2004). The quantity and frequency of imports at Ninch suggests that this site had direct access to sea-borne trade and that material further inland was perhaps distributed through sites such as Ninch or Colp West.

Raiding, both for material and political gain, also appears to have been a relatively common occurrence along the Boyne Valley from the middle of the first 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 targets, although the annals also record the plunder of dwellings and souterrains. Stout (2002, 81) has emphasised the scale of some of these incursions, such as the 120 Norse ships on the rivers Boyne and Liffey in AD 837 and the Norse naval force at Rossnaree recorded in AD 842 of the *Annals of the Four Masters*.

2.6 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 (Fig. 2.38). The new foundation, named Mellifont, was the first in Ireland and was granted considerable lands along the newly-conquered southern fringes of Airghialla (Colmcille 1953). A series of royal charters and grants issued from the late twelfth century onwards provide information about this changing and expanding landscape (see Colmcille 1953, 1958). They also 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



Fig. 2.38: The now ruined Cistercian abbey of Mellifont in County Louth, on the banks of the River Mattock [Con Brogan]

names of some now fossilised 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 Gilttown, 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. Annals entries indicate that a motte was constructed here in 1175/1176, and two stone-lined ditches and the remains of a bastion have been uncovered on the south-eastern side of the main mound (Byrne in Eogan 1968: 399; Ó hInnse 1947; Eogan 1991, 121-2). By at least 1185, however, Knowth lay at the centre of a new Cistercian farm, and grange buildings were erected on the top of the mound. Excavations have revealed a rectangular walled courtyard with lean-to buildings and a possible oratory or chapel (Eogan 1984, 7;

Fig. 2.39). To the north-east of the Knowth mound (Moore 1987, 123, 126), the complex of earthworks now known to include the remains of an early medieval cemetery (Stout and Stout 2008b; see above) also contains features such as enclosures, field boundaries, cultivation ridges, and a possible pond that may relate to medieval farming activity associated with the grange (Stout 2002, 87).

In 1329, the lands of Monknewtown were granted as a grange to the Cistercians, while Newgrange became the 'new grange' of Mellifont sometime before 1348 when it was separated from the parent grange of Knowth (Bradley 1997, 33). These granges and others like them saw intense agricultural activity centred on grain cultivation and sheep and cattle rearing, and linked to an export industry put in place



Fig. 2.39: The footprint of medieval grange buildings on the summit of Knowth Tomb 1 [Con Brogan]

by the Cistercians. Huge quantities of wheat, barley and oats, for example, were exported to England at this time. There is a 1309 reference in the Llanthony rolls to a William O'Kelly who was granted permission to transport 100 crannocs of wheat to England in 1309 (Tresham 1828, 12b, no. 26; Hogan 2008, 146–7). The shipping of grain back to mother houses was an essential part of the canons' administration in Ireland (Hogan 2008, 132), and the monks made ready use of the fertile land so close to a major river and the nearby developing port town of Drogheda. At the time of the dissolution of Mellifont Abbey in 1540, some 90% of lands held were recorded as being good

for arable agriculture (White 1943). The scenario of widespread tillage is also attested in the archaeological record. At Newgrange, plough pebbles have been found over a wide area from the main mound down to Site A, while the excavation of Site Z uncovered an extensive ridge-and-furrow cultivation (O'Kelly *et al.* 1978; O'Kelly 1976). Seventeen plough pebbles were found with thirteenth-century pottery at Knowth, with additional examples recovered from Balfeddock, Townleyhall, Littlegrange, Oldbridge and Donore townlands (Brady 2002, 11; Brady *et al.* 2007, 74; N. Brady 1986, 1988; O'Carroll 2002; Fig. 2.40).

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 an earlier 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 fifteenth-sixteenth 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).



Fig. 2.40: Medieval plough pebbles collected during systematic fieldwalking in the Brú na Bóinne area [Conor Brady]

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; 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; Fig. 2.41). 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 (Fig. 2.42). 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 twelfth 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). In 1366, the abbot of Mellifont was reprimanded

for obstructing navigation by erecting a weir at Oldbridge (Went 1953, 39). In 1435, a weir built at Proudfootstown by John Proudfoot was appropriated and dismantled by the king's officers for causing obstruction (Tresham 1828, 261b, no. 9), while in 1537 an act was passed for the removal of certain '*werres, purprestures, milpoundes, ingens and other obstacles*' from the River Boyne (Connolly 2002, 289-91). Such activity is supported by the recent discovery during river dredging of a very well-preserved clinker-built vessel at Drogheda, most likely a local coastal trading boat that would have serviced the port in the later medieval period.



Fig. 2.41: The vernacular mill at Rossnaree occupies the site of an earlier mill run by the Cistercians at Mellifont [Con Brogan]



Fig. 2.42: A fish weir on the Boyne below Dowth [Con Brogan]

The detailed records kept by monastic houses of their holdings often provide the only link left to landscapes now completely hidden from view. One example is the village of Lougher, described in detail in the cartularies of Llanthony (Hogan 2008; Stout 2002, 100-1). At the centre of the complex stood a moated manor house with a separate small hall, cowhouse and gatehouse. There was a small vill with at least 15 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



Fig. 2.43: A vertical aerial shot of a modern farm complex in Lougher townland, possibly on the site of the medieval village of Lougher [The Discovery Programme/Meath County Council]

settlement may lie beneath a large farmhouse and farmyard within the townland (Michael Potterton, pers. comm.; Fig. 2.43).

In accordance with their vow of poverty, the Cistercians were forbidden to acquire tithes, rents or tenants, and instead farmed their land directly and solely to maintain themselves. However, no more than a few decades after the foundation of the Mellifont house, in 1208, the renting of lands on certain conditions was being permitted by the general chapter of the Cistercian order (Colmcille 1958, xxxiii), and by the fifteenth century, lay brothers had all but disappeared from the farms. The monks became powerful landlords and the records show that their main income now came from rents (Colmcille 1958, xxxiv). These changes in land holdings naturally affected the character of settlement, and monastic granges such as Monknewtown developed into small villages housing growing secular communities (White 1943, 217; Graham 1974, 53; Kenny in Byrne *et al.* 2008). Excavations in 2008 at Stalleen, on what would have been abbey lands, have revealed a fourteenth-century gate structure, associated ditches and industrial features. This later medieval settlement possibly functioned as a grange (Mandy Stephens, pers. comm.; Fig. 2.44).

2.7 The Anglo-Normans

In 1172, following successful military campaigns in Leinster, the newly declared Lord of Ireland, King Henry II, 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 20 years of campaigns and counter-campaigns as de Lacy, Lord of Meath, attempted to assert Anglo-Norman control over those local kings who refused to recognise his authority (Carey 1998). His efforts are documented

by Giraldus Cambrensis, nephew of Robert fitzStephen, one of the first Anglo-Normans to land in Ireland (Scott and Martin 1978; Dimock 1867). Giraldus and the annals record a series of castles rapidly erected throughout Meath and Leinster and within Brú na Bóinne, at Knowth (see above) and possibly Dowth (D'Alton 1844, 43; Graham 1974, 51; O'Kelly and O'Kelly 1983, 149; Byrne *et al.* 2008). 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 were 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.



Fig. 2.44: A medieval gate structure uncovered in Stalleen townland [Mandy Stephens/Hawkeye]

The list of free tenants who held land on the manor included Irish as well as English names; 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. 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 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 in whose hands it remained until the Reformation. The present church is mostly fourteenth or fifteenth century in date (Moore 1987, 134; Fig. 2.45);

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).



Fig. 2.45: The late medieval church at Dowth [Michael Potterton]

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 was physically marked by a fortified ditch and rampart (O’Keeffe 1992). Both within and without, fortified residences, or towerhouses, were constructed to defend households and their lands. While Brú na Bóinne lay at the centre of the Pale, the construction of towerhouses did not occur on the nucleated settlements on Church-held lands, leaving a very different pattern of settlement remains in the two areas (Stout 2002, 102). Two towerhouses were constructed within Dowth manor, one on the Dowth ridge on a good vantage point above the river (Galway 1985/1986, 57–8; Moore 1987, 170; Fig. 2.46), the second in Proudfootstown



Fig. 2.46: Dowth towerhouse [Con Brogan]

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, 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; Stout 2002, 97; 2007, 338–9, 341; Fig. 2.47). In the grounds of the adjacent Netterville Institute, a 2004 geophysical survey revealed a large number of ditches and walls as well as several enhanced anomalies suggestive of burnt remains and areas of occupation (James Bonsall, pers. comm.).

2.8 Reform and Rebellion — The Sixteenth and Seventeenth Centuries

There was a radical change in colonial policy in Ireland in the sixteenth century, as the English government sought to take control of crown land, dissolving the monasteries and establishing an English-manned and military-based administration at Dublin with regional officers and garrisons posted at places like Drogheda (Stout 2002). Within the Pale, confiscation was not as pronounced, and a high percentage of Old English Catholic families remained in the south Louth/east Meath region. The Nettervilles of Dowth are one such example who held onto their lands through the turbulent sixteenth and seventeenth centuries, although they were dispossessed for a short time for their role in the Ulster Rising of 1641 (Stout 2002, 109; Simington 1940, 17, 350–1). 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, an English ‘soldier of fortune’ (Bradshaw 1974, 114; Colmcille 1958, 198; Simington 1940, 13–14, 351–2). Until the late seventeenth century, the Moores were the only



Fig. 2.47: An aerial photograph of Dowth mound, taken on 8 July 1964, captures a series of cultivation ridges and roadways running through the adjacent fields (CUCAP AJO 103) [Cambridge University Collection of Aerial Photographs]

Protestant landowners in Brú na Bóinne; 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). Jenkins (in Byrne *et al.* 2008) gives a colourful account of the separate social and political circles in which these two powerful families, the Protestant Moores and the Catholic Nettervilles, moved. 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 in c. 1700 (Stout 2002, 123).

Following the success of the Cromwellian campaign, surveys such as the Civil Survey and the Down Survey were undertaken to obtain accurate information on the location and contents of confiscated lands. Less attention was paid to lands that were not to be transferred,

such as those within the Pale, and areas like Brú na Bóinne were not so thoroughly mapped. Nevertheless, these surveys are still some of the most important sources of information about land ownership, agriculture, industry and settlement in the WHS in the seventeenth century. The 1654 Civil Survey for County Meath, for example, lists Dowth as comprising a castle, a stone house, a stable and other out-houses, a church, a farmhouse, 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 now survives above ground level. 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,

Rossnaree and Gilltown had dwindled and, in most cases, disappeared entirely (Stout 2002, 111–12). At Monknewtown, only a church, a farmhouse and a stone bridge are recorded (Simington 1940, 352). The Down Survey maps of the area show stone buildings at Douth, Proudfootstown, Roughgrange, Lougher and Platin (Stout 2002, 112–13; Fig. 2.48), but the overall picture is one of fewer buildings than in previous centuries. An undeniable factor in this shift was the post-1540 change in land ownership and local influence from the religious houses to secular landlords (see Jenkins in Byrne *et al.* 2008). In terms of the economy of the region, almost 75% of the land in Brú na Bóinne was recorded as ‘arable’ in the Civil Survey (Simington 1940; Stout 2002, 112), something reflected in the increase in the number of recorded mills from three in 1540 to eight in 1654 (Stout 2002, 111–12). Most of the rest of the land was pasture, and there were smaller acreages of meadow, bog and woodland.

The seventeenth century in Brú na Bóinne was punctuated with major conflicts — the Ulster Rising of 1641, the Cromwellian campaign in nearby Drogheda in 1649, and the Battle of the Boyne in 1690. The 1640s in particular was a tumultuous time and damage was done to many buildings including the churches at Douth and Monknewtown (Ellison 1973, 5, 7; Fig. 2.49). In the 1620s, Archbishop Ussher noted that Douth 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



Fig. 2.48: The Down Survey map of Douth, from the map of Slane barony, 1657 (NAI, Quit Rent Office, Down Survey map no. 28, Slane) [courtesy of the Director of the National Archives of Ireland]



Fig. 2.49: Monknewtown church [Con Brogan]

Boyer 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, allowing for a relatively detailed reconstruction of the seventeenth-century landscape of the area (Stout 2002, 113–23; Fig. 2.50). 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, fieldwalking, geochemical analysis, remote sensing, a metal-detector survey and a sonar survey of the river. 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. An additional metal-detector survey and test-excavation were carried out in 2007 (Walsh 2009). For the first time, a wide range of artefacts associated with the battle was systematically collected and recorded (Fig. 2.51).



Fig. 2.50: The Battle of the Boyne, by Jan Wyck [courtesy of the National Gallery of Ireland]



Fig. 2.51: Musketballs recovered during a survey of the Battle of the Boyne site [Conor Brady]

2.9 Economy and Industry — The Eighteenth Century Onwards

The Irish landscape changed dramatically in the eighteenth century, and the landscape of Brú na Bóinne is no exception. A period of stability and relative prosperity followed the Williamite wars, and a new system of estates created demesnes, farms and fields along the Boyne, all of which have been documented in detail by Stout (2002, 124–143). Three major estates lay within Brú na Bóinne — the Nettervilles of Dowth, the Campbells (and later the Caldwelles) of Newgrange and Knowth, and the Coddingtons of Oldbridge and Sheephouse. All three landowners erected large mansions on their estates and placed them 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' (Fig. 2.52). The main source of information about this eighteenth-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 (Fig. 2.53), while another map dating to 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 first edition Ordnance Survey maps provide the first detailed cartographic record of the new walled gardens, tree plantations and road networks of the improving landlords (Fig. 2.54).

Relaxed trade barriers in England in the eighteenth 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 (Fig. 2.55). 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



Fig. 2.52: Dowth Hall, built in the early eighteenth century for Viscount Nicholas Netterville [Con Brogan]

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 eighteenth century, mills were found 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 eighteenth-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. Initially, road repair and construction were financed through tolls and later through the tenant farmers, with monies levied per acre of land leased (Killen 1997). Between 1748 and 1790, parts of the River Boyne were canalised in order to encourage trade with Dublin and to facilitate the transportation of corn to the port at Drogheda from inland markets (Fig. 2.56). *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 page 56,57).

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, while the Catholic faithful secretly continued



Fig. 2.53: Survey of part of the estate of Charles Caldwell in the counties of Meath and Louth with the names of tenants, by Bernard Scalé. NLI Manuscript Map 21 F78 (63) [reproduced with the permission of the Board of the National Library of Ireland]



Fig. 2.54: Dowth demesne as seen from the 1836 Ordnance Survey fair plan [courtesy of the Director of the National Archives of Ireland]

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. Despite a series of proclamations against Mass houses in Meath in the first quarter of the eighteenth 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; Fig. 2.57).

Life in nineteenth-century 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



Fig. 2.55: The eighteenth-century industrial mill at Slane, which started production in 1766 [Con Brogan]

area between 1837 and 1839, contained information on the size and value of land holdings and on the type, size and value of buildings. Along with the published *Griffith's Valuation*, these enable a classification of rural society from the nobleman down to the casual labourer (Fig. 2.58). Also recorded in *Griffith's Valuation* were ecclesiastical and industrial



Fig. 2.56: The Lower Boyne Navigation [from Stout 2002]

buildings and national schools. The first half of the nineteenth century saw an explosion in church building, which was accelerated by the Catholic Emancipation process (Fig. 2.59). 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.



Fig. 2.57: Stone pedestal outside the door of the present church at Donore village [from Stout 2002]

Generally speaking, the Great Famine of 1845-49 did not affect Brú na Bóinne as severely as other parts of the country. Sources such as the Census of Ireland and the Perambulation Books (similar to Field Books but containing extra information such as the date of initial tenure) record hardship in the area, although this was alleviated in certain places by landlords who reduced or suspended rents. In the post-famine period, there was an overall consolidation of landholdings and increased prosperity and security among stronger tenants. It is their properties that survive today — Stout’s fieldwork in the late 1990s showed that the dwellings of the nineteenth-century cottiers and labourers were an extreme rarity and were in danger of disappearing completely (Stout 2002, 155-6; Figs. 2.60-62). In the late nineteenth century and early twentieth century, the enactment of the Labourers (Ireland) Acts resulted in the replacement of some of the decaying labourers’ housing with stone cottages, a distinctive feature of Brú na Bóinne and designed by a local architect, P. J. Dodd of Drogheda (Fig. 2.63).

From 1932, a scheme of State-assisted migration led to the transfer of Irish-speaking families from congested districts in the west of Ireland to five locations in County Meath, including the Bend of the Boyne. Migrations to Brú na Bóinne occurred mainly in the years 1938-40, with small groups of families being relocated in the townlands of Newgrange and Dowth on land formerly held by the Gradwells of Dowth Hall. A patchwork landscape of small ‘family’ farms was created, divided up by new rows of hedges, ditches and fences. Architecturally, change came in the form of houses distinctively styled for the migrants (Fig. 2.64). Other distinctive contemporary architecture within the WHS included the concrete artillery emplacements or ‘pillboxes’ that were erected during World War II, known as the ‘Emergency’ in Ireland. The rivers Boyne and Blackwater 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 37 examples between the Boyne estuary at Baltray and Navan (Fig. 2.65).

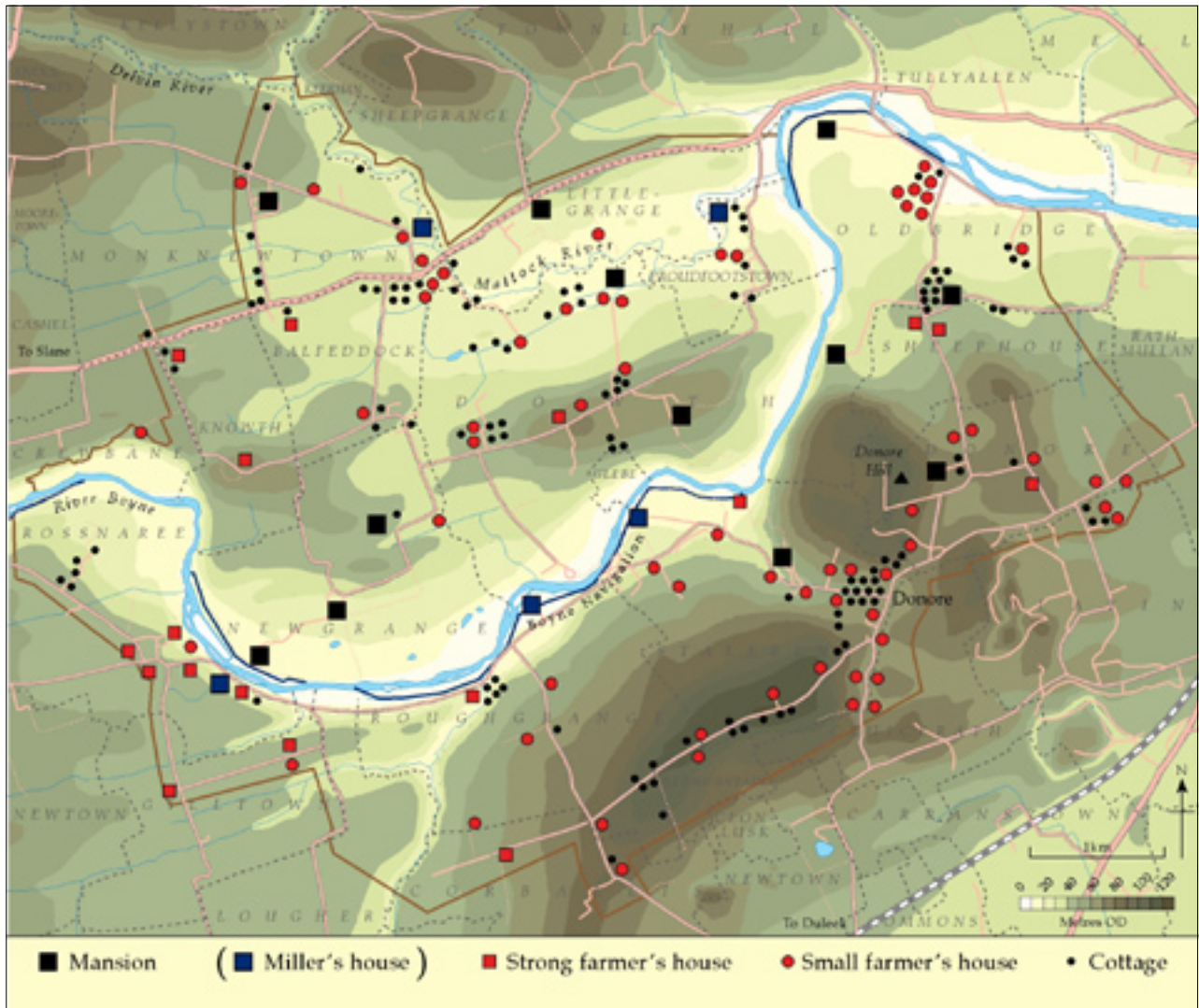


Fig. 2.58: Housing in the WHS in the mid nineteenth century (based on Griffith's Valuation 1854) [from Stout 2002]



Fig. 2.59: The nineteenth-century Church of the Nativity of Mary Immaculate, Donore [from Stout 2002]



Fig. 2.60: Strong farmer's house at Donore [from Stout 2002]



Fig. 2.61: Labourer's cottage, Donore village [from Stout 2002]



Fig. 2.62: Labourer's cabin, Redmountain [from Stout 2002]



Fig. 2.63: Local Authority cottage at Knowth [DoEHLG]



Fig. 2.64: Land Commission house, Knowth [from Stout 2002]



Fig. 2.65: World War II pillbox on high ground on the south side of the Boyne [from Stout 2002]

2.10 Modernisation to the Present Day

The modernisation of the Brú na Bóinne farming landscape intensified from the 1950s onwards, initially with grants provided by the Land Rehabilitation Project, a scheme financed with aid from the Marshall Plan, and then in 1974 with grants from the Farm Modernisation Scheme. The size of farms grew, quickly outstripping in size the smallholdings set up by the Land Commission several decades earlier. Farm expansion and agricultural intensification, led by the pressure for economic viability, meant that by the late twentieth century, *'the landscape of self-sufficient small farms envisioned by de Valera was now unravelling'* (Jenkins in Byrne *et al.* 2008, 242). The aggregation and alteration of this farming landscape continues today, with many works carried out in the WHS exempt under the Planning and Development Act. The widening of roads, removal of field hedges and roadside ditches, insertion of ranch-style fencing and the planting of tall *leylandii* hedgerows have all had a cumulative and significant impact on the landscape setting of Brú na Bóinne.

Change is also evident in the forms of housing and in particular in the growth of bungalow dwelling throughout rural Ireland from the 1970s onwards as offspring from family farms sought to settle in the area, often on a small plot beside the original farm (Fig. 2.66). There has been considerable demand for new one-off houses in the Brú na Bóinne area in the last ten years. Increasingly, these new home-owners are deriving incomes from sectors other than agriculture and often outside of the WHS. While Meath County Council ceased granting planning permission for building in the core area of the WHS in the late 1990s, certain developments in the buffer zones do get planning permission. The recent discovery of a Bronze Age ring ditch with associated burials in Stalleen townland ahead of the construction of a private dwelling (see Fig. 1.37) illustrates the quality of the archaeological resource outside of the river bend and the difficulty of protecting that resource while meeting the needs of the local community.

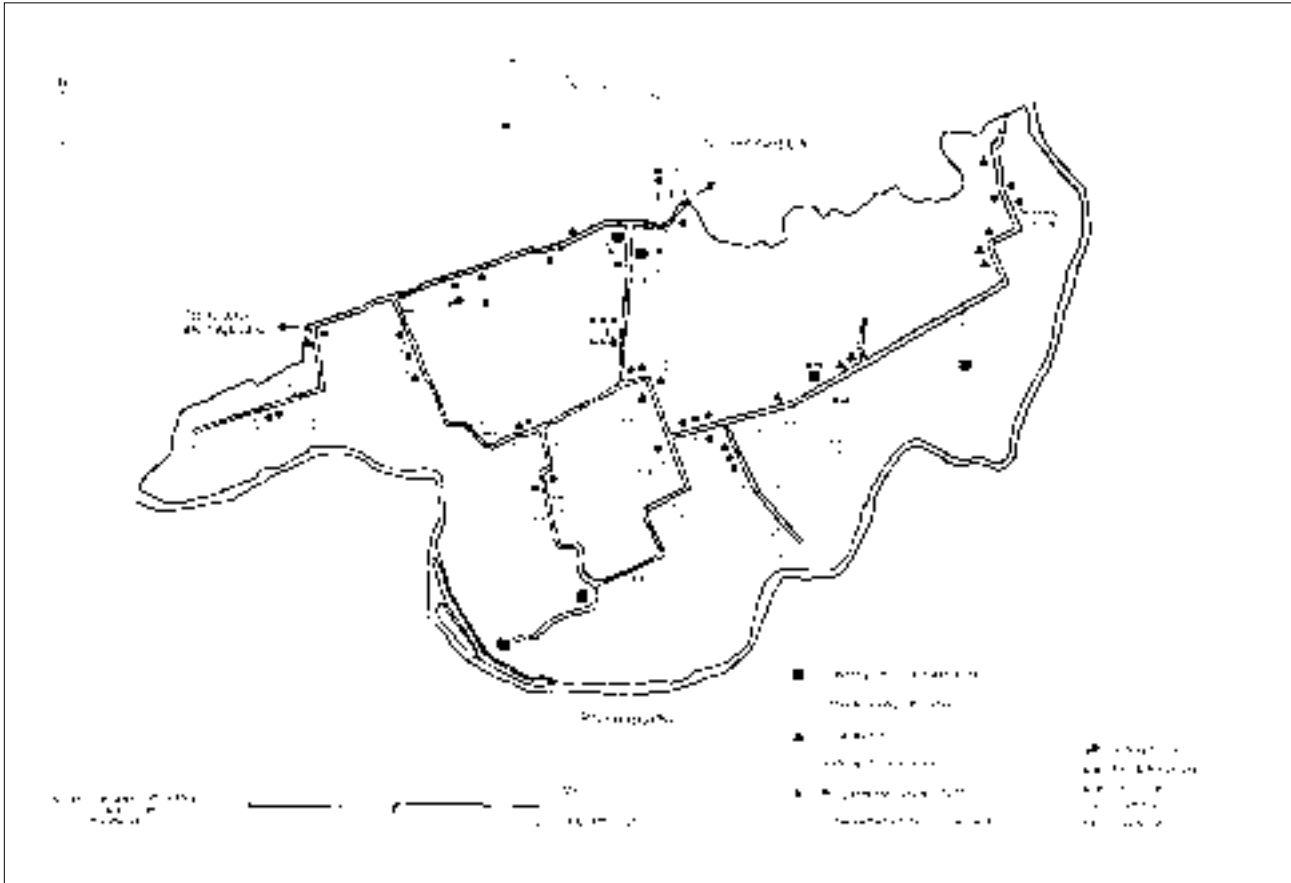


Fig. 2.66: Housing types in Brugh na Bóinne c. 1995, see Fig. 3.9, W. Jenkins, 'Settlement, society and landscape in Brugh na Bóinne since the mid-sixteenth century', in *Historical Knowth and its hinterland*, Royal Irish Academy, 2008 [reproduced by permission]

Perhaps the most significant development at Brú na Bóinne in recent years has been the shift towards archaeological resource management. At Newgrange, official visitor figures grew steadily from around 30,000 per annum between 1969 and 1974 to 75,000 in 1982. By the 1980s, crowd management had become a serious issue; at the peak of the summer tourist season, tour buses and cars caused gridlock in the narrow road below the passage grave and guides had to turn away large numbers of people seeking entry. A solution was sought in designating the entire Bend of the Boyne and adjacent areas an Archaeological Park, complete with a dedicated visitor centre away from the monuments to better manage visitor flow and reduce the impact on Newgrange and Knowth (see 1.1, above). The Brú na Bóinne Visitor Centre, opened in 1997, represented 'a serious attempt to balance the integrity of important monuments in the landscape and the pressure

to provide tourist access to them' (Stout and Stout 2008a, 108; Fig. 2.67). Built to be almost invisible from Newgrange, the centre can accommodate 400 visitors at any one time, and usually does so in the summer months. As well as a permanent exhibit dealing with the Neolithic and later periods, it also houses temporary exhibits from local artists and craftspeople. It provides a place of employment for some of the rural community, and local schools are involved in many of the centre's activities, the most important being the annual Winter Solstice Draw that takes place in September every year. The project has not been free of controversy or critique however, with some commentators expressing concern over the 'commodification' of heritage and the degree to which the local community were both on board and involved in the scheme, especially as it necessitated the bypassing of nearby Slane and the small-scale tourist industry that had developed on the

north side of the river (McManus 1997, Hayes and Patton 2001; Ronayne 2001; Fig. 2.68). In May 2008, a new visitor centre was opened on the site of the 1690 Battle of the Boyne, in the recently restored eighteenth-century Oldbridge House. This latest addition to the Boyne Valley tourist 'product' provides for the first time a formal interpretative setting for the events that have been commemorated in the songs, iconography and parading traditions of the Orange Order from the late eighteenth century onwards (Fig. 2.69). In spite of the large numbers of people visiting Newgrange and Knowth every year, tourism is not currently of very great significance to the area, which is now essentially part of the capital's commuter belt. Drogheda has become an important and rapidly expanding commuter town, supported by the new M1 motorway (effectively defining the eastern limit of the WHS) as well as good rail links to Dublin. Consequently, development pressures within and around the WHS are great, although in the current economic climate this may be set to change. Commuter belt counties have experienced the largest percentage increases in unemployment over the past year; in Meath alone unemployment has increased by 114 per cent (*The Irish Times*, Saturday, 7 February 2009).

Future climate change will also have an important effect on the living landscape of the WHS. Research is only now emerging (e.g. Daly 2008), but higher temperatures and wetter winters are likely to have an impact on natural and cultural resources, agriculture, tourism and recreation, and may even threaten the outstanding universal value of the World Heritage Site itself (Fig. 2.70). The seasonal flow of the Boyne, which is fed by surface water, is also predicted to fall dramatically in coming decades (Murphy and Charlton 2008).



Fig. 2.67a: Carefully designed planting around the Brú na Bóinne Visitor Centre has helped to ensure that the building blends into the surrounding landscape [Jessica Smyth]



Fig. 2.67b: Local people attend a photography exhibition in the Visitor Centre [Clare Tuffey]

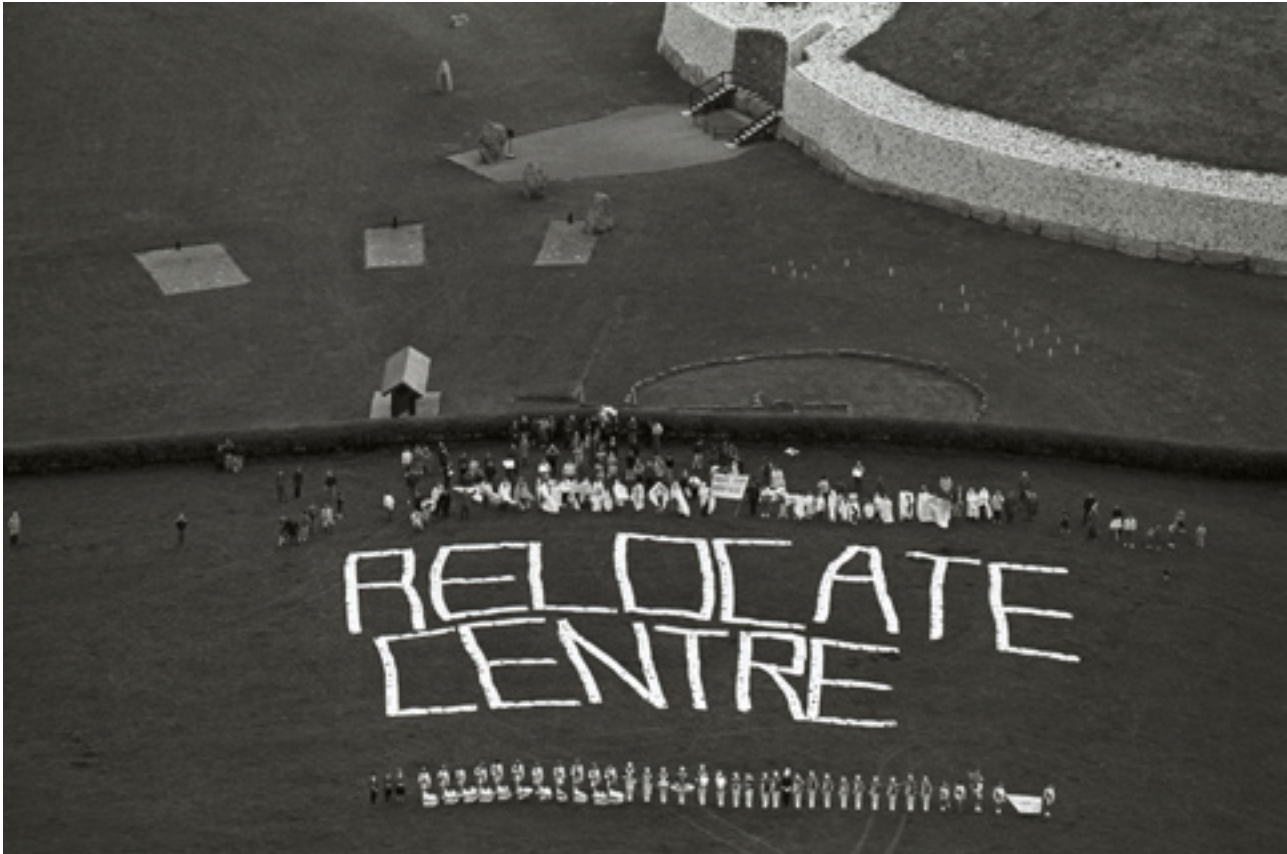


Fig. 2.68: Photo from the front page of The Irish Times, 21 April 1992: 'Lines of resistance. Members of the local community demonstrating at Newgrange, County Meath, on Monday April 20th, 1992 against the Office of Public Works' plan to open an interpretative centre two miles from the national monument' [Carol Lee]



Fig. 2.69: Orangemen at the opening of the Battle of the Boyne Centre, Oldbridge, in May 2008 [Eric Luke/The Irish Times]

Outstanding Universal Value:	Rock Art	Megalithic Monuments	Cultural Landscape
Impacts for which Vulnerability is High (Level 3)	Wet-dry cycles Salt crystallisation		Reduction in water levels Changes to biodiversity Plough damage
Impacts for which Vulnerability is Medium (Level 2)	Biological growth	Collapse (saturation)	
Impacts for which Vulnerability is Low (Level 1)	Chemical weathering Cryoclastic weathering Thermoclastic weathering Mechanical weathering	Wind damage Collapse (dehydration)	Landslide

Fig. 2.70: Summary of predicted climate change vulnerabilities for Brú na Bóinne to 2099 [from Daly 2008]

Section 3 — Research Agenda

3.1 Developing an Agenda

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

- People
- Politics and Power
- Landscape and Environment
- Legacy
- The Living World Heritage Site

These themes also reflect the interests of many of the participants at the public seminars (see Appendix II), who were keen to get to grips with the more social or human-level aspects of their heritage rather than be presented with traditional and more abstract treatments of the past. For ease of reference only, the research questions below are numbered 1-38. No attempt has been made to privilege one question over another.

3.2 Research Questions

3.2.1 People

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

To date, no evidence for early Mesolithic activity has been uncovered within the Brú na Bóinne WHS. Despite the likely attraction of the early Holocene Boyne Valley for incoming groups, there may not have been any human presence in the area between 8000 and 6500 BC. Alternatively, past survey and excavation may have focused on parts of the landscape that were not extensively used during the early Mesolithic; new material may lie undiscovered in areas away from the later passage tombs or in fields that are currently in pasture. Methodologies need to be designed that are appropriate to the identification of early Mesolithic material. While surface collection survey offers good potential, the small size of lithic artefacts manufactured during this period makes their identification more difficult than material from other periods. The use of test-pitting or shovel-test surveys with sieving of spoil could be considered to ensure good landscape coverage and also to improve rates of recovery of artefacts.



Fig. 3.1: The Boyne river valley in the early Holocene would have been rich in resources [Con Brogan]

In terms of a late Mesolithic presence, material is known from Newgrange and Knowth, and additional lithics have been recovered during field survey. However, the level of activity seems to be low, given the amount of material recovered from the wider region. Once again, field survey offers the best potential for identifying late Mesolithic sites. The lithic tools of this period are relatively large and distinctive, and recognition of this material should not be as difficult as for the early Mesolithic. As yet unidentified material may even exist in older excavation and surface collection assemblages. The immediate channel of the river offers significant potential for the identification of material from both the early and late Mesolithic periods, as do recent excavations along the routes of M1 and M3 motorways, to the east and west of the WHS respectively (Fig. 3.1).

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

We know very little about the funerary practices accompanying the early Neolithic presence in Brú na Bóinne. Given the apparent lack of megalithic monuments in the area, we need to explore the possibility of early fourth millennium non-megalithic funerary practices. What is the date of the cremated human material inside the Carrowkeel bowl at Monknewtown, and how would this date compare with those obtained at Tara for Carrowkeel ware? Detailed examination of the aerial photographic record as well as topographic and geophysical survey may help identify traces of potential non-megalithic mounds, such as Site G at Dowth. Excavation across the wider landscape, particularly sites from the M1 motorway, may help us to understand the character of the early Neolithic both in Brú na Bóinne and in other focal areas such as the Cooley Peninsula, where rectangular houses have been found in close proximity to early stone monuments (Fig. 3.2).

Fig. 3.2: The Carrowkeel bowl cremation uncovered during excavations at Monknewtown [David Sweetman]



3. Where did the passage tomb builders live?

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

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

Despite the relatively large amount of Beaker material that has been uncovered at Newgrange, Knowth and Monknewtown, we have puzzlingly little evidence for the early Bronze Age in Brú na Bóinne. Consequently, we have little idea of how the changes in social practice and material culture that must have accompanied the introduction of metal were played out. Does the apparent lack of remains mean that the area declined in importance in the early Bronze Age? The bronze flat axe and remnants of the large stone circle in front of Newgrange provide some tantalising glimpses of society in the late third and second millennium BC. However, much of what various authors have written about different aspects of the final Neolithic/early Bronze Age activity at Newgrange is contradictory. Renewed, targeted excavation in the vicinity may provide ways to understand the existing archive. Resolution of the question of the dating and extent of the Great Circle would also be a worthwhile project, as would re-analysis of the Beaker remains from Monknewtown in the light of more recent material from commercial excavation. The water-filled enclosure at Monknewtown

has been compared with the King's Stables' ritual pond near Eamhain Macha (Navan Fort) in County Armagh, which dates from the later Bronze Age. Sword moulds, animal bones and human remains were recovered from the Armagh site. Similar investigations at Monknewtown could yield similar results. Within the WHS as a whole, we need to ascertain if the current archaeological record is truly reflective of activity during the Bronze Age. Some sites possibly dating to this period have recently been identified: are there more lying undiscovered in the Brú na Bóinne landscape? 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 (Fig. 3.3)?



Fig. 3.3: The early Bronze Age flat axe discovered at Newgrange [National Museum of Ireland]

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

The later prehistoric period stands in sharp contrast to the wealth of information uncovered about earlier prehistory. George Eogan often referred to it anecdotally as the '*long lonely years of Knowth*'. This period has left little in the way of visible markers in the landscape. Identifying the homes and settlements of Iron Age communities is notoriously difficult; the evidence outside 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 on the landscape in this period, systematic palaeoenvironmental analysis needs to be undertaken at suitable wetland and dryland sites. We are on firmer ground when we talk about later prehistoric burial in Brú na Bóinne, which shows some considerable diversity. Nevertheless, we are still a long way from knowing the full extent and nature of Iron Age funerary activity in the WHS. There are several possible ring-barrows 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.

In Ptolemy's record of the known world of the mid second century AD, the Boyne Valley was identified as *Buvinda*. There is much artefactual evidence that the Boyne was a key contact point for the Roman world, most of which has come from the excavations at Knowth and Newgrange. To judge from the prestige offerings deposited at Newgrange, pilgrims of high social status visited the mound, which seems to have functioned as a shrine over a prolonged period from the first to the late fourth century AD. Roman coins of high value and personal ornaments of silver and gold, including finger rings, brooches, glass beads and earrings, were placed as votive offerings in front of the main tomb at Newgrange in the vicinity of the three tall stones of the stone circle. Raghall O' Floinn's work has identified a distinct military assemblage indicating that the donors may have been high-ranking officials. Post-graduate research on Roman hoards and metalwork in Ireland is also ongoing in the Department of Archaeology, NUIG (Fig. 3.4)



Fig. 3.4: Claudius Ptolemaius' second-century geography of the then known world records the River Boyne (Buvinda). [Cosmographia, Rome, Petrus de Turre, 1490 prima Europe Tabula (detail)] [courtesy of the Royal Irish Academy]

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

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

Analysis of human remains has the potential to provide important information concerning the health of the people buried within Brú na Bóinne. Metabolic diseases, including cribriform 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 also inform us about past physical activities, not to mention interpersonal violence. Analysis of dental remains can provide evidence for calculus, abscesses, ante-mortem tooth loss and caries, this last an important indicator of a diet rich in carbohydrates.

The use of stable isotope analysis on bone from the WHS could contribute greatly to the study of past diets, offering important insights into the relative value of different foodstuffs. New techniques also offer the potential to establish whether people were heavily manuring crops through the concurrent effects of isotope signatures of human bone. Isotope levels also carry information on the geological signature of the place where humans and animals originated or spent a large amount of time. Such analysis can also help track past population movements. Faunal remains from the WHS have been identified to species and, in the case of the early medieval assemblages from Knowth, have been rigorously analysed, dated and compared with similar material from around the island. The small amounts of surviving prehistoric material, however, have not been independently dated. Where unburnt human and animal bone survives, there is a value-added factor in the ability to measure both radioactive and stable isotopes: in other words, to obtain both dating and dietary information from the same specimens. In addition to informing on the use of prehistoric and later monuments, such data will contribute towards a greater understanding of human diets and farming practices. The recently developed ability to date cremated bone offers great potential in dealing with the chronology of the WHS sites. It will also improve our understanding of the relationship between inhumation and cremation as alternative burial rites (Fig. 3.5).

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

There exists a significant level of knowledge concerning the groups that owned land in the

area in the medieval period, but much less is known about the people who lived on and farmed this land. Focused research may shed light on the ethnic make-up, familial structures, religious affiliation and standards of living of the tenants living in Brú na Bóinne, and how these factors may have changed over time. It may be possible to use documentary references to buildings and features to investigate where tenants lived and to reconstruct a picture of settlement patterns through the medieval and post-medieval periods. Remains of buildings and traces of settlements, whether documented or not, should be located and quantified, and may repay further investigation. We might also usefully explore how the few surviving buildings of this period — e.g. Dowth church, Dowth towerhouse and Monknewtown church — fit into this settled landscape. Might the earthworks visible in the vicinity of these monuments yield evidence for associated or neighbouring buildings or structures — fields, gardens, orchards, yards etc. — and the people who worked them (Fig. 3.6)?



Fig. 3.6: Earthworks possibly relating to the medieval manor at Dowth (CUCAP AJO101) [Cambridge University Collection of Aerial Photographs]

3.2.2 Politics and Power

8. When were passage tombs first built in Brú na Bóinne? What is the sequence of their construction?

Who built these tombs — the descendants of early Neolithic farmers or new arrivals from elsewhere? The appearance of passage tombs seems to be accompanied by a number of changes in the archaeological record such as new pottery styles and a switch from rectangular to circular houses. How and why these changes took place need to be examined, and the models of development suggested for the tombs need to be tested. Sites provisionally identified as passage tombs and the full extent of tombs such as Dowth could be usefully explored with remote sensing techniques such as ground penetrating radar. What is the possible significance of the tripartitioning of the Brú na Bóinne passage tomb cemetery, mirrored to an extent at other passage tomb cemeteries? What were the processes behind the siting of individual tombs? How do the Brú na Bóinne monuments fit within our overall distribution and chronology of passage tombs in Ireland and beyond? Exploration of these issues would bring us to a closer understanding of the fundamental aims of the builders and of how the Brú na Bóinne complex was intended to function. New techniques now

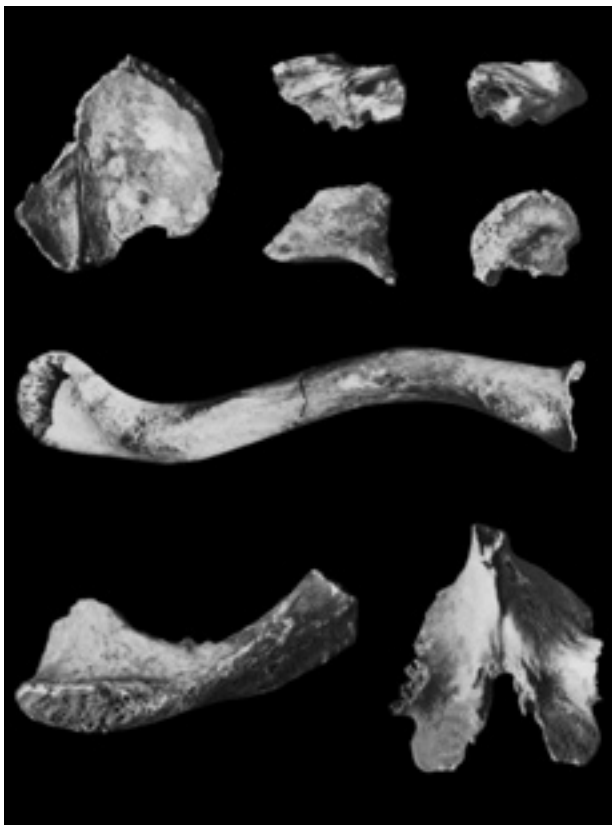


Fig. 3.5: Unburnt human bone from Newgrange. Top: skull fragments; centre: clavicle; bottom left: pelvis fragment; bottom right: thoracic vertebra. Various scales [O'Kelly archive, DoEHLG]

make close dating of many of these monuments possible, subject to the availability of suitable organic material. Cremated and uncremated human remains excavated from the tombs also offer very significant potential (Fig. 3.7).



Fig. 3.7: Passage tomb Site B on the Boyne floodplain [Con Brogan]

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

From present evidence, it seems likely that Brú na Bóinne functioned at a range of different scales. At one level, there is the scale of local settlement, perhaps the area where the tomb-builders lived. The next scale might be the wider region from which the raw materials for the construction of the monuments came and where other passage tomb cemeteries exist. This area has been reasonably well defined by geological studies (see 2.2 above), with a possible northern limit in the Cooley/Mourne Mountains and a southern edge in the Wicklow Mountains. Significant use was also made of the eastern coastal zone from where the structural stones for some of the tombs came, as well as lithic raw material. The western, inland edge of such a region is less distinct but may have extended as far as the Loughcrew passage tomb cemetery, which contains another important collection of passage tomb art. How can we better define the extent of this region and explore the relationships between Brú na Bóinne and other ritual foci in the wider area? A third scale would seem to connect Brú na Bóinne with certain overseas areas, such as the eastern edge of the Irish Sea, the Orkney Islands, Brittany and Iberia, where similar monuments were constructed and very similar art styles were sometimes used, and areas like Ballynahatty and

Wessex, where there are several shared elements of Grooved Ware 'culture'. There is a need for an up-to-date, authoritative statement on the evidence for and nature of these links, as well as a relative chronology of the monuments that are cited as comparanda. The examination of the full range of artefactual material from sites in Brú na Bóinne and the wider region will be critical in exploring how the monument complex functioned within these nested scales and over time (Fig. 3.8).



Fig. 3.8 The sources of the stone used at Newgrange. Recent research has confirmed that the source of the greywacke orthostats and kerbstones from Newgrange, Knowth and Dowth was most likely Clogherhead, on the north Louth coast [from Cooney 2000, based on information in Mitchell 1992]

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

The appearance of open-air timber and earthen enclosures and Grooved Ware pottery has been traditionally viewed as marking the beginning of the late Neolithic in Ireland. However, we currently have a poor understanding of the chronology of changes that occur during the

late fourth and early third millennium BC, *i.e.* the transition between the middle and late Neolithic. There is a need to clearly identify monuments dating to the latter period and establish the degree of chronological overlap between the two phases. While there is continued use of certain passage tombs and a continued focus on the area of these earlier monuments, the change in monument styles is dramatic and may signal significant social developments. When are the first earthen enclosures built? What is the sequence of construction of these enclosures, and what is their relationship to the timber circles discovered in the area?

The nature of settlement may also have shifted during this period, with perhaps some change in the level and composition of the population. Surface collection survey, geophysics, geochemistry and excavation can be used to identify and explore the non-monumental aspects of late Neolithic society — settlement, burial, economy and material culture — which to date have received relatively little attention. Answers are not likely to be gleaned from the occupation material excavated in front of Newgrange, an area of so-called ‘Beaker’ settlement that in fact contains a mix of material dating from the middle Neolithic through to the early Bronze Age. The collation and review of comparative, securely dated sites is also crucial; emerging data from sites like the Stones of Stenness in Orkney or, closer to home, late Neolithic sites along the M1 and M3 motorways will undoubtedly bring us closer to answering questions about the arrival and origin of Grooved Ware in Brú na Bóinne and the period of overlap with earlier material culture (Fig. 3.9).

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

The Síl nAedo 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. Excavation of the main passage tomb at Knowth has revealed that two large concentric ditches were dug around



Fig. 3.9: The large late Neolithic/Bronze Age enclosures in front of Newgrange [Con Brogan]

the mound in the early medieval period. There was no evidence for contemporary structures or occupation except for animal bones and some finds in the ditch fill. Assuming that Knowth was the residence of the kings of Brega, the royal complex may have incorporated the earthwork on the bank of the River Boyne and the recently excavated secular cemetery at Knowth Site M. A narrowly focused excavation similar to that recently undertaken at Knowth Site M could finally enlighten us as to its date, function and role during this important period of Brú na Bóinne history.

In the early historic period, the Brú na Bóinne area incorporated a major overland route, a highway between Tara and Ulster known in early medieval ‘place lore’ as the *Slighe Midluachra*. This highway crossed the Boyne by the ford of Brow (*Brúgh*) just below Newgrange and near the old Rosnaree mill. Early texts trace its route from Tara to Ulster via the ford of Newgrange (*Brúgh Meic an Oigh*), Rosnaree (*Dubhros*), and onto *Sliabh Bregha* near Mellifont. More research needs to be carried out on these main routeways and crossing points at the heart of the WHS. Did the strategic position of this putative royal demesne give rise to more defensive domestic enclosures, *i.e.* ringforts? (Fig. 3.10).

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

We know relatively little about the pre-Norman ecclesiastical sites within Brú na Bóinne. Slane was undoubtedly the main ecclesiastical

centre in the area but there were smaller ecclesiastical sites at Dowth and possibly at Stalleen, Rosnaree and Monknewtown. Dowth is particularly intriguing, with its long unbroken settlement history. A reference to the slaying of Oengus of Slane by the *airchennach* (church warden) of *Dubad* (Dowth) (AU 1012) indicates that there was a pre-Norman church at Dowth; listed in the *Genealogies* is Senchan, the saint associated with Dowth. *The Annals of the Four Masters* also list this church at Dowth among 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, including 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.



Fig. 3.10: Placename evidence and early documentary sources indicate that the fording point south of Newgrange was an important Boyne crossing on a key route between Tara and Ulster [from Stout 2002]

When the story of Patrick came to be written, the Boyne Valley was chosen as the location for its symbolic if not actual beginning. The Hill of Slane, 3km west of the Brú na Bóinne, has traditionally been associated with the saint's earliest deeds. However, this identification has recently been questioned. There is, for

example, an intriguing reference linking Patrick with Newgrange from the *dindshenchas* of *brug* (Newgrange) contained in the *Book of Ballymote*: 'The grave of Esclam, the Dagda's *brehon*, which is called now *Fert-Patric*'. What was the relationship between the early foundation at Slane, their patrons the Síl nAedo Sláine dynasty and Brú na Bóinne?

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

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

It is possible that a Norse longphort existed on the Boyne, perhaps at Rosnaree, 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* (Rosnaree) in AD 842. That entry also notes the plundering of *Birr* and *Saighir* by the foreigners of the Boyne, 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 60 Norse ships on the Boyne in AD 837. These forces plundered the plain of Brega, including 'churches, forts and dwellings'. Underwater investigations could yield valuable information on these Norse occupants.

In the ninth century, the Síl nAedo Sláine made alliances with the Norse against the Clann Cholmain. Maelmithig Mac Flannacain became a powerful overlord in AD 918, as did his son Congalach Cnogba, in the mid tenth century. The period of their reign coincides with a major re-settlement phase at the main mound at Knowth. The construction of souterrains may point to the rise of the slave trade as

a significant economic pursuit, suggesting that Brú na Bóinne had become incorporated into the economy of Viking Dublin. How did the rise of feudalism and the ever-increasing centralisation of power impact on the homes and lives of relatively independent commoners in the ninth and tenth centuries? Did it lead to the abandonment of most of the ringforts in the area and the enlargement of others?

14. How was medieval Brú na Bóinne connected?

Brú na Bóinne's long history of settlement and economic exploitation, allied with its great ritual significance, implies long-standing networks of communication, transport and exchange. While continuities with the prehistoric and early medieval periods are probable, various factors in the medieval period are likely to have promoted new types and intensities of connection. In particular, the commercial exploitation of agrarian resources to provision urban centres within Ireland, to supply developing export markets, and to meet royal purveyances for English armies fighting in Scotland and Wales, required the development of efficient transport

links and market mechanisms. Many aspects of these processes remain to be explored, including the impact of the foundation and development of Drogheda upon the landscape and environment of Brú na Bóinne, through its role as a regional centre, market and trade entrepôts. Connections with Slane also demand investigation, while the detailed reconstruction of transport networks, including a search for evidence on the ground, is a priority. The role of the Boyne as a link to the interior of Meath and to the wider world through the port of Drogheda forms a central subject for investigation. The other roles fulfilled by rivers — as sources of milling power, water supply and as elements of defence — should be explored fully (Fig. 3.11).

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

The arrival of continental monastic orders and the Anglo-Normans in the twelfth century undoubtedly brought significant administrative change. We know relatively little, however, about the degree of continuity from the early historic period in terms of land ownership, administrative boundaries, land organisation, land use, agriculture, industry and economy. Systematic research is required to establish who the land-holding lay families in medieval Brú na Bóinne were, where they came from, and what their inter-relationships were. Further questions need to be asked about the role of religious houses and how this fitted into a wider national and international context. Comparisons and contrasts need to be assessed between the management of Llanthony properties in the Boyne Valley and those in Wales. The background to the land grants to the Cistercians and the Augustinians in the area needs to be fully explored, as do the effects the dissolution of the monasteries had on land ownership. The records kept by Church, Crown and ultimately State on the various land holdings and dealings within Brú na Bóinne and around should in theory provide us with a picture of land ownership from the twelfth century onwards. Cartographic analysis, and the examination



Fig. 3.11: The River Boyne was essential for transport and communication in the medieval period [Con Brogan]

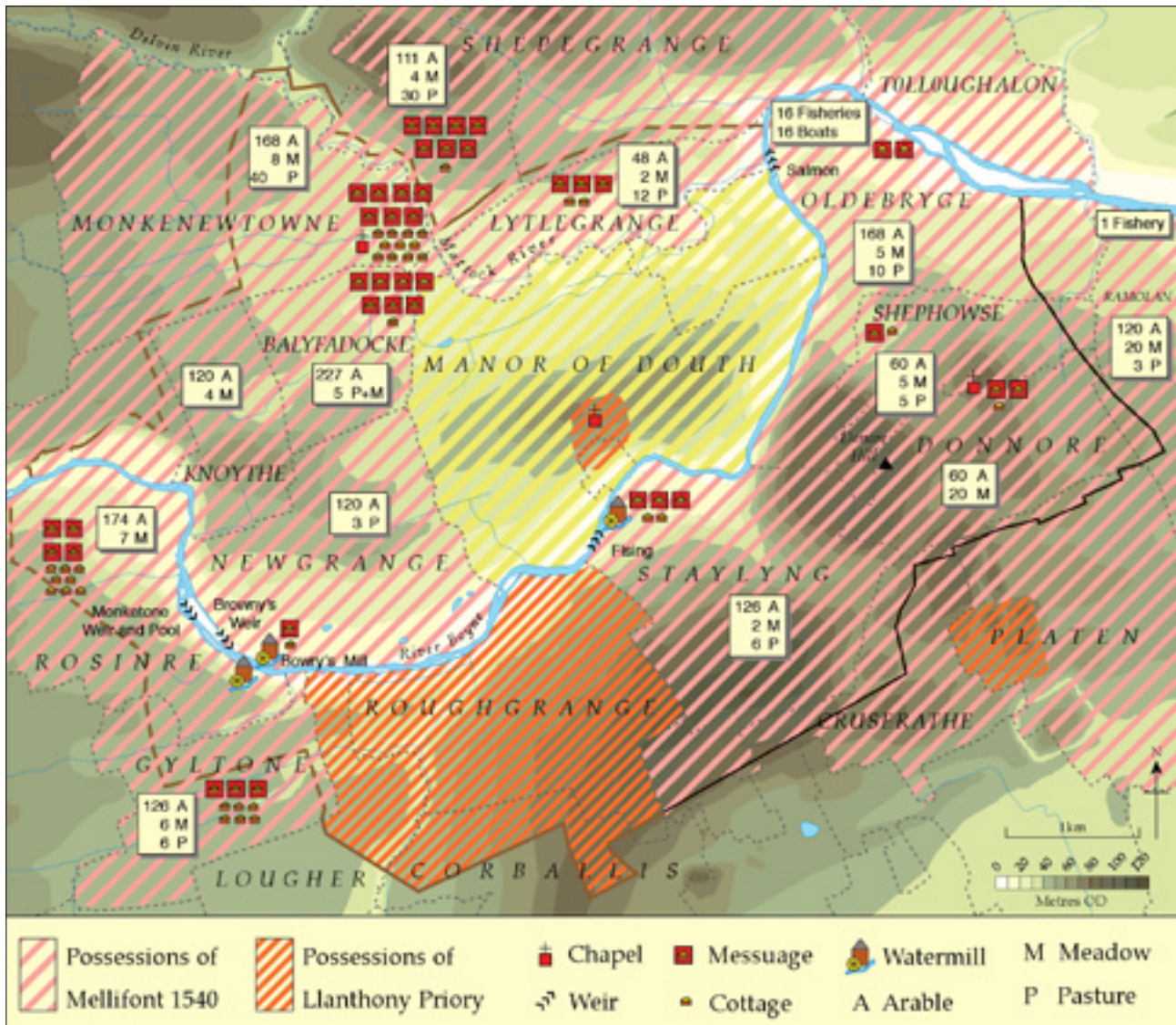


Fig. 3.12: Monastic possessions and settlement in the WHS c. 1540 [from Stout 2002]

of later maps such as the Down Survey, the Ordnance Survey and estate, may also help us explore earlier land-holding and settlement patterns (Fig. 3.12).

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

The pilot survey of the archaeological potential of the Oldbridge Estate identified a number of directions for future research in the area (see above). Targeted diving in the river and a combined detailed topographic survey were suggested, as was the extension of the geophysical survey in the area of Oldbridge village to establish its extent, followed by excavation aimed at elucidating the character

of the settlement and its role during the battle. Systematic large-scale metal detector survey across the full extent of the Oldbridge Estate would identify further areas of potential. Beyond the estate, further work could usefully take in the wider landscape, especially those areas that are known to have figured in the battle, such as the Hill of Donore and Platin. There are strong oral traditions in the area regarding some buildings and their connection with the Battle of the Boyne, and more detailed research is needed on specific sites such as the farmhouses at Fennor and Stalleen and buildings at Shephouse. The key and sensitive question of the burial places of the casualties of the day, if they exist, also needs to be addressed (Fig. 3.13).

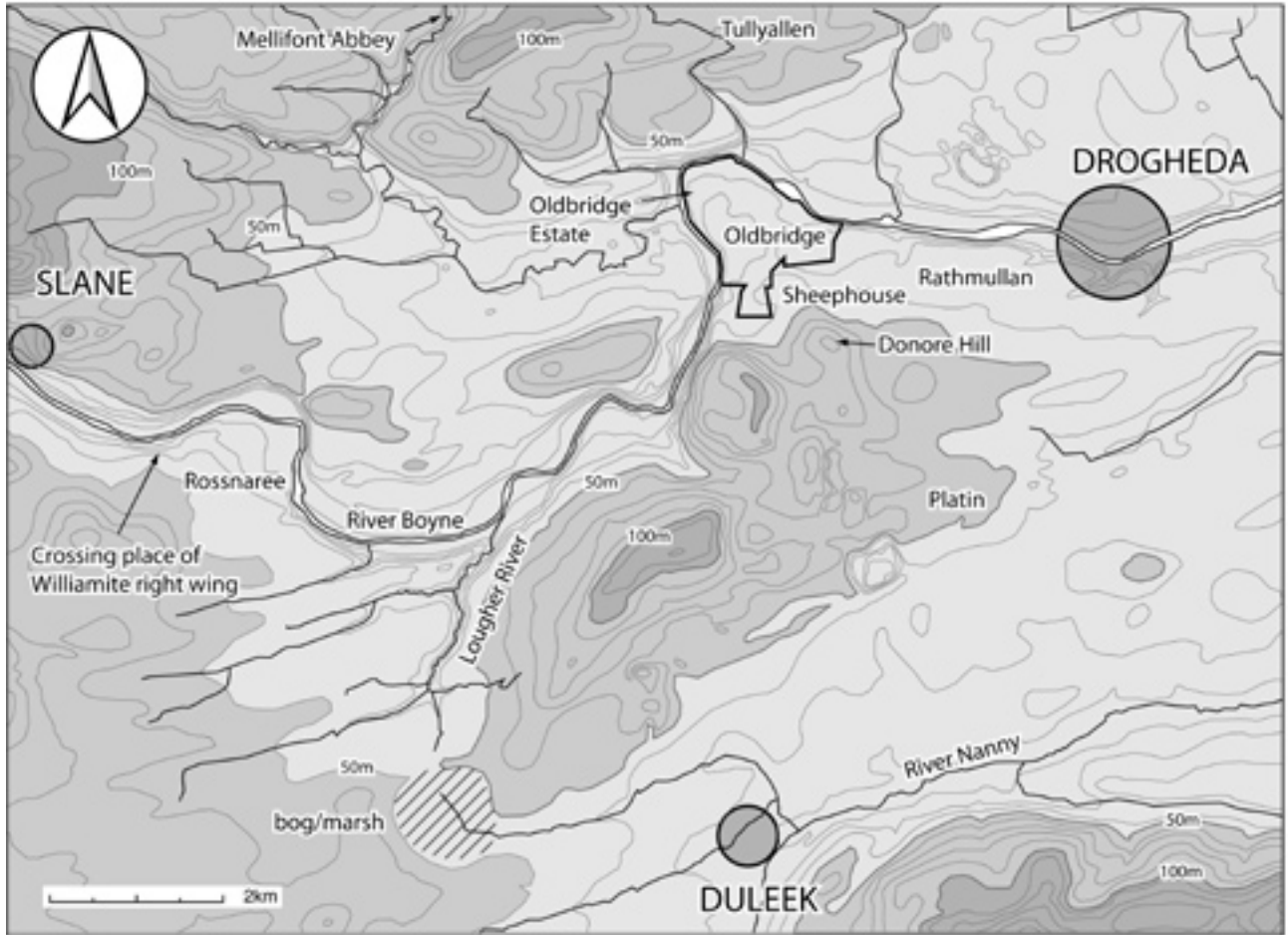


Fig. 3.13: The landscape of the Battle of the Boyne [from Brady et al. 2007]

3.2.3 Landscape and Environment

17. What is the current status of biodiversity and geodiversity? What actions can be taken to manage, enhance and protect it?

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. This includes 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. Although

a preliminary survey of invasive species along the Boyne has been undertaken, 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 was funded 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
- exact soil drainage characteristics of the regions around the monuments.

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 also be very valuable in assessing the impact of changing land use, invasive species, climate change and development pressure. More work needs to be carried out on the ways in which natural heritage can be protected and enhanced in the Brú na Bóinne area. This could include research into the control of invasive species and examining how biodiversity can be increased on State-owned land, initiatives which would need regular monitoring (Fig. 3.14).



Fig. 3.14: Red deer at Dowth; they are descended from the herd established in the eighteenth-century deerpark [Con Brogan]

18. How has the Brú na Bóinne environment changed over the last six millennia?

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

introduced, both deliberately and inadvertently, as a result of human activity. The existing palaeoenvironmental record for Brú na Bóinne is poor. New, systematic palaeoenvironmental research will have a key role in piecing together the vegetational history of this traditionally agriculturally productive area of Ireland. Understanding this aspect of the Brú na Bóinne WHS is also critical to the presentation of the extent and nature of settlement and land-use strategies across all time periods.

Detailed, local-scale palynological analysis can facilitate a reconstruction of the development of woodland in the area. This will provide information on the changing character and ultimate demise of woodland cover, the floristic diversity of farmed land and the development of hedgerows. By examining continual records of vegetation cover provided by the pollen sequences, it will be possible to establish if and when levels of human activity in the Brú na Bóinne area dropped in intensity. By comparing local-scale records, it may be possible to determine whether the focus of human activity shifted from one area to another over time. Sampling of small wetland basins will be particularly useful for detecting evidence for arable agriculture. Coleopteran analysis



Fig. 3.15: The base layers of a core taken from Thomastown Bog being subsampled for scanning with an Itrax Core Scanner. Laminated lake sediments are visible along the core length [Stephen Davis/UCD School of Archaeology]

from palaeochannel deposits can also provide important insights into habitat loss and biodiversity. Strong chronological control, obtainable through close interval radiocarbon dating, is essential for understanding the timing of human impact on the landscape and enabling specific periods of significant change to be identified (Fig. 3.15).

19. When does the transition to farming take place in Brú na Bóinne? What changes does this bring about?

The earliest Neolithic remains so far uncovered within Brú na Bóinne are the rectangular houses at Knowth. Do these structures represent the first Neolithic presence in the landscape? If not, where in Brú na Bóinne do Neolithic groups first settle, and what is the level of interaction with late Mesolithic populations? What is the environmental impact on the area of the arrival of the first farmers? How quickly is the landscape cleared of its woodland cover? How extensive are the clearances? Are they permanent? Surface collection survey followed by geophysical survey, geochemical survey and excavation will be important in identifying the extent and nature of settlement during this period, providing appropriate material for detailed dating, including Bayesian analysis, and evidence to facilitate environmental reconstruction. Consideration also needs to be given to how this early Neolithic activity in Brú na Bóinne fits within our broader understanding of the period in Ireland as a whole (Fig. 3.16).



Fig. 3.16: What evidence for ancient farming practices lies beneath the modern farming landscape? [Con Brogan]

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

The substantial amounts of animal bone from the late Neolithic/early Bronze Age areas of activity in front of Newgrange, and from the medieval occupation of Knowth, have provided detailed information on the livestock economy and meat diet of the area during certain

periods. There are, however, large gaps in our knowledge for other periods. Moreover, without knowing how comprehensively plant remains were sampled at sites, it remains extremely difficult to calculate the importance of wild and domesticated plant resources. The visibility of bone remains is much higher than plant remains and can often achieve an apparently higher significance in the economy of a site. It is important not to make such an assumption. Future research should endeavour to retrieve substantial samples of both bone and plant remains to allow us to fill these knowledge gaps.

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

21. How can we better understand the River Boyne?

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

Overall, the aim of future work should be to try to obtain a better appreciation and understanding of the role and relevance of the river throughout prehistory and into the historic period. Any future programme of research should include exploration of the sacred nature of the river and its ritual uses in the past. In Celtic mythology, for example, the River Boyne was considered to be a supernatural being, appearing as the female deity Boann, and was associated with passing into the underworld. In the nineteenth century, Wilde recounts a tradition of swimming cattle across the river as a charm against fairies and certain diseases (Fig. 3.17).



Fig. 3.17: Salmon fishing in coracles on the River Boyne (Myles Dillon collection, DoEHLG)

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

O'Kelly's observation of the winter solstice alignment of the main Newgrange tomb initiated the first modern scientific archaeoastronomical investigation of an Irish archaeological monument. Subsequent research has made it clear that astronomical factors were important considerations in the world view of people in the Boyne Valley during the Neolithic and Bronze Age. Current thinking is shifting towards acceptance of the symbolic nature, use and power of astronomy rather than its use as a precision tool — which is not to dismiss the idea that the apparent movement of the sun on the horizon may also have been used to divide the year into culturally meaningful segments of time. What additional monuments within the WHS might be tied into the astronomical alignments recorded at Newgrange? What is the archaeoastronomical potential of the pit and post circles, the henges, and the so-called 'cursus' monument (Fig. 3.18)?

Current research is also beginning to reveal the wider occurrence of solar alignments at Irish passage tomb sites outside of Brú na Bóinne. There is additional evidence to support the hypothesis that sites and tombs were apparently 'linked' — both visually and tangibly — across their distribution range. Importantly, therefore, the Boyne Valley should not be considered as a stand-alone landscape but as one that is a component part of a wider whole. Future multi-disciplinary research initiatives need to explore these astronomical and other alignments fully, as



Fig. 3.18: The shadows cast by GC-2, GC-1 and GC1 onto the kerb at Newgrange at 06:49 UTC (Coordinated Universal Time), 17 March 1989, a few days before the midway point between the solstices [Frank Prendergast]

well as recording the visibility of passage tombs in the prehistoric landscape. What is the level of intervisibility between tombs? What might this say about prehistoric social networks? Are there any correlations between the astronomical and spatial characteristics of tombs and their morphology and passage tomb art? UNESCO has designated 2009 as the International Year of Astronomy. Such a focus provides an ideal opportunity to develop robust methodologies and theories for this aspect of Brú na Bóinne's character. It will also help to promote the WHS by broadening its appeal in this area of investigation.

23. How was land used during the medieval and post-medieval periods? Can we gauge the environmental impact?

The medieval and post-medieval periods saw intensive agricultural production in the area. An assessment is required, however, of the relative importance of various land uses (arable,

meadow, pasture, woodland etc.), where these were practised, and how this changed over time. Little is known about the ways in which monastic farms or granges operated in the area (where was the grange of Newgrange, for example?), or the degree to which ownership of the land by religious houses influenced the type of agriculture that was practised and the techniques and technologies involved. Other questions that need to be addressed concern the nature and extent of field boundaries, the fuels that were used in this largely treeless landscape, and the impact of medieval and later peoples on the environment of Brú na Bóinne. Following on from this, further research is required to understand the ways in which human exploitation of the region was affected by long-term processes of climate change — from the relatively warm and settled conditions of the twelfth and thirteenth centuries to the cooler and stormier conditions of the 'Little Ice Age' in the preceding centuries.



Fig. 3.19: Aerial shot of the Boyne taken by German air reconnaissance on 24 December 1940. Drogheda is visible in the bottom left of the image, the eastern half of the WHS in the top right [The National Archives, Washington DC]

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

Both vertical and oblique photographs, 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 (Fig. 3.19).

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. Among 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.

25. 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 a 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 (Fig. 3.20).



Fig. 3.20: Geophysical anomalies recorded on the Oldbridge Estate during a pilot archaeological survey of the Battle of the Boyne site [from Cooney et al. 2001]

3.2.4 Legacy

26. What can be revealed through further study of the megalithic art and rock art of the Boyne Valley?

A detailed analysis of the 350+ carved stones with megalithic art from Knowth is well under way and will be published in conjunction with the archaeology of Tomb 1. Particular attention has been paid to the sequence of art application and the different techniques utilised, as well as the importance of examining the 'hidden' art in terms of the structural sequence of the tomb. The cultural significance of the geology of the carved stones has also been explored, as has the wider context of the carvings, both within Brú na Bóinne and abroad. This important volume aside, the quality of analytical scrutiny in the

Boyne Valley has generally not kept pace with developments in the study of megalithic art, which in recent years has shifted its focus onto the origins and social function of the artwork, the relationship with rock art, the experience of megalithic art in its architectural setting, and the role of the art as one of several symbolic variants in megalithic structures. Now that a comprehensive publication of the Knowth art is imminent, there is an urgent requirement for a review of the megalithic art in the Boyne Valley. 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. Laser scanning of the Brú na Bóinne megalithic art would create another level of recording to accompany the existing drawings and photographs. This technique could be particularly useful in detecting subtle underlays and overlays of motifs. A significant amount of megalithic art may yet lie undiscovered in the unexplored sections of Newgrange, and Dowth in particular, although the investigation of such would require highly invasive research methods. Less invasive avenues of research could include examining how the megalithic art in Brú na Bóinne connects to the art from Tara and Loughcrew, or how — if at all — it relates to cup-and-ring rock art elsewhere in the local area and beyond. Any new research should avoid 'ghettoising' megalithic art, as if this aspect of the structures existed in isolation from the architecture, deposition ritual, alignments and artefacts, landscape setting and social role of the monuments (Fig. 3.21).



Fig. 3.21: Close-up of the motifs on kerbstone K52, Newgrange [O'Kelly archive, DoEHLG]

27. The past in the past — what was the role of the prehistoric sites in the later periods?

Within Brú na Bóinne, there is consistent evidence for the re-use of the major prehistoric monuments. The main mound at Knowth, for example, became a focus of extensive domestic settlement. 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-seventh century date appears to have developed out of a ring-barrow tradition. Interestingly, Newgrange passage tomb does not seem to have been re-used for settlement in the Iron Age and early medieval periods. What was the motivation for this adoption (or avoidance) of the prehistoric centres by early historic society (Fig. 3.22)?

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

Brú na Bóinne has a rich place lore and folklore, some of which can be traced to the late prehistoric or proto-historic period and which has been added to by successive generations up to the early modern period and later. The area is associated with some of the chief figures in



Fig. 3.22: One of the later burials found around the base of Knowth Tomb 1. This example (Burial 14) dates to between the sixth and ninth centuries AD and had been placed in a pit in the base of a ditch dug around the base of the mound [George Eogan]

early Irish mythology. Pre-Patrician annals, sagas and place lore such as *Cath Ruis na Ríg* (which describes a battle at Rosnaree) frequently contain topographical and geographical details on the early Boyne landscape. Early medieval place lore or *dindshenchas*, written down between the tenth to twelfth centuries, mentions *brug*, describing the graves of particular individuals still visible at the time of writing and listing individuals known to have been buried there, beginning at the top of the ridge and working downhill to the river. The *dindshenchas* texts also record monuments that have not been identified. There are references to a *fulacht Fiachach Sraiptine*, mentioned in AFM 276AD, and boat-shaped burials at Newgrange such as *Barc braineach*. The combination of archaeological, historical and literary research has been used very effectively in the Discovery Programme's recent work at Tara. A similar approach would greatly enhance our current picture of the WHS.

Research also needs to be carried out on the townland names and field names in Brú na Bóinne, most of which probably originated in the later medieval and post-medieval periods. What are the connections between surviving buildings and more recent folklore, relating, for example, to the Battle of the Boyne? Tradition has it that the derelict building complex at Sheephouse functioned as a field hospital for the Battle of the Boyne, while the thatched farmhouse at Stalleen baked bread for the troops. In what ways can local knowledge be accessed, gathered and interpreted? Research into and recording of the oral traditions linking vernacular building with the battle and other important events would be of considerable interest locally, while adding another layer to cultural tourism (Fig. 3.23).

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

Reassessment of old artefact assemblages and environmental samples in the light of more recent theories, ideas and discoveries should be



Fig. 3.23: According to tradition, bread was baked for the Jacobite soldiers in the oven of this miller's house in Stalleen [from Stout 2002]

an ongoing process. Given the pace of technological change, it is likely that there is a range of new techniques now available which could usefully be applied to material recovered during old excavations. Advances in dating techniques in particular offer a key source of new information. The possibility exists for the identification of material that may have been overlooked or misclassified originally because of the particular research questions being pursued or methodologies being employed at the time. Any detailed programme of dating of excavated sites and monuments will have the additional effect of providing detailed dates for particular contexts and the artefacts recovered from them, thus 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 the possible additional knowledge from the application of modern analytical and scientific techniques.

An inventory of all known artefacts from the World Heritage Site is also badly needed. Later prehistoric material from the area, for example, is held in a number of institutions in Ireland and abroad. Its proper recording is crucial, given that

we know very little about the material culture of people in later prehistoric Brú na Bóinne (Fig. 3.24).



Fig. 3.24: Beaker pottery from Monknewtown embanked enclosure [David Sweetman]

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

Some 93 Recorded Monuments lie within the bounds of the World Heritage Site. They include passage tombs, henges, *fulachta fiadh*, cist burials, ringforts and souterrains. Many of these monuments have been surveyed at different times in the past, and there is much ambiguity and confusion relating to their classification. Research should be directed towards the better identification and classification of such sites using whatever techniques are required, up to and including excavation. A key priority should be the recovery of dating material. Such a programme would be very informative in relation to the development of monument construction in the area and could provide data where gaps in our knowledge currently exist, particularly monuments of the early Neolithic and the Bronze Age. Monuments outside the WHS could 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; it is also possible that the motte on the top of the Hill of Slane is a remodelled prehistoric monument. A range of techniques could be used to address this question — detailed topographical survey including aerial photography and LiDAR, geophysical survey, geochemical survey and excavation. There is also an urgent need to assess the condition of all of the monuments in the WHS. This would include the sites themselves as well as their settings (see 32 below).

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

Only a handful of upstanding buildings dating to the medieval period are known, although an additional number may survive as cores within later structures. We know relatively little about who owned these buildings through time or their architectural history, including the date of their construction and of subsequent alterations. For buildings erected in the nineteenth century, Stout (2002) has recently estimated that 58% of nineteenth-century housing stock disappeared between 1854 and 1998. While good examples of the larger house types survive, the remaining smaller buildings are critical in providing a representative sample of the built heritage of the area. Vernacular buildings are most at risk, as evidenced by the recent destruction by fire of the roof of Boyne Valley Cottage, east of the village of Donore (Fig. 3.25).



Fig. 3.25: Boyne Valley Cottage, Donore, before and after a fire in May 2008 [Jill Chadwick]

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 are considered of importance within the area and should include industrial buildings, ecclesiastical and institutional buildings, the canal, mills, bridges, the big houses and the cottages. With additional resources, more detailed recording should follow. This might include condition surveys where there is a danger of losing a structure considered to be of importance and/or irreplaceable. This survey work will inform recommendations for the protection and, if necessary, adaptive re-use of these structures to ensure their survival. Another outcome of this inventory and recording should be a map of all upstanding structures in the area by period of building.

32. What impact has conservation had upon the Brú na Bóinne monuments, in particular Knowth and Newgrange?

The approaches taken to the conservation works at both Newgrange and Knowth reflect the twin, and sometimes conflicting, needs to conserve the monuments and present them to the public. The concrete canopies over the passages are a potential future problem as their lifespan is unsure and accurately ascertaining their integrity is also very invasive. Excavation and conservation works have also exposed the passage tombs to the threats of pollution and human impact, and their response to climate is now quite different from that of the previous 5,000 years. One of the key objectives of the 2002-2007 Management Plan was to undertake a monitoring programme of the tombs and to prepare conservation strategies for the sites. To date, however, no formal conservation monitoring scheme has been put in place. A recent desk-top vulnerability assessment of the WHS (Daly 2008) has provided a useful indication as to where future research and monitoring would be best deployed. Scientific stone testing, environmental monitoring and systematic condition surveys were all indicated as priority areas.

An accurate knowledge of past alterations and interventions is also central to any understanding of the authenticity of the currently existing monuments. While the Boyne



Fig. 3.26: Spreading the concrete capping over the passage at Newgrange [O'Kelly archive, DoEHLG]

Valley has a generally very good publication record, there is a serious deficit of information with regard to the post-excitation presentation of the monuments and the justification and recording of this aspect of the site's history. The importance of access to these records is also evident in the recent discussion (Cooney 2006) on the presentation of Newgrange and the degree to which the presentation of the remains post-excitation corresponded to the excavated evidence. Record-keeping is not only essential to conservation work but will also play a crucial role in the interpretation of the monuments in the future (Fig. 3.26).

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

The Brú na Bóinne area has been subject to research and investigation over many centuries, inspiring artists and poets. Following an audit of all existing research and research archives, there is a need to bring all of this material on the World Heritage Site together in one place where it could form an important resource for future research. The 2002-2007 Brú na Bóinne Management Plan recommended

that a feasibility study be undertaken on the adaptation and future use of the Knowth House complex. This has been completed and planning permission has been granted for a research centre at Knowth, although this permission is due to lapse imminently.

The establishment of a detailed online GIS-based database of the Brú na Bóinne region would greatly facilitate archaeological research at all levels. Such a database should include:

- a detailed classification of all known monuments and sites discovered through field survey, remote sensing or excavation, and cross-referenced to a database of all pre-existing and ongoing archaeological work related to each site.
- a listing of all known artefactual material and its current location.
- a listing of sources and detail of all palaeoenvironmental data.
- a listing of other environmental data relating to the archaeology of the area, e.g. geology, soils etc.
- an inventory of all radiocarbon dates for the area.

Given the regional importance of the Brú na Bóinne area, such a database should not be restricted to material from within the boundaries of the WHS. Relevant material must be drawn from a wide area, e.g. the excavations from the M1, the M3 and other locations in the region.

3.2.5 The Living World Heritage Site

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

The imposing monuments of Brú na Bóinne are set in a rural landscape with a farming tradition that spans 6,000 years. Their survival is testament to the tradition of respect shown by countless generations of farmers in the area.

As farming changes and as new crops are grown, there is a need to research which farming techniques have less impact on the



Fig. 3.27: The vivid yellow oilseed rape fields in the area around the WHS. More and more of this crop is being grown for use in the manufacture of biofuels [Discovery Programme/Meath County Council]

archaeology and biodiversity of the area. Evidence is emerging that buried metal artefacts are suffering active destruction through the chemical action of fertilisers and agricultural chemicals (<http://www.rcep.org.uk/chemical/CBA.htm>). There is also a need to protect the built heritage from the cumulative small changes that can erode its character. Do we want to protect features such as hedgerows, laneways and field patterns? If so, 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. These include the addition of extensions up to 40m² in floor area, the insertion of uPVC windows, and landscape changes created by new farming practices. Demesne landscapes of the eighteenth and nineteenth centuries are important parts of the cultural and architectural heritage of Brú na Bóinne. Alterations to the setting of buildings,

both large and small — including the widening of roads, removal of field hedges and roadside ditches, insertion of post-and-rail or ranch-style fencing, planting of unsuitable screening such as tall *leylandii* hedgerows — can all have a significant impact on the landscape setting. The most effective, easily administered method of achieving control over such changes should be investigated and recommendations made for putting this in place (Fig. 3.27).

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

There has been considerable demand for new one-off houses in the Brú na Bóinne area in the last decade. There are varying perceptions that the area has been subjected to excessive development, or alternatively, that it is impossible for those who grew up in 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 a continuing basis.

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

Are there sites where rural housing can be most easily accommodated, or are there areas that can accommodate clusters of buildings? What is the capacity of the landscape to absorb further development without damage to the character of the area? The first edition (1836) OS mapping shows areas with clusters of cottages. These historic cluster sites should be investigated to determine the survival of structures in the area; 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.

The largest losses in the area's built heritage are of eighteenth and nineteenth-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 (Fig. 3.28).



Fig. 3.28: The refurbishment of a traditional cottage at Roughgrange [from Stout 2002]

36. 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? A map submitted to UNESCO in 1992 shows the core area ending on the south bank of the Boyne, while a 2007 map shows the line running along the middle of the river (<http://whc.unesco.org/en/list/659/documents/>). 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? 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 (Fig. 3.29).

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

Many different bodies such as the Office of Public Works, the Department of the Environment, Heritage and Local Government and Meath County Council have an input into the management of the WHS. However, these



Fig. 3.29: The cement factory at Platin, on the south-eastern edge of the WHS [Con Brogan]

are not the only ones. 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 may need to be examined.

38. How are people accessing, interpreting and enjoying the monuments?

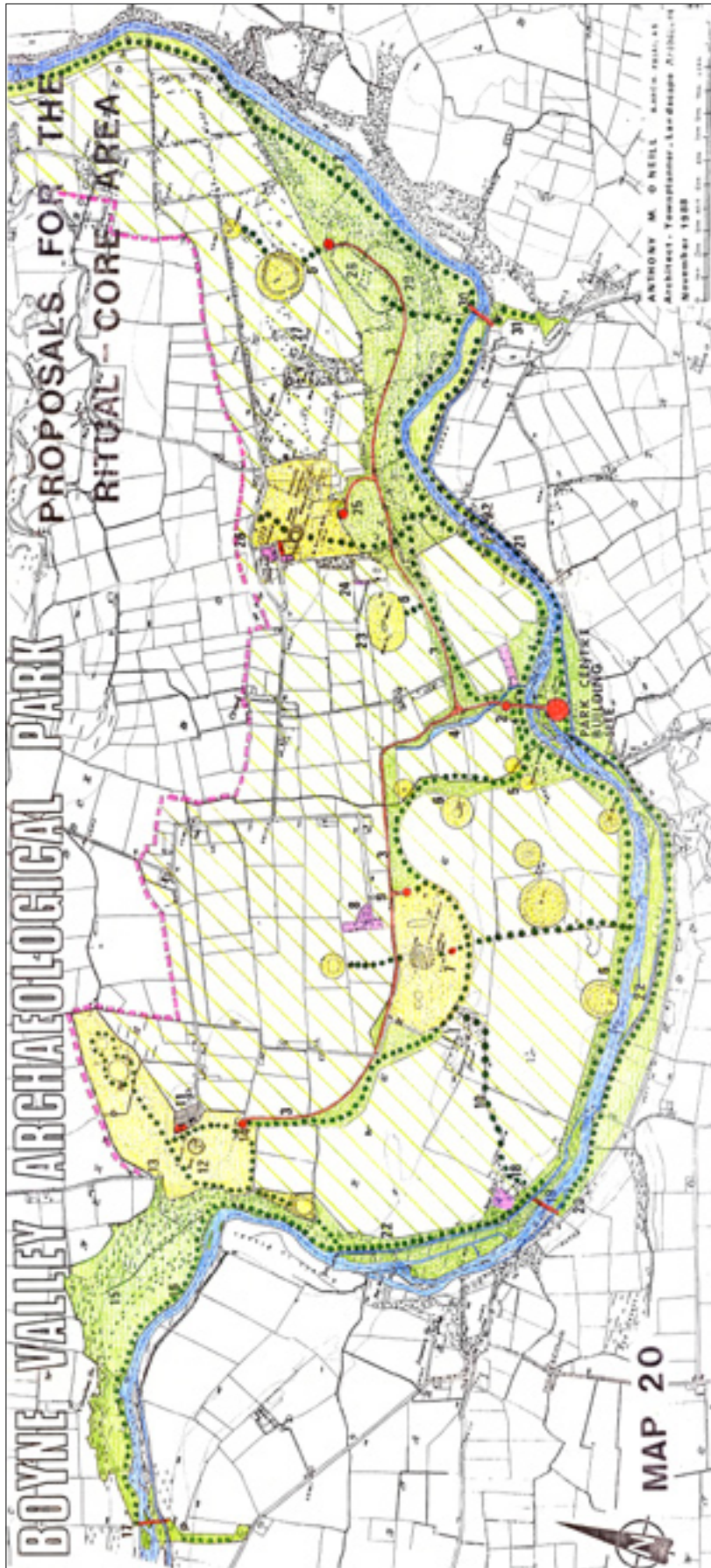
In 2007, nearly a quarter of a million visitors came to see Newgrange, Knowth and Brú na Bóinne Visitor Centre. Where did they come from? What were their expectations? How is their experience evaluated? What could be done to improve the experience? Are visitors coming away with an understanding of the need to protect the monuments for future generations? Is there an appropriate balance being struck

between access and conservation? As part of the Boyne Valley research project, there is a need for an independent tourism research project using modern best practice.








The local community is proud to live and work in or near the World Heritage Site, and has always supported the excavations and research that have taken place. How can the proposed Research Framework involve the local community — farmers, landowners and residents — in a positive way? A publication for landholders and owners in the area could be produced, explaining the designation of the site, its international importance, and how they and the State can work together to maintain their inheritance for future generations. A field monument guide that maps and interprets all of the WHS archaeology and places it in its landscape setting would also help promote more sensitive development and conservation and a local pride of place. Linking such material with an updatable web resource would help keep an interested local, national and international public informed (Figs. 3.30 and 3.31).



Fig. 3.30: Visitors to Newgrange past and present [O'Kelly archive, DoEHLG/Clare Tuffy]



KEY TO LAND USES ON MAP No. 20

-  State property to be set back in viable farm units with covenants attached. Fencing activities would be traditional dry stock, cattle and sheep.
-  Public parkland including riverside walk areas: A.S.I.'s and site of Park Centre Building. Existing monuments with extended areas of protection around each.
-  Park Centre Building site with high level pedestrian bridge to Ritual-Core Area.
-  Local Interpretive Centres to knoweth. New Grange and Booth making use of existing buildings and with toilet facilities.
-  Park Managers House with adjoining Park Maintenance Building and Yard.
-  Park bus system using 2.4 metre track of compacted gravel with pull-in bays. Bus stops are at each of the major monument sites.
-  Pedestrian system with surfaces of: grass, gravel or boardwalk.
-  Bridges over Boyne. Three of them are associated with small viewing car parks and picnic sites.
-  Existing farmhouses, possible B & B accommodations.

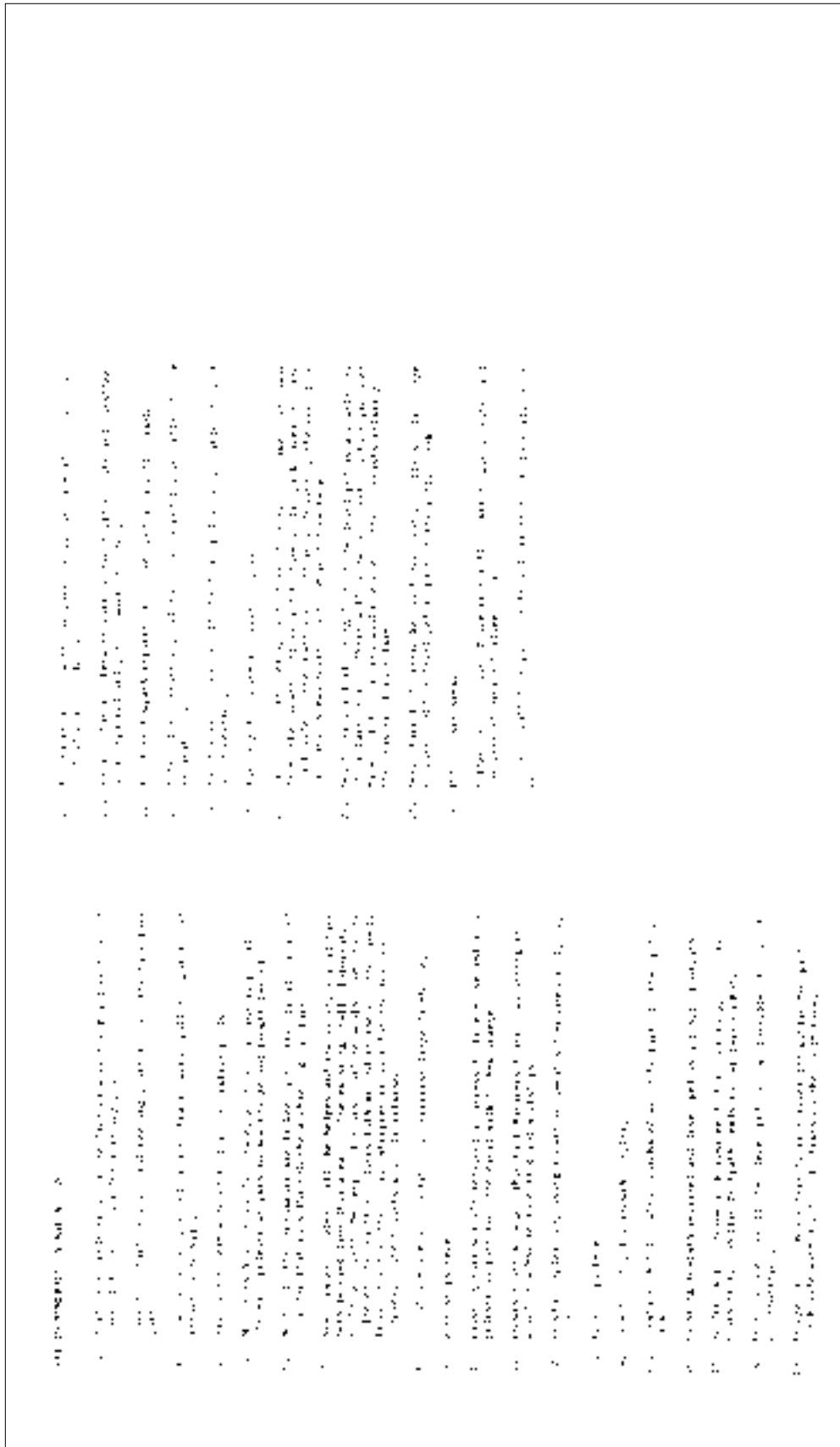


Fig.3.31: Anthony O'Neill's proposal for the Boyne Valley Archaeological Park

Section 4 — Research Strategy

4.1 Creating Objectives

The following section sets out a plan for addressing the research questions contained in Section 3. A list of 18 objectives has been drawn up which, over the next few years, will either form the basis of projects to tackle specific problem-orientated research, or will provide a context for the support of curiosity-driven research. A balance must be struck between setting out a route to specific research goals and allowing enough flexibility to respond to unexpected discoveries and opportunities. There is no one-to-one relationship between research questions and objectives; some objectives may address more than one research question while other questions are addressed through several objectives. The objectives have been arranged here under four main headings:

- The Big Gaps
- The Mega-tombs and Related Monuments
- Integrating Monuments and Landscape
- Research Infrastructure

4.1.1 The Big Gaps

1. Reconstruction and modelling of palaeoenvironment and landscape development

The wider landscape of County Meath in which the World Heritage Site sits has a paucity of bog or wetland environments. Opportunities for the retrieval of traditional palaeoenvironmental data from the WHS, and from the vicinity of the main monuments in particular, are few and far between. Some preliminary attempts have been made to locate potential waterlogged sites (David Weir, pers. comm.; see Section 2 above) and such work could at the least be followed up by a more robust feasibility study of wetland palaeoenvironmental sampling sites. However, of perhaps greater relevance to the WHS is the palaeoenvironmental data available from dryland sites. There are many opportunities to retrieve data from soils

and sediments both within the WHS and the monuments themselves. Studies of dryland data are crucial to understanding ancient land-use practices and changes in specific locations. These feed directly into the landscape-scale models developed from more classic wetland locations. Material from both wetland and dryland deposits could potentially reveal much about the past landscapes of Brú na Bóinne, from prehistory to the present day. Analyses include palynology, diatom and coleopteran analysis, beetle and molluscan analysis, macrobotanical analysis, as well as analysis of pedological, sedimentological and hydrological data from dryland, monumental and fluvial locations.

Suitable environmental material may survive in older excavation archives. Appropriate environmental sampling strategies put in place for any future excavation in the WHS, whether development or research-related, are also crucial. A recently established research project aims to model landscape and land-use history in the river valley through the collation of pre-existing spatial and environmental data and the sampling of soils, alluvial and colluvial sediments (see Current Initiatives below). This programme of mapping and modelling could easily and valuably be extended across the Boyne floodplain and terraces and around the various monuments. The mapping of subsurface deposits through techniques such as augur survey will give us a better idea of landscape and land-use change over time, perhaps even identifying areas of colluvial material and buried landscapes. Systematic waterborne geophysical survey is also needed to define and characterise the river itself (and other important waterways such as the River Mattock). As well as providing a much-needed map of the current riverbed, techniques such as swath bathymetry, sub-bottom profiling and marine LiDAR can contribute to the assessment and characterisation of areas of high archaeological potential along waterways, including the mapping of former shorelines or land surfaces now submerged off the modern coast. Central to any reconstruction of the palaeogeography of Brú na Bóinne is an understanding of the sea level history of

the area. While Mitchell (1995) has speculated on the tidal extent of the river during the Neolithic, this needs to be followed up by directed investigation. Virtually no reliable sea level data exist for this part of Ireland, the latest models (see Brooks *et al.* 2008) providing only an approximation of sea level change on the east coast. There is a key need to ground truth this model by coring for sediments from the coast at the mouth of and adjacent to the Boyne.

2. Produce a master chronology for the WHS

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

3. Understanding settlement

Most of the research that has taken place in the Brú na Bóinne area has been site-based, especially that of the later twentieth century. Although settlement evidence has been identified during these investigations, such discoveries have generally been accidental, coming to light only as a by-product of the excavation of more prominent ritual and ceremonial monuments. As a result, we have only been getting narrow glimpses of the wider settlement histories of the WHS from prehistory up to the post-medieval period (Fig. 4.1). In order to understand the complex sequence of development of the settlement history of this area, a much more systematic and extensive landscape-based approach is required. A variety of desk-top studies, e.g. the examination of the aerial photographic record, LiDAR data, cartographic data, an HLC, are of obvious value for early medieval landscapes and later. The settlement remains of earlier periods are perhaps best understood through a combination of systematic fieldwalking and geophysical survey, along with targeted excavation (see Current Initiatives below). Follow-on excavation could take place in promising areas, while earlier areas of investigation, e.g. the 'Western Neolithic' complex at Knowth, or the late Neolithic/early Bronze Age settlement in front of Newgrange, could be revisited to define the extent and chronology/phasing of remains. Much existing settlement data from a variety of periods was uncovered along the Drogheda Bypass section of the M1 Northern Motorway, only a few kilometres from the eastern edge of the WHS. If properly analysed and fully published, this archive would be extremely valuable for understanding settlement in Brú na Bóinne.

Hand in hand with the examination of the physical remains of settlements and activity areas is an investigation of diet and food procurement practices — what people ate and cultivated or gathered, what animals were reared, how farming was carried out. Older excavation archives can be examined for suitable environmental samples, while all future work in

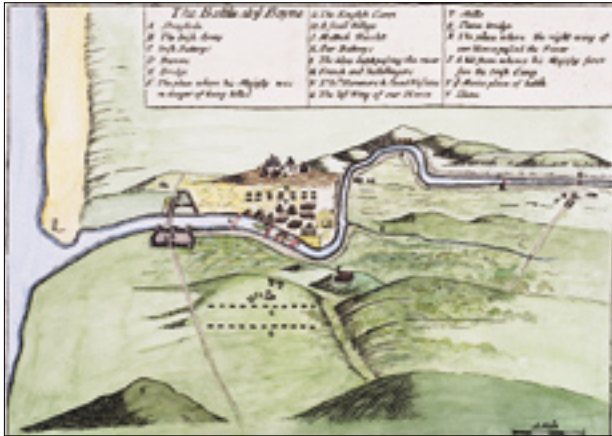


Fig. 4.1: Oldbridge village in the late seventeenth century [detail from Reverend George Story's 1693 map of the Battle of the Boyne]

the WHS should include rigorous multi-disciplinary environmental sampling methodologies. Detailed palaeoenvironmental analysis (see above) could inform us on the variety of flora and fauna being exploited through time, as well as providing information on land use and clearance. Isotope analysis on human and animal bone will help us understand the diets of people in the area, and possibly their origins. Strontium and oxygen analysis is already being carried out on some of the multi-phase burials at Knowth (Kerri Cleary, pers. comm.).

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

4. Establish the nature and extent of later prehistoric activity

Bronze Age monuments are much less visible in the Brú na Bóinne landscape, giving the impression that there was a decline in the area's importance during this period. However, the recent discovery of several ring ditches in the

east of the WHS and possibly also in the vicinity of Newgrange and Site M (see Section 2 above) suggests that Bronze Age remains, and sub-surface remains in particular, are more extensive than previously thought (Fig. 4.2). Analysis of the aerial photographic record for the WHS, complemented by systematic programmes of geophysical survey, could identify additional ring ditches, field systems or settlement enclosures, which of course will need to be ground truthed. The same techniques can be used to prospect for sub-surface Iron Age features — the home bases perhaps of those individuals buried at Knowth and Rosnaree — although Iron Age material could only be identified as such through excavation. Osteological and isotope analysis of the Iron Age skeletal material could provide us with information on the origins and lifestyles of these individuals. Skeletal material of possible Bronze Age date from Monknewtown and Newgrange should also be assessed to determine their suitability for absolute dating and isotope analysis. Other useful initiatives include the survey, coring and test excavation of the possible Bronze Age/Iron Age ponds such as that at Monknewtown. There is also a need for early Irish historians to engage with this later prehistoric area through the examination of proto-historical sources such as the *dindsenchas* and early myths and legends.



Fig. 4.2: One of the simple cist burials excavated within Monknewtown embanked enclosure [David Sweetman]

5. Understanding continuity and change in the historic period

This is a more general objective, and one which overlaps with several others in this list, but is at the heart of the Brú na Bóinne WHS designation. Indeed, in recommending the site for inscription, the reporting committee noted that '*...the long continuity from prehistory to the late medieval period make this one of the most significant archaeological sites in Europe*'. To date, however, acknowledgement of this aspect of the WHS has been negligible. The two interpretative centres in the WHS — the Brú na Bóinne Visitor Centre and the Battle of the Boyne Visitor Centre — relate the Neolithic and the seventeenth-century history of the area, with little acknowledgement of the detail in between. If we are to present this to the wider public successfully, then more, multi-disciplinary, research needs to be focused on key junctures in the history of Brú na Bóinne, for example:

- the impact of the early medieval church on Iron Age society
- the influence of new Viking communities and economies
- the administrations of Anglo-Norman lords, the Cistercians, Augustinians
- the modern English parliament.

Such research may take place at a landscape scale, looking at changes in land use and farming practice across the WHS, or at the scale of single sites — as has been undertaken on animal bone from the different phases of medieval occupation at Knowth. Primary historical research also has an essential role to play. The recent work of Geraldine Stout on the long-lived early medieval cemetery at nearby Site M also demonstrates the effectiveness of individual or curiosity-driven research projects in tackling questions of continuity and change.

4.1.2 The Mega-tombs and Related Monuments

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

The current programme of publication for Knowth Tomb 1 will clarify certain issues of

phasing within the main mound, as will an ongoing programme of radiocarbon dating of bone and wood samples from the tomb. Surviving skeletal and other environmental assemblages from the Newgrange excavations might also provide suitable samples for a targeted programme of dating. Other aspects of the passage tomb complex, such as the full extent and date of Dowth and other unclassified or possible passage tombs, will likely require further excavation to resolve, although as much pre-existing archive material as possible should be used in establishing a sequence for the tombs. Remote sensing techniques might also be used to obtain profiles of the many unexplored or partially explored mounds (Fig. 4.3). Laser scanning of the tombs' decorated stones could further our understanding of the sequence of carving, particularly on the kerbstones which are exposed to the elements and which are liable to deteriorate further through weathering.



Fig. 4.3: Site E, an unexplored passage tomb north-east of Newgrange [Con Brogan]

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

The relative scale of the three mega-passage tombs and the extraordinary concentration of megalithic art at Brú na Bóinne would suggest that the complex was at least as important in the Neolithic as we consider them to be today. Future research needs to examine more explicitly and more accurately the scales at which the monuments operated and how wide-reaching their influence was.

- What were the inter-relationships between the three mega-tombs?
- What was the nature of the contact that existed between Brú na Bóinne and nearby passage tomb cemeteries like Bremore/ Gormanstown, Fourknocks and Loughcrew, as well as those across the rest of the island?
- Beyond Ireland, what was the interplay between places like Orkney, Wessex and Brittany, for example?

At each of these scales, we should be assessing the evidence for and nature of influences, as well as the relative chronology of the monuments that are cited as comparanda. The midwinter (and perhaps other) observances at Brú na Bóinne are central to our present appreciation of the passage tombs and were probably also important at other points in the past. In addition to investigating the changes in use and interpretation of the Boyne tombs through time, we should endeavour to build a more interpretative and probing approach to the religious belief that must have suffused these structures and the communities that erected them.

Much of the above could be accomplished through a series of interlinked parallel

investigations focusing on different aspects of the problem. Individual researchers (archaeologists, historians, anthropologists) working in different areas could be brought together through workshops and seminars. A research network formally established between centres such as Brú na Bóinne, Avebury/ Stonehenge, Orkney and Brittany would facilitate the exchange of ideas and expertise, as well as providing a strong platform for funding opportunities.

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

Excavations at Newgrange and Knowth have demonstrated that at least some of the passage tombs remained as foci for activity into the late Neolithic and beyond. In the immediate vicinity of Newgrange in particular there is a large amount of multi-phase activity — pit and post circles, hearths, burials and occupation debris — that is poorly understood chronologically. In front of and running around the mound is a partial circle of monumental standing stones, probably originally a complete circle, which has neither been accurately dated nor fully mapped. Small-scale excavation of the Great Circle could be carried out to obtain



Fig. 4.4: Harvest moon over the Great Stone Circle [Con Brogan]

radiocarbon or OSL dates from the stone sockets, while geophysical techniques such as electrical resistivity tomography survey could establish how many stones were originally erected around Newgrange. Magnetic gradiometry and susceptibility surveys carried out in 1999 and 2000 in the field immediately to the east of Newgrange have revealed what appears to be the full extent of the larger Newgrange pit circle, as well as a number of distinct elements composed of regularly spaced double and single rows of pits. Small-scale invasive and non-invasive techniques on such features, combined with data from previous investigations, would help us understand the sequence of late Neolithic/early Bronze Age activity at Newgrange and very likely at Knowth and Dowth as well (Fig. 4.4).

4.1.3 Integrating Monuments and Landscapes

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

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

Other forms of remote sensing carried out in the WHS have been far less extensive and systematic. To date, geophysical survey has been carried out on a relatively small scale. However, the land use and land cover at Brú na Bóinne make the area suitable for a variety of geophysical techniques, which have been employed very successfully in recent large-scale projects such as road developments and pipelines. Necessary projects include the acquisition of previous and ongoing survey data, the completion and publication of unfinished surveys, and the provision of technical guidelines for new surveys. Systematic surveys should be undertaken to define the spatial extent of Brú na Bóinne, individual complexes and individual sites and to map hidden landscape and site elements, e.g. the pit alignments between the cursus and Newgrange passage tomb. Geophysical survey can also be usefully employed alongside fieldwalking programmes to investigate the sub-surface signature of lithic scatters (see Current Initiatives below). Basic LiDAR survey has been carried out at Brú na Bóinne with a resolution of 0.5m and has allowed for detailed 3D mapping of the area. The use of high-resolution airborne LiDAR and hyperspectral imaging could be employed to extend the understanding of the WHS. This data can be incorporated into a GIS to provide the base map for the area and will readily provide maps and illustrations of the landscape from various perspectives. Future 3D survey could be carried out at ground level to accurately record inscribed stones and the interiors of buildings or structures (Fig. 4.5).

10. Understanding land-use change

Brú na Bóinne is a living landscape that has been home to a succession of peoples since Neolithic times. That landscape, although forged by geological, climatic and biological forces, has been altered and adapted by the people who made it their home. It is still home to a rural community who principally make their living by farming, and more recently, from tourism. It is hoped that future palynological and related analyses will provide detailed information on past vegetation, climate and, indirectly, on crop and animal husbandry. This palaeoenvironmental

research needs to be supported by a Historic Landscape Characterisation (HLC) to show changing patterns of population distribution and land enclosure etc. Current land use within Brú na Bóinne needs to be recorded, monitored and managed so as to avoid damage to the irreplaceable asset that the WHS designation represents. A full map of all landholdings within Brú na Bóinne will be a necessary practical tool in the formation of future policy. One such map, detailing farm sizes and activities, was drawn up in the 1980s (O'Neill 1989). This needs to be updated and made available to all agencies involved in the care and protection of the WHS. All planning applications for developments in the area and their outcomes should also be mapped on an ongoing basis. This kind of research will help identify areas under particular pressure from development such as housing but also agricultural/industrial.

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

11. Mapping the Battle of the Boyne

Prior to the development of Oldbridge House and part of its demesne as an interpretative

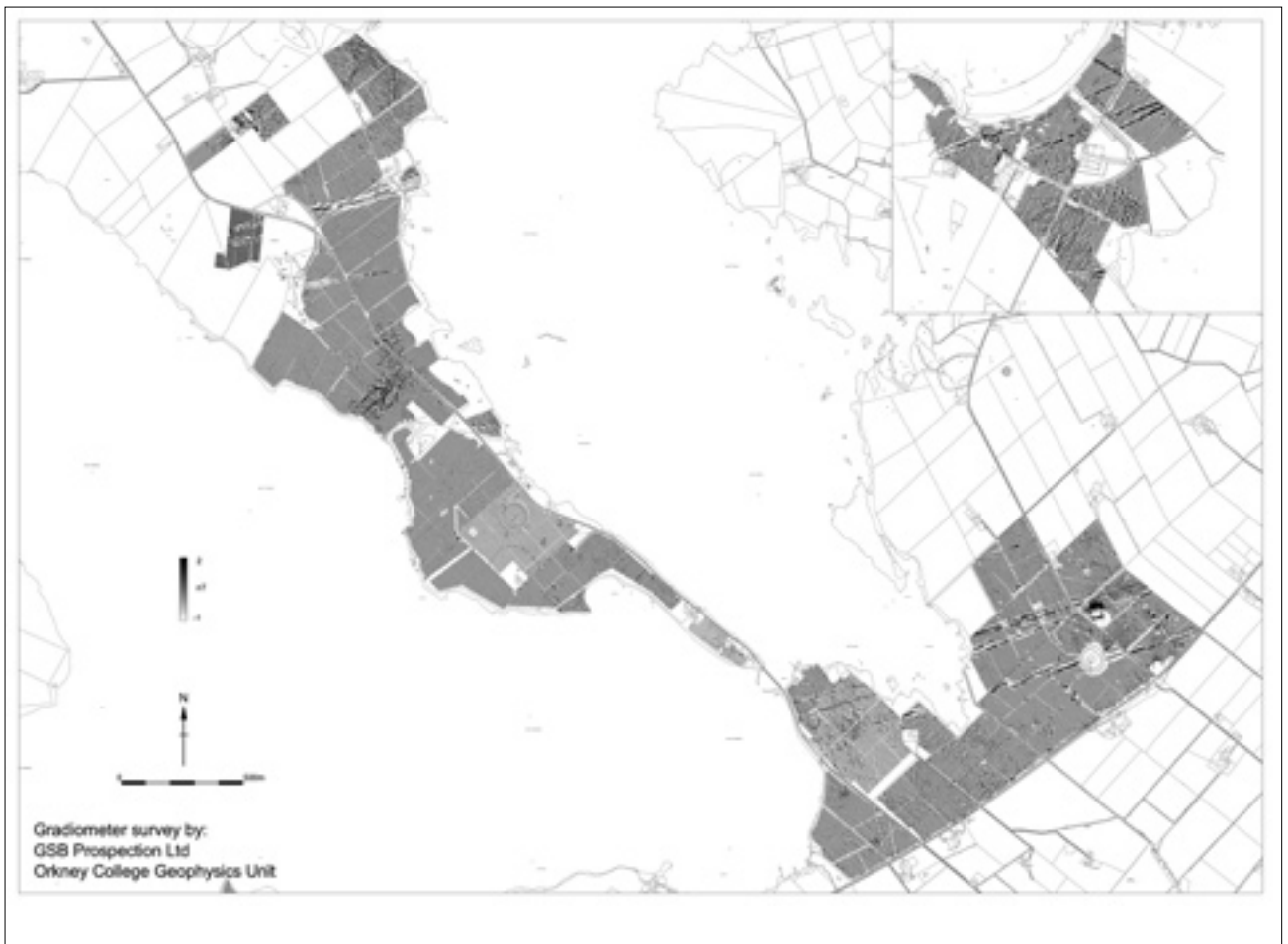


Fig. 4.5: Systematic geophysical survey has been carried out across the entire Heart of Neolithic Orkney World Heritage Site, with spectacular results [Jane Downes]

centre, an important pilot study on the archaeology of the Battle of the Boyne was carried out. This short project was able to fix the location of the village of Oldbridge, confirm the scene of the first military engagement on the day of the battle, and clarify some of the theories relating to the river crossings. However, much more remains to be understood about the battle, its participants and how it played out across the Boyne landscape. Recommendations for future work include:

- additional geophysical survey, combined with detailed topographic survey and excavation, in the area of Oldbridge village to establish its extent and character as well as its role during the battle
- systematic large-scale metal detector survey across the full extent of Oldbridge estate to identify the exact locations of engagements as well as the siting and extent of each encampment
- targeted diving in the river to retrieve artefacts possibly lost during the crossings.

In the wider landscape, key locations such as the Hill of Donore and Platin should be investigated for their archaeological potential, while research designed to identify the burial places of battle casualties could also be carried out.

12. Investigating the archaeology of the River Boyne

Brú na Bóinne is one of the most studied archaeological landscapes in Ireland. However, the very feature around which many of the sites are focused, the river, has been largely ignored from an archaeological perspective. Future studies of Brú na Bóinne need to take into consideration the underwater archaeological potential of the river and put in place appropriate methodologies for a multi-disciplinary approach to assessing that potential. Future work should aim to obtain a better appreciation and understanding of the role and relevance of the river throughout prehistory and into the early medieval period. LiDAR survey, sidescan sonar, multibeam sonar, ground-penetrating radar and sub-bottom profiling can

all be used along different parts of the Boyne to map river sediments and morphology as well as areas of archaeological potential/archaeological features. Magnetic survey could also be carried out on and in the water to detect ferrous objects. Any areas identified as being of high archaeological potential can then be followed up by targeted and focused diver surveys (Fig. 4.6).



Fig. 4.6: Recent river survey carried out as part of a larger investigation of the Battle of the Boyne site [Conor Brady]

4.1.4 Research Infrastructure

13. Create multiple inventories of material relating to the WHS

At least 6,000 years of human activity, centuries of administration by Church and Crown, together with over 300 years of antiquarian and archaeological interest have generated an enormous body of artefactual, architectural, cartographic and documentary data, not to mention a rich onomastic and folkloric tradition. Much of this material is spread across different government departments, universities and other institutions, and among commercial archaeological companies and private individuals and researchers. The effectiveness of future research in Brú na Bóinne is dependent on a proper understanding of the information already collected, its location and condition. Inventories could be undertaken by any number of parties or individuals as long as the results were centrally stored and accessible. Certain key information — the condition of upstanding buildings within the WHS, the amount of human

and animal skeletal material from excavations, the extent of aerial photographic coverage — on which future dating, mapping or management programmes were based would need to be collected systematically within a managed time-frame. Other curiosity-driven work could be completed on a more *ad hoc* basis.

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

The significance of SDI for future research at Brú na Bóinne cannot be overstated. Work to date in the WHS has generated an enormous amount of information that needs to be properly archived, analysed and accessed if it is to remain of use to future generations of researchers. A pilot web programme for displaying and storing and searching archaeological data has recently been developed (see Current Initiatives below). This could very usefully be extended and developed, with the relevant licensing and permissions, to display a variety of information (primary spatial data, images, excavation reports, artefact inventories, datelists etc.) to a variety of users (interested members of the public to academic specialists). Future work in this area should also include the designation of a suitable body to administer a Brú na Bóinne SDI, as well as issuing standards for information and geo-referenced data contributed by researchers (Fig. 4.7).

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

The current boundaries of the WHS were set out in the Boyne Archaeological Park report (O'Neill 1989). The core area is defined in part by the location of three main passage tombs and the prominent bend in the River Boyne, while the northern and southern buffer zones were established in large part to protect views into and out of the core area, particularly along the ridgeline from which the midwinter sun rises. The report also included a chapter on views and prospects within the WHS (Fig. 4.8). This work

should be revisited and built upon to provide a robust setting and landscape use strategy to aid future planning and management within the WHS. This should be informed by an examination of definitions in existing policy documents, legislation and planning inquiry case studies from Ireland and abroad. A 2008 report commissioned by Historic Scotland to provide an objective description of the setting of the Heart of Neolithic Orkney World Heritage Site could be a useful comparative document. While the setting of each World Heritage Site is of course unique, some of the critical setting elements established for Orkney are of direct relevance to Brú na Bóinne:

- an undeveloped ridgeline providing a direct visual link back to the landscape that the builders of the monuments probably experienced
- the strong rural but working character of the landscape in which the monuments are situated
- the view from the entrance of Maeshowe chambered tomb and its midwinter solstitial alignment
- visual linkages between the monuments within the WHS and modern views from roads, paths and settlements around the WHS that structure people's experience of the WHS and often parallel the visual archaeological links
- the links (both tangible and intangible) evidenced through archaeological research.

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

In 2008, nearly a quarter of a million visitors came to see Newgrange, Knowth and the Brú na Bóinne Visitor Centre. Little systematic evaluation of visitor profiles and experiences has been carried out. Neither has any formal investigation of the needs and expectations of the local community living in and close to the WHS been conducted. Detailed research carried out in 2004 by Angela McClanahan (University of Manchester) for the Heart of Neolithic Orkney World Heritage Site aimed to build knowledge

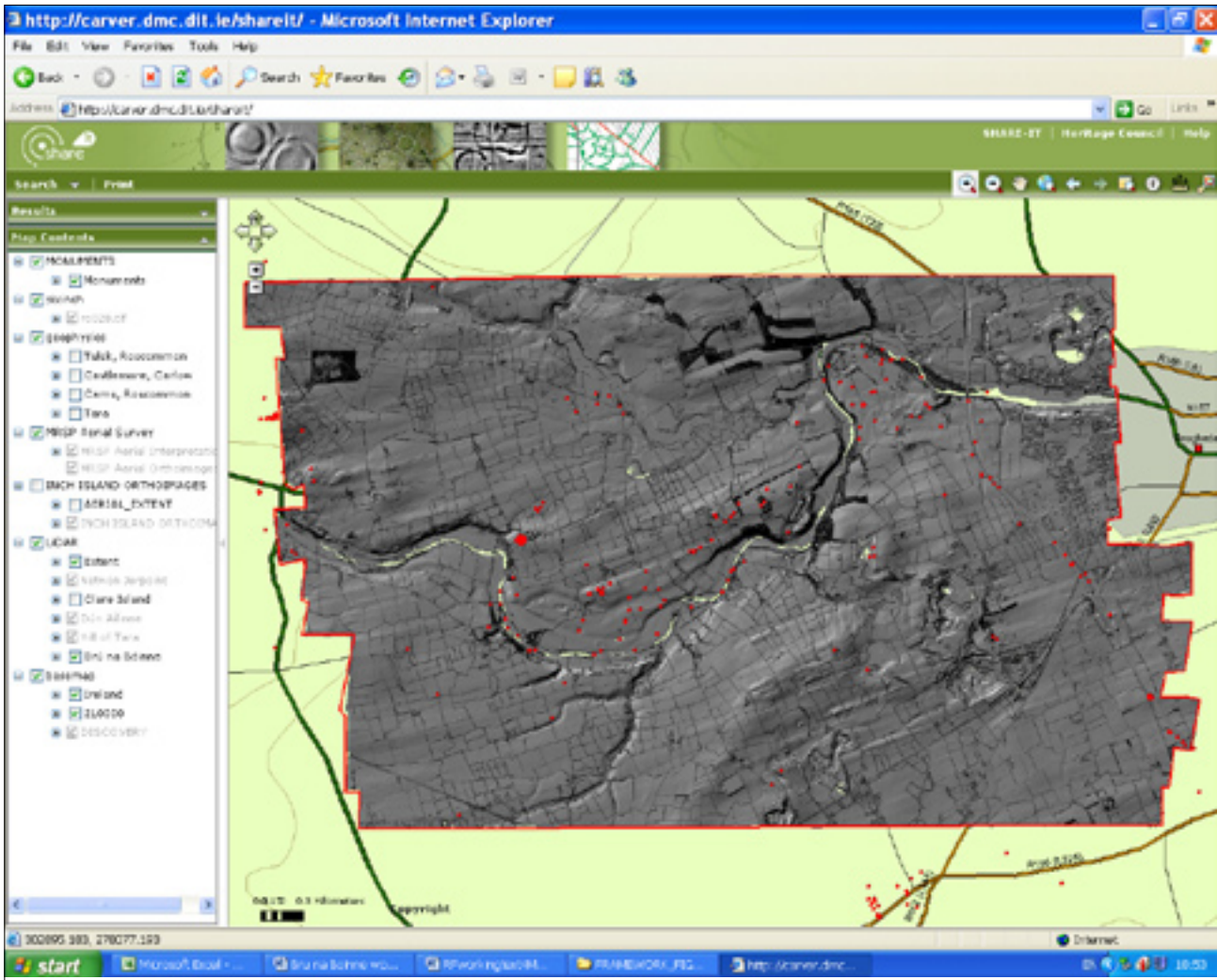


Fig. 4.7: The SHARE I.T. pilot web programme: technology currently exists to store, search and display a wide range of information on the WHS. Displayed here is the LiDAR data from Brú na Bóinne as well as all of the Recorded Monuments for the area [The Discovery Programme]

and understanding of visitor perceptions and expectations of the WHS, assessing the impact of WHS status on visitors' desire to visit the monuments and looking at visitor patterns both between and within individual sites. McClanahan's work also addressed how archaeological monuments figured in the daily practices of the local community and how WHS status, heritage organisations and cultural tourism impacted upon their daily lives. Twelve months of fieldwork using methods such as participant observation, behavioural observation and interview-based research provided in-depth analysis of the WHS in its contemporary contexts. A similar project could be planned for the Brú na Bóinne WHS. A periodic, perhaps biennial, follow-up visitor survey on a smaller scale could

be undertaken to monitor any changes in demographic and any changes in perceptions or 'valuing' the WHS as a response to research undertaken.

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

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



Fig. 4.8: The O'Neill report contained important preliminary research on views and landscape settings within the WHS [from O'Neill 1989]

focus for ongoing research programmes and the dissemination of information and research results to land owners, the general public and the archaeological community. It could be built and supported by the visitor centre operators and run in conjunction with the Brú na Bóinne research steering group (see below). The centre could also store paper and digital archives relating to the WHS; material from new investigations might be displayed here on a temporary basis. The focus of the centre would be very much orientated towards ongoing research, providing lecture space and classrooms for educational events, meeting space for steering/management groups, and an operational base for those carrying out research in the area (Fig. 4.9).

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

If the interest and momentum generated by

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

4.2 Mapping Research Capacity

Unlike the research questions listed in Section 3, which are effectively a 'wish-list' from stakeholders and interested parties, the above



Fig. 4.9: The complex of buildings at Knowth House, which have been proposed as the location of a research centre for the Brú na Bóinne WHS [Con Brogan]

objectives are components of a strategy that can be aimed for and realistically achieved in a reasonable time. It is impossible to survey, record and conserve every artefact and every feature from the entirety of Brú na Bóinne's human past. Prioritisation of the research agenda is therefore critical for the allocation of resources. The table in Fig. 4.10 represents the first step towards a tiered prioritisation of research within the WHS.

The next stage will be to map the research strategy against the current capacity of Brú na Bóinne's stakeholders (Fig. 4.11).

The main stakeholders are :

- UNESCO
- the National Monuments Service, the National Parks and Wildlife Service, and the Heritage Policy Unit of the Department of the Environment, Heritage and Local Government
- the Office of Public Works
- Meath and Louth County Councils and their respective Heritage Fora
- the Heritage Council
- the Royal Irish Academy
- An Taisce
- the Irish tourist board, Fáilte Ireland
- third-level institutions (universities, institutes of technology)
- the local community, some of which are represented through rural development initiatives (e.g the LEADER programme), and groups such as the Irish Farmers' Association, Meath Archaeological and Historical Society, County Louth Archaeological and Historical Society, Slane Historical Society, and the Old Drogheda Society.

Objective	Questions addressed	Related questions	Priority
The big gaps			
1. Reconstruction and modelling of palaeoenvironment and landscape development	1, 3, 4, 5, 6, 7, 18, 19, 20, 21, 23	8, 17	High
2. Produce a master chronology for the WHS	1, 4, 6, 8, 9, 10, 18, 19, 29, 30	2, 20, 26, 27	High
3. Understanding settlement	1, 2, 3, 4, 5, 7, 9, 11, 12, 13, 14, 15, 19, 23, 28, 29, 30, 31, 35	20, 21, 26, 27	High
4. Establish the nature and extent of later prehistoric activity	4, 5, 6, 10, 18, 20, 27, 30	21, 29, 34	Medium
5. Understanding continuity and change in the historic period	5, 7, 11, 12, 13, 15, 18, 20, 23, 27	6, 14, 21, 28, 31, 30, 35	Medium
The mega-tombs and related monuments			
6. The structural sequence, phasing and interpretation of the passage tombs	4, 6, 8, 10, 30	2, 29	High
7. Investigating the essential importance and distinctiveness of the passage tomb complex, past and present	9, 10, 22, 26, 27, 28, 32, 38	2, 6, 30	Medium
8. Investigating the Great Stone Circle and the sequence of the other monuments in front of Newgrange	3, 4, 9, 10, 22, 27, 30	5, 6, 29	Medium
Integrating Monuments and Landscapes			
9. Obtaining blanket coverage of the WHS using a combination of remote sensing techniques	2, 3, 4, 5, 7, 10, 12, 14, 16, 21, 23, 24, 25, 30, 35	11, 13, 34	High
10. Understanding land-use change	4, 17, 18, 19, 20, 23, 34, 35	21	Medium
11. Mapping the Battle of the Boyne	16, 21, 28	23	Medium
12. Investigating the archaeology of the River Boyne	1, 9, 11, 13, 14, 16, 18, 21, 30	28, 31	Medium
Research infrastructure			
13. Create multiple inventories of material relating to the WHS	1, 6, 7, 15, 17, 24, 26, 28, 29, 30, 31, 32	33, 35	Medium
14. Build a Spatial Data Infrastructure (SDI) that can store, connect and display all current and future information relating to the WHS and make this accessible as a web-based database/interface	33	18, 35, 38	High
15. Develop a setting and landscape use strategy for the protection and management of the WHS	17, 21, 22, 31, 34, 35, 36, 37, 38	9	High
16. Study visitor (local and non-local) expectations and experiences of the WHS	35, 36, 38		Medium
17. Establish a Brú na Bóinne Research Centre and associated education network	17, 33, 38		High
18. Create a steering group to implement and progress the framework	All		High

Fig. 4.10: The relationships between research questions and proposed objectives [after Darvill 2005]

It would be extremely useful to allocate different stakeholders to the research questions and objectives raised. Moreover, a timeline linked into these objectives, along with the application of Key Performance Indicators, would allow a clear review of the realisation of these objectives. This is something that could realistically be attempted in the short term by the steering group (Objective 18, above).

At the time of writing, three Irish third-level institutions were carrying out projects of varying scale and duration in the WHS (see below). There is clearly huge scope to establish research links nationally and internationally, pooling expertise and specialisms and tapping into already established research projects, e.g. *Out of Asia: the spread of agriculture* (University of Sheffield/University College London). There are also strong links to be forged with related World Heritage Sites such as Orkney and Stonehenge/Avebury, which can offer the benefits of shared experiences and methodologies. A number of UNESCO World Heritage Sites have developed the use of networks of volunteers to support their research activities (see <http://whc.unesco.org/en/71/>). This is a clear possibility for the Brú na Bóinne World Heritage Site, with its large annual influx of visitors and its strong community base. It should also be noted that several of the research objectives are being addressed wholly or partly by a number of current projects. These are listed under Current Initiatives, below.

4.2.1 Current Initiatives

Investigation of geophysical properties of lithic scatter sites at Brú na Bóinne, County Meath

Funded by the Heritage Council, a programme of targeted geophysical survey is under way in Brú na Bóinne which builds on the results of a large-scale fieldwalking survey. As its focus, this research concentrated on the systematic identification and mapping of prehistoric settlement evidence in the wider Brú na Bóinne landscape. As such, it has revealed extensive evidence of earlier prehistoric (primarily Neolithic and early Bronze Age) activity in the

form of a continuous blanket of lithic material. Dense scatters of material within this distribution may represent focal points in this landscape. The aim of the current programme of survey is to explore the geophysical properties of some of these lithic scatters in an attempt to better understand what activities they represent and, where possible, to identify possible residential settlement locations (Fig. 4.12).

Contributed by Conor Brady

Knowth Publication Project

To date, four Royal Irish Academy volumes have been published on the excavations at the Knowth passage tomb complex. The first focused on the archaeology of the small tombs, and was followed in 1997 by an examination of the Neolithic settlement evidence and the Beaker/early Bronze Age activity. The third volume dealt comprehensively with the faunal remains assemblage from the Early Christian period of occupation, while the most recent publication explored the historic hinterland of the site. Work on a further three volumes is currently in progress. The fifth instalment will deal specifically with the archaeology of the first and second millennia AD, incorporating the burials from the later prehistoric period. This volume will also examine the eighth-century double-ditched enclosure, the numerous souterrains and houses uncovered, and will include an extensive finds catalogue. The sixth volume in the series will present the archaeology of the large mound, passage tomb 1, including an extensive dating programme, re-analysis of the burials, a closer look at the geology and environmental evidence, and an examination of the conservation and reconstruction methodology employed at the site. This book will have a companion volume that will specifically present the large corpus of megalithic art uncovered at Knowth. All seven volumes will encapsulate the complexity of the archaeology uncovered and the longevity of the site's occupation.

Contributed by Kerri Cleary

SHARE I.T. Project

The aim of the Spatial Heritage & Archaeological Research Environment I.T. (SHARE I.T.) Project is to investigate spatial archaeological landscape data in Ireland and to develop a WebGIS tool pilot for its exploration for use in further research. The key research challenges will be:

- assessing current levels of spatial data content and standards within the Irish archaeology sector
- identifying suitable digital archiving strategies for spatial landscape data
- developing and testing a suitable WebGIS for the exploration of spatial archaeological landscape data and the promotion of this data to the archaeological research community.

Initially, the WebGIS tool will host geophysical, aerial and LiDAR data, together with their associated interpretations. This project has obvious potential for the management and dissemination of data relating to the World Heritage Site, and is of use to both the interested public and the research community.

Contributed by Anthony Corns

Stakeholders	Nature of contribution
International	
UNESCO	Strategic; Public awareness
Educational and research funding bodies	Funding
Third level institutions	Research; Specialist expertise
National	
DoEHLG	Strategic; Funding; Research
OPW	Strategic; Funding
The Heritage Council	Strategic; Funding; Public awareness
Royal Irish Academy	Strategic; Funding
The Discovery Programme	Research; Specialist expertise
An Taisce	Public awareness; Volunteer network
Fáilte Ireland	Funding; Public awareness
Third level institutions	Research; Education; Specialist expertise
Individual researchers/private consultants	Research; Specialist expertise
Local	
Meath County Council	Strategic; Funding; Public awareness
Louth County Council	Strategic; Funding; Public awareness
Rural development schemes	Funding; Volunteer networks
Irish Farmers' Association	Public awareness; Monitoring
Local heritage groups/NGOs	Research; Volunteer networks
Individual researchers/private consultants	Research; Specialist expertise

Fig. 4.11: Research capacity of various stakeholders in the WHS

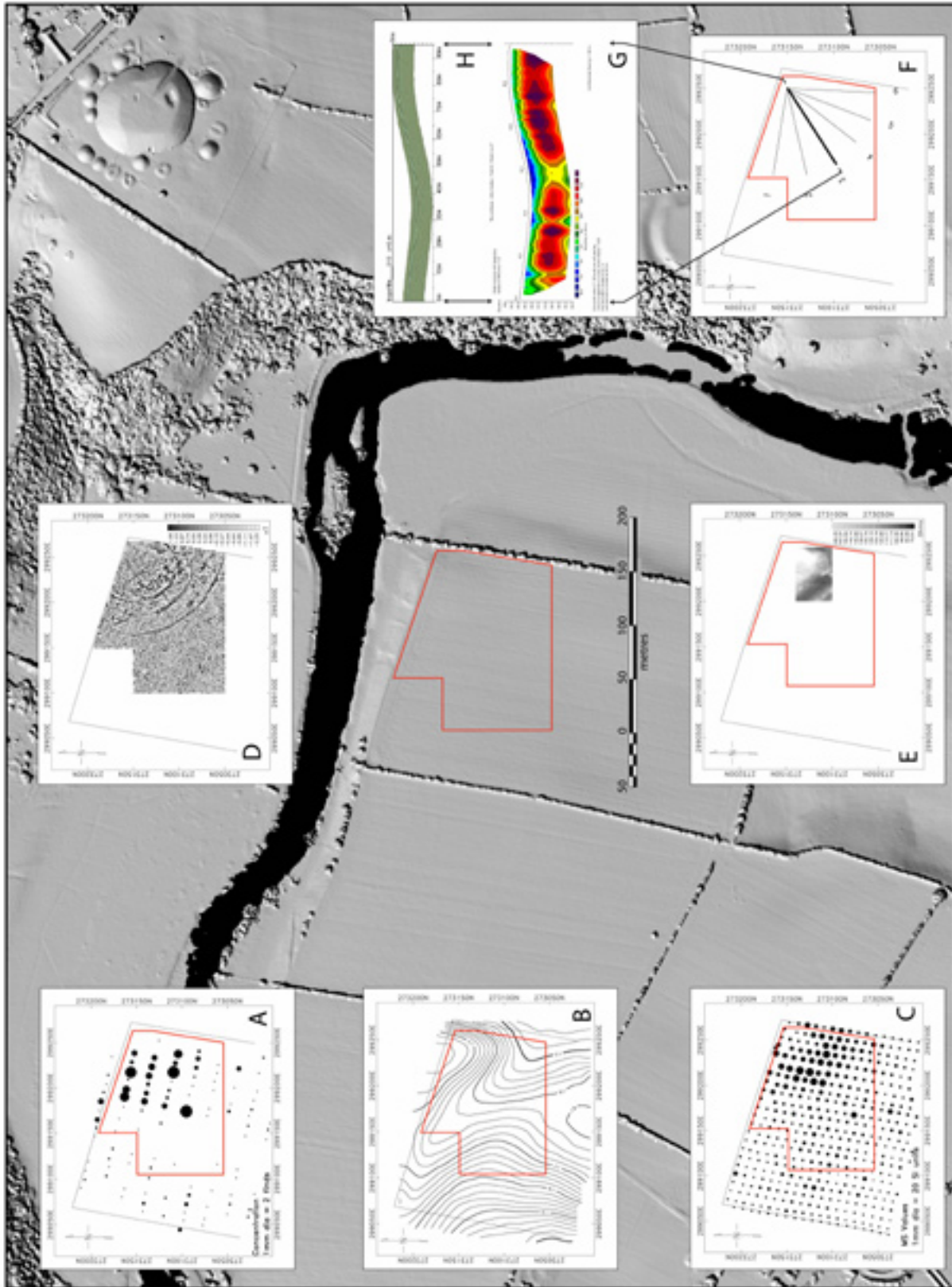


Fig. 4.12: Possible Neolithic enclosure at Rossmaree: the potential of this site was first identified through systematic fieldwalking. There were no indications from other sources, e.g. aerial photographs or LIDAR. Significant densities of lithic material were recovered from the surface of the field with distinct concentration in the NE quadrant. Subsequent microtopographic survey and magnetic susceptibility survey produced very complementary datasets which supported the indication of significant activity having taken place here during the Neolithic. The subsequent magnetic gradiometry and earth resistance (funded by the Heritage Council) followed by earth resistance tomography and ground penetrating radar (funded by Meath County Council) all confirmed these initial observations and added detail to the picture

A. Plot of lithic density recorded during initial fieldwalking survey
 B. Microtopography. Contours at 0.2m intervals
 C. Plot of magnetic susceptibility data
 D. Magnetic gradiometry plot
 E. Earth resistance plot
 F. Position of transect used for earth resistance tomography and ground penetrating radar profiles.
 G. Earth resistance tomography plot
 H. Ground penetrating radar plot
 The background for this image is from the recent LIDAR survey of the Brú na Bóinne WHS (courtesy of Meath County Council) [Conor Brady and Kevin Barton]

Boyne Catchment GIS Project

This INSTAR funded project aims to develop an integrated and comprehensive landscape archaeological model for the history of the River Boyne, with a focus on linking changing land use and environment to the known landscape of ancient monuments and settlement. The aims of the project are to collate all extant landscape and environmental data available today into a GIS database for modelling purposes, and to use this database to identify zones of likely change in the natural and cultural landscapes. Ground truthing of two-three specific zones of the river system against the model developed from the GIS database is to be carried out, and then integrated into the GIS, providing a comprehensive dataset for and model of landscape and river history in the Boyne Valley which can be made available for public use (Fig. 4.13).

Contributed by Helen Lewis

Meath Field Name Survey

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

Contributed by Martin Dier

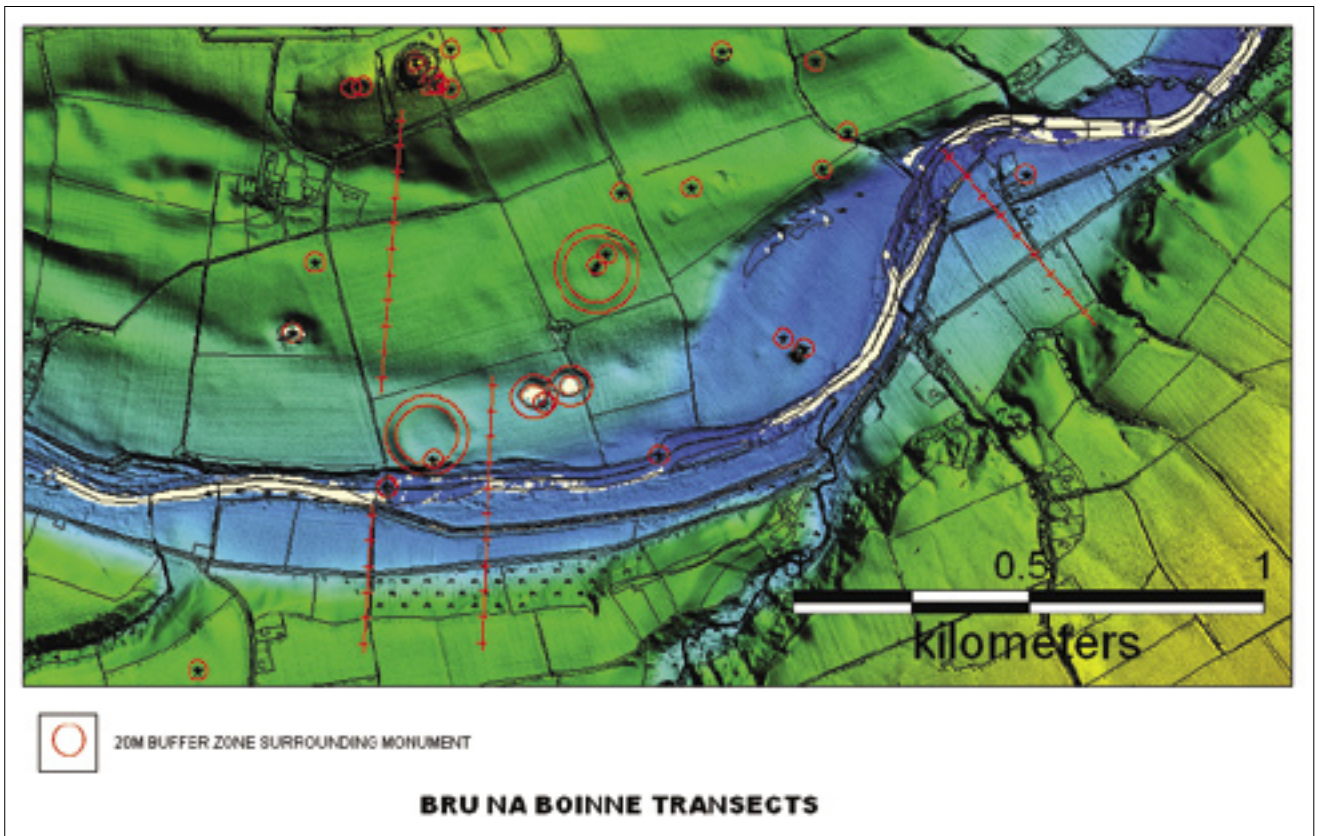


Fig. 4.13: A number of transects are planned for the Boyne catchment to help characterise the river landscape and to identify the processes that have created it. Shown here are the Central (Newgrange Farm) and Eastern transects [Helen Lewis]

Brugh na Bóinne Research Project

This project, under the direction of Joe Fenwick (NUI Galway), Richard Warner (Belfast) and George Eogan (Dublin), is part of an ongoing research initiative designed specifically to address the nature and function of selected monuments within the broader landscape of the Brú na Bóinne World Heritage Site through the exclusive use of non-invasive survey techniques. This project also serves as a vehicle for the instruction of post-graduate students from NUI Galway in the use and application of scientific survey techniques and associated software. Since 2004, integrated magnetometer, electrical resistance and micro-topographical survey have been conducted on and in the vicinity of a sub-rectangular enclosure in Newgrange townland. In the 2007 programme of fieldwork, magnetometer survey was expanded beyond the confines of the earthwork in order to map the full extent of the sub-surface archaeological remains; electrical resistance survey was extended over the western rampart. In addition, a magnetic susceptibility survey was conducted over selected features of the site (Fig. 4.14)

Contributed by Joe Fenwick

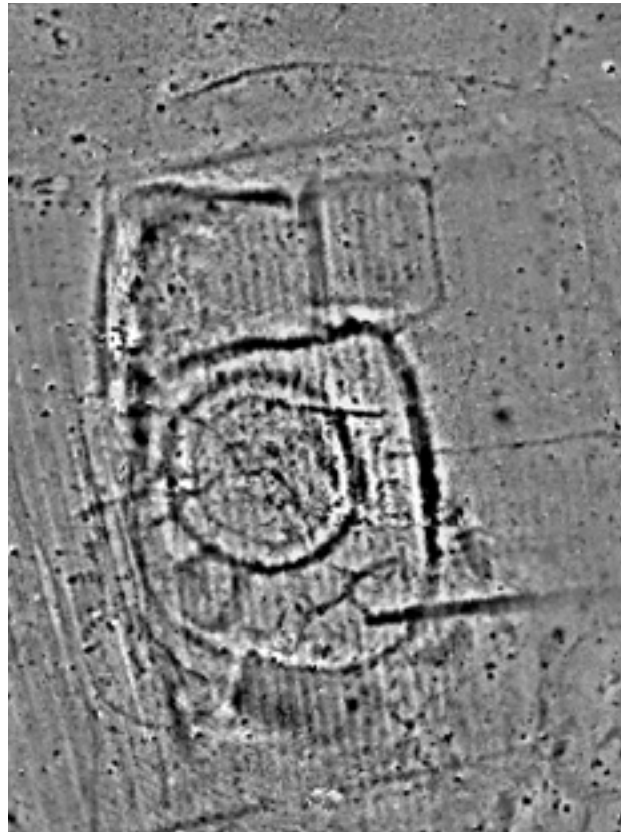


Fig. 4.14: The results of magnetic gradiometer survey within the sub-rectangular enclosure in Newgrange townland [Joe Fenwick]

Section 5 — Recommendations

Section 4 proposes 18 areas for further research under four themes. However, the recommendations below reflect a number of issues that have emerged strongly during the framework process and which will hopefully feed into the forthcoming review of the Brú na Bóinne Management Plan.

- While the Heritage Policy Unit and National Monuments Service of the DoEHLG, as well as elements of the OPW, have a day-to-day role in the management of the Brú na Bóinne World Heritage Site, it is apparent that there is a case for a more proactive role on the ground, liaising with the local community, academic community and the local authority, and communicating new initiatives regarding research and management. Such a recommendation was also made by ICOMOS in their *Report on the Mission to the Skellig Michael, Ireland 25-29 November 2007*.
 - The major programmes of excavation carried out to date in the Brú na Bóinne WHS have largely focused on large monuments such as the passage tombs. Such a focus was then very much a feature of research practice. In recent years, however, there has been a shift towards examining the historic landscapes that sustained and were closely associated with such monuments. This should be encouraged and supported.
 - Access to key data on the WHS for researchers and the public is vital. This is now very achievable using web-based interfaces for curating and presenting spatial data such as mapping, geophysics and survey data. The pilot WebGIS tool recently developed by the Discovery Programme under the INSTAR funded
- SHARE I.T. initiative provides an ideal starting point for such an initiative and should be further developed.
- There is a need for research co-ordination in the Brú na Bóinne WHS to be within the remit of an agency or body. Discussions with the DoEHLG have tended to suggest a role for a committee such as that convened by the Heritage Council for the purposes of drafting the Research Framework.
 - Given the development of significant visitor infrastructure that has taken place at Brú na Bóinne over the past 15 years, a case should now be made for examining the research and learning infrastructure within the World Heritage Site. Such infrastructure could take the form of investment in a research and education centre at Knowth House and greater web-based learning and information management resources.
 - The critical setting elements of the Brú na Bóinne WHS are currently under-researched and vulnerable in the face of ongoing development pressure. Aspects of this were addressed in the 1989 O'Neill report on the Boyne Valley Archaeological Park, which formed the basis for the existing WHS. The rationale and decision-making process behind the O'Neill report needs to be re-stated and a robust setting and landscape use strategy put in place to ensure that the living landscape of the WHS can be managed in a mutually beneficial way.

Appendices

Appendix I

Research Committee and Working Groups

In December 2007, a research co-ordination committee was convened to help co-ordinate and steer the framework process. The research committee comprised representatives from the State heritage agencies, the universities, Meath County Council and from the local community. Committee meetings were held in February, March, May and September 2008. Eight committee members also acted as chairs of eight working groups.

Research committee

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

Working groups

In March 2008, eight working groups were established to examine the perceived gaps in research carried out to date in Brú na Bóinne and to produce a series of key questions for future investigation. These research questions were to form the Research Agenda section of the framework document.

Brú na Bóinne in earlier prehistory

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

Brú na Bóinne in later prehistory/the early historic period

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

Brú na Bóinne in the medieval and post-medieval period

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

Vernacular/Built Heritage

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

Spatial Data

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

Palaeoenvironment and palaeogeography

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

Natural Heritage

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

Management and Interpretation

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

Appendix II

Consultation Process

The compilation of this Research Framework involved extensive consultation amongst the archaeological community and general public over a period of more than 12 months.

Webpage

An important part of the project's external communications was the project webpage, made available to the public in early 2008:

<http://www.heritagecouncil.ie/archaeology/heritage-council-initiatives/bru-na-boinne-research-framework/>

The page carried a project description, details of research committees, as well as committee meeting minutes, and abstracts and presentations from the public seminars. Drafts of the framework were also uploaded to the webpage during consultation periods. In addition to the usual indexing through search-engine links, people were directed to the page through mailshots and through local and national press and radio.

Mailshots

An extensive electronic mailing list was the primary means used to contact interested individuals and organisations. Included were universities, archaeological companies, the Royal Irish Academy, the Royal Society of Antiquaries of Ireland, the Institute of Archaeologists of Ireland and Meath County Council's database of local heritage groups. Notices were also distributed through the mailing lists of the Neolithic Studies Group and the World Archaeological Congress mailing list.

National and international experts from a range of university departments and institutions were targeted directly with letters requesting comment on consultation drafts. Hard copies of the consultation draft were sent to these individuals, as well as to local landowners and residents within the WHS. Multiple copies of the consultation draft were also distributed through the Brú na Bóinne Visitor Centre.

Mailshots and press releases dispatched

Public seminar notices: February, May and September 2008

Consultation draft notices: July and December 2008

Press release to local press and radio: March, June and October 2008

Press release to national media: December 2008

Resulting printed notices and articles

Drogheda Independent (March 2008, February 2009)

Drogheda Leader (July 2008)

Meath Chronicle (June 2008, November 2008)

Meath Weekender (June 2008, October 2008)

The Irish Times (December 2008)

PAST newsletter (November 2008)

Archaeology Ireland (Summer 2008)

Workshops

Two workshops were convened which involved focused group discussions of the research agenda and research strategy, respectively.

• 26 May 2008, University College Dublin

Kevin Barton, Conor Brady, Karl Brady, Jill Chadwick, Kerri Cleary, Tom Condit, Gabriel Cooney, Anthony Corns, Steve Davis, Jane Downes, Ian Doyle, George Eogan, Eoin Grogan, Loreto Guinan, Finbar McCormick, Robbie Meehan, Rosanne Meenan, Margaret Murphy, Declan Murray, Cliona O'Brien, Gill Plunkett, Michael Potterton, Matt Seaver, Gráinne Shaffrey, Jessica Smyth, Geraldine Stout, Matthew Stout, Clare Tuffy, Elizabeth Twohig, Abigail Walsh, Richard Warner

• 28 September 2008, The Discovery Programme, Dublin

Phil Barratt, Stefan Bergh, Karl Brady, Jill Chadwick, Kerri Cleary, Tom Condit, Gabriel Cooney, Ana Dolan, Jane Downes, Ian Doyle, Robin Edwards, George Eogan, Loreto Guinan, Robert Hensey, Helen Lewis, Meriel McClatchie, Roseanne Meenan, Margaret Murphy, Michael Potterton, Frank Prendergast, Marc Ritchie, Matt Seaver, Grainne Shaffrey, Rob Shaw, Jessica Smyth, Clare Tuffy, Elizabeth Twohig, Abigail Walsh, Oliver Ward

Seminars and Conferences

Each phase of the project was marked by a public information seminar. Seminars were held in Slane, County Meath, in March, June and October 2008, introducing the public to the range of research currently being carried out in the WHS, the draft research agenda and the draft research strategy, respectively. Each phase of the Research Framework was marked by a public information seminar. Over 100 people attended the March seminar, with 60 and 30 people attending the June and October seminars, respectively.

A seminar on the framework process was given in the UCD School of Archaeology in May 2008, and a talk on the research strategy was given to the Slane Historical Society in February 2009. Posters were also prepared for the Institute of Archaeologists of Ireland Spring 2008 conference and for the sixth World Archaeological Congress in July 2008.

Comments and responses received

The following individuals and organisations provided helpful comments on the draft framework documents:

Phil Barratt, Emmet Byrnes, Neil Carlin, Kerri Cleary, Bryn Coldrick, Cathy Daly, Steve Davis, Erica Devine, Palle Eriksen, Robin Edwards, George Eogan, Michael Gibbons, Robert Hensey, Louth Heritage Officer, Meriel McClatchie, Meath Archaeological and Historical Society, Edward McDonald, Niall McManus, Alan Monaghan, Muireann Ní Bhrolcháin, Victor Reijs, Tadhg Ó Dúshláine, Muiris O'Sullivan, Frank Prendergast, Royal Irish Academy Committee for Archaeology, Rick Schulting, Doug Schwartz, Alison Sheridan, Nicola Whitehouse

The draft framework document and the framework process were also reviewed externally by Prof. Robin Coningham, Durham University, and Prof. Timothy Darvill, Bournemouth University.

Appendix III

Investigations carried out in the WHS

Antiquarian investigations

- 1699 Edward Lhwyd records the discovery of the passage tomb at Newgrange; the interior of the tomb is planned. Other megalithic remains in the vicinity are recorded.
- c. 1712 Thomas Molyneux surveys Newgrange, producing a plan of the interior and a sketch of the eastern recess. A stone basin recovered from Knowth is also illustrated.
- 1769 Thomas Pownall produces detailed plans of Newgrange, including the first accurate sections of the tomb and a description of the kerbstones.
- 1786 Charles Vallancey produces a section and plan of the Newgrange interior, as well as an outside view of the mound.
- 1836 John O'Donovan, of the Ordnance Survey of Ireland, researches the placelore and folklore of County Meath for clues to the location of the legendary pagan burial ground of Brugh na Bóinne.
- 1841/42 Dowth possibly explored by J. H. Smith, member of the Royal Irish Academy's Antiquities Committee. No records survive.
- 1844 William Newenham digs out part of the passage and chamber of Site L.
- 1845 George Wilkinson publishes an account of the geology of Newgrange in a larger work on the geology and ancient architecture of Ireland.
- 1847-48 Royal Irish Academy excavations at Dowth passage tomb, directed by R. H. Frith.
- 1848 William Wakeman produces a detailed description and illustrations of Newgrange and the recently excavated Dowth in his popular guidebook of Irish antiquities.
- 1849 William Wilde further popularises the passage tomb complex in his guidebook on the antiquities of the Boyne and the Blackwater valleys; his research correctly identifies the location of the Brugh na Bóinne cemetery as being within the river bend.
- 1885 Inspector of National Monuments, Thomas Newenham Deane, carries out excavations at Dowth, discovering the southernmost tomb.
- c. 1890 Deane carries out conservation work at Newgrange. The entrance stone and some kerbstones are fully exposed; the floor of the chamber is cleared of loose material. Site K or Site L also appear to have been explored.
- 1890-91 George Coffey conducts the first modern investigations at Brú na Bóinne. Over several visits, the stones at Newgrange are photographed, a geological report is commissioned and detailed analysis of the megalithic art is undertaken. Modern plans and sections of Newgrange and Dowth are also carried out and many of the Brú na Bóinne monuments are systematically labelled. Coffey substantially revises his work on the megalithic art in 1911.
- 1894-95 The owner of Oldbridge estate discovers a cist grave in the grounds of Oldbridge House, which is subsequently investigated by George Coffey. The skeletal remains are analysed by Trinity College Dublin.
- 1896 Alfred Haddon and George Coffey examine a second cist burial uncovered at Oldbridge in 1889, the former providing a detailed analysis of the surviving skeletal remains.

Modern excavations

- 1928 R. A. S Macalister and Robert Lloyd Praeger re-expose part of the kerb at Newgrange, also investigating the fallen standing stone GC-10 as well as the decorated roofbox lintel.
- 1941 Macalister undertakes preliminary excavations at Knowth, uncovering half of the outer kerbstones of the main mound, a souterrain and the burial chamber of one of the smaller tombs.
- 1942 Joseph Raftery, of the National Museum, records a burial mound disturbed by military engineers at Rosnaree.
- 1954 The laying of cable for the installation of electric light in the Newgrange chamber is supervised by P.J. Hartnett, Archaeological Officer for Bord Fáilte. A cache of flint is uncovered between two stones in the Great Circle.
- 1954 Ó Riordáin and Ó hEochaidhe carry out trial excavations at the Great Circle close to the entrance of Newgrange.
- 1960-61 George Eogan and Frank Mitchell excavate a small, undifferentiated passage tomb at Townleyhall, 2km north of Dowth.
- 1962-98 George Eogan excavates the passage tomb cemetery at Knowth and its multi-period remains.
- 1962-75 M. J. O’Kelly excavates Newgrange, focusing on the tomb and the area in front of the mound including the Great Circle. The south-eastern pit circle and the passage tomb Site Z are revealed. Passage tombs Sites K and L, immediately west of Newgrange, are also excavated.
- 1971 David Sweetman, archaeologist with the Office of Public Works, carries out rescue excavation at Monknewtown henge ahead of agricultural development.
- 1982-84 Sweetman opens test trenches at Newgrange ahead of site management works, revealing an extension of the arc of pits and postholes uncovered by O’Kelly south-east of the tomb. Additional site management works in 1984 reveal a second, smaller pit circle to the west of the tomb.
- 1988-89 Ann Lynch, archaeologist with the Office of Public Works, excavates a large section of the Newgrange kerb, towards the back of the mound, during the restoration and consolidation of the cairn.
- 1989-90 Lynch opens a cutting close to the entrance shaft to the north tomb at Dowth to facilitate the construction of a new entrance and steps.
- 1992 The Office of Public Works carries out underwater excavation on the bed of the Boyne at Stalleen prior to the construction of a footbridge, recovering a small number of finds possibly relating to the Battle of the Boyne.
- 2001 The Department of Archaeology, UCD, carries out test excavation on the Oldbridge estate in the concluding phase of fieldwork for a pilot archaeological survey of the site of the Battle of the Boyne.
- 2002-04 Geraldine Stout completes three seasons of excavation at the Site M complex of earthworks, north-east of Knowth, to determine its date and function.
- 2004 Kieran Campbell excavates a ring ditch in Stalleen townland, revealed during archeological monitoring of topsoil-stripping for a private dwelling.
- 2007 Archaeological Projects Ltd complete excavation of a series of test pits on the Oldbridge Estate - halted in 2001 by a foot and mouth outbreak – over an area previously surveyed by metal detector.
- 2008 CRDS Ltd uncovers extensive early and later medieval settlement remains in Stalleen townland, ahead of construction works at the Donore Waste Water Treatment Plant.

Surveys

1968-74	Detailed survey of Dowth, including review of early Irish literature carried out by M. J. and Clare O'Kelly.
1974	John Patrick undertakes an archaeoastronomical investigation of the midwinter solstice at Newgrange.
1989	Frank Prendergast investigates the shadow-casting phenomena linking the Newgrange kerb and the Great Circle.
1996	David Weir takes a number of corings across the wider Brú na Bóinne area to assess its palaeoenvironmental potential.
1998-2007	Conor Brady undertakes a programme of systematic fieldwalking across a 24km ² study area centred on the WHS.
1999-2000	LGS Ltd and GeoArc Ltd carry out a geophysical investigation of the possible cursus monument in the field east of Newgrange.
2000	CRDS Ltd undertake a ploughzone assessment and geophysical survey in advance of a proposed gravel extraction quarry at Littlegrange, in the northern buffer zone of the WHS.
2001	The Department of Archaeology, UCD, carries out a pilot archaeological study of Battle of the Boyne landscape, Oldbridge.
2004	Earthsound Archaeological Geophysics carry out a series of geophysical surveys at Site M. EAG also undertake geophysical survey in the grounds of the Netterville Institute, Dowth in advance of a proposed driveway.
2004-present	The Brugh na Bóinne Research Project are undertaking detailed topographical and geophysical survey work on a sub-rectangular enclosure immediately to the west of Rosnaree ford in Newgrange townland.
2007	A LiDAR survey of the WHS, at 1 metre resolution, is commissioned by Meath County Council and The Heritage Council.
2008	An archaeoastronomical investigation of the passage orientations at Knowth Tomb 1 is carried out by Frank Prendergast and Tom Ray.
2008–present	Boyne Catchment GIS project is attempting to identify and characterise past environmental and land-use changes within the Boyne river catchment and to correlate these to the known archaeology of the area.
2008–present	Conor Brady and Kevin Barton are investigating the geophysical properties of lithic scatter sites identified during systematic fieldwalking (see above).

Appendix IV

Radiocarbon dates from the WHS

Calibrated using OxCal, dates are expressed as a date range calibrated from the original age determination at two standard deviations which broadly equates with the 95% confidence limits. The laboratory number, original uncalibrated age determination in radiocarbon years BP are also given, as well as information on material sampled, context and published references where possible.

Knowth Tombs

Pre-tomb activity

GrN-18773 5885±45 BP 4895-4868 cal BC (1.8%)
 4850-4654 cal BC (91.5%)
 4639-4617 cal BC (2.1%)

Charcoal

From spread close to Pit 3 within 'Earlier Western Neolithic Complex', Zone A, behind kerbstone 123 of Tomb 1 (Eogan and Roche 1997, 16)

GrN-20179 5080±20 BP 3957-3906 cal BC (29.3%)
 3881-3800 cal BC (66.1%)

Charcoal

From fill of Trench 1, Zone A (Eogan and Roche 1997, 39)

GrN-20180 5040±15 BP 3943-3857 cal BC (72.2%)
 3842-3834 cal BC (1.3%)
 3822-3781 cal BC (21.9%)

Charcoal

From fill of Trench 1, Zone A (Eogan and Roche 1997, 39)

GrN-20181 5345±20 BP 4315-4299 cal BC (2.7%)
 4261-4221 cal BC (20.2%)
 4211-4150 cal BC (37.4%)
 4134-4054 cal BC (35.1%)

Charcoal

From fill of Trench 6, Zone B (Eogan and Roche 1997, 39)

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

Charcoal

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

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

Charcoal

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

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

Hazel charcoal

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

Tomb 1

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

Humic acid

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

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

Charcoal

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

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

Hazel charcoal

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

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

Wood fragments

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

UB-357 4745±165 BP 3942-3857 cal BC (3.4%)
 3842-3839 cal BC (0.1%)
 3820-3085 cal BC (90.7%)
 3063-3029 cal BC (1.1%)

Charcoal

Combined charcoal from Samples 4 and 5 from basal redeposited sod-like layer of mound of Tomb 1
 (Smith *et al.* 1971, 453)

UBA-10340 4779±25 BP 3640-3619 cal BC (14.3%)
 3610-3521 cal BC (81.1%)

Cremated human bone

From blanket deposit in left recess of eastern tomb, Tomb 1
 (Kerri Cleary, pers. comm.)

UBA-10341 4449±21 BP 3328-3218 cal BC (41.6%)
 3179-3158 cal BC (4.3%)
 3123-3021 cal BC (54.1%)

Cremated human bone

From under blanket deposit of bone (UBA-10340), left recess of eastern tomb, Tomb 1
 (Kerri Cleary, pers. comm.)

UB-6350 4418±49 BP 3331-3214 cal BC (22.3%)
 3187-3156 cal BC (4.1%)
 3128-2914 cal BC (69.0%)

Bone collagen

Cremation Deposit 3, fill of Pit 2, right recess of eastern tomb, Tomb 1
 (Kerri Cleary, pers. comm.)

UB-6351 4333±43 BP 3089-3058 cal BC (5.9%)
3031-2886 cal BC (89.5%)

Bone collagen

From east corner of sillstone behind large stone, left recess of eastern tomb, Tomb 1
(Kerri Cleary, pers. comm.)

UB-6352 4529±38 BP 3364-3262 cal BC (34.4%)
3251-3099 cal BC (61.0%)

Bone collagen

Primary deposit from base of Pit 1, Segment 2, right recess of eastern tomb, Tomb 1
(Kerri Cleary, pers. comm.)

Smaller tombs

BM-786 3185±225 BP 2025-901 cal BC (95.4%)

Charcoal

From charcoal spread in gap from missing kerbstone, between kerbstone 16 and 17 of Tomb 2. Associated with Beaker pottery
(Burleigh *et al.* 1976, 33; Eogan 1991, 130; Eogan and Roche 1997, 202)

GrN-9325 3750±70 BP 2453-2445 cal BC (0.4%)
2436-2420 cal BC (1.0%)
2405-2378 cal BC (2.0%)
2350-1956 cal BC (92.0%)

Charcoal, incl. oak charcoal

Associated with Grooved Ware in left recess of Tomb 18
(Eogan 1991, 130; Kerri Cleary, pers. comm.)

BM-1078 4399±67 BP 3335-3211 cal BC (20.7%)
3191-3152 cal BC (4.9%)
3137-2899 cal BC (69.8%)

Charcoal

From within mound of Tomb 16 (Area 4, Sq 26), 0.33m below the surviving top of the mound. Provides a *terminus post quem* for Tomb 1
(Burleigh *et al.* 1976, 34; Eogan 1984, 125; Kerri Cleary, pers. comm.)

UB-318 4875±150 BP 4035-4024 cal BC (0.3%)
3993-3349 cal BC (95.1%)

Charcoal

From scatter in soil beneath mound of Tomb 17 (Area 4, Sq 43)
(Smith *et al.* 1971, 453)

UB-319 4795±185 BP 3976-3086 cal BC (94.5%)
3062-3029 cal BC (0.9%)

Charcoal

From similar location to UB-318
(Smith *et al.* 1971, 453)

BM-785 4158±126 BP 3090-3044 cal BC (1.3%)
3036-2436 cal BC (92.9%)
2421-2404 cal BC (0.4%)
2379-2349 cal BC (0.8%)

Charcoal

From within mound of Tomb 2
(Eogan 1984, 22; 1991, 130)

UBA-10338 4687±24 BP 3624-3603 cal BC (5.9%)
3524-3488 cal BC (22.1%)
3472-3372 cal BC (67.5%)

Cremated human bone

From Tomb 3 chamber
(Kerri Cleary, pers. comm.)

UBA-10339 4507±25 BP 3348-3263 cal BC (32.4%)
3246-3100 cal BC (63.0%)

Cremated human bone
From right recess of Tomb 2
(Kerri Cleary, pers. comm.)

GrN-11714 4415±50 BP 3332-3214 cal BC (23.5%)
3187-3155 cal BC (4.6%)
3130-2915 cal BC (67.3%)

Charcoal
From cremation deposit in end recess of Tomb 9
(Eogan 1991, 130; Hedges *et al.* 1993, 315; Kerri Cleary, pers. comm.)

Grooved Ware Circle

GrA-445 4130±35 BP 2873-2617 cal BC (89.5%)
2611-2581 cal BC (5.9%)

Charred material
From interior surfaces of pottery sherds in post-pit 16 of Grooved Ware circular wooden structure in front of Tomb 1
(Eogan and Roche 1997, 136, 219; Eogan and Roche 1999; Kerri Cleary, pers. comm.)

GrA-448 3985±35 BP 2617-2611 cal BC (0.4%)
2581-2455 cal BC (92.3%)
2419-2407 cal BC (1.0%)
2376-2351 cal BC (1.6%)

Charred material
From interior surfaces of pottery sherds in post-pit 7 of Grooved Ware circular wooden structure in front of Tomb 1
(Eogan and Roche 1997, 130, 219; Eogan and Roche 1999)

BM-1077 3118±48 BP 1496-1289 cal BC (93.6%)
1282-1270 cal BC (1.8%)

Charcoal
From 'Beaker Concentration A', a dark layer overlying 'Early Western Neolithic' layer northeast of Tomb 1. Associated with Beaker and Grooved Ware
(Eogan 1991, 130; Eogan and Roche 1997, 202; Kerri Cleary, pers. comm.)

Later Occupation and Burials

OxA-7670 1175±35 BP 727-737 cal AD (1.1%)
771-905 cal AD (78.8%)
912-970 cal AD (15.5%)

Dog bone
Dog skeleton from basal fill of enclosure ditch at Tomb 1
(Bronk Ramsey *et al.* 2002, 63)

UB-299 1200±70 BP 675-975 cal AD

Charcoal
From secondary occupation on summit of Tomb 1
(Smith *et al.* 1971, 452-3)

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

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

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

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

GrN-13578	1354±30 BP	632-711 cal AD (89.5%) 746-767 cal AD (5.9%)
Animal bone From Outer Ditch Layer 2, section C30/31, sample 2 (Kerri Cleary, pers. comm.)		
GrN-13579	1170±30 BP	776-901 cal AD (79.4%) 917-966 cal AD (16.0%)
Animal bone From Outer Ditch Layer 4, section C30/31, sample 4 (Kerri Cleary, pers. comm.)		
UB-4248	1227±20 BP	694-748 cal AD (23.9%) 765-880 cal AD (71.5%)
Animal bone (K90 AB87, sample 5) from ditch layer 11 (PRIA), W Quad C21/22 (Kerri Cleary, pers. comm.)		
UB-4249	1145±20 BP	782-789 cal AD (1.3%) 812-845 cal AD (7.2%) 857-974 cal AD (86.9%)
Animal bone (K93 AB85, sample 6) from ditch in front of eastern Tomb 1 (Kerri Cleary, pers. comm.)		
UB-4244	1350±20 BP	645-688 cal AD (95.4%)
Animal bone (K75 AB31) from C43, Ditch, upper fill under fireplace No.2, above shale ditch slip (Kerri Cleary, pers. comm.)		
UB-4245	1295±17 BP	666-724 cal AD (60.3%) 739-772 cal AD (35.1%)
Animal bone (K75 AB10) from C42, Ditch, upper 30cm of basal fill, a natural slip layer (Kerri Cleary, pers. comm.)		
UB-4246	1332±19 BP	651-695 cal AD (86.5%) 700-707 cal AD (1.4%) 747-765 cal AD (7.6%)
Animal bone (K75 AB21) from C42, Ditch, below first 30cm of naturally accumulated ditch fill (Kerri Cleary, pers. comm.)		
UB-4251	1185±19 BP	778-890 cal AD
Animal bone (K95 AB8) from lower fill of ditch, behind kerbstones 70-71 (Kerri Cleary, pers. comm.)		
UB-4247	1255±17 BP	680-780 cal AD (92.9%) 792-805 cal AD (2.5%)
Animal bone (K75 AB6) from C42, Ditch, beneath spread of charcoal (Kerri Cleary, pers. comm.)		
UB-4250	1203±20 BP	730-735 cal AD (0.7%) 771-889 cal AD (94.7%)
Animal bone (K94 AB92, sample 7) from ditch, above area of paving, behind kerbstones 73-72 (Kerri Cleary, pers. comm.)		
UB-4119	1182±17 BP	778-891 cal AD
Animal bone (K95 AB9) from area in front, behind kerbstone 74, Sq7, stony fill in bottom layer of outer ditch (Kerri Cleary, pers. comm.)		

GrN-15368	4375±40 BP	3261-3258 cal BC (0.3%) 3097-2902 cal BC (95.1%)
Human bone From Burial 1 (Kerri Cleary, pers. comm.)		
GrN-15369	1830±30 BP	86-109 cal AD (3.7%) 119-253 cal AD (91.7%)
Human bone From Burial 4 (Kerri Cleary, pers. comm.)		
GrN-15370	1920±30 BP	2-137 cal AD (94.9%) 199-206 cal AD (0.5%)
Human bone From Burial 7 (Kerri Cleary, pers. comm.)		
GrN-15371	1960±30 BP	40-88 cal AD (91.5%) 104-121 cal AD (3.9%)
Human bone From Burial 8/9 (Kerri Cleary, pers. comm.)		
GrN-15372	2095±20 BP	175-50 cal BC
Human bone From Burial 10 (Kerri Cleary, pers. comm.)		
GrN-15384	1355±20 BP	645-685 cal AD (95.4%)
Human bone From Knowth 11/12 (Kerri Cleary, pers. comm.)		
GrN-15385	1120±30 BP	784-787 cal AD (0.3%) 823-842 cal AD (1.9%) 862-994 cal AD (93.2%)
Human bone From Knowth 24/25 (Kerri Cleary, pers. comm.)		
GrN-15371	1270±25 BP	668-780 cal AD (94.6%) 795-800 cal AD (0.8%)
Human bone From Burial 14, at base of ditch (Kerri Cleary, pers. comm.)		
GrA-13595	1920±50	38-10 cal BC (4.1%) 3 cal BC -219 cal AD (91.3%)
Bone carbonate Burial 21(?) - crouched burial of adult female and child with large number of beads (Lanting and Brindley 1998, 6)		
GrA-13334	1880±40	53-235 cal AD (95.4%)
Bone carbonate Burial 7(?) – unburnt bone (Lanting and Brindley 1998, 4)		
GrA-13335	1260±40	668-870 cal AD (95.4%)
Bone carbonate Burial 14(?) – unburnt bone (Lanting and Brindley 1998, 4)		

OxA-3324	470±70	1306-1364 cal AD (11.8%) 1385-1528 cal AD (69.9%) 1554-1633 cal AD (13.7%)
-----------------	--------	--

Bone collagen

Burial 25, located between Tombs 1 and 13 in pit dug through slip from the mounds. All three of the Burial 25 dates appear contaminated by later bone as the dates don't match the late Iron Age grave goods (Hedges *et al.* 1993, 315; Kerri Cleary, pers. comm.)

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

Bone collagen

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

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

Bone collagen

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

Newgrange

Main tomb

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

Charcoal

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

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

Charcoal

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

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

Charcoal

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

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

Peat

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

UB-360	1650±45 BP	259-295 cal AD (7.6%) 322-536 cal AD (87.8%)
---------------	------------	---

Humic acid

From upper sod layer within mound, 60 to 90 cm above old ground surface (Smith *et al.* 1971, 452)

UB-361	4535±105 BP	3520-2923 cal BC (95.4%)
---------------	-------------	--------------------------

Humic acid

From basal sod layer
(Smith *et al.* 1971, 452)

Late Neolithic/Beaker Occupation

GrN-6342	3885±35 BP	2471-2281 cal BC (92.0%) 2250-2231 cal BC (2.6%) 2219-2213 cal BC (0.7%)
-----------------	------------	--

Charcoal

From fill of pit, intermixed with Beaker pottery and charred seeds. South of and adjacent to Hearth 1. (O'Kelly 1972, 227; O'Kelly *et al.* 1983, 13, 15)

GrN-6343	3990±40 BP	2621-2451 cal BC (91.5%) 2445-2439 cal BC (0.4%) 2420-2405 cal BC (1.3%) 2378-2350 cal BC (2.2%)
-----------------	------------	---

Charcoal

From pit containing pottery, northwest of and adjacent to Hearth 1. (O'Kelly 1972, 227; O'Kelly *et al.* 1983, 13, 15)

GrN-6344	4050±40 BP	2851-2813 cal BC (7.9%) 2743-2728 cal BC (1.3%) 2695-2686 cal BC (0.8%) 2680-2472 cal BC (85.4%)
-----------------	------------	---

Charcoal

From eastern end of short curved trench containing mixed pottery. South of Hearth 1. (O'Kelly 1972, 227; O'Kelly *et al.* 1983, 13, 16)

South-eastern Pit Circle

UB-2392	3985±55 BP	2834-2819 cal BC (1.2%) 2661-2650 cal BC (0.7%) 2635-2333 cal BC (91.8%) 2325-2300 cal BC (1.7%)
----------------	------------	---

Charcoal

From pit containing pottery in 'multiple arc of pits' (pit circle), southeast of tomb. (Eogan 1991, 130; O'Kelly *et al.* 1983, 12-13, 21)

UB-2393	3985±45 BP	2623-2396 cal BC (90.5%) 2385-2346 cal BC (4.9%)
----------------	------------	---

Charcoal

From pit containing pottery in 'multiple arc of pits' (pit circle), southeast of tomb. (Eogan 1991, 130; O'Kelly *et al.* 1983, 12-13, 21)

UB-2394	3875±90 BP	2578-2125 cal BC (92.8%) 2091-2043 cal BC (2.6%)
----------------	------------	---

Charcoal

From pit containing pottery in 'multiple arc of pits' (pit circle), southeast of tomb. (Eogan 1991, 130; O'Kelly *et al.* 1983, 12-13, 21)

GrN-11800	4070±40 BP	2859-2810 cal BC (13.8%) 2752-2722 cal BC (4.7%) 2701-2486 cal BC (76.8%)
------------------	------------	---

Charcoal

From animal cremation deposit (Burial 7) inserted into south side of Pit 14, inner arc of pits, Cutting 1 (Sweetman 1985, 200-201, 218)

GrN-11801	4070±60 BP	2867-2804 cal BC (15.3%) 2777-2473 cal BC (80.1%)
Charcoal From clay-lined Pit 11, Cutting 1 (Sweetman 1985, 199, 218)		
GrN-11802	4030±35 BP	2832-2821 cal BC (1.8%) 2631-2471 cal BC (93.6%)
Charcoal From Pit 6, outer arc of pits, Cutting 1 (Sweetman 1985, 218)		
GU-1617	4050±65 BP	2872-2801 cal BC (12.9%) 2792-2787 cal BC (0.3%) 2780-2463 cal BC (82.2%)
Charcoal From Pit 1, outer arc of pits, Cutting 1 (Sweetman 1985, 218)		
GU-1618	3980±75 BP	2856-2812 cal BC (3.6%) 2748-2724 cal BC (1.2%) 2698-2282 cal BC (89.6%) 2249-2232 cal BC (0.8%) 2218-2214 cal BC (0.2%)
Charcoal From Pit 2, inner arc of pits, Cutting 1 (Sweetman 1985, 218)		
GU-1619	3885±70 BP	2567-2522 cal BC (4.3%) 2498-2195 cal BC (88.5%) 2176-2145 cal BC (2.6%)
Charcoal From Pit 3, outer arc of pits, Cutting 1 (Sweetman 1985, 218)		
GU-1620	4000±65 BP	2853-2812 cal BC (4.3%) 2746-2726 cal BC (1.2%) 2697-2335 cal BC (88.4%) 2324-2301 cal BC (1.5%)
Charcoal From animal cremation deposit in burial hole (Burial 5), Cutting 1 (Sweetman 1985, 218)		
GU-1621	3890±75 BP	2573-2512 cal BC (6.4%) 2505-2191 cal BC (85.8%) 2181-2141 cal BC (3.2%)
Charcoal From animal cremation deposit in burial hole (Burial 25), Cutting 3 (Sweetman 1985, 218)		
GU-1622	3905±70 BP	2574-2199 cal BC (94.9%) 2161-2153 cal BC (0.5%)
Charcoal From occupation spread inside pit circle, Cutting 1 (Sweetman 1985, 200-218)		
GU-1771	3935±70 BP	2620-2203 cal BC (95.4%)
Charcoal From charcoal deposit in clay-lined Pit 18, Cutting 3 (Sweetman 1985, 206-7, 218)		

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

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

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

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

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

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

Western Pit Circle

GrN-12828 4000±30 BP 2577-2468 cal BC (95.4%)

Charcoal
From top fill of Pit 1, also containing flint and Beaker pottery fragment
(Sweetman 1987, 286)

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

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

Site M

UB-6566 1448±31 BP 561-652 cal AD

Unknown material
From posthole feature A31, Square A
(Stout and Stout 2008, 156)

UB-6569 1301±31 BP 660-773 cal AD

Unknown material
From charcoal spread feature F11c, Square F
(Stout and Stout 2008, 156)

UB-6571 1396±32 BP 595-675 cal AD

Unknown material
From grave B84, Square B
(Stout and Stout 2008, 156)

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

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

UB-6578	1130±32 BP	782-790 cal AD (1.3%) 810-849 cal AD (6.8%) 855-990 cal AD (87.2%)
Unknown material From grave H14, Cutting H (Stout and Stout 2008, 157)		
UB-6579	1467±31 BP	548-646 cal AD
Unknown material From trench feature D17, Square D (Stout and Stout 2008, 157)		
UB-6580	1461±33 BP	548-649 cal AD
Unknown material From posthole feature A31, Square A (Stout and Stout 2008, 157)		
UB-6581	1980±32 BP	48 cal BC-82 cal AD
Unknown material From basal layer of ditch 2, Square K (Stout and Stout 2008, 157)		
UB-6587	1198±31 BP	712-746 cal AD (6.1%) 767-896 cal AD (87.3%) 924-939 cal AD (1.9%)
Unknown material From curved trench feature B21, Square B (Stout and Stout 2008, 158)		
UB-7018	1112±30 BP	712-746 cal AD (6.1%) 767-896 cal AD (87.3%) 924-939 cal AD (1.9%)
Unknown material From upper fill of curved trench feature B21, Square B (Stout and Stout 2008, 158)		
UB-7019	1427±32 BP	571-660 cal AD
Unknown material From layer 7, ditch 2, Cutting 1 (Stout and Stout 2008, 158)		
UB-7020	1277±30 BP	662-780 cal AD (93.5%) 792-805 cal AD (1.9%)
Unknown material From layer 3, ditch 2, Cutting 1 (Stout and Stout 2008, 158-9)		
UB-7021	5398±38 BP	4343-4225 cal BC (79.6%) 4205-4162 cal BC (9.8%) 4130-4113 cal BC (2.1%) 4101-4072 cal BC (3.9%)
Unknown material From bottom fill of trench M28, Square M (Stout and Stout 2008, 159)		
UB-7022	1347±32 BP	636-721 cal AD (84.7%) 741-770 cal AD (10.7%)
Unknown material From posthole L25a, Cutting L (Stout and Stout 2008, 159)		

Monknewtown

UB-728 3810±45 BP 2459-2136 cal BC
Oak and birch charcoal
From young oak and birch branches and older birch wood from around hearth of Beaker structure
(Smith *et al.* 1974, 269)

UB-729 2445±40 BP 756-684 cal BC (22.4%)
669-407 cal BC (73.0%)
Hazel charcoal
From grey cultural layer stratified above gravel surface, from burial area, northern half of site
(Smith *et al.* 1974, 269)

UB-730 2495±70 BP 791-414 cal BC
Hazel charcoal
From small hearth directly on gravels, from burial area, northern half of site
(Smith *et al.* 1974, 269)

UB-731 1130±70 BP 709-747 cal AD (3.9%)
766-1025 cal AD (91.5%)
Charcoal, incl. alder charcoal
From two small hearths directly in gravels, from burial area, northern half of site
(Smith *et al.* 1974, 270)

UB-732 4750±65 BP 3648-3488 cal BC (65.7%)
3472-3372 cal BC (29.7%)
Charcoal, incl. alder charcoal
From small hearth directly in gravel, from burial area, northern half of site
(Smith *et al.* 1974, 270)

UB-733 2440±65 BP 764-679 cal BC (22.3%)
674-402 cal BC (73.1%)
Charcoal, incl. ash charcoal
From small hearth directly on gravels, from burial area, northern half of site
(Smith *et al.* 1974, 270)

UB-734 3465±80 BP 2016-1996 cal BC (1.2%)
1980-1606 cal BC (92.5%)
1575-1537 cal BC (1.7%)
Charcoal, incl. gorse charcoal
From small hearth directly on gravels, from burial area, northern half of site
(Smith *et al.* 1974, 270)

Sheephouse

Field 2, Oldbridge-Sheephouse Bypass

Wk-23993 798±30 BP 1185-1277 cal AD
Carbonised bread wheat grain
From secondary fill F215 of medieval ditch F207
(Matthew Seaver, pers. comm.)

Field 4, Oldbridge-Sheephouse Bypass

Wk-24021 3835±31 BP 2458-2418 cal BC (7.5%)
2408-2375 cal BC (8.5%)
2368-2200 cal BC (79.4%)
Hazel charcoal
From primary deposit F9 of linear ditch F5, also containing Bronze Age pottery and lithics
(Matthew Seaver, pers. comm.)

Appendix V

Areas for Further Reading

Guides and general popular accounts

The Boyne tombs

- Coffey, G. 1912. *New Grange and other incised tumuli in Ireland*. Dublin.
- Eogan, G. 1986. *Knowth and the Passage Tombs of Ireland*. London: Thames and Hudson.
- Mac Uistin, L. 2006. *Exploring Newgrange*, 3rd edition. Dublin: O'Brien Press.
- O'Kelly, C. 1978. *Illustrated guide to Newgrange and the other Boyne monuments*. Blackrock.
- O'Kelly, M. 1982. *Newgrange: Archaeology, Art and Legend*. London: Thames and Hudson.
- Ó Ríordáin, S. and Daniel, G. 1964. *Newgrange and the Bend of the Boyne*. London: Thames and Hudson.
- Stout, G. 2002. *Newgrange and the Bend of the Boyne*. Cork: Cork University Press.
- Stout, G. and Stout M. 2008. *Newgrange*. Cork: Cork University Press.
- Wakeman, W. 1848. *A handbook of Irish antiquities, pagan and Christian: especially of such as are easy of access from the Irish metropolis*, Dublin: James McGlashan
- Wilde, W. 1849. *The beauties of the Boyne and its tributary, the Blackwater*. Dublin.

The Battle of the Boyne

- Lenihan, P. 2003. *1690 Battle of the Boyne*. Stroud: Tempus.
- McNally, M. 2005. *Battle of the Boyne 1690: The Irish Campaign for the English Crown*. Oxford: Osprey.

Antiquarian accounts

- Beranger, G. 1775. Beranger sketch book. Royal Irish Academy MS 3C 30 f4.
- Beaufort, L. C. 1828. An essay upon the state of architecture and antiquities, previous to the landing of the Anglo-Normans in Ireland. *Transactions of the Royal Irish Academy* 15, 101-242.
- Coffey, G. 1892-6. On the tumuli and inscribed stones at New Grange, Dowth and Knowth. *Transactions of the Royal Irish Academy* 30, 1-96.
- Coffey, G. 1912. *New Grange and other incised tumuli in Ireland*. Dublin.
- De Latocnaye, E. 1797. *Promenade d'un Français dans l'Irlande*. Dublin.
- Fergusson, J. 1872. *Rude stone monuments in all countries*. London.
- Haddon, A.C. 1896-98. Studies in Irish Craniology: III. A Neolithic cist burial at Oldbridge, County of Meath. *Proceedings of the Royal Irish Academy* 20, 570-85.
- Herity, M. 1967. From Lhuyd to Coffey: new information from unpublished descriptions of the Boyne Valley tombs. *Studia Hibernica* 7, 127-45.
- Herity, M. (ed.) 2001. *Ordnance Survey Letters Meath: Letters containing information relative to the antiquities of the County of Meath collected during the progress of the Ordnance Survey in 1836*, edited with an introduction by Michael Herity. Dublin: Four Masters Press.
- Hoare, R. C. 1807. *A journal of a tour in Ireland in AD 1806*. London.
- Ledwich, E. 1804. *The Antiquities of Ireland*, 2nd edition. Dublin: John Jones.
- Lefroy, G. 1865. Proceedings. *Archaeological Journal* 22, 87-8.
- Molyneux, T. 1726. Part III. A Discourse concerning the Danish Mounds, Forts and Towers in Ireland; never before published. In G. Boate, *A Natural History of Ireland in Three Parts, by Several Hands*. Dublin: George Grierson.
- Petrie, G. 1833. New Grange. *Dublin Penny Journal* 39(1), 305-6.
- Pownall, T. 1773. A description of the sepulchral monument at Newgrange, near Drogheda, in the county of Meath, in Ireland. *Archaeologia* ii.
- Story, G. 1693. *An impartial history of the wars of Ireland*. London.
- Vallancey, C. 1786. *Collectanea de Rebus Hibernicis*, Volume IV(1). Dublin: Luke White.
- Wilde, W. 1844-7. On the discovery of a small tumulus on the western side of the great mound of Newgrange. *Proceedings of the Royal Irish Academy* 3, 262.
- Wilde, W. 1847. Irish rivers. *Dublin University Magazine* 5, 732-43.

Wilde, W. 1849. *The beauties of the Boyne and its tributary, the Blackwater*. Dublin.

Wilkinson, G. 1845. *Practical geology and ancient architecture of Ireland*. London.

Wright, T. 1748. *Louthiana*. London.

20th and 21st century investigations in the Brú na Bóinne area

Brady, C. 2007. The lithic landscape of the Newgrange environs: an introduction. In M. Larsson & M. Parker Pearson (eds), *From Stonehenge to the Baltic: living with cultural diversity in the third millennium BC*, BAR International Series 1692, 213-20. Oxford: Archaeopress.

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.

Eogan, G. 1963. 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. 1984. *Excavations at Knowth 1*. Dublin: Royal Irish Academy.

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

Fenwick, J., Warner, R and Eogan, G. 2009. Revealing hidden details of the ancient landscape at Newgrange, Brugh na Bóinne World Heritage Site, Co. Meath. *Ríocht na Midhe* 20, 5-23.

Hartnett, P. 1954. Newgrange passage grave. *Journal of the Royal Society of Antiquaries of Ireland* 84, 181-2.

Macalister, R. A. S. 1943. A preliminary report on the excavation of Knowth. *Proceedings of the Royal Irish Academy* 49C, 131-66.

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

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

Byrne, F.J., Jenkins, W., Kenny, G. and Swift, C. 2008. *Excavations at Knowth 4. Historical Knowth and its Hinterland*. Dublin: Royal Irish Academy.

O'Kelly, M. 1982. *Newgrange. Archaeology, Art and Legend*. London: Thames and Hudson.

O'Kelly, M., Cleary, R. and 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. and O'Kelly, C. 1978. Three passage-graves at Newgrange, Co. Meath. *Proceedings of the Royal Irish Academy* 78C, 249-352.

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

Ó Riordáin, S. and Ó hEochaidhe, M. 1956. Trial excavation at Newgrange. *Journal of the Royal Society of Antiquaries of Ireland* 86, 52-61.

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.

Sweetman, P. D. 1976. An earthen enclosure at Monknewtown, Slane, Co. Meath. *Proceedings of the Royal Irish Academy* 76C, 25-73.

Sweetman, P. D. 1985. A Late Neolithic/Early Bronze Age pit circle at Newgrange, Co. Meath. *Proceedings of the Royal Irish Academy* 85C, 195-222.

Sweetman, P. D. 1987. Excavation of a Late Neolithic/Early Bronze Age site at Newgrange, Co. Meath. *Proceedings of the Royal Irish Academy* 87C, 283-98.

Newgrange re-construction

Cooney, G. 2006. Newgrange – a view from the platform. *Antiquity* 80, 697-710.

Eriksen, P. 2004. Newgrange og den hvide mur. *Kuml* 2004, 45-77.

Eriksen, P. 2006. The rolling stones of Newgrange. *Antiquity* 80, 709-10.

Eriksen, P. 2008. The great mound of Newgrange. An Irish multi-period mound spanning from the Megalithic Tomb period to the Early Bronze Age. *Acta Archaeologica* 79, 250-73.

O'Kelly, M. 1979. The restoration of Newgrange. *Antiquity* 53, 205-10.

O'Kelly, M. 1982. *Newgrange. Archaeology, Art and Legend*. London: Thames and Hudson.

Stout, G. and Stout M. 2008. *Newgrange*. Cork: Cork University Press.

Archaeoastronomy

- Patrick, J. 1974. Midwinter sunrise at Newgrange. *Nature* 249, 517-19.
- Prendergast, F. 1991a. New data on Newgrange. *Technology Ireland* 22, 22-5.
- Prendergast, F. 1991b. Shadow casting phenomena at Newgrange. *Survey Ireland* 9, 9-18.
- Ray, T. 1989. The winter solstice phenomenon at Newgrange, Ireland: accident or design? *Nature* 337, 343-5.

Megalithic art

- Dronfield, J. 1995. Subjective vision and the sources of Irish megalithic art. *Antiquity* 69, 539-49.
- 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 Megalítico*, Brigantium 10, 217-234. La Coruña.
- Eogan, G. 1999. Megalithic art and society. *Proceedings of the Prehistoric Society* 65, 415-46.
- O'Kelly, C. 1973. Passage grave art in the Boyne Valley. *Proceedings of the Prehistoric Society* 39C, 354-82.
- O'Sullivan, M. 1995. *Megalithic art in Ireland*. Dublin: Country House.
- O'Sullivan, M. 2006. The Boyne and beyond: A review of megalithic art in Ireland. In R. Jousaume, L. Laporte and C. Scarre (eds), *Origine et Développement du Mégalithisme de l'Ouest de l'Europe*, 651-88. Bougon: Musée des Tumulus de Bougon.
- 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 and E. Shee Twohig (eds), *New agendas in Irish prehistory: papers in commemoration of Liz Anderson*: 89-105. Bray: Wordwell.

Artefacts, materials and sources

- Eogan, G. and Richardson, H. 1982. Two maceheads from Knowth, Co. Meath. *Journal of the Royal Society of Antiquaries of Ireland* 112, 123-138.
- Meighan, I., Simpson, D. & Hartwell, B. 2002. Newgrange – sourcing of its granitic cobbles. *Archaeology Ireland* 16(1), 32-5.
- Meighan, I., Simpson, D., Hartwell, B., Fallick, A. & Kennan, P. 2003. Sourcing the quartz at Newgrange, Brú na Bóinne, Ireland. In G. Burenhult (ed.), *Stones and Bones. Formal disposal of the dead in Atlantic Europe during the Mesolithic-Neolithic interface 6000-3000 BC*, BAR International Series 1201, 247-251. Oxford: Archaeopress.
- Mitchell, G. F. 1992. Notes on some non-local cobbles at the entrances to the passage-graves at Newgrange and Knowth, County Meath. *Journal of the Royal Society of Antiquaries of Ireland* 122, 128-45.
- O'Kelly, M. and Shell, C. 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.
- Phillips, A., Corcoran, M. and Eogan, G. 2001. Derivation of the source localities for the kerb, orthostat and standing stones of the Neolithic passage graves of the Boyne Valley, Co. Meath. Unpublished report for the Heritage Council. Department of Geology, Trinity College Dublin.
- Phillips, A., Corcoran, M. and Eogan, G. 2002. Identification of the source area for megaliths used in the construction of the Neolithic passage graves of the Boyne Valley, Co. Meath. Unpublished report for the Heritage Council. Department of Geology, Trinity College Dublin.

The Boyne tombs in their wider archaeological and landscape setting

- Brady, C. 2002. Earlier prehistoric settlement in the Boyne Valley. *Archaeology Ireland* 16(3): 8-12.
- Brady, C. 2007. A landscape survey of the Newgrange environs: earlier prehistoric settlement at Brú na Bóinne, Co. Meath. Unpublished PhD thesis, University College Dublin.
- Mitchell, G. F. 1995. Did the tide once flow as far as Newgrange? *Living Heritage* xii, 34.
- Cooney, G. 1990. The place of megalithic tomb cemeteries in Ireland. *Antiquity* 64, 741-53.
- 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 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.

Herity, M. 1974. *Irish passage graves: Neolithic tomb-builders in Ireland and Britain, 2500 BC*. Dublin: Irish University Press.

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.

Heritage and archaeological resource management

Cooney, G. 1996. Building the Future on the Past: Archaeology and the Construction of National Identity in Ireland. In M. Miaz-Andreu and T. C. Champion (eds), *Nationalism and Archaeology in Europe*, 146-163 London: UCL Press.

Daly, C. 2008. Climate Change and World Heritage: A Vulnerability Assessment of Brú na Bóinne, Ireland. Unpublished MA thesis, Brandenburg Technical University.

Harvey, D. 2005. Newgrange, heritage and the Irish nation: two moments of transformation. In M. McCarthy (ed.), *Ireland's Heritages. Critical Perspectives and Memory and Identity*, 123-38. Hampshire: Ashgate.

Hayes, D. and Patton, M. 2001. Proactive crisis-management strategies and the archaeological heritage. *International Journal of Heritage Studies* 7 (1), 37-58.

McManus, R. 1997. Heritage and tourism in Ireland - an unholy alliance? *Irish Geography* 30, 90-98.

O'Neill, A. 1989. Boyne Valley Archaeological Park: a study in archaeological resource management. Report commissioned by Bord Fáilte Eireann.

Ronayne, M. 2001. The political economy of landscape: conflict and value in a prehistoric landscape in the Republic of Ireland – ways of telling. In B. Bender and M. Winer (eds), *Contested Landscapes: Movement, Exile and Place*, 149-64. Oxford: Berg.

References cited in the text

- 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.
- Anonymous. 1895. Discovery of an artificial cave at Oldbridge, County Meath. *Journal of the Royal Society of Antiquaries of Ireland* 25, 86.
- Balfour, B. 1890. Round tower at Proudfootstown. *Journal of the Royal Society of Antiquaries of Ireland* 21, 247-8.
- Barclay, A. and Bayliss, A. 1999. Cursus monuments and the radiocarbon problem. In A. Barclay and J. Harding (eds), *Pathways and Ceremonies: The Cursus Monuments of Britain and Ireland*, 11-29. Oxford: Oxbow.
- Barton, K., McCarthy, M., Condit, T. and Buckley, V. *In prep.* Newgrange Passage Tomb to the Cursus; Multi-method Geophysical Survey discovers a pit alignment and other features.
- Bateson, J. 1973. Roman material from Ireland: a re-consideration. *Proceedings of the Royal Irish Academy* 75C, 21-97.
- Bergh, S. 1995. *Landscape of the Monuments*. Stockholm: Riksantikvarieämbet Arkeologiska Undersökningar.
- 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* 13, 8-17.
- 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.
- Bradley, R. 1998. *The Significance of Monuments*. London: Routledge.
- Bradshaw, B. 1974. *The dissolution of the monastic properties of Ireland under Henry VIII*. Cambridge.
- 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. 2007a. A landscape survey of the Newgrange environs: earlier prehistoric settlement at Brú na Bóinne, Co. Meath. Unpublished PhD thesis, University College Dublin.
- Brady, C. 2007b. The lithic landscape of the Newgrange environs: an introduction. In M. Larsson & M. Parker Pearson (eds), *From Stonehenge to the Baltic: living with cultural diversity in the third millennium BC*, BAR International Series 1692, 213-20. Oxford: Archaeopress.
- 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.
- Bronk Ramsey, C., Higham, T.F.G., Owen, D.C., Pike, A.W.G. and Hedges, R.E.M. 2002. Radiocarbon dates from the Oxford AMS system: *Archaeometry* datelist 31. *Archaeometry* 44 (3) Supplement 1, 1-149.
- Brooks, A., Bradley, S.L., Edwards, R., Milne, G.A., Horton, B.P. and Shennan, I. 2008. Post-glacial relative sea-level observations from Ireland and their role in glacial rebound modelling. *Journal of Quaternary Science* 23(2), 175-192.
- 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]).

- Buckley, V. 1988/89. Meath souterrains: some thoughts on Early Christian distribution patterns. *Ríocht na Midhe* 8, 64-7.
- Burleigh, R., Hewson, A. and Meeks, N. 1976. British Museum natural radiocarbon measurements VIII. *Radiocarbon* 18 (1), 16-42.
- Byrne, F. J. 1987. *Irish Kingship and High Kings* (Rev. second edition). London: Batsford.
- Byrne, F.J., Jenkins, W., Kenny, G. and Swift, C. 2008. *Historical Knowth and its Hinterland*. Dublin: Royal Irish Academy.
- Byrnes, E. 1999. Recent excavations at Richardstown, Co. Louth. *Archaeology Ireland* 13(4), 33.
- Byrnes, E. 2000. Richardstown. Archaeological complex. In I. Bennett (ed.), *Excavations 1999: Summary accounts of archaeological excavations in Ireland*, 221-2. Bray: Wordwell.
- Campbell, K. 1995. Sheephouse. Fulachta Fiadh. In I. Bennett (ed.), *Excavations 1994: Summary Accounts of Archaeological Excavations in Ireland*. Bray: Wordwell.
- Campbell, K. 2002a. Balgatheran 2. Prehistoric pits. In I. Bennett (ed.), *Excavations 2000: Summary accounts of archaeological excavations in Ireland*, 212-213. Bray: Wordwell.
- Campbell, K. 2002b. Mell 6. Prehistoric pit. In I. Bennett (ed.), *Excavations 2000: Summary accounts of archaeological excavations in Ireland*, 237. Bray: Wordwell.
- Campbell, K. 2002c. Oldbridge 1. Neolithic pit. In I. Bennett (ed.), *Excavations 2000: Summary accounts of archaeological excavations in Ireland*, 262. Bray: Wordwell.
- Campbell, K. 2002d. 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*, 348-9. Bray: Wordwell.
- Carey, H. 1998. The kingdom and lordship of Meath: 1100-c.1215. Unpublished Mlitt thesis, Trinity College Dublin.
- 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.
- Caspari, W. A. 1983. Appendix II: Identification of seeds. In M. O' Kelly, R. Cleary and D. Lehane 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.
- Charles-Edwards, T. 2000. *Early Christian Ireland*. Cambridge: Cambridge University Press.
- Clinton, M. 2001. *The souterrains of Ireland*. Bray: Wordwell.
- Cleary, R. 1983. Part II: the ceramic assemblage. In M. O' Kelly, R. Cleary and D. Lehane, *Newgrange, Co. Meath, Ireland. The Late Neolithic/Beaker Period Settlement*, BAR International Series 190, 58-117. Oxford: British Archaeological Reports.
- Coffey, G. 1893-6. On a double-cist grave and remains recently discovered at Oldbridge, Co. Meath. *Proceedings of the Royal Irish Academy* 19, 747-52.
- Coffey, G. 1892-6. On the tumuli and inscribed stones at New Grange, Dowth and Knowth. *Transactions of the Royal Irish Academy* 30, 1-96.
- Coffey, G. 1912. *New Grange (Brugh na Bóinne) and other incised tumuli in Ireland. The influence of Crete and the Aegean in the extreme west of Europe in early times*. Dublin: Hodges Figgis & Co. Ltd.
- 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. Late Neolithic ritual – earthen ceremonial enclosures. In T. Condit & G. Cooney (eds), *Brú na Bóinne: Newgrange, Knowth, Dowth and the River Boyne*, supplement to *Archaeology Ireland*, 22-3.
- 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.
- Connolly, P. (ed.) 2002. *Statutes rolls of the Irish parliament, Richard III-Henry VIII*. Dublin: Four Courts Press.
- Conway, M. 2003a. Report on resolution of archaeological site, Platin Fort. Northern Motorway Road Project, Contract 7, Gormanstown – Monasterboice. Unpublished report for Archaeological Consultancy Services Ltd. on behalf of Meath County Council.
- Conway, M. 2003b. Platin Fort, Platin. Inland promontory fort and environs. In I. Bennett(ed.), *Excavations 2001: Summary accounts of archaeological excavations in Ireland*, 316-17. Bray: Wordwell.
- Conyngham, A. 1844. Description of some gold ornaments recently found in Ireland. *Archaeologia* 30, 137.
- Cooney, G. 1991. Irish Neolithic landscapes and land use systems: the implications of field systems. *Rural History* 2(2), 123-139.
- Cooney, G. 1996. Standing stones: marking the Neolithic landscape. *Archaeology Ireland* 36, 29-30.
- Cooney, G. 2000. *Landscapes of Neolithic Ireland*. London: Routledge.
- Cooney, G. 2004. Neolithic stone axe quarries and production sites in Scotland and Ireland. In I. Shepherd & G. Barclay (eds), *Scotland in ancient Europe*, 191-203. Edinburgh: Society of Antiquaries of Scotland.
- Cooney, G. 2006. Newgrange – a view from the platform. *Antiquity* 80, 697-710.
- Cooney, G. and Brady, C. 1998. The Red Mountain Transect: a pilot fieldwalking study. Unpublished report, University College Dublin.
- Cooney, G., Byrnes, E., Brady, C. and O’Sullivan, A. 2001. A Pilot Archaeological Survey of the Site of the Battle of the Boyne, Oldbridge Estate, Co. Meath. Unpublished report for Dúchas, The Heritage Service.
- Cooney, G., Byrnes, E., Brady C. and O’Sullivan A. 2002. The archaeology of the battle of the Boyne at Oldbridge, Co. Meath. *Archaeology Ireland* 16(4), 8–12.
- Cooney, G. and Grogan, E. 1994. *Irish Prehistory: a social perspective*. Bray: Wordwell.
- 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.
- Daly, C. 2008. Climate Change and World Heritage: A Vulnerability Assessment of Brú na Bóinne, Ireland. Unpublished MA thesis, Brandenburg Technical University.
- Daniel, G. 1967a. Reviews. *Antiquity* 41(164), 326.
- Daniel, G. 1967b. *The origins and growth of archaeology*. London: Penguin.
- 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.

- Delaney, S. and Roycroft, N. 2003. Early medieval enclosure at Balrigan, Co. Louth, *Archaeology Ireland* 17, 16-9.
- Dimock, J. F. (ed.) 1867. *Topographia Hibernica et expugnatio Hibernica*, Rolls Series 21, Giraldi Cambrensis Opera Volume 5. London.
- 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.
- Doyle, I. W. 2001. The Early Medieval pottery from excavations at Colp West, Co Meath. Unpublished specialist report for Margaret Gowen & Company Ltd.
- Doyle, I. W. 2008. Appendix IX. A sherd of E ware – Gaulish imported pottery. In G. Stout and M. Stout, *Excavation of an Early Medieval Secular Cemetery at Knowth Site M, County Meath*, 160-1. Bray: Wordwell.
- Dronfield, J. 1995. Subjective vision and the sources of Irish megalithic art. *Antiquity* 69, 539-49.
- 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. 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. 1963. 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. 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. 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. 1977. 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. 1984. *Excavations at Knowth 1*. Dublin: Royal Irish Academy.
- Eogan, G. 1986. *Knowth and the Passage Tombs of Ireland*. London: Thames and Hudson.
- 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 Megalítico*, Brigantium 10, 217-234. La Coruña.
- 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. 2009. Dowth passage tomb: note on possible structural sequence. *Ríocht na Midhe* 20, 1-4.
- 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 Roche, H. 1997. *Excavations at Knowth 2*. Dublin: Royal Irish Academy.
- 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.
- Eogan, J. 2000. Bettystown. Prehistoric/multi-period site. In I. Bennett (ed.), *Excavations 1998: Summary accounts of archaeological excavations in Ireland*, 161. Bray: Wordwell.
- Eriksen, P. 2004. Newgrange og den hvide mur. *Kuml* 2004, 45-77.
- Eriksen, P. 2006. The rolling stones of Newgrange. *Antiquity* 80, 709-10.
- Eriksen, P. 2008. The great mound of Newgrange. An Irish multi-period mound spanning from the Megalithic Tomb period to the Early Bronze Age. *Acta Archaeologica* 79, 250-73.
- Feilden, F.M. & Jokilehto, J. 1993 *Management Guidelines for World Cultural Heritage Sites*. Rome: ICCROM.
- Fenwick, J., Warner, R and Eogan, G. 2009. Revealing hidden details of the ancient landscape at Newgrange, Brugh na Bóinne World Heritage Site, Co. Meath. *Ríocht na Midhe* 20, 5-23.
- Fitzgerald, M. 2007a. Revolutionising our understanding of Prehistoric Basketry. *Seanda* 2, 49-51.
- Fitzgerald, M. 2007b. Catch of the Day at Clowanstown, Co. Meath. *Archaeology Ireland* 21(4), 12-15.
- 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. 1989. Colp West. In I. Bennett (ed.), *Excavations 1988: Summary Accounts of Archaeological Excavation in Ireland*, 31-2. 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. 1980. The mottes of the Norman liberty of Meath. In H. Murtagh (ed.), *Irish midland studies: essays in commemoration of N. W. English*, 39-56. Athlone: Old Athlone Society.
- 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. 1984. Appendix two. Pollen and seed analyses. In G. Eogan, *Excavations at Knowth 1*, 325-9. Dublin: Royal Irish Academy.
- 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. 2002. Neolithic houses in Ireland: a broader perspective. *Antiquity* 76, 517-25.

- Grogan, E. 2004. The implications of Irish Neolithic houses. In I. Shepherd and G. Barclay (eds), *Scotland in ancient Europe*, 103-114. Edinburgh: Society of Antiquaries of Scotland.
- Grogan, E., O'Donnell, L. and Johnston, P. 2007. *The Bronze Age landscapes of the Pipeline to the West: an integrated archaeological and environmental assessment*. Bray: Wordwell.
- Grogan, E. and Roche, H. 2005. The prehistoric pottery from Balregan 1, Co. Louth (03E0157). Unpublished report for Irish Archaeological Consultancy Ltd.
- Gunther, R. 1945. *Life and letters of Edward Lhwyd*. Oxford: Oxford University Press.
- Haddon, A.C. 1896-98. Studies in Irish Craniology: III. A Neolithic cist burial at Oldbridge, County of Meath. *Proceedings of the Royal Irish Academy* 20, 570-85.
- Halpin, E. 1995a. Excavations at Newtown, Co. Meath. In C. Mount & E. Grogan (eds), *Annus Archaeologiae*, 45-54. Dublin: Organisation of Irish Archaeologists & Office of Public Works.
- Harbison, P. 2007. In Retrospect. The Royal Irish Academy's only archaeological excavation: Dowth in the Boyne Valley. *Proceedings of the Royal Irish Academy* 107C, 205-13.
- Hartwell, B. 1998. The Ballynahatty complex. In A. Gibson & D. Simpson (eds), *Prehistoric Ritual and Religion*, 32-44. Stroud: Sutton Publishing.
- Hartnett, P. 1954. Newgrange passage grave. *Journal of the Royal Society of Antiquaries of Ireland* 84, 181-2.
- Harvey, D. 2005. Newgrange, heritage and the Irish nation: two moments of transformation. In M. McCarthy (ed.), *Ireland's Heritages. Critical Perspectives and Memory and Identity*, 123-38. Hampshire: Ashgate.
- Hayes, D. and Patton, M. 2001. Proactive crisis-management strategies and the archaeological heritage. *International Journal of Heritage Studies* 7 (1), 37-58.
- Hedges, R.E.M., Housley, R.A., Ramsey, C.B and van Klinken, G.J. 1993. Radiocarbon dates from the Oxford AMS system: Archaeometry datelist 17. *Archaeometry* 35, 305-326.
- Herity, M. (ed.) 2001. *Ordnance Survey Letters Meath: Letters containing information relative to the antiquities of the County of Meath collected during the progress of the Ordnance Survey in 1836*, edited with an introduction by Michael Herity, Dublin: Four Masters Press.
- Hoare, R. C. 1807. *A journal of a tour in Ireland in AD 1806*. London.
- Hogan, A. 2008. *The Priory of Llanthony Prima and Secunda in Ireland, 1172-1541: lands, patronage and politics*. Dublin: Four Courts Press.
- Jenkins, W. 2008. Post-Reformation settlement and society in Brugh na Bóinne. In F. J. Byrne, W. Jenkins, G. Kenny and C. Swift, *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. 2008. Late medieval Brugh na Bóinne, 1142-1541. In F. J. Byrne, W. Jenkins, G. Kenny and C. Swift, *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.
- Lanting, J. N. and Brindley, A. L. 1998. Dating cremated bone: the dawn of a new era. *The Journal of Irish Archaeology* 9, 1-7.
- Ledwich, E. 1790. *Antiquities of Ireland*. Dublin: Arthur Grueber.
- 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.

- Leon, B. 2005. Mesolithic and Neolithic activity on Dalkey Island – a reassessment. *Journal of Irish Archaeology* XIV, 1-21.
- Lewis, S. 1837. *Topographical dictionary of Ireland*, 2 vols. London.
- Liversage, G. 1960. A Neolithic site at Townleyhall, Co. Louth. *Journal of the Royal Society of Antiquaries of Ireland* 90, 49-60.
- Lucas, A. 1971-3. Souterrains: the literary evidence. *Béaloideas* 39-44, 39-41.
- 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.
- Macalister, R. A. S. 1935. *Ancient Ireland*. London: Methuen.
- Macalister, R. A. S. 1943. A preliminary report on the excavation of Knowth. *Proceedings of the Royal Irish Academy* 49C, 131-66.
- 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.
- McClanahan, A. 2004. The Heart of Neolithic Orkney in its Contemporary Contexts: Report on the Orkney World Heritage Sites and Community Study. Unpublished report prepared for Historic Scotland.
- Mc Conway, C. 2003. Ninch, Laytown. In I. Bennett (ed.), *Excavations 2001: Summary Accounts of Archaeological Excavations in Ireland*, 311-13. Bray: Wordwell.
- 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 and H. Roche, *Excavations at Knowth II*, 300-307. Dublin: Royal Irish Academy.
- 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), 85-104.
- 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.
- McManus, R. 1997. Heritage and tourism in Ireland - an unholy alliance? *Irish Geography* 30, 90-98.
- 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.
- McSparron, C. 2008. 'Have you no homes to go to?': Neolithic housing. *Archaeology Ireland* 22(3), 18-21.
- Mason, C. and Evans, J. G. 1982. Appendix G. Land molluscs (2). In O'Kelly, M., *Newgrange. Archaeology, art and legend*, 227. London: Thames and Hudson
- Meighan, I., Simpson, D. & Hartwell, B. 2002. Newgrange – sourcing of its granitic cobbles. *Archaeology Ireland* 16(1), 32-5.

- Meighan, I., Simpson, D., Hartwell, B., Fallick, A. & Kennan, P. 2003. Sourcing the quartz at Newgrange, Brú na Bóinne, Ireland. In G. Burenhult (ed.), *Stones and Bones. Formal disposal of the dead in Atlantic Europe during the Mesolithic-Neolithic interface 6000-3000 BC*, BAR International Series 1201, 247-251. Oxford: Archaeopress.
- Mills, J. (ed.) 1905-14. *Calendar of justiciary rolls, Ireland, Vols i and ii*. Dublin and London.
- Mitchell, G. F. 1942. A composite pollen diagram from County Meath, Ireland. *New Phytologist* 41, 257-261.
- Mitchell, G. F. 1986. *The Shell Guide to Reading the Irish Landscape*. Dublin: Michael Joseph Ltd.
- Mitchell, G. F. 1992. Notes on some non-local cobbles at the entrances to the passage-graves at Newgrange and Knowth, County Meath. *Journal of the Royal Society of Antiquaries of Ireland* 122, 128-45.
- Mitchell, G. F. 1995. Did the tide once flow as far as Newgrange? *Living Heritage* xii, 34.
- Molyneux, T. 1726. Part III. A Discourse concerning the Danish Mounts, Forts and Towers in Ireland; never before published. In G. Boate, *A Natural History of Ireland in Three Parts, by Several Hands*. Dublin: George Grierson.
- Monk, M. 1982. Appendix E. Macroscopic plant remains. In O'Kelly, M., *Newgrange. Archaeology, art and legend*, 223-5. London: Thames and Hudson.
- 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.
- Moore, D. 2003. Site 19, Duleek Road, Platin. Neolithic house. In I. Bennett (ed.), *Excavations 2001: Summary accounts of archaeological excavations in Ireland*, 320. Bray: Wordwell.
- Murphy, C. and Charlton, R. 2008. Climate Change and Water Resources. In J. Sweeney, F. Albanito, A. Brereton, A. Caffarra, R. Charlton, A. Donnelly, R. Fealy, J. Fitzgerald, N. Holden, M. Jones and C. Murphy, *Climate Change - Refining the Impacts for Ireland*, STRIVE report series no. 12, 39-81. Wexford: Environmental Protection Agency.
- Murphy, D. 2002. Tullyallen. Prehistoric features. In I. Bennett (ed.), *Excavations 2000: Summary accounts of archaeological excavations in Ireland*, 242. Bray: Wordwell.
- Nelis, D. 2003. Site 9a, Rathmullan. In I. Bennett (ed.), *Excavations 2001: Summary accounts of archaeological excavations in Ireland*, 323-4. Bray: Wordwell.
- Noel, M. J. and Hale, D. N. 1993. Geophysical Survey in Newgrange townland. Unpublished report for Archaeological Development Services and GeoQuest Associates on behalf of the Office of Public Works.
- NRA. 2006. A1/N1 Newry Dundalk Link, Counties Armagh and Louth. Archaeological Discoveries Brochure and Poster Series.
- O'Carroll, F. 2002. Littlegrange. In Isabel Bennett (ed.), *Excavations 2000: summary accounts of archaeological excavations in Ireland*, 234. Bray: Wordwell.
- O'Connor, B. 2007. Carving identity: the social context of Neolithic rock art and megalithic art. In D. A. Barrowclough and C. Malone (eds), *Cult in Context: Reconsidering Ritual in Archaeology*, 183-90. Oxford: Oxbow.
- O'Connor, D. 2007. Sheephouse and Oldbridge. Testing. In I. Bennett (ed.), *Excavations 2003: summary accounts of archaeological excavations in Ireland*, 391-2. 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 Drisceoil, C. 2003. Balgatheran Site 4. Late Neolithic ritual/ settlement. In I. Bennett (ed.), *Excavations 2001. Summary Accounts of Archaeological Excavations in Ireland*, 255-257. Bray: Wordwell.
- 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'Keefe, 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, C. 1973. Passage grave art in the Boyne Valley. *Proceedings of the Prehistoric Society* 39C, 354-82.
- 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. 1972. Further radiocarbon dates from Newgrange, Co. Meath. *Antiquity* 46, 226-227.
- 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. 1982. *Newgrange. Archaeology, Art and Legend*. London: Thames and Hudson.
- O'Kelly, M., Cleary, R. and 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. and O'Kelly, C. 1978. Three passage-graves at Newgrange, Co. Meath. *Proceedings of the Royal Irish Academy* 78C, 249-352.
- O'Kelly, M. and O'Kelly, C. 1983. The tumulus of Dowth, County Meath. *Proceedings of the Royal Irish Academy* 83C: 135-90.
- O'Kelly, M. and Shell, C. 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.
- O'Neill, A. 1989. Boyne Valley Archaeological Park: a study in archaeological resource management. Report commissioned by Bord Fáilte Éireann.
- Olivier, A. 1996. *Frameworks for our Past: A review of research frameworks, strategies and perceptions*. London: English Heritage.
- Ó Ríordáin, S. and Daniel, G. 1964. *Newgrange and the bend of the Boyne*. London: Thames and Hudson.
- Ó Ríordáin, S. and Ó hEochaidhe, M. 1956. Trial excavation at Newgrange. *Journal of the Royal Society of Antiquaries of Ireland* 86, 52-61.
- O'Sullivan, M. 1995. *Megalithic art in Ireland*. Dublin: Country House.
- O'Sullivan, M. 2006. The Boyne and beyond: A review of megalithic art in Ireland. In R. Jousaume, L. Laporte and C. Scarre (eds), *Origine et Développement du Mégalithisme de l'Ouest de l'Europe*, 651-88. Bougon: Musée des Tumulus de Bougon.
- Parker Pearson, M. 2007. The Stonehenge Riverside Project: excavations at the east entrance of Durrington Walls. In M. Larsson & M. Parker Pearson (eds), *From Stonehenge to the Baltic: living with cultural diversity in the third millennium BC*, BAR International Series 1692, 125-44. Oxford: Archaeopress
- Paston, G. (ed.) 1900. *Mrs Delany (Mary Granville): a memoir, 1700-1788*. New York and London.
- Patrick, J. 1974. Midwinter sunrise at Newgrange. *Nature* 249, 517-19.
- Petrie, G. 1833. New Grange. *Dublin Penny Journal* 39(1), 305-6.
- Phillips, A., Corcoran, M. and Eogan, G. 2001. Derivation of the source localities for the kerb, orthostat and standing stones of the Neolithic passage graves of the Boyne Valley, Co. Meath. Unpublished report for the Heritage Council. Department of Geology, Trinity College Dublin.
- Phillips, A., Corcoran, M. and Eogan, G. 2002. Identification of the source area for megaliths used in the construction of the Neolithic passage graves of the Boyne Valley, Co. Meath. Unpublished report for the Heritage Council. Department of Geology, Trinity College Dublin.
- Pollard, J. 2001. The aesthetics of depositional practice. *World Archaeology* 33(2), 315-33.
- Pownall, T. 1773. A description of the sepulchral monument at Newgrange, near Drogheda, in the county of Meath, in Ireland. *Archaeologia* ii, 236-75.

- Prendergast, F. 1991a. New data on Newgrange. *Technology Ireland* 22, 22-5.
- Prendergast, F. 1991b. Shadow casting phenomena at Newgrange. *Survey Ireland* 9, 9-18.
- 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.
- Raftery, B. 1997. *Pagan Celtic Ireland*. London: Thames and Hudson.
- Robin, G. 2008. Neolithic passage tomb art around the Irish Sea: iconography and spatial organization. Unpublished PhD thesis, University of Nantes.
- Roche, H. 1995. Style and context for Grooved Ware in Ireland: with special reference to the assemblage at Knowth, Co. Meath. Unpublished MA thesis, University College Dublin.
- Ronayne, M. 2001. The political economy of landscape: conflict and value in a prehistoric landscape in the Republic of Ireland – ways of telling. In B. Bender and M. Winer (eds), *Contested Landscapes: Movement, Exile and Place*, 149-64. Oxford: Berg.
- 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.
- Scott, A. and Martin, F. (eds) 1978. *Expugnatio Hibernica; the conquest of Ireland by Giraldus Cambrensis*. Dublin: Royal Irish Academy.
- Seaver, M. 2001. Final Report. Archaeological investigations at Platin Fort, Northern Motorway, Gormanstown-Monasterboice, Co. Meath (00E0030). Unpublished report for Valerie J. Keeley Ltd.
- Seaver, M. 2002. Platin Fort. Prehistoric. In I. Bennett (ed.), *Excavations 2000: Summary accounts of archaeological excavations in Ireland*, 263-264. Bray: Wordwell.
- Seaver, M. 2006. Through the mill: excavation of an early medieval settlement at Raystown, County Meath. In J O'Sullivan and M. Stanley (eds), *Settlement, Industry and ritual: proceedings of a public seminar on archaeological discoveries on national road schemes, September 2005*, Archaeology and the National Roads Authority Monograph Series 3, 73-87. Dublin: National Roads Authority.
- 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.
- Shee, E. and Evans, D. M. 1965. A standing stone in the townland of Newgrange. *Journal of the Cork Historical and Archaeological Society* 70, 124-30.
- 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.
- Sheridan, A. 2006. A non-megalithic funerary tradition in early Neolithic Ireland. In M. Meek (ed.), *The Modern Traveller to our Past*. Rathfriland: DPK.
- Simington, R. (ed.) 1940. *The Civil Survey: county of Meath 1654-56, Vol. V, Co. Meath*. Dublin.
- Smith, A.G., Pearson, G.W. and Pilcher, J.R. 1974. Belfast radiocarbon dates VI. *Radiocarbon* 16 (2), 269-276.
- Smith, A.G., Pearson, G.W. and Pilcher, J.R. 1971. Belfast radiocarbon dates IV. *Radiocarbon* 13 (2), 450-467.
- 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.

Smith, J. H. 1840-44. Description of cinerary Urns discovered in the Hill of Rath, near Drogheda. *Proceedings of the Royal Irish Academy* 2, 259-61.

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

Smyth, J. 2007. Neolithic settlement in Ireland: new theories and approaches. Unpublished PhD thesis, University College Dublin.

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

Stewart, R. M. 1996. The vegetation and land use history of Moynagh Lough, County Meath with correlation to the archaeological evidence from the site. Unpublished MSc, Trinity College Dublin.

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. 1991. Embanked enclosures of the Boyne region. *Proceedings of the Royal Irish Academy* 91C, 245-84.

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. 2008a. *Newgrange*. Cork: Cork University Press.

Stout, G. and Stout, M. 2008b. *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.

Sweetman, P. D. 1976. An earthen enclosure at Monknewtown, Slane, Co. Meath. *Proceedings of the Royal Irish Academy* 76C, 25-73.

Sweetman, P. D. 1985. A Late Neolithic/Early Bronze Age pit circle at Newgrange, Co. Meath. *Proceedings of the Royal Irish Academy* 85C, 195-222.

Sweetman, P. D. 1987. Excavation of a Late Neolithic/Early Bronze Age site at Newgrange, Co. Meath. *Proceedings of the Royal Irish Academy* 87C, 283-98.

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

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

Thomas, J., Marshall, P., Parker Pearson, M., Pollard, J., Richards, C., Tilley, C. and Welham, K. 2009. The date of the Greater Stonehenge Cursus. *Antiquity* 83(319), 40-53.

Topp, C. 1956. The gold ornaments reputedly found near the entrance to New Grange in 1842. *12th Annual Report of the University of London Institute of Archaeology*, 53-62.

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

- Vallancey, C. 1786. *Collectanea de Rebus Hibernicis*, Volume IV(1). Dublin: Luke White.
- Van der Spoel, S. 1982. Appendix F. Land molluscs (1). In O'Kelly, M., *Newgrange. Archaeology, art and legend*, 226. London: Thames and Hudson.
- 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.
- Vogel, J.C. and Waterbolk, H.T. 1972. Groningen radiocarbon dates X. *Radiocarbon* 14 (1), 6-110.
- Waddell, J. 1970. Irish Bronze Age cists: a survey. *Journal of the Royal Society of Antiquaries of Ireland* 100, 91-139.
- Wakeman, W. 1848. *A handbook of Irish antiquities, pagan and Christian: especially of such as are easy of access from the Irish metropolis*. Dublin: James McGlashan
- Walsh, C. 2009. Archaeological test trenches and metal detector survey of the Potato Field, Oldbridge Estate, Co. Meath. Unpublished report for Archaeological Projects Ltd on behalf of the Dept. of the Environment, Heritage and Local Government.
- Weir, D. 1995. A palynological study of landscape and agricultural development in County Louth from the second millennium BC to the first millennium AD. In *Discovery Programme Reports 2: Project Results 1993*, 77-126. Dublin: Royal Irish Academy/ Discovery Programme.
- Weir, D. 1996. Brú na Bóinne Palaeoenvironmental Project: Assessment of Potential and Proposals for Further Work. Unpublished report for the Knowth Research Project.
- Went, A. 1953. Materials for a history of the fisheries of the River Boyne. *County Louth Archaeological and Historical Journal* 13, 18-33.
- 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.
- White, N. B. (ed.) 1943. *Extents of Irish monastic possessions, 1540-1541, from manuscripts in the Public Record Office, London*. Dublin: Stationery Office.
- Wilde, W. 1847. Irish rivers. *Dublin University Magazine* 5, 732-43.
- Wilde, W. 1849. *The beauties of the Boyne and its tributary, the Blackwater*. Dublin.
- Wilkinson, G. 1845. *Practical geology and ancient architecture of Ireland*. London.

Index

Page numbers in **bold** refer to illustrations.

- access and conservation · 3, 87
 Aed Sláine · 41
 aerial photography · 39, 65–6, **68**, **79**, 82, 91–2, 95
 research questions · 79
 Aghnaskeagh · 26–7
 agriculture · **76**
 18th century · 55
 intensification · 60
 Iron Age/Roman · 41
 medieval · 42–4, 47, 76, 78
 modern · 2, 18, 60, 84–5, **85**
 monastic · 46–7, 78
 Neolithic · 36
 prehistoric and historic · 67, 76, 91
 research questions · 76, 84–5
 Airghialla · 46
 Allen family · 52
 An Taisce · 101
 Ancient Monuments Protection Act
 1882 · 12
 Anglo-Norman period · 49–51, 76, 93
 Anglo-Saxon raiders · 46
 animal remains · 12, 33–4, 36, 47, 70, 76
 radiocarbon dating · 120–1, 124–6, 129
 research questions · 66–7
Annals of the Four Masters · 41, 46, 71
Annals of Ulster · 41
 Anstis, John · 8, **11**
 antiquarianism · 10, 13
 arable agriculture · 47, **85**
 18th century · 55
 monastic · 47
 research questions · 76
 archaeoastronomy · 20, 29, 116
 research questions · 77–8
 see also astronomical alignment
 archaeological resource
 management · 16, 61
 Architectural Conservation Area · 5
 archives
 aerial photography · 65, 79, 91–2, 95
 architectural · 97
 artefactual · 81–2, 97
 cartographic · 91, 97
 digital · 100
 documentary · 41–2, 44, 46–9, 54, 57–8, **71**, 72, 84, 97
 excavation · 90, 91, 93
 geophysical · 95
 research objectives · 97–8
 research questions · 84
 art · see megalithic art
 artefact assemblages: research
 questions · 81–2
 astronomical alignment · 20, **20**, 29, 38, 77–8, **78**, 98; see
 also archaeoastronomy;
 summer solstice; winter
 solstice
 Augustinians · 46, 50, 72, 93
 Avebury · 1, 2, 94, 103
 axe, Bronze Age · 37, **38**, 39, 65, **66**
 Balfeddock · 51, 52
 Balgatheran · 26, 34, 37, **37**
 Ballynahatty · 34, 69
 Balregan · 30
 Balriggeran · 44
 Barton, Kevin · 116
 Battle of the Boyne · 52–4, **54**, 81, **92**
 artefacts · 54, **54**, 115
 research objectives · 96–7
 research questions · 73
 site · 7, 39, 54, **74**, **80**, 97, 115, 116
 visitor centre · 20, 62, **63**, 93, 97
 beads · 27, **28**, 66
 Beaker culture · 35–7, **38**, 70
 artefacts · 18, 34–7, 65, **82**
 levels · 25, 31, 32, 33, 36
 radiocarbon dating · 124
 beehive quern · 41, 66
 Bend of the Boyne · see Brú na Bóinne
 Beranger, Gabriel · 10, **11**, **13**
 Bettystown · 34
 biodiversity · 74–5, 96
 Blackwater, River · 5, 58
 Blundelstown · 25
 Board of Public Works · 12–13; see
 also Office of Public
 Works
Book of Ballymote · 45, 71
Book of Leinster · 45
Book of the Dun Cow · **45**
 Bord Fáilte · 5, 15–16; see also
 Fáilte Ireland
 Boyne, Battle of · see Battle of the Boyne
 Boyne, River · 5, 6, 48, **48**, 55, 58, 62, **64**, 70–2, **72**, 90, **97**, 106
 research objectives · 97
 research questions · 77
 Boyne Cable Bridge · **24**
 Boyne Catchment GIS Project · 106, 116
 Boyne Navigation · 55, **58**
 Boyne River Islands pNHA · 4
 Boyne Valley Archaeological Park · 5–7, 7, 16, **16**, **88–9**, 98, **100**, 108
 research objectives · 97
 Brady, Conor · 116
 Brega · 19, 41, 70
 Brehon Laws · 41
 Bremore · 94
 Brittany · 69, 94
 Bronze Age · 37–9, 65
 artefacts · 37, **38**, 39, **66**
 continuity with Late Neolithic · 34, 35
 funerary activity · 24, 39
 research objectives · 92
 research questions · 65–6
 settlement patterns · 39, 65–6
 structures · **24**, 39
 Browe · 48
 Brú na Bóinne
 antiquarian investigations · 8–12, 114
 architectural heritage · 2
 built heritage · 83
 chronology: research objectives · 91, 93
 condition of monuments · 82
 conservation work, 19th century · 12–13
 construction phases · 28–30, 68–9
 continuity and change · 95–6
 early interpretations · 8–12
 educational centre · 99–101, **101**
 excavations and research · 8–24, 114–16
 folklore · 81, 92, 114
 geology and climate · 4, 74
 habitats · 4, **6**, 32–3, 75
 influences · 94
 integrated approach · 2, 19
 land use · 4, **6**, 34, 41
 landscapes · 32, 75, **100**, **106**
 links to wider world · 69, 72, 77, 94
 location · 3–4, **4**, **5**, 11, 114
 management plan · 2, 83–4, 87, 99
 modern excavations · 14–24, 115
 monuments · **5**
 myths · 10, 92
 name · 3
 natural environment · 2, 75
 political significance · 70
 protection · 7
 research centre · 99–101, **101**
 research framework · 3
 settlement patterns · 91–2
 state-owned land · **8**
 visitor centre · 1, **1**, 4–5, 7, 20, 61, **62**, **63**, 87, 93, 98
 see also World Heritage Site and individual monuments

- Brugh na Bóinne Research Project · 107, 116
- buffer zone · 6, 60, 98
- built heritage: research questions · 83–4, 85
- burials · 37, **40**, 67, **81**, **92**, 94, 114
- Caldwell, Charles · 55, **56**
- Caldwell family · 54
- Campbell, Charles · 8
- Campbell, Kieran · 115
- Campbell family · 54
- Carboniferous stone · 4, 29
- Carinated Bowl pottery · 26
- Carrowkeel bowl · 30, 65, **65**
- cartographic analysis · 91
- Castletown River · 26
- Castletown Tara · 25
- Catholic emancipation · 58
- Catholic worship · 55
- cattle · 42–3, 47, 55, 58
- cemeteries · 43–4, 47
Site M · 44–5, **44**, 66–7, 70, 81, 91, 93
- ceramics · see pottery
- cereals · 32–3
- charcoal: radiocarbon dating · 117–20, 123–6, 128–9
- Church of Ireland · 55
- cist burials · 37, **38**, 39, 82, **92**, 114
- Cistercians · 46–9, 72, 76, 93
- Civil Survey · 52–3
- Clann Cholmain · 71
- Claristown · 41
- Claudius Ptolemaeus · 41, 66, **67**
- climate change · 62, **63**, 75, 78, 90, 96
- Clogherhead · 29, **69**
- Clonlusk · 43
- Clowanstown · 25
- Coddington family · 54
- Coffey, George · 13–14, 114
labelling system · 14, **14**
- coins · 10, 40–1, **40**, 54, 66
- Collierstown · 45
- Colp West · 45, 46
- Columille, Saint · 44
- community involvement · 3, 87, 108, 112–13
- Congalach Cnogba · 71
- congested districts · 58
- conservation
built heritage · 83, 86, **86**
monuments · 12–13, 17, 83
natural environment · 74
- construction materials · 28–9, 69
- consultation process · 3, 87, 108, 112–13
- continuity and change · 81, 93–4
- Conyngham, William · 10
- Conyngham hoard · 40–1
- Cooley Peninsula · 29, 65, 69
- Coolfore · 26–7, **27**
- Cormac Mac Airt · 40
- County Louth Archaeological and Historical Society · 101
- County Meath Development Plan 2007–2013 · 7
- cremations · 18, 27, 28, 30, 34–7, 39, 65, **65**, 67, 69
- Crewbane Marsh pNHA · 4, **6**
- Cromwellian campaign · 52–3
- cropmarks · 39, **40**, 42, 66, 79, 95
- Cruicerath · 26, 42
- Cú Chulainn · 45
- cultivation · see arable agriculture
- cultivation ridges · 47, 51–2, **52**
- cultural heritage: criteria · 6–7
- cursus monument · 20, **22**, 30, **31**, 45, 77, 91, 95, 116
- cushion maceheads · 29
- D'Alton, James · 58
- damage to monuments · 12, 15
- Darcy family · 52
- data management
recommendations · 108
research objectives · 90, 97–8
research questions · 84
- dating, absolute · 24, 92
- dating of monuments · 27–30, 68–9, 82
research objectives · 91, 93
- de Lacy, Hugh · 47, 49
- de Lacy, Walter · 48
- de Picheford, Ralph · 49
- Deane, Thomas Newenham · 114
- Decorated Pottery levels · **32**, 33
- decorated stones · **11**, 14, 29
- Dee, River · 26
- deer, red · **75**
- Department of the Environment, Heritage and Local Government · 1, 87, 101, 108
- development pressure · 39, 75, 85–6, 96
recommendations · 108
- diet, human · 67, 76, 91, 92
- diseases · 67
- disposal of the dead: research questions · 65, 67
- Dodd, P. J. · 58
- Donaghmore · 31
- Donnchadh Ó Cearbhaill · 46
- Donore · 39, 46–7, 51–2, **58**, **59**, 73, **83**, 97, 115
- Down Survey · 52–3, **53**, 73
- Dowth · **29**
church · 46, 50, 53, 68, 71
conservation, 19th century · 13
construction phases · 29
cultivation ridges · **52**
damage · 12
depicted by Beranger · **11**
description, 17th century · 52
ecclesiastical site · 44, 71
excavations and research · 12, 17, **19**, 28, 114–16
first description · 10
henge · 35, **35**, 91
kerbstones · 17, **19**
manorial village · 49, **68**
map, 17th century · **53**
map, 19th century · **57**
medieval findings · **52**
Neolithic findings · 35
ownership · 50, 52
souterrain · 43, **43**
towerhouses · 51, **51**, 68
- Dowth Hall · **55**
- Dowth Wetlands pNHA · 4
- Draycott family · 52
- Drogheda · 4, 47–9, 53, 55, 62, 72, 76, **79**, 82
bypass · **24**, 26, **27**, **37**, 39, 41, 91–2
- Duleek · 46, 49
- Dundalk bypass · 26, 30–1
- Durrington Walls · 34, 36
- E ware · 45
- Eamhain Macha · 39, 66
- Early Neolithic · 25–7, 33, 65
artefacts · 25
settlement patterns · 26, **26**, **27**, 76
- ecclesiastical sites · **44**, 46–50
research questions · 70–1
- education centre: recommendations · 108
- eighteenth century · 54–7
- electrical resistivity · 20, 107
- environment
change · **63**, 75
conservation · 74
monitoring · 83
research objectives · 90
research questions · 74–5
- environmental impacts · 78–9
- Environmental Protection Agency · 87
- Eogan, George · 17, **19**, 30, 66, 107, 115
- equinox · 38, **78**
- Erc, Bishop of Slane · 44
- Fáilte Ireland · 101; see also Bord Fáilte
- Famine, Great · 58
- Fanning, Tom · **19**
- Farm Modernisation Scheme · 60
- fauna · 67, 76, 92
medieval · 24
modern · 74
Neolithic · 33–4, 36
- Fenwick, Joe · 107
- Fews Mountains · 42
- field boundaries · 78

- fieldwalking · 20, **21**, 25, 36–7, 47, 54, 91, 95, 103, 105, 116
- fishing · 48, 58, **77**
- Fleming, Richard · 46
- flint
Mesolithic · 25, **25**
macehead · **36**
- flora · 74–5, 92
- folklore · 81, 92, 97, 106, 114
- Food Vessel artefacts · 37
- foreign contact, medieval · 45
- Fourknocks · 29, 94
- Freshwater Fish Directive · 5
- Frith, R. H. · 12, 114
- fulachta fiadh* · 37, **38**
- funding opportunities · 94
- funerary practices · 67
Iron Age · 66
Neolithic · 65
- Gannon, Ann · **19**
- geochemical survey and analysis · 29, 54, 65, 76, 82
- geodiversity · 74–5, 96
- geographic information system (GIS) · 74, 79, 84, 95–6, 104, 106
- geological survey · 69
- geophysical survey · 20, 39, 43, 65–6, 76, **80**, 82, 92, 95–7, **96**, 103, 116
research questions · 79
- Gilltown · 42, 46, 53
- Giraldus Cambrensis · 49
- Glebe · 50
- gold · 41
- Gormanstown · 94
- Gradwell family · 58
- Graham, John · 52
- grain · 47, 58
- granite: construction material · 28–9
- grave goods · 40, **41**
- Great Stone Circle · 8, 12, 91, **94**
astronomical alignment · 20, **20**, 38, **78**, 116
date · 38, 65
excavations and research · 14, 115, 116
magnetometry · **22**
research objectives · 94–5
- greywacke: construction material · 29, 38, **69**
- Griffith's Valuation* · 57, **59**
- Grooved Ware · 69, 70
artefacts · 34–5, 37, **37**
burials · 35
levels · 31, 33
radiocarbon dating · 120
structures · 35, 37
- habitats · 4, 5, 74, 96
- Habitats Directive · 5
- Haddon, Alfred · 114
- Hartnett, P. J. · 15, 115
- health of prehistoric people · 67
- Heart of Neolithic Orkney WHS · 1, **96**, 98, 103
- hearths · 26, 31, 35, **37**, 94
- hedges · 60, 75
- henges · 10, 18, 35, **35**, **36**, 39, 77
- Henry II, King · 49
- heritage 'commodification' · 61
- Heritage Council · 1, 101, 103, 108, 116
- Hill of Tara · see Tara
- Historic Landscape Characterisation (HLC) · 91, 96
- Hoare, Richard Colt · 10
- Holroyd, John Baker · 55
- holy wells · 57
- horse: domestication · 36
- housing · 83
19th century · **59**, **60**
modern · 60, **61**, 85–6
research questions · 85–6
see also residential development; settlement patterns
- human remains · 8, 12, 40, **41**, **68**, 69, **81**, 92
radiocarbon dating · 118–19, 122
research questions · 66–7
- humans · see people
- humic acid: radiocarbon dating · 118, 123
- ICOMOS (International Council on Monuments and Sites) · 1, 6, 108
- identification and classification of sites · 82, 84
- industry
17th century · 52
18th century · 55
medieval · 43, 44, 49
modern · 86, **87**
- INSTAR (Irish National Strategic Archaeological Research) · 74
- invasive species · 75, 96
- inventory
research objectives · 97–8
research questions · 81–4
- Irish Farmers' Association · 101, 106
- Irish raiders · 46, 51
- Irish-speaking migrants · 58
- Iron Age · 39–41
artefacts · 40
burials · 40–1, **41**
research objectives · 92–3
research questions · 66
settlement patterns · 66
see also Roman period
- isotope analysis · 24, 67, 92
- Jones, Will · 8, **9**
- Kilgobbin · 27
- Killaha axe · 37, **38**
- Kilsharvan · 39
- King's Stables pond, Eamhain Macha · 39, 66
- Knowth
astronomical alignment · 116
Bronze Age findings · 37, **38**, 65
burials · 8, **41**
conservation · 83
construction phases · 27–9, 31
continuity and change · 81
Decorated Pottery complex · **32**
depicted by Wakeman · **12**
early interpretations · 12
eastern tomb · **19**
ecclesiastical grange · 46
entrance · 14
excavations and research · 14, 17, **18**, **19**, 27, 114–16
fauna · 67
fortified, 12th century · 46, 49
habitations · **32**
historical period · 24
housing · **60**
Iron Age findings · 39, **41**, 92
kerbstones · 14, **30**
Kingdom of Brega · 41
medieval findings · 43, 45, 47, **47**, 70
megalithic art · 29, **30**, 80
Neolithic findings · 26–7, **26**, 34–5, **36**, 65, 76
ogham inscriptions · 42, **42**
ownership, 16th century · 51
pollen and seed analysis · 32
quarrying, 19th century · 42
radiocarbon dating · 117–23
research centre · 84
ringfort · 42–3, **42**, 91
Roman findings · 40
soil analysis · 32–3
souterrains · 43
strontium and oxygen analysis · 92
timber circle · 34–5, **35**
Tomb 1 · **36**, 39, 42–3, **47**, 80, **81**, 93, 116
Tomb 14 · 14, **15**
Tomb 15 · 36
- Knowth House · **101**
- Knowth Publication Project · 103
- labelling system · 14, **14**
- Labourers (Ireland) Acts · 58
- Lagavoreen · 26, 39
- Lambay Island · 29
- Land Commission · 60
- land ownership
18th–19th century · 54
Anglo-Norman · 49
Catholic and Protestant · 52, 54
ecclesiastical and secular · 53

- medieval · 67
- monastic · 48–9, **73**
- research questions · 72–3
- Land Rehabilitation Project · 60
- land use · 16
- 17th century · 53–4
- 18th century · 54–5
- history · 74–5
- manorial · 49
- medieval · 78
- prehistoric and historic · 90, 92
- research objectives · 95–6, 98, 108
- landscape and landform · 2, 6, 16, 19
- 18th century · 54–5
- archaeology · 108
- change · 20, 74, 90
- living landscape · 62
- research objectives · 95
- research questions · 74–5
- laser scanning · 93
- Late Neolithic · 34–7, 65
- artefacts · 35
- chronology · 69
- continuity with Bronze Age · 34–5
- levels · 25
- settlement patterns · 34–5, 70
- Leask, Harold · 14
- Lebor na hUidre* · **45**
- Ledwich, Edward · 10
- legacy: research questions · 80–4
- legislation · 87, 98
- Lewis, Samuel · 58
- Lhwyd, Edward · 8–10, **9, 11**, 40, 114
- LiDAR (light detection and ranging) · 20, **23**, 66, 82, 90–1, 95, 97, **99, 105**, 116
- Liffey Valley · 42
- Linen Board · 55
- Lisdornan · 39
- Listervan · 42
- literary evidence · 10, 81, 116
- lithic scatters · 20, **21**, 25–6, 35–6, 79, 95, 103, **105**, 116
- Littlegrange · 43, 47, 116
- Littlemill · 31
- livestock
 - medieval · 43, 47
 - prehistoric · 36
 - research questions · 76
- 'living World Heritage Site': research questions · 84–7
- Llanthony · 46–8, 50, 72
- Loughcrew · 69, 80, 94
- Lougher · 46, 48–9, **49**, 52–3
- Louth County Council · 101
- Lynch, Ann · 115
- M1 motorway · 24, **24**, 26, **27, 37**, 39, 41, 62, 65, 70, 91–2
- M3 motorway · 25, 65, 70
- Macalister, R. A. S. · 14, **15**, 115
- Mac Murchada, Diarmait · 71
- Maelmithig Mac Flannacain · 71
- Maesmawr-type flint macehead · **36**
- magnetometry · 20, **22**, 34, 95, 97, **105**, 107, **107**
- management plan · 2, 108
- manorial villages · 49
- mapping and modelling · 90–1, 96
- Marshall Plan · 60
- Marshes Upper · 43
- mass houses · 57
- Mattock, River · 3, 6, 35, 46, 48, 90
- Meath Archaeological and Historical Society · 101, 106
- Meath County Council · 3, 5, 86, 87, 101, 116
- Meath County Library Service · 106
- Meath Field Name Survey · 106
- medieval period · 24, 41–6, 70, 72
 - awareness of prehistoric monuments · 44
 - buildings · **50**
 - research objectives · 93
 - research questions · 67–8, 70, 72
 - settlement patterns · 43, 47, 49, 67–8
- Mediterranean artefacts · 45
- megalithic art · 1, 7, **7**, 29, **30, 80**
- recording · **30**, 80, 114
- research questions · 80
- Mell · 26, 37
- Mellifont · 46–9, **46**, 51, 76
- Mesolithic · 25, 64–5
- metal-detector survey · 54, 73, 97
- metalworking, medieval · 43
- Middle Neolithic · 27–34
 - artefacts · 27, 30, 35
 - chronology · 70
 - levels · 31
 - links between distant sites · 29, 69
 - settlement patterns · 31–2, 65
- mills · 48, **48**, 53, 58
 - industrial · 55, **57**
- Mitchell, G. Frank · 17, 25, 115
- modern period · 60–3
- molluscs · 32
- Molyneux, Thomas · 8, 10, 114
- monasteries · 46–9
 - dissolution · 51
- monastic period · 46–9, **73**
- Money more · 25
- Monknewtown · 18, **19**, 30, **40**, 44, 47, 49, 51–3, **53**, 55, 65–6, 68, 71, **82**, 86, 91–2, 115
 - cist burial · 37
 - henge · 35, **36**, 39
 - radiocarbon dating · 127–8
- mottes · 46, 49, 82
- Mount Pleasant · 36
- Mourne Mountains · 69
- movements of prehistoric people · 67
- National Development Plan 2007–13 · 1
- National Monuments Acts 1930–2004 · 7
- National Monuments Service · 101, 108
- National Museum of Ireland · 5, 13, 115
- National Parks and Wildlife Service · 87, 101
- national schools · 58
- Natural Heritage Areas (proposed) · 4
- Navan Fort · *see* Eamhain Macha
- Neolithic · 25–37
 - structures · **105**
 - see also* Early Neolithic; Middle Neolithic; Late Neolithic
- Netterville, Nicholas · **55**
- Netterville family · 50, 51–2, 54, 57
- Netterville Institute · 51, 116
- Newenham, William · 114
- Newgrange · **31, 70**
 - agriculture · 47
 - astronomical alignment · 20, **78**
 - Beaker findings · 31, **38**
 - Bronze Age findings · 37, **38**, 65, **66, 70**, 92
 - chronology · 28–9, 32, 94–5
 - concrete capping · **84**
 - conservation · 12–13, **13**, 17, **28**, 83, **84**
 - construction phases · 28–9, **29**, **30**, 32, 94–5
 - continuity and change · 81
 - cursus · 20, **22**, 30, **31**, 45, 77, 91, 95, 116
 - damage · **13**, 15
 - depicted by Beranger · **13**
 - depicted by Lhwyd · 8, 9, **9, 11**
 - depicted by Molyneux · **10**
 - discovery · 8, 114
 - dominance · 1
 - early interpretations · 8, 10, 12
 - ecclesiastical grange · 47
 - electric lighting · 15, 115
 - entrance stone · 12, 20
 - excavations, chronology · **18**, 27, 114–16
 - excavations, 1920s · 14, 115
 - excavations, 1960s–70s · 15, 27, 41, 115
 - excavations, 1980s · 16–17, 28, 115
 - façade · 28, **28, 94**
 - graffiti, 19th century · **13**
 - Great Circle · *see* Great Stone Circle
 - Hearth 12 · **37**
 - human remains · **68**
 - Iron Age/Roman findings · 39, 40–1, **41**, 66

- kerbstones · 7, 10, **13**, 14, **16**,
28–9, **30**, **69**, **78**, **80**, 114
magnetometry · **22**, 95, 107
medieval findings · 47
megalithic art · **7**, **30**, **80**
Mesolithic findings · 25
Neolithic findings · 27, **28**, 34–5,
65
ownership, 16th century · 51
pit and post circles · 16, 17, **17**,
34–5, **34**, 95, 115
pollen and seed analysis · 32,
33
purchase by Bord Fáilte · 15
radiocarbon dating · 15, 123–4
reconstruction · **28**, **84**
ringfort · 42
roof-box · 12, 14–15, 28
satellite tombs · 28
shrine · 66
sources of materials · **69**
surveys · 34, 39, 116
thought to be Bronze Age · 15
timber circle · 38
tree and scrub growth · 15, **15**
visitors · **87**
- Newtown · 26
Ninch · 45–6
nineteenth century · 57–8
Norse raiders · 10, 43, 46, 71
Norse settlers · 43, 71, 72, 93
- O'Donovan, John · 10–11, 114
Oengus · 45, 71
O'Floinn Raghnaill · 66
Ó hArtagain (poet) · 44
Ó hEochaidhe, M · 14, 115
O'Kelly, Claire · 30, 116
O'Kelly, M. J. · 14–17, 27–9, 35, 41,
49, 77, 115, 116
O'Kelly, William · 47
O'Neill, Anthony · 5, 6
Ó Riordáin, Seán · 14, 115
Office of Public Works · 5, 15, 87,
101, 115; *see also* Board
of Public Works
ogham inscriptions · 42, **42**
Old Drogheda Society · 101
Oldbridge · 5, 7, 26, 37, **38**, 39, **40**,
42–3, 47–8, 51–2, 54,
73, **80**, **92**, 97, 114, 115,
116
radiocarbon dating · 129
Oldbridge–Sheephouse bypass · 24,
37, 39, **40**, 91
open-air enclosures: relationship to
other structures · 69, 70
Ordnance Survey of Ireland · 10, 44,
55, 73
Orkney · 1, 2, 34, 69–70, 94, **96**, 98,
103
orthostats
decoration · 8
- GC-10 · 14
material · 29, **69**
ogham inscriptions · 42
- palaeoenvironmental research · 32–
3, 66, 75, 90, 92, 95–6
- Pale, the · 51
palyology · 25, 32–3, **33**, 75, 90, 95
Passage Tomb Z · 35
Passage Tomb Z₁ · 35
passage tombs
chronology · 27, 28, 30, 68–70,
93
distribution · 7, 17, **28**, 68–9, 77
integration · 93
interrelationships · 94
relationship to other structures ·
69–70
research objectives · 93–5
research questions · 65, 68–70
unexplored · 93
- Patrick, John · 116
Patrick, Saint · 1, 44, 71
peat: radiocarbon dating · 123
pendants · 27, **28**
people
earliest · 64–5
environmental impact · 75, 78,
96
research questions · 64–8
- Petrie, George · 10, **12**
petrographic analysis · 29
pigs · 36
pillboxes · 58, **60**
pit and post circles · 16, 17, **17**, 34–
5, **34**, **35**, 77, 94–5, 115
radiocarbon dating · 124–6
place lore · 45, 70, 81, 114
placename evidence · 42, **71**, 81,
97, 106
Planning and Development Acts · 7,
60, 85
planning issues · 6–7, 60, 85–6, 96
Plaster · 26–7
Platin · 46, 52–3, 73, 86, **87**, 97
Platin Fort · 39
plough pebbles, medieval · 47, **47**
ploughzone archaeology · 20, **21**, 25,
116
politics and power: research
questions · 68–73
pollen analysis · 25, 32–3, **33**, 75,
90, 95
pollution monitoring · 96
population density, Neolithic · 31
postholes · 16, 26, 31, 32, 34–5,
34, **35**
potato · 55
pottery · 18, 25–7, **28**, 31, 34, 35, 37,
39–40, 45, 47, 69, **82**
- Pownall, Thomas · 8, 10, 114
Praeger, Robert Lloyd · 14, 115
Prendergast, Frank · 116
- Protected Structures for Meath · 5
Proudfoot, John · 48
Proudfootstown · 48, 50–3, 55
Prutfot, Alan · 50
Ptolemy · 41, 66, **67**
public consultation · 3, 112–13
- quartz: construction material · 28–9
- radar, ground penetrating · 68, 97,
105
- radiocarbon dating · 15, 34, 40, 67,
75, 91, 93, 95, 117–29
- Raftery, Joseph · 115
Randalstown · 45
Rath, Hill of · 37, 39
Rathmullan · 37, 39, 42, 51
Ray, Tom · 116
Raystown · 44
recommendations · 108
Recorded Monuments · **5**, 82
records
17th century · 54
18th century · 57
19th century · 57–8
Anglo-Norman · 49
medieval · 41, 44, 46, **71**
modern · 84
monastic · 42, 47–9, 72
- Redmountain · **60**
Registry of Deeds · 54
remote sensing · 20, 54, 68, 93, 95
rescue excavation · 18
research
agenda · 2, 3, 64–89
archaeology · 1
as land use · 3
capacity · 100–1, **104**
centre · 84, 99–101, **101**, 108
co-ordination · 1
current initiatives · 103–7
framework · 1–3, **2**, 87, 100,
108
history · 8–24
infrastructure · 97, 108
network · 94
objectives · 90–103, **102**
officer · 1
priorities · **102**
questions · 64–87, **102**
steering group · 100, 103
strategy · 2–3, 90–107
working groups · 64
- residential development · 39
research questions · 85–6
see also housing
- resources
assessment · 2–3, 25–63
co-ordination · 3
management · 16
- Review of Research Needs in Irish
Archaeology* (Heritage
Council) · 1
- Richardstown · 26

- ring-barrows · 66
- ring-cairns · 41
- ring-ditches · 18, **24**, 39, **40**, 60, 92
- ring-forts · 42–3, **42**
- ritual and domestic activity · 26, 41, 76
- roads
 - medieval · 70, **71**
 - modern · 55, 60
 - see also M1 motorway; M3 motorway
- Roman period
 - artefacts · 40
 - coins · 8, **40**
 - research questions · 66
 - settlement patterns · 66
 - see also Iron Age
- Rossnaree · 20, 39–40, 43–4, 46, 48, **48**, 53, 66, 71, 92, **105**, 116
- Rossnaree Riverbank pNHA · 4
- Roughgrange · 46, 52–3, **86**
- Royal Irish Academy · 5, 12, 24, 101, 103, 114
- rural development · 101; see also agriculture, modern; development pressure
- salmon fishing · **77**
- Scalé, Bernard · **56**
- sea level · 74, 90–1
- seed analysis · 32–3, 36
- Senchas na Relec* · 45, **45**
- settlement patterns · **59**, **61**
 - research objectives · 91–2
 - research questions · 72–3
 - see also housing
- seventeenth century · 51–4
- SHARE I.T. project · **99**, 104, 108
- sheep · 36, 47, 52
- Sheepgrange · 43
- Sheephouse · 38, 39, 42, 51, 52, 81
 - radiocarbon dating · 128–9
- shovel-test surveys · 64
- Síl nAedo Sláine · 70
- Site A · 35, **36**
- Site B · **69**
- Site C · 38, **39**
- Site D · 38
- Site E · 8, **93**
 - depicted by Lhwyd · **11**
- Site G · 30, 65
- Site K · 8, 28, 45, 114
 - depicted by Lhwyd · **11**
 - early interpretations · 8, 10
- Site L · 8, 25, 28, 45, 114
 - depicted by Lhwyd · **11**
 - early interpretations · 8
- Site M · 19, **20**, 43–5, **44**, 66–7, 70, 81, 91–3, 115, 116
 - radiocarbon dating · 126–7
- Site P · 35
- Site Q · 35
- Site Z · **22**, 26, 28, 47
- sixteenth century · 51
- Skellig · 108
- Slane · 4, 44, **44**, 46, 49, 55, **57**, 61, 70–2, 82
- Slane Historical Society · 101
- slavery · 43, 71–2
- Slieve Breagh · 37
- Slighe Midluachra* · 70
- Smith, J. H. · 114
- Smyth, Jessica · 3
- Society of Antiquaries of London · 8
- soil analysis · 32, **75**, 90, 116
- solar alignment · 20, **20**, 29, 38, 77–8, **78**, 98
- solstice · 38; see also summer solstice; winter solstice
- sonar survey · 54
- souterrains · 12, 14, 43, **43**, 46, 71
- spatial data infrastructure (SDI) · 98
- Special Area of Conservation (candidate) · 5
- stakeholders · 101, **104**
- stakeholes · 17, 26, 31, 37
- Stalleen · 24, **24**, 39, 44, 45, 48, **50**, 51, 60, 71, 81, **82**, 115
- standing stones · see orthostats
- Stenness · 70
- stone urn · 37, **38**
- Stonehenge · 1, 2, 94, 103
- Stonehenge, Avebury and Associated Sites WHS · 1, 103
- Story, George · **92**
- Stout, Geraldine and Matthew · 19, 91, 93, 115
- sub-surface archaeology · 64
- summer solstice · 20
- sustainability · 3
- Sweetman, David · 115
- sword moulds · 66
- Tara · 65–6, 80
- test-pitting · 64
- Thomastown Bog · 33, **75**
- tillage · see agriculture
- tomography · **105**
- torc · **41**
- tourism · 2, 17, 62, 87
 - pressure · 61
 - research objectives · 98–9
- towerhouses · 51, **51**, 68
- Townleyhall · 17, 27, 31, 47, 115
- trade
 - 18th century · 55
 - medieval · 45–6, 72
 - monastic · 47
- transects · **106**
- transport networks · 72
- Trim · 44, 48
- Tuatha Dé Danann · 45
- Tullyallen · 39
- Ulster Rising · 51, 53
- underwater archaeology · 71, 77, 97
- UNESCO · 1, 78, 101, 103
- University College Dublin · 5, 115, 116
- urn cremations · **38**, 39
- Ussher, James (Archbishop) · 53
- Vallancey, Charles · 10, 114
- value for money · 3
- views, protection · 98, **100**
- Vikings · 10, 43, 46, 71–2, 93
 - research questions · 71–2
- visitor centre · see Battle of the Boyne, visitor centre; Brú na Bóinne, visitor centre
- visitor experience · 87, **87**, 98–9
- visitor numbers · 1, 15, 61, 62, 87, 98
- votive offerings · 41, 66
- vulnerability assessment · 83
- Wakeman, William · 11–12, 114
- Warner, Richard · 66, 107
- Weir, David · 116
- weirs · 48, **48**, 50
- Wessex · 69, 94
- Whitewell · 34
- Wicklow Mountains · 29, 69
- Wilde, William · 11–12, 77, 114
- Wildlife (Amendment) Act 2000 · 7
- Wilkinson, George · 114
- winter solstice · 15, 20, 28–9, 77
 - draw · 1, 1, 61
 - webcast · 1
- wood: radiocarbon dating · 118
- woodland
 - clearance · 33, 75, 76
 - natural · 75
 - vegetation · 32, 33
- wool · 47, 55, 76
- World Heritage Convention · 6
- World Heritage Site
 - boundaries · 86, 98
 - buffer zone · 86
 - core area · 86–7
 - excavations and research · 8–24, 114–16
 - inscription · 5–7, 93
 - landscapes · **100**, **106**
 - legislation · 87
 - ‘living WHS’ · 84
 - location · 4–5, **5**
 - management plans · 1–2
 - other sites · 1, 98, 103
 - protection · 7
 - research framework · 1–3
 - see also Brú na Bóinne
- World War II · 58, **60**, **79**
- Wyck, Jan · 54
- Wynne, William · 12
- Young, Arthur · 55