NRA
An tÚdarás um Bóithre Náisiúnta
National Roads Authority

seanda

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Cover image: View of Slane Bridge,
Co. Meath, showing one of the medieval
pointed arches, with an 18th-century round
arch at rear. (Photo: Rob Goodbody)

Welcome to the
Seventh Edition of *Seanda*

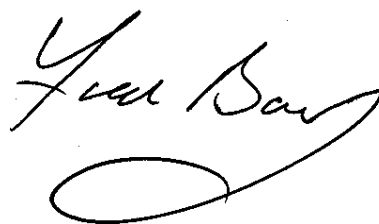Fred Barry, Chief Executive of the National Roads Authority

Fred Barry

As regular readers of *Seanda* will know, the last issue was the first to be made available solely online, the printed version having been discontinued. Feedback to date indicates that the new electronic incarnation of the magazine has been broadly welcomed, with readers commenting approvingly on the maintenance of the previous high production standards, the updated design and the usefulness of the enhanced navigation features. A number of people did, of course, lament the move to online publication but were nonetheless glad to see that *Seanda* would continue in a new format. We are grateful for these observations and encourage you to continue to communicate your views on this new approach.

The character and scale of new road schemes has changed considerably with the completion of the five Major Inter-Urban motorways (the M1, M6, M7, M8 and M9) and the decrease in funding available for infrastructural projects. Nonetheless, as some of the articles in Issue 7 attest, even comparatively modest developments such as motorway service areas and road safety schemes have the potential to yield significant archaeological discoveries. The nature of recent road projects is somewhat dwarfed relative to the motorways under construction in the previous decade but the approach taken towards archaeological heritage encountered on roads remains the same—as does our commitment to communicating the results of these investigations.

Of course, archaeological excavation results require time to collate, analyse and interpret. The completion of the technical excavation report can sometimes take years to achieve. Moreover, projects undertaken some years ago still have the capacity to generate unanticipated discoveries during the post-excavation phase, as well as culminating in the final excavation reports that ultimately provide the raw material for exhibitions, magazine articles, papers in scholarly journals, scheme-specific books and, crucially, further research. There are still new stories to tell.

Excavations at Neolithic Tullahedy published

Archaeological Excavations at Tullahedy, County Tipperary: Neolithic settlement in North Munster, by Rose M Cleary and Hilary Kelleher, was launched in Nenagh Library on 8 December 2011. The book, published by The Collins Press, describes excavations undertaken by University College Cork in 2006–7 in advance of the construction of the M7 Nenagh to Limerick motorway, on behalf of Limerick County Council and the NRA. It describes how and why a Neolithic community lived at Tullahedy close to the shoreline of Lough Derg almost 6,000 years ago. The abundant finds of stone axeheads, arrowheads, pottery, beads and pendants recovered here, as well as the valuable information derived from environmental analyses, add greatly to the national corpus of data on the Neolithic way of life.
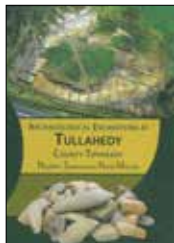
The launch was well attended by locals and members of the local Ormond Historical Society and the County Tipperary Historical Society. The book was launched by the Leas Chaithaoirleach of Limerick County Council, Councillor Damien Riedy. Mayor of Nenagh, Councillor Virginia O'Dowd, also spoke on the night, along with Professor William O'Brien and Rose Cleary of the Archaeology Department, University College Cork. *Archaeological Excavations at Tullahedy, County Tipperary* retails in bookshops at €49.99 and can also be purchased online from The Collins Press website (www.collinspress.ie/) at €39.99.

Richard O'Brien, NRA Archaeologist, Southern Team.

Excavation reports

Virtually every *Seanda* article is based on the results of an archaeological excavation. Since 2001 over 2,000 excavations have taken place on national road schemes and each one results in the production of a final report describing the findings and, ideally, telling the story of the people who lived, worked and died there in the past. Ultimately, these reports are the primary building blocks for much archaeological research. The NRA has always been keen to see these excavation reports used and believes this is another way by which the value of the considerable public expenditure can be achieved.

The NRA has provided copies of reports to numerous researchers in the past and has recently begun providing digital copies of these reports to the National Monuments Service, Department of the Arts, Heritage and the Gaeltacht.

In 2008 the NRA launched an online database that provides summary information on many of these excavations (see www.nra.ie/Archaeology/NRAArchaeologicalDatabase/). To complement the database, we are now publishing a register of the final excavation reports currently held by the NRA in PDF format. The register currently contains 1,300 reports and will be updated regularly as new reports are received (see www.nra.ie/Archaeology/ExcavationReports/). If you would like a digital copy of a particular report listed in the register please contact lbutler@nra.ie or rswan@nra.ie. If you are seeking information on an excavation not currently listed in the register please contact us and we can advise you of its status.

Rónán Swan, NRA Head of Archaeology, NRA Head Office.

New midlands publications

In December 2011 the Offaly Historical and Archaeological Society launched the sixth edition of their journal *Offaly Heritage*. The latest volume includes a range of articles of historical and archaeological interest relating to County Offaly, two of which pertain to archaeological discoveries made on the N52 Tullamore Bypass. Carmelita Troy and Susan Lalonde examine a Bronze Age burial discovered in the townland of Mucklagh, with its extraordinary grave-goods of a Wessex-type gold bead or button cover and an awl made from antler. The gold cover is a unique find from an Irish context and was featured in issues 2 and 3 of *Seanda*. Tom Janes discusses the full range of sites identified on the scheme, which provided evidence of prehistoric activity around Tullamore, including Bronze Age *fulachtaí fia*/burnt mounds and Iron Age metal-working. He also examines the post-medieval sites from the bypass, which included a vernacular dwelling and a small-scale iron-working site. *Offaly Heritage* Vol. 6 is available from Offaly Historical and Archaeological

Society, Bury Quay, Tullamore, Co. Offaly. The final reports from the N52 Tullamore Bypass excavations are available to download from the society's website at: http://www.offalyhistory.com/articles/448/1/N52-Tullamore-Bypass-Final-Reports-on-Archaeological-Excavations/Page1.html

Later this year Westmeath County Council will publish *Settlement and Community in the Fir Tulach Kingdom: archaeological excavations on the M6 and the N52 road schemes*. Written by John Channing and Paul Stevens of Valerie J Keeley Ltd, this book presents an intriguing account of life and death in the early medieval period, exploring the territory of the Fir Tulach and the ruling Clann Cholmáin kings of early Mide. The publication is based on the excavation of the monastic site of Clonfad, with its hand-bell factory, the 'lost' cemetery of Ballykillmore and the 'ringfort' at Rochfort Demesne.

Orlaith Egan, NRA Archaeologist, Eastern Team.

Archaeological discoveries 'alongside the Suir'

The eighth NRA scheme monograph, *Cois tSiúire—Nine Thousand Years of Human Activity in the Lower Suir Valley. Excavations on the N25 Waterford City Bypass*, edited by James Eogan and Elizabeth Shee Twohig, was launched by Dr Maurice Hurley at a reception hosted by Waterford Museum of Treasures on 6 February 2012.

Speaking at the launch, Councillor Pat Hayes, Mayor of Waterford, expressed the hope that the book would "spark the interest of the people who live here, and visitors to the area; and inspire them to find out more about the 450 generations who have lived *cois tSiúire*—alongside the Suir". Dr Hurley paid tribute to the NRA for putting in place structures that not only ensured that the excavations were successfully completed but also that the necessary post-excavation analyses and research were carried out to a high standard. He reflected on the paradox that if it were not for the construction of the new bypass the discoveries that form the core of the book would not have been made. The launch concluded on a musical note with a performance of the folk song *Cailín ó chois tSiúire me* (I am a girl from the Suir-side) by local soprano Anna-Marie Doyle accompanied by Maeve O'Callaghan on grand piano.

Reviewing the book for *The Irish Times* Prof. Gabriel Cooney wrote: "Integrating all the archaeological evidence provides us with a basis on which to write a convincing historical account of life in the past . . . all the contributors have certainly provided a very solid foundation on which to build." In the Institute of Archaeologists of Ireland's newsletter Dr Michael Ryan commented that "the book and the attached volume on CD are a tribute to the skill of the original artists and to the book's designers with excellent typography, clear figures and maps, which make the texts easy to follow and easy on the eye".

Cois tSiúire—Nine Thousand Years of Human Activity in the Lower Suir Valley

Fred Barry, NRA Chief Executive, presents Councillor Pat Hayes, Mayor of Waterford City, with a copy of *Cois tSiúire—Nine Thousand Years of Human Activity in the Lower Suir Valley*. (Photo: John Power Photography)

was published by the NRA in December 2011 and has sold out since going on general sale in bookshops.

James Eogan, NRA Senior Archaeologist, Southern Team.

Journeys in Time

Ireland's newest County Museum was opened in Carlow town on 11 April by Minister for the Environment, Community and Local Government Phil Hogan, TD, and Councillor Tom O'Neill, Cathaoirleach of Carlow Town Council. The Museum will help cater for the cultural and educational needs of the community and provide a much needed indoor heritage tourism amenity for the county. The majority of the project costs were met from within Carlow Town Council's own resources but have received grant assistance from the Heritage Council, the Department of Tourism, Culture & Sport, the NRA, Carlow County Development Partnership and Fáilte Ireland.

The new Museum premises involved the restoration of the former Presentation Convent on College Street, a landmark building in a prime town centre location. The conversion of the convent into a museum must be viewed in the overall context of Carlow's Cultural Quarter. This runs from Tullow Street along College Street to the Old Dublin Road encompassing the County Library, Archive, Tourist Office, the Cathedral of the Assumption, Carlow College (Ireland's oldest third level Catholic institute), the Visual Centre for Contemporary Art and The George Bernard Shaw Theatre, and the magnificent early 19th-century Carlow Courthouse. The Museum is the last part of the Cultural Quarter to be opened.

The Museum, which is part of a complex that already houses the County Library, Archive and the Tourist Office, has four exhibition rooms. The two largest rooms house the permanent collection, while the two smaller rooms will be used for temporary exhibitions. The Museum already contains a growing collection that represents a wide range of periods and topics, and includes objects of national and international importance.

The first temporary exhibition, *Journeys in Time—the story of the M9 Carlow Bypass*, has been developed by Carlow County Museum in association with the NRA and the National Museum of Ireland. The exhibition features a summary of the more than 60 archaeological sites excavated in advance of the construction of the M9 Carlow Bypass, which opened in 2008. Exhibition highlights include Carlow's first medieval ring-brooch, a prehistoric red deer antler pick, a variety of chert arrowheads, an Early Bronze Age bead made of faience, a porcellanite stone axehead dating from the Neolithic period and a 2-mm Iron Age glass bead, which is the Museum's smallest object.

As these were the largest ever excavations undertaken in the county and such was the significance of the finds the exhibition will run until April 2013. All of the artefacts featured in this exhibition are on loan from the National Museum of Ireland, which is the authority responsible for the care of all archaeological artefacts. The National Museum of Ireland has designated Carlow County Museum as one of 12 County/City Museums that can collect and display archaeological finds in the county in which they are found. For opening hours and a preview of the County Museum check out

At the official opening of Carlow County Museum: (left to right) Carlow Museum Curator, Dermot Mulligan, Minister for the Environment, Community and Local Government, Phil Hogan, TD, and Cathaoirleach of Carlow Town Council, Councillor Tom O'Neill. (Photos: Paul Curran, Carlow County Council)

www.carlowcountymuseum.com/ or join in the conversation on www.facebook.com/ carlowcountymuseum and twitter.com/ carlowcountymus

Dermot Mulligan, Museum Curator, Carlow County Museum.

Part of the *Journeys in Time—the story of the M9 Carlow Bypass* exhibition developed by Carlow County Museum in association with the NRA and the National Museum of Ireland.

NRA research award

University of Bradford PhD student James Bonsall was selected as a finalist to present his research at the prestigious Transport Research Arena (TRA) 2012 conference, which was held in Athens, Greece, from 23–26 April 2012. The TRA is the largest surface transport research event in Europe, gathering together key stakeholders every two years. At the conference James presented his reappraisal of the use of archaeogeophysical surveys on Irish road schemes which forms a substantive part of an NRA Fellowship Programme Award led by Dr Chris Gaffney and Prof. Ian Armit (see *Seanda*, Issue 6 [2011], pp. 38–9). After an intensive presentation and interview James was awarded the silver medal in the environmental pillar. The presentation was made by EU Commissioner for Research, Innovation and Science Maire Geoghegan-Quinn.

NRA Head of Archaeology Rónán Swan said: "The NRA is delighted that James Bonsall has been awarded a silver medal for his doctoral research at this year's TRA conference. James' research is critical not only for enabling the early identification of archaeological sites along national road schemes in a cost-effective manner but also for creating for the first time in Ireland an empirical data set which can help determine where and when archaeogeophysical surveying may be successfully undertaken."

Dr Chris Gaffney said: "I am delighted that his research is ranked so highly by the Young European Arena of Research judges. James was selected as one of only 30 finalists from over 330 research students across Europe. This selection recognises the project's impact beyond the traditional archaeological community."

Michael Stanley, NRA Archaeologist, NRA Head Office.

Harvesting the Stars

An exceptional Iron Age ceremonial enclosure excavated at Lismullin, Co. Meath, is the subject of *Harvesting the Stars* by Aidan O'Connell, a forthcoming book in the NRA Scheme Monographs series. The Lismullin post enclosure was an open-air pagan temple located in the Gabhra valley beneath the Hill of Tara, but why was it built and why was this unusual location chosen? Was it a venue for spectacular nocturnal rituals imploring the gods for a bountiful harvest?

Various theories are explored in this publication of one of the most significant discoveries made on the M3 motorway scheme. These include Frank Prendergast's study of the archaeoastronomy of the site, which has identified a relationship between the entrance avenue alignment and the rising of the Pleiades star cluster in the autumnal night sky. Historian Anne Connon speculates on place-name evidence for a relationship with the cult of the God Lug ('the shining one'), who also has harvest festival associations. The discovery, excavation and interpretation of this Iron Age monument, designated a National Monument shortly after its discovery, is the centrepiece of the book, but the earlier and later phases of

Artist's reconstruction of the Iron Age ceremonial post enclosure at Lismullin, Co. Meath. (Image: Phil McDarby)

activity at the site, including a Neolithic decorated megalith reused as a capstone in an early medieval souterrain, are also described.

Harvesting the Stars: a pagan temple at Lismullin, Co. Meath will be published by the NRA in late 2012.

Mary Deevy, NRA Senior Archaeologist, Eastern Team.

Futures and Pasts

From 11–15 July international researchers, policy makers, business leaders and global media gathered in the Convention Centre Dublin to take part in Euroscience Open Forum (ESOF 2012). A science conference like no other, ESOF 2012 was unique in representing the largest convergence of the sciences, humanities and culture in Europe in 2012 (for further information see www.dublinscience2012.ie/). To celebrate this prestigious, international event in Dublin, the City of Science 2012, a programme of science-related events and activities has run throughout the year across the island of Ireland. The NRA Archaeology Section will be contributing to the Dublin City of Science 2012 Public Engagement Programme by

devoting its National Archaeology Seminar 2012 to the topic of archaeological science.

Futures and Pasts: archaeological science on Irish road schemes will take place on Thursday 23 August at the City Wall Space, Wood Quay Venue, Dublin Civic Offices, Dublin 8. If you would like to reserve a place at this free public seminar please contact Lillian Butler (lbutler@nra.ie; +353 1 6602511). For further information see www.nra.ie/Archaeology/NationalArchaeologySeminar/ArchaeologySeminar2012/

Michael Stanley, NRA Archaeologist, NRA Head Office.
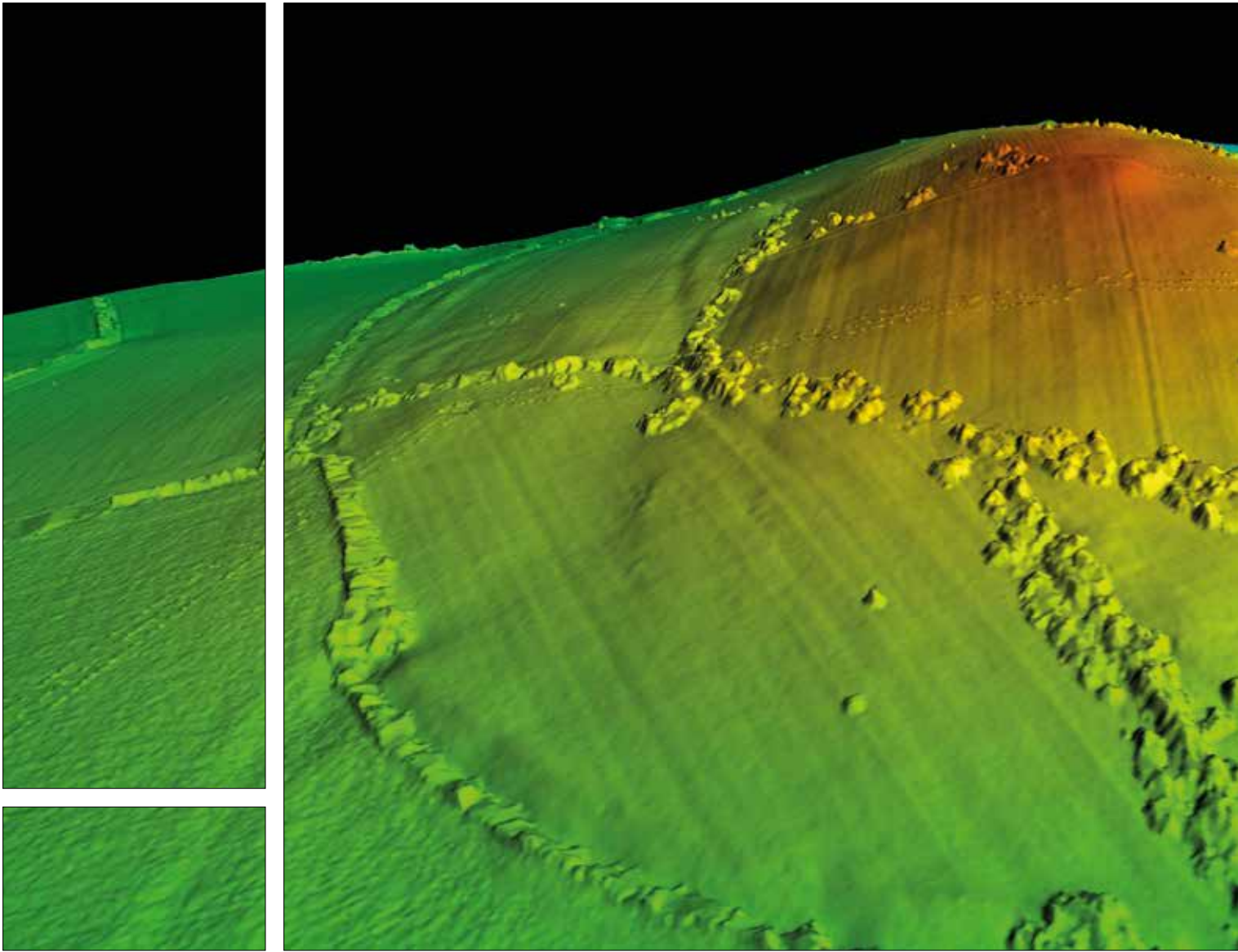
Three-dimensional image of Kill Hill, Co. Kildare, generated from NRA noise-mapping lidar data. (Images: Steve Davis)

Getting to the point(s)

New research is demonstrating the archaeological applications of NRA LiDAR data originally commissioned for noise-mapping on national road schemes.

By Stephen Davis, Lecturer, School of Archaeology, University College Dublin

LiDAR (Light Detection and Ranging) data have been increasingly used as part of integrated archaeological research projects in Ireland over the last decade. Where once just 'having' LiDAR was enough, increasingly archaeologists are focused on how best to use these data sets, not only for archaeological prospection but also to provide landscape context for research projects. A measure of this development is the progress from the acronym LiDAR to the common usage of the word 'lidar' as a noun or eponym.
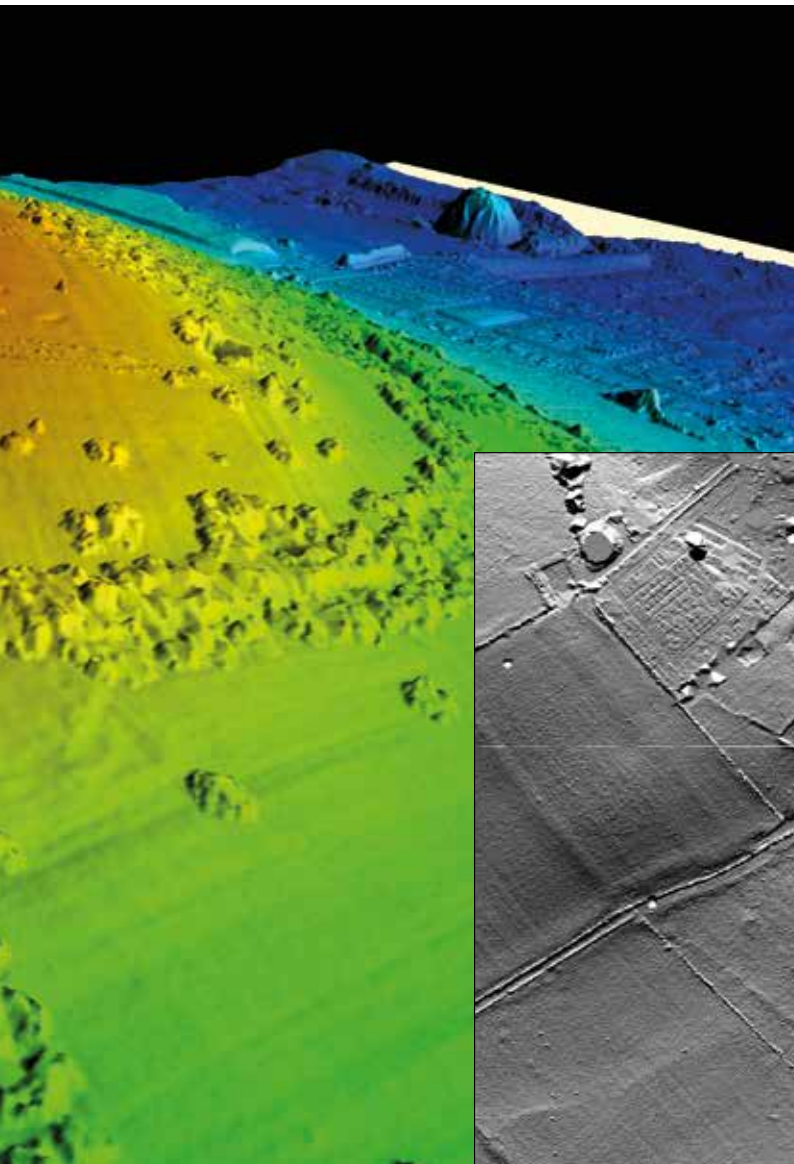
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Simply put, lidar is high-quality survey data, captured from an airborne laser platform and georeferenced using a combination of a Global Positioning System (GPS) and an Inertial Measurement Unit.
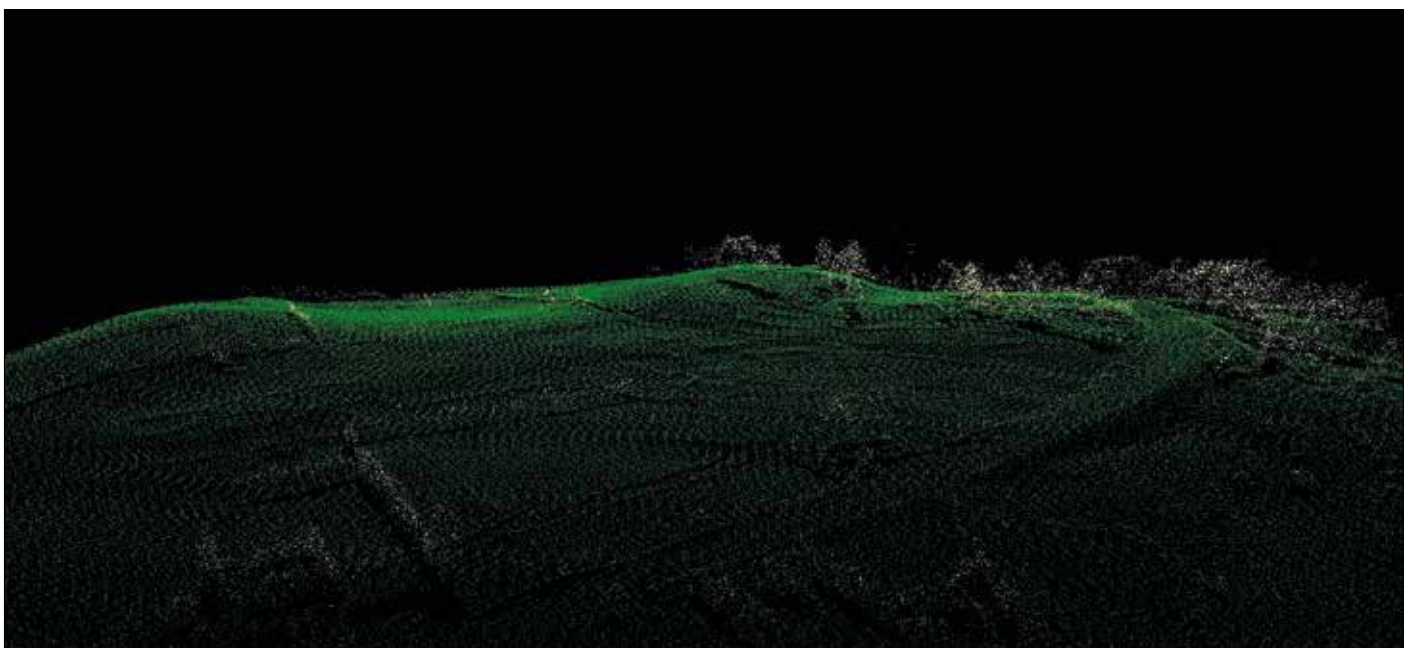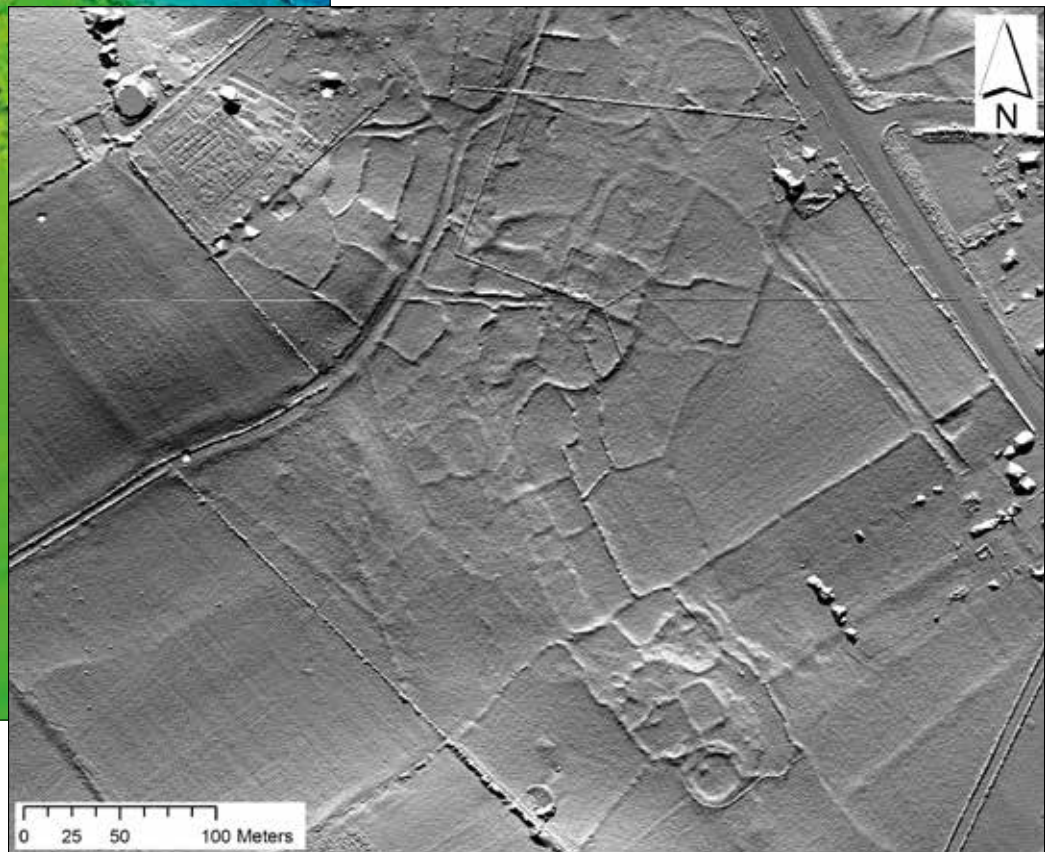
Bottom: three-dimensional point cloud of Ardcarn, Co. Roscommon. Top: standard analytical hillshade of vegetation-stripped data set. ▲
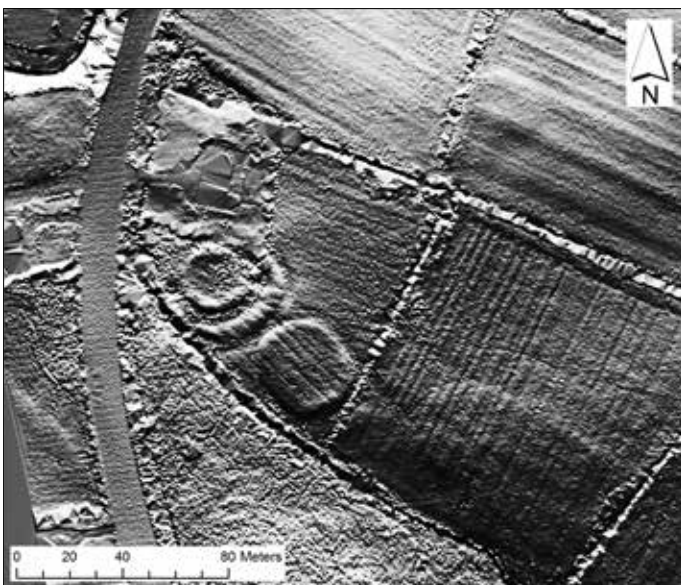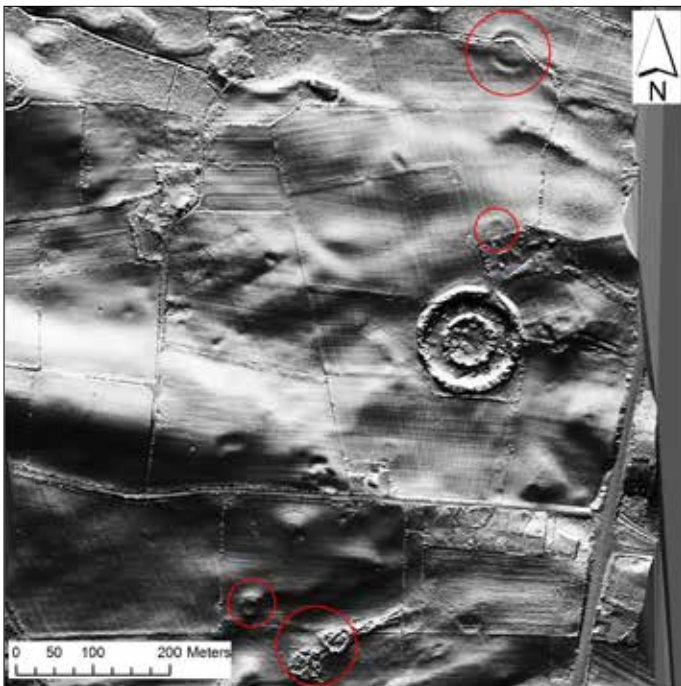
Simply put, lidar is high-quality survey data, captured from an airborne laser platform and georeferenced using a combination of a Global Positioning System (GPS) and an Inertial Measurement Unit. The costs associated with actually getting lidar are still relatively high, largely owing to the need to put a plane in the air, and can also vary tremendously depending on the resolution desired. High-resolution data, such as the Discovery Programme-led surveys at Tara and Skellig Michael are still prohibitively expensive, require helicopter-mounted scanners but result in extremely high-quality datasets. For instance, the Tara data set was acquired at 60 survey points per m^2 (see http://www.discoveryprogramme.ie/technology/metric-survey/140-lidar-at-the-discovery-programme.html).

At these resolutions, all but the densest vegetation is penetrated by the airborne laser, allowing 'vegetation stripping' at the processing stage and the construction of accurate 'bare earth' models. However, these data sets are the exception rather than the rule; the majority of lidar data are acquired at one to two points per m^2, and are frequently gridded to a one point per 2 m^2 Digital Elevation Model (DEM). While not perfect, such DEMs can be surprisingly successful for both prospection and addressing landscape questions (see *Seanda*, Issue 6 [2011], pp. 32–5). Similarly, the Brú na Bóinne lidar data set is not particularly high resolution (one point per m^2) but has proved invaluable in furthering our understanding of this landscape (see http://www.ucd.ie/archaeology/research/researcha-z/boynecatchmentgisproject/gis/).

NRA lidar coverage

A great deal of lidar data exists in Ireland which has been captured for non-archaeological purposes but which can be put to excellent archaeological use. Often these data sets are quite low resolution (again, one point per 2 m^2 DEM) but it would cost significant amounts of money were we to have to pay for them to be captured again. Possibly the most exciting recent development in such data sets has been the availability of NRA noise-mapping lidar. Under EU Directive 2002/49/EC relating to the assessment and management of environmental noise, the NRA has been preparing strategic noise maps for all national roads carrying in excess of three million vehicle passages per year. This equates to noise-mapping for approximately 3,750 km of the Irish road network. While the requirements of the project mean that the captured data is only 1 km in width these data sets are particularly exciting in that both the 2 m^2 DEM and the raw point data are available.

NRA noise-mapping lidar data can produce exceptionally detailed terrain models.

These point 'clouds' were acquired at an average of two points per m^2, but frequently there are several overlapping swathes of data, meaning that the effective resolution can be up to seven to eight points per m^2. There are some downsides to this: processing of raw point cloud data is time intensive, computer intensive (the one depends greatly on the other) and can be expensive in regard to the software needs, although freeware and shareware alternatives do exist. However, these data can produce exceptionally detailed terrain models. Below are a few examples of some of the more spectacular sites (including some previously unknown) from three small areas covered by NRA noise-mapping lidar data.

N4, Carrick-on-Shannon
The well-known medieval settlement and field systems at Ardcarn, Co. Roscommon (see p. 7), are highlighted beautifully by lidar,

Top: standard analytical hillshade model of Tonafortes henge, Co. Sligo (to left), with modern roundabout (centre) closely mirroring dimensions of the Late Neolithic enclosure. A ringfort at Tullynagracken South (SL014-227) is visible to the east.
Middle: standard analytical hillshade model of Lisnalurg ceremonial enclosure, Co. Sligo. Features circled in red are previously unrecorded.
Bottom: standard analytical hillshade model of conjoined ringforts at Tully, Co. Sligo, showing two large, previously unrecorded ringforts, with hints of an additional enclosure lying to the south-east.

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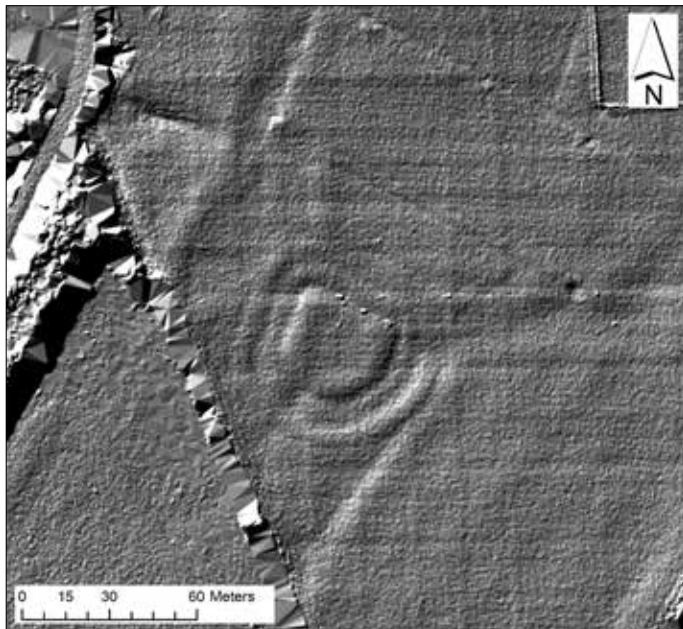
clearly showing the topography of the site and the old road (Record of Monuments and Places [RMP] No. RO006-103008), running parallel with the modern roadway. The bottom image shows a 3D representation of the unfiltered point cloud where ground points have been classified as green and all non-ground points classified as yellow. The denseness of tree cover and low number of 'returns' from under the canopy is clearly visible as black voids and suggest that this data set was gathered when the trees were fully vegetated, limiting the possibility of obtaining a good bare earth model. The top image is a standard hillshade model, lit from an elevation of 20 degrees with an azimuth of 30 degrees, and shows the density of archaeological features. In the southern portion, two bivallate ringforts appear to have been incorporated into a later field system

N4, Sligo

The data set takes in two ceremonial enclosures (see p. 8), to the south (top) the partially excavated henge of Tonafortes (SL014-224) and to the north (middle) the spectacular bivallate enclosure of Lisnalurg (SL014-012001). The site at Tonafortes is nicely juxtaposed with the modern roundabout which is of very similar dimensions. At Lisnalurg a range of previously unrecorded features is evident, not all of which are shown, including small circular enclosures and a partially destroyed multivallate enclosure. Farther north in Tully townland (bottom), two previously unidentified conjoined ringforts can be seen, one a bivallate example.
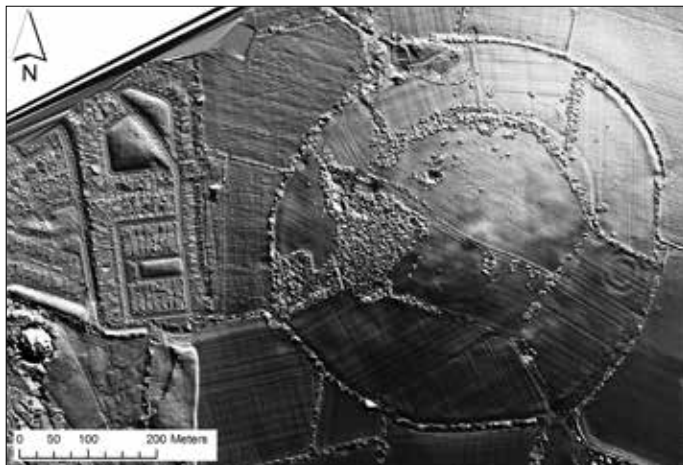
N7, Co. Dublin/Co. Kildare

The ringfort at Baldonnell Little (DU021-020) is described in the RMP as a raised circular area with traces of an external fosse. Lidar data show considerably more detail (top left): the site is trivallate and of a highly unusual construction, squared to the north-west, with the banks curving around in an arc. This suggests a site of some status.

Kill Hill, Co. Kildare, is a spectacular hilltop enclosure (KD020-001) measuring approximately 570 m east–west (middle left). Traces of two banks are clearly visible, with lidar data highlighting a third innermost bank, which is oval. Significant gorse cover on the hill is not penetrated by the laser, hence not removed by filtering. Between the two outer embankments a low profile enclosure (KD020-002) is revealed as large and barrow-like. To the west lies a heavily wooded motte and bailey castle (KD019-008004) where poor laser penetration provides only an outline of the underlying mound.

The motte and bailey castle (KD015-009001) at Castlewarden, Co. Kildare, and its associated earthworks to the south (KD015-009002) are incorporated into a modern golf course (bottom left). An apparent enclosure curves round to the south of the motte and intersects with at least two bunkers, while a range of cut features of indeterminate age are clearly visible to the east and south-east.

Conclusions

These data, although only representing narrow transects across the country, clearly have tremendous archaeological potential both in locating new sites, better informing us about known monuments and in furthering our understanding of archaeological landscapes. Although the unfiltered data require a little patience to work with, there is a significant quality improvement when compared to the standard 2 m^2 DEM (although timing of flight can be an issue as in the N4 data set). The few examples presented here demonstrate that lidar data continue to be an extremely valuable component of the archaeologist's toolkit and should not solely be considered to be the province of specialists in the field.

Top: standard analytical hillshade model of ringfort at Baldonnell Little, Co. Dublin. An extremely unusual form with three banks and squared to the north-west. Several other potential archaeological features are present here, with a curved cut to the north-east and possible enclosure to the south-east.
Middle: standard analytical hillshade model of Kill Hill, Co. Kildare. This massive enclosure possesses two clear banks, with a third near the summit only visible through lidar.
Bottom: standard analytical hillshade model of the motte and bailey castle at Castlewarden, Co. Kildare, with associated earthworks and modern golf course. The motte is surrounded by a large enclosure which is cut by multiple bunkers. Additional earthworks are visible to the east and south-east.

One flint arrowhead recovered fromTullahedy is very unusual and provides clues as to how leaf/lozenge-shaped arrowheads were hafted in grooved wooden shafts.

A selection of polished stone axeheads from Tullahedy, Co. Tipperary. (Photo: Tomas Tyner)

100 mm

What lies beneath

Leaf/lozenge arrowhead; note the crushed tip. (Drawing: Patsi Bates)

Excavations at Tullahedy, Co. Tipperary, recovered a Neolithic flint arrowhead with rare traces of the arrow shaft.

By Farina Sternke, freelance lithic finds specialist

Rose Cleary and Hilary Kelleher's new book, *Archaeological Excavations at Tullahedy, County Tipperary: Neolithic settlement in North Munster*, relates how and why a Neolithic community lived at Tullahedy close to what was the shoreline of Lough Derg almost 6,000 years ago. The book, published in December 2011, describes excavations undertaken by University College Cork in 2006–7 in advance of the construction of the M7 Nenagh to Limerick motorway, which produced an impressive stone tool assemblage (see *Seanda*, Issue 5 [2010], pp. 52–5). The assemblage is extraordinary for two main reasons: the presence of 274 polished stone axeheads and related artefacts (axehead fragments, flakes and blades) and 139 leaf/lozenge-shaped arrowheads and related artefacts (roughouts and arrowhead fragments). Twenty-nine items relate to possible abandoned arrowhead production attempts. Interestingly, chert is the dominant raw material used; only four arrowheads are made of flint.

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The flint leaf/lozenge-shaped arrowhead, with rare traces of the arrow shaft, recovered from Tullahedy. (Photo: Farina Sternke)

One flint arrowhead recovered from a pit within one of the structures excavated at Tullahedy is very unusual. This is 41 mm long, 16 mm wide and 3 mm thick and provides clues as to how leaf/lozenge-shaped arrowheads were hafted in grooved wooden shafts. The arrowhead had, at some point, been exposed to fire in order to soften the pitch or resin with which it had been covered and facilitate its removal from the shaft. This resulted in the discolouration of the arrowhead and the outline of the shaft was left on it. Presumably, the arrowhead was replaced because its tip had been crushed during use. The damage to its lower half is the result of prolonged burning. It was probably discarded in the fire after it had been removed from the shaft. It is unknown why the arrowhead was discarded and not repaired like so many others at this site.

The photo opposite shows the most likely hafting method for Irish leaf/lozenge-shaped arrowheads. The arrowhead shaft was most likely made from guelder rose or dogwood. Both types of wood are relatively straight, lightweight and pliable, and therefore well-suited for arrowhead shafts. Guelder rose is known to have been used by Native Americans, and both species were used for arrowhead shafts in Europe during the Neolithic period.

Leaf/lozenge-shaped arrowheads were most likely hafted in a V-groove, bound with animal sinew and covered with birch

Experimentally produced and hafted triangular arrowheads. (Photo: Jakob Hirzel)

tar or pitch. The sinew would have been applied when fresh. It would have shrunk and tightened around the groove as it dried and thus kept the arrowhead firmly lodged within the groove. The binding would then have been covered with birch pitch and shaped to produce a streamlined arrow tip. Swiss archaeologist Peter Kelterborn has experimentally shown that sinew binding prevents the shaft from splitting during use and that the pitch cover facilitates an easy removal of the arrow from the target. He was also able to show that pitch-covered arrowheads can be repaired in haft when damaged, thus saving time and effort.

Archaeological evidence for arrowhead shaft types or hafting styles is extremely scarce, but the shaft is widely considered to be the most important part of the composite bow and arrow system, after the bow with its string. Despite the fact that they are generally the sole survivors in the archaeological record, we must not forget that arrowheads are only minor, replaceable and repairable components in this complex system.

Post-excavation view of the probable Bronze Age roundhouse at Garryduff 2, Co. Limerick, in January weather conditions. (Photo: Irish Archaeological Consultancy Ltd)

Past lives in 'the black garden'

Even small developments like the 3.15 km-long N21 Killarney Pole to Barnagh Road Safety Scheme can yield discoveries of regional significance.

By Shane Delaney, Excavation Director with Irish Archaeological Consultancy Ltd

The townland of Garryduff, about 4 km south-west of Newcastle West, Co. Limerick, is on the edge of an open plain with good views to the north-east, east and south. The surrounding countryside is characterised by reasonably level, but poorly drained, pasture fields, with some woodlands to the west. The dominant feature in the landscape is Barnagh Hill to the west, which rises to 273 m above sea level. The land slopes gently to the south-east. Three archaeological sites (Garryduff 1–3) were identified here in October 2011 and were subsequently excavated during a wet and dark January in 2012. A small watercourse extends west–east immediately south of the sites and a canalised stream flows west–east approximately 200 m to the north. The provisional excavation results suggest that people were drawn here from the Bronze Age onwards.

One of the most significant findings was a possible Bronze Age roundhouse (c. 8 m in diameter) at Garryduff 2. This was represented by stake-holes, pits and a curvilinear foundation trench. The house was defined on its northern side by the arc of the foundation trench, which had intermittent stake-holes within it on alternate sides. Evenly spaced stake-holes were positioned externally along its length and continued to the south, where truncation had removed all trace of the trench and only the shallow impression of some stake-holes survived. There was a 0.8 m-wide un-dug causeway across the foundation trench but the function of this is unclear. What might have been thought to be an entranceway appears to have been blocked deliberately with stake-holes. It was possibly a vent with a grille of wooden stakes designed to keep animals

The charcoal production pit at Garryduff 3. (Photo: Irish Archaeological Consultancy Ltd)

LEGEND
- ● Stake-holes
- Foundation trench
- Possible support posts
- Possible hearths
- Pits
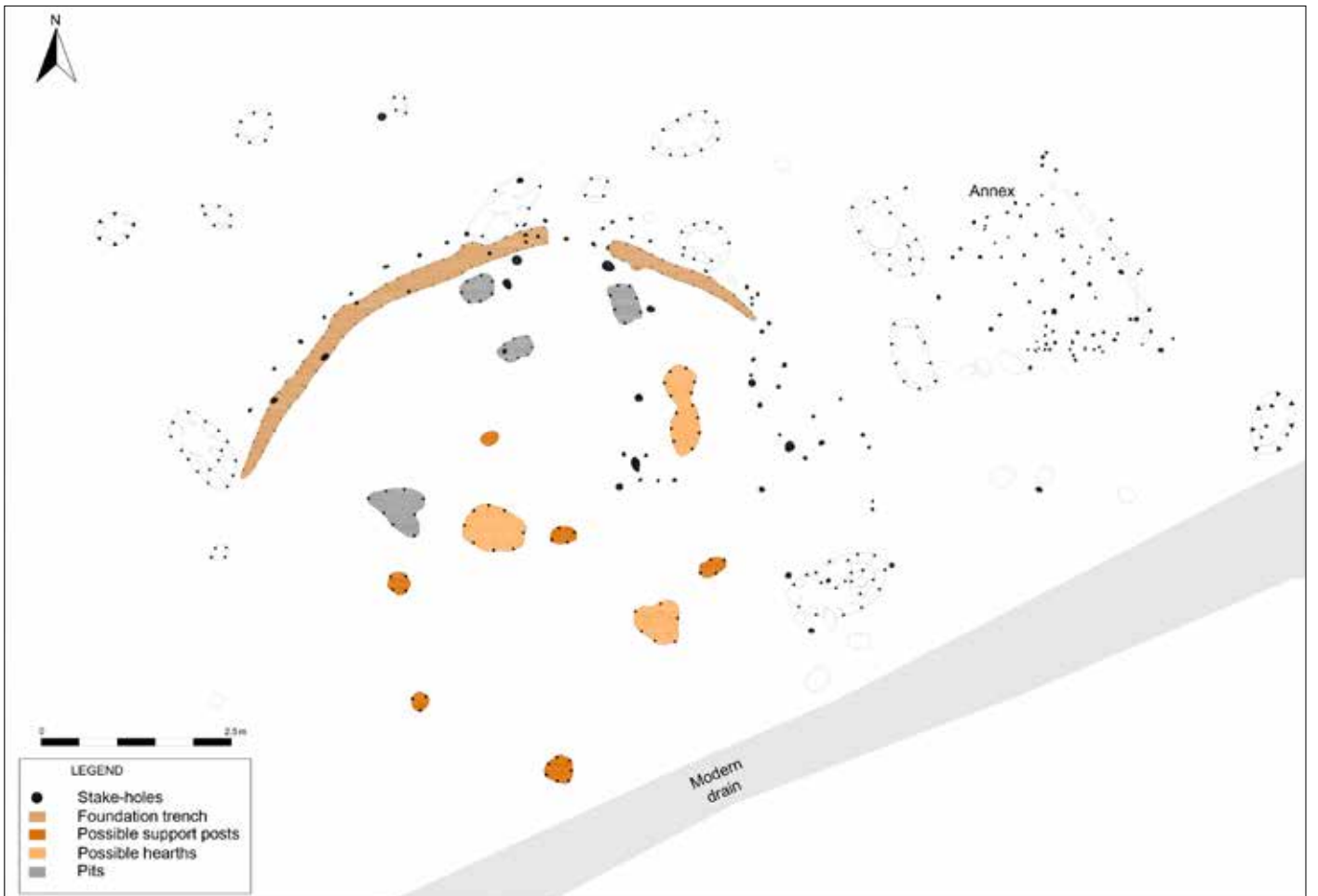
Post-excavation plan of the probable Bronze Age roundhouse at Garryduff 2. (Drawing: Irish Archaeological Consultancy Ltd)

The vernacular cottage at Garryduff 2, showing the fireplace and the drain. (Photo: Irish Archaeological Consultancy Ltd)

out. An east- or south-facing entrance, maximising the amount of natural light entering the house, would be most common but no trace of such a feature survived.

Three possible hearths and a number of pits and probable post-holes were identified within the interior. A central post-hole was identified with a line of post-holes arcing around it, positioned halfway between the central post and foundation trench. These post-holes were very shallow and no post-pipes were identified; they may merely represent the base of post-holes or post-pads. The nature of the fills suggests that the posts were removed during abandonment and did not decay *in situ*. The pits were mainly toward the north of the building but this apparent clustering may be a result of the truncation of the southern half of the house. One of the pits contained sherds of Middle Bronze Age (c. 1600–1100 BC) domestic pottery—the sole artefacts recovered from the site. These potsherds may well provide a date for the house; however, radiocarbon-dating results are pending at the time of writing.

A number of pits were identified outside the roundhouse, some pre-dating it, as evidenced by foundation stake-holes dug into them. A concentration of stake-holes forming what may be an annex or separate structure was identified to the east of the main building. The annex comprised a triangular configuration of approximately

The Irish version of the townland name—An Garraí Dubh— translates as 'the black garden' perhaps a reference to the prehistoric burnt mounds which would have appeared as a black mixture of burnt stone and charcoal.
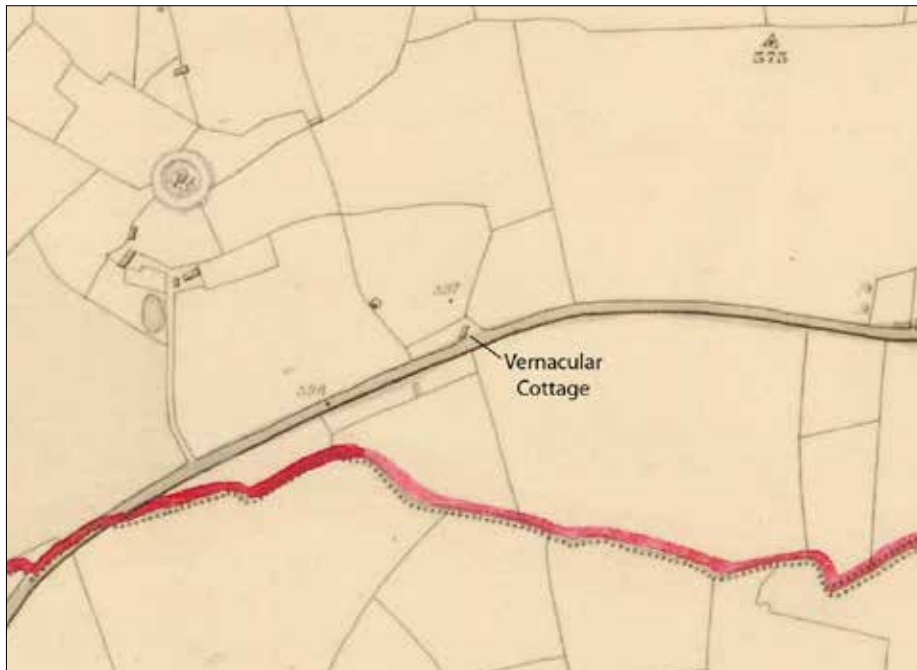
100 stake-holes containing charcoal-rich fills. Along the east side of the annex there was a line of elongated depressions (some concentrated around stake-holes). These may be impressions left by the bottom line of sails from a wicker wall/fence that had been pressed into the ground. The charcoal from these stake-holes suggests that this structure burnt down.

Some pits and a rectangular pit/trough, with a charcoal-rich fill of heat-shattered stone, were recorded to the south of the roundhouse. The trough fill was similar to the material normally associated with *fulachtaí fia*/burnt mounds. Approximately 20 m downslope to the east another probable trough, associated pits and stake-holes were identified. This appears to have been the remains of a burnt mound, possibly contemporary with the roundhouse; however, no trace of an actual mound of burnt stone survived.

At Garryduff 1, approximately 100 m west of Garryduff 2, there were the remnants

of a small burnt mound probably dating from the Bronze Age. This may have been contemporary with the roundhouse and associated features. All that remained of the site was the basal horseshoe-shaped deposit of washed-out silt (6 m by 0.7 m) and a centrally placed pit with flanking post-holes, possibly representing a spit or rack. Other heavily truncated features in the vicinity included stake-holes and possible pits.

Garryduff 3 was approximately 400 m east of Garryduff 2 and consisted of a charcoal production pit with some surrounding pits of unknown function. The pit measured 2.2 m by 0.7 m and its fill was very rich in charcoal, suggesting that this charcoal kiln may have been abandoned for some reason. Perhaps it got wet during the production process or did not produce charcoal of sufficient quality. Charcoal production pits can date from the Iron Age, early medieval period or medieval period and are often linked to iron-working where the charcoal was used as a fuel in furnaces. The pit was flanked to the north and south by two stake-holes which

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The cottage at Garryduff 2 as depicted on the first-edition Ordnance Survey six-inch map surveyed in 1841. (Image: Ordnance Survey Ireland)

Approximately midway on the interior were the remains of a slab-built fireplace. It appears that the rest of the floor was a compacted clay surface. Just in front of the hearth was a buried stone-lined drain that drained from the north-west to the south (front) of the building. This cottage is depicted on the first-edition Ordnance Survey six-inch map but is not evident on the second edition.

It is interesting to note that the Irish version of the townland name—*An Garraí Dubh*—translates as 'the black garden'. Perhaps this is a reference to the prehistoric burnt mounds at Garryduff 1 and 2 and probably other burnt mounds in the vicinity, which would have appeared as a black mixture of burnt stone and charcoal strewn throughout the area. The name might also carry within it the memory of charcoal production that took place here in later periods. The post-excavation analysis and research that is currently underway will significantly enhance the excavation results. Very little prehistoric evidence has been identified previously in this part of Limerick, which is rich in archaeological monuments dating from the early medieval period, and the Garryduff sites are a welcome addition to the archaeological record.

may represent a spit over the kiln, perhaps indicating the expedient use of the smoke to heat or smoke the charcoal-makers' meals.

The very truncated remains of an 18th- or 19th-century vernacular cottage were also identified at Garryduff 2. This cottage appears to have had an internal floor space of approximately 3 m by 4 m. The base of the western gable was evident and was comprised of the lower courses of rough rubble on both corner wall returns.

Aerial view of a typical prehistoric burnt mound/*fulacht fia* on a national road scheme. Note the black mixture of burnt stone and charcoal strewn throughout the area. (Photo: Studio Lab)

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The discovery of a Bronze Age spearhead shaft in County Kildare has led to an important reconstruction for experimental archaeology.

By Colm Moloney and Liam Hackett of Rubicon Heritage Services Ltd

The Bronze Age spearhead shaft from Mullamast (left) and the reconstructed replica. (Photos: Rubicon Heritage Services Ltd)

The Mullamast spearhead, the only one to have been found in a defined cultural deposit, is a unique find.

From busted to reconstructed

Archaeological investigations on the N9/N10 Kilcullen to Carlow road scheme uncovered some of the most impressive sites discovered in Ireland in recent years. A particularly rich and diverse assemblage of metal-work was recovered during the excavations. One object in particular—the socketed shaft of a Bronze Age spearhead—offered an opportunity to conduct some experimental archaeology. The spearhead has been recast, rehafted and is now available for experimentation to determine its original function and effectiveness.

The spearhead

Rubicon Heritage Services Ltd (formerly Headland Archaeology (Ireland) Ltd) undertook an excavation of the proposed site for a compound at Mullamast, near Ballitore, Co. Kildare. Liam Hackett directed excavations at the site, which revealed a number of archaeological features concentrated in two areas. These included an Early Bronze Age crouched inhumation, the possible remains of a Middle Bronze Age pyre together with cremated bone, and an Early Iron Age pit. The finds included stone

tools, pottery and the shaft of the bronze spearhead.

The spearhead fragment was recovered from the surface level of the fill of an isolated, shallow pit towards the southern limits of the excavation area. Pottery from the pit dates from the Middle to Late Bronze Age and would be of a similar age to the spearhead. The cremation and pyre are also of Middle Bronze Age date and were possibly related to the deposition of the spearhead. The spearhead was in very poor

The wax replica of the actual spearhead shaft and a reconstructed wax model of the replica spearhead.

The moulds for the casting are formed around the wax replicas. The moulds are made from river clay, horse manure and sand, which is left to dry for several weeks. This forms a slightly breathable material that can withstand intense heat while releasing the gases produced during the casting.

The dried moulds are heated to roughly 8,000° C to completely remove the inner body of wax and prepare them for the casting of the bronze.

The copper and tin ingots (foreground) are ready for the crucible, where they will be combined to form bronze. Crucibles and their fragments are important indicators of metal-working activity on archaeological excavations.

The crucible (containing the ingots) is placed in the furnace and approximately 25–30 kg of high-grade charcoal is used to reach a temperature of 1,500° C. This process takes roughly 30 minutes using a hand-operated bellows.

The heated moulds are readied for the casting. The small holes, or risers, to the side are to release gases that form within the empty mould when the bronze is poured.

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The reconstructed spearhead, cleaned and polished.

condition—only the shaft remained intact. Four small protrusions towards the base of the shaft (two on each side) indicated that it was of a type that incorporated side loops to assist in hafting it to a wooden shaft. These side loops were missing, as were the blades. Analysis of the spearhead by archaeologist Dr Charles Mount indicated this type of spear originated in the Killymaddy phase of the Bronze Age (c. 1500–1400 BC) and was in use up to the Dowris phase (c. 900–800 BC). Prior to this discovery, no side-looped, socketed spearheads had ever been found during an excavation in Ireland. All of the known examples up to this point have been stray finds found in natural places (50% are from rivers, 40% from bogs). Just three out of 103 Middle Bronze Age spearheads come from dryland locations. Therefore the Mullamast example, the only spearhead to have been found in a defined cultural deposit, is a unique find.

Reconstruction

It was decided to reconstruct the spearhead with the aid of a group of metal-workers and artists called Uamha Aois (meaning Bronze Age). The group remained as true to the original casting methods of prehistoric metal-working as possible, using hand-built furnaces and bellows and hand-crafting the moulds and other tools used in the process. The project, funded by the NRA, had two main aims: to re-create an artefact of national importance as a visual aid for teaching and exhibitions and, from an experimental archaeology perspective, to examine the actual process of bronze casting from 'birth to grave'. The residue left by the process was of particular interest, both the material itself and the 'footprint' left by the work, as it will aid in the identification and interpretation of such furnaces by archaeologists in the field. Several versions of the new spearhead were made, to ensure at least one successful outcome.

The results of the experimental work were highly informative. Post-casting evidence for the process was restricted to the fragments of the moulds themselves and a small patch of highly oxidised soil. The charcoal used in the process burned away to a fine white ash owing to the extreme temperature achieved by the small furnace and was easily blown away by even a slight breeze. All of the waste bronze (whether a product of imperfect casting or spillage) was collected for re-use. This would suggest that it can be difficult to archaeologically identify the site of a possible copper/bronze-working furnace owing to the lack of diagnostic material that can be immediately attributed to metal-working. If the moulds are removed from the site, very little trace remains that any significant activity had taken place.

Effectiveness

It was decided to haft the reconstructed spearhead in order to further explore its functionality and effectiveness. A possible Iron Age spear shaft, made of yew, was found on the same scheme on the bank of the River Lerr, near Castledermot. This was used as a model for the Mullamast spear shaft. The resulting reconstruction is believed to be a throwing spear rather than a thrusting spear based on initial research by Colm Moloney. It is hoped that the effectiveness of this projectile can be further explored through collaboration with re-enactment societies and martial arts groups.

The hafted spearhead will facilitate further insights using experimental archaeology.

The molten bronze is poured into the mould. This is the most critical time of the casting, when many hours of work are at stake.

The bronze is allowed to rest in the mould, to fill the entire cavity and to set.

The bronze cooled and set, as seen by the change in its colour. Oxides in the metal are responsible for the black surface colour.

The moulds are doused in cold water.

The moulds are broken off and the spearhead is revealed for the first time, when the preparation and labour come to fruition.

The batch of cast spearheads after initial cleaning; the risers are still attached and will be removed along with any other imperfections. Of the five castings undertaken on this occasion, only one was considered to be of sufficient quality to be fully finished and polished.

Bothersome badgers and cutting-edge science

Dating the archaeology of Castletown Tara 3, Co. Meath, was a problem cracked by a scientific technique little used in Ireland.

By Stuart Rathbone, freelance archaeologist

A previous edition of *Seanda* (Issue 2 [2007], pp. 55–6) described the application of Optically Stimulated Luminescence (OSL) dating at Garretstown 2, Co. Meath, a site excavated on the M3 motorway. This newly available dating technique is used when sites do not produce the array of artefacts and organic samples that archaeologists typically use to date archaeological features. It works by analysing the amount of radiation held within quartz crystals recovered from soil samples, the quantity of radiation indicating the approximate age of the sample (see In Brief panel). Application of the dating technique was also required at Castletown Tara 3.

Castletown Tara 3 was on a small drumlin at the boundary between the northern edge of the Hill of Tara and the Gabhra Valley, the northern half of which was located within the road corridor. The defended enclosure of Rathmiles is about 350 m to the south, on a slope overlooking the drumlin, and archaeologist Conor Newman has suggested that this was an important residence during the late prehistoric/early medieval occupation of the Hill of Tara. During archaeological testing a large stone-lined, cereal-drying kiln was identified on the eastern side of the drumlin and in February 2007 a small team of archaeologists was assembled to excavate it. During the initial cleaning of the excavation area we encountered our first problem. Several animal bones were noticed protruding from what was initially presumed to be the natural sandy soil. Further cleaning showed that this was in fact the sandy fill of a narrow ditch. Within a few days it was clear that what had been intended as a small excavation of a single feature was going to turn into a major

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Aerial view of the drumlin and the excavation site at Castletown Tara 3, Co. Meath. (Photo: Studio Lab)

The Middle Enclosure, looking south. (Photo: Archaeological Consultancy Services Ltd)

excavation—the ditch, and several others like it, was found to entirely encompass the base of the drumlin.

At this point we encountered our second problem. A hedgerow running across the site was found to be the home of a substantial family of badgers and excavation was suspended until environmental scientists re-housed them. This long, complex process involved the construction of an artificial sett and then gradually encouraging the badgers to relocate there. While this took place the eastern half of the site was excavated and then the site was closed down for several months. When it was permissible to return, the western half was stripped, cleaned and excavated, allowing the full scale and nature of the site to be assessed.

The main features were three concentric enclosures, each defined by a complex series of intercutting and somewhat discontinuous ditches. The Outer Enclosure was defined by a set of ditches around the base of the drumlin in an area of marl (white clay that forms in the base of lakes) and which extended out across Gabhra Valley. The Middle Enclosure was defined by ditches that also fully enclosed the drumlin, but which were located slightly higher upslope. Finally, there was a smaller Inner Enclosure on the north-east corner of the drumlin,

defined by a small continuous ditch flanked by two much larger, parallel ditches that ran down the northern slope but which did not appear to connect with each other. Within the enclosed space there were small cereal-drying kilns, various pits and the large kiln that was the original focus of the excavation and which was found to overlie the infilled Middle Enclosure ditch. A north–south aligned cobbled roadway, with flanking ditches, was discovered at the far east of the site. This relates to nearby Rathmiles House and dates from the late 18th century.

A third problem became apparent when the excavation recommenced. While the kilns were providing plenty of burnt material that could be radiocarbon dated, the ditches were not providing enough material to fully establish the sequence of activity at the site. Unfortunately, the artefacts were not helpful either. The most important finds were five sherds from a Late Bronze Age domestic pottery vessel. These were found close to the eastern terminal of the Inner Enclosure ditch, an area that had been extensively damaged by burrowing animals, quite possibly the second time badgers had affected the excavation! It was impossible to know if the pottery derived from the ditch or from a separate feature that had been destroyed by animal activity. Other finds included the incomplete skull of an adult female from the

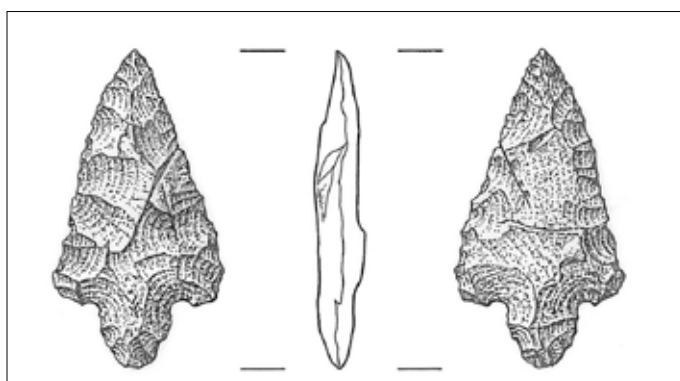The Inner Enclosure, looking west. (Photo: Archaeological Consultancy Services Ltd)

The incomplete skull of an adult female from the western terminal of the Inner Enclosure. (Photo: Archaeological Consultancy Services Ltd)

A barbed-and-tanged chert arrowhead from the upper fill of a ditch thought to be the earliest version of the Middle Enclosure. (Drawing: Archaeological Consultancy Services Ltd)

A butt-trimmed flint flake dating from the Late Mesolithic period, which was recovered from a pit radiocarbon-dated to AD 695–967. (Drawing: Archaeological Consultancy Services Ltd)

western terminal of the Inner Enclosure, a potsherd from an Early Neolithic carinated bowl, a small flint flake recovered from a shallow, infilled terrace south of the large kiln, and a barbed-and-tanged chert arrowhead from the upper fill of a ditch thought to be the earliest version of the Middle Enclosure.

This sparse but interesting finds assemblage suggested that the site consisted of a series of prehistoric ditches dug to enclose the drumlin and a series of early medieval kilns. The nature of the prehistoric activity was much debated as the form of the enclosures was quite unusual and the variety of finds provided a lot of ground for speculation. Time and again, however, we had to return to the issue of the unsecure location of the Late Bronze Age pottery. Could we really assume that its proximity to the ditch terminal could be used to date the ditch?

Fortunately, the ditches eventually provided enough material to obtain radiocarbon dates, but towards the end of the excavation it was decided that samples for OSL dating should also be taken. Three samples were sent to the Oxford Luminescence Dating Laboratory, which had successfully dated Garretstown 2. This, it turned out, was a very fortuitous decision indeed!

Several months after the excavation the OSL dates were returned and they were not exactly what were expected. The ditch from which the

barbed-and-tanged arrowhead had been recovered returned a date of 1622–1102 BC confirming that it was created during the Middle Bronze Age. This ditch, however, was not related to the Middle Enclosure as had been thought. Two radiocarbon dates (AD 650–780 and AD 810–1010) were obtained from the two uppermost fills of the ditch at the east of the Middle Enclosure. A stratigraphically unconnected stretch of ditch along the north of the Middle Enclosure returned an OSL date of AD 978–1378 and a radiocarbon date of AD 690–980 confirming that the Middle Enclosure belonged to the early medieval period (although it may have continued being recut into the medieval period). The Inner Enclosure was also shown to belong to the early medieval period; a sample associated with the female skull returned a radiocarbon date of AD 870–1010. Finally, two radiocarbon dates were successfully obtained from two of the ditch segments belonging to the Outer Enclosure. These dates,

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AD 1530–1950 and AD 1660–1960, have very large error ranges and are not particularly useful. The OSL sample, however, was much more illuminating as it returned a date of AD 1298–1558 suggesting, in combination with the radiocarbon dates, that the Outer Enclosure dated from the late medieval period or early in the post-medieval period.

Radiocarbon dates obtained from several of the kilns and pits on the drumlin added vital information to our attempts at understanding the different periods of activity on the site. Three dates from the large kiln span the period from AD 877 to AD 1118. A smaller kiln to the east returned a date of AD 783–1018, while an irregular shaped pit also on the east of the site returned a date of AD 695–967, despite producing two Late Mesolithic (c. 5500–4000 BC) flint artefacts! Finally, a small circular pit close to the large kiln returned a date of AD 127–345, providing the only evidence of Iron Age activity on the site.

The drumlin at Castletown Tara 3 was ultimately shown to have archaeology dating from all periods of Irish history. There were small traces of activity belonging to the Mesolithic period, Neolithic period and the Iron Age, and there was slightly more substantial evidence of activity during the Bronze Age and early medieval and post-medieval periods. The enclosures seem to represent a long sequence of activity spanning the early to late medieval period, with the cereal-drying kilns associated with the early medieval phase. Rather than being a series of unusual prehistoric enclosures these features can now be seen to relate to a long period of agricultural activity, probably originally linked to the nearby occupation at Rathmiles. The burial of the female skull in the terminal of what appears to be a ditch demarcating an agricultural enclosure is an unusual and currently not satisfactorily explained feature of the site. Perhaps the skull is a residual prehistoric artefact that was encountered and quickly reburied in the early medieval period, or perhaps she was an outcast or criminal who merited this unusual treatment upon her death?

Through the combination of artefactual evidence and scientific dating the sequence of activity across the site was firmly established. It was the decision to use OSL dating, however, that ultimately led to the identification of the substantial Bronze Age ditch and clarified that the Outer Enclosure belonged to the late medieval period. The

hazards of older residual artefacts being found in much younger features and of artefacts being recovered from features disturbed by burrowing animals are well known. The excavations at Castletown Tara 3 provide a compelling example of why such hazards should be taken seriously and why archaeologists need to combine as many appropriate techniques as possible in our attempts to understand the sites that we excavate.
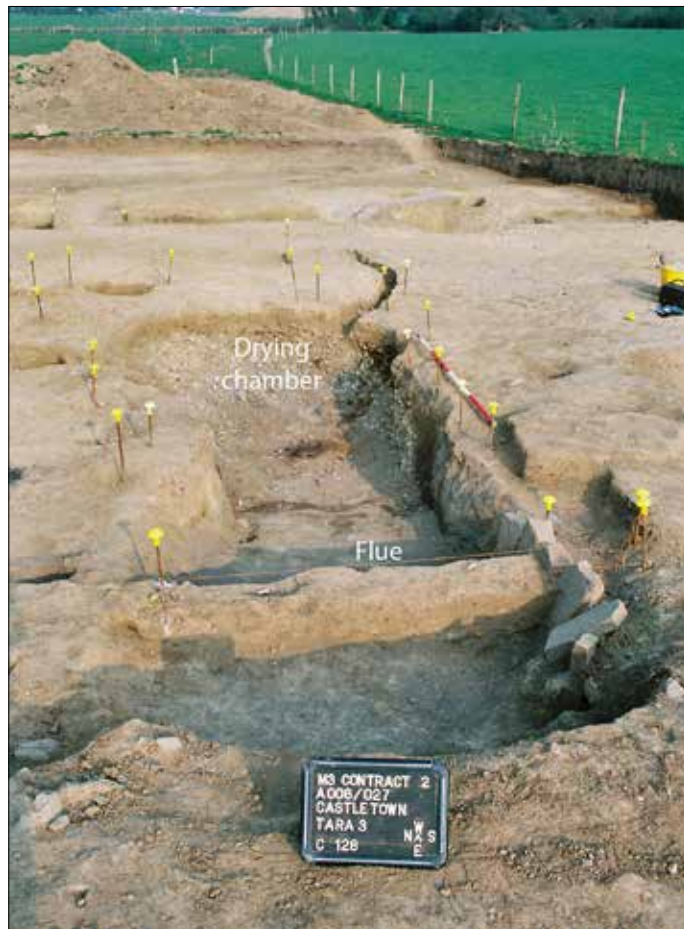
The large, early medieval cereal-drying kiln. (Photo: Archaeological Consultancy Services Ltd)

In Brief: OSL dating

The particular advantage of luminescence dating is that it provides a date for the archaeological artefact or deposit itself, rather than for organic material in assumed association. In the case of OSL (Optically Stimulated Luminescence) sediment dating, suitable material (grains of quartz and feldspar) is usually available throughout the site. When ionising radiation (predominantly alpha-, beta- or gamma-radiation) interacts with an insulating crystal lattice (such as quartz), it triggers a net redistribution of electronic charge. Electrons are stripped from the outer shells of atoms and, though most return immediately, a proportion escape and become trapped at 'meta-stable' sites within the lattice. These are held in place until exposed to light or heat, whereupon they become 'free' and return to their normal state,

but in order to do this they must lose energy, which they do by emitting light.

If sediment at the base of a ditch, for example, is exposed to light, all of the trapped electrons will be released and this effectively resets the radiometric 'clock'. When the sediment becomes buried and is no longer exposed to light, the meta-stable sites will slowly fill up with electrons at a rate determined by the local level of background radiation. If a sample of this sediment is carefully removed during excavation, without exposing it to light, the age since the sediment was deposited can be calculated.

To obtain a date using this method, a portion of the sample is first exposed to a known dose of radiation and then illuminated. The amount of light given off is observed and is used to create a dose response curve. Another part of the sample is then illuminated and the amount of emitted light is compared to the dose response curve, which allows an estimate of the total absorbed radiation dose. Once measurements

OSL soil sample being collected from a ditch section. (Photo: Archaeological Consultancy Services Ltd)

have been made to establish the levels of background radiation in the location where the sample was taken, this can then be used to calculate the approximate age of the sediment.

The error limits on the dates obtained are typically ± 3–8%, although recent technical developments now allow luminescence measurements to be made with a precision of ± 1–2%, in favourable circumstances.

Floor plans of the Neolithic house in Dunsinane, Co. Wexford, and the 19th-century cottage in Ahish, Co. Clare. (Drawings: Aisling Mulcahy, TVAS (Ireland) Ltd)

The Neolithic house was revealed at one of 125 sites located on the proposed M11 Gorey to Enniscorthy scheme and was excavated in early 2011 under the direction of Derek Gallagher of TVAS (Ireland) Ltd. This astonishing house was a substantial rectangular building, which was 15.6 m long and just over 7 m wide. The foundation trenches were up to 1 m wide and deep and were filled with packing stones that would have held walls of upright planks and posts in place. These walls, together with structural posts inside and outside the house, supported a roof that was probably thatched. The internal living space (50 m^2) was divided into two rooms. The presence of a hearth surrounded by stake-holes and numerous pits found in the eastern room suggests that this part of the house was used for food preparation and storage. Analysis has shown that phosphate found in samples taken from the floor in this area was from ash, vegetal debris and small amounts of kitchen-type garbage. This room was the kitchen. A narrow annex was located at this end of the house and was probably used for storage, a pantry perhaps.

The western room was less busy and, as phosphate analysis tells us, was kept clean. The floor was regularly brushed and the room was kept tidy. It is possible that this part of the house was used for storage but not for food preparation. Two narrow, T-shaped slot-trenches at the western end of the room might have held a platform—a raised sleeping compartment perhaps. A hearth in the middle of the house, between two narrow partition trenches ending with large structural posts, was primarily a source of heat and light. Stake-holes surrounding this fireplace provide evidence of a structure, maybe a spit. Alternatively, the stakes might have been part of a small oven which could have offered better fuel consumption and faster and more even cooking.

From Wexford to Clare in 5,600 years

Prehistoric and early modern house architecture may seem far separated in time, but the recent excavation of a Neolithic house evokes a sense of how little domestic life has changed.

By Milica Rajic, Post-Excavation Manager with TVAS (Ireland) Ltd

During the fourth millennium BC, a large two-room house was built in Dunsinane townland in County Wexford. Approximately 5,600 years later, in the first half of the 19th century, another two-room house was built on the other side of Ireland, in Ahish, Co. Clare. What is the connection between these two buildings? The preliminary post-excavation work on the records and specialist analysis of the material from the first house was carried out within the walls of the second building and triggered an awareness of their striking similarity.

The house was surrounded by post-holes, presumably roof supports. At the north side of the house numerous pits were probably used for storage. Another rectangular structure found at the same side, might have been used as a tool shed or shelter for animals.

The 19th-century cottage, in the west of Ireland, accommodates the TVAS (Ireland) Ltd office. It is a stone-built, rectangular dwelling with a tile roof which replaced the original thatch. The main part of the house was erected before 1839 and is visible on

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the first-edition Ordnance Survey six-inch map of County Clare. The other rooms were added later in the 19th and the early 20th century, when a storage shed and the bathroom were built.

The present-day cottage is 16 m long and 6 m wide, but its size is not the only thing this house shares with the much earlier dwelling in Wexford. Although their orientations differ, the cottage is almost a mirror-image of the Neolithic house. The number of rooms and the internal layout are remarkably similar. There are two fireplaces; the larger one in the middle room of the cottage was an open hearth until the late 20th century. The kitchen and food storage is at the west end of the house; the 'sleeping area', with a smaller fireplace, is at the east end. In the original 19th-century layout, a sleeping platform was located above the kitchen at the western end of the house. (There is another bedroom on the first storey of the cottage, which was, until recently, open plan.) To the south of the cottage there is a stone-built, rectangular, open-end fuel storage shed.

The 1911 Census records that a family of six lived in the cottage. These people, just like their Neolithic ancestors, were subsistence farmers. And just like them, they organised their life around the agricultural year and their animals: cows, goats and sheep brought to Ireland by the first farmers. The family who lived in the house in Wexford (just like their descendants) lit fires, cooked their food, raised their children (to whom the valuable property would have been passed) and interacted with their neighbours.

As the analysis of the material from the Neolithic house progresses we might be able to see further parallels between these people, separated by millennia. Both groups built very similar houses which sheltered them, held them together and provided them with a safe place for rest and storage, self-reflection and the potential to 'create their own history'. These houses were their homes.

The 19th-century cottage in Ahish as it is today. (Photo: TVAS (Ireland) Ltd)

Although their orientations differ, the present-day cottage is almost a mirror-image of the Neolithic house.

Elevated view of the Dunsinane Neolithic house with some members of the excavation team. (Photo: AirShots Ltd)

Farming and fighting on the frontier

The knowledge value of excavations at Carrickmines Castle in south County Dublin is close to being realised as post-excavation analysis nears completion.

By Thaddeus Breen, Excavation Director with Valerie J Keeley Ltd

Aerial view of Carrickmines about 1960. (Photo: source unknown)

Excavations on road schemes can sometimes be frustrating because you are often digging in a field beside an upstanding site—the actual monument is avoided by the road and cannot be touched. At Carrickmines, on the South Eastern Motorway, the site of the castle itself was left untouched between two excavated strips, but related features including defensive outworks were found, along with thousands of artefacts and hundreds of environmental samples. These allow us to build up an extensive picture of life at Carrickmines Castle over the centuries.

The castle had been badly damaged in 1642 and was then extensively pillaged for building stone with the result that in 1781

the antiquarian Austin Cooper could only find 'a kind of pier . . . which they call the castle gate'. This is still standing today, as the end wall of one of a series of farm outbuildings. The farmhouse itself lacks the thick walls, which are the tell-tale signs of a re-used castle building, so the rest of the castle must have been demolished to ground level. However, the foundations are probably still present under the house.

The areas excavated were mainly to the north and south of the castle site. They revealed evidence of human activity from the Mesolithic period (c. 8000–4000 BC) to the present day. Stone tools and pottery testify to extensive activity in Carrickmines

throughout prehistoric times, especially the Neolithic period (c. 4000–2400 BC). The stone tools were concentrated in four distinct areas. Two were areas where there was relatively little activity in later ages: the north-west and south-west. In the latter, the concentration is so great that some form of settlement feature would not be surprising immediately beyond the excavated area further to the south-west. The other two concentrations of stone tools were on either side of the unexcavated castle site, in areas which also had the densest concentrations of medieval and post-medieval features on the site. Evidently this slightly raised, dry land beside a marshy area was always seen as a suitable area for settlement.

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By 1781 this was the only upstanding part of the castle buildings. It is traditionally believed to be part of a gatehouse. (Photos: Valerie J Keeley Ltd)

A medieval well with steps.

Aerial photograph, taken during the excavation, showing the rectangular bawn surrounded by three ditches. The post-1800 Glenamuck road crosses it and the farm buildings are on the left.

We found nothing to tell us about Iron Age Carrickmines, and the silence continues until the ninth or 10th century AD, when charcoal was being made, probably for use in metal-working. No evidence of the latter was recovered, but a copper-alloy stick-pin of 12th-century date was found. A ringed stone cross was probably also from this period.

By the time Carrickmines emerges in the historical record as a newly created manor in the 13th century, developments were taking place in quick succession. A cereal-drying kiln was replaced by another and that in turn was destroyed when a headrace was dug for a horizontal watermill. This was abandoned by the time a defensive enclosure was built,

apparently a ringwork enclosed by, in places, three ditches and two banks. (A ringwork is an Anglo-Norman earthwork castle.) The area which it enclosed was where the castle was later built. To the west of it, a small sub-rectangular field was enclosed by a boundary ditch. Furrows found in this field contained only medieval pottery. A cereal-drying kiln was later dug into the ditch.

This field was bounded on the south by a stream. The area to the south of this again was the next part to be defensively enclosed. This south-western enclosure did not replace the ringwork but was an extension to it. It is not clear how much it may have overlapped the ringwork to enclose the castle site.

Structures, including two houses, were built in the north-eastern corner of this enclosure, but the remainder was agricultural land, with marshy ground further to the west.

The third enclosed area was a more-or-less rectangular area enclosed by three ditches. The inner ditch was revetted with stone. This enclosure was definitely external to the castle area. This was probably the bawn (an enclosed courtyard) mentioned in historical sources. It would have been used to protect livestock in the event of an attack, and could also have been an encampment for a temporary garrison when necessary. It is likely to have been the location for the annual fair which was held at Carrickmines.

These defensive phases were all completed in the 13th century and large amounts of pottery from this period were found. Most was Leinster Ware, with a variety of vessels including jars, pitchers, platters and lamps. Many sherds of Dublin-type wares were also found, but there was only a small amount of imported pottery (from the Saintonge region of France). Only two coins from this period were found—an Irish coin of King John and a Scottish coin of Alexander III.

Carrickmines was a manor held by various tenants over the years. It is not mentioned at this time as a frontier post or stronghold, but like all settlements on the fringe of the mountains, it was vulnerable to attack from the O'Byrnes and O'Tooles. By 1300 the situation was becoming more dangerous and by 1312 much of the lands of Carrickmines lay waste and were subsequently abandoned. In 1355 it had been fortified as part of a string of defences from Ballymore Eustace to Tallaght, Balally and Kilgobbin, and beyond Carrickmines north-east to Dalkey. By 1400, Carrickmines was the seat of the Walsh family.

Irish silver farthing of King John, 1204–11, minted in Dublin.

James II 'gun-money' sixpence, emergency money minted in Ireland, August 1689.

An 18th- or early 19th-century Officer's sleeve button.

Clay-pipes arranged by date from the large 19th-century bowl with 'Land League' slogan down to the small, sloping late 16th- or early 17th-century bowl.

Many of the medieval finds come from this later period. Architectural stone and floor tiles show that there was an impressive building with a vaulted chapel or hall and a floor of decorated tiles like those in the Dublin monasteries. Yet no roof tiles were found, so the roof, even of the main building, must have been thatched. Artefacts found include shoes and a sling-pouch of leather, a copper-alloy ring-brooch and purse mount and some Jew's harps (a simple musical instrument, popular in medieval times). The environmental samples showed that drying of arable crops was being carried out on an industrial scale. Cattle were brought to the site, but not bred there, and used for both meat and dairy products.

After the rich haul of pottery from the 13th-century layers, the following centuries were a disappointment. It is well known

Two musket balls, one unused (left), the other impacted (right).

that in this period little pottery was used, which means that organic materials such as wood and leather were being used instead, with cooking vessels of metal. None of this, however, has been found at Carrickmines, despite some deposits in ditches and wells which were wet enough to preserve organic material. Perhaps wooden vessels which were broken or leaking were routinely thrown onto the fire?

By the later 16th century, pottery had returned in the form of relatively exotic imports from France, Spain or Germany. Some of these were quite functional, including tankards and mugs, and storage vessels for beer and wine. A chafing dish for keeping food warm on the table after it had been brought from the kitchen was found. Tobacco had now been introduced and a few clay-pipes from the first half of the 17th

Part of an 18th-century shoe buckle.

century were found. These were English imports. An increasing number of ridge-tiles and roof-slates are evidence of a change in building technology. This may have been because of the fire risk from thatch in what was now an important frontier post.

The most spectacular find at Carrickmines was a pair of mass graves which almost certainly date from the attack on the castle by government forces in 1642, Theobald Walsh having sided with the rebels during the Irish Confederate Wars. They were shallow graves, 25 m from the presumed site of the castle, and dated by coins to the early 17th century. Various musket balls found around the site may date from 1642 or from earlier attacks on the castle. One of these was initially puzzling. It is an iron ball, unlike musket balls which were made of lead, but only 36 mm in diameter. This is very small for a cannon but very big for a musket. However, a farmer from Dean's Grange, who went to 'the house of Carrickmayne' in search of cattle which had been seized by Walsh, testified to having seen a 'sling piece' there. This was a small naval swivel-gun which could have had such a small calibre. The gun was not found, but perhaps this was one of the balls fired from it.

After the siege, the castle of Carrickmines was damaged beyond repair, and the Hearth Tax returns 22 years later show 27 householders in small houses. By the 1680s, Carrickmines had been bought by the Allen family, but their seat was at Stillorgan and Carrickmines was leased to a succession of

The most spectacular find at Carrickmines was a pair of mass graves which almost certainly date from the attack on the castle by government forces in 1642.

farmers. There was still a manor court and a market.

Finds from the later 17th century are plentiful. In the westernmost part of the excavated area, foundations were found of a two-room cottage, with a later extension and a number of cobbled surfaces. The coins found in this area date from this period. The later fills in the ditches show that they were gradually filling up.

Although there was no longer a gentleman's seat at Carrickmines, the large assemblage of pottery and glass from the later 17th and the 18th centuries show that at least some of the residents had quite a high standard of living. The ceramic finds included expensive tableware such as creamware and pearlware, and a lot of wine bottles and wine glasses were found, along with window-glass.

Some thimbles and a large quantity of sewing pins testified to the making and repair of clothes. Some shoes and shoe buckles were found. The roofs of houses, it appears, were no longer slated but tiled, orange pantiles giving what would nowadays seem an exotic appearance. A new entrance to the main farmhouse was constructed, running alongside a still-open ditch from the original ringwork. Large amounts of coins and trade tokens (locally produced coins used primarily as small change) were found, perhaps as a result of the market, which was still being held regularly. There were more clay-pipes now, both of Irish manufacture and Dutch imports. A wide assortment of buttons were found, including one from the Powerscourt Cavalry, a local volunteer regiment based at Lord Powerscourt's estate not far to the south. This probably dated from the 1790s, as did a French coin of the First Republic.

Finds from 19th-century Carrickmines were as plentiful as those from the 18th century. This was the Carrickmines shown on the maps by Taylor, Duncan and the Ordnance Survey—a quiet rural backwater. Pottery finds reveal that more mass-produced items were used. New types included stoneware whiskey jars, ink bottles and marmalade pots, and the glassware included mineral-water and medicine bottles. There were plenty of coins, mostly pennies and halfpennies, though an 1816 silver sixpence and a 1921 two-shilling piece must have been missed more acutely. Even in the 20th century, evidence was accumulating which would enable us to tell the story of Carrickmines through the millennia.

A sherd of 17th–18th-century North Devon sgraffito ware.

A moving memorial

The restoration of a 19th-century public drinking fountain and memorial evokes memories of Limerick's landlord class.

By Paul O'Keeffe, NRA Assistant Archaeologist with the Southern Team

Top: The memorial reinstated.

Right: The Fitzgibbon Memorial prior to dismantling in 2001.
(Photos: Paul O'Keeffe)

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The Fitzgibbon Memorial is a handsome Gothic arch, erected over a roadside water pump by Lady Louisa Fitzgibbon and her husband Gerald in 1875, in memory of their son who had died five years before. It was originally located on the Limerick–Nenagh road in the townland of Carrowkeel, about 3.5 km east of Limerick City, and was known locally as the 'Carrowkeel Fountain' or 'Carrowkeel Pump'. The memorial was dismantled in 2001 because it lay within the route of the Limerick Southern Ring Road. It has now been fully restored and rebuilt at a new site on the realigned Limerick–Nenagh road, 600 m NNE of its original location. The memorial was officially reinstated by Councillor Mary Harty, Chathaoirleach of Limerick County Council, on 5 October 2011.

The Fitzgibbons of Mountshannon

The Fitzgibbons were a wealthy and influential Limerick family whose rise to prominence was brought about by John Fitzgibbon (1708–80) of Ballysheedy, an accomplished lawyer and Member of Parliament, who amassed a fortune through his legal practice. He purchased a house and land in Mountshannon, 2 km south-west of Castleconnell, c. 1765. The estate eventually extended to 13,000 acres, 900 acres of which comprised the beautiful gardens and parkland of Mountshannon Demesne, which was bounded to the north and west by the Shannon and Mulkear rivers respectively. At its heart was Mountshannon House, an 18th-century mansion widely regarded as one of the finest in Ireland (though sadly now only a burnt-out shell), complete with gate lodges, stewards' houses, servants' quarters, stables, coach-houses, heated greenhouses and gasworks. It remained the seat of the Fitzgibbon family for over 120 years.

However, it was under the stewardship of John Fitzgibbon's son, also John (1748–1802), that the family reached the height of its power and influence. Like his father, he was a lawyer and Member of Parliament, and was created Lord Chancellor of Ireland (the first Irishman to hold the office since 1725) and Baron Fitzgibbon of Lower Connello in 1789. He was later created Viscount Fitzgibbon (1793), First Earl of Clare (1795) and Lord Fitzgibbon of Sidbury, Devonshire (1799). These titles were in recognition of his services to the Crown, which included opposing reform and emancipation for Catholics, crushing the 1798 rebellion and supporting the Act of Union. For these very same acts he was hated by Catholics and was disparagingly known as 'Black Jack'. It is said that dead cats were thrown at his coffin, in remembrance of a remark attributed to him that he would 'make the Irish as tame as a mutilated cat'. After his death in 1802, the wealth and influence of the Fitzgibbon family steadily declined. Nevertheless, the subsequent family history is a colourful one, connected with well-known people and events, not to mention the odd scandal.

> *When the pump was first placed here by the Second Earl in the early to mid 19th century, the provision of free, fresh drinking water was a pressing social issue.*

Mountshannon House, an 18th-century mansion, now only a burnt-out shell.

Detail of the inscribed memorial stone after restoration.

Black Jack's son, John Fitzgibbon, Second Earl of Clare (1792–1851), inherited the estate at only 10 years of age and went on to serve as Lord Lieutenant of Limerick and governor of Bombay. He was a close friend of the poet Byron and inspired one of the latter's early works, addressed to 'The Friend of my Youth'. When the Second Earl died without issue in 1851, his brother Richard (the Third Earl of Clare, 1793–1864) inherited the estate.

Prior to inheriting, Richard caused a public scandal by conducting an affair with a married woman and fathering her child. The lawsuit taken by the lady's aggrieved husband, Mr Maurice Crosbie Moore, did considerable damage to the Earl's reputation, and the court award of £6,000 did even greater damage to his purse. Though he later married the ex-Mrs Crosbie Moore, their eldest son was born out of wedlock and was therefore illegitimate, making their second son, Viscount John Charles Henry Fitzgibbon, the intended heir. That was, however, until a fateful day in October 1854 when John Charles Henry, as a Lieutenant in the 8th Royal Irish Hussars, took part in the Charge of the Light Bridge at the Battle of Balaclava. Though comrades witnessed him receiving two bullet wounds to the chest, his body was never recovered. Rumours circulated that he was not, in fact, dead and speculation was fuelled by the appearance of a man matching his description at the 8th Royal Hussars' regimental mess in Hounslow, Middlesex, in 1877. A similar appearance

occurred when the regiment was stationed on the north-west Indian frontier in 1892, where a number of the officers were certain that the elderly man who visited their mess was none other than Viscount Fitzgibbon. The sightings were widely reported in the newspapers and inspired Rudyard Kipling's short story 'The Man Who Was'. A monument was erected to 'commemorate the bravery of Viscount Fitzgibbon . . . and his gallant companions in arms' in 1857 on Wellington Bridge (now Sarsfield's Bridge) in Limerick City. The bronze statue of the Viscount that surmounted it was toppled by members of the Irish Republican Army in 1930 and the monument now commemorates the 1916 Rising.

Owing to the death of his only legitimate son, Richard's eldest daughter, Lady Louisa (1826–98), inherited the Mountshannon estate. Louisa's extravagance soon wasted what was left of the Fitzgibbon fortune and in desperation she married a Sicilian nobleman, the Marchese Della Rochella, following the death of her first husband Gerald some years before. Lady Louisa intended to use his money to pay her debts. Unbeknown to her, however, the Marchese's estates were heavily mortgaged and, having once attended one of her sumptuous balls at Mountshannon, he was sure this wealthy widow was the answer to his financial woes. One can only imagine that the marriage was something of a disappointment to both parties. Louisa eventually resorted to London moneylenders,

who soon foreclosed and sold the estate. Leaving Ireland a relatively poor woman, she ended her days in a convent on the Isle of Wight.

The memorial

Although the Fitzgibbons were resented in many quarters, particularly because of the legacy of the First Earl (Black Jack), they were nevertheless admired as good landlords. There are many tales of their generosity and even Black Jack was known to be highly critical of landlords who neglected their tenants or allowed middlemen and agents to run their estates. Presumably it was this sense of public duty that led his son, John (the Second Earl), to install a pump on the side of the Limerick–Nenagh road for the benefit of his tenants and neighbours, and travellers heading to and from the city. Lady Louisa (his niece) and her first husband renovated the pump in 1875 and erected a stone memorial over it, dedicated to their eldest son, Charles Richard George, who died of blood poisoning from a minor accident at the age of 20.

The memorial is a gabled, Gothic arch of dressed limestone with a white marble memorial stone, above which is the family coat of arms and motto, '*NIL ADMIRARI*', meaning 'to be astonished at nothing'. A semi-circular stone trough abuts the front of the arch. The arch is believed to have originally been surmounted by a cross-

shaped finial and the entire structure was at one time surrounded by a semi-circular arrangement of iron railings that guided travellers, and their mounts, from the road to the trough and back out again. It was a well-known landmark and continued to provide fresh water for the local area until at least the 1960s, by which time Limerick County Council had installed a new pump on a concrete platform behind the arch.

When the pump was first placed here by the Second Earl in the early to mid 19th century, the provision of free, fresh drinking water was a pressing social issue, particularly in towns and cities. From the 1850s onwards, philanthropic and civic-minded societies advocated and raised funds for the construction of public drinking fountains. As the most common source of funding was wealthy individuals and prominent public figures, fountains and troughs often bore dedications to their benefactors. A tradition of memorial fountains soon developed, where those who drank from the fountain were requested to pray for the soul of the dearly departed. This tradition, which surely influenced how Lady Louisa chose to commemorate her son, was very prevalent in England in the late 19th century. Indeed, it is in England that one finds the closest parallels for the distinctive gabled arch of the Fitzgibbon Memorial.

Restoration and rebuilding

Public water schemes, and the rise of motorised transport, eventually made the pump in Carrowkeel obsolete and the memorial fell into disrepair. Weathering caused the column stones to crack and the lead letters of the memorial stone to fall out; the base stones were damaged, the finial lost, and the entire memorial largely abandoned in an overgrown tract of disused land. Then in 2001 the memorial was dismantled to make way for the Limerick Southern Ring Road. A location on which to rebuild it could not be identified until the adjoining M7 Nenagh–Limerick motorway was completed, and so the memorial spent a lonely 10 years in storage.

After the opening of the motorway in 2010, and with the help of local residents (in particular Paddy Rainsford), the Castleconnell Historical Society, and Tom Cassidy (Conservation Officer, Limerick County Council), a new location for the memorial was identified and a programme of restoration was begun. The lettering on the marble memorial stone was re-cut and new lead letters inserted by Stephen Bracken of Celbridge, Co. Kildare; while the arch stones were expertly repaired by Ashfort Stoneworks of Crecora, Co. Limerick. Where possible, the broken column stones were dowelled back together. For those in especially poor condition, new pieces were carved by Edward Murphy of Kilkenny and dowelled to the surviving original stone. Smaller areas of damage were repaired using a colour-matched restoration mortar. The trough, which had become fully buried prior to the memorial being dismantled, was also completely restored.

Now standing on the north side of the realigned Limerick–Nenagh road, on land that was formerly part of the Mountshannon Demesne, the Fitzgibbon Memorial is once again a prominent local landmark. It seems somehow fitting that, of all the testaments to the power and wealth of the Fitzgibbon family, it is this memorial, which originated as an act of public good and was embellished by a grieving mother, that is the one that survives today, still entreating passersby to pray for young Charles Fitzgibbon, who died in his 21st year.

Detail of column stone restoration.

A 'face' from the past

How primary school students from Mitchelstown, Co. Cork, came face-to-face with their Bronze Age past.

By Ken Hanley, NRA Archaeologist with the Southern Team

In October 2011 scores of enthusiastic primary school children poured through the doors of the newly opened Mitchelstown Library in County Cork to hear about a truly remarkable discovery, the likes of which had never before been found in Ireland. While undertaking excavations in advance of the N8/N73 Mitchelstown Relief Road, archaeologists uncovered the remains of a small 3,800-year-old ceramic cup, specifically shaped in the form of a human face. The cup was found in a pit on the bank of the Gradoge River, just outside Mitchelstown, and it was accompanied by a ceramic spoon and two pots. The cup has a large nose, two eyes and two ears. One of the pots also has ears affixed to it. Intriguingly, one ear on the cup (and similarly on the pot) was back-to-front! The pottery specialists who examined the finds were astonished and described them as the most exciting ceramic discovery from prehistoric Ireland.

The Cork County Library and Arts Service, in partnership with the NRA, invited primary schools in the Mitchelstown area to take part in a special group project competition for fifth and sixth classes, which required the submission of 2-D and 3-D artwork, as well as a research piece and a creative writing piece centred on the face cup. The aim of the competition was to engender greater appreciation of our shared heritage and ancestry. As a prelude to the competition, the classes were invited to Mitchelstown Library where they were given talks on the background to the discovery and on the range of other sites identified on national road schemes in County Cork.

The competition judges were overwhelmed by the imagination and creativity of all the submitted projects, each of which was highly commended. Following a long debate, however, it was the sixth class from Bunscoil na Toirbhirte in Mitchelstown who won over the judges with their particularly innovative work. They were duly crowned competition winners in an award ceremony at Mitchelstown Library in December 2011.

The Bronze Age face cup found near Mitchelstown, Co. Cork. (Photos: John Sunderland)

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The sixth class pupils from Bunscoil na Toirbhirte, Mitchelstown, deserved winners of the 2011 Mitchelstown Face Cup competition. (Photo: Ken Hanley)

A specially commissioned bronze-cast trophy was sculpted by artist Hele Helsner and sponsored by Eachtra Archaeological Projects. The trophy was presented to the winning school by Jacinta Kiely, a co-Director of Eachtra. Mitchelstown Librarian, Liz Fay, presented the class pupils with individual medals and refreshments for the well-deserved winners were provided courtesy of Tesco (Ireland) Ltd. The award ceremony was presided over by Ian McDonagh, Arts Officer with Cork County Council, and Mary McPhillips, Senior Executive Librarian with the Cork County Library. To commemorate the discovery a replica of the face cup and spoon was presented by the NRA to Mitchelstown Library and both items are currently on display there. The competition trophy will be kept by the winning school for a year and will then be returned to the library as a perpetual trophy for future community-based competitions in Mitchelstown.

The bronze-cast perpetual Mitchelstown Face Cup trophy sculpted by artist Hele Helsner and sponsored by Eachtra Archaeological Projects. (Photo: Ken Hanley)

But the last word should go to the inspiring sixth class children from Bunscoil na Toirbhirte:

'The Face Cup was found where a driver drives his load
Down by the N8 Mitchelstown Road.
Galty Mountains to the north, Ballyhoura to the west
Was where the Face Cup was laid to rest.

The Face Cup came with two posts and a spoon
I wonder did they use it to worship the moon.
The Face Cup was found with two other pots
They were found in a field where a farm grows crops.

I heard someone say it was used to worship fire
But no-one knows so don't call me a liar.
The Face Cup was found with two pots from a different time
It's in the National Museum, so you better stand in line.

Where it will have pride of place
Because of its unique face
There's a replica in the library in town
So take a trip to Mitchelstown!'

(Extract of poem by sixth class from Bunscoil na Toirbhirte, Mitchelstown. Winners of the 2011 Mitchelstown Face Cup competition for local primary schools)

Jacinta Kiely (Eachtra Archaeological Projects) giving a talk to primary school children at Mitchelstown Library. (Photo: Ken Hanley)

A unique find was uncovered during the excavation of a standing stone on the N11 Arklow–Gorey Link Road in County Wexford.

By Paul Stevens, an Excavation Director with Valerie J Keeley Ltd, with contributions by Marc Guernon

A grooved stone from Ask, Co. Wexford, represents an important and possibly unique find that reveals how a prehistoric standing stone could be set into position with pinpoint accuracy. The precision setting of this monolith suggests that its orientation in the landscape was vital to its architectural design. In addition, the size, shape, and even colour of the stone all seem to have been very important to its ancient architects. These discoveries provide clues about the stone's relationship to its wider landscape setting. The findings represent evidence for a degree of planning, precision and expertise in stone masonry not usually associated with standing stones (prehistoric examples of which are generally unhewn).

Ancient architecture
From painstaking reconstruction of the excavation evidence, a sequence of events has been established (see reconstruction drawing on next page) for the standing stone investigated at Ask (designated here as Ask 1). Originally, a glacial erratic boulder of metamorphosed feldspathic tuff rock—typical of the region—lay partly exposed in the ground (A). The ancient architects removed a large rectangular block

How a standing stone was made

from the boulder along a natural fracture. The block was worked into the desired shape and size using stone hammers (B). A dark blue-green colour was revealed by this process as large chunks and fragments were removed. The southern face was left untouched, however, deliberately retaining a vein of white phenocryst (a type of quartzite) that provided a striking contrast to the blue-green rock exposed elsewhere. This stone was raised upright and probably held up by stone wedges and guy-ropes tied to wooden stakes (C–D)—a layer of water-rolled pebbles found during the excavation may also have been used to assist in this process (D). The end shape was a ragged wedge-shaped top, a roughly square cross-section and a tapering pencil-pointed base. The standing stone was positioned vertically to rest on its point so as to make it easier to manoeuvre (C–E). The standing stone was now ready to be moved and adjusted into its permanent alignment using leverage from a rod inserted into the slot in the 'keystone' (E), with the unworked white side facing south. Finally, it was partially buried and stood to a height of 1.37 m above the ground surface (F).

Keystone
Of the larger residual chunks and fragments originally removed from the standing stone, some were used for packing, wedges, props and supports, rammed in against the base of the stone. One in particular is most important as it represents the key architectural evidence for the final precise manoeuvre. This unique find is a large wedge-shaped fragment with a 260-mm-long groove or slot (30 mm wide and 8–13 mm deep) pecked out by hand, with obvious care and attention. This stone was placed between the base of the standing stone, a second wedge and the remainder of the boulder. The groove was placed vertically along the side of the standing stone, to fit a long, circular timber rod or stake; in effect a lever to help manoeuvre the stone through several degrees fine-tuning to the desired aspect and angle. Once the stone was set into position, the timber would have been withdrawn and the base backfilled with clay and stone, including the remaining stone chip fragments and cobbles. The time, trouble and planning required to design and cut such a groove is unprecedented for standing stones, but may be replicated elsewhere in Ask townland (see Ask 2 below). Such attention to alignment merits some discussion of the environment surrounding the site.

Its place in the landscape
The Ask 1 standing stone is 3 km north-east of Gorey town and was part of an extensive and previously undocumented cemetery complex that was in use for over two millennia, commencing in the Neolithic
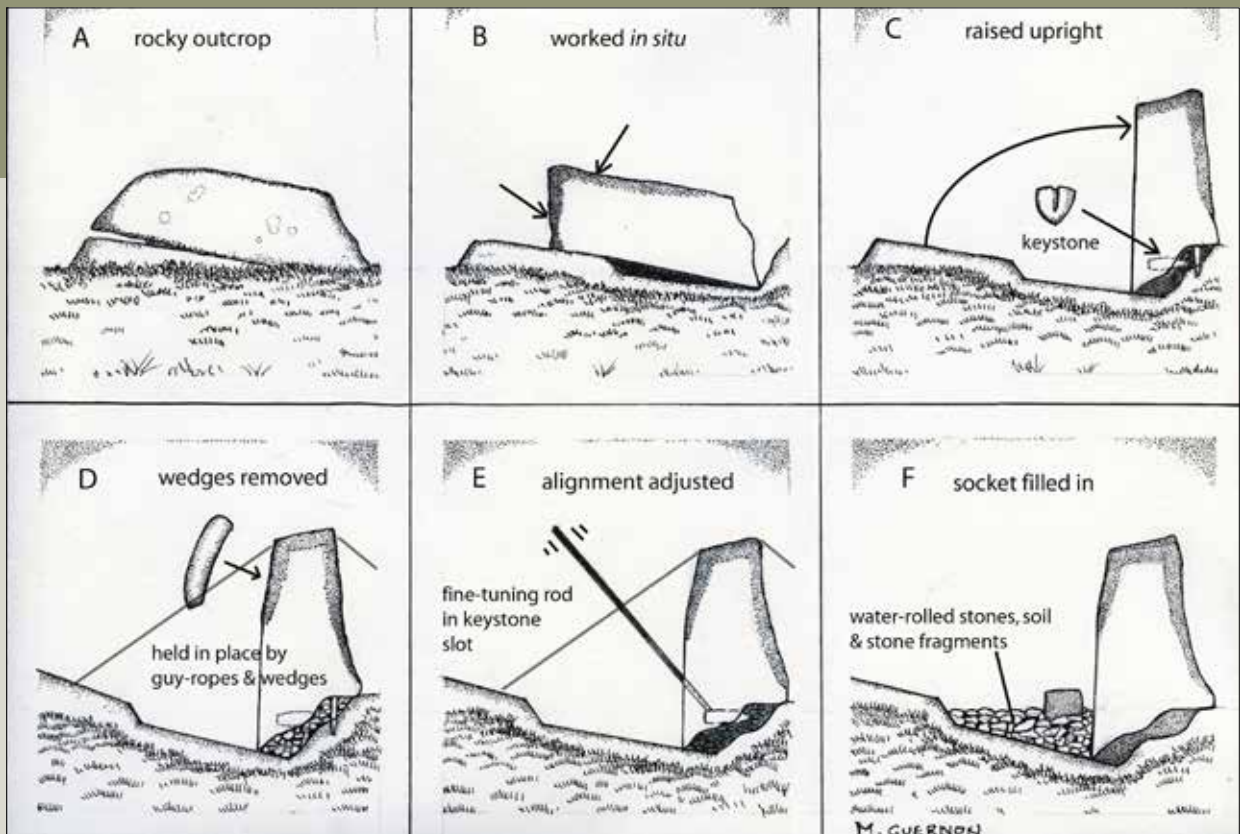
Illustration showing the sequence of events (A–F) in the creation of the Ask 1 standing stone. (Drawings: Marc Guernon)

View west, showing the vein of white phenocryst (stained green over time), likely retained for its vivid colour and contrast. (Photo: Valerie J Keeley Ltd)

Detail of the 260-mm-long groove cut into a stone found wedged against the standing stone, possibly used to house a lever for adjusting the final position of the standing stone. (Photo: Marc Guernon)

Elevated view of the excavations at Ask, Co. Wexford, showing the ring-ditch cemetery c. 55 m south-west of the Ask 1 standing stone. (Photo: John Sunderland)

period. Two standing stones were located in Ask townland; the second standing stone (Ask 2) lies undisturbed in an adjacent field south-west of Ask 1, beyond the road corridor. These stones were originally located at either end of the cemetery site. Following the excavation the Ask 1 standing stone was relocated to what is now Tinnock Roundabout. Ask 2 lay 411 m south-west of Ask 1. It is slightly smaller, measuring 0.95 m in height and is roughly square. It is of identical rock type. It also contains a small groove cut into its south-east face, of unknown origin or purpose, but reminiscent of the grooved stone from Ask 1.

The cemetery and standing stones occupy the western slopes of Ask Hill overlooking a narrow pass between north Wexford and south Wicklow and with commanding views of the Wicklow plains. A 100 m-high ridge conjoins the hill at Ask with the larger Tara Hill to the east. This high ground marks an ancient territorial boundary, marking the limits of the important Uí Cheinnselaig tribal territory, later defining the ecclesiastical Diocese of Ferns.

The wider context

A standing stone may be defined as a stone deliberately set upright in the ground and varying in height from 0.5 m up to 6 m. Standing stones are thought to have functioned as burial-markers, commemorative monuments, boundary-markers and route indicators. Notoriously difficult to date, they are commonly dated to the second millennium BC, but examples from the Neolithic to the early medieval periods are known. Standing stones remained a focal point for burial as late as the early medieval period and may have been important ancestral monuments.

Standing stones are one of the most abundant monuments in Ireland and are distributed widely. An association at Ask to the wider landscape is strongly suggested. Ask 1 and 2 are one of a number of standing stones in the locality, including a possible example at Tinnock Lower, seven monoliths partly encircling Tara Hill and 22 other recorded stones from the wider surrounding area.

There is some evidence to suggest a date for Ask 1 and Ask 2 between the Late Neolithic period and the Middle–Late Bronze Age. Curiously, no other archaeological evidence was found within a c. 20–30 m radius of Ask 1, which suggests an exclusion zone was deliberately placed around it in the past.

Previous excavations of standing stones in Ireland demonstrate a general association with prehistoric burial grounds and they are often interpreted as territorial markers. It has also been occasionally suggested that some are aligned on important landscape features such as local mountains. It has also been suggested that standing stones were intended to resemble the human form. The Ask stones may fall into one of two categories: 'guardian' stones to the site both warning

Standing stone

Ask 1, looking south, either deliberately or accidentally reflecting the slope of Ask Hill. (Photo: Valerie J Keeley Ltd)

of the entry into a sacred or supernatural space and protecting the outside world from the energies within, or 'companion' stones to the dead, marking the limits and extent of a sacred or significant place, such as a cemetery.

Excavation of standing stones have produced associated burials at Kiltullagh, Co. Roscommon, Ballykeel South, Co. Clare, Kilgowan, Co. Kildare, Brackloon, Co. Kerry, Forenaughts Great, Co. Kildare, and Long Stone, Drunmahare, Co. Down. At the Long Stone, Punchestown, Co. Kildare, an empty stone cist was revealed at the base of the 7 m-tall monolith. Standing stones at Carrownacaw, Co. Down, and Kiltullagh Hill, Co. Sligo, are both located near a ring-barrow. The standing stones at Ask are not immediately adjacent to burials, but are clearly associated with the ring-ditch cemetery and other features on the site.

Standing stones are thought to have functioned as burial-markers, commemorative monuments, boundary-markers and route indicators.

Colour is not often discussed in the archaeology of standing stones, but in the case of Ask 1, particular effort and time seem to have been spent to deliberately expose specific colours. This is rarely recorded at other sites in Ireland. At Carbane West, Co. Meath, however, a fallen 2 m-long quartz stone marks the western periphery of the Loughcrew funerary complex. Equally, a similar sized white quartzite monolith marks the summit of Slieve na mBan, Co. Tipperary, adjacent to the large cairn there. An off white stone with patches of red stands outside the west passage of the main mound at Knowth, Co. Meath, the colour of which is particularly vivid after a rain shower.

Conclusion

The excavations at Ask have produced important new, and possibly unique, architectural evidence from the Ask 1 standing stone. When taken in context, it is clear that the prehistoric cemetery was deliberately referenced by the standing stone setting, which faces the cemetery and mirrors the surrounding topography with pinpoint accuracy and intriguing use of colour. Furthermore, the prehistoric cemetery appears to avoid the standing stone. This picture of how the stone was raised, worked into shape (deliberately retaining the vivid vein of white phenocryst) and set with such accuracy represents a degree of architectural planning, precision and expertise in stone masonry not usually associated with standing stones. Certainly, this new discovery may encourage more questions as to the intended meaning and significance of such standing stones in the past. Architecturally, the use of the keystone indicates technological ingenuity reminiscent of the elaborate megalithic monuments from much earlier in the archaeological landscape.

The Ask 2 standing stone was identified during the excavation and was possibly associated with the cemetery. (Photo: Valerie J Keeley Ltd)

Kildare underground

The entrance creep of the souterrain at Halverstown, Co. Kildare, from the south.
(Photo: Irish Archaeological Consultancy Ltd)

West-facing section through the chamber of the Halverstown souterrain. (Photo: Irish Archaeological Consultancy Ltd)

The chamber and entrance, from the ESE, following the reduction of the surrounding ground surface. Owing to the depth of the Halverstown souterrain, the ground level had to be reduced to permit the safe excavation of the lower levels. (Photo: Irish Archaeological Consultancy Ltd)

Underground structures known as souterrains can provide numerous insights into early medieval life.

*By Noel Dunne (NRA), Tim Coughlan (Irish Archaeological Consultancy Ltd)
and Tara Doyle (Rubicon Heritage Services Ltd)*

Two previously unknown, earth-cut souterrains were discovered on the Kilcullen to Carlow section of the M9 motorway. One of these was located on the site for the Kilcullen Motorway Service Area, in Halverstown townland, about 4 km south of Kilcullen, Co. Kildare. Coincidently, the service area is on the demesne lands of Halverstown House, from which the Purcell family once operated a stagecoach service from Dublin to Cork. How the wheel has come full circle with the lands now destined to become a motorway pit-stop—an interesting article for a future edition of *Seanda* no doubt!

The Halverstown souterrain

The Halverstown souterrain consisted of an east–west aligned subrectangular chamber, with an entrance at the west end. The chamber had near vertical sides and a flat base. It was 6.8 m long, 4.7 m wide and 2.35 m high. The 8.9 m-long entrance was aligned north–south, sloping and deepening to the south, before turning at a right angle to enter the chamber at floor level at the south end of the west side. Its floor width was 0.85–1.1 m.

The roof of the chamber was originally supported by large posts (average diameter 0.2 m) in each corner and central posts along the north and south sides and the east end, with a further post in the middle of the chamber. The south-west corner post also doubled as a door post for the entrance, with an additional post forming the opposite side of the door. Another post was located along the south side, midway between the central post and the south-west corner. The evidence for the posts was in the form of post-pads—

shallow, subcircular features with short vertical sides and flat bases—indicating that the posts rested on the ground surface rather than being braced by post-hole sockets. The north and south side posts had diameters of 0.3 m, the central post being 0.35 m, attesting to the greater load-bearing requirement at the centre of the chamber.

The entrance passage incorporated numerous post-holes: a pair towards the north end, four at the south end before the east turn, one at the south-west angle and a further pair flanking the entrance to the chamber, one of which doubled as the south-

west corner support. These posts would have acted as roof supports, but also as door and blocking features. They were notably smaller than those of the chamber, indicating that a substantially lighter load was carried here.

The souterrain was filled with heavy, sticky boulder clay and the roof support timbers were evident as vertical cavities within this. The tops of these voids along the east end of the chamber were at depths of 0.55 m and 1 m below the level of the souterrain cut. It is interpreted that the structural posts decayed *in situ* after the souterrain was abandoned and backfilled naturally. A cut into the top

Elevated view of the enclosure and souterrain at Ballyvass, Co. Kildare, from the SSW. (Photo: AirShots Ltd)

of the east wall of the chamber would have functioned as an air vent, in addition to possibly supplying a small source of light.

In the east half of the chamber, narrow post-holes and slot-trenches were recorded around the perimeter, between the structural timbers. These are thought to be evidence of timber wall panelling or skirting board-style edging along the wall—such edging was evident in section along the east half of the south wall. Panelling/edging was not evident in the west half of the chamber, suggesting that the chamber was originally divided into two separate areas or rooms. A floor surface of limestone cobbles was evident in the central area of the west half of the chamber. A slight hollow and a gravel surface were recorded in the central floor area in the east half. It is likely that the hollow arose from the occupants periodically cleaning out the floor and then depositing gravel to provide a clean, dry surface.

The souterrain was discovered within a narrow, tapering portion of the development; hence investigation of the surrounding areas was confined. However, there was no evidence of the souterrain being located within a ringfort-type enclosure. A concentration of features (e.g. post- and stake-holes, pits, ditches) immediately to the north is provisionally interpreted as being broadly contemporary, however, post-excavation analysis is ongoing at present. Artefacts from these features include two copper-alloy pin fragments and a rotary quern-stone disc.

The cut of the souterrain at Ballyvass, from the south-east. (Photo: Rubicon Heritage Services Ltd)

The Ballyvass souterrain

A second earth-cut souterrain was discovered on the M9 in Ballyvass townland, about 2 km north-west of Castledermot. Geophysical survey initially recognised a curvilinear ditched enclosure on a gravel ridge, with a

The north-west portion of the enclosure ditch, from the north-east. (Photo: Rubicon Heritage Services Ltd)

slightly broader and deeper linear feature (the souterrain) within it. Both features extended beyond the road corridor. Subsequent test-excavation identified the enclosure ditch, the internal souterrain cut and two keyhole-shaped cereal-drying kilns outside the enclosure (see p. 39). Full excavation revealed the north-west half of a ringfort-type enclosure defined by a V-shaped ditch. One of the basal fills of this ditch was radiocarbon-dated to AD 660–810. The souterrain was in the south-west area of the interior. It was rectangular in plan and aligned north-west–south-east. The excavated length was 10.75 m and it was 3.2 m wide and 3.6 m deep. It had vertical sides, an uneven base and had been cut into gravel deposits.

The Halverstown and Ballyvass souterrains were built using the open trench method of construction, with the probable use of timbers to line the sides, roof and support structures. The gravels at Ballyvass would have been relatively easy to dig but would have necessitated immediate shoring; if this was not put in place the structure would have suffered instant collapse. The remains of a possible timber revetment or lining were represented by thin vertical lines of discolouration along the north-east and south-west sides of the souterrain. Three subrectangular vertical rebates at the upper levels of the sides may have held structural

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timbers. One was positioned centrally at the north-west end, while the others were on the north-east and south-west sides, towards the north-west end. Differently angled rebates were noted in the lower levels, this and the overall depth of the cut suggest that the souterrain may have had two floors originally.

The bronze drinking horn terminal from a refuse pit within the Ballyvass souterrain trench. (Photos: John Sunderland)

The Halverstown and Ballyvass souterrains were built using the open trench method of construction, with the probable use of timbers to line the sides, roof and support structures.

North-west facing section through the Ballyvass souterrain, showing some of the small, later refuse pits and deposits (darker-coloured soils) near the surface. (Photo: Rubicon Heritage Services Ltd)

It is likely that the primary function of the rectangular cut feature within the enclosure was for use as a souterrain. Shortly after the commencement of ringfort occupation, however, the souterrain appears to have been abandoned and allowed to partly silt up; it was then reused as a cereal-drying kiln. The burnt remains of a timber-built, tobacco-pipe-shaped kiln were identified at the north-west end of the souterrain, built against the side of the existing trench. Charred timber remains appear to attest to a catastrophic firing event at the kiln. Charred textile recovered from the kiln base probably represents the remains of a cloth drying-rack. A hazelnut shell from the base was radiocarbon-dated to AD 690–890.

A period of natural silting seems to have occurred next, followed by the third and final phase of use of the souterrain structure—the deposition of organic refuse in pits, which served to raise the open trench to ground level. The souterrain trench was a convenient place for the disposal of occupation waste and copious environmental, faunal and artefact evidence came from the deposits. Artefacts included iron nails and knives, a socketed iron arrowhead, a weaving tensioner, a copper bucket rim and copper bucket handle

escutcheon, a copper wire ring, a hinged lozenge-shaped brooch-pin, copper-alloy fragments, roof slates, a lignite bracelet, whetstones, hammerstones, flint tool-making waste, a convex scraper, bone combs, a bone cylinder and smithing slag.

A very significant artefact was recovered from a pit in the upper fills at the south-east end of the souterrain—a bronze drinking horn terminal in the shape of a dog's head. This beautiful and exquisite work of art consists of a tapering socket curved along its length to mirror the curve of a drinking horn. It was cast in one piece and the surface tinned to give it a silver appearance (see *Seanda*, Issue 3 [2008], pp. 14–15). Charred material from the pit fill was dated to AD 770–980.
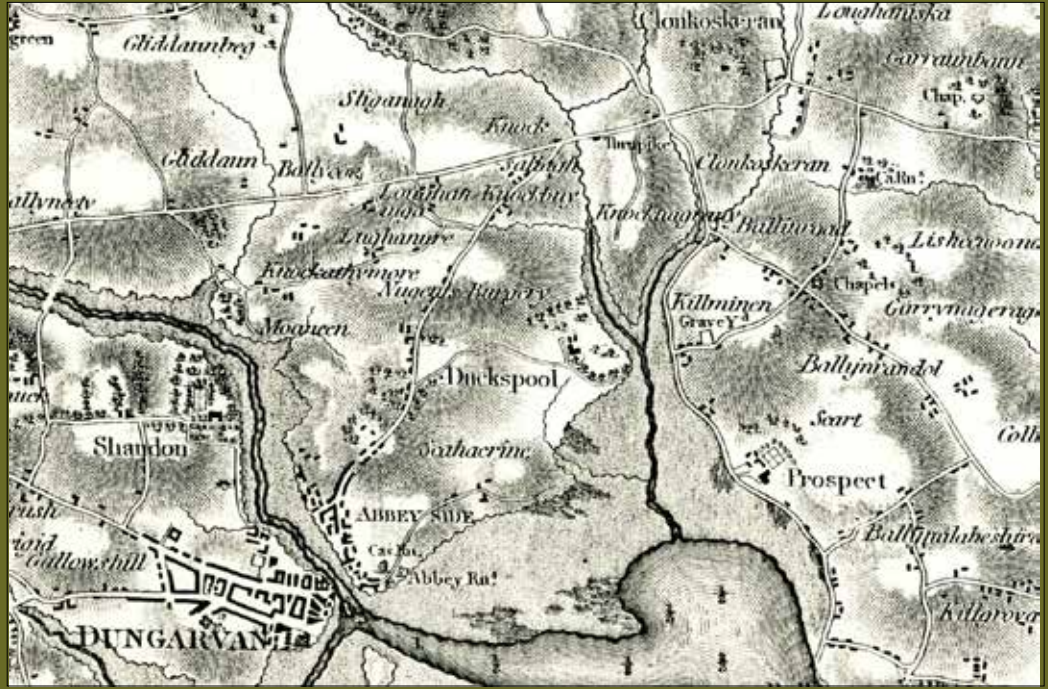
The Halverstown and Ballyvass souterrains revealed similarities in their open-cast, earth-cut nature and probable settlement associations, incorporating the need for safety, refuge and storage. Significant differences are, however, apparent in terms of the type and status of the associated settlements. For instance, the enclosed Ballyvass site was probably of higher status, owing perhaps to its proximity to Castledermot town and the more immediately adjacent ecclesiastical site of Church Hill.

Artists impression of a drinking horn, illustrating where the Ballyvass terminal mount was attached to the horn. (Drawing: Sara Nylund)

An extract from William Larkin's map of Waterford (c. 1818) showing the road network around Dungarvan, Co. Waterford.

Waterford's 19th-century stone depots are relics of the county's road development worth recording.

By Bernice Kelly, NRA Assistant Archaeologist with the Southern Team

A legacy of labour

A 19th-century stone depot on the R676 between Lemybrien and Carrick-on-Suir, Co. Waterford. (Photo: Bernice Kelly)

For as long as Ireland has been inhabited, pathways and tracks have connected settlements with outlying areas. Archaeological evidence bears testimony to the existence of roadways in Ireland from early prehistory and wooden block-wheels from Doogarymore, Co. Roscommon, Timahoe East, Co. Kildare and Edercloon,

Co. Longford, point to the use of wheeled transport during later prehistory. These discoveries also illustrate the need to engineer flatter routeways upon which wheeled vehicles could be manoeuvred. *Cormac's Glossary* of c. AD 900 distinguishes seven categories of road ranging from the cow track to the highway and further literary

An entry from the Minute Book of the Turnpike Board (Waterford County Archive ref. IE/WCA/GJ/32) dated 19 July 1838: 'fifty pounds be granted for making depots at the sides of the road in such places as shall be most necessary and useful'. (Photo: Waterford County Archive)

An entry from the Minute Book of the Turnpike Board dated 28 October 1840, recommending that roads contractor, James Kearney, be authorised to 'build on the road 43 depots pursuant to his specification'. (Photo: Waterford County Archive)

sources note the great ecclesiastical thoroughfares of the medieval period, such as the Rian Bó Phádraig (linking Cashel, Co. Tipperary, with Lismore, Co. Waterford). Communications development accelerated in the first half of the 18th century when turnpike roads (toll roads) were put in place and stagecoach services initiated. As the export trade grew in the latter half of that century, surplus supplies of butter and agricultural commodities were brought to commercial centres such as Cork by means of 'butter roads'. The growth of industry and the introduction of the mail coach ensured the simultaneous expansion of the road network, while in the era of the great country house, roads were developed out of political expediency or to uphold social standing.

But what of the maintenance of these roads? In the medieval period, road repair was seen as a public duty and, according to law texts, included the digging out of the ditches flanking the route, filling in potholes and cutting away bushes. Legislation passed in 1613 required landowners, tenants, cottiers and labourers to give six days' annual free labour towards the construction and upkeep of roads. In 1634, the county cess (an archaic word for tax) was introduced and levied upon the occupants of land within the jurisdiction of counties and baronies to fund the construction of roads and bridges and other public works.

The maintenance of the country's modern public road network is a more standardised process entailing continuous planning, design and project management, the responsibility for which has been assumed by the NRA and local authorities. The NRA evaluates the condition of the road network annually by carrying out road condition surveys. Using this data, road inspectors identify the priorities for maintenance funding and circulate this information to road authorities to allow maintenance programmes to be planned. Such duties were inherited from organisations such as turnpike trusts (c. 1730–1855), the Wide Streets Commission (c. 1758–1849) and the Paving Board (c. 1773–1840). The Grand Jury, however, is counted as the forerunner of the modern local authority. From the 17th century to its abolition in 1898, with the passing of the Local Government Act, this landlord-controlled body took responsibility for road maintenance and construction as well as other public services. These services were funded by presentments or grants financed by the county cess, just as some of the money collected as motor tax today supports road repair and infrastructural programmes. Under the reign of George III (1769–1820), any individual promoting the repair of a road was required to have the work surveyed by two engineers and the details sworn before a magistrate. The work, once allowed, was paid for by the promoter, who could recoup the expense from the Grand Jury.

Some relics of the Grand Jury's administration in Waterford are still visible in the form of stone depots situated along the verges of the county's national and regional road network. These narrow, stone-built recesses accommodated heaps of stones—and the stone breakers engaged to reduce the stone to rubble—to be spread on the

A less well-preserved stone depot on the R676. (Photo: Bernice Kelly)

road surface. Local landowners were commissioned by the Grand Jury to supply the road-builders with stone from the surrounding fields. The stone was brought to the depot where two stone breakers were employed to crush it using sledges, wedges and lump hammers. Women, it seems, were also engaged in this arduous labour. The standard of the work was inspected by a Grand Jury overseer who used a ring to measure the crushed stone. The type and size of stone used in this process was important. In 1818, James Clarke, a land surveyor, published *Practical Directions for Laying-Out and Making Roads*. He advocated the use of 'hard brittle limestone' or 'the toughest stone that can be had', adding that a 'stratum of stones, nearly the size of a man's head' should be laid as a foundation, and covered with 'two to three inches of smaller ones'. Clarke observed that if the stones were too small, the carriage wheels would grind them to powder. Manual breaking of stone continued until the early 20th century when steam engines were employed to crush road material and to pull equipment during road construction.

A stone depot on the N72 near Cappoquin. (Photo: Bernice Kelly)

Detail of the wall fabric of one of the stone depots on the R676. (Photo: Bernice Kelly)

Stone depots were positioned at one furlong intervals ($^1/_8$ of a mile) along roads built or upgraded in 19th-century County Waterford. Some references to these exist in the Minute Book of the Turnpike Board (whose functions were later transferred to the Grand Jury) retained in the Waterford County Archive. An entry dated 19 July 1838 resolves that a sum of 'fifty pounds be granted for making depots at the sides of the road in such places as shall be most necessary and useful'. On 28 October 1840, it was recommended that a roads contractor, one James Kearney, be authorised to 'build on the road 43 depots pursuant to his specification' and that 'he shall account for the expenditure upon oath; and be allowed eight per cent on the expenditure for his superintendence'.

These structures are often difficult to distinguish along the roadside, being in a mostly neglected state, overgrown with vegetation. They are particularly noticeable along the N72 between Dungarvan and Cappoquin and the R676 between Lemybrien and Carrick-on-Suir. The latter examples are all on the western verge of this north-east–south-west aligned road, while the N72 depots occur on the northern margins of this east–west aligned route. There are milestones erected within many of the N72 depots, indicating that these structures served a further purpose of supporting and protecting the markers. In the case of both routes, the depots are not depicted on the historic Ordnance Survey six-inch mapping, but rectangular recesses are shown on the later 25-inch series, suggesting that they had been erected some time after 1840, coinciding with the Minute Book records.

Having surveyed a selection of the N72 and R676 depots, the average dimensions were recorded as 10 m in length and 2.4 m in width, with a wall thickness of 0.5 m. The original height of the walls is difficult to ascertain owing to their varying states of dereliction, however, the maximum height recorded was 1.45 m. The walls are of horizontally laid rubble stones, bonded with lime mortar, some of which are capped with vertical coping. Many of the R676 examples have been restored by Waterford County Council and the Comeragh Community Development Group who led a successful campaign to have the depots preserved and included in the Record of Protected Structures for the county.

Whether or not these features are unique to County Waterford requires further investigation. A 'Specification for Keeping Roads in Repair by Contract for Years' is printed at the end of one of the Grand Jury presentment books for 1888, held in the Wexford County Archive. The specification makes reference to 'depots, which should be filled . . . in convenient places on the sides of the road, completely clear of the carriage way, and so as not to interfere with the water tables'. Tender documents for road repairs in the county in the early part of the 20th century also detail the requirements of the contractor in relation to the erection of depots. One such document, dated 25 February 1938, pertaining to the maintenance of the road between Ballyknockan and Ballyhought, required 'Depots for Material' to be of 'uniform size' with 'perfectly level floors' and a 'plumb back'. The road in question is the R741—the old Dublin road, leading north from Wexford town.

Industrial archaeologist Colin Rynne has noted 'stone breakers' niches' along 'roadside walls' in counties Tipperary and Galway. Their widespread occurrence along Waterford's road network, however, bears testimony to the efficiency of the Grand Jury within the county and its commitment to the upkeep of the county's thoroughfares. Waterford's stone depots have endured over 150 years of infrastructural progress and are reminders of a time when roads were largely built by manual labour. Their consideration as features of social and historical interest within the Record of Protected Structures will help to ensure that they remain a legacy of the road development within the county.

Artistic reconstruction of the settlement at Faughart Lower, Co. Louth, with internal cemetery around the time of the Vikings. (Drawing: Niall Roycroft)

Vikings at Faughart Lower?

Artefact analysis by Jörn Schuster and Grace Perpetua Jones (Wessex Archaeology) has possibly identified a Viking presence in north County Louth.

By Niall Roycroft, NRA Archaeologist with the Eastern Team

The 106 mm-long silver ingot weighs 105 g. (Photo: Archaeological Development Services Ltd)

A stone mould for a metal ingot 120 mm long. This mould shows that ingots were being made on site, perhaps from melted down spoils or traded items. (Photo: Archaeological Development Services Ltd)

During the ninth century AD the Vikings could not overrun powerful Dundalk in north Louth. Dundalk people lived at the heart of a strong and ancient territory and they stayed put. So the Vikings entrapped them with flanking settlements around Carlingford and Annagassan. An example of local ninth-century strife is seen at the Omeath ecclesiastic site of Cillansnamh (the 'Church of Cuan Snamh Aigheannach'). This is now the townland of Cornamucklagh at Narrowwater, not far from Faughart Lower on the Carlingford Peninsular. Cillansnamh monastery was destroyed by Vikings in 841 and, with the exception of the abbot who was absent at the time, the whole community was slaughtered. Warfare and raids of the ninth century gave way to trade with and, finally, eviction of the local Vikings during the 10th century.

As a defence against this insecurity the people of Louth built many and massive souterrains (underground galleries and chambers). But finding actual evidence of Vikings is much harder than commonly thought. Remains from a lightning raid are usually impossible to see and events were happening so quickly that, from today's viewpoint, it is very difficult to untangle any evidence. What is needed are artefacts that have a telltale north European or Viking function and/or provenance. Even then we usually do not know if the items were traded or lost during an invasion. If it was invasion the person losing the item could have stayed a day or a decade. A selection of finds from

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Iron ploughshare and coulter (pre-conservation) found hidden in the Faughart Lower souterrain. (Photo: Archaeological Development Services Ltd)

Faughart Lower, a cemetery-settlement excavated on the A1/N1 by archaeologist Peter Bowen (see *Seanda*, Issue 3 [2008], pp. 9–11) indicates an unusual Irish site with more than a passing contact with Vikings. Among other finds there is high-status metal-work (especially of silver), which includes a weapon, an iron plough with coulter and an extraordinary double-headed eagle.

The metal finds included a 106 mm-long silver ingot weighing 105 g. Silver was the monetary currency of the Vikings. In addition, a stone mould for a 120 mm-long ingot matched the general shape of the recovered silver ingot. Three small crucibles, one triangular and complete, indicated valuable metal-working. These finds may go with a Scandinavian-style iron strike-a-light and a lucet made from a cattle nasal bone. A lucet is a tool used to create dress-making cords or braids and is often considered to have Viking or North European origins. The iron ploughshare and coulter recovered from a backfilled souterrain is particularly significant. (A coulter is a vertically mounted knife-like blade, which cuts down into the

A selection of finds from Faughart Lower, a cemetery-settlement, indicates an unusual Irish site with more than a passing contact with Vikings.

soil ahead of the ploughshare, softening the soil and allowing the plough to undercut the furrow made by the coulter.) The coulter appears to have been introduced to Britain in the later Roman period but the introduction of the coulter plough to Ireland is now thought to have occurred during the Viking period. Whether the Faughart Lower plough was a locally made, Viking-inspired example or an import is still open to debate. The introduction of the ploughshare and coulter may just have been coincidental with the time of the Vikings.

The only weapon found around Dundalk during excavations on the M1 or A1/N1 came from Faughart Lower: a knife with a triangular blade 195 mm long (plus 83 mm tang). This weapon appears to be an Irish type as it was very similar to a much larger single-edged sword from Lagore, Co. Meath.

Arguably the most intriguing object from the entire site was a bifurcated iron finial ending in two averted birds' heads recovered from a grave fill. The eyes are inlaid with a yellow-golden copper alloy, most likely brass, and the beaks, of the same material, are formed by attaching a cap to the ends. The caps have triangular indentations at their bases. The decidedly hooked beaks suggest these 'protomes' (decorative busts of an animal or person) are meant to represent birds of prey, probably eagles. The incomplete base is held by a rivet between two fragmented rods on either side. The rivet and two ornamental copper-alloy pellets inlaid in the rods are obscured by corrosion and are only visible in X-ray images. The object is similar to an Iron Age firedog (a device used to hold logs above the hearth or food skewers above the flames for cooking), but this similarity in form does not necessarily mean similarity in function.
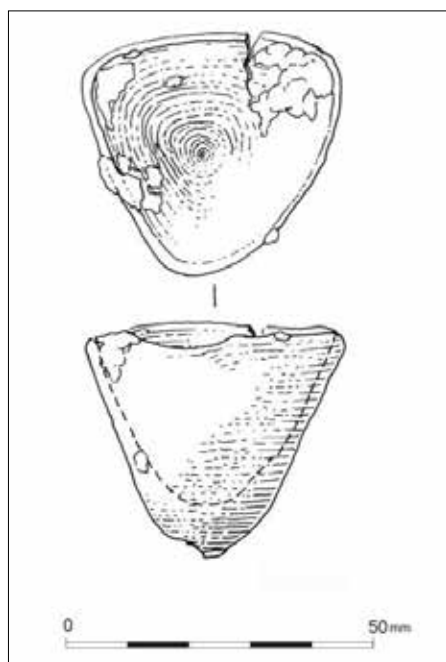
Triangular crucible from Faughart Lower. Residues indicate it was used to melt copper alloy. (Drawing: Archaeological Development Services Ltd)

The 'double-headed eagle' finial. (Photo: Archaeological Development Services Ltd)

Archaeology from the end of the road

The early medieval cereal-drying kiln at Pottlebane 2.

The archaeology identified along the M3 has received much attention in recent years but numerous lesser sites have missed the spotlight, until now.

By Stuart Rathbone, freelance archaeologist

Over the years archaeologists working on behalf of the NRA have undertaken some truly massive excavations which have attracted a lot of attention. At the very opposite end of the spectrum there are sites that consist of small groups or isolated examples of pits, kilns or hearths. These common features tend to be overlooked when there are much more impressive archaeological sites to talk about. Here we look in detail at the north-western end of the M3 motorway where for several kilometres the excavated archaeology consisted almost entirely of these small sites. In this area the road ran along the River Blackwater floodplain before climbing up the steep sides of the valley. It is a very different and less manageable landscape than elsewhere on the M3 where larger sites occurred in considerable number. Ten sites were excavated by the author and by Derek Gallagher in the adjacent townlands of Derver and Pottlebane, Co. Meath. An extensive programme of radiocarbon dating identified the age of many of the features excavated and it is this information that now allows us to consider the archaeology of this area in detail.

Pottlebane

The first sites were on the Blackwater floodplain in Pottlebane. At Pottlebane 3A there was a burnt stone mound which was found to date from the Early Neolithic (c. 4000–3500 BC) period. The burnt stone was surrounded by five medium-sized pits, one of which was of Middle Iron Age (c. 500 BC–1 AD) date. At Pottlebane 3B there were two early medieval cereal-drying kilns and two large pits that are undated. Pottlebane 2 consisted of three undated pits and an early medieval cereal-drying kiln. The smallest of the pits contained a small amount of cremated human bone.

At Pottlebane 1 nine features were found on the summit and slopes of a drumlin at the centre of the floodplain. This was a very conspicuous hill and the most interesting feature present was an oval hollow on its summit, which was over 5 m long and almost half a metre deep. At the centre there was a substantial hearth surrounded by several large square boulders, which appeared to have been used as fireside seats. This hollow seems to have been a campsite in use during the Early Bronze Age (c. 2400–1600 BC). The location offers excellent views and the campsite may have been specifically used as a look-out post, watching for animals or people moving along the valley. A single piece of Bronze Age pottery and two chert flakes were recovered from the fills of the hollow.

Two small pits were identified immediately east of the large hollow and another sherd of Bronze Age pottery was found in one of them. A third pit located some distance to the east also produced Bronze Age pottery.

Isolated pits dating from the early medieval period were found at the base of the drumlin to the north and to the south-west. A cluster of three pits with charcoal-rich fills and layers of unburnt stone at their bases was found on the south-eastern slopes of the drumlin, one of which was dated to the Early Bronze Age.

A Middle Iron Age pit at Pottlebane 3A, located just a few metres from an Early Neolithic burnt stone mound.

Derver

Derver 5 consisted of four medium-sized pits containing burnt stone and a burnt stone spread. Three of the pits were closely spaced and one of these was dated to the Middle Bronze Age (c. 1600–1100 BC). The fourth pit was located a short distance away and was found to date from the Middle Iron Age. Derver 6 consisted of a medium-sized (undated) pit filled with burnt stone.

Derver 4 was the most substantial of the excavated sites. It consisted of a series of medium-sized pits filled with burnt stone and several small spreads of burnt stone. One of these features was radiocarbon-dated to the Early Iron Age (c. 600–400 BC). A roundhouse defined by a semicircle of 38 post-holes was found in the midst of these pits and this was dated to the Early Iron Age, making it an exceptionally rare discovery. The position of this building makes it seem an unlikely candidate for domestic occupation as it would always have

been highly prone to flooding. One popular explanation for burnt stone mounds is that the heated stones were used to produce steam for saunas or sweat-lodges, and the Derver 4 building is certainly a good candidate for that sort of role.

The final three sites were all on the steep north-eastern side of the valley. Derver 3 consisted of a large shallow pit with a sooty black fill overlying a fire-reddened base and can confidently be identified as a hearth. Derver 2 consisted of two hearths very similar in form to that at Derver 3. At Derver 1 there was a cluster of six pits of various shapes and sizes and with a scatter of Beaker period or Early Bronze Age pottery on the adjacent ground surface. Five of the pits contained burnt stones and two of them contained sheep bones. Given the sandy soil and steep slope at Derver 1 it seems unlikely that the pits there could have held water and there was no indication that any of them had waterproof linings. It seems that Derver 1 should not

be identified as a burnt stone mound site, although clearly stones were being burnt at this location.

The history revealed

Taken as a whole, these pits tell quite an interesting story. Sporadic use of the valley had occurred from the Early Neolithic period through the Bronze Age, Iron Age and on into the early medieval period. It is very noticeable that some features found in close proximity were subsequently shown to belong to very different time periods, increasing the sense of very widely distributed activity. Environmental analysis demonstrated a much greater range of wood species were being exploited in the Iron Age and early medieval periods than had been the case in the Bronze Age. This suggests a major shift in the environment or land management regime from the Bronze Age when only a restricted range of species are represented in the pit fills. The function of the Pottlebane 1 campsite, the kilns and the hearths can be identified with some confidence. Four of the sites can be identified as burnt stone mounds, albeit of differing size and date, and with three lacking any appreciable mound. This still leaves a substantial number of small pits from this stretch of the M3 whose functions remain elusive.

It is very noticeable that some features found in close proximity were subsequently shown to belong to very different time periods, increasing the sense of very widely distributed activity.

The Iron Age building at Derver 4, surrounded by pits and burnt stone spreads.

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A half section of the hearth at Derver 3.

While no substantial sites were encountered within the road corridor several are known from this part of the Blackwater Valley. Two early medieval ringforts are located to the east and south of the Pottlebane sites. The kilns and pits of this date probably derive from farming activity associated with these settlements. There is also a substantial Anglo-Norman motte west of the Derver sites. Mottes were typically built in strategic locations for monitoring traffic along routeways, indicating that prior to the Anglo-Norman invasion this valley was already a well-established routeway. It is interesting to note that a similar role was suggested for the Early Bronze Age campsite at Pottlebane 1.

The prehistoric period is more difficult as no substantial sites are known in this area. Often pit clusters are taken as a proxy for settlement, where it is assumed that the dwellings themselves have not left clearly identifiable archaeological traces. In this case the pits are rather too dispersed and occur in such small numbers that this explanation seems unlikely. The pits may have been used for the disposal of rubbish but this would either imply that rubbish was being transported to scattered locations in the landscape from settlements located some

distance away, or that some process was taking place away from any settlement that generated large enough quantities of rubbish to require burial. In addition the nature of the material deposited within the pits also does not fit with rubbish disposal; we would expect to find more than the odd scrap of bone, single sherd of pottery or fleck of charcoal. The use of the pits for storage also seems unlikely given the apparent distance from any settlement and the consistently wet ground conditions in this area. To use this explanation we would have to answer difficult questions such as why things were being stored in isolated locations, how were they supposed to be recovered, and how the process of storage and retrieval could leave the types of fills that were recorded.

Finally, the use of the pits during ritual ceremonies must be considered. In this case the fills of the pits could be seen as reflecting some ceremonial deposition of material into specially created pits. The placement of small quantities of potsherds and bone could have been part of the ritual process and the occasional charcoal flecks could have derived from fires set close to, but not within, the pits. The small pit containing cremated human bone at Pottlebane 2 is the most obvious candidate for this

explanation and the spread of pottery on the ground surface at Derver 1 could have resulted from the deliberate smashing of a pot during a ceremony. The placement of unburnt stone under charcoal-rich fills in the pits at Pottlebane 1 could also possibly be indicative of ritual activity. The pits lack evidence of the sort of complex and ordered deposition often associated with ritual offerings, however, and high-status artefacts, a common occurrence at such sites, were absent.

At present many important questions have to be left unanswered, nevertheless the decision to process the environmental samples and obtain so many radiocarbon dates from these sites was significant. The excavation of so many large sites has allowed us to make great leaps forward in our understanding of the early development of Ireland. On the other hand this type of project demonstrates that there are large areas of the landscape where we have very little idea about what sort of activities the early inhabitants of Ireland were undertaking. Only through further fieldwork accompanied by similarly comprehensive post-excavation analysis will we be able to develop a better understanding of these important aspects of Irish archaeology.

Older part of Slane Bridge, Co. Meath, on downstream side. (Photos: Rob Goodbody)
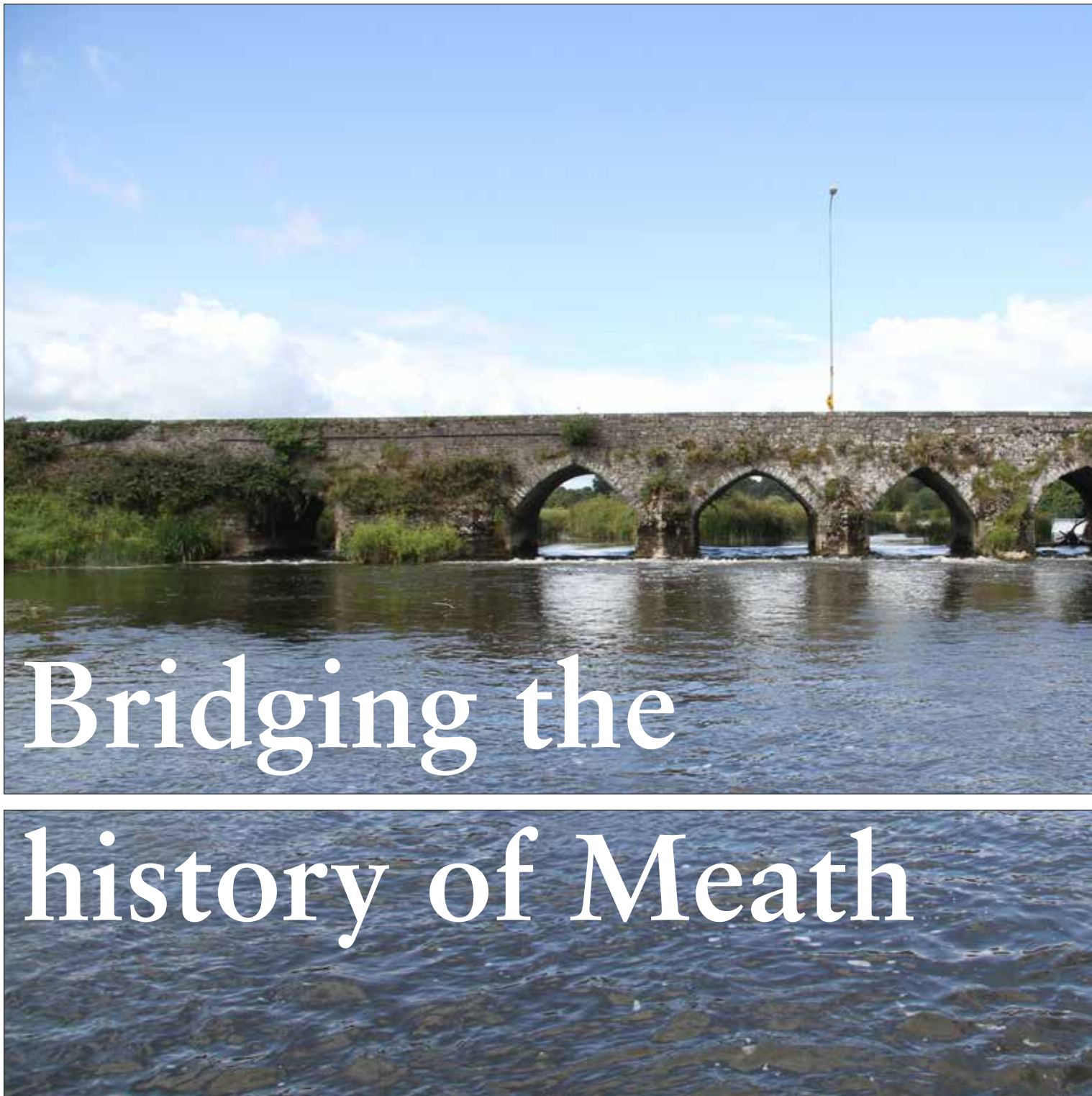
Bridging the history of Meath

A recent study of Slane Bridge with Irish Archaeological Consultancy Ltd and repair and maintenance work with the NRA have provided new information on this important medieval bridge.

By Rob Goodbody, Historic Building Consultants

Slane Bridge spans the transport, military and industrial history of County Meath. It is a recorded medieval monument (Record of Monuments and Places No. ME019-024), which carries the N2 national primary route over the River Boyne, just to the south of the village of Slane. The bridge dates from the 14th century AD but has been much altered over time. A contemporary account records that

all of the bridges on the Boyne except one were destroyed in a flood in 1330, indicating that the bridge at Slane cannot be earlier than that date. The pointed style of some of the arches in the bridge is typical of the medieval period and it seems likely that the bridge was built soon after 1330.

Widening the bridge

The original bridge was narrow, as were most medieval bridges, and the road crossing over it was about 4 m in width. This would have been more than enough for a wagon to cross the bridge, but was only acceptable so long as wheeled traffic levels were low, as two wagons could not have passed on the bridge. The road across the bridge is almost 200 m long and wagons would have taken a significant time

to cross. This would have severely limited the capacity of the bridge to take wheeled traffic. For this reason the bridge was widened as traffic volumes increased.

The usual way of widening a bridge was to build another bridge alongside, as this was relatively simple and cheap to do. The new bridge often has a different style of arch to the original and in Slane this is indeed the case as all of the arches on the upstream side are semicircular. The join between the original bridge on the downstream side, with its seven pointed segmental arches, and the new work is easily seen underneath the arches.

The question is when was the bridge widened? Local tradition has it that the work was completed by 1812. Another source claimed that the work was not listed in the surviving records of the Grand Jury for Meath, which had responsibility for roads and bridges, and therefore must have been done by the turnpike trust that took over the Slane road in 1828. (Turnpike trusts were bodies set up by individual Acts of Parliament in the 18th–19th century, with powers to collect road tolls for maintaining the principal roads.) In fact, the junction between the new and the old parts of the bridge is not found in the two canal arches (see below), and as the canal was built in the 1760s the widening has to have occurred before this. The records of the Meath Grand Jury only go back as far as 1760 and it is quite likely that the bridge is not mentioned as it was widened before this date.

It seems likely that the bridge was built soon after 1330.

Eighteenth-century round arches on upstream side of bridge.

Medieval pointed arch, with 18th-century round arch at rear.

What the arches tell

Today Slane Bridge has 13 arches and those on the downstream side vary in width and style. Eight of these arches are in the main channel of the river, two are canal arches, one is a mill-race arch and two are flood arches.

The flood arches

Where a bridge crosses a broad valley with low-lying land alongside the river it is common to have arches that are normally dry, but which take water during floods. The flood arches and five of the arches in the river at Slane are pointed, where the sides of the arch rise as arcs that meet at a point at the top.

The mill-race arch

There has been a mill on the Boyne at Slane from an early period and there was probably an arch for the mill-race from the time the bridge was built. A weir that provided the head of water to turn the mill-wheels is alongside the bridge on the upstream side and the mill-race passes beneath the bridge. The nature of the stonework in the mill-race arch suggests that the arch is medieval or early modern in date, and if it is not an original feature it is nonetheless early in date. It may have been a bridge arch rather than a mill-race arch originally.

The present mill building is substantial. This dates from the 18th century and was built for a partnership made up of powerful local landowners and David Jebb, who was the miller.

The canal arches

David Jebb was also involved with a project to provide a canal system along the Boyne to make it navigable and this canal was critical in the plan to build the large mill at Slane. The construction of the canal involved the demolition of the southern end of the bridge

Medieval side of flood arches.

and the construction of a large elliptical arch to span the canal. The same happened at the northern end to construct a branch of the canal to lead to the mill.

When canal boats were being brought through the arch leading to the mill they passed alongside the weir and the flow of water over the weir would have dragged the boats towards it. During the recent works on the bridge, deep groove marks were found in the coping stones on the parapet on the roadside just to the north of the bridge. (Coping is the top course of a wall, formed of large flat or sloping stones.) These appear to result from the abrasion of ropes used to hold the boats away from the weir, and are similar to the rope marks found on many canal bridges around the country.

Slane Bridge in history

Slane Bridge featured at the time of the Battle of the Boyne in 1690. It seems to have been the intention of William of Orange to send a substantial part of his army westward to cross Slane Bridge and outflank James' army. Some accounts say that this contingent crossed at Slane, but it is now accepted that they made their crossing by fording the river downstream from Slane at Rosnaree. There is contemporary evidence that James' army broke down two arches of Slane Bridge to prevent it being used by William's troops and it seems likely that this is correct.

As each end of the bridge was rebuilt to accommodate the canal it is uncertain whether the arches rebuilt after the battle of the Boyne still exist. There is, however, a possibility that the fourth and fifth arches from the northern end may be the ones that were destroyed before the battle. Unlike most of the other arches in the river and the flood arches, these two are semicircular. They have triangular keystones

Grooves cut in parapet by ropes used to manoeuvre canal barges.

and the lower stones of the arch ring, which is the line of stones that forms the edge of the arch, are not aligned on the centre of the curve of the arch, but lie slightly closer to the horizontal. These two features are commonly found in bridge arches of the later medieval and early modern periods, and would not be out of place in an arch built in the late 17th century.

A more recent event in the history of the bridge occurred in the mid 20th century when the undersides of the arches were sprayed with liquid concrete in a process known as gunniting. Whoever carried out this work must have had a sense of the history of the bridge, as beneath one of the arches in the river channel they wrote in the wet concrete the year '1957'.

Canal arch built in 1760s.

GLOSSARY

Archaeological feature

Any component of an archaeological site, such as a post-hole, pit, wall, ditch, or any deposit that may have accumulated on site.

Anglo-Norman

The Anglo-Normans were the descendents of the Normans who ruled England following the conquest by William of Normandy in AD 1066. In AD 1169 Ireland was invaded by the Anglo-Normans.

Artefact

Any movable object that has been used, modified or manufactured by humans.

Bronze Age

The era (c. 2400–600 BC) succeeding the Neolithic period, which saw the introduction of bronze for tools and weapons.

Chert

A grey, black or blue siliceous rock that occurs as bands in limestone deposits and was often used during prehistory for tool production.

Carinated bowl

A type of Early Neolithic pottery vessel with a hemispherical bowl, a distinct shoulder or carination, an upright, gently concave neck and an everted rim.

Cremation

The practice of burning the bodies of the dead. In prehistory the ashes were commonly placed in a pottery vessel and buried in a pit.

Faience

A blue glass-like material made from baked siliceous clay.

Fill

A term used to describe the individual layer(s) of material contained within archaeological features, such as post-holes, pits or ditches.

Flint

A hard, brittle siliceous rock with conchoidal fracturing properties that is highly suitable for the manufacture of edged tools.

Fulacht fia (plural fulachtaí fia)

A site, generally dating from the Bronze Age, consisting of a horseshoe-shaped mound of burnt stones, a hearth(s) and a trough(s). These sites were used to heat water for a variety of possible purposes. Also known as ancient cooking places.

Global Positioning System

A Global Positioning System (GPS) provides a longitude and latitude for a position on the ground by reference to satellites. It thus allows for the accurate and rapid survey and mapping of surface archaeological features.

Geophysical survey

A scientific method of exploring below the ground surface by measuring differences, or 'anomalies', in the magnetic, electrical and other properties of the earth capable of being detected by survey instruments.

Inertial Measurement Unit

An electronic device that measures and reports on an aircraft's velocity, orientation, and gravitational forces.

Inhumation

The practice of laying the bodies of the dead in a grave.

In situ

Archaeological artefacts are said to be in situ when they are found in the location where they were last deposited (i.e. undisturbed and unexcavated).

Iron Age

The final period of prehistory, beginning around 600 BC. In this period iron superseded bronze for the manufacture of tools and weapons.

Lignite

A soft, brownish-black coal in which the alteration of vegetable matter has proceeded further than in peat, but not as far as in bituminous coal. Polished lignite was used to make bracelets during the early medieval period.

Medieval

The period succeeding the Iron Age, which in Ireland is dated from the advent of Christianity in the fifth century AD up to the 16th century.

Mesolithic

The Mesolithic period or Middle Stone Age (c. 8000–4000 BC) was when Ireland was first settled by early hunters and foragers.

Motte and bailey

An Anglo-Norman earthen fortification comprising a large, steep-sided mound, flat on top, and surrounded by a ditch, with an adjoining rectangular or oval enclosure, called a bailey, defined by a bank and outer ditch.

Neolithic

The Neolithic period or New Stone Age (c. 4000–2400 BC) preceded the introduction of metal-working and is characterised by the beginnings of farming.

Phosphate analysis

A type of chemical analysis used to identify phosphate residues, which can reveal the former presence of organic debris resulting from past human activity.

Post-medieval

The period after the medieval period, often taken to be the era after the dissolution of the monasteries in the mid 16th century.

Quern-stone

A large stone used for grinding grain into flour. The four main categories of querns found in Ireland are, in chronological order: the saddle quern, beehive quern, rotary quern and pot quern.

Radiocarbon dating

A scientific method of dating by measuring the decay of the radioactive isotope Carbon 14, which is present in all organic material. As the amount of Carbon 14 in the atmosphere has fluctuated throughout time radiocarbon dates have to be calibrated against tree-ring sequences that provide absolute calendar dates.

Record of Monuments and Places

An inventory of archaeological monuments in the State recorded on a county-by-county basis by the Archaeological Survey of Ireland.

Ring-barrow

A barrow is an earthen burial mound, generally dating from the Bronze Age and Iron Age. Ring-barrows are the most common form and consist of a low, circular mound of earth, 15–20 m in diameter, surrounded by a ditch with an external bank.

Ring-ditch

A small, circular enclosure, defined by a ring-shaped ditch, which is often associated with prehistoric burials. Many have been discovered to be ploughed-out ring-barrows.

Ringfort

An early medieval defended farmstead consisting of a circular enclosure defined by an earthen bank and an external ditch. High-status ringforts can have two or three banks.

Slag

A glassy, non-metal residue and waste material left behind after the smelting of a metal.

Souterrain

An early medieval underground structure consisting of one or more passages and chambers, with a concealed entrance at ground level. They functioned as temporary refuges and storage areas.

Viking

Scandinavian word (*Vikingur*) for seafaring raiders from Norway, Sweden and Denmark who ravaged the coasts of Europe from the seventh century AD onwards.
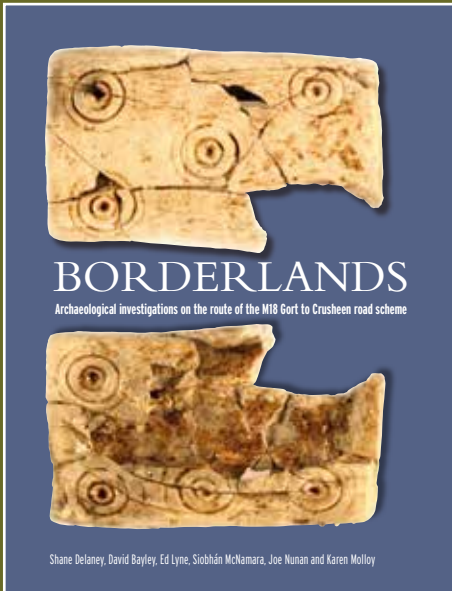
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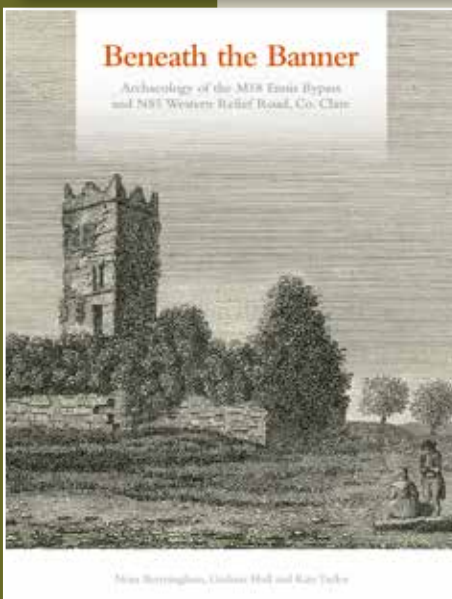**NRA Scheme Monographs 9**

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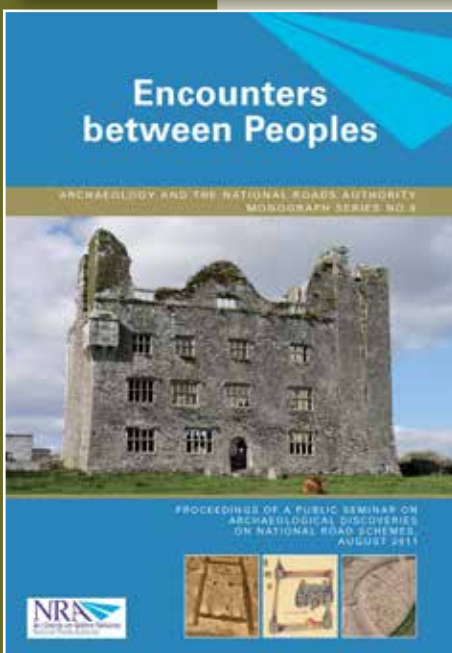Archaeology of the M18 Ennis Bypass and N85 Western Relief Road, Co. Clare
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