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Developing a Visitor Profile: The Hill of Tara for Hill of Tara Conservation Management Plan

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Rialtas na hÉireann
Government of Ireland

Tara Conservation
Management Plan
Appendices

September 2022

Prepared by Department of Housing, Local Government and Heritage
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Appendix A

**Tara Monument
Catalogue &
Condition Assessment**

Roseanne Schot
The Discovery Programme

2019

Introduction

This catalogue contains information relating to over 50 archaeological monuments located within the c. 100-acre State property on the Hill of Tara (Fig. 1). They include imposing, high-profile earthworks such as the Forrad, Tech Cormaic, Ráith Gráinne and the so-called 'Banqueting Hall', as well as an array of low-profile mounds, barrows and enclosures that appear only as slight humps and depressions in the grass. Monuments and structures that exhibit no surface topographic expression and have been recorded solely through geophysical survey or excavation are also referred to in the catalogue but are not listed individually. The monuments are spread across the summit and upper flanks of the ridge and form part of a more extensive archaeological complex that also includes additional sites and monuments on the Hill of Tara and in the wider surrounding landscape.

For practical purposes, the State lands at Tara have been divided into five areas (see Fig. 1) corresponding with the 'divisions' set out by Conor Newman in Tara: an archaeological survey (1997), which is the most comprehensive study of the archaeological monuments published to date. The divisions are named after the principal monument in each area and are presented in the catalogue in the following order: Ráith Lóegaire division, Ráith na Ríg division, Ráith na Senad division, Ráith Gráinne division, Clóenfherta division.

The catalogue contains 41 individual entries, of which 39 relate to single monuments and the remaining two (nos. 34 and 39) to groups of monuments. The entries are numbered sequentially and contain the following information on each monument:

Name: if recorded

Type: archaeological classification

SMR Number: a unique number given to each site by the Archaeological Survey of Ireland

Grid Reference: Irish Traverse Mercator (ITM) coordinates (Easting/Northing)

Illustrations: figure numbers refer to relevant illustrations in the catalogue

References: details of select/main published sources (a more extensive bibliography is provided at the end of the catalogue)

Dimensions: based on existing survey data and published sources

Description: a summary description and interpretation of the monument

Physical Condition: an assessment of historic and modern impacts on the monument and its current condition

Maintenance Issues: a summary of the main issues, vulnerabilities and threats affecting the monument.

The condition assessment was informed by survey data and imagery held by the Discovery Programme, existing records and publications, field assessment and consultation with staff of the Office of Public Works (OPW) and the National Monuments Service. The effects of weathering and historic land use practices as well as modern farming, tourism and recreation on the various monuments are detailed in the catalogue and illustrated with photographs and high-resolution imagery generated from aerial lidar data captured in 2007 (see Corns et al. 2008 for further details on the Tara lidar survey). Field assessments carried out in April–June 2018 and January 2019 indicate that the main erosion pressures and conservation issues currently affecting the complex are similar to those highlighted by previous surveys (e.g. lidar) and condition assessments (Dolan 2009; Cunnane Stratton Reynolds 2005). An overview of the principal conservation issues and the policies set out to address them are presented in the main body of the Tara Conservation Management Plan.

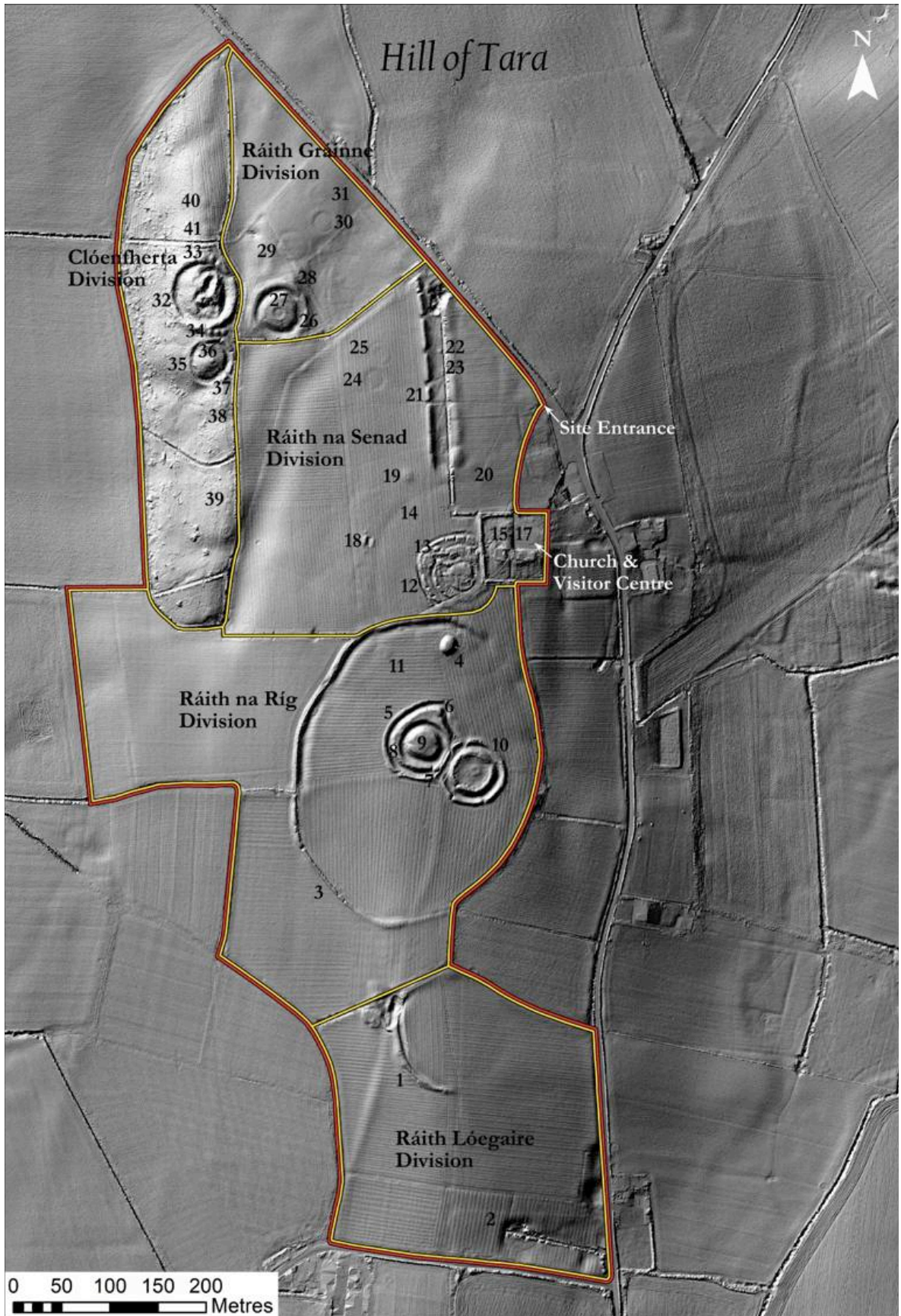



Fig. 1 Hillshaded lidar terrain model of Tara showing boundary of the State property (red), monument divisions (outlined in yellow) and numbered monuments in catalogue.

Ráith Lóegaire Division (Castleboy Td)



Fig. 2 Hillshaded digital terrain model of the Ráith Lóegaire division generated from 2007 lidar data, with extant archaeological monuments indicated.

1	Name: Ráith Lóegaire, Lóegaire's Rath Type: Bivallate enclosure	SMR No. ME031-033001- Grid Ref. 691938, 759349
 <p>Fig. 3 Aerial view of Ráith Lóegaire, from the W. Note gently-rounded profile of the remnant inner bank, on SW.</p>		Illustrations Figs 2–5
		References Newman 1997, 47–52, 180, 317
		Dimensions Max. diameter approx. 130m N/S by 122m E/W (excluding levelled bank on E); interior ground surface 2.2m high above bottom of ditch; outer bank 6.3m in max. width and 0.7m high above bottom of ditch
<p>Description</p> <p>Situated at the southern end of the summit ridge, Ráith Lóegaire is a large, circular enclosure defined by two banks (B1 and B2) with an intervening ditch (Figs 3 and 4). The E part of the enclosure was levelled sometime before 1836, and only the W half – extending as far as a remnant field boundary (FB1) that once bisected the enclosure N/S – is visible today. Here the ramparts were built along a marked break in slope, where a former quarry (Q) has cut away part of the outer bank and accompanying ditch. The inner bank is best preserved on the SW, albeit much denuded by former cultivation which extended across the interior of the enclosure. On the NW and NE, the ramparts were incorporated into field boundaries (FB2 and FB3) that formed part of the earliest identifiable field system at Tara (Newman 1997). One of these boundaries (FB2) has been removed while the other (FB3) comprises the footings of a stone wall fronted by a post-and-wire fence and forms a boundary of the State property. A possible road or droveway (DW), which pre-dates the quarry, approaches the enclosure from the SW and continues northwards to the junction of the Forrad and Tech Cormaic, inside Ráith na Ríg. Traces of the levelled, E boundary of Ráith Lóegaire are visible on lidar imagery (arrowed on Fig. 4) and its full circumference was mapped by geophysical survey in 2002. This confirmed that the enclosure had an E-facing entrance and revealed significant new features in its interior, including a possible roundhouse. The investigations also identified several ring-ditches and other features in the immediate environs of the monument.</p>		
<p>Physical condition</p> <p>Most parts of the enclosure have suffered considerable damage from past land use practices, with only the SW quadrant escaping the most severe impacts. In addition to the effects of agriculture and quarrying, there are signs of minor deterioration in the form of narrow gaps in the outer bank and erosion from animal traffic (evidenced on lidar imagery as a series of faint narrow tracks, generally trending NW/SE). Despite extensive loss and disturbance of the earthworks, however, geophysical survey has shown that significant below-surface features survive across the site.</p>		
<p>Maintenance issues</p> <p>Ráith Lóegaire attracts fewer visitors than other parts of the hill and there is minimal evidence of wear from pedestrian traffic. The surviving earthworks are difficult to interpret, and even locating them under the high grass can be a challenge (the nameplate from the existing signpost is missing). There are signs of erosion from sheep sheltering beside a lone hawthorn tree on the W-facing slope of the outer enclosure bank, an area previously impacted by quarrying (Fig. 5). As well as sheep and deep-rooting vegetation, there is also a potential risk of disturbance by burrowing animals. A no-drive zone is currently in operation over the entire area of the monument (tracks created by farm vehicles crossing the enclosure are visible on the 2007 lidar imagery). As FB3 forms a boundary of the State-owned lands, it needs to be maintained as a stock-proof fence.</p>		

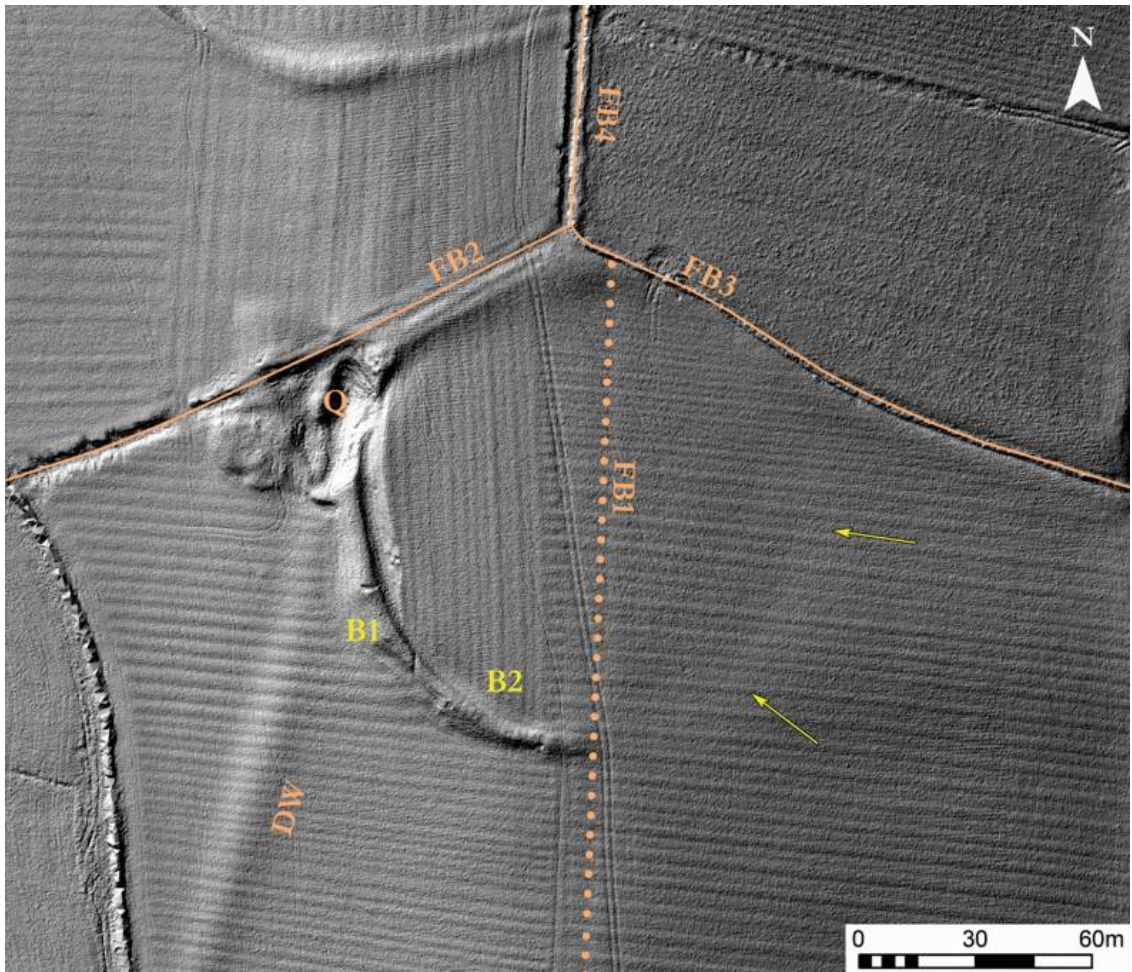



Fig. 4 Lidar hillshade model of Ráith Lóegaire showing key archaeological (yellow) and historical (orange) features.



Fig. 5 The western boundary of Ráith Lóegaire, looking south. The substantial bank, with a hawthorn tree on its slope, is difficult to make out under the high grass. The pile of cut grass on the right is lying in an old quarry pit, which has created a large hollow in the bank (June 2018).

2	Name: Nemnach Type: Spring/well	SMR No. ME031-033087- Grid Ref. 691994, 759137
		<p>Illustrations Figs 2, 6-8</p> <p>References Macalister 1931, 7-12; Fenwick 1997, 29; Newman 1997, 46-7; Newman 2011, 37-9</p> <p>Dimensions Length of watercourse to E field boundary approx. 110m</p> <p>Fig. 6 (Left) View of stream issuing from the spring of Nemnach (centre), looking west (January 2019).</p>
<p>Description</p> <p>The spring known as Nemnach lies approximately 150m downslope of Ráith Lóegaire, to the SE (Fig. 2). The spring is described in medieval topographical lore as the source of the River Níth and the site of the first water mill in Ireland, built during the reign of Cormac mac Airt. The name Nemnach shares a common etymology with <i>nemed</i> ('sacred', 'holy') and there is intriguing evidence to suggest that both the spring and the river were imbued with sacred significance in prehistoric times (see Newman 2011). A broad hollow, revetted with stones, has been created around the springhead, from which a small stream flows in an ESE direction towards a stone field boundary that defines the SE limit of the State property (Figs 6 and 7). The stream is lined with trees and vegetation, and in some places the banks have been shored up to form low embankments. East of the spring the streambed widens to form a broad marshy hollow (Fig. 8). The stream formerly fed into a small lake on the grounds of Tara Hall (the lake was bulldozed and filled in 1993) and eventually joined the River Gabhra, in the valley between Tara and Skreen (Fenwick 1997; Newman 2011).</p>		
<p>Physical condition</p> <p>The water issuing from the spring is clear, but it occasionally dries out and becomes stagnant. The area surrounding the springhead is covered by high grass and littered with stones that have been dislodged by tree roots and pedestrian/animal traffic. The stream is overgrown and clogged with silt and dead vegetation.</p>		
<p>Maintenance issues</p> <p>Regular cleaning and maintenance works are required to improve the condition of the site.</p>		
 <p>Fig. 7 Stone revetment and tree roots surrounding the spring (January 2019).</p>		 <p>Fig. 8 East-facing view of overgrown streambed and adjacent marshy hollow.</p>

Ráith na Ríg Division (Castleboy Td)

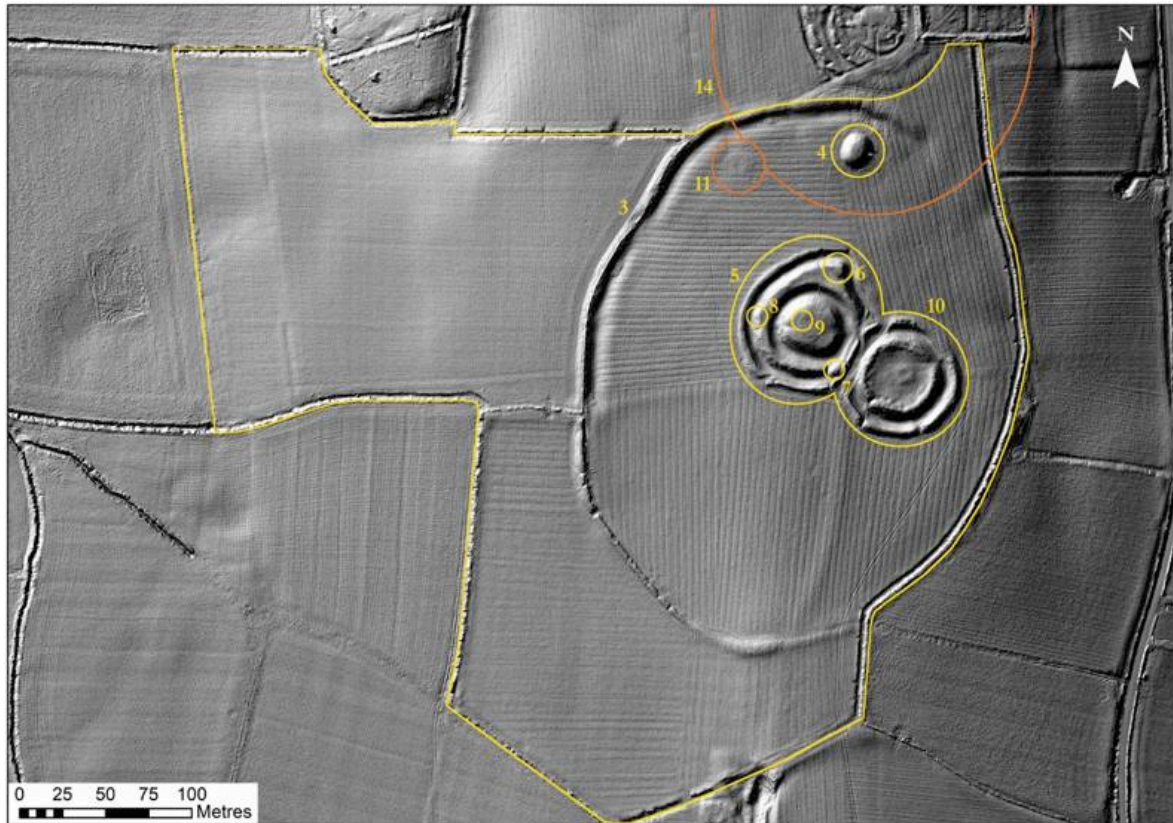



Fig. 9 Hillshaded digital terrain model of the Ráith na Ríg division generated from 2007 lidar data, with extant (yellow) and low-profile (orange) archaeological monuments inside Ráith na Ríg highlighted.

3	<p>Name: Ráith na Ríg, Rath of the Kings Type: Ceremonial enclosure</p>	<p>SMR No. ME031-033005- Grid Ref. 691900, 759620</p>
		<p>Illustrations Figs 9–14</p>
		<p>References Newman 1997, 53–90, 170–7, 230, 318; Fenwick and Newman 2002; excavation results and dating: Roche 2002 and Bayliss and Grogan 2009; see also Dowling 2006; Schot 2018</p>
		<p>Dimensions Diameter 318m N/S by 264m E/W; internal area approx. 55,000m²; max. external height of bank 2.5m; max. depth of (excavated) ditch 3.5m</p>
<p>Fig. 10 Trenches excavated in 1997 across the north sector of Ráith na Ríg, showing the enclosure bank (right), rock-cut internal ditch and inner palisade trench. The Mound of the Hostages is visible at top left (Roche 2002, pl. 3).</p>		

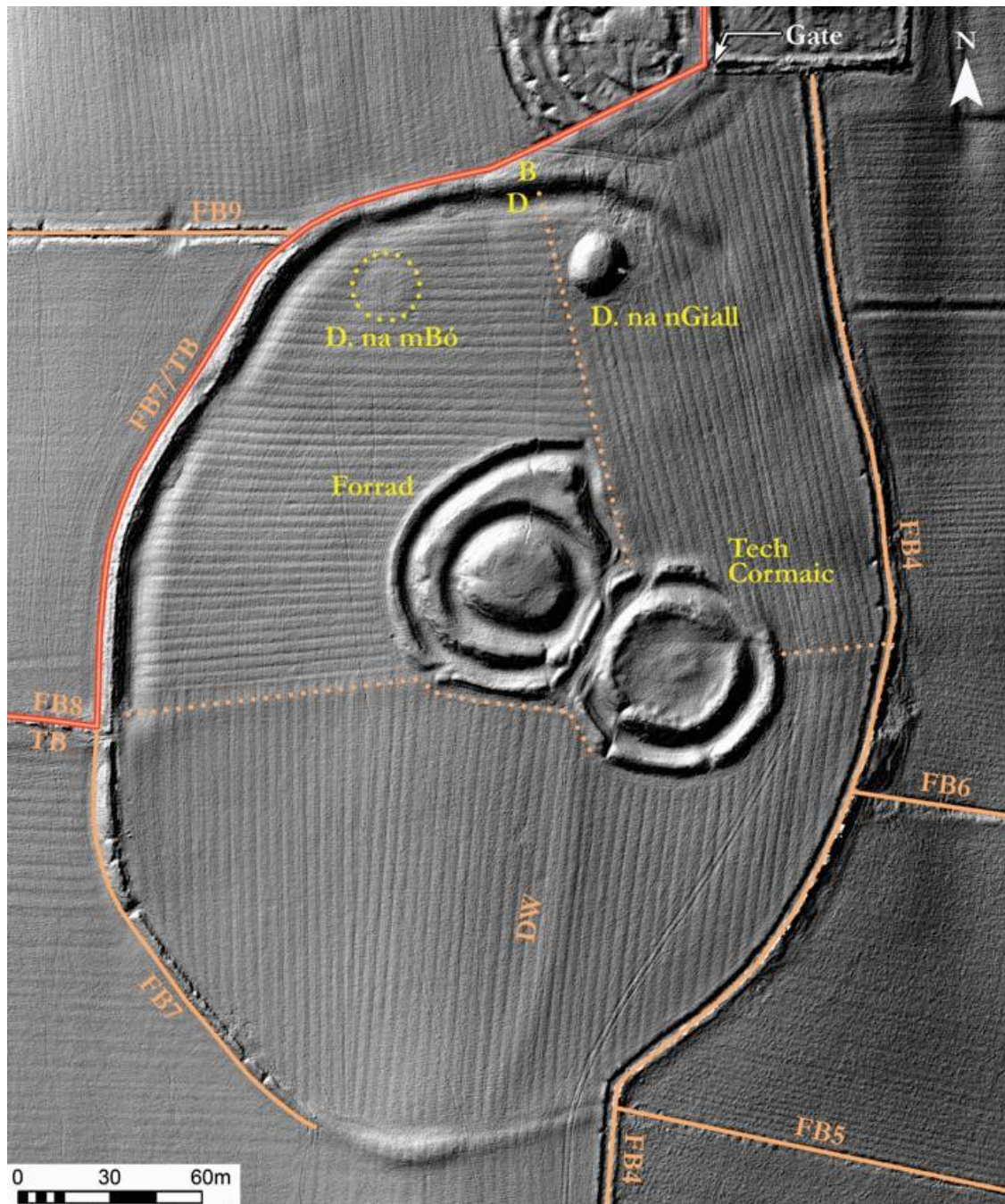


Fig. 11 Lidar hillshade model of Ráith na Ríg showing key archaeological (yellow) and historical (orange) features. Relict field divisions inside the enclosure are indicated by dotted lines. The impact of former cultivation on the earthworks is most marked on the northeast and south, where the bank has been almost completely ploughed out.

Description

The largest monument on Tara, the oval-shaped enclosure of Ráith na Ríg encircles the crown of the hill and has a circumference of nearly one kilometre (**Fig. 11**). It is defined by an earthen bank (B) with an internal ditch (D) and encloses three high-profile monuments: the Mound of the Hostages (Duma na nGiall, no. 4) and the conjoined earthworks of the Forrad (no. 5) and Tech Cormaic (no. 10). Other, formerly prominent monuments include Duma na mBó (no. 11), which was levelled in the 19th century. Buried traces of a host of other funerary monuments and enclosures have also been discovered inside Ráith na Ríg by geophysical survey. Sections of the enclosure, on the N, were excavated in 1953-4 and in 1997. This showed that the deep, V-shaped enclosure ditch was cut into the underlying shale bedrock and was flanked internally by a wooden palisade (**Fig. 10**). Beneath the enclosure bank, the excavators unearthed the remains of a craft workshop where iron and bronze, and possibly glass, objects were made during the Iron Age. The enclosure was built soon after, around 100 BC, and is believed to have functioned as a sacred precinct for communal gatherings and kingship ceremonies.

Physical condition

The historic division of the hilltop into field systems and associated cultivation have had a significant adverse impact on the monument (see **Fig. 11**), with the result that only a short section of the enclosure bank, on the N and NW, remains relatively undisturbed. On the NE and S, the bank has been much denuded by ploughing and there are also several smaller gaps along its circuit, on the W, SW and E. The location of the original entrance has yet to be identified but is likely to lie on the E. Both the E and W sides of the enclosure were incorporated into field boundaries sometime prior to 1837. The boundary on the E (FB4) consists of a substantial modern ditch (which was cut into the enclosure ditch) backed by a hedge and post-and-wire fence (**Fig. 12**); the denuded remains of the enclosure bank now lie on the opposite side of the field boundary, outside the State-owned lands. On the W, the grass-covered remnants of a stone wall (FB7) built on top of the bank of Ráith na Ríg forms part of the townland boundary (TB) between Castleboy and Castletown Tara (**Fig. 13**). There are several mature hawthorn trees growing on the bank. Four further field boundaries abut the enclosure on the W (FB8, FB9) and E (FB5, FB6). Traces of other relict field divisions extend E/W and N/S across the interior of the enclosure, while a possible road or driveway (DW) traverses its boundary on the S and extends northwards to the junction between the Forrad and Tech Cormaic. The high volume of visitor traffic between the churchyard gate and the Mound of the Hostages is causing increasing attrition of the bank in this area, evidenced mainly as a network of surface-worn paths (**Fig. 14**). Tracks created by pedestrians, sheep and farm vehicles, and localised erosion around existing gaps in the earthworks, are also evident elsewhere along the circuit of the enclosure and in its interior.

Maintenance issues

The principal threats to the enclosure and its internal monuments stem from tourism and recreational pressures and damage caused by livestock. It should be noted that it is not only the fabric and setting of upstanding earthworks that are at risk: a major concentration of archaeological features and deposits is known to lie just below the ground surface, which are also vulnerable to damage. Erosion from pedestrian traffic is mainly concentrated along specific routes linking the high-profile monuments. There is also significant footfall along the crest of the bank and around the inner circuit of Ráith na Ríg (the use of the latter area as a 'track' for fitness training is causing damage and is not compatible with the sensitive nature of the site). The level of erosion along these paths varies, from minor surface wear to more deeply incised tracks and erosion scars, particularly on the slopes of the earthworks. Mature hawthorn trees on the bank of Ráith na Ríg are causing disturbance to sub-surface archaeological layers and could cause more extensive damage to the earthwork if uprooted. Grazing and sheltering sheep are also contributing to localised erosion of the bank of Ráith na Ríg, while cattle in the adjacent fields to the E pose a significant threat to the already disturbed portion of the enclosure bank lying outside the State-owned lands. The field boundary running along the circuit of Ráith na Ríg (FB4) forms part of the E boundary of the State property and is re-enforced by a stock-proof fence which requires regular maintenance. The risk of damage from farm vehicles has been minimised by the imposition of a no-drive zone over the entire area of the monument.



Fig. 12 Curving tree-lined field boundary and modern ditch built along the western boundary of Ráith na Ríg, viewed from the north (April 2018). The field fence forms the boundary of the State property.



Fig. 13 The eastern boundary of Ráith na Ríg, showing the sloping interior, infilled ditch and external bank topped by hawthorn trees, viewed from the north (April 2018). The grass-covered footings of a stone wall running along the crest of the bank forms the town-land boundary between Castleboy and Castletown Tara.



Fig. 14 Concentrated footfall between the churchyard gate and the Mound of the Hostages is causing accelerated erosion of the already denuded bank of Ráith na Ríg (arrowed), as evidenced during a prolonged dry spell in June 2018. The impact of large numbers of people climbing on to the Mound of the Hostages is also exacerbated in very dry or wet conditions.

4

Name: Duma na nGiall, Mound of the Hostages
Type: Passage tomb/Bronze Age cemetery

SMR No. ME031-03307-;
ME031-033076-
Grid Ref. 691936, 759747



Fig. 15 East-facing entrance to the passage tomb, showing turf reinforcement mesh extending from entrance to edge of mound and extensive erosion from pedestrian traffic (April 2018).

Illustrations

Figs 9, 11, 14-19

References

O'Sullivan 2005; O'Sullivan et al. 2009; Newman 1997, 71-5, 145-9, 225-7, 318-19, 334

Dimensions

Mound approx. 2.75m high and 21.5m in diameter prior to excavation. Interior of passage approx. 3m long, 1.25m wide and 1.75m high.

Description

Completed around 3100 BC, this Neolithic passage tomb was shown by excavation in the 1950s to have a long and complex history. Part of an earlier enclosure and other traces of activity were discovered beneath the monument, which appears to have been constructed in several phases. The tomb consists of a single stone-lined passage, about 3m in length, which is divided by sill-stones into three compartments and covered by a stone cairn and soil mantle (**Fig. 15**). The entrance, which is flanked by portal stones, faces ESE and a decorated upright stone (orthostat) is visible on the S side of the passage (**Fig. 16**). The remains of hundreds of individuals, most of them cremated, were placed in and around the tomb and in the overlying mound during the Neolithic and Early-Middle Bronze Age. Three main phases of burial activity have been identified, the latest dating to about 1700-1600 BC and represented by a young man, aged 14-15 years, whose unburnt body was placed in a grave dug into the mound. He wore a necklace of faience, amber, jet and bronze beads and had a bronze razor and an awl near his feet. The burials and rich assemblage of grave goods from the Mound of the Hostages (**Fig. 17**) provide an important window onto developments in funerary traditions, material culture, social organisation and exchange networks, both locally and with other regions of Europe, over a period of more than 1,500 years. The name of the monument suggests that kings exchanged hostages here in early historic times, a practice that likely had pre-Christian roots.



Fig. 16 Laser-scanned model of orthostat with carved Neolithic ornament in the passage tomb (© The Discovery Programme).



Fig. 17 A selection of funerary vessels from the Mound of the Hostages (O'Sullivan 2005, pl. 1 photo Jonathan Hession).

Physical condition

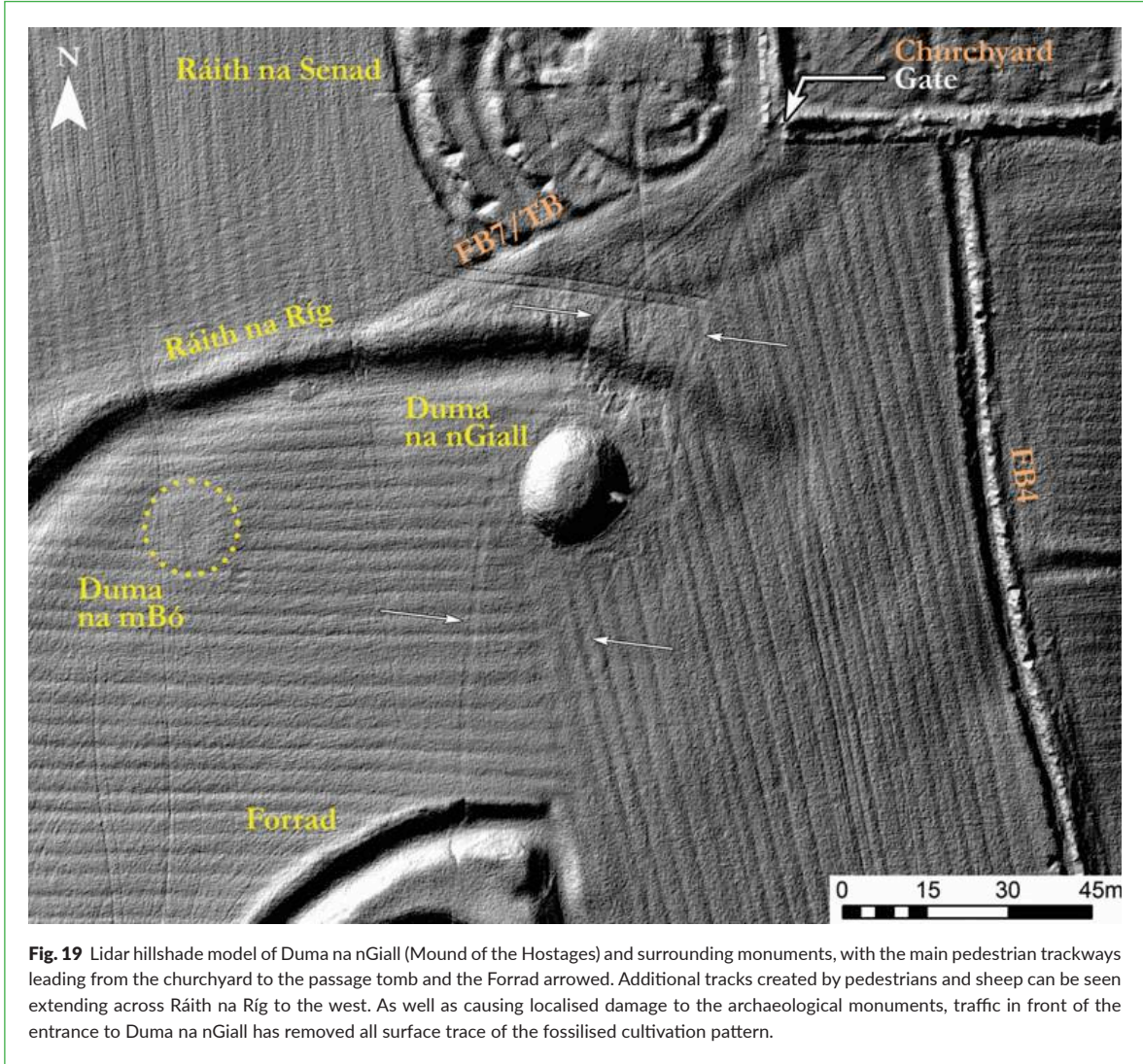
Prior to archaeological excavation in the 1950s, the monument appeared as a relatively low, flat-topped mound that was partly gorse covered and showed signs of erosion from grazing animals (**Fig. 18**). Following near-complete excavation the monument was fully reconstructed, a process that seems to have involved the incorporation of some imported (non-local) stone and soil. A programme of works to address subsequent deterioration and subsidence of the mound and tomb entrance was undertaken by the OPW in 2012 and the monument is currently in a stable condition. Some surface erosion and scarring are visible on the slopes and top of the mound. This is mainly the result of large numbers of visitors climbing onto it, and perhaps also occasionally sheep. In front of the tomb entrance, the ground surface is heavily compacted and worn bare from the high volume of pedestrian traffic. This area may also be used as a shelter by sheep, though there are few obvious signs of animal trampling or erosion. In addition to the effects of natural weathering, lichens are present on the portal stones and some of the exposed stones in the passage, including the decorated orthostat.

Maintenance issues

Concentrated and sustained footfall between the churchyard, the Mound of the Hostages and the Forrad has created a network of earth-worn tracks that are causing damage to the earthworks they cross and risk exposing near-surface archaeological layers (**Fig. 19**). The Mound of the Hostages is highly vulnerable to attrition from visitors climbing on to it and there is also a potential safety risk arising from the height and angle of the slopes (**Fig. 14**). Inappropriate recreational use, such as sledding when the mound is covered in snow, is also a cause for concern. These types of activities are placing increased pressure on the monument and the resources required to maintain it in a stable condition. A turf reinforcement grid has been laid flush with the ground surface in front of the tomb entrance to help reduce surface erosion (see **Fig. 15**). The area is also regularly reseeded to promote grass cover; however, this has had limited effect due to the high level of soil compaction and wear from pedestrian traffic. Although not accessible to the public, the interior of the passage tomb is exposed to the elements and there is also a potential future risk of damage from burrowing/nesting animals. Local environmental conditions within the tomb and their effect on the exposed structural elements require detailed assessment as part of a broader condition monitoring programme.



Fig. 18 The Mound of the Hostages before excavation, viewed from the east (O'Sullivan 2005, fig. 7 Ó Ríordáin Archive, University College Dublin).



5	<p>Name: An Forrad, (Royal) Seat</p> <p>Type: Bivallate barrow/assembly mound</p>	<p>SMR No. ME031-033010-</p> <p>Grid Ref. 691911, 759643</p>
 <p>Fig. 20 Aerial view of the Forrad, looking south. The largest of three mounds (no. 6) incorporated into the inner bank forms a prominent protrusion on the north side of the monument.</p>		<p>Illustrations</p> <p>Figs 9, 11, 20-24</p> <p>References</p> <p>Newman 1997, 77-83, 169-70, 227, 319-20</p> <p>Dimensions</p> <p>Max. overall diameter 94m (NE/ SW); basal diameter of central mound 38m; max. height of mound above surrounding ditch 3.6m</p>
<p>Description</p> <p>The Forrad is a large, flat-topped mound encircled by a ditch and two external banks with an intervening ditch (Fig. 20). The monument as it appears today developed in several phases (Newman 1997) and traces of earlier structures on this spot have been revealed by geophysical survey. The central mound is thought to be a Bronze Age burial monument which later became a focus for royal assemblies and ceremonies. The inner of the two banks encircling the mound incorporates up to three smaller mounds (nos 6-8), which are clearly older than the bank and may also pre-date the central mound. The outer bank is believed to have been added many centuries later, by the builders of the adjoining ringfort, Tech Cormaic (no. 10). There are two stone monuments on the summit of the Forrad: the Lia Fáil (no. 9), the reputed inauguration stone of Tara, which originally stood near the Mound of the Hostages (no. 4); and a memorial commemorating the United Irishmen killed at the Battle of Tara on 26 May 1798, who are said to have been buried in a mass grave in the central mound. Both stones were erected on the Forrad in 1824.</p>		
<p>Physical condition</p> <p>The monument is generally well preserved, with the main components surviving for the most part as impressive earthworks. A notable exception is the NE section of the outer bank, which has been almost completely erased by cultivation (Fig. 21). A V-shaped niche was cut into the bank on the SW, where it is abutted by a former field boundary, and the incorporation of the monument within this early field system also resulted in some modification of the bank on the S. There are several breaches in the banks on the E and SE resulting from long-term use of the junction between the Forrad and Tech Cormaic as a thoroughfare by pedestrians and farm animals. This route may have originated as an extension of the old road or droveway (DW) approaching from the S, which pre-dates the relict cultivation pattern inside Ráith na Ríg. Modern recreational use – and to a lesser extent, animal traffic – has increased the number of erosion paths and is placing additional pressure on vulnerable parts of the earthworks, in particular the steep-sided slopes and the gaps in the banks. On the N, concentrated footfall has carved a path across the banks and onto the mound summit which is steadily eroding the archaeological deposits (Fig. 22). Heavy footfall and extreme weather conditions also pose a threat to the stability of the earthworks, with slippage most likely to occur where the angle of slope is steepest (e.g. both faces of the inner bank and the NE side of the mound). Localised wear and disturbance in the form of erosion scars and trampling is also evident at various other locations around the monument (Fig. 23). Around the Lia Fáil and 1798 memorial on the mound summit, the ground surface is worn bare and is prone to waterlogging (Fig. 24). The depth and extent of ground disturbance resulting from the erection of these stones is not recorded.</p>		

Maintenance issues

The key issues affecting the monument are damage caused by recreational use and the risks posed to the stability of the earthworks and visitor safety by the steepness of the slopes, particularly in wet or very dry conditions. Visitor pressure is mainly focused on N and E sides of the monument. The most extensive erosion path, on the N, is fenced off at regular intervals to allow for resting and reseeded (Fig. 22); however, the effects are short-lived and offer minimal protection to the exposed archaeological deposits. Other areas of the monument are also affected by surface erosion, including the summit of the central mound. Sheep may be a contributory factor, though sustained visitor traffic likely acts as a deterrent to regular grazing or sheltering.

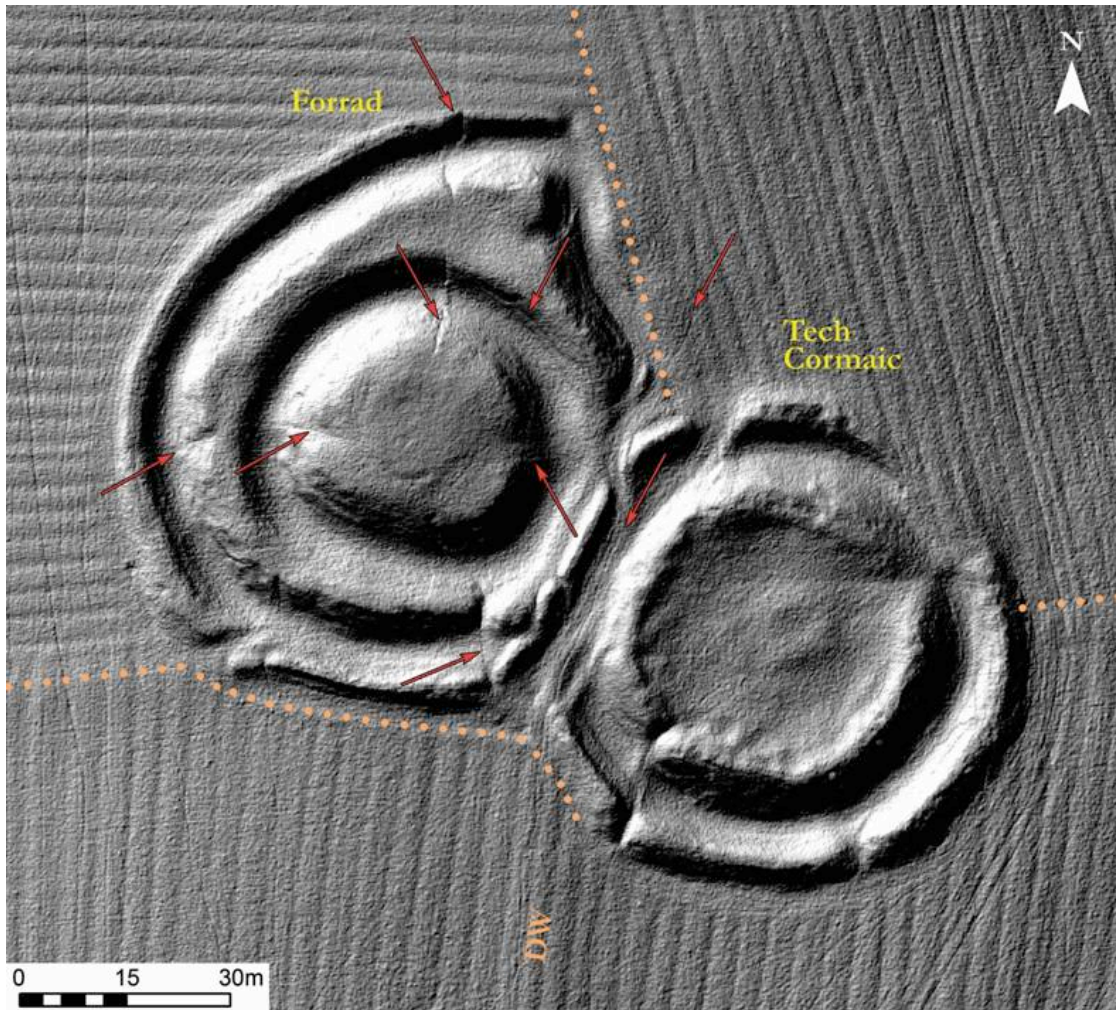


Fig. 21 Lidar hillshade model of the Forrad, with arrows indicating the main erosion tracks over the earthworks. Additional pedestrian and animal tracks are visible to the west of the monument. The dotted lines mark the location of relict field divisions associated with former cultivation.



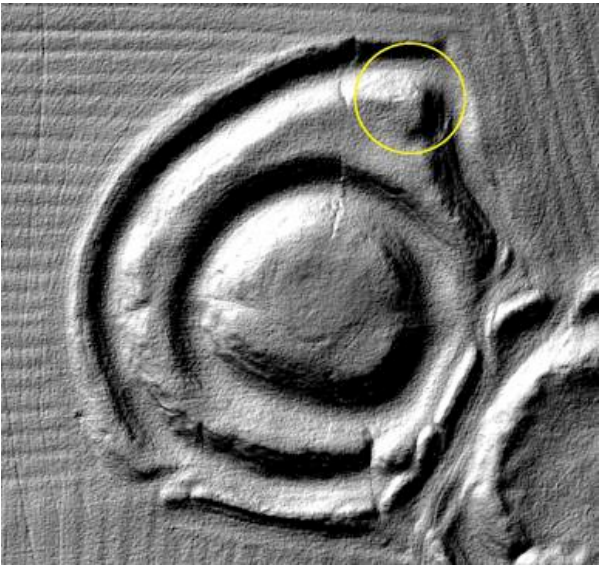

Fig. 22 Incised path on north side of the Forrad, viewed from the central mound, showing accelerated erosion between April (left) and May (right) 2018, when the area was fenced off for reseeding. Damage resulting from pedestrian traffic is largely confined to the slopes of the earthworks, with the tops of the banks showing little evidence of wear.





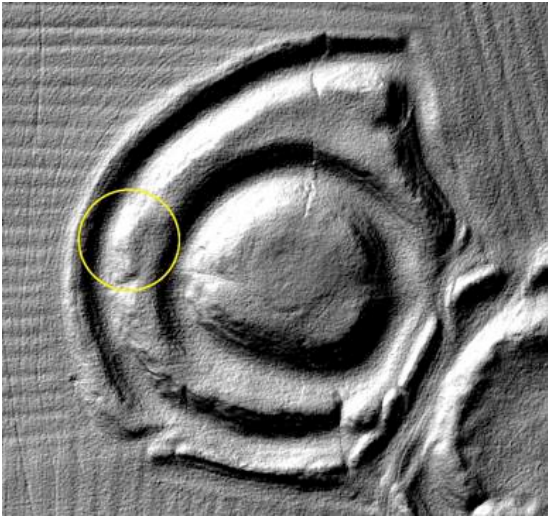
Fig. 23 Surface erosion on the external face of the inner bank of the Forrad, on the northeast (April 2018).







Fig. 24 Erosion and surface water around the 1798 memorial on the summit of the Forrad (April 2018).

6	Name: Unnamed (part of the Forrad) Type: Mound/barrow	SMR No. ME031-033011- Grid Ref. 691922, 759676
		<p>Illustrations Figs 9, 20–21, 25–26</p> <p>References Newman 1997, 77–83, 165–6, 320</p> <p>Dimensions Max. diameter of mound 7.5m; surrounding ditch approx. 2–2.5m wide</p> <p>Fig. 27 (Left) Prominent mound on north side of the Forrad.</p>
<p>Description</p> <p>This substantial, almost flat-topped mound protrudes conspicuously from the outer face of the inner bank of the Forrad, on the NNE (Fig. 25). GPR survey in the 1990s revealed potential traces of a ditch and bank encircling the mound, leading Newman (1997) to classify the monument as a possible bowl-barrow with outer bank.</p>		
<p>Physical condition</p> <p>Localised attrition and slumping are evident on the N and E sides, while pedestrian traffic is causing erosion of the base of the mound on the SE (Fig. 26). A deeply incised track created by a high volume of visitor traffic onto the Forrad skirts the monument several metres to the W (Fig. 21).</p>		
<p>Maintenance issues</p> <p>The site is at risk of further erosion from pedestrian traffic and sheep.</p>		
 <p>Fig. 28 East side of mound, showing subsidence and erosion from pedestrian traffic around base (January 2019).</p>		

7	Name: Mur Tea (?) Type: Mound/barrow	SMR No. ME031-033012- Grid Ref. 691921, 759616
		Illustrations Figs 9, 21, 27-28
		References Newman 1997, 77-82, 165-6, 320
		Dimensions Approx. 5m in diameter and 1.1m high above the inner ditch of the Forrad
		Fig. 27 (Left) Mound on southeast side of the Forrad.
<p>Description</p> <p>This small, rounded mound is visible in the circuit of the inner bank of the Forrad, on the SE (Figs 27 and 28). A 2m-wide gap which separates the mound from the bank may be the remains of a ditch that once encircled the mound but it could also be the result of more recent damage. Possible traces of a surrounding bank have also been noted on the E side of the mound. The mound is located near the junction of the Forrad and Tech Cormaic and the complexity of the earthworks in this area makes archaeological interpretation challenging. It has been speculated that this may be the feature identified in medieval topographical lore as Mur Tea, the burial mound of the Egyptian princess Tea, wife of Éremón, a legendary king of Tara.</p>		
<p>Physical condition</p> <p>The mound is intact and is generally well preserved. However, traffic through the adjacent gap is causing attrition of the slope and base of the mound on the E side (see Figs 21 and 28).</p>		
<p>Maintenance issues</p> <p>The site is at risk of further erosion from pedestrian traffic and sheep.</p>		
		<p>Fig. 28 (Left) View of mound (arrowed) and surrounding earthworks, from the northwest, showing evidence of attrition from traffic through the gap between the mound and the inner bank of the Forrad (right) (January 2019).</p>

8	Name: Unnamed (part of the Forrad) Type: Possible mound	SMR No. ME031-033013- Grid Ref. 691877, 759644
		Illustrations Figs 9, 21, 29
		References Newman 1997, 77-83, 320
		Dimensions Uncertain
		<p>Fig. 29 (Left) Possible mound on west side of the Forrad.</p>
<p>Description</p> <p>This feature is characterised by a slight protrusion in the W (external) face of the inner bank of the Forrad (no. 5; Fig. 29). It is classified as a possible mound by Newman (1997), albeit considerably more tentative than the mounds incorporated into the bank on the NNE and SE.</p>		
<p>Physical condition</p> <p>Uncertain; the site is difficult to distinguish from the bank of the Forrad.</p>		
<p>Maintenance issues</p> <p>This is currently a low-traffic area compared to other parts of the Forrad. However, an incised pedestrian track is located a short distance to the south (see Fig. 21) and the site is also at potential risk of damage by sheep.</p>		

9	Name: Lia Fáil, Stone of Destiny Type: Standing stone	SMR No. ME031-033014- Grid Ref. 691906, 759649
		<p>Illustrations Figs 9, 30-32</p> <p>References Newman 1997, 86-8, 148-9, 320-1</p> <p>Dimensions Height above ground level 1.57m; circumference 1.58m, tapering to 1.23m near top</p> <p>Fig. 30 (Left) The Lia Fáil, viewed from the east, showing extensive erosion and pooling water outside the stone pavement at the base of the stone (April 2018).</p>
<p>Description</p> <p>A pillar-shaped stone composed of coarse white granite (Fig. 30), the Lia Fáil formerly stood near the Mound of the Hostages (no. 4). It was moved to its present position on the central mound of the Forrad (no. 5; see Fig. 9) in 1824 to commemorate the United Irishmen who died in the Battle of Tara in May 1798. The S face of the stone is engraved with a small cross and the letters R.I.P. (Fig. 31), below which are possible traces of a second, ringed cross. The famed inauguration stone of Tara, the Lia Fáil is said to have cried out in recognition of a rightful king. It is first mentioned in an 8th-century account of the inauguration ceremony of the legendary king of Tara, Conaire Mór, and was considered one of the 'wonders' of Tara by medieval writers.</p>		
<p>Physical condition</p> <p>The stone is in good condition but shows signs of natural weathering as well as minor damage caused by vandalism. In the first of two recent incidents, several small fragments were chipped from its surface, and in 2014 paint was poured over the monument (Fig. 32). The OPW staff removed the paint without delay while still wet but some slight staining remains despite immediate treatment.</p>		
<p>Maintenance issues</p> <p>The stone is exposed to the elements and is also at risk of further incidents of vandalism, as well as attrition from sheep. Intensive pedestrian traffic around the stone (and the adjacent 1798 memorial) is actively eroding the surface of the mound and making it prone to waterlogging, placing vulnerable archaeological deposits at risk of damage (see Fig. 30). The monument used to stand in a pool of water and due to concerns regarding its stability, limestone paving was laid around the base of the stone in the early 2000s to provide solid support.</p>		
	<p>Fig. 31 3D laser-scan of the south face of the Lia Fáil, with inscribed cross visible at approximate centre and letters R.I.P. above (© The Discovery Programme).</p>	 <p>Fig. 32 The stone covered in paint following the latest incident of vandalism in May 2014; view looking north towards the Mound of the Hostages (photo: OPW).</p>

10	<p>Name: Tech Cormaic, Cormac's House Type: Bivallate ringfort/rath</p>	<p>SMR No. ME031-033009-; ME031-033078- Grid Ref. 691962, 759613</p>
		<p>Illustrations Figs 9, 11, 33–34</p> <p>References Newman 1997, 83–6, 170, 180, 230, 319</p> <p>Dimensions Max. diameter approx. 80m; height of inner bank 0.9m; height of outer bank above bottom of ditch 1.8m; internal area 816m²</p> <p>Fig. 33 (Left) Aerial view of Tech Cormaic, looking south.</p>
<p>Description</p> <p>Tech Cormaic is a circular enclosure defined by two banks with an intervening ditch (Fig. 33), which joins with the SE side of the Forrad in a figure-of-eight arrangement (Fig. 34). Geophysical prospection has revealed traces of a possible second ditch surrounding the outer bank of Tech Cormaic, as well as the footprint of several earlier structures buried beneath the earthworks. The enclosure is likely to be a 'royal' ringfort, associated with the king(s) of Tara, and was possibly built sometime between the 6th and 8th centuries AD. It is thought that the builders of Tech Cormaic also constructed the outer bank around the Forrad to physically encompass and lay claim to the 'royal seat' or assembly mound of Tara (Newman 1997). The original entrance to Tech Cormaic was probably on the NE, where the banks are much eroded by cultivation. The raised interior is almost flat and the foundations of a building or house are visible as a low, sub-rectangular platform near its centre. Medieval chroniclers believed the enclosure to be the royal residence of Cormaic mac Airt in the 2nd or 3rd century AD.</p>		
<p>Physical condition</p> <p>Apart from localised disturbance and erosion of the banks, the enclosure is in good overall condition. There are narrow gaps in the inner (SW) and outer (NW, SW, SE) banks and both have been partially flattened by cultivation on the NE. The field system associated with this phase of land use impinges on the enclosure and has resulted in some modification of the outer bank on the SW. These impacts mainly occurred between the 19th and mid-20th centuries and aerial photographs show no significant loss or deterioration of the earthworks since the mid-1970s. However, a number of incised paths have developed from sustained pedestrian and animal traffic through gaps in the banks and along the junction between Tech Cormaic and the Forrad (see Fig. 34). This junction links with an old road or droveway (DW) approaching from the S, which pre-dates the relict cultivation pattern inside Ráith na Ríg. The slopes of the banks also show evidence of damage and wear caused by sheep.</p>		
<p>Maintenance issues</p> <p>Tech Cormaic is a high-traffic site for visitors, though less so than the Forrad, which overlooks it and provides a good vantage point from which to view the monument. The earthworks are vulnerable to accelerated erosion from recreational and animal use and the steep incline of the slopes increases the risk of slippage/collapse as well as presenting a potential safety risk to visitors.</p>		

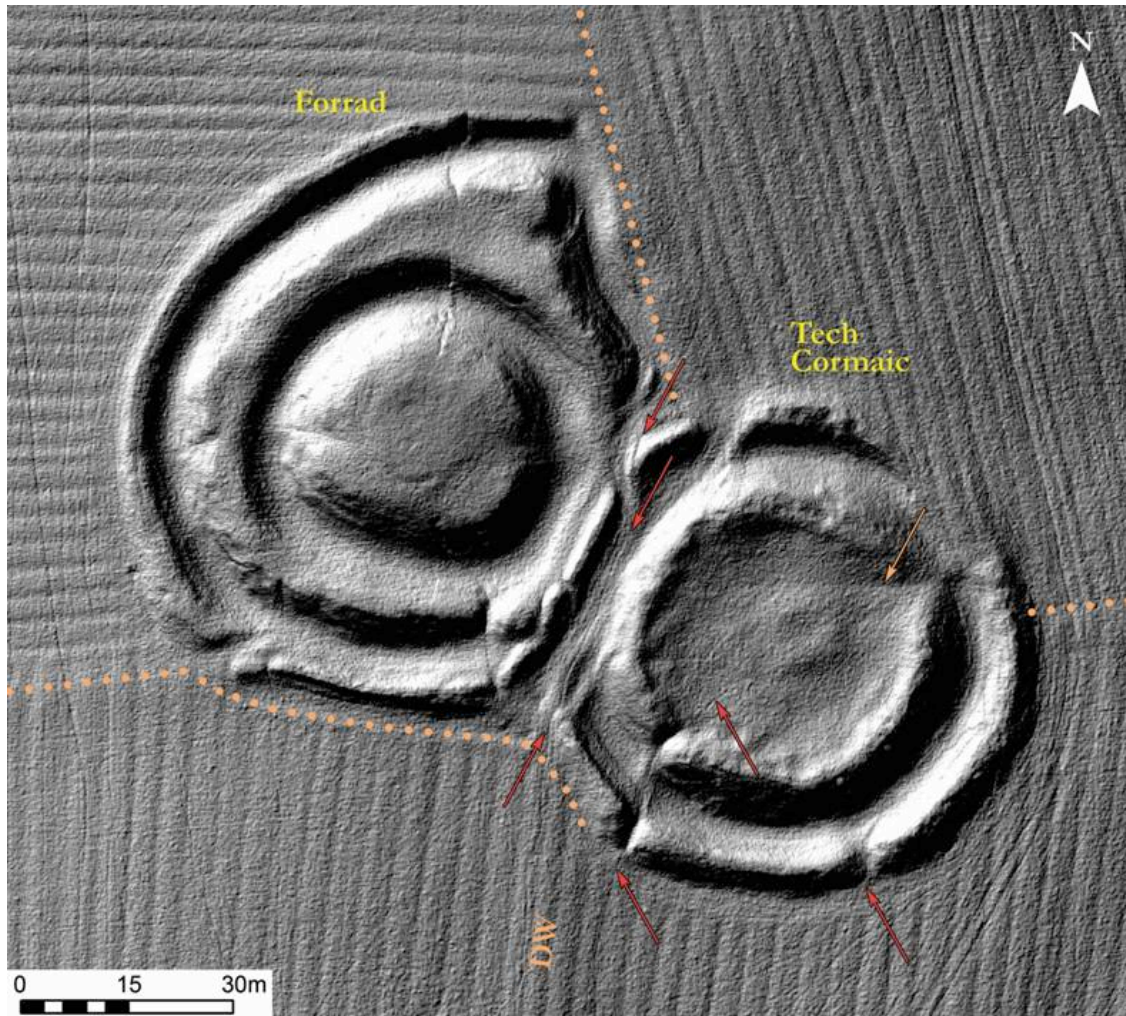
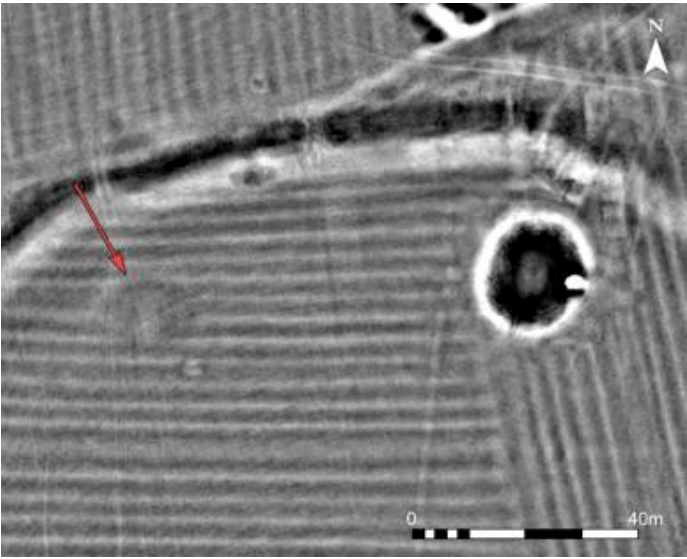


Fig. 34 Lidar hillshade model of Tech Cormaic, with arrows indicating the main erosion tracks over the earthworks. Farm vehicle tracks can also be seen skirting the southeast side of the enclosure. The dotted lines mark the location of relict field divisions associated with former cultivation. A linear depression running E/W across the enclosure (indicated by orange arrow) may form part of the same field system; however, this feature could also be archaeological in origin.

<p>11</p>	<p>Name: Duma na mBó, Mound of the Cow Type: Mound (site of)</p>	<p>SMR No. ME031-033006- Grid Ref. 691876, 759745</p>
		<p>Illustrations Figs 9, 19, 35</p> <p>References Petrie 1839, 158; Dawson 1901, 9; Newman 1997, 68–71, 318</p> <p>Dimensions Described by Petrie (1839) as being 1.8m high and 12m in diameter</p> <p>Fig. 35 (Left) Local relief model generated from lidar data, showing the remnant mound of Duma na mBó (arrowed).</p>
<p>Description</p> <p>The first-edition (1837) Ordnance Survey map shows Duma na mBó as a circular mound similar to Duma na nGiall, some 50m to the east. The monument was levelled sometime between 1839 and 1887, reputedly 'to make top-dressing for the adjoining pasture land' (Dawson 1901, cited in Newman 1997). The only above-surface trace of the mound is a very slight subcircular rise or platform (Figs 19 and 35), which is suggested by geophysical survey to contain stony or compacted material.</p>		
<p>Physical condition</p> <p>The surviving remains are extremely low-profile and difficult to discern at ground level. Archaeological deposits above and below the ground surface also appear to have been impacted by cultivation following the levelling of the monument, particularly on the S. The site is traversed N/S by shallow erosion tracks.</p>		
<p>Maintenance issues</p> <p>The site is at risk of further erosion from pedestrian and animal traffic.</p>		

Ráith na Senad Division (Castletown Tara Td)



Fig. 36 Hillshaded digital terrain model of the Ráith na Senad division generated from 2007 lidar data, with extant (yellow) and low-profile (orange) archaeological monuments indicated.

12

Name: Ráith na Senad, Rath of the Synods
Type: Multivallate enclosure/multi-period site

SMR No. ME031-033016-
Grid Ref. 691948, 759816

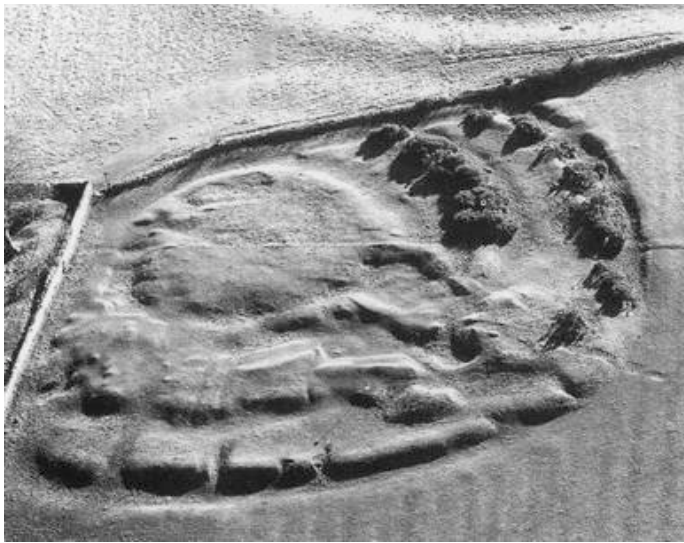


Fig. 37 Aerial view of the Rath of the Synods, from the north (photo: Leo Swan, from Newman 1997, pl. 17). The curving bank of Ráith na Ríg is visible at top of image.

Illustrations

Figs 36–39, 41

References

Grogan 2008 and Bayliss and Grogan 2009 (excavation results and dating); Newman 1997, 90–8, 160, 177–80, 230, 321; Carew 2003; Dowling 2011

Dimensions

Max. overall diameter approx. 91m (NW/SE); internal area 26m in diameter; banks approx. 2.5–3.5m wide and up to 1.5–2m high; average dimensions of excavated ditches – *Ditch 1*: 5.5m wide and 2.2m deep; *Ditches 2 and 3*: 2–3m wide and 1–1.5m deep

Description

The Rath of the Synods, which abuts the NNE side of Ráith na Ríg (no. 3), is a much-disturbed circular enclosure defined by three earthen banks with outer ditches (Fig. 37), some of which were originally augmented by timber palisades. The remains of a possible fourth (outer) bank survive on the N and SW. The multivallate (multi-ramparted) enclosure lies at the centre of the Ditched Pit Circle (no. 14; see Figs 39 and 41) and represents the final structural phase in a complex sequence of activity at this spot. An undated barrow (no. 13) was incorporated into the NW quadrant of the enclosure and excavations by S.P. Ó Ríordáin in 1952–3 also unearthed traces of pre-earthwork structures (comprising a circular ditched enclosure followed by a sequence of palisaded enclosures) in the central area of the site (Fig. 38). These appear to be several centuries older than the multivallate enclosure, which dates from the 2nd to 4th centuries AD. A square structure recorded in the interior of the Rath of the Synods has been variously interpreted as a house or a shrine. Evidence of metalworking, feasting and ritual activity, possibly including burial, suggests the enclosure had a multi-faceted role. The impressive assemblage of Roman material from the site, and its historical significance as a precursor to the high-status multivallate rath of the early medieval period, make the Rath of the Synods one of the most important excavated Iron Age enclosures in Ireland. Later activity is attested by three inhumation burials in the central area, which range in date from the 8th to 13th centuries AD. Although the earliest reference to a church at Tara occurs in 1220, the burial evidence and the synods reputedly held at the site by Patrick, Rúadhan and Adomnán may signal an ecclesiastical presence on the hill centuries earlier.

Physical condition

The enclosure has suffered extensive damage and is in a poor but stable condition (Fig. 39). The encroachment of the churchyard on the E side of the enclosure has removed all surface trace of the earthworks in this area. Sub-surface archaeological deposits within the churchyard will also have been severely impacted by graves, landscaping works and tree roots. South of the churchyard wall and the townland boundary between Castletown Tara and Castleboy (FB7/TB), the ramparts have been almost completely erased by cultivation. These historic interventions have together resulted in the loss of over one-third of the monument. The site was also extensively damaged in 1899–1902 through digging by the British-Israelites in a misguided search for the Ark of the Covenant (see Carew 2003). As a result, all archaeological deposits over a considerable part of the central area, NW quadrant and several other parts of the enclosure were removed. Despite this, significant *in situ* deposits survived in some areas of the site excavated in the 1950s. The imprint of some of the backfilled excavation cuttings is still visible. The surviving earthworks are breached in numerous places and the enclosure is crossed by a network of eroded paths. The widest paths lead from the churchyard gate to the Mound of the Hostages and have caused localised surface erosion over the S sector of the monument. A narrower inscribed path, possibly resulting from animal, as well as pedestrian, traffic runs N/S across the earthworks on the W.

Maintenance issues

The poor condition and complexity of the earthworks make it difficult for visitors to appreciate the layout of the monument and its archaeological significance. The two main (most direct) routes onto the summit of Tara cross the enclosure, placing the earthworks at increased risk of erosion. The S side of the enclosure, where the ramparts are extremely denuded and archaeological deposits lie close to the surface, is particularly vulnerable to impacts from pedestrian traffic between the churchyard and Ráith na Ríg. Moreover, many people using this route will be unaware they are crossing an archaeological monument. Associated archaeological deposits located within the W part of the churchyard are at risk of impact from any works involving ground disturbance, as well as rooting trees. The threat of damage to the monument from vehicular traffic (visible on **Fig. 39**) has been minimised by the imposition of a no-drive zone over this part of the hill.

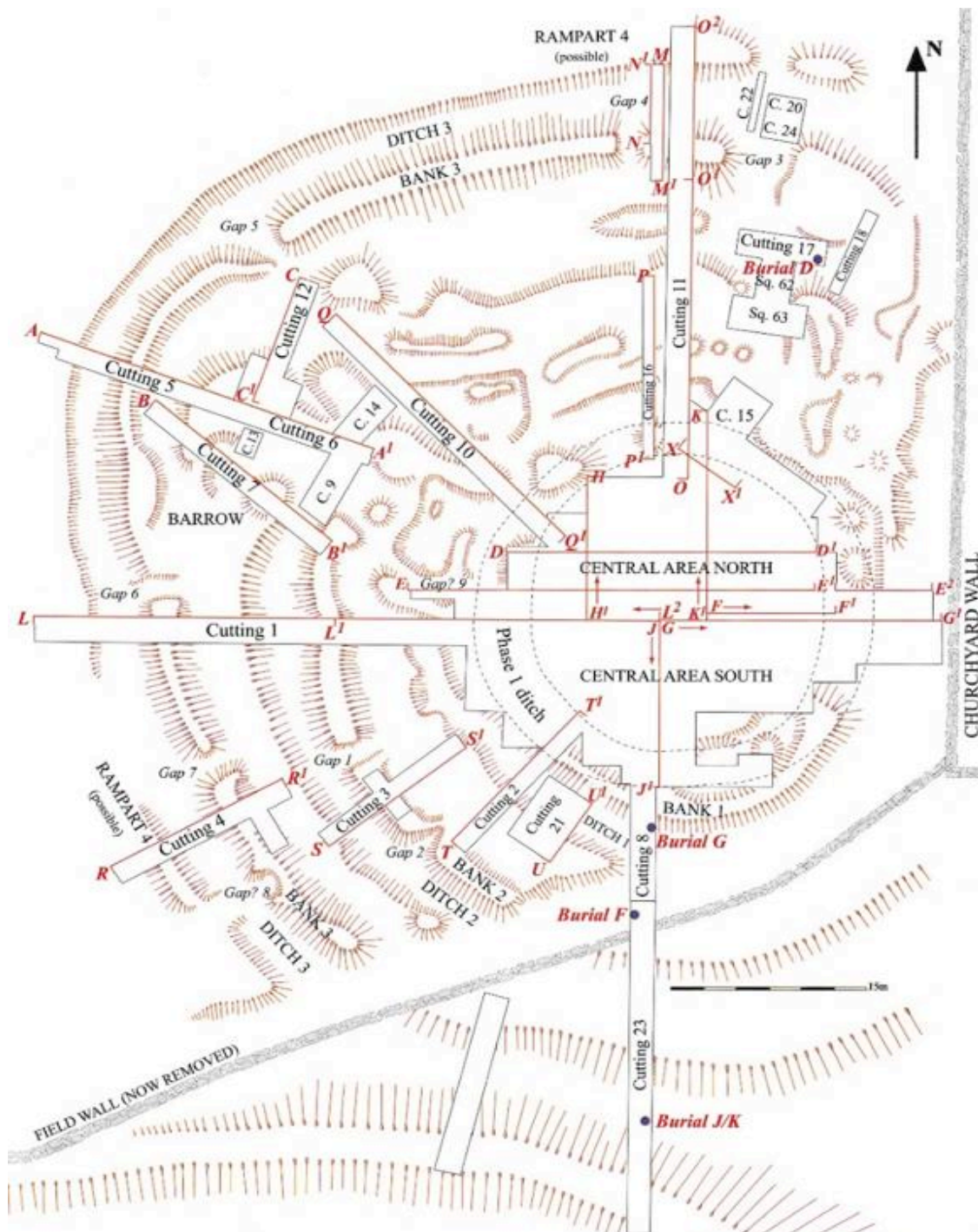


Fig. 38 Pre-excitation plan of the Rath of the Synods, showing the location of the 1950s excavation cuttings (from Grogan 2008, fig. 1.4). The 'Phase 1 ditch' in the central area and barrow to the west both pre-date the multivallate earthworks.

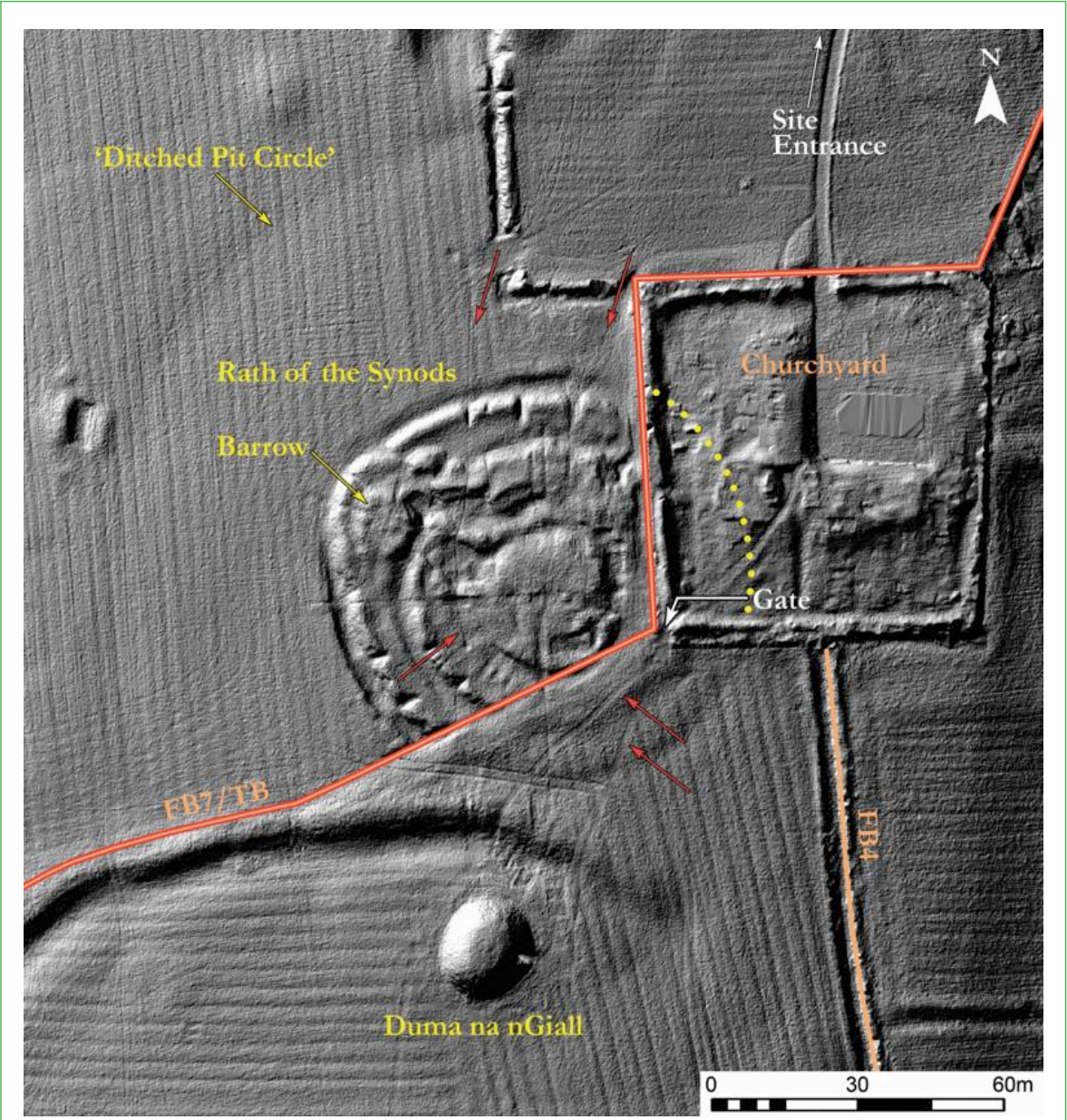



Fig. 39 Lidar hillshade model of the Rath of the Synods, showing projected circuit within the churchyard. Many of the backfilled trenches from the 1950s excavations (see **Fig. 38**) are still visible. The red arrows indicate the main erosion paths over the earthworks. Old farm vehicle tracks can also be seen extending E/W across the southern perimeter of the enclosure, between the churchyard and the Mound of the Hostages.

13	<p>Name: Unnamed (part of Ráith na Senad) Type: Mound (possible bowl-barrow)</p>	<p>SMR No. ME031-033017- Grid Ref. 691913, 759831</p>
 <p>Fig. 40 View of mound (centre) looking west from the ramparts of Rath of the Synods (January 2019).</p>		<p>Illustrations Figs 36, 38–40</p>
		<p>References Newman 1997, 92–6, 164, 166, 177, 321–2; excavation results and analysis: Grogan 2008, 37–42; O’Sullivan et al. 2009</p>
		<p>Dimensions 16.5m in max. overall diameter; mound 12m in max. diameter; height of mound above old ground surface 1.25m; surrounding ditch up to 3m wide and 2m deep</p>
<p>Description A small, irregular mound incorporated into NW quadrant of the Rath of the Synods (no. 12), between the second and third ramparts (Figs 39 and 40). Excavations by S.P. Ó Riordáin in 1952–3 (see Fig. 38) revealed that the primary mound (phase 1) was constructed from stone and clayey material excavated from the surrounding ditch, which is V-shaped in profile and partly rock-cut. The mound contained five primary cremation burials and some animal bone; a single cremation deposit and a large quantity of animal bone from the ditch were also associated with this phase. The mound was subsequently remodelled (phase 2) by levelling off the top and spreading the material over and beyond the ditch on the W and N. A natural sod layer formed over the secondary mound and three further episodes of burial and modification were identified, the latest represented by the digging of Ditches 2 and 3 of the Rath of the Synods. The secondary burials consisted of four cremations (one in the barrow ditch) and a single crouched inhumation near centre of the mound. None of the burials from the barrow have been dated.</p>		
<p>Physical condition The barrow is much disturbed but is in a stable condition. In 1899–1902 the British-Israelites cut a large pit, up to 1.8m deep, through the central western part of the mound, and on the E side the ditch was also cut into and all archaeological material removed. The surface of the barrow remains uneven and the backfilled 1950s excavation cuttings are still visible (see Fig. 39).</p>		
<p>Maintenance issues The monument is difficult to distinguish from the other earthworks at the Rath of the Synods and although not currently under threat, it is at increased risk of erosion from visitor and animal traffic.</p>		

14

Name: 'Ditched Pit Circle'
Type: Prehistoric enclosure (henge)

SMR No. ME031-0330074-
Grid Ref. 691948, 759812



Illustrations

Figs 36, 39, 41

References

Fenwick and Newman 2002; Newman 2007, 420-1, 433

Dimensions

Max. dimensions 210m N/S by 175m E/W; width of ditch approx. 5m.

Fig. 41 (Left) The Ditched Pit Circle, as revealed by geomagnetic survey in the 1990s (after Fenwick and Newman 2002, fig. 2).

Description

The below-surface remains of this impressive oval enclosure were identified by geophysical survey in 1998-9. It is defined by a substantial ditch flanked by a ring of regularly spaced pits which may have supported timber uprights (**Fig. 41**). The enclosure encompasses an area of some 3ha, within which the Rath of the Synods (no. 12) is centrally positioned; the Mound of the Hostages (no. 4) and several other burial monuments are also located in its interior. Part of the NE sector of the enclosure lies under the churchyard and a low-relief depression curving from N to W around the Rath of the Synods represents the only visible surface trace of the enclosure (**Fig. 39**). On the WSW and SE, the enclosure intersects with (and is cut by the ditch of) Ráith na Ríg (no. 3), which was constructed around 100 BC. The closest parallels for the Ditched Pit Circle are found among the corpus of Irish and British henge monuments of the late Neolithic/early Bronze Age period. However, timber and pit circles have a lengthy currency in Ireland (see Fenwick and Newman 2002, 11-14) – as exemplified by the Iron Age enclosure excavated at Lismullin (O'Connell 2013), less than 2km NW of the Hill of Tara – and the possibility of a date as late as the 2nd century BC for the Ditched Pit Circle cannot be ruled out.


Physical condition

The surface remains are slight – there is no evidence to suggest the enclosure ever had a bank and any wooden components (e.g. posts) will have long since decomposed – but substantial archaeological features and deposits survive below ground. These have likely been impacted by activity in the area of the churchyard and, to a more limited extent, by field boundaries.

Maintenance issues

Any surface/sub-surface works or disturbance in the area of the enclosure pose a threat to the archaeological remains. The remains in the churchyard are particularly vulnerable to damage.

<p>15</p>	<p>Name: Unnamed Type: Stone pillar (architectural fragment?)</p>	<p>SMR No. ME031-033018- Grid Ref. 691991,759847</p>
		<p>Illustrations Figs 36, 42–43</p> <p>References Guest 1936, no. 30; Andersen 1977, 152; Rynne 1987, 192; Newman 1997, 98–101, 322; Freitag 2004, 143</p> <p>Dimensions 1.89m high, 0.62m wide and 0.27m thick; carved figure 0.42m tall</p> <p>Fig. 42 (Left) East face of stone pillar with carved figure in relief (June 2018).</p>
<p>Description</p> <p>This is the taller of two stone pillars in the churchyard, both of which appear to be composed of shaly, fossiliferous limestone of local origin (see Newman 1997, 98). The stone is aligned N/S and is rectangular in cross-section, tapering inwards slightly from base to top (Figs 42 and 43). The E and W faces are dressed back at the top and bottom, suggesting that the stone may be a re-used architectural fragment, possibly from the earlier church (Andersen 1977; Newman 1997). A worn, human figure carved in relief on the lower E face appears to be a sheela-na-gig, a type of sexualised female representation mainly found on medieval churches and castles.</p>		
<p>Physical condition</p> <p>The stone is affected by weathering and lichen but is otherwise in good condition. The worn condition of the carved figure makes it difficult to identify many of its features clearly.</p>		
<p>Maintenance issues</p> <p>Pedestrian traffic is mainly confined to the adjacent hardcore path and, apart from natural weathering, the stone is not at active risk of damage or interference. However, burrowing animals, tree roots or other ground disturbance could threaten its stability.</p>		

16	<p>Name: Unnamed Type: Standing stone</p>	<p>SMR No. ME031-033019- Grid Ref. 691996, 759847</p>
		<p>Illustrations Figs 36, 43</p> <p>References Newman 1997, 98-101, 322</p> <p>Dimensions Height 0.73m; approx. 1.62m in max. circumference</p> <p>Fig. 43 (Left) Southeast face of standing stone, with taller stone pillar (no. 15) in background (January 2019).</p>
<p>Description This squat, round-topped stone stands a few metres ESE of a taller stone (no. 15) in the W part of the churchyard (Fig. 43). It is roughly oval in section and appears to be composed of shaly, fossiliferous limestone of local origin (see Newman 1997, 98).</p>		
<p>Physical condition The stone is fissured and weathered and is covered by lichen.</p>		
<p>Maintenance issues Pedestrian traffic is mainly confined to the adjacent hardcore path and, apart from natural weathering, the stone is not at active risk of damage or interference. However, burrowing animals, tree roots or other ground disturbance could threaten its stability.</p>		

17

Name: Unnamed
Type: Medieval church (site of)

SMR No. ME031-033071-
Grid Ref. 692012, 759833



Illustrations

Figs 36, 39, 44-46

References

Grose and Ledwich 1791-5, 88, pl. 72

Dimensions

Overall length approx. 41m E/W by 12m N/S; earthen banks defining tower approx. 12m N/S by 10.5m E/W and 0.2-0.3m high

Fig. 41 (Left) Fragment of stone wall on the site of the residential tower, viewed from the southeast (January 2019).

Description

A church associated with the Anglo-Norman manor at Tara is first recorded in the early 13th century and was replaced by a fortified church in the 15th century. The latter is shown in a 1791 illustration by Francis Grose as comprising a divided nave and roofed chancel with a residential tower of at least three storeys at the W end (**Fig. 45**). There was a pointed doorway in the S wall of the nave, with a window to either side. Both the nave and the tower are depicted as roofless and dilapidated and the graveyard, containing some half a dozen headstones, appears to be bounded on the E by a stone wall. The site of the medieval church lies just to the S of the present church and appears as a low rectangular platform defined by scarps on the N, E and S (**Fig. 39**). A modern path and stairs to the W divide it from the site of the tower (**Fig. 46**), which is evidenced as a rectangular area demarcated by low earthen banks. A fragment of coursed masonry in the E bank may form part of an arched wall that supported a vaulted ceiling (**Fig. 44**). The W side of the tower overlaps with the outer rampart and ditch of the Rath of the Synods (no. 12).



Fig. 45 Grose's 1791 drawing of the medieval fortified church at Tara, viewed from the southwest.

Physical condition


Poor; the upstanding remains are very fragmentary and the site has been extensively disturbed by graves and landscaping. There are fewer obvious signs of ground disturbance over the E part of the site (E of the masonry remains) which may have a favourable bearing on the preservation of sub-surface archaeological features and deposits in this area.


Maintenance issues

The remains are highly vulnerable to damage from any form of ground disturbance, including grave-digging and the root systems of trees.



Fig. 46 View of earthen banks and masonry remains on the site of the medieval residential tower, looking northeast towards St Patrick's church (January 2019).

18	Name: Dall ('Blind') Type: Mound (possible ring-barrow)	SMR No. ME031-033020- Grid Ref. 691852, 759852
		Illustrations Figs 36, 39, 47
		References Newman 1997, 99–101, 322
		Dimensions Max. diameter of surviving earthworks 16.5m; max. height 0.6m; central hollow 12.5m N/S by 2.5m E/W
		Fig. 47 (Left) View of mound, looking north (January 2019).
Description This much-disturbed earthwork, identified in medieval literature as Dall, was probably originally a circular mound into which a sub-rectangular hollow has been dug (Fig. 47). Approximately 2m to its N and S respectively are two small, lozenge-shaped mounds which Newman (1997, 101) suggests may be the remains of a surrounding bank with a projected diameter of about 23m (see Fig. 39). It forms part of a ring of barrows surrounding the Ditched Pit Circle (no. 14).		
Physical condition The upstanding remains have been extensively disturbed through digging, possibly by treasure-hunters. If the mound had a surrounding bank, this feature has been almost completely ploughed out.		
Maintenance issues The monument is located in a low-traffic area and is not under immediate threat. However, any increase in pedestrian/animal traffic or surface/sub-surface works would place the site at risk of damage.		

19	<p>Name: Dorcha ('Dark')</p> <p>Type: Mound (possible bowl-barrow)</p>	<p>SMR No. ME031-033021-</p> <p>Grid Ref. 691892, 759920</p>
		<p>Illustrations Figs 36, 48, 51</p> <p>References Newman 1997, 100–02, 322–3</p> <p>Dimensions 18.5m N/S by 15.5m E/W; height 0.4m</p> <p>Fig. 48 (Left) View of mound, looking east (January 2019). The hollow at its centre (to right of top of ranging rod) may be the result of digging by treasure-hunters.</p>
<p>Description</p> <p>The low, rounded mound known Dorcha is located near the S end of Tech Midchúarta (no. 21) and is one of several barrows surrounding the Ditched Pit Circle (no. 14) (Figs 48 and 51). Traces of a possible ditch surrounding the mound were revealed by geophysical survey.</p>		
<p>Physical condition</p> <p>The mound has been flattened by ploughing and a small hole has been dug into the top.</p>		
<p>Maintenance issues</p> <p>The monument is located in a relatively low-traffic area and is not under immediate threat. However, any increase in pedestrian/animal traffic or surface/sub-surface works could place the site at risk of damage.</p>		

20

Name: Duma na mBan-Amhus, Mound of the Women Mercenaries
Type: Mound (possible bowl-barrow)

SMR No. ME031-033022-
Grid Ref. 691957, 759931

**Illustrations**

Figs 36, 49, 51

References

Petrie 1839; Newman 1997, 103, 323;
 Swan 1978, site c

Dimensions

Diameter approx. 8m

Fig. 49 (Left) Detail of Petrie's 1839 map of Tara, showing the mound described as Duma na mBan-Amhus (arrowed), to the east of Tech Midchúarta.

Description


A few metres ESE of the southern end of Tech Midchúarta (no. 21) is a very low circular mound which Petrie equates with the site described by medieval chroniclers as Duma na mBan-Amhus, the 'Mound of the Women Mercenaries' (Figs 49 and 51). Potential traces of a ditch surrounding the mound, and a pit at its centre, were recorded by geophysical survey (Newman 1997). Ó Ríordáin (1965) noted that the S end of the adjacent bank of Tech Midchúarta may incorporate another, potentially larger, mound.

Physical condition

Denuded and disturbed by cultivation; the mound is difficult to discern at ground level.

Maintenance issues

The monument is located in a low-traffic area and is not under immediate threat. However, any increase in pedestrian/animal traffic or surface/sub-surface works could place the site at risk of damage.

<p style="font-size: 2em; font-weight: bold; color: green;">21</p>	<p>Name: Tech Midchúarta, 'Banqueting Hall' Type: Linear earthwork/ceremonial avenue</p>	<p>SMR No. ME031-033023- Grid Ref. 691913, 760133 to 691929, 759912</p>
		<p>Illustrations Figs 36, 49-57</p>
		<p>References Newman 1997, 103-11, 150-3, 225-7, 323; Newman 2007</p>
		<p>Dimensions Max. length 203m; distance between crests of banks 25.3-28.5m; average height of W bank 0.8m above exterior/2m above interior ground surface</p>
<p>Description</p> <p>Fancifully described as the remains of a great banqueting hall by medieval writers, the Tech Midchúarta ('House of the Middle Circuit') is a sunken avenue defined by two parallel earthen banks which extend roughly N/S for just over 200m (Figs 50 and 51). The earthworks align directly on the Mound of the Hostages (no. 4) but terminate some 175m N of the passage tomb (Fig. 36). The better-preserved, W bank is slightly curved while the E bank, which has been extensively disturbed by cultivation and quarrying, is almost straight. Inside the banks, which appear to have been constructed from material scarped outwards from the central area, the ground surface rises steadily towards the S, where the avenue terminates at a very low-profile bank. Multiple gaps occur in both the W and E banks (up to eleven in total), many of which are suggested to be original features that acted as windows onto surrounding burial monuments and landmarks and were integral to its role as a ceremonial way associated with royal procession and kingship rituals (Newman 2007). Whether this was its original purpose or relates to a potential re-use of the monument is uncertain, as the site has not been dated. The morphology of the earthworks has led to comparisons with so-called 'cursus' monuments of the Late Neolithic/Early Bronze Age (c. 3500-2000 BC), though Newman asserts that the Tech Midchúarta may have been built or modified as late as the mid-first millennium AD. The monument encompasses three possible mounds: two just inside the E bank (nos 22-23; Figs 54 and 55) and one potentially incorporated into the end of the latter bank on the S (see no. 20; Fig. 51).</p>		<p>Fig. 50 (Left) Aerial view of the Banqueting Hall, from the southeast. The remains of two low-profile barrows are visible to the west of the monument.</p>
<p>Physical condition</p> <p>Although the upstanding earthworks remain impressive, the monument has suffered considerable disturbance in recent centuries. There are substantial old quarry pits (Q, Fig. 51) at the N end of the monument, which have caused damage to the E bank and extensive loss of deposits from the central area. The E bank has also been flattened and spread by ploughing and a field ditch (FD) cut into its base on the W side extends along the full length of the monument and a short distance beyond it on the S. The main source of modern deterioration is pedestrian traffic, which has caused localised erosion of the crests and slopes of the banks, particularly around some of the existing gaps. This is most evident along the path leading W from the main site entrance, which crosses the monument a short distance S of its midpoint (Fig. 52). Patches of bare ground, vehicle ruts, trampling and other signs of disturbance also occur along the route of another path that extends around the N end of the monument (Fig. 53).</p>		

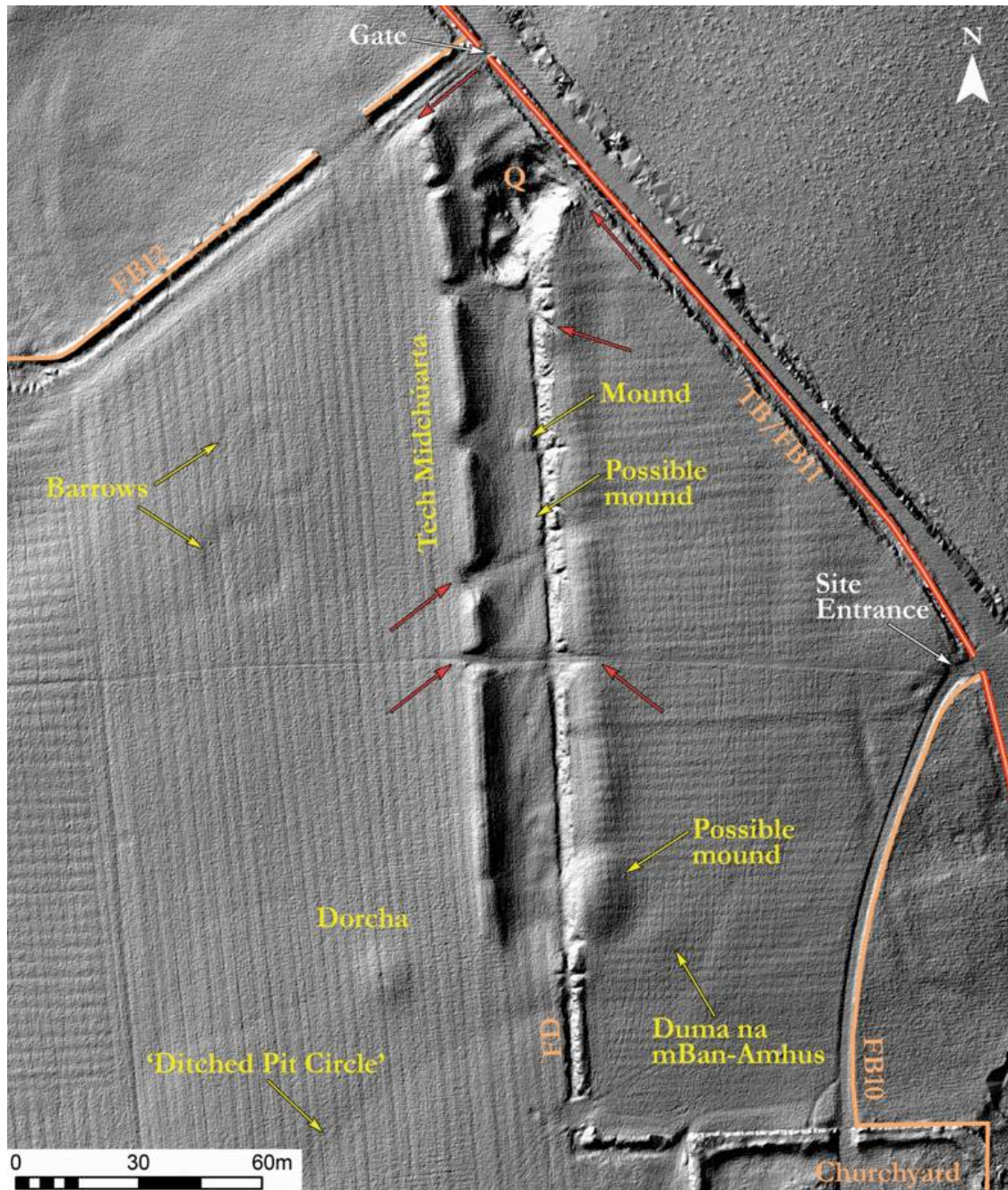


Fig. 51 Lidar hillshade model of Tech Midchúarta and surrounding monuments. The main pedestrian paths across the earthworks are indicated by red arrows. One of the paths follows the townland boundary wall between Castletown Tara and Cabragh (TB/FB11), which flanks the local access road. The section of the wall extending south to the main site entrance, together with FB10, form part of the eastern boundary of the State lands. Traces of the former village of Tara are bisected by the path between the site entrance and the churchyard.

Maintenance issues

The substantial size and orientation of the monument, which runs perpendicular to the main approach from the site entrance, is placing certain sections of the earthworks under increased pressure from pedestrian traffic. The slopes, which are steep in places, and the access points through gaps in the banks, are most at risk of further erosion. Regular grazing and the cutting of small patches of gorse growing on the E bank and around the quarry may help to reinforce the ground surface and make it more resistant to wear. Two field boundaries and an access gate lie in close proximity to the N end of the monument, creating a pinch-point which is subject to sustained footfall from recreational users, as well as occasional farm vehicle traffic. These pressures are accelerating erosion of the ground surface and detract from the monument's


setting. Among the range of monuments visible through the gaps in the W bank of Tech Midchúarta is Ráith Grainne (no. 26), which lies on the opposite side of the northern field boundary (FB12). These views contribute to an understanding of the setting and role of the monument and could be adversely affected by modifications to the field boundary, such as the planting of trees. A localised area of disturbance visible at the bottom of the quarry in May 2018 may be the result of illicit digging or animal burrowing. The depth and steepness of the quarry pit also present a potential safety risk.




Fig. 52 Erosion from pedestrian traffic across the eastern bank of Tech Midchúarta, looking north (June 2018).




Fig. 53 Surface erosion, tyre tracks and discarded dog litter bag at the northern end of Tech Midchúarta (April 2018).

22	Name: Unnamed Type: Mound (possible barrow)	SMR No. ME031-033064- Grid Ref. 691926, 760050
		Illustrations Figs 36, 51, 54
		References Newman 1997, 106, 333
		Dimensions Diameter approx. 5m; height 0.7m
		<p>Fig. 54 (Left) Small mound (left of ranging rod) near the eastern bank of Tech Midchúarta, viewed from the southwest (June 2018).</p>
<p>Description</p> <p>A well-defined, rounded mound in the interior of Tech Midchúarta (no. 21), near the E bank (Figs 51 and 54). The mound is clearly visible on lidar imagery but is indistinguishable in the geophysical survey results. It appears to be a small barrow, though the possibility that it is a result of field clearance cannot be ruled out. A second possible mound (no. 23) is located some 20m to the S.</p>		
<p>Physical condition</p> <p>The mound appears undisturbed.</p>		
<p>Maintenance issues</p> <p>The site is not currently under threat. However, there is a potential risk of damage from pedestrian/animal traffic, as well as any surface/sub-surface works.</p>		

23	Name: Unnamed Type: Mound (possible barrow)	SMR No. ME031-033063- Grid Ref. 691929, 760033
		Illustrations Figs 36, 51, 55 References Newman 1997, 106, 333 Dimensions Diameter approx. 7.2m; height 0.4m Fig. 55 (Left) Low-profile mound (right of ranging rod) near the eastern bank of Tech Midchúarta, looking north (January 2019).
Description A low, subcircular mound in the interior of Tech Midchúarta (no. 21), adjacent to the E bank (Figs 51 and 55). The site is difficult to distinguish topographically and produced no discernible geophysical signature. It is uncertain whether this feature is archaeological or modern (e.g. a result of field clearance).		
Physical condition Possibly disturbed. The E edge may have been truncated by a modern field ditch flanking the bank of Tech Midchúarta.		
Maintenance issues The site is not currently under threat. However, there is a potential risk of damage from pedestrian/animal traffic, as well as any surface/sub-surface works.		


<p>24</p>	<p>Name: Unnamed Type: Ring-barrow</p>	<p>SMR No. ME031-033024- Grid Ref. 691858, 760020</p>
		<p>Illustrations Figs 36, 50–51, 56</p> <p>References Swan 1978, site 1; Newman 1997, 109, 111–12, 323</p> <p>Dimensions Overall diameter approx. 30m; diameter of central mound 16m</p> <p>Fig. 56 (Left) High-resolution 2008 orthophoto of barrow no. 24 (arrowed), to the west of Tech Midchúarta.</p>
<p>Description</p> <p>The more clearly defined of two low-profile barrows recorded to the W of Tech Midchúarta by aerial photography (Swan 1978; Figs 50 and 56) and subsequent topographical and geophysical surveys. It consists of a slightly domed circular area with a slight depression at its centre, encircled by a shallow ditch and traces of an outer bank (Fig. 51). The monument is visible at ground level in favourable conditions. Several additional barrows (ring-ditches) and features have been identified in this area by geophysical survey, some of which appear to intersect with the ring-barrow.</p>		
<p>Physical condition</p> <p>Denuded by ploughing; only slight surface traces visible and below-surface archaeological deposits have likely been disturbed.</p>		
<p>Maintenance issues</p> <p>The site is located in a low-traffic area and is not currently under threat. However, the monument is vulnerable owing to its reduced visibility and the shallow depth of the buried archaeological deposits. Surface/sub-surface works or increases in vehicular, animal or pedestrian traffic would place the site at risk of damage.</p>		

25	Name: Unnamed Type: Possible bivallate ring-barrow	SMR No. ME031-033025- Grid Ref. 691864, 760047
		<p>Illustrations Figs 36, 50-51, 57</p> <p>References Swan 1978, site 2; Newman 1997, 109, 111-12, 323-4</p> <p>Dimensions Diameter of inner ditch approx. 10.4m/ outer ditch 24m</p> <p>Fig. 57 (Left) High-resolution 2008 orthophoto of barrow no. 25 (arrowed), to the west of Tech Midchúarta.</p>
<p>Description</p> <p>One of two low-profile barrows recorded to the W of Tech Midchúarta by aerial photography (Swan 1978; Figs 50 and 57) and subsequent topographical and geophysical survey. The site appears as a slightly sunken circular area surrounded by two concentric ditches, the outer one of which is roughly oval in plan and flattens out somewhat on the S where it abuts barrow no. 24 (Fig. 51). There are indications of a bank between the ditches, suggesting it may be a bivallate ring-barrow. The site is only visible at ground level in optimum conditions and its geophysical signature is poorly defined.</p>		
<p>Physical condition</p> <p>Cultivation has erased almost all surface trace of the monument and has likely caused disturbance to below-surface archaeological deposits.</p>		
<p>Maintenance issues</p> <p>The site is located in a low-traffic area and is not currently under threat. However, the monument is vulnerable owing to its reduced visibility and the shallow depth of the buried archaeological deposits. Surface/sub-surface works or increases in vehicular, animal or pedestrian traffic would place the site at risk of damage.</p>		

Ráith Gráinne Division (Castletown Tara Td)



Fig. 58 Hillshaded digital terrain model of the Ráith Gráinne division generated from 2007 lidar data, with extant (yellow) and low-profile (orange) archaeological monuments indicated.

26	Name: Ráith Gráinne, Gráinne's Rath Type: Ring-barrow	SMR No. ME031-033041- Grid Ref. 691760, 760092
		Illustrations Figs 58–62, 67 References Newman 1997, 125–39, 164–5, 169, 329 Dimensions Max. overall diameter 70m; central mound 42m in max. diameter and approx. 2m high above bottom of ditch; max. height of bank approx. 1.5m Fig. 59 (Left) High-resolution 2008 orthophoto of Ráith Gráinne.
Description <p>Ráith Gráinne is one of a group of exceptionally large ring-barrows located at the NW edge of the summit plateau, which also includes the Clóenfherta (nos 32 and 35), just to the W (Figs 58 and 67). These monuments form part of a much larger concentration of barrows spread across the N side of the hill, some of which lie outside the boundary of the State-owned lands (see Newman 1997; Schot <i>et al.</i> 2016). Ráith Gráinne itself consists of a circular, almost flat-topped mound, encircled by a broad, U-shaped ditch and an outer bank (Fig. 59). The monument is positioned on a natural break in slope so that, despite its substantial appearance, the central mound is only marginally higher than the surrounding ground surface (Newman 1997, 125). Occupying the top of the mound, just off-centre, is another, smaller ring-barrow (no. 27). Several pit-type features have been recorded in the area of the summit barrow and elsewhere on the mound by geophysical survey. A host of other low-profile and sub-surface features have also come to light in the surrounding field (see Fig. 60), including a possible sunken road or driveway (DW) and a large number of barrows, only four of which survive as surface features (nos. 28–31). One of the latter (no. 28) appears to have been incorporated into the NE quadrant of Ráith Gráinne, in a manner similar to that seen at the Forrad and Ráith na Senad. Although very few barrows at Tara have been excavated, most of them were probably built during the Bronze Age and Iron Age, with Ráith Gráinne possibly falling into the latter group (Newman 1997, 168).</p>		
Physical condition <p>Ráith Gráinne is arguably the best-preserved earthen monument at Tara, having been less severely impacted by historic interventions than other high-profile earthworks (Fig. 60). Nonetheless, cultivation as well as disturbance from an adjacent field boundary (FB12) that encroaches on the monument have caused attrition of the bank and the mound on the S and SW. There is also a small hollow in the upper N edge of the mound and signs of wear on the external slopes of the bank. Apart from a small depression on the NE, however, the bank is uninterrupted. The monument and its immediate environs are traversed by a network of narrow incised tracks resulting from pedestrian and animal traffic. The two most established pedestrian routes extend E/W across the centre of the monument and in a circuit around the top of the bank.</p>		
Maintenance issues <p>Although the site attracts fewer visitors than other high-profile monuments, there is a risk of accelerated erosion (soil loss) along established paths which could impact vulnerable archaeological deposits, particularly in the area of the summit barrow. The steep-sided slopes are also vulnerable to attrition and potential slippage from pedestrian and animal traffic and can be dangerous in wet conditions. Access by sheep is mainly through a series of gaps in the dilapidated field boundary (FB12) to the S, which in this area comprises an earth-and-stone bank and hedgerow, fronted by a ditch on the N. Repair of the field bank would help divert animal traffic away from the monument. In addition, the root systems of trees in the adjacent hedgerow may be encroaching on the already denuded bank of Ráith Gráinne and sensitive management of this field boundary is necessary to avoid or minimise potential impacts on the monument.</p>		

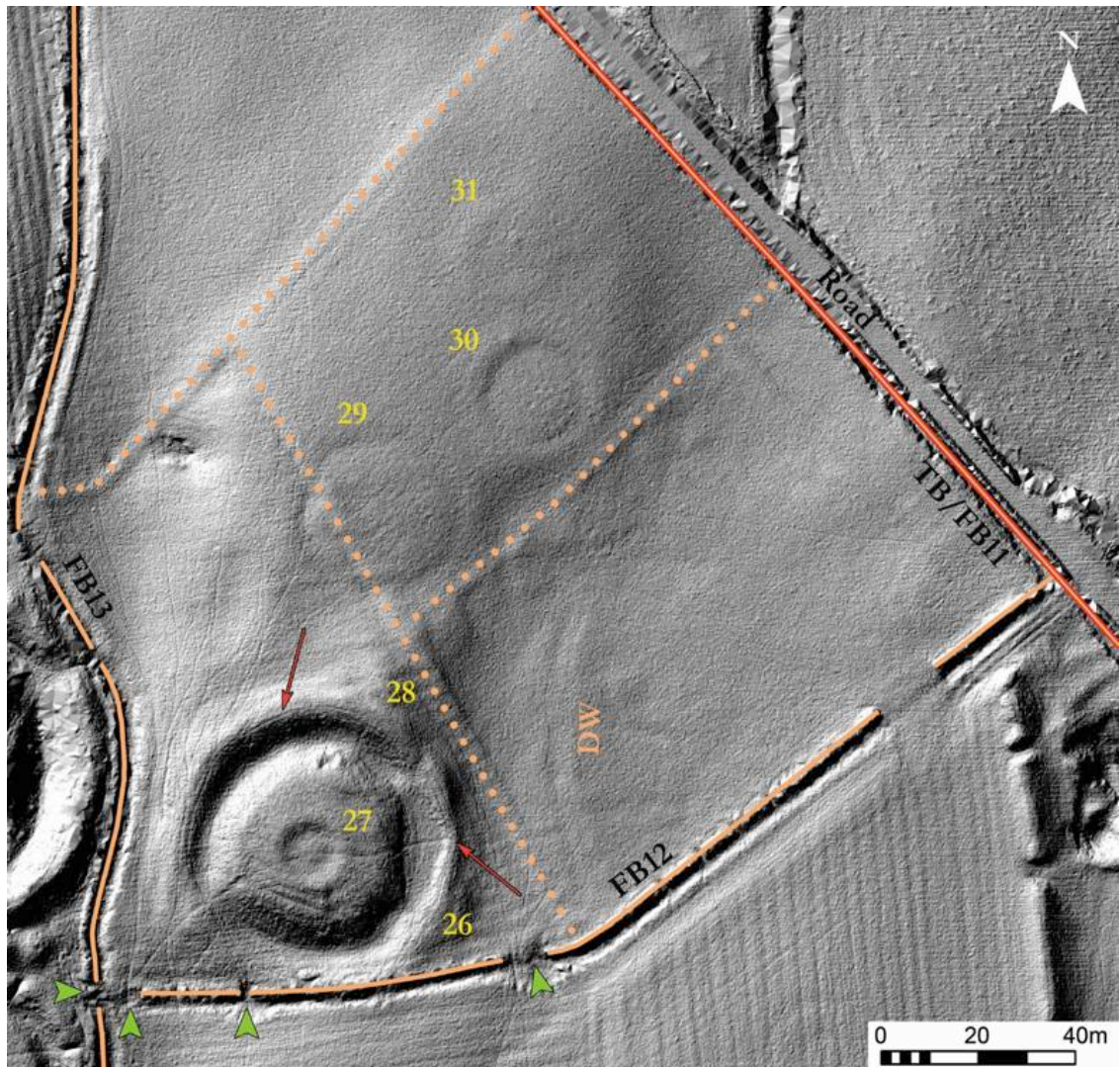


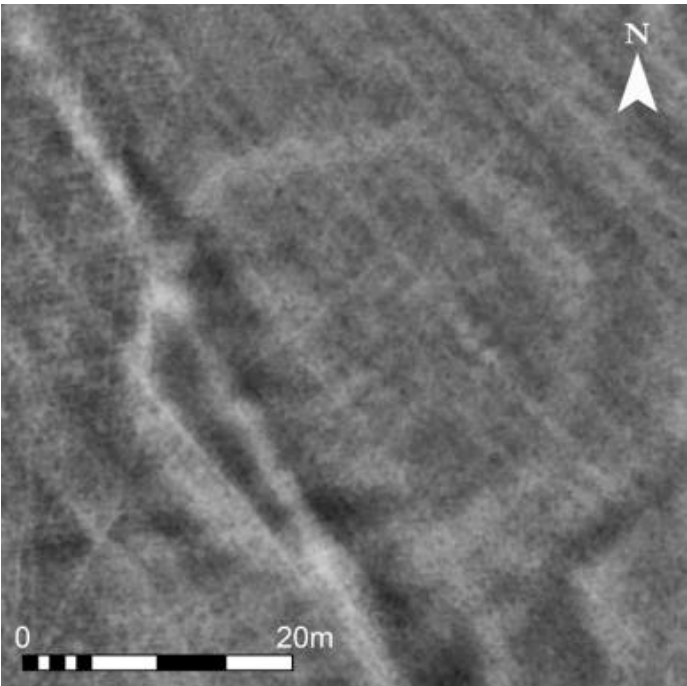
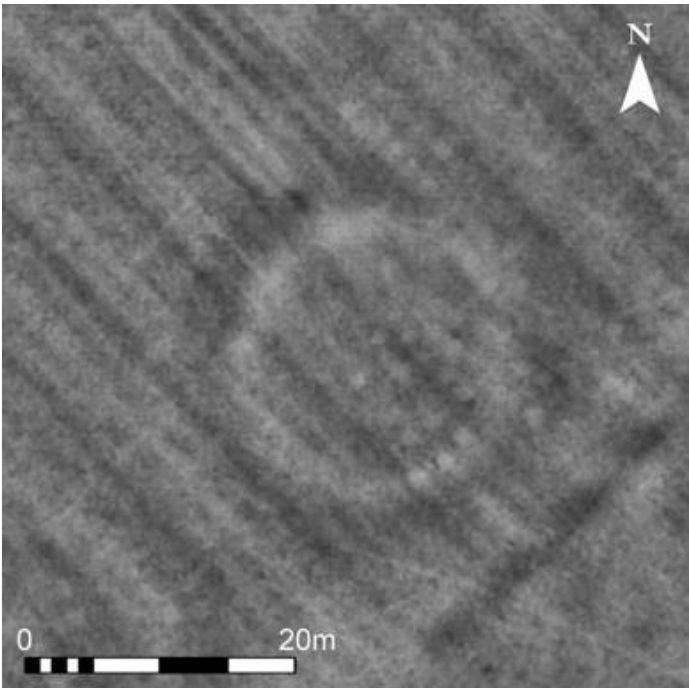


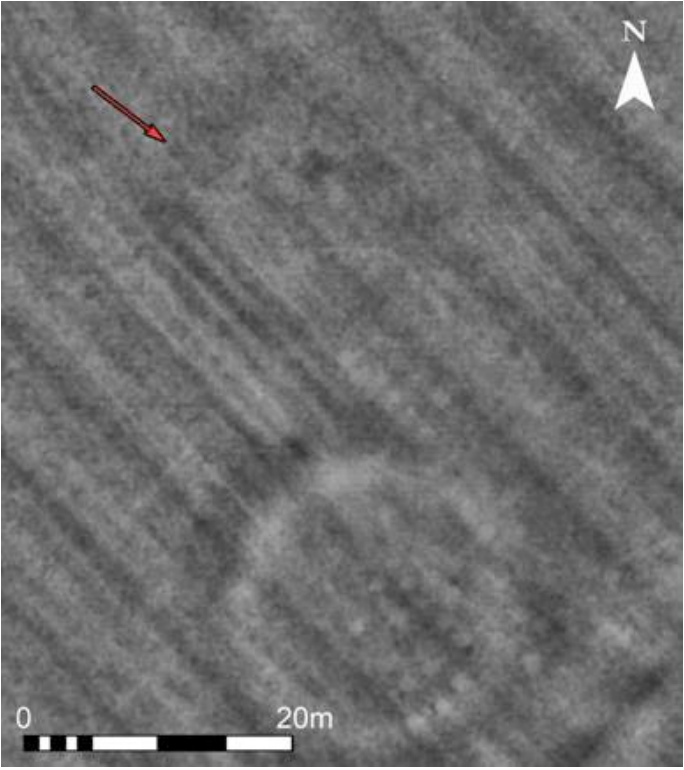
Fig. 60 Lidar hillshade model of Ráith Gráinne and surrounding monuments. Arrows mark the main pedestrian paths (red) and access gaps used by sheep (green), while relict field boundaries are indicated by dotted lines.

27	Name: Unnamed (Ráith Gráinne) Type: Ring-barrow	SMR No. ME031-033088- Grid Ref. 691759, 760089
		Illustrations Figs 58–61 References Newman 1997, 125–31, 329 Dimensions Overall diameter approx. 16m Fig. 61 (Left) Ring-barrow on summit of Ráith Gráinne, looking southwest, with low central mound and depression of infilled ditch visible at centre of image (January 2019).
Description This small barrow is roughly centrally positioned on the summit of Ráith Gráinne (Figs 59–61). It appears as a slightly domed circular area surrounded by a shallow ditch with slight traces of an external bank. The presence of a bank has been confirmed by recent topographical (lidar) and geophysical surveys, which also recorded several pit-type features across the interior of the site. There is also evidence to suggest that the low central mound is composed of redeposited, possibly stony, material. Based on these findings, the monument is provisionally classified as a ring-barrow.		
Physical condition The circuit of the monument is complete and is clearly visible, but the surface remains have been reduced by cultivation and weathering (Fig. 60). Surface erosion is occurring along a pedestrian path that bisects the monument from E to W.		
Maintenance issues The site is highly vulnerable to impacts from pedestrian and animal traffic, as even minimal soil loss could result in exposure and damage to near-surface archaeological deposits.		

28	Name: Unnamed Type: Barrow and possible enclosure	SMR No. ME031-033042- Grid Ref. 691772, 760125
		Illustrations Figs 58, 60, 62
		References Newman 1997, 130, 169, 329-30
		Dimensions Diameter of penannular (barrow) ditch 15m; projected overall diameter of enclosure approx. 60m Fig. 62 (Left) Mound incorporated into the bank of Ráith Gráinne, viewed from the north (January 2019).
Description This monument was identified by geophysical prospection in the 1990s (Newman 1997) and has since been mapped in greater detail. The only visible feature is a low rounded hummock or mound which protrudes from the outer face of the bank of Ráith Gráinne (no. 26) on the NE (Figs 60 and 62). Geophysical survey has revealed a circular ditch, with a possible opening on the W, surrounding the mound and a cluster of pit-type features near its centre. Forming a broad arc around the barrow from the NW around to the SE are sub-surface traces of what may be the eastern half of an enclosure with a projected diameter of about 60m (see Newman 1997). It appears to intersect with a barrow (no. 29) on the N and to continue beneath Ráith Gráinne on the S.		
Physical condition Cultivation and field boundary interference have contributed to the poor state of preservation of the monument. The putative outer enclosure is ill-defined.		
Maintenance issues Surface/sub-surface works or increases in vehicular, animal or pedestrian traffic could place vulnerable archaeological deposits at risk of damage.		

29	Name: Unnamed Type: Barrow (possible ring-barrow)	SMR No. ME031-033044- Grid Ref. 691774, 760159
		<p>Illustrations Figs 58, 60, 63</p> <p>References Swan 1978, site 3; Newman 1997, 130-3, 162, 329-30</p> <p>Dimensions Max. overall diameter 42m; central area approx. 30m in diameter</p> <p>Fig. 63 (Left) Lidar-derived local relief model of barrow no. 29, to the north of Ráith Gráinne. The barrow ditch appears as a negative (white) ring, surrounded by a darker halo which probably represents an external bank.</p>
<p>Description</p> <p>This is one of several low-profile barrows identified in the Ráith Gráinne field by aerial photography (Swan 1978). It appears as a slightly domed, subcircular area enclosed by a ditch and is visible at ground level in favourable conditions. Traces of a possible bank surrounding the ditch have been recorded by lidar (Figs 60 and 63) and geophysical survey. The latter survey also revealed a small circular feature, possibly a barrow, overlapping with the NW side of the monument (where there is a prominent bulge in the line of the ditch) and a potential pit near its centre.</p>		
<p>Physical condition</p> <p>The above-surface remains have been disturbed by cultivation and archaeological deposits lying just below the ground surface are also likely to have been impacted. The monument is truncated by a relict field boundary on the W and traversed by sheep tracks.</p>		
<p>Maintenance issues</p> <p>The monument is extremely vulnerable owing to its reduced visibility and the shallow depth of the buried archaeological deposits. Any surface/sub-surface works or increases in vehicular, animal or pedestrian traffic could place the site at increased risk of damage.</p>		

<p>30</p>	<p>Name: Unnamed Type: Barrow (possible ring-barrow)</p>	<p>SMR No. ME031-033047- Grid Ref. 691805, 760184</p>
		<p>Illustrations Figs 58, 60, 64–65</p> <p>References Swan 1978, site 4; Newman 1997, 134, 162, 330</p> <p>Dimensions Overall diameter approx. 29m</p> <p>Fig. 64 (Left) Lidar-derived local relief model of barrow no. 30, to the northeast of Ráith Gráinne. The concentric, negative (white) and positive (dark) rings correspond with the ditch and external bank of the barrow respectively, and are partly obscured by the overlying cultivation pattern.</p>
<p>Description First identified by aerial photography (Swan 1978), this low-profile barrow is clearly defined on lidar imagery (Figs 60 and 64) but less so in the geophysical results. It consists of a slightly raised circular area surrounded by a ditch and low outer bank, suggesting it to be either a ring-barrow or an embanked ring-ditch (the latter being characterised by the absence of redeposited material in the central area, i.e. a mound). Several arcuate features and possible pits have been recorded near the centre of the monument. The site lies directly S of another low-profile barrow (no. 31).</p>		
<p>Physical condition This is the best preserved of the three low-profile barrows located to the NE of Ráith Gráinne, all of which have been impacted by former cultivation.</p>		
<p>Maintenance issues The monument is extremely vulnerable owing to its reduced visibility and the shallow depth of the buried archaeological deposits. Any surface/sub-surface works or increases in vehicular, animal or pedestrian traffic could place the site at increased risk of damage.</p>		

<p>31</p>	<p>Name: Unnamed Type: Barrow (possible ring-barrow)</p>	<p>SMR No. ME031-033048- Grid Ref. 691798, 760213</p>
		<p>Illustrations Figs 58, 60, 65</p> <p>References Swan 1978, site 6; Newman 1997, 136-7, 166, 330</p> <p>Dimensions Overall diameter approx. 35m</p> <p>Fig. 65 (Left) Lidar-derived local relief model showing barrow no. 31 (arrowed) and a more clearly defined barrow (no. 30) to its south. The remnant bank of the monument can be traced as a broad, semi-circular arc beneath the fossil cultivation pattern.</p>
<p>Description</p> <p>A circular feature was first identified at this location by aerial photography (Swan 1978). More recent lidar and geophysical surveys have shown that it consists of a very low rise or mound encircled by a ditch and slight traces of an outer bank. The remnant bank is most clearly discernible on the W side of the monument on lidar imagery (Figs 60 and 65). A cluster of geomagnetic anomalies, including several possible pits, was recorded in the central area. The site lies directly N of another low-profile barrow (no. 30).</p>		
<p>Physical condition</p> <p>The surface remains are extremely low-profile owing (at least in part) to agricultural disturbance. Cultivation has likely also impacted on below-surface archaeological deposits.</p>		
<p>Maintenance issues</p> <p>The monument is extremely vulnerable owing to its reduced visibility and the shallow depth of the buried archaeological deposits. Any surface/sub-surface works or increases in vehicular, animal or pedestrian traffic could place the site at increased risk of damage.</p>		

Clóenfhertha Division (Castletown Tara Td)



Fig. 66 Hillshaded digital terrain model of the Clóenfhertha division generated from 2007 lidar data, with extant (yellow) and low-profile (orange) archaeological monuments indicated.

32	Name: Clóenfherta (Northern), Sloping Trenches Type: Ring-barrow	SMR No. ME031-033026- Grid Ref. 691679, 760112
		Illustrations Figs 66-72, 74
		References Newman 1997, 115-18, 164-5, 169, 324
		Dimensions Max. diameter 80m (N/S); height of bank above bottom of ditch (on E) 3.3m
<p>Fig. 67 (Left) Digital surface model of the Clóenfherta and Ráith Gráinne (vertical exaggeration x 2), viewed from the northwest (after Newman 1997, fig. 47).</p>		
<p>Description</p> <p>Perched above the steep, NW flank of the hill, the so-called Clóenfherta or 'Sloping Trenches' are among the largest and most dramatically positioned barrows at Tara (Fig. 67). The adjacent slope is covered in woodland, with trees and gorse also encroaching on the earthworks. Both the northern Clóenfherta and its southern counterpart (no. 35) straddle the break in slope, prompting medieval writers to attribute their tilted appearance to calamitous events; the western side of the northern Clóenfherta is said to have collapsed when a false legal judgement proclaimed by Lugaid mac Con showed him to be an unworthy king (see Bhreathnach 1995). The northern Clóenfherta is the larger of the two ring-barrows and consists of a central mound encircled by a U-shaped ditch and external bank (Fig. 68). An earlier barrow (no. 33) is incorporated into the circuit of the bank on the N (Fig. 72). There are two gaps in the bank, on the NNE (directly E of no. 33) and NE. Large parts of the monument are overgrown with vegetation (Fig. 69), which is particularly dense in the area of a substantial hole dug into the centre of the mound - possibly by treasure-hunters or for stone extraction - sometime prior to the late 1830s. Topographical survey in the 1990s, following clearance of scrub from the western part of the Clóenfherta, allowed for the first detailed assessment of the earthworks and also revealed a significant number of previously unrecorded mounds in the surrounding area (Newman 1997). Three mounds (no. 34a-c) are located between the two Clóenfherta, and others are strung out along the shoulder of the ridge to the N and S (nos 38-41).</p>		
<p>Physical condition</p> <p>On the basis of previous topographical surveys (including lidar), the monument appears largely intact, with the exception of pre-1830s damage to the mound. Although dense vegetation and high grass prevent a thorough assessment of its current condition, it is evident that gorse/tree roots, burrowing animals (rabbits) and recreational use are all having a detrimental impact (Figs 69 and 70). Pedestrian traffic is causing significant compaction and erosion of the ground surface, particularly on the crests and slopes of the bank and mound, which are worn bare in places. Erosion of the surface vegetation (grass) and underlying soils along these routes is placing vulnerable archaeological deposits at risk.</p>		
<p>Maintenance issues</p> <p>Dense vegetation cover, coupled with the large size and complexity of the earthworks, makes it difficult to get an overall sense of the monument on the ground. Disturbance from scrub, as well as burrowing animals, is likely to be widespread and poses a threat not only to buried archaeological deposits, but also to the structural integrity of the earthworks. Recreational use (this part of the hill is mainly frequented by locals/walkers, often with dogs) and animal traffic are placing additional pressure on the monument. There are also issues relating to camping, fire-lighting and litter on the wooded slope directly W of the monument (Fig. 71).</p>		

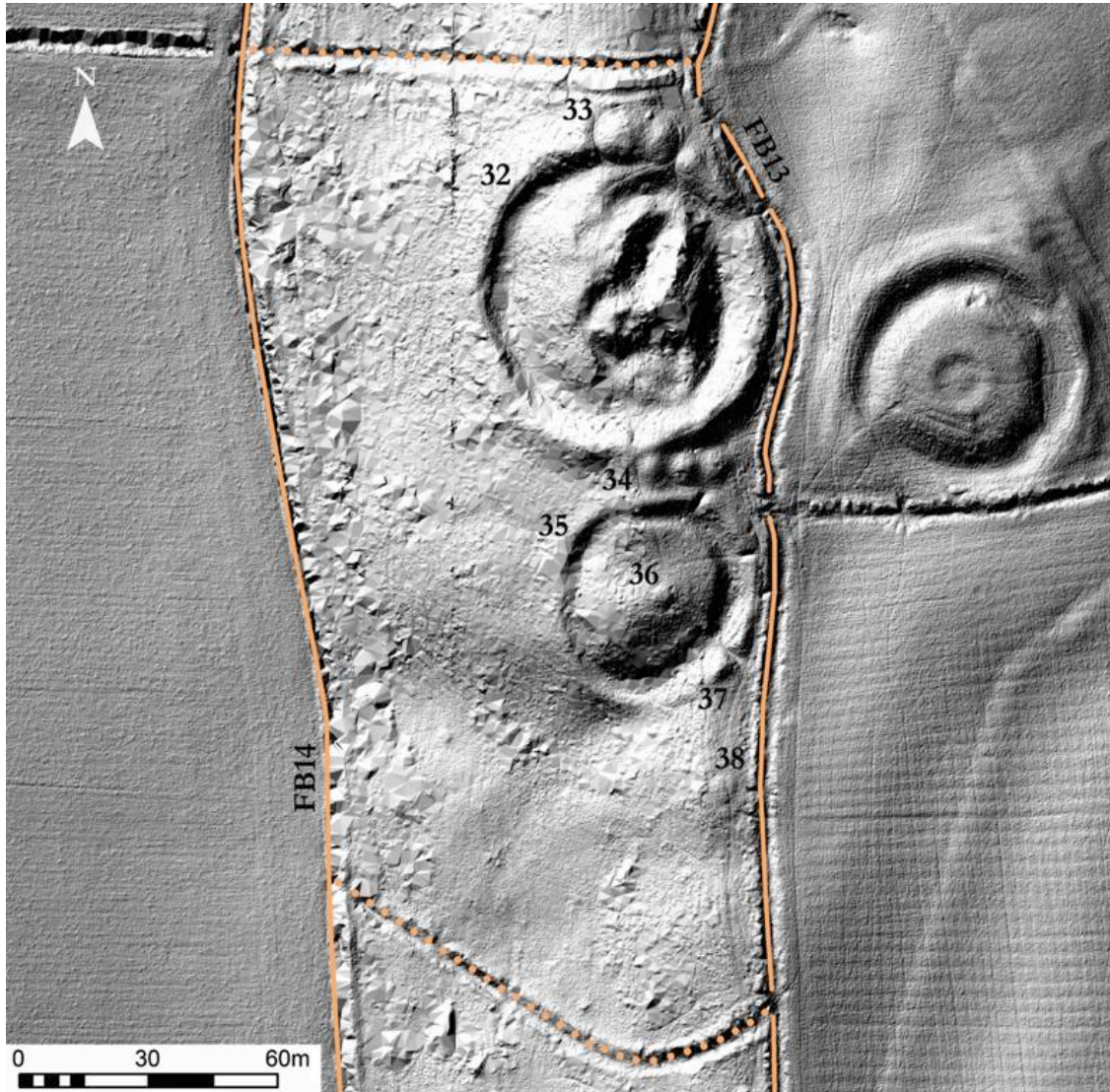


Fig. 68 Lidar hillshade model of the Clóenfhera and surrounding monuments. Relict field boundaries are indicated by dotted lines. FB14 forms part of the western boundary of the State property.




Fig. 69 Overgrown vegetation and eroded path on bank (foreground) and mound of the northern Clóenfherta, viewed from the south (June 2018).




Fig. 70 Rabbit burrows (centre) in the bank of the northern Clóenfherta, on southeast (May 2018).



Fig. 71 Debris from encampment on slope west of the northern Clóenfhera (April 2018).

<p>33</p>	<p>Name: Unnamed (part of N. Clóenfherta) Type: Possible bowl-barrow w/outer bank</p>	<p>SMR No. ME031-033027- Grid Ref. 691679, 760147</p>
		<p>Illustrations Figs 66, 68, 72</p> <p>References Newman 1997, 116, 165, 324</p> <p>Dimensions Max. diameter approx. 20m; height of mound approx. 1.8m</p> <p>Fig. 72 (Left) Aerial view of barrow (eastern side of bank arrowed) incorporated into the bank of the northern Clóenfherta (after Newman 1997, pl. 21).</p>
<p>Description This small barrow is incorporated into the circuit of the bank of the northern Clóenfherta (no. 32), on the N (Figs 68 and 72). It consists of a circular mound with a domed profile surrounded by a ditch and external bank. A gap in the bank directly E of the barrow may be the result of erosion.</p>		
<p>Physical condition The mound appears intact, but the enclosing bank is denuded on the N and S. Spoil from pre-1830s digging in the central mound of the northern Clóenfherta appears to have been thrown on top of the bank on the S side. The site is traversed by a number of narrow, incised paths.</p>		
<p>Maintenance issues The earthworks are vulnerable to erosion from pedestrian and animal traffic, as well as encroaching vegetation. There is also a risk of damage from burrowing animals (rabbits), whose presence is recorded at the northern Clóenfherta.</p>		

<p>34</p>	<p>Name: Unnamed Type: Barrow group (possible bowl-barrows)</p>	<p>SMR No. ME031-033028- to ME031-033030- Grid Ref. (a) 691687, 760069; (b) 691694, 760070; (c) 691701, 760069</p>
		<p>Illustrations Figs 66, 68, 73, 75</p> <p>References Newman 1997, 118, 324-5</p> <p>Dimensions (a): approx. 7m in diameter and 0.7m high (b): approx. 6.5m in diameter and 0.4m high (c): approx. 6.3m in diameter and 0.2m high</p> <p>Fig. 73 (Left) The western mound (34a), looking north towards the northern Clóenfherta (June 2018).</p>
<p>Description Three rounded, circular mounds are set close together in an east/west alignment between the northern and southern Clóenfherta (nos 32 and 35; Figs 68 and 75). The mounds (34a-c) are of similar size but decrease in height from W to E. Geophysical investigations undertaken during the initial Tara survey suggest they may have surrounding ditches (Newman 1997).</p>		
<p>Physical condition The mounds are generally well preserved, although two (b and c) are partly hidden under high grass. Some surface attrition is evident on the westernmost mound (a), which is flanked by the main pedestrian path extending across the Clóenfherta (Fig. 73).</p>		
<p>Maintenance issues The earthworks are vulnerable to erosion from pedestrian and animal traffic. There is also a risk of damage from burrowing animals (rabbits), whose presence is recorded at the northern Clóenfherta.</p>		

35

Name: Clóenfherta (Southern), Sloping Trenches
Type: Ring-barrow

SMR No. ME031-033031-
Grid Ref. 691688, 760039



Illustrations

Figs 66–68, 74–75

References

Newman 1997, 115, 118–21, 164, 325

Dimensions

Approx. 57m in diameter (N/S)

Fig. 74 (Left) Aerial view of the Clóenfherta, from the southeast (after Newman 1997, pl. 22). Just to the right of the gorse covering the western half of the southern Clóenfherta is a small mound, and another is visible in the circuit of the bank on the southeast.

Description

Although smaller and somewhat more oval in plan, the southern Clóenfherta is similar in appearance to the northern Clóenfherta, from which it is separated by a distance of about 10m (**Fig. 68**). It, too, comprises a mound surrounded by a ditch and outer bank, and is classified as a ring-barrow (Newman 1997). A small mound (no. 36) is located near the centre of the barrow and another (no. 37) appears to have been incorporated into the bank in the SE quadrant (**Figs 74** and **75**).

Physical condition


The monument is largely intact and the visible earthworks are in fair condition. However, the western half of the monument is heavily overgrown with gorse which has likely had a significant adverse impact on buried archaeological deposits. The bank is somewhat denuded on the S and there are narrow gaps on the NE, E and SE, which appear to be the result of erosion. The earthworks are traversed by sheep tracks as well as an incised pedestrian path which forms a loop across the Clóenfherta and continues onwards to Ráith Gráinne (no. 26) via a gap in the adjacent field boundary. Erosion of the surface vegetation (grass) and underlying soils along these routes is placing vulnerable archaeological deposits at risk.




Fig. 75 High-resolution 2008 orthophoto of the southern Clóenfherta and adjacent monuments, showing vegetation cover and tracks created by pedestrians and sheep.


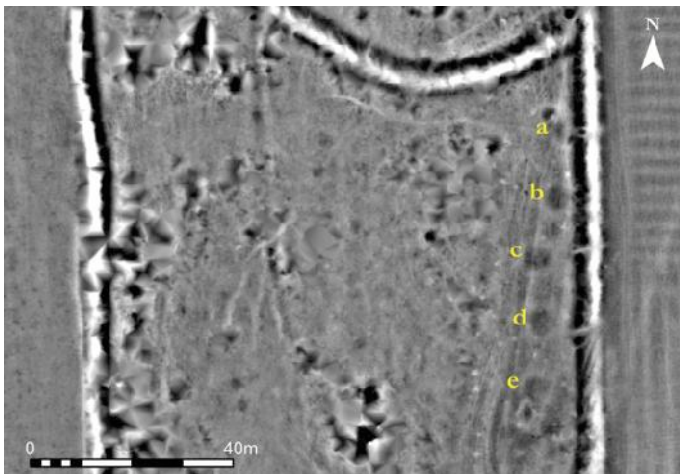
Maintenance issues


The earthworks are vulnerable to further erosion from pedestrian and animal traffic, particularly across the eastern half of the monument. Soil disturbance from gorse/rooting vegetation is also an issue. There is also a risk of damage to the earthworks from burrowing animals (rabbits), whose presence is recorded at the northern Clóenfherta.


<p>36</p>	<p>Name: Unnamed (S. Clóenfherta) Type: Mound/barrow</p>	<p>SMR No. ME031-033077- Grid Ref. 691688, 760039</p>
		<p>Illustrations Figs 66, 68, 74-76</p> <p>References Newman 1997, 118, 325</p> <p>Dimensions Approx. 3m in diameter</p> <p>Fig. 76 (Left) Mound on the summit of the southern Clóenfherta, looking west (January 2019).</p>
<p>Description This small mound stands just SE of centre on the central mound of the southern Clóenfherta (no. 35; Figs 68 and 75). It is roughly circular in plan and has a rounded profile (Fig. 76).</p>		
<p>Physical condition Intact and relatively well preserved; there is a small erosion scar on the NE side.</p>		
<p>Maintenance issues The mound is located near the main pedestrian routes across the Clóenfherta and there are also sheep tracks nearby (see Fig. 75). As such, there is an increased risk of erosion from recreational and animal traffic, as well as encroaching vegetation and rabbit burrowing.</p>		

37	<p>Name: Unnamed (S. Clóenfherta) Type: Possible mound/barrow</p>	<p>SMR No. ME031-033032- Grid Ref. 691704, 760023</p>
		<p>Illustrations Figs 66, 68, 74-75, 77</p>
		<p>References Newman 1997, 118, 325</p>
		<p>Dimensions Approx. 5.6m in diameter and 1m high</p>
<p>Description This small mound appears to have been incorporated into the bank of the southern Clóenfherta (no. 35), in the SE quadrant (Fig. 75). A gap in the bank on the E side of the mound serves as an access point for pedestrians and animals.</p>		
<p>Physical condition Overgrown. Although there is an observable rise in the bank at this point, the mound is ill-defined (Fig. 77). The site is flanked on the E and W by incised paths.</p>		
<p>Maintenance issues The site is vulnerable to erosion from pedestrian and animal traffic through the adjacent gap in the bank, and along the W side of the mound. There is also a risk of damage from rabbit burrowing.</p>		

<p>38</p>	<p>Name: Unnamed Type: Mound (possible bowl-barrow)</p>	<p>SMR No. ME031-033033- Grid Ref. 691703, 759995</p>
		<p>Illustrations Figs 66, 68, 78</p> <p>References Newman 1997, 118–20, 166, 325</p> <p>Dimensions Approx. 6.5m in diameter; height <0.2m</p> <p>Fig. 78 (Left) Local relief model generated from lidar, showing mound (no. 38) surrounded by a lighter 'halo' which is likely to represent a ditch. A shallow incised trackway runs N/S across the centre of the monument.</p>
<p>Description This is one of a number of small, low-profile mounds revealed by topographical survey along the ridge to the S of the Clóenfherta in the 1990s (Newman 1997; see Fig. 66). It has a rounded profile and appears to be surrounded by a ditch (Fig. 78), traces of which are still visible on the N. The site lies about 25m due S of a more prominent mound (no. 37) incorporated into the bank of the southern Clóenfherta.</p>		
<p>Physical condition The mound is partly obscured by high grass. Pedestrian traffic across the centre of the monument is causing wear and compaction of the ground surface.</p>		
<p>Maintenance issues In addition to erosion from recreational traffic, the monument is also at risk of disturbance from burrowing animals, sheep and encroaching vegetation.</p>		

<p>39</p>	<p>Name: Unnamed Type: Barrow group (possible bowl-barrows)</p>	<p>SMR No. ME031-033034- to ME031-033038- Grid Ref. (a) 691708, 759920; (b) 691709, 759907; (c) 691706, 759894; (d) 691706, 759881; (e) 691704, 759867</p>
 <p>Fig. 79 View looking south from mound 39b, in foreground (January 2019).</p>		<p>Illustrations Figs 66, 79–80</p> <p>References Newman 1997, 118–20, 166, 325–6</p> <p>Dimensions Alignment approx. 57m in length; mounds, from N to S: (a) 5.5m in diameter; <0.2m high (b) 6.5m in diameter; <0.2m high (c) 5.8m in diameter; <0.3m high (mound); max. overall diameter 9m (d) 6.7m in diameter; <0.3m high (e) 6m in diameter; <0.2m high</p>
<p>Description A linear concentration of five small, low-profile mounds (a–e) was revealed by topographical survey along the ridge to the S of the Clóenfhertha in the 1990s (Newman 1997). Traces of two further, possible mounds have been recorded by lidar and geophysical survey. The mounds form an irregular, N/S alignment, some 57m in overall length, and have diameters ranging from about 5.5m to 6.7m (Figs 66 and 80). Geophysical survey has confirmed that most (if not all) have surrounding ditches, supporting their provisional classification as bowl-barrows.</p>		
<p>Physical condition Many of the mounds are difficult to discern under the high grass. Their condition varies: mound 39b (Fig. 79) appears relatively well preserved while others show obvious signs of disturbance. Mound 39a is truncated by the adjacent field boundary and has a tree-hollow near its centre. Both it and the most westerly mound (39c) are traversed by a pedestrian track that extends across the ridge S of the Clóenfhertha. Some of the mounds are also crossed by sheep tracks.</p>		
		<p>Fig. 80 Local relief model generated from lidar, showing barrow group to the south of the Clóenfhertha. A small circular rise between mounds 'b' and 'c' may be the remains of a sixth mound, and there are possible traces of another between sites 'c' and 'd'. The pedestrian track running N/S across the site is also visible.</p>
<p>Maintenance issues These monuments are vulnerable to erosion from recreational and animal traffic, as well as disturbance from burrowing animals and the root systems of trees along the adjacent boundary.</p>		

40	Name: Unnamed Type: Barrow	SMR No. ME031-033040- Grid Ref. 691680, 760204
		Illustrations Figs 66, 81 References Swan 1978, site 7; Newman 1997, 123, 326 Dimensions Approx. 15m in diameter Fig. 81 (Left) Site of low-profile barrow (right of ranging rod), looking north (January 2019). Traces of former ridge-and-furrow cultivation can be seen running north/south.
Description First identified by aerial photography (Swan 1978), this is one of two (possibly three) barrows located on the ridge directly N of the Clóenfhera, which are clearly visible on lidar imagery (Fig. 66). It comprises a very low, circular mound surrounded by a ditch and has a well-defined geophysical (geomagnetic) signature. A slight rise between it and site no. 41 could be the remains of a third barrow, but if so, it is poorly defined in the geophysical results.		
Physical condition The above-surface remains are obscured by the overlying cultivation pattern and are difficult to discern at ground level (Fig. 81). Buried archaeological deposits have also likely been impacted by cultivation.		
Maintenance issues There is minimal evidence of recreational or animal traffic on this part of the hill. However, the low visibility of the monument and the shallow depth of the buried archaeological deposits place it at increased risk of accidental damage from farm vehicles and activities such as grass cutting.		

41	Name: Unnamed Type: Barrow	SMR No. ME031-033039- Grid Ref. 691684, 760175
		Illustrations Figs 66, 82
		References Newman 1997, 123, 326
		Dimensions Approx. 12m in diameter and <0.2m high
<p>Fig. 82 (Left) View of low-profile barrow, looking north (January 2019). The mound can be discerned as a slightly raised, circular area of darker grass (right of ranging rod), surrounded on the north by a shallow depression.</p>		
<p>Description This monument lies roughly midway between the northern Clóenfherta and another low-profile barrow to the N (no. 40; Fig. 66). It consists of a low, circular mound surrounded by a shallow ditch, which was also recorded by geophysical survey.</p>		
<p>Physical condition The surface remains are very low-profile and show evidence of disturbance from cultivation, which has likely also impacted on below-surface archaeological deposits (Fig. 82). Some surface wear from pedestrian traffic is evident across the southern part of the site.</p>		
<p>Maintenance issues Although it is located near one the main routes used by walkers around the Clóenfherta, the current volume of traffic over the monument appears to be low. The field boundary and hedgerow located a few metres to the S are dilapidated and overgrown, providing an ideal shelter for burrowing animals and sheep. The low visibility of the monument and the shallow depth of the buried archaeological deposits also place the site at increased risk of accidental damage from farm vehicles and activities such as grass cutting.</p>		

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



National Parks
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Appendix B

Hill of Tara Habitats and Species

Jim Moore and Dr. Maurice Eakin

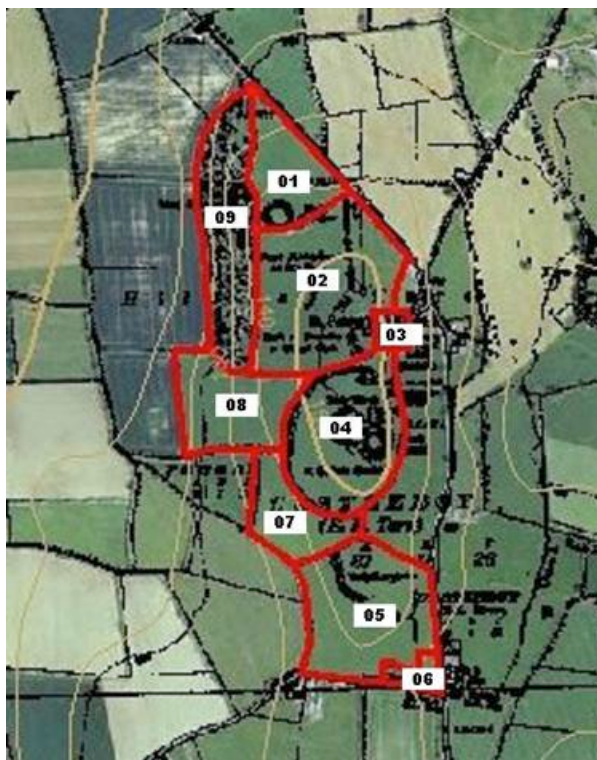
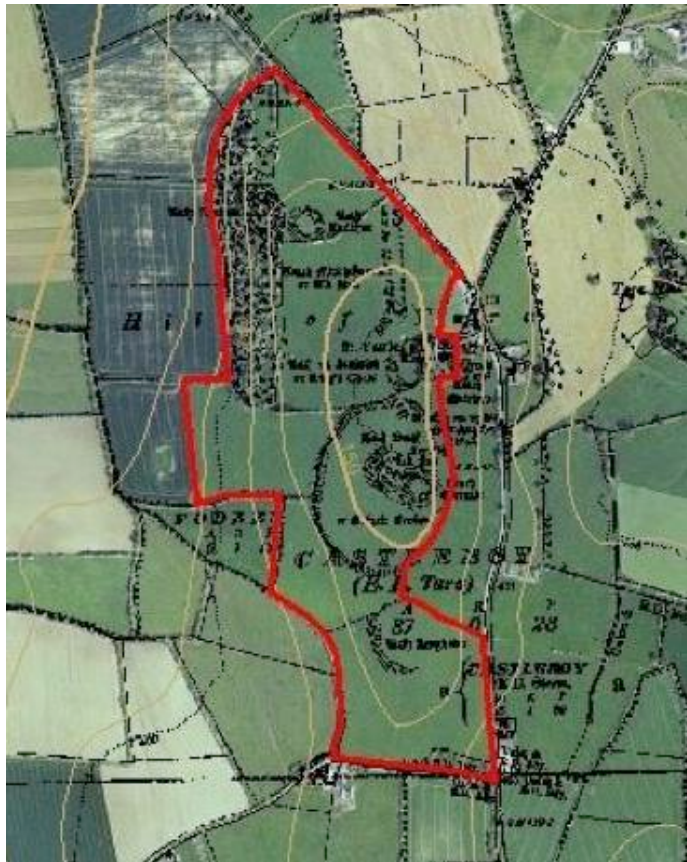
September 2010

Introduction

The Hill of Tara National Monument is located roughly 8km south-east of Navan in County Meath. Deceptively, from most nearby locations it is not a conspicuous hill yet from the hilltop there are unobstructed views in all directions.

The hill itself is a limestone outcrop overlain with deep rich soils created for the most part from about 10,000 years ago when the island of Ireland was forested to about 4,000 years ago when settlers moving inland along the river Boyne opened clearings in the woodland. Those clearings have since evolved into the “fields” of the modern-day agricultural landscape.


Soils are free draining resulting in permeation, a system of springs and neutral grasslands.



For the purpose of this survey the area is sub-sectioned as follows:

- | | |
|---|--------------------|
| 1 | - Rath Taelchon |
| 2 | - Rath Na Seanaidh |
| 3 | - Churchyard |
| 4 | - Rath Riogh |
| 5 | - Rath Laoghair |
| 6 | - Spring |
| 7 | - Rath Riogh (A) |
| 8 | - Rath Riogh (B) |
| 9 | - Woodland |

Rath Taelchon

	<p>Location: West of the public road at the north end. Extending west to the woodland and south to an old field boundary immediately south of Rath Taelchon.</p>
	<p>Main Feature: Rath Taelchon</p>
	<p>Habitat: Semi-improved grassland; hedgerow; wet grassland; dry ditch; freshwater spring</p>

Floristically, of all the open grassland swards this is probably the most diverse. It is assumed this is a result of it being the least visited by the sheep. Thus, Rye-grass is not so dominant and other less competitive grass species and other forbs (more typical of low input farming) are frequent: Sweet Vernal Grass, Crested Dog'stail, Field Wood-rush, Glaucous Sedge, Cuckoo Flower and Bulbous Buttercup. The steeply sloping sides of Rath Taelchon form the most diverse floristically rich assemblage, a consequence of the leaching of nutrients despite the sheep's best effort to enrich with their droppings – a feature of all the monuments.



Apart from the woodland, hedgerows are one of the most important wildlife habitats on the site. Because Ireland was forested for so long, most of its wildlife is woodland wildlife and where there are no woodlands, woodland wildlife will readily occupy and utilise hedgerows. The hedgerows on Tara are mainly relatively young Hawthorn that would benefit from management and this is the subject of a separate study.

The other habitats listed in this section are hedgerow; wet grassland; dry ditch; freshwater spring. The hedgerow alongside the north-bounding road has a particularly rich 'understorey'. The hedgerow pictured above

separates a narrow meadow from Rath Taelchon; it is currently a habitat of limited potential and the strong green plants such as Nettle and Dock indicate high nutrient levels, undergrazing and/or insufficient mowing.

The wet grassland is a very small area associated with a freshwater spring, one of a number of small (inactive or disused) springs that occur on Tara; these were probably very important prior to the water-mains era and would have been most important to the first people to reside and otherwise utilise the area. Arterial drainage associated with modern agriculture and other development would also have impacted the hydrology of the hill.

Rath Na Seanaidh



Location:

West of the public road. Extending west to the woodland and from the north end of Teach Míodhchuarta south to the churchyard and the north edge of Rath Riogh.

Main Feature:

Teach Míodhchuarta and Rath Na Seanaidh.

Habitat:

Semi-improved grassland; improved grassland; hedgerow; embankment; dry ditch

Ecologically, this is a large homogenous block but with the grassland sward retaining some floristic diversity.

It may seem offensive to some to describe monuments of such significance as dry ditches but from a strict ecological perspective, the now shallow hollows that accompany the earthen banks that form the monuments are dry shallow ditches with recreational grassland and where these are high enough or deep enough, such as at the north end of Teach Míodhchuarta, they may be described as embankment or earth banks.



The roadside hedgerow in this section is a continuation of the aforementioned hedgerow in Rath Taelchon. These are the best sections of hedgerow on Tara being trimmed regularly along the public road. They are also kept low but require management on the inside. Generally, the older a hedgerow is the more tree and shrub species will be found within it. There are a few individual mature trees along the hedgerow but not all are native deciduous trees.



When the trees and shrubs of a hedgerow are established, it is quite acceptable to allow wild plants to grow along the base. Protective fencing is very beneficial and the general biodiversity of the hedgerow can be improved greatly by allowing or even encouraging wild plants.



Churchyard



Location:

On the east boundary of the site adjacent to Rath Na Seanaidh and between Teach Miodhchuarta and Rath Na Riogh.

Main Feature:

Saint Patrick's Church and graveyard

Habitat:

Mature large trees; stone wall; church; ancient masonry; gravestones; shrubs and plants associated with graves

Due to the variety of both natural and man-made structures within the graveyard, this block has an interesting biodiversity value. Although no bats were detected, the church itself has potential to provide summer roosting places ('bats in the belfry'); this could be tried with no repercussions for the conservation of the building itself. The trees, although mostly non-native, provide vertical structure and provide nesting potential for many species of birds; under their shade a niche is provided for typical woodland flowers like Bluebell and Wood Anemone (an uncommon species in Meath). Typical of old graveyards, the gravestones are replete with lichens and mosses which cause no harm to the stones themselves and, in the opinion of the authors of this study, greatly enhance the aesthetics of place – they are simply a measure of the history of the place, surely an intrinsic part of Tara.

The churchyard is first and foremost a churchyard and a burial place; however, the combination of trees, shrubs and vascular plants, stones, stone walls and other masonry, attracts a good variety of wildlife. The Painted Lady butterfly and Primrose (below) are just some of the many species of wildlife recorded in the churchyard.



Yew and Holly

Yew and Holly trees are strongly associated with churchyards and burial places throughout Britain and Ireland. Yew and Holly are native deciduous trees that retain their leaves all year round and for that reason both were deemed special or even holy (the Holy tree) by pre-Christian people.

Yew and Holly are two of fourteen native trees from which the ancient Ogham alphabet was created. The trees remain and along with them their historical significance; it is therefore appropriate to Tara that these trees remain and not just within the churchyard.

Rath Riogh



Location:
South of churchyard and Rath Na Seanaidh (main central oval monument).

Main Feature:
Rath Riogh, Teach Cormac, An Lia Fail and the Mound of the Hostages

Habitat:
Semi-improved/amenity grassland; hedgerow; dry ditch

Although largely compromised ecologically by the intensity of human traipsing and sheep grazing, the steeply sloping sides of the monuments retain some floristic value and include Bird's-foot-trefoil, Carex (Sedge) species, Selfheal, Tormentil, Heath Bedstraw and Yarrow, Field Wood-rush plus some mosses indicative of lower nutrient status (e.g. *Pseudoscleropodium purum*).

The chamber of the Mound of the Hostages is home to a few shade-tolerant plants that would naturally be more at home in a cave.

The chamber is also home to a family of Swallows. The female is so tolerant and not deterred by the thousands of prying eyes, In fact, most eyes peered into the chamber and didn't notice the nest attached cleverly onto the north wall. The male when feeding the sitting female perched constantly on the nameplate of the mound waiting for any opportunity to fly in and provide family care in the form of insects gleaned from just above grasses and treetops.



The chamber was also home to a small selection of insects, spiders and arachnids.



Left: Excessive grass growth just south of Rath Riogh. Centre: The contours of Rath Riogh indicate excessive application of nitrates and under-grazing resulting in loss of biodiversity and a potential for ground water pollution. Right: Grassland "managed" or altered by trampling indicates a more desirable botanical diversity.

Rath Laoghaire



Location:

The most southerly unit, south of Rath Na Riogh and bounded on three sides by public roads

Main Feature:

Rath Laoghaire

Habitat:

Improved grassland; semi-improved grassland; hedgerow; limestone outcrop (fragment)

This section is very poor in botanical diversity, an indication of undergrazing by the sheep that tend to forage and lounge here away from visitors to the monuments.

Enrichment by addition of organic (or inorganic) fertiliser may also have further impacted the area.

Rye-grass is the dominant species with other competitive species, including Creeping thistle, evidence of the enrichment.



A tiny area of calcareous grassland indicated mainly by Lady's Bedstraw.

This is one of a small number of these microhabitats and it is due to the immediate influence of limestone stones placed within the mounds of monuments and one small area of actual limestone outcrop. Good calcareous grassland would normally have orchids which were not recorded at Tara.

On the west margin of Rath Laoghaire is an area that in summer is colonised by Thistle, Nettle and other species that improved management of the site would reduce or perhaps eliminate. Not only is this desirable for good management practice but the control of noxious weeds must also be taken into account. The control of noxious weeds is a legal requirement under the Noxious Weeds Act, 1936.



Spring



Location:

South-east of Rath Laoghaire at the south-east corner of the site.

Main Feature:

Calcareous or "tufa" spring

Habitat:

Spring system; tufa spring; stream; large Ash trees; wet grassland; stone wall

This small block in the very south-east corner of the site is possibly the most interesting ecologically. The outfall of the spring is Nemnach's Well whose steep sides are encrusted with a Thallose liverwort and Hart's-tongue fern.

In parts the stream is 'choked' with instream vegetation, particularly Fool's Watercress, an indication of enrichment. However, to the east, sections of the stream are more 'natural' with gravel beds; therein the gravel and twiggy material has some encrustation of Calcium carbonate or 'tufa'. Moreover, the presence of the moss species *Cratoneuron filicinum* tentatively classifies the site as a tufa spring, a Priority Habitat under the EU Habitats Directive.



The small ephemeral 'pond' close to the boundary walls includes Floating Sweet-grass and the common wetland moss *Calliergonella cuspidatum*.




Finally, in this block, there is the boundary wall which is a fine example of a lime-mortared masonry wall, the lime mortar providing a foothold for most species. Left untouched for so long, the wall has developed a rich flora including Hart's-tongue fern, Maidenhair Spleenwort (fern), Wall-rue (fern). Most significantly, the stones are encrusted with lichens and at least seven species of moss were recorded. Such walls are becoming uncommon, being largely regarded as unkempt and unsightly.

The L-shaped spring section includes the northern lobe where a small pond forms for most of the year. It is believed that the

pond is connected to the springs and stream and would therefore be part of the same hydrological unit. For management purposes this area should be rectangular or quarter circle in shape.

Rath Riogh (A)

	Location: South south-west of Rath Riogh
	Main Feature: Boundary hedgerow
	Habitat: Improved grassland

Semi-improved grassland with poor floristic diversity.

Such areas are not only poor in botanical diversity but are almost devoid of any wildlife. Apart from some insect and bird species recorded along the existing hedgerow, only Hare and Rabbit were recorded in the grassland indicating the absence of flowering plants, insects and the ecosystem associated with botanically rich grasslands.



Hedgerows



1. Rath Riogh (A) boundary hedgerow of young Hawthorn with gaps and without any understorey.



2. A young laid Hawthorn hedgerow with occasional individual trees and protected by sheep fencing.



3. An original boundary hedgerow with an alternative woodland strip planted inside.

Above are three hedgerow alternatives which are: 1, unmanaged; 2, well managed and 3, managed with additional planting. Alternative 2 is desirable but is achievable and effective only with young trees. Alternative 3 is ideal where a boundary hedgerow cannot be properly managed and where space and place allows. The additional planting creates a very valuable woodland strip that also provides a wildlife corridor along with nesting places, a source of food and cover. Many areas of Tara provide opportunities for such management even the under-planting of existing unmanaged hedgerows and hedgerow fragments would improve greatly the biodiversity of this site.

Rath Riogh (B)



Location:
West of Rath Riogh.

Main Feature:
Boundary hedgerow

Habitat:
Improved grassland

Semi-improved grassland but retaining some botanical diversity. It includes a small spring wetland area at the western boundary.

The image opposite indicates the locations of five springs on or associated with Tara. Springs and wells were until relatively recent times most important as they not only provide drinking water but could also dictate settlement, farm animal and human habitation enclosure and social gathering. Drainage, modern piped water and certain contents of the refrigerator have drawn our attention away from springs and wells more often than not resulting in their neglect.



Photo: Con Brogan
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Rath Riogh (B) A large area of improved grassland with little interest and a lot of potential.



A naturally occurring wildflower meadow on neutral grassland in County Mayo.



A wildflower meadow created / planted on enriched neutral grassland in County Meath.

Such areas present an opportunity to create habitat and enhance biodiversity. This area is ideal for a meadow.

Other areas with similar potential are:

- the northern triangle of Rath Taelchon,
- the west half of Rath Na Seanaidh,
- the central area of Rath Laoghaire, and
- almost all of both Rath Riogh (A) and Rath Riogh (B).



Woodland



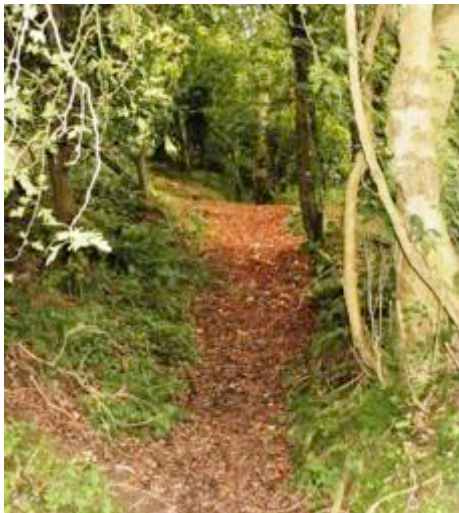
Location:
North-west portion of site

Main Feature:
Deciduous woodland

Habitat:
Deciduous woodland; dry ditch; embankment; woodland clearing (now meadow)

In biodiversity terms, the 'woodland' is probably the most important area at Tara. However, it doesn't approximate to 'native woodland' and lacks in large part most features of integral woodland. It is best described as a 'Mixed Broadleaved Woodland' (WD1) within the 'Highly Modified/Non-Native Woodland' category of Fossitt's 'Guide to Habitats of Ireland'. The dominant tree species, both structurally and quantitatively, are the large Horse Chestnut, a non-native species; both living and dead standing trees are present. These Chestnut trees produce a very large shadowing effect which results in a 'sterile' area below the trees, largely devoid of woodland ground-storey flora. However, some of them are clearly moribund which, strangely, has ecological benefits – the processes of decay ensue with bacteria, fungi and invertebrates all taking up residence with knock-on feeding potential for birds and small mammals. In other areas there are mono-specific stands of Hawthorn, again with a depleted ground flora. Elsewhere dense briars and gorse prevent a typical woodland ground flora. The only places where some semblance of native woodland ground flora occurs is along the middle embankment where ferns and mosses proliferate.

The woodland occurs along the north-west edge of Tara on a steep slope that is not very suitable for agriculture, probably the reason the woodland survived periods of intensive agricultural development. The original forests were of Oak, Ash and Elm with Holly and Hazel. The wildlife associated with such woodland is some of the richest of all habitats in temperate zones and effective management of the Tara woodland could restore the woodland and its wildlife creating an additional attraction on the site.



There is ground and field layers with Bramble and a good variety of fern; there are also some climbers including Ivy and Honeysuckle. The woodland is currently mixed deciduous woodland with Oak, Ash, Elm and Holly. There are also some Scots pine, Birch, Rowan and Hawthorn and some old non-indigenous Beech, Horse Chestnut and Sycamore. The area of cleared woodland at the north-east end that is now a meadow has great potential for replanting, planting of Willow or Hornbeam tunnels, a maze or other such attractions that may well be beneficial to the overall management of the site.

Objectives and Strategies

The Hill of Tara is a National Monument; most of the site is neutral grassland currently managed by grazing by sheep. In so far as it is reasonably practicable, the objectives and strategies below will be implemented taking into account the provisions of the National Biodiversity Plan. The main wildlife conservation objectives are:

O = OBJECTIVES

S = STRATEGIES

O1: To manage all grasslands in the interest of the National Monument taking into account the requirements of a Nutrient Management Plan, the European Communities (Good Agricultural Practice for Protection of Waters) Regulations 2006, S.I. No. 378 of 2006 as amended and the National Biodiversity Plan.

S1: To implement the provisions of a Teagasc approved management plan for grasslands including nutrient management.
To cease the application of any fertiliser within the raths and certain selected areas.

O2: To maintain and enhance existing woodlands.

S2: Maintain existing woodlands.
Extend existing woodland where appropriate.
Replant selected open areas with native deciduous tree species.
Replace fallen trees with native deciduous tree species.
Protect woodlands from grazing animals.
Encourage natural ground and field layer undergrowth.
Create woodland corridors where practicable.
Create deadwood wood piles where appropriate.
Allow selected dead trees to remain standing where appropriate.
Connect woodland to hedgerows where possible.

O3: To maintain and enhance existing hedgerows.

S3: Maintain existing hedgerows.
Extend existing hedgerows where appropriate.
Create hedgerow corridors where practicable.
Repair hedgerows where necessary.
Commence the practice of hedge-laying where appropriate.

O4: To protect and enhance freshwater wells and freshwater springs.

S4: Protect wells and springs from any pollution.
Exclude livestock from wells and springs.

O5: To protect and enhance the freshwater stream from the calcareous spring.

- S5:** Prevent any deterioration of the stream.
Exclude livestock from the stream.
Remove any damaging or obstructive matter from the stream.
Remove and/or cut back selected trees and other vegetation along the stream.
Reinstate the main flow channel of the stream close to the boundary wall and culvert.
Maintain the free flow of the stream.
-

O6: To maintain stone wall habitat.

- S6:** Maintain all stone walls in sound condition.
Maintain crevices and cavities that do not threaten the physical structure.
Retain any nest, roost or breeding place of any wild bird or any wild animal that do not threaten the physical structure.
Remove undesirable plant species from certain crevices.
Allow mosses and lichens to remain on walls and on individual stones.
-

O7: To create, maintain and enhance traditional and wildflower meadow where practicable. Compartmentalisation will be required for effective management.

- S7:** Sow, maintain and manage traditional hay meadows using native Irish seed.
Mow meadows late August to September annually.
Remove excess vegetation in areas of high nutrient concentration more regularly if required.
Expand meadows wherever practicable.
-

O8: Control or eliminate any invasive alien plant species.

- S8:** Remove any invasive alien plant species.
Prevent the introduction of invasive alien species.
-

O9: Protect the breeding or roosting place of any wild bird or any protected wild animal.

- S9:** Protect where possible, the breeding or roosting place of any wild bird or any protected wild animal.
-

O10: Implement a control of dogs policy throughout the site.

- S10:** Prevent dogs running uncontrolled.
Prevent dogs causing disturbance to wildlife.
Prevent dogs fouling the site.
-

Appendix 1



Illustration by Dr. Maurice Eakin.

Appendix 2

BIRDS

Blackbird	<i>Turdus merula</i>
Blackcap	<i>Sylvia atricapilla</i>
Bullfinch	<i>Pyrrhula pyrrhula</i>
Buzzard	<i>Buteo buteo</i>
Chaffinch	<i>Fringilla coelebs</i>
Chiffchaff	<i>Phylloscopus collybita</i>
Crow, Hooded	<i>Corvus corone</i>
Dove, Collared	<i>Streptopelia decaocto</i>
Dunnock	<i>Prunella modularis</i>
Fieldfare	<i>Turdus pilaris</i>
Flycatcher, spotted	<i>Muscicapa striata</i>
Goldcrest	<i>Regulus regulus</i>
Goldfinch	<i>Carduelis carduelis</i>
Greenfinch	<i>Carduelis chloris</i>
Jackdaw	<i>Corvus monedula</i>
Kestrel	<i>Falco tinnunculus</i>
Magpie	<i>Pica pica</i>
Martin, House	<i>Delichon urbica</i>
Peregrine	<i>Falco peregrinus</i>
Pheasant	<i>Phasianus colchicus</i>
Pipit, Meadow	<i>Anthus pratensis</i>
Raven	<i>Corvus corax</i>

Redwing	<i>Turdus iliacus</i>
Robin	<i>Erithacus rubecula</i>
Rook	<i>Corvus frugilegus</i>
Skylark	<i>Alauda arvensis</i>
Sparrow, House	<i>Passer domesticus</i>
Sparrowhawk	<i>Accipiter nisus</i>
Starling	<i>Sturnus vulgaris</i>
Swallow	<i>Hirundo rustica</i>
Swift	<i>Apus apus</i>
Thrush, Mistle	<i>Turdus viscivorus</i>
Thrush, Song	<i>Turdus philomelos</i>
Tit, Blue	<i>Parus caeruleus</i>
Tit, Coal	<i>Parus ater</i>
Tit, Great	<i>Parus major</i>
Tit, Long-tailed	<i>Aegithalos caudatus</i>
Treecreeper	<i>Certhia familiaris</i>
Wagtail, Pied	<i>Motacilla alba</i>
Warbler, Willow	<i>Phylloscopus trochilus</i>
Whitethroat	<i>Sylvia communis</i>
Woodpigeon	<i>Columba palumbus</i>
Wren	<i>Troglodytes troglodytes</i>
Yellowhammer	<i>Emberiza citrinella</i>

Appendix 3

MAMMALS

Bat	<i>Species unidentified</i>
Badger	<i>Meles meles</i>
Fox	<i>Vulpes vulpes</i>
Hare, Irish	<i>Lepus timidus</i>
Hedgehog	<i>Erinaceus europaeus</i>
Mouse, Field	<i>Apodemus sylvaticus</i>
Rabbit	<i>Oryctolagus cuniculus</i>
Rat, Brown	<i>Rattus norvegicus</i>
Stoat	<i>Mustela erminea</i>

Appendix 4

WILDFLOWERS

Bartsia	<i>Odontites verna</i>	Ground Ivy	<i>Glechoma hederacca</i>
Bindweed	<i>Calystegia sepium</i>	Groundsel	<i>Senecio vulgaris</i>
Bird's-foot-trefoil	<i>Lotus corniculatus</i>	Hawkbit, autumnal	<i>Leontodon autumnalis</i>
Black Medick	<i>Medicago lupulina</i>	Heath Bedstraw	<i>Galium saxatile</i>
Bluebell	<i>Hyacinthoides non-scripta</i>	Herb Robert	<i>Geranium robertianum</i>
Bramble	<i>Rubus fruticosus</i>	Hogweed	<i>Heracleum sphondylium</i>
Brooklime	<i>Veronica beccabunga</i>	Honeysuckle	<i>Lonicera periclymenum</i>
Burdock	<i>Arctium lappa</i>	Ivy	<i>Hedera helix</i>
Bush Vetch	<i>Vicia sepium</i>	Knapweed	<i>Centaurea nigra</i>
Butterbur	<i>Petasites hybridus</i>	Lesser Celandine	<i>Ranunculus ficaria</i>
Buttercup bulbous	<i>Ranunculus bulbosus</i>	Lords-and-ladies	<i>Arum maculatum</i>
Buttercup - creeping	<i>Ranunculus repens</i>	Marsh Bedstraw	<i>Galium palustre</i>
Buttercup - meadow	<i>Ranunculus acris</i>	Meadow Buttercup	<i>Ranunculus acris</i>
Cats ear	<i>Hypochaeris radicata</i>	Mouse-ear	<i>Cerastium fontanum</i>
Charlock	<i>Sinapis arvensis</i>	Nettle	<i>Urtica dioica</i>
Chickweed	<i>Stellaria media</i>	Oxeye Daisy	<i>Leucanthemum vulgare</i>
Cleavers	<i>Galium aparine</i>	Pellitory-of-the-wall	<i>Parietaria judaica</i>
Colts-foot	<i>Tussilago farfara</i>	Pignut	<i>Conopodium majus</i>
Cow Parsley	<i>Anthriscus sylvestris</i>	Pineapple weed	<i>Matricaria matricarioides</i>
Creeping Buttercup	<i>Ranunculus repens</i>	Poppy	<i>Papaver rhoeas</i>
Cress - Fools water cress	<i>Apium nodiflorum</i>	Primrose	<i>Primula vulgaris</i>
Cuckoo flower	<i>Cardamine pratensis</i>	Privet	<i>Ligustrum vulgare</i>
Daisy	<i>Bellis perennis</i>	Ragwort	<i>Senecio jacobaea</i>
Dandelion	<i>Taraxacum officinale</i>	Ramsons (Wild Garlic)	<i>Allium ursinum</i>
Dock, Broad-leaved	<i>Rumex obtusifolius</i>	Red Clover	<i>Trifolium pretence</i>
Dog Rose	<i>Rosa canina</i>	Red Dead Nettle	<i>Lamium purpureum</i>
Enchanter's nightshade	<i>Circaea lutetiana</i>	Redshank	<i>Polygonum persicaria</i>
Eyebright	<i>Euphrasia nemorosa</i>	Ribwort Plantain	<i>Plantago lanceolata</i>
Eyebright	<i>Euphrasia brevipila</i>	Sanicle	<i>Sanicula europaea</i>
Fat-hen	<i>Chenopodium album</i>	Selfheal	<i>Prunella vulgaris</i>
Field Rose	<i>Rosa arvensis</i>	Shepherd's-purse	<i>Capsella bursa-pastoris</i>
Field Speedwell	<i>Veronica persica</i>	Shining Crane's-bill	<i>Geranium lucidum</i>
Figwort	<i>Scrophularia nodosa</i>	Silverweed	<i>Potentilla anserine</i>
Forget-me-not, Field	<i>Myosotis arvensis</i>	Sorrel	<i>Rumex acetosa</i>
Forget-me-not, Tufted	<i>Myositiscaspitosa</i>	Sorrel - Sheep's sorrel	<i>Rumex acetosella</i>
Forgot-me-not, Changing	<i>Myosotis discolor</i>	Sow-thistle	<i>Sonchus oleraceus</i>
Foxglove	<i>Digitalis purpurea</i>	Spear Thistle	<i>Cirsiumvulgare</i>
Fumitory	<i>Fumaria officinalis</i>	St. John's Wort	<i>Hypericum perforatum</i>
Garlic Mustard	<i>Alliaria petiolata</i>	Sticky Groundsel	<i>Senecio viscosus</i>
Germander Speedwell	<i>Veronica chamaedrys</i>	Toadflax, Ivy-leaved	<i>Cymbalaria muralis</i>
Gorse	<i>Ulex europaeus</i>	Tormentil	<i>Potentilla erecta</i>
Greater Celandine	<i>Chelidonium majus</i>	Tufted Vetch	<i>Vicia cracca</i>
Greater Stitchwort	<i>Stellaria holostea</i>	Vetchling, meadow	<i>Lathyrus pratensis</i>

Appendix 4 cont'd

WILDFLOWERS cont'd

Violet, Dog	<i>Viola riviniana</i>
Violet, Early-Dog	<i>Viola reichenbachiana</i>
White Clover	<i>Trifolium repens</i>
Wild Carrot	<i>Daucus carota</i>
Wild Strawberry	<i>Fragaria vesca</i>
Winter Cress	<i>Barbarea vulgaris</i>

Winter Heliotrope	<i>Petasites fragrans</i>
Wood avens	<i>Geum urbanum</i>
Wood sorrel	<i>Oxalis acetosella</i>
Wood-rush	<i>Luzula campestris</i>
Woundwort	<i>Stachys sylvatica</i>
Yarrow	<i>Achillea millefolium</i>

Appendix 5

GRASSES

Cock's-foot	<i>Dactylis glomerata</i>
Common Bent	<i>Agrostis capillaries</i>
Creeping Bent	<i>Agrostis stolonifera</i>
Crested Dog's-tail	<i>Cynosurus cristatus</i>
Floating Sweet-grass	<i>Glyceria fluitans</i>
Hudson-Meadow Fescue	<i>Festuca pratensis</i>
Meadow Foxtail	<i>Alopecurus pratensis</i>

Perennial Rye-grass	<i>Lolium perenne</i>
Red fescue	<i>Festuca rubra</i>
Rough Meadow-grass	<i>Poa trivialis</i>
Sweet Vernal Grass	<i>Anthoxanthum odoratum</i>
Timothy	<i>Phleum pratense</i>
Yorkshire fog	<i>Holcus lanatus</i>

MOSSES AND FERNS

Black Spleenwort	<i>Asplenium adiantum-nigrum</i>
Common male fern	<i>Dryopteris filix-mas</i>
Lady fern	<i>Athyrium filix-femina</i>
Maidenhair spleenwort	<i>Asplenium trichomanes</i>
Newman - Hart's tongue	<i>Phyllitis scolopendrium</i>
Shield fern	<i>Polystichum sp.</i>
Wall-rue	<i>Asplenium ruta-muraria</i>
Moss	<i>Bryum capillare</i>
Wetland Moss	<i>Calliergonella cuspidatum</i>
Well moss	<i>Cratoneuron filicinum</i>
Well moss	<i>Platyhypnidium riparioides</i>
Wall Moss	<i>Encalypta streptocarpa</i>
Wall Moss	<i>Eucladium verticillatum</i>
Wall Moss	<i>Grimmia pulvinata</i>
Wall Moss	<i>Homalothecium sericeum</i>

Wall Moss	<i>Tortula muralis</i>
Ground Moss	<i>Fissidens taxifolius</i>
Ground Moss	<i>Plagiomnium undulatum</i>
Ground Moss	<i>Rhytidiadelphus squarrosus</i>
Ground Moss	<i>Pseudoscleropodium purum</i>
Woodland Moss	<i>Thamnobryum alopecurum</i>
Woodland Moss	<i>Thuidium tamariscum</i>
Woodland Moss	<i>Atrichum undulatum</i>
Liverwort	<i>Pellia sp.</i>
Common Moss	<i>Brachythecium rutabulum</i>
Moss (tree epiphyte)	<i>Cryphaea heteromalla</i>
Moss (tree epiphyte)	<i>Kindbergia praelonga</i>
Moss (tree epiphyte)	<i>Orthotrichum affine</i>
Moss (tree epiphyte)	<i>Ulota crispa/bruchii</i>
Tree Liverwort	<i>Frullania dilatata</i>

Appendix 6

TREES AND SHRUBS

Ash	<i>Fraxinus excelsior</i>
Beech	<i>Fagus sylvatica</i>
Birch	<i>Betula pendula</i>
Birch	<i>Betula pubescens</i>
Box	<i>Buxus sempervirens</i>
Chestnut, Horse	<i>Aesculus hippocastanum</i>
Elder	<i>Sambucus nigra</i>
Elm, English	<i>Ulmus procera</i>
Elm, Wych	<i>Ulmus glabra</i>

Fir, Douglas	<i>Pseudotsuga menziesii</i>
Hawthorn	<i>Crataegus monogyna</i>
Hazel	<i>Corylus avellana</i>
Holly	<i>Ilex aquifolium</i>
Mountain Ash	<i>Sorbus aucuparia</i>
Oak, Pedunculate	<i>Quercus robur</i>
Scots Pine	<i>Pinus sylvestris</i>
Yew	<i>Taxus baccata</i>

Appendix 7

INSECTS

Butterflies

Large White	<i>Pieris brassicae</i>
Meadow Brown	<i>Maniola jurtina</i>
Orange Tip	<i>Anthocharis cardamines</i>
Painted Lady	<i>Cynthia cardui</i>
Peacock	<i>Inachis io</i>
Red Admiral	<i>Vanessa atalanta</i>
Ringlet	<i>Aphantopus hyperantus</i>
Small Copper	<i>Lycaena phlaeas</i>
Small Tortoiseshell	<i>Aglais urtica</i>
Small White	<i>Pieris rapae</i>
Speckled Wood	<i>Pararge aegeria</i>
Wall Brown	<i>Lasiommata megera</i>
Wood White	<i>Leptidea sinapis</i>

Moths

Burnished Brass	<i>Diachrisia chrysitis</i>
Cinnabar	<i>Tyria jacobaeae</i>
Dark Spinach	<i>Pelurga comitata</i>
Garden Tiger	<i>Arctia caja</i>
Goat	<i>Cossus cossus</i>
Magpie	<i>Abraxas grossulariata</i>
Oak Eggar	<i>Lasiocampa quercus</i>
Pale Tussock	<i>Calliteara pudibunda</i>
Peppered	<i>Biston betularia</i>
Silver Y	<i>Autographa gamma</i>
Six Spot Burnet	<i>Zyaena filipendulae</i>

Bees

Buff-tailed Bumble-bee	<i>Bombus terrestris</i>
Honey Bee	<i>Apis mellifica</i>
Red-tailed Bumble-bee	<i>Bombus lapidarius</i>
Small Garden Bumble-bee	<i>Bombus hortorum</i>

Other Insects

Common Field Grasshopper	<i>Chorthippus brunneus</i>
Cranefly	<i>Tipula maxima</i>
Daddy Long-legs	<i>Tipula paludosa</i>
Earwig	<i>Forficula auricularia</i>

Arachnids

Garden Spider	<i>Araneus diadematus</i>
Crab Spider	<i>Xytiticus cristatus</i>
Funnel Web Spider	<i>Segestria seneculata</i>
Hunting Spider	<i>Pisaura mirabilis</i>
Long-legged-spider	<i>Pholcus phalangioides</i>
Harvestman	<i>Phalangium opilio</i>
Money Spider	<i>Erigone atra</i>
Red Spider Mite	<i>Panonychus ulmi</i>



Appendix C

**Hill of Tara
Public and Stakeholder
Consultation Events**

Hill of Tara Public and Stakeholder Consultation Events

Various methods were employed to understand the views of the public and of local and national stakeholders. These included:

- An online survey through the Heritage Council website between 21 March and 15 May 2018 which elicited 400 responses.
- A visitor survey conducted on the Hill of Tara on 18 July 2018 by a team from the DIT College of Arts and Tourism.
- Dr Edel Bhreathnach, former CEO, The Discovery Programme, addressed the Ashbourne Municipal District meeting on 21 May 2018.
- Dr Edel Bhreathnach also met local interest groups including The Friends of Tara (31 May 2018) and the Rathfeigh Skryne Tara group (16 July 2018).
- The Meath Archaeological and Historical Society made a representation on behalf of its members.
- Local businesses were consulted.
- The national and local bodies that participated in the consultation process included An Garda Síochána, Meath County Council, National Monuments Service, National Parks and Wildlife Service and the Office of Public Works.
- A presentation on the progress of the Tara Conservation Management Plan was made to Ashbourne Municipal District Council on 10 December 2019.
- Meath County Councillors Claire O'Driscoll and Suzanne Jamal sat on the Steering Group responsible for preparation of the Tara Conservation Management Plan.

An Chomhairle Oidhreachta
The Heritage Council



The Discovery
Programme
Centre for Archaeology
and Innovation Ireland

Appendix D

Hill of Tara Public Consultation Survey Report

Heritage Council & Discovery Programme

Emma Hannah

July 2018

1. Introduction

The Hill of Tara is one of Ireland's most important archaeological and cultural landscapes, containing around 150 monuments above and beneath the ground-level surface. With a history of use spanning over five millennia, Tara has acted as a place of prehistoric funerary and ritual practices as well as a ceremonial focal point for medieval kingship through the ages, making it a landscape set apart from the rest of the island. This uniqueness of place resonated through to modern times, and the hill was used as a setting for social and political gatherings by contemporary leaders. Today, the Hill of Tara is enjoyed by locals and visitors alike as an historical monumental landscape and social space.

The Tara public consultation survey was undertaken to inform a Conservation Management Plan for the Hill of Tara, Co. Meath. This was announced by the Minister for Culture, Heritage and the Gaeltacht, Ms Josepha Madigan, in early 2018. The Tara Conservation Management Plan has been commissioned by the Department of Culture, Heritage and the Gaeltacht (DCHG) and is being undertaken by the Heritage Council and the Discovery Programme. The Conservation Management Plan is guided by a Steering Group with membership from the DCHG, the Office of Public Works, Meath County Council, the Heritage Council, and the Discovery Programme. The public consultation process was facilitated by the Heritage Council and a five-question survey was launched online and made available between March and May 2018.

It should be noted that the contents of this report are derived from public consultation and the Conservation Management Plan will seek to reflect these views. However, not all of the actions suggested in this report can be reflected in future policy for the management or intended management of the Hill of Tara State-owned lands.

2. Executive Summary

The Tara consultation survey, conducted between March and May 2018, offered the public an opportunity to engage in plans for the conservation and management of the Hill of Tara and its lands in an open and constructive manner. The online survey had both qualitative and quantitative elements in its questionnaire, acting as a platform for capturing basic information on how participants used the site, how often they visited, and what they valued most about the monumental landscape.

Analysis of feedback indicates that the deeply rooted archaeological and historical significance of the Hill of Tara and the use of its lands as a local public amenity are felt to be the most important aspects of the site. There is, however, something of a conflict between these roles. Dog fouling, the presence of off-lead dogs, litter, and the use of the site for sporting recreation are cited as issues. Other major issues identified by the public included parking facilities and traffic management, catering for growing numbers of visitors, the impact of commercialism and potential developments, as well as the overall interpretation and presentation of the site.

Almost half of respondents (49.9%) claim to visit Tara frequently, that is, those who visit every day, on a weekly basis, or at least monthly. The semi-frequent visitor, who visits at least once a year, makes up just under one-third of participants (30.8%).

The Hill of Tara often evokes considerable feeling within those who visit, which brings with it a sensitivity to any plans for change. There is a clear call for Tara to be enhanced and maintained with minimal disturbance to the unique sense of place that the monument holds; a challenging task considering the variety of issues associated with the site at present. The issues identified touch on various components of the overall management and presentation of Tara. Potential actions that were frequently suggested by consultees include:

- significant improvements to the traffic management system regarding approach to site and creation of additional parking facilities
- implementation of a more effective interpretation strategy for the monumental landscape, particularly in the form of signage and guided tours, that also incorporates a broader contextualisation of the site's significance within Irish archaeology and culture
- creation of designated trails/paths to help preserve monuments and direct footfall across the site
- a limit on the number of visitors allowed on the hill per day and/or permit entry only at certain times of the day/year
- installation of additional toilet facilities.

Most issues can be tackled through committing a dedicated on-site presence at Tara for the purposes of site monitoring/policing, maintenance and interpretation, and this is something which many respondents, in some form, recognise and expressed.

3. Background and Method

In January 2018 the Minister for Culture, Heritage and the Gaeltacht, Ms Josepha Madigan TD, announced that a Conservation Management Plan for the State-owned lands at the Hill of Tara was to be drafted. A further press release by the Minister in March coincided with the opening of a public consultation process. The public consultation was facilitated by way of an online survey. The aim of this was to offer a platform for the public to meaningfully engage with plans for the hill and form part of the constructive dialogue geared towards its protection, conservation, and management.

The advancement of the online survey was undertaken by the Heritage Council. It was advertised widely online and through social media by the organisations engaged in the Steering Group. Engagement was encouraged with the tagline “Have your say”, and individuals were met with a summary page which communicated – in brief – the ministerial conservation management proposal, the historical significance of the monument, the scope of the public survey, the key organisations involved in the development of the plan, and comments from the Minister (see Appendix A). Participants were then directed to the live survey via a web-link.

The survey, hosted on Survey Monkey, was live from 21 March to 15 May 2018. It was designed to identify what the public value most about the Hill of Tara, what they perceive as the issues with the site, and what they suggest be done to preserve it for the future. Participants were asked the following five questions:

- (Q.1) What is important to you about the Hill of Tara?
- (Q.2) What issues concern you in relation to the hill?
- (Q.3) How can we best protect and preserve the Hill of Tara?
- (Q.4) How often do you visit the Hill of Tara?
- (Q.5) Any other comments?

Responses to each question were given in an open-ended text box. No personal information was asked of the survey participants.

The public consultation in this report is designed to play a significantly greater role in the design of the overall plan. The consultation itself was designed to be accessible for a greater number of people, over a longer period of time and to create a documented response that could be latterly disseminated. The results of the public survey are used to inform the overall Tara Conservation Management Plan.

4. Responses

Upon closing, the survey had 400 recorded responses within its database. However, owing to the presence of a duplicate set of answers in one instance (confirmed by an identical IP address match), the survey had, in actuality, gathered responses from 399 individuals. To the benefit of the consultation process, this also translated to a similarly high number of responses per question (Table 1). The average time spent by participants on the completion of the survey questions was six minutes. Without detailing the length of responses unnecessarily, this varied due to the open format of the survey, which allowed respondents the freedom to express their views in as comprehensive a manner as they wished. It should be stated that the majority were brief, comprising only several words, phrases or sentences. A portion, however, were significantly longer.

Question	Number of respondents	Percentage (%) in relation to total number of respondents (n = 399)
1	397	99.5%
2	393	98.5%
3	389	97.5%
4	393	98.5%
5	330	82.7%

Table 1: Breakdown of response rates per question.

The survey captured the views of interested members of the public who were, predominantly, local to Tara and wider County Meath, but responses were also garnered from those elsewhere across the country. In addition to this, there was a small international component within the survey demographic with some participants living in the United States and the United Kingdom, for example.

The following section details the findings of each survey question in turn. For each, the responses are summarised quantitatively, where possible, and the dominant themes contained within are drawn out and discussed further.

4.1 Importance of Tara

In the question with the highest response rate (99.5%), participants were first asked: “What is important to you about the Hill of Tara?” Two themes emerge from this with a resounding clarity: the importance of Tara as place of significance (a place set apart, whether this be archaeologically, historically, religiously, spiritually, or otherwise culturally); and its ability to function as a social amenity and a green space within the local environs for play, exercise, and leisure (see Fig. 1).



Figure 1: Dominant words and phrases in responses to what survey participants felt was important about the Hill of Tara.

Just under three-quarters (74.3%, or n=295) of participants mentioned significance in their responses (Fig. 2). The remainder cited the use of Tara as an amenity (15.6%) or something which does not fall into either category (10.1%). The latter groups together the forty responses that mention various generalities of the site, but mostly access, atmosphere, it being a place of beauty and a largely unspoilt landscape. Figure 3 shows the breakdown of the 295 individuals who mentioned the significance of Tara (in whatever respect). Focusing on the dichotomy once again, these responses can be further divided into those who mention significance and those who cite both its significance and the use of the site as a public social amenity.

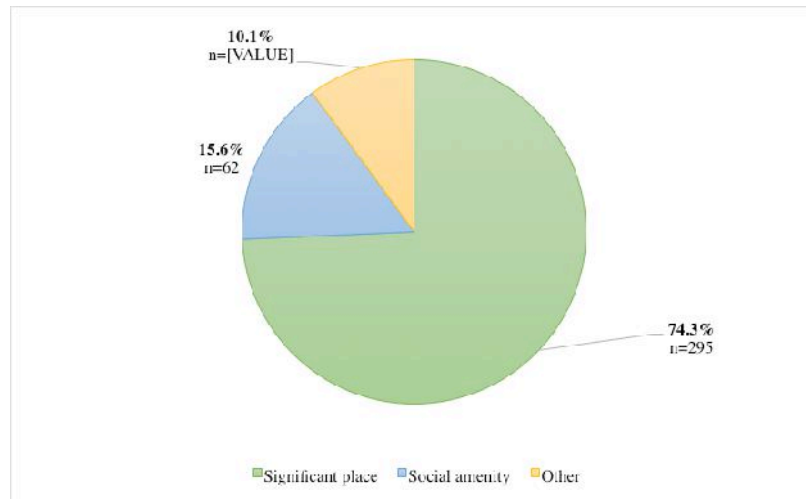


Figure 2: Broad statistics of Question 1 responses regarding importance.

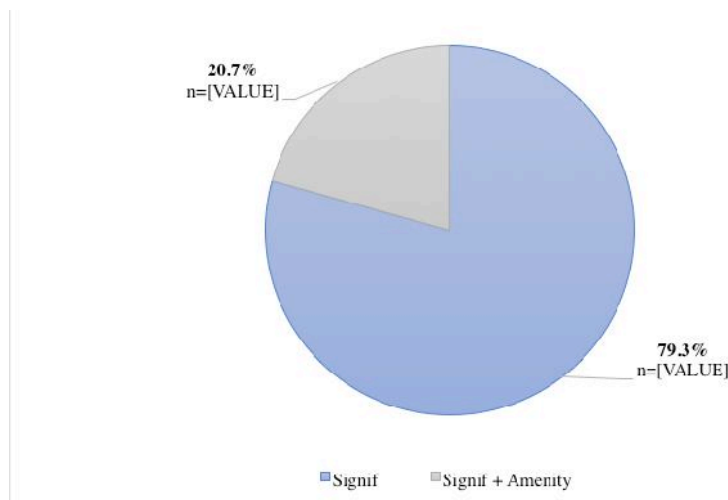


Figure 3: Number of respondents who value Tara's significance vs significance and use as an amenity.

It is clear that those who value the duality of Tara are in the minority, forming only one-fifth (20.7%) of the total (n=295). This is especially interesting given that, in subsequent questions (see sections IV.ii and IV.v), there are clear indicators of these aspects coming into direct conflict. The tension is detectable here, however. For instance, one respondent writes:

"Freedom, more information given on the place. I dont [sic] want to see any dogs running there. More bins..."

For some, Tara and its landscape are more important as a place of informal social gathering and, (somewhat paradoxically) given its history, this is fitting; the site still harbours a spirit of community in much the same way it did in the past: 123 participants value Tara as a social amenity, with many responses citing walking, hiking, dog-walking, play, and sports as activities they frequently engage in while at the hill. But the historic value of the Hill of Tara is what resonates with most and a selection of quotations from several responses captures the awe which the site inspires:

“Tara is about purpose and place. Tara is an anchor into the past. It allows people to connect with a landscape that was of enormous importance to our ancestors. It’s [sic] soft banks and sombre slopes lie in the landscape like a fallen titan – greatly diminished in stature but no less in power. Tara still possesses the extraordinary ability to mystify and enthrall any guests that roam its raths and woods.”

“The landscape of Tara has been the focus of Irish social and political history for thousands of years. The geography of the land tells its own story, for instance, when standing at Tara, one can look out in every direction and see ancient peoples coming to gather here. It ignites the imagination.”

“It creates a link to the past...it’s [sic] sense of mystery...it’s [sic] simplicity in terms of development”

“...an important monument, a portal into the past. A reminder of things lost...”

Regardless of how the site is viewed, accessibility is also deemed to be important and participants have used phrases like “Accessible archaeology” or “The accessibility of history” to express this. Not unrelated are those comments which speak of the value of Tara’s “untouched”, “unspoilt” landscape. The hill’s openness and biodiversity contribute to this:

“I would like to see the natural heritage valued and conserved as much as the cultural heritage.”

“...provides one of the most valuable of open spaces for people to exercise at whether it is walking, running or bringing pets out for fresh air. There are not many large open grassland sites in area/county where one can walk through what is essentially a field knowing that one is not trespassing on private land. Another important aspect... the significance with regards to our natural heritage, as the Hill is home to incredibly important habitats, including woodland, hedgerow, grassland, and stone walls...”

In short, the Hill of Tara and its various socio-cultural and spiritual dimensions are valued. What Tara is differs for many people, although each connect with it on some level and, in all who visit, it evokes a unique sense of place.

4.2 Issues

Survey participants were next asked to identify what they considered to be the issues associated with the site in its present state: “What issues concern you in relation to the hill?”. Some 98.5% of participants expressed their views. The top ten issues (many of which overlap) and their relative frequency within the participant responses for this question are shown in Figure 4.

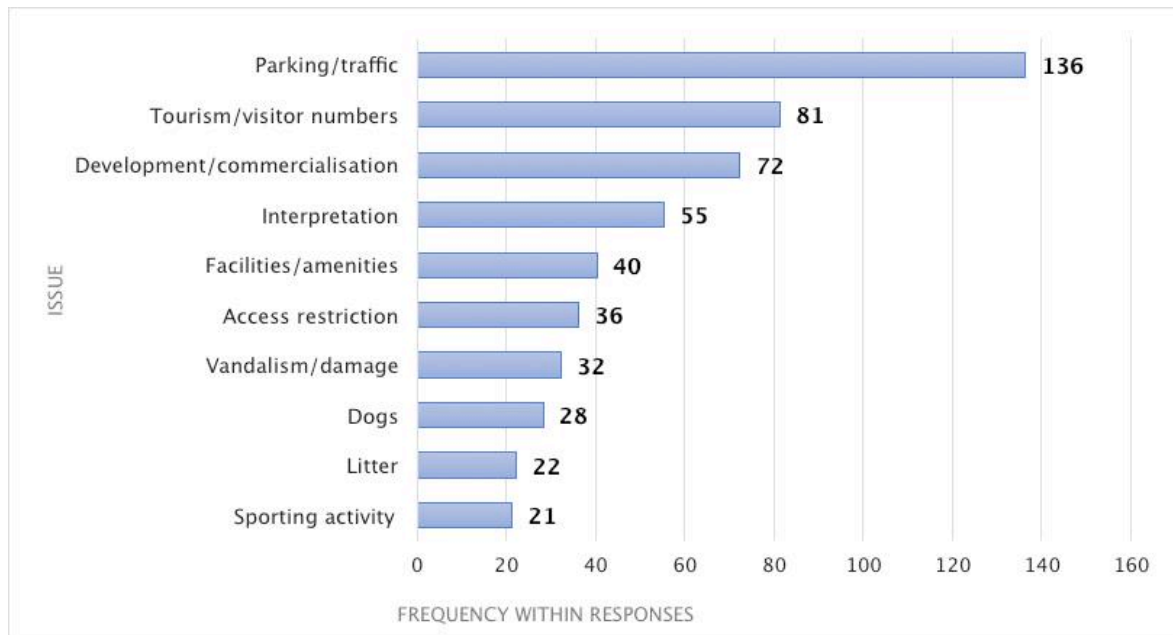


Figure 4: Graph showing frequency of main issues featuring within Question 2 survey responses.

By a significant margin, concerns surrounding the current parking facilities and management of traffic are perceived to be the most pressing. On the whole, the responses relate to the absence of an effective system to cater for the volume of vehicular traffic that frequents the site on a daily basis. The present car parking area is felt to be too limited for the number of visitors to the Hill of Tara. This is pointed out as a year-round problem although in summer months it worsens substantially. When the car park is full, haphazard parking of cars along the verges of the road junction occurs, and this is further compounded by the parking of large coaches and tour buses in this general area. Not only does the present situation create a difficult approach to the site for vehicles but there are also major concerns over the safety of pedestrians navigating their way to and from the site:

“Lack of provision of facilities to cater for the numbers visiting the site - it is often chaotic during the summer months. There is a serious safety issues because of the lack of separation between pedestrians and motor vehicles including full-sized buses.”

One respondent expressed a concern about the building of a large parking facility, though the reason for this is not articulated. Others suggest the additional facilities should be built away from the site and the introduction of a shuttle bus service.

The next most frequently expressed issue relates directly to the parking and traffic management problem, that is, the volume of tourists at Tara and the large numbers of visitors to the site. The responses make clear that the hill is walked and visited by both tourists and a significant portion of the local population, although the mention of this particular issue in the survey feedback is principally focused on the former. Large visitor numbers feed into several other main issues, notably the general lack of visitor facilities and amenities, the development of the area, as well as the commercialisation of the site. Current (independently run) facilities – café, shop, visitor centre, etc. – are deemed to be inadequate for the visitor population, and twenty respondents decried the limited toilet facilities specifically. Regarding those latter issues, there are concerns about the overdevelopment of the areas around the Hill of Tara, whether this is related to the site or otherwise (e.g., housing developments), and its increased commercialisation. It is generally felt that this would compromise the integrity of the monument and its historical significance.

Likewise, visitor numbers have also contributed to fears over damage to the site. There are more general concerns over some acts of vandalism which were claimed to have occurred (although these are not specified in the further detail), but the effect of “foot traffic” on the earthen monuments accounts for most of the response counts in relation to this issue. Other sources of potential damage mentioned include detectorists (in a single instance), bad weather, and sheep.

Another significant factor that has been raised is the use of the lands at Tara for recreational sporting activities by football teams, personal training/fitness boot-camps, and mountain bikers. Concerns over this recreational usage is a considerable component of the worry surrounding damage to the hill’s various archaeological monuments, but it has been listed as a separate issue because respondents also articulated how these activities are detrimental to the atmosphere. There is a desire for this to be conducted elsewhere in the vicinity and, at the very least, away from the immediate space of the monuments. One response communicates the various dimensions to this activity:

*“I am very concerned about the **deterioration of the ground...** the use of the Hill by sports clubs as a practise ground for training sessions. This has had a very **negative effect upon the atmosphere** of the Hill of Tara and detracts from this historical and spiritual focus of this special place...This use has increased to detrimental levels over the past few years. This also **causes traffic and parking problems** as the car park is full of cars dropping children to training. The Hill of Tara is not a training field. Remembering and experiencing the **historical significance of the Hill of Tara is diminished** by this inappropriate use.”*

The interpretation of Tara is another major issue that emerges clearly out of the public consultation, the consensus being that this is quite poor as it stands in its present state. More specifically, the lack of signage throughout the site – or more accurately, at the location of the monuments – is bemoaned, as is a clear display of the overall importance of Tara in Ireland’s archaeological and social past and how the site would have looked at different periods of time; visitors simply do not understand what they are looking at when faced with the “bumps on a hill” in the words of one respondent. Those participants who acknowledge the panels at the entrance desire their placement elsewhere, for example:

“For tourists, the visitors centre is unwelcoming and not properly signposted. While a handful of signs are up regarding it, they are not appropriately positioned and many visitors simply walk by the visitors centre, assuming it to be just a church. Additionally, the information plaques are limited to the entrance way and would likely make it difficult for visitors without tour guides to appropriately appreciate the sites and earthworks.”

“The audio visual display is outdated and the church is not a good setting for it. It offers no clear picture of what the area looked like over the centuries, and there are no reconstruction/scale models...There are no descriptions/signage of the monuments on the hill. All of the signage is at the entrance way, and so visitors need to memorize everything before walking onto the hills...How can people appreciate the area if they don't know what they're looking at...?”

Dogs are also a cause for concern. This relates mainly to their being allowed to roam the site off-lead. It should be stressed that most respondents concerned about dogs do not wish to see the animal banned from the hill but there is a desire for dogs to be kept on a leash at all times while walking the area, due to the presence of large numbers of visitors and concerns over their potential behaviour around sheep, which sometimes graze on the site. Dog fouling is also regarded as a relatively serious problem and how it is being left on the hill. In a similar vein, respondents have also perceived a problem with litter being left around the hill (or having blown off after being tied to rag trees) and the lack of bins (for both forms of waste) has been noted in the survey.

A sizable portion of participants (n=36) discuss the issue of restricted access. An increase in the number of visitors to the site per year is recognised and the public have rationalised that some form of entry measure may be put in place to control this, as illustrated in several responses:

“The number of tourists increasing with no control restricted entry or facilities available for parking toilets etc”

“I am concerned about unrestricted public access to the monument throughout the year. It would seem prudent to restrict public access shortly after sunset until shortly before sunrise...”

“Should be visitors/crowd control...”

“Large tourist numbers unrestricted”

“Destruction of the site due to bus loads of tourists having uncontrolled access”

Yet, a conflict of opinion arises over this issue because, for the most part, respondents do not want to have (at the very least, local) access restricted in any form, irrespective of the increased foot traffic on the hill. The issue overlaps somewhat with growing concerns for the monetisation and commercialisation of the site as several responses expressed a fear that entrance fees will be instated:

“A fee is charged which means we can not [sic] access regularly”

“That the site will be closed off to public like Newgrange and a tax/fee required to gain access”

“Concerned that it would become a pay for entry site”

“The balance of free access and it's [sic] protection”

Outside of these top ten issues are a series of others which should also be noted. One of the more sensitive issues involves the number of individuals camping at Tara on a near permanent basis. Sixteen people explicitly addressed this concern in their responses. The campers place themselves mainly by the entrance but also in the area amongst the 'sloping trenches'. Those camping at the entrance produce the strongest feeling and have been accused of contributing to litter, begging, intimidation and making “others feel very uncomfortable”, parading “controversial slogans”, and generally detracting from the site.

A general lack of maintenance and management of Tara by a dedicated team has also been raised within responses:

“...absence of a clear presence all year round (e.g. caretaker, guides, etc.)”

“Lack of management of sites...”

“Parking, lack of definition, no governance”

This sentiment could be argued to be underlying in most of the main issues (e.g., interpretation, providing facilities, litter, monitoring how the site is used, etc.) and therefore reflects a resounding call for a structured management resource to be put in place.

Other issues include concerns over graveyard access for locals, the grazing of sheep close to the public, environmental damage, pram and wheelchair access, grassland management, noise pollution (from nearby traffic) and general site preservation.

4.3 Protecting and Preserving Tara

The third survey question afforded the public the opportunity to suggest actionable information and other measures they would like to see in place at the Hill of Tara. It elicited the proposal of a diverse range of conservation and management actions which were, in some instances, specific in their detail. As such, comments touch on practical suggestions, aimed more towards improving the overall visitor experience than protecting the site, but there are also those of a more sensitive nature that are worthy of further discussion, e.g. preserving the unique atmosphere at Tara with low-impact solutions and the avoidance of catering for mass tourism.

Several suggested actions emerged with great clarity, having appeared with great frequency within the responses. They can, broadly, be construed as follows:

- Access/infrastructure: significant improvements to the traffic management system regarding approach to site and the creation of additional parking facilities
- Interpretation: desire for an enhanced interpretation strategy for the monumental landscape, particularly in the form of signage and guided tours. To a lesser extent, there are also calls for a new interpretative centre
- Personnel: this feeds into an improved interpretation strategy (i.e., tour guides) but a dedicated on-site presence has also been suggested for the purposes of site monitoring/policing and maintenance
- Directed site movement: installation of designated walkways/trails/paths to help preserve monuments and direct footfall to elsewhere within the site
- Restricted entry/reduce visitor numbers: limit the number of visitors allowed on the hill per day and/or permit entry only at certain times of the day (e.g., 9am-5pm) or certain times of the year, or both
- Installation of additional toilet facilities

Other suggested efforts can be listed, which also overlap with perceived issues with the site and its current usage, although these do not appear with the same as frequency as those outlined above:

- Implement camping restrictions: there is an issue with individuals camping at the site, particularly at the gated entrance and within the car park
- Ban clubs/groups from training and other forms of potentially damaging recreational sports from being conducted on monument lands/provide a social amenity park for this (either on the outer bounds of State-owned lands or elsewhere nearby)
- Education strategy: especially within school curriculums, to foster knowledge and respect for the site and its condition
- Fees: nominal ticketed entrance and/or parking fees
- Improve access for those with restricted mobility or other impairments
- Waste management: provide bins for general litter and dog waste
- Dogs should be not loosed and allowed to roam the hill: provide a dedicated dog park area
- No walking/climbing on select site features e.g., Mound of Hostages, and/or fencing around particularly fragile areas
- Further excavation
- Minimal action/leave as is.

A consideration of responses in more depth proved that the underlying conflict between the Hill of Tara's historic and social values was found to be latent within comments once again, as in Question 1. This was mainly expressed in relation to the development of the site's infrastructure, whether in relation to parking, visitor facilities (i.e., shop, café/restaurants), or an interpretative centre. For some individuals, the Brú na Bóinne Visitor Centre, Co. Meath, was used as a parallel for the type of strategy they wish to see implemented at the site. Others who drew upon the same parallel, would view any such development as an over-commercialisation of the site and one that, ultimately, could be detrimental to Tara's overall ambience and, in the words of one respondent, "spoil its magic". The clash has also been expressed in comments suggesting a restriction of visitor (i.e., tourist) numbers while allowing all-round access for locals – a strategy that would be challenging to implement in reality.

It can be stated, however, in spite of underlying tensions, that there is a strong desire for greater resources to be invested in the presentation and management of the site itself. Yet, this also comes with a firm stipulation that any changes are as unobtrusive as possible, with a delicate balance to be struck in seeking solutions which are minimal but effective. This balance also feeds into respondents wishing to further their sense of connection to the Hill of Tara. A sophisticated interpretation and education strategy has been identified as one means of achieving this; a plan that, imperatively, places Tara in its wider national archaeological-historical context (e.g., in relation to other 'royal' landscapes: Navan Fort, Co. Armagh; Cashel, Co. Tipperary; Dún Ailinne, Co. Kildare; Rathcroghan, Co. Roscommon) and broader cultural significance as an ancient, social place ingrained with various layers of meaning. This would be expected to provide an indirect means of protecting and preserving the Tara landscape through an increased awareness of its importance and particular vulnerabilities.

4.4 Visit Frequency

Participants were asked about the frequency of their visits to the site: "How often do you visit the Hill of Tara?" This was answered by 393 of the 399 total number of respondents. Responses were assigned to one of seven categories: Daily; Weekly; Monthly; Yearly; Rarely; Never; and Indeterminate. A brief methodological statement: for the responses which straddled more than one of these groupings (e.g., "weekly-monthly"), the more frequent of the two was used for the purposes of this analysis. The results are presented in Figure 5 and Table 2.

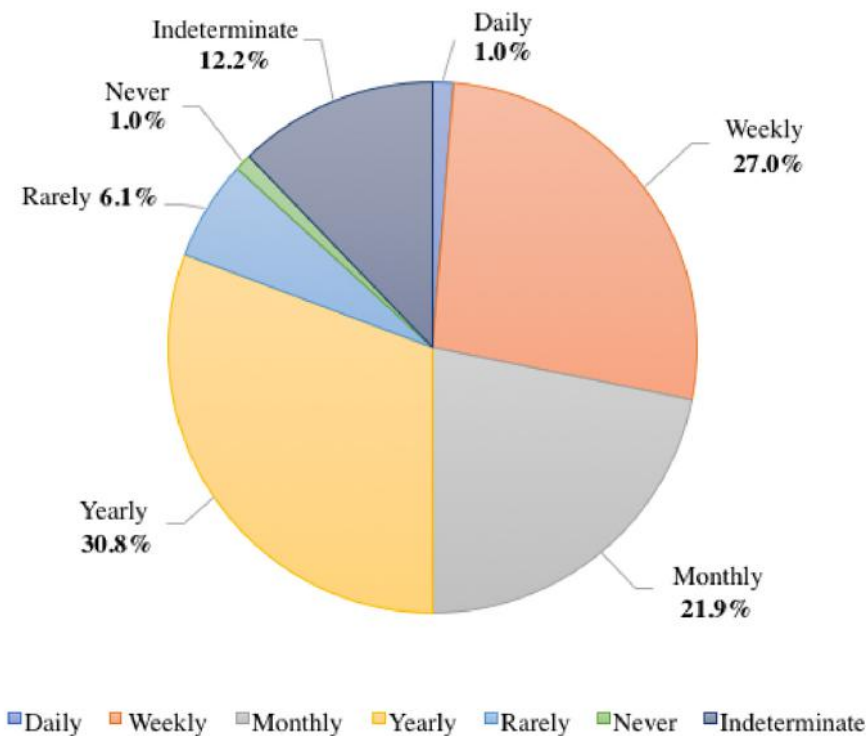


Figure 5: Percentage of the frequency of visits by survey participants.

Visit Frequency	Number of Respondents (n=393)	Further Comment
Daily	4	Visitors attend every day
Weekly	106	18 individuals state at least once a week; 42 specify visits between 2 and 6 times per week; others simply state weekly, several times per week, or more again (e.g., one respondent states 10–15 times per week in summer, 4–5 times per week in winter)
Monthly	86	53 claim to visit at least/more than once per month; otherwise once a month or, simply, monthly
Yearly	121	Includes those visiting 1–2 times per year, seasonally, as well as those who have averaged visits, e.g., 20 times
Rarely	24	More than one year between visits. Visits vary from every two or three years to those who attend occasionally or have been only once
Never	4	Those who have not visited the hill, or in some instances, Ireland
Indeterminate	48	Includes those responses which did not clearly specify their visitation frequency. Responses ranged across: “regularly”, “often”, “when family/friends visits”, “very frequently”, “dozens of times”, “varies”, “special occasions”, or other similar comment

Table 2: Further detail of comments related to visit frequency.

Almost half of respondents (49.9%) claim to visit Tara frequently, that is, those who visit every day, on a weekly basis, or at least monthly. For the small portion who visit the site every day (n=4), it can be assumed that these are individuals that live in the vicinity of Tara. This is likely to be the case for most of those visiting the hill on a weekly basis – many of whom do so more than once per week – who form over a quarter of all respondents (27%). Within this group, forty-two individuals specify going to the site anywhere between two and six times each week. A further eighteen participants state that they visit at least once, implying that they oftentimes attend multiple times per week. This is significant because a sizable portion of survey respondents then visit the Hill of Tara on a near daily basis (see Table 2).

Fifty-three individuals state at least once or multiple times a month for the regularity of their visits to the site, with typical statements of this averaging two to three times monthly. The remainder of responses in this group visit once per month, or do not specify otherwise. The semi-frequent visitor – who visits at least once a year – makes up just under one-third of participants (30.8%). Again, regularity varies within this grouping: from those visiting once, twice, or several times a year to the seasonal or bi-monthly visitor.

Twenty-four individuals said they do not visit the Hill of Tara on any kind of regular basis. This category incorporates those who have visited once as well as those that visit every few years. Their very participation in the survey speaks to both the meaningfulness of the Tara landscape, which can resonate with even the occasional visitor, and the concern which can be elicited for its protection. Interesting still are the four individuals who feel in some way connected to or invested in Tara without having ever visited, in what is a clear display of the international renown of the monument.

The remaining responses form a somewhat muddled category: ‘Indeterminate’. This arose from a selection of responses which did not specify the frequency of their visits in such a way that they could be assigned to one of the other groupings (see Table 2 for detail). A portion (approximately thirteen) affirm some kind of regular attendance, and from this it may be speculated that they may visit on a weekly or monthly basis, at least. Conversely, roughly seventeen responses would indicate more occasional visits.

It is noteworthy that the categories with the highest number of individuals are those relating to visits of a weekly

basis or periodically throughout the year. In fact, the majority of survey participants (80.7%) are frequent or semi-frequent visitors to Tara. This should be taken as assurance that the issues discussed in the survey are, by and large, those which are having the most profound impact on the overall visitor experience, and are being put forward by individuals who regularly bear witness to them. Feedback to this particular question has even provided evidence for the issues surrounding the site having a direct impact on visitor attendance. Several participant responses illustrate this:

“Used to be twice a week. Now hardly ever because It’s [sic] often chaotic and there are no real quiet times”

“2/3 times a year. I would go more often, but quite frustrating with parking/busy-ness at peak times”

“Few times a year now, theres [sic] no wheelchair access so i cant [sic] bring my mum anymore”

4.5 Additional Comments

The final survey question was non-specific in what it asked participants to address. Respondents could provide additional comments they wished to express further to previous questions. Of all questions, most individuals chose not to engage with this part of the survey, a fact which is reflected in the lowest response rate of 82.7%. This is exacerbated further when the additional forty-two respondents who stated “no”, or something to this effect, in their response are considered. In reality, only 288 survey participants engaged with this question. Most of the statements made here are a reinforcement of the issues and sentiments expressed in the previous questions, particularly those relating to the importance of, issues with, and preservation of Tara. For example, two respondents mention the issue of the near permanent presence of campers at the entrance to the site. Three individuals raised the issue of dogs off-lead and dog fouling and suggest a policy of allowing dogs on the hill only if they are kept on a lead at all times, in addition to the installation of bins for waste materials. Forty-six participants discussed their resistance to the possibility of restricted access being introduced at Tara, many of whom specified a non-monetised form of access. Another frequent comment (n=38) relates to interpretative issues, and how these need to be improved for the site as it stands.

It is clear that people connect with and value the Tara landscape and its multiple dimensions in particular ways. On the whole, they want improvements to be made that will not harm the integrity of the site, changes that may make the site unrecognisable in terms of the experience they seek. Several participants plea for nothing to be done to the site, to “leave it alone”. Others recognise that with the melting pot of issues that have coalesced, the current situation is unsustainable for the preservation of the monument in the long run. One of the more interesting ‘requests’ so-to-speak from this part of the survey is presenting – at least some aspects of Tara – in a broad, regional and, even national, context:

“...I also believe that more should be attempted to demonstrate that the Hill of Tara is not an isolated site but that it is part of the Tara Skryne valley, and is set within a landscape of other intervisible hills across Meath and North Dublin which have been the sites of significant prehistoric activity with rich mythologies.”

“It would also be great if we had a walking path across the landscape that linked all the great sites in Meath. People should be able to walk from one to the other without having to pay any money, and without trespassing.”

“Involve the local historians, the residents, Tara Centre, expand the holistic and historical services. Don’t keep it in isolation from the other surrounding sacred sites and hills EG [sic]: Uisneach...”

“Developer [sic] interlinked walk ways with Trim, Screen, Bective and other local heritage areas...”

“Tara is 45 minutes from Dublin airport and should be promoted along with Trim Castle, Bective Abbey, Hill of Skryne, Slane and Newgrange as a tourist route creating jobs in these areas...”

“A wonderful site with tons of high quality research done. Needs high quality & sensitive interpretation but without excessive ‘emotionality’. Place it in it’s [sic] local, regional and national context...”

...If there was a tour that could be done incorporating Tara, Slane and Newbridge. Or Trim and some of the many other historical sites it would be fantastic. It would showcase some of the lesser known cultural nd [sic] historical sites thus protecting them from being built on reduced to lesser importance in our rich tapestry of history.”

There is great scope for presenting Tara in such a way. Archaeologically, Tara could be set within the various burial contexts of prehistory, or that of Iron Age ceremonial and enclosure sites, or early medieval kingship and royal assembly. In terms of social history, the use of the hill by early modern political leaders and during periods of warfare can be more widely contextualised, not to mention drawing upon the rich mythological heritage of Ireland in which Tara features repeatedly.

Another aspect which came through in responses, was how people cherish the site for its openness and, together with knowing the importance of the site in many different ways in Irish culture, how they take immense satisfaction in feeling connected to a place but also experiencing somewhere with such a unique sense of place. As mentioned elsewhere, however, it has been expressed by a portion of participants that there should be some degree of separation of activities at Tara, at least keeping those more intensive recreational forms, i.e., sports, away from the earthen enclosures, or relegating others to the site perimeter.

5. Other Groups

Two local interest groups provided submissions to the Heritage Council for consideration as part of a consultation process: Meath Archaeological and Historical Society and Tara Skryne Preservation Group. The views expressed in both submissions are on behalf of the collective membership of the groups and are not a series of individual responses from members. Their views are summarised below.

5.1 Meath Archaeological and Historical Society (MAHS)

The official views of the society were submitted in hard copy (by post) to the Heritage Council which addressed the same five questions that formed the online survey. The society did submit the same official responses into the Survey Monkey questionnaire, therefore their views have been assimilated into the discussion and statistics above. Their main views are extended upon here, however, in brief.

MAHS feels that Tara and its hinterland are important for acting as a “symbol of the unity and diversity of the peoples of this island” over the course of its existence while also acknowledging its historical and ritual significance in terms of kingship, assembly, mythology, and religion in the wider Irish landscape.

Similar to the responses from the public consultation detailed above, the main issues that MAHS identified were interpretation (poor signage, information, audio visual displays), lack of facilities (toilets and other visitor amenities), inadequate car parking (including disabled parking and general disabled access to the site).

The group suggest that a permanent presence be installed at Tara for the purposes of maintenance and management. Education and further research are also identified as means to protect and preserve the site, as is the continuation of sheep farming on the hill, and the avoidance of major infrastructural or other development (excepting an improved visitor centre).

Most interestingly, the group states that it has “over 400 members, mostly living in Co. Meath, many visit the Hill regularly, some on a weekly basis.” This means that the number of regular (daily, weekly, monthly) visitors to Tara is probably significantly higher than is quoted above in section IV.iv.

Further comments made by MAHS included stressing the role of Tara in expressing diversity in Ireland, a place for bringing peoples together to a central place over the millennia. More practically, the group expressed their opposition to any potential plans to bring major roadways (naming the Dublin Outer Orbital Road specifically) into the vicinity of Tara.

5.2 Tara Skryne Preservation Group (TSPG)

This submission was not formatted in a way that directly related to the online consultation survey. TSPG stresses the spiritual significance of the Hill of Tara. The group is of the opinion that access to Tara be unrestricted and that the Mound of the Hostages be open to the public at significant events (citing Imbolc and Samhain as examples). The TSPG also relates the need for protection for a series of sacred wells at Tara: the Nemnach, the Calf Well, the Pinnacle, and Tobar Finn, and requests that a dedicated space be allocated where “Ceremonial Fires” may be lit during religious/spiritual festivals over the course of the year. TSPG have expressed a desire to see, “one overall body in charge of dealing with conservation and maintenance issues as they arise”, which echoes other calls for an investment to be made in installing a management structure and significant resources at Tara. The document also identifies perceived issues with the site, mainly tree and hedgerow management and interpretation (signage that does not create crowding at the entrance, as can occur at present).

Appendix 1: Text Used for Online Advertisement of Tara Survey

The Minister for Culture, Heritage and the Gaeltacht, Josepha Madigan, TD, has announced details of an online consultation process where the public can give their views on the Hill of Tara in County Meath as part of her Department's proposals to develop a new plan for the future preservation and management of the State-owned lands at the hill. The Conservation Plan is being developed by the Discovery Programme and the Heritage Council.

The Hill of Tara is one of the richest archaeological landscapes in Ireland. The hill contains around 150 archaeological monuments, which span over 5,000 years from the Neolithic to modern times. Tara is a place of great cultural importance. It was the focus of prehistoric burials and rituals and the ceremonial landscape of powerful medieval kings. It attracted the attention of Irish leaders throughout the ages and became the symbolic capital of Ireland in literature. The hill is also an amenity enjoyed by the local community and by visitors.

The Minister said that "with the numbers of visitors increasing all the time, there is a pressing need to have the management of the State-owned lands on the Hill of Tara supported by sustainable long-term policies that will guide national and local agencies in the preservation of this significant landscape. The first phase in developing a new strategy is to produce a Tara Conservation Management Plan that will clearly define Tara's significance, identify issues and vulnerabilities affecting the complex, and draw up policies that will inform a future implementation phase. This public consultation process is a central component of the drafting of this Plan".

The consultation process is intended to be an open and effective way for members of the public to engage in a constructive dialogue on Tara. The feedback received will be carefully assessed and analysed and will feed into the final text of the Plan. The Plan will be a dynamic document that will be open to regular evaluation and updating as policies are developed in the future. It will be drawn up by a Steering Group set up by the Minister that includes representatives from her own Department, the Office of Public Works, Meath County Council, the Heritage Council and the Discovery Programme.

The Minister said that she "hopes for the greatest possible participation by the public. The Hill of Tara is an invaluable cultural asset that is there for everyone to enjoy. The more people that take part the more ideas and views will be taken into account in shaping how we conserve it for future generations".

The Heritage Council is facilitating this consultation and we welcome your participation in this process and wish to thank you in advance for your valuable input.

The survey can be accessed via this link **[Note: This was hyperlinked to the Survey Monkey questionnaire when the survey was live between March and May 2018]**



Appendix E

Developing a Visitor Profile, Tara, County Meath

Kevin Fogarty (DT406/1) Fieldwork and commentary
Emylli Santana Souza (DT406/1) Fieldwork and commentary
Gabija Stasiulyte (DT406/1) Fieldwork and commentary

Facilitator: Dr. Catherine Gorman
School of Hospitality Management and Tourism, Dublin Institute of Technology,
Cathal Brugha Street, Dublin 1
catherine.gorman@dit.ie

Executive Summary

Title: Visitor Profile for Tara Archaeological Site, County Meath

GPS Co-ordinates: 53.5788° N, 6.6116° W

1.0 Brief and Process

A Conservation Management Plan for the State-owned lands at the Hill of Tara was commissioned by the Minister for Culture, Heritage and the Gaeltacht in January 2018. As an element of this at the request of the Heritage Council and the Discovery Programme, a visitor profile was undertaken by staff and students of the School of Hospitality Management and Tourism, Dublin Institute of Technology (DIT).

According to the Office of Public Works (OPW), over 200,000 people visit Tara archaeological site each year, and the site is being actively promoted as part of the Ireland's Ancient East brand by Fáilte Ireland. As part of the Conservation Management Plan consideration is required as to how the site should be managed in the future, and a visitor profile is the first step in identifying aspects of visitation to the site.

The objective of the research work was to develop a visitor profile of the Tara archaeological site in County Meath. The survey was administered to visitors to the Hill of Tara over one day, 18 July 2018. The survey was administered by three volunteer students from the BA in Tourism Management (DT406), DIT, facilitated by Dr. Catherine Gorman. These students were informed of the survey and were offered an opportunity to volunteer to undertake the work.

The following were undertaken:

- Ethics approval for the work by DIT Ethics Committee
- A protocol of consent for respondents
- A risk assessment in relation to student involvement
- Insurance indemnity.

2.0 Methodology

A primarily quantitative approach was adopted as the methodology. This was due to the nature of the work and the population being researched. Visitors enjoying a site are only willing to provide limited time to responding to a survey.

Study Population: Visitors to the Hill of Tara, County Meath

Sampling Criteria: that the survey participant should be visiting/have visited the Hill of Tara and be over the age of 18

Method of Sampling: Probability random sampling

Sample Number: 148 valid responses collected. Some questions deviated from this as they were unanswered.

Date of Administration: Wednesday 18 July 2018 10.00-7.00

Survey Instrument: Questionnaire with mainly closed questions. Questions based on input from the Heritage Council and the Department of Culture, Heritage and the Gaeltacht and on the following framework:

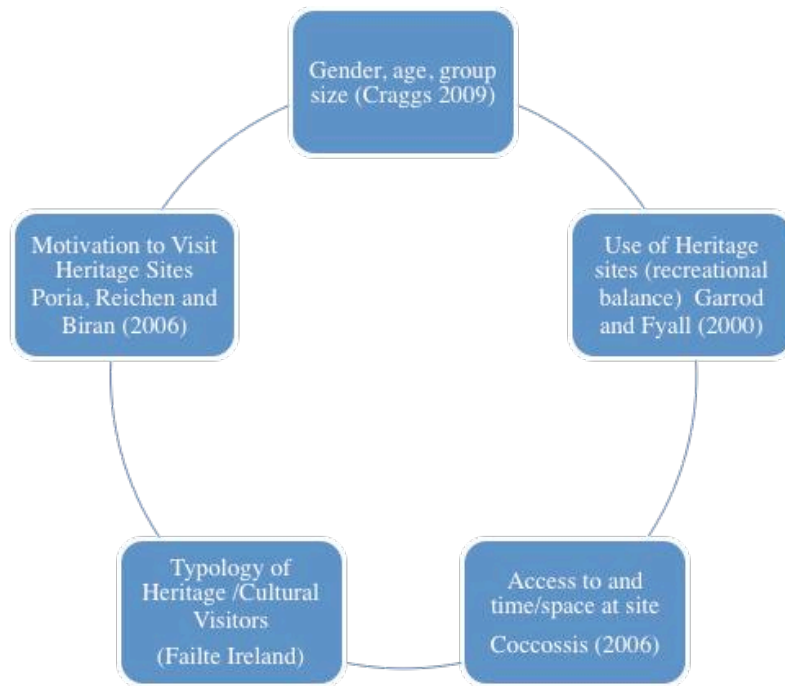


Figure 1 Framework for Questionnaire Development

Method of Administration

Student volunteers approached visitors at three locations who were invited to participate in the survey:

- The carpark and exit gate
- The hill
- Outside the coffee shop.

The administrators of the questionnaire introduced themselves and provided an explanation:

- of what the survey is about
- that the information received is anonymous
- that the participant at any time may withdraw from the survey
- that the data would be analysed and interpreted as a collective
- that the survey data would be used for the purpose of the survey report and publication
- that data collected would be destroyed on completion of the work.

On completion of the questionnaire, the data was coded and input into Microsoft Excel generating statistical output. It was then analysed. A word cloud was generated from the 'one word' comment. There was also a number of other comments which were recorded. These are clustered into positive and negative comments and other emerging issues. Recommendations were also recorded.

A copy of the questionnaire can be found in Appendix 1.

Comparative Data

A survey with the objective of developing a visitor profile was undertaken in 2003 at the Hill of Tara. This was undertaken by the DIT Research Centre and generated 206 responses. While comparisons can be drawn between some questions, others proved more elusive. Comparative percentages are highlighted where possible. Limitations and considerations have also been highlighted under each question.

3.0 Key Findings

3.1 Question 1 Nationality

Just over one third of the respondents (34%) were non-Irish, and 66% were from Ireland. This is the reverse of the visitor breakdown in 2003.

TABLE 1 Q.1 Nationality				
	Response Indicator	Frequency	%	2003 data %
Irish	Yes	97	66	35
Non-Irish	No	51	34	65
	Total	148	100	100

As the tourism profile was being considered, and an overseas visitor is defined as being more than 24 hours away from their place of residence, residency was used as considered variable. Some visitors to the site, although living in Ireland, considered themselves as from another jurisdiction and this had to be teased out with a number of respondents. Thirteen different nationalities were recorded. The main non-Irish nationalities were Spain (n=9), USA (n=8), and Australia (n=7). The full list of nationalities is recorded in Table 2.

TABLE 2 Country of Origin 2018			
Nationality	Frequency (n)	Nationality	Frequency (n)
Spain	9	Canada	2
US	8	Belgium	1
Australia	7	Denmark	1
Germany	4	France	1
Italy	4	Japan	1
UK	4	Hungary	1
Switzerland	3		
NA= 4		Total =46	

Comparative Data 2003 vs 2018

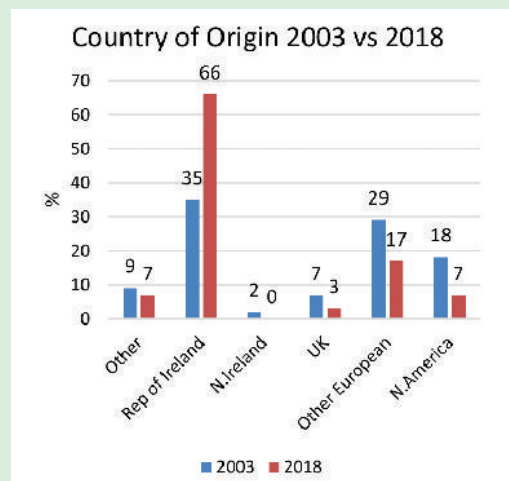


Figure 2 Country of Origin 2003 vs 2018

Figure 2 indicates that a higher percentage of visitors from Ireland are represented in the survey in 2018.



Figure 3 Q.1A If from Ireland, where are you from?

N=98

Of those who were Irish (n=98) 42% of them were local and 28% were not local but lived in County Meath.

3.2 Question 2 Reason to Visit

The most cited single reason for visiting the site was 'a day out' (32%) and 'to visit the Hill of Tara' (heritage) (30%). However, including those who combined reasons, 'a day out' was cited as one of the reasons to visit for 49% of the respondents, with 43% visiting the heritage of the Hill of Tara. Just under a quarter (22%) of the respondents mentioned exercise/walking as the reason to visit.



Figure 4 Q.2 Why have you come here today?

Table 3, using two different questions, indicates some form of comparison, though it is difficult to draw direct comparisons.

TABLE 3 Comparative Data 2003 vs 2018

Using different questions, three comparisons can be made with 2003 data		
	2018 %	2003 %
Local visitors		
Day-trippers	47 (Q.1)	23
Visiting specifically for the Hill of Tara/heritage	49 (Q.2)	5
<ul style="list-style-type: none"> • for 2018 data Meath and local were considered local • visiting specifically for the Hill of Tara, 2003 figure excludes local people 		

3.3 Question 3 Previous Visit

There was a high incidence of repeat visitors with 59% saying they had been to the site before. The high number of local people and their reason to visit may have influenced this answer.

TABLE 4 Q.3 Have you been here before?				2003
	Response Indicator	Frequency	%	%
	Yes	86	59	30
	No	61	41	70
NA=1	Total	147	100	100

Comparative Data 2003 vs 2018

Almost twice the percentage of people said their visit to the site was a repeat visit in 2018, as compared to those surveyed in 2003. The local origin and reason to visit (day out) may contribute to this change.

3.4 Question 4 Party Composition

Question 4 asked 'what type of visitor are you?', providing various categories to ascertain party composition. The majority of the respondents (n=84) comprised family. Groups constituted only 10% of the respondents.

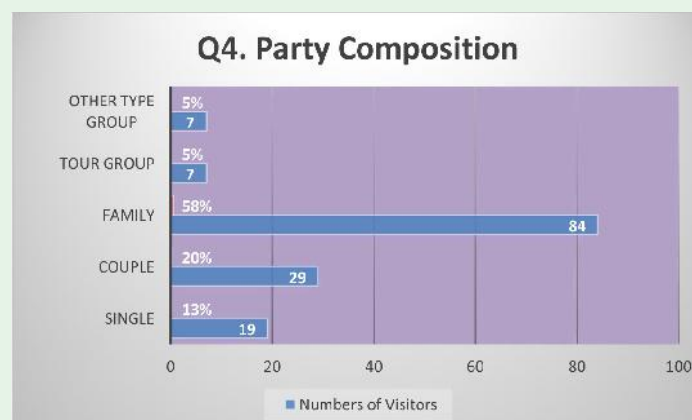


Figure 5 Party Composition

N=146

Comparative Data 2003 vs 2018

Families constituted only 31% of the visitors in 2003, whereas in 2018 they constituted 58% of the respondents. Groups constituted 23% in 2003 but only 10% in 2018.

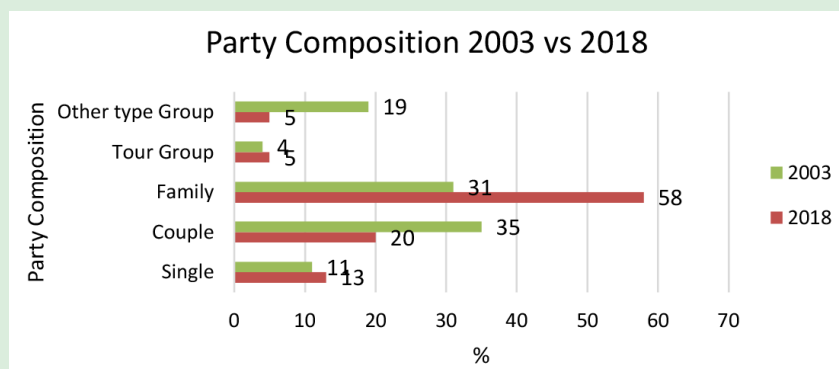


Figure 6 Comparative Data Party Composition

3.5 Question 5 Mode of Transport to Site

There is no public mode of transport to the site and the nearest public transport, which runs approximately every hour to and from Dublin, requires a 2km walk to the site from the main road. There is a carpark to facilitate the main mode of transport which is cars and buses. Almost all (92%) used a car to get to the site.

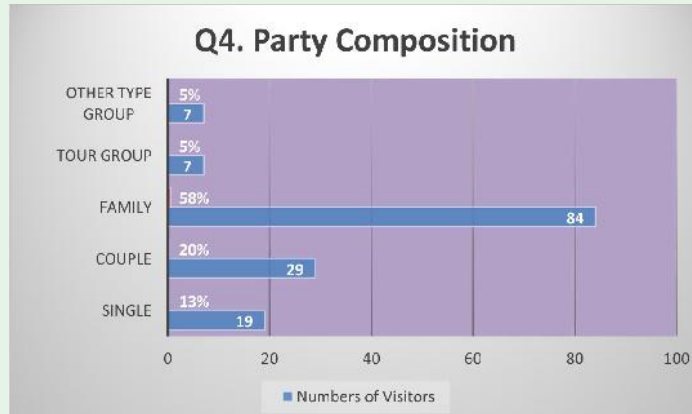


Figure 7 Mode of Transport to Site

N=148

Comparative Data 2003 vs 2018

Car usage to the site has increased by 21% between 2003 and 2018.

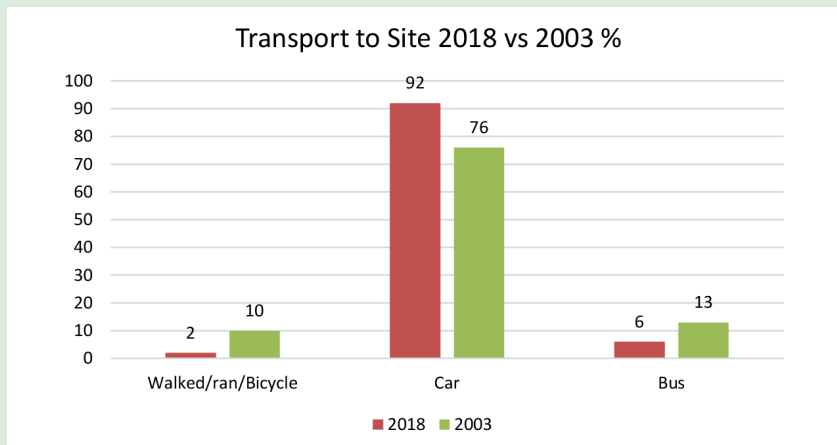


Figure 8 Comparative Data: Transport to Site

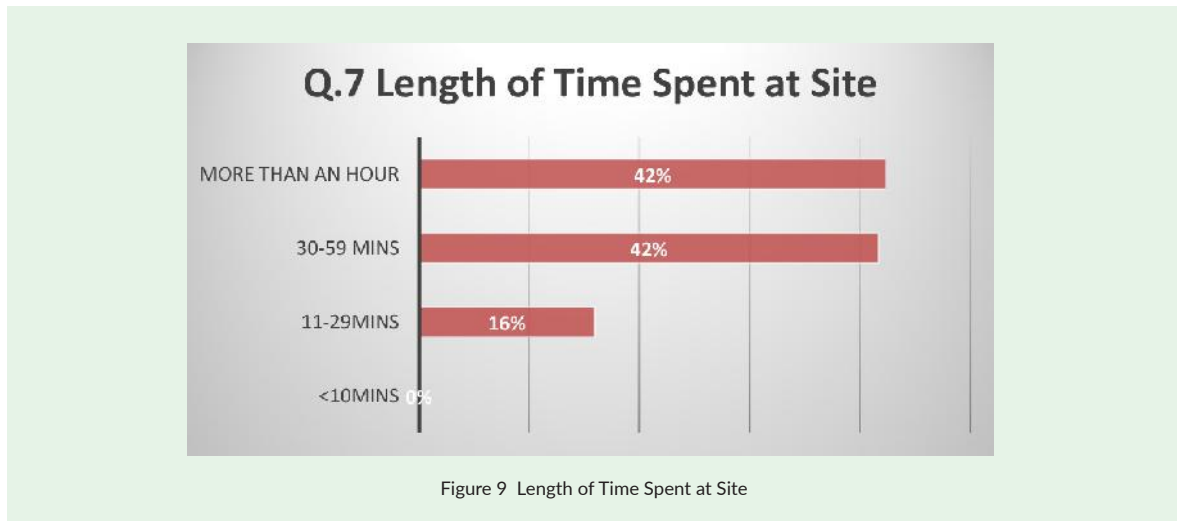
3.6 Question 6 Knowledge of WHS Tentative List

Almost half of those who responded said that they knew that the Hill of Tara is on the World Heritage Site Tentative List (46%).

TABLE 5 Q.6 Did you know that the Hill of Tara is on the World Heritage Site Tentative list?			
	Response Indicator	Frequency	%
	Yes	66	46
	No	78	54
NA=4	Total	144	100

3.7 Question 7 Time Spent at Site (approx.)

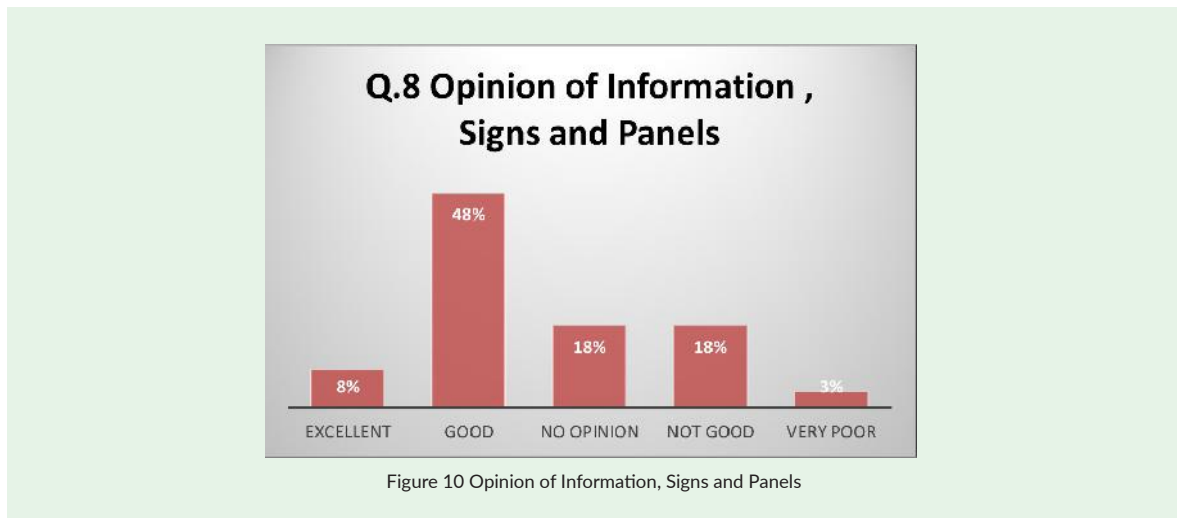
A good percentage of the respondents spent more than an hour at the site (42%) with another 42% spending between 30 minutes and an hour at the site. This may be reflective of their composition (family) and the reason for their visit (day out). It was also noted that the coffee shop was busy for most of the day.



N=144

3.8 Question 8 Opinion of Current Information, Signs and Panels

There are a number of interpretative signs provided at the entrance to the hill and this is preceded by the standardised and branded 'Ireland's Ancient East' sign which lies just outside the site. There is limited signage on the site itself and this was commented on by some of the visitors. Over half of the respondents (56%) had a positive opinion of the current information, signs and panels.



N=143

Comparative Data 2003 vs 2018

The opinion of the signage had improved over the period 2003–2018. In 2003, 55% of the respondents did not find the information provision adequate and 88% of these said that more information was required at the site.

In 2018, 56% of the respondents had a positive opinion of the interpretative panels and signage.

Comparative Data 2003 vs 2018

In 2003, there appeared to be more recurrent words used to describe Tara, though the 2018 survey requested that only one word be used to encapsulate the site. In 2003, 'ancient/historic' was used by 27% of the respondents, 'natural' and 'mysterious' were each used as descriptive terms by 17% of the respondents, and 'peaceful' was used by 12%.

3.11 Question 11 Other Sites Visited

In order to ascertain the interest in heritage shown by the visitor, the respondents were asked whether they had recently visited other key heritage sites/monuments. Newgrange was the most popular with 57% of the respondents having visited the monument recently. This was followed by Kells at 31%.



Figure 13 Other Sites Visited

N=137

- As some visitors had visited multiple sites, the figure exceeds 100%

Comparative Data 2003 vs 2018

In 2003, the Book of Kells was the most popular other heritage site visited by the respondents (27%) before their visit to Tara followed by Newgrange (16%). In 2003, the town of Kells was only mentioned by 5 as a place they would visit after their visit to Tara. It must be noted that the list of places visited by the respondents in 2003 was far more extensive than in 2018, and 'other' in 2018 was not explored (though this only constituted 8% of the 137 respondents). The difference between 2003 and 2018 may be reflective of the higher percentage of non-Irish visitors who were part of the 2003 survey.

3.12 Question 12 Prior Level of Knowledge of Site

Respondents were asked about the knowledge they had of Tara before they visited the site; 43% said that they had some knowledge of the site, however, 37% said that they had little or no knowledge.

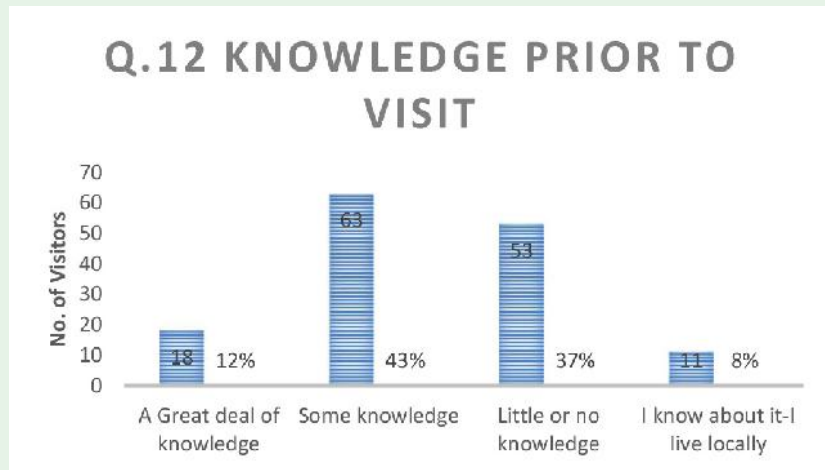


Figure 14 Knowledge Prior to Visit

3.13 Question 13 Use of Guide

The respondents were asked whether they used a guide and the type of guide used. Reflective of the numbers of visitors from the local population, and their use of the site as a 'day out', 79% did not use a guide at all. However, it was observed that many of the visitors do read the interpretation panels either on the way up or down from the hill.

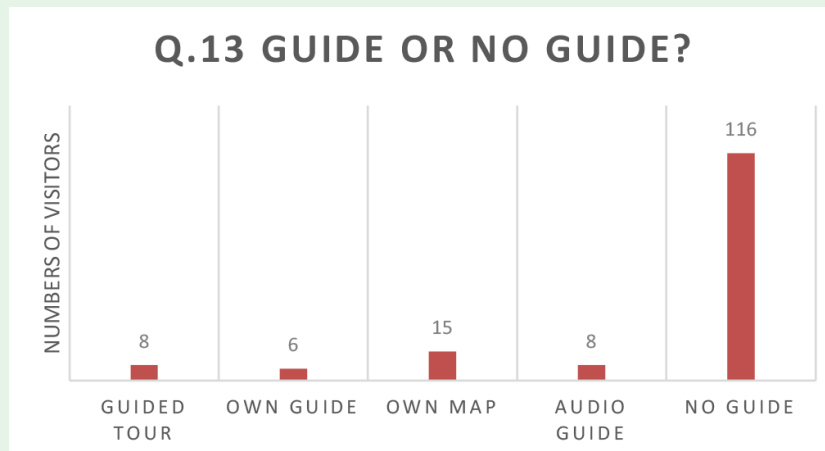


Figure 15 Use of Guide

N=146

Comparative Data 2003 vs 2018

In 2003, 15% of visitors took a guided tour. In 2018, only 5% took a guided tour and another 4% had their own guide.

3.14 Question 14 Expectations

Just over three-quarters of the respondents (76%) said that the visit met their expectations, with 12% stating it was better than their expectations and the remainder (12%) saying that it did not meet their expectations.

TABLE 6 Q.14 Did your visit to Tara...				2003
	Response Indicator	Frequency	%	%
	Meet your expectations?	106	76	82
	Not meet your expectations?	16	12	11
	Was better than your expectations?	17	12	Not asked
NA= 9	Total	139	100	

Comparative Data 2003 vs 2018

In 2003, 82% of the respondents said that the experience met their expectations. In 2018, 88% of the respondents said that their visit either met or was better than their expectations.

Classified Information

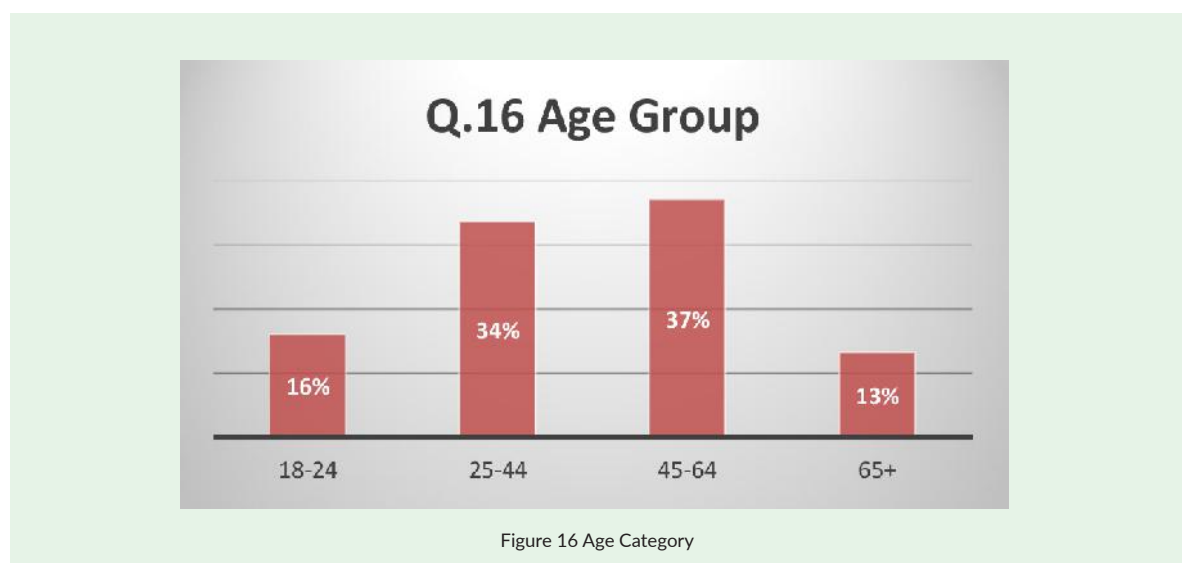
3.15 Question 15 Gender

Approximately two-thirds of the respondents were female (n=94/64%). This may be reflective of the day of week (Wednesday) and time of day at which the survey was undertaken.

TABLE 7 Q.15 Gender			
	Response Indicator	Frequency	%
	Male	52	36
	Female	94	64
NA=2	Total	146	100

3.16 Question 16 Age Category

Over two thirds of the respondents were between the age of 25 and 64 (n=71%). Those under the age of 18 were not questioned. It was observed that there were a considerable number of people under 18 and this is reflective of the main composition of visitors (family).



N=143

Comparative Data 2003 vs 2018

Although not directly comparable as the age range is different, the comparative data does indicate that there was a higher percentage of older people 65+ (from 5% to 13%) who responded as part of the survey in 2018.

TABLE 8 Age Category

Age Range	Percentage
18-24 (2018)	16
19-25 (2003)	7
25-64 (2018)	71
26-65 (2003)	87
65+ (2018)	13
65+ (2003)	5

3.17 Other Comments

Eighty-six (n=86) other comments were recorded. These ranged from recommendations to observations, complements and criticism.

TABLE 9 Other Comments

Parking a problem; it is our heritage, people are using it as a stamping ground
Need more connection between the Ancient-East panels and the others; also those at the monuments
More space to park; site is good, more info e.g. screaming stone commemoration
Needs more signage; hard to identify what there is; Enjoyed it, very interesting. Cant [sic] destroy it
Parking could be better organized; better signage; thought there would be a charge for car parking
Orientate for NSEW; signs for each mound; should be like Newgrange
Need picnic area and play area for families
Make more of it; been to Ireland before - not on the radar; try and have a minute of reflection up there by oneself
Happy
Use reality headsets/ AR. Do not change it (use technology, lights to make it more magical)
Shame there are posts on the sites; need leaflet; when out on site, lose track of where you are
Need walking signs, no paths, no explanations at hills - need to read up before
Needs to be controlled. Athletic club uses mounds to train on, no paths; longer walks can be developed around Maeve's tomb (lecturer DCU)
Beautiful; no change
Ban drones; need more coffee shops in the area (Screen etc.) Don't overdevelop it; Public don't know that they can access tree areas/create walks
Put more money into the trees; Don't change it; don't commercialise it; information boards totally unsuitable for the area; I am an archaeologist
Extend the parking for buses; better signage required around the monuments
very interesting; less is more; keep it simple
Happy
Lovely site; parking limited; signs could be more informative; nice that it is not overly touristic
it is recreation vs heritage; more space for parking; love it the way it is: more benches; some heritage sites are overpriced; e.g. Bunnratty; needs to be transparent in terms of money being spent
Better signage at the mound and at the cross; need to appreciate; need to know the history
Perhaps light up around the mound of the hostages

TABLE 9 Other Comments cont'd

Great guide; Did tour in church; really great; how could you understand the place without the tour
Accessibility for older people (golf carts); doggy bins; more toilets (badly need them); nice at certain times of the year
Best leave it untouched; nice that it isn't touristy; only a little info beside the hills
an interpretive centre like Newgrange but where would you put it? Place often used for day care (small children)
Coming here for 30-40 years; want to do the tour; pity there are not more facilities; the church is not a great visitor centre; more toilets; there are people camping under the trees
Need something like Newgrange; draws people in the winter; fit it anywhere; perimeter is 4km
rope off areas; better signage on hills
Beautiful; leave as is; no new buildings
More signs in English
Great for preservation
Directions poor as we got lost
Came for the mystical and spiritual
A leisurely local
More natural looking??
Stay the way it is
Lots of kids out with day care Meath; nursery schools
Clean the toilets
More interesting info at each point; guided tours
No signs
Keep natural
Keep it the way it is
Really liked the church video; good info in French and other languages
No real directions: a trail?
No idea of the history of the??
Signage
Mystic; nothing other than main hall
Visitor centre? Viewing points? What can I see from here
history, stories and myths
All good
Better map signs
Investment on site not just on shop and roads
More information in English and need better signs
Better information displayed
more investment on trail
No signs on the trail
Need more signs in English and other languages
Keep it the way it is
Good experience
Relaxing and a good day out
Great for family and day off
Good day with kids and family
Quiet and mysterious
More signs
Won't change nothing
More features for tourists

TABLE 9 Other Comments cont'd
More signs on the way
Information on other languages
Conserve as it is
Green and relaxing
great experience
Wouldn't mind paying
More development needed
More options in the attraction
More improvement for kids and families
Keep it natural
Use a replica based on original e.g. based on Spain's Altamira Caves
Good for the family and kids love it
Better map in English and more language options
Better information displayed
More investment on site
Directions on trail
Entrance needs to be more organised with info.
Better signs; paths are dangerous; the Temple is not indicated I [sic] the map; entrance not properly indicated; more investment is required on the site and not on the coffee shop Use money for improvement and conservation

TABLE 10 Clustered Comments		
Theme	Frequency (%) 2018	% 2003
Positive	24 (30)	
Negative	2 (2)	
Parking	4 (4.6)	
Infrastructural (paths, trails etc)	17 (20)	
Signage	31 (36)	29
Develop further	10 (12)	
Leave as is	16 (18.6)	29

It should be noted that there were very few negative comments.

4.0 Limitations/Considerations

A number of limitations/considerations need to be highlighted. These have been mentioned under the questions; however, they are teased out further here.

As the survey was undertaken in English, it was difficult to communicate with some of the tour groups who visited as their English was poor and in a number of cases, they declined to participate.

Question 1

In view of touristic definition, respondents who categorised themselves as non-Irish, and lived locally or in Ireland, were categorised as Irish. Those who are categorised as non-Irish are visitors to Ireland and do not live in Ireland.

Question 4

At times it was difficult for people to categorise themselves as a particular category; for example, if they were a couple and part of a group or if they were single and part of a family or if they were a group of friends.

Question 6

It is possible that the word 'tentative' was not understood – respondents just heard World Heritage Site hence the high positive response to the question.

Question 10 Word Cloud

As the survey was administered, biases can occur where it is thought by the respondent that offence may be taken if a negative word is used... this was experienced a few times.

Question 11

As many could not confirm that the visit was within the last 6 months, respondents tended to answer 'visited recently'. The aim of this question was to segment the market, i.e., are they regular visitors of heritage?

Question 12

This refers to their perception of their knowledge and will vary from person to person. Does the lack of prior knowledge indicate a lack of research prior to visit or is it reflective of the respondent profile and the high recreational use of the site?

5.0 Some Conclusions

Classified Information

Where comparison can be drawn, the data from the 2003 survey are highlighted in red.

The key findings were that a significant number of the visitors to the site in 2018 were Irish (66%) (35%) and many of these were local in origin (42%). The main age cohort was between 25 and 64 years old (71%) (87%) and overall respondents were mainly female (64%). The party composition was primarily of families (58%) (31%). The main purpose of visit was 'a day out' (49%), with the heritage site also providing a reason to visit (43%). Almost all visitors travelled to the site by car (92%) (76%).

The Site Experience

Almost all visitors (99%) visited the hill; however, only 17% said they visited the church and no-one said they visited the AV in the church. This was disputed by some of the comments as two visitors commented on the AV. A total of 74% (63%) visited the restaurant/shop. Repeat visitors constituted 59% (30%) of the respondents. A large majority of visitors to Tara (88%) said the experience of visiting the site either met or exceeded their expectations. The site was described in many terms, and the most frequent terms included 'beautiful', 'mysterious/mystic/mystery', 'peace/peaceful' and 'history/historical'. In 2003, the most frequent terms used were 'ancient/historic', 'natural', 'mysterious' and 'peaceful'. Some 42% of visitors spent more than an hour at the site with the same percentage spending between 30 minutes and 1 hour at the site.

Comments on the site were almost all positive though similar to 2003, signage was the most common issue arising (36%) (29%). A number of respondents (18.6%) (29%) wished to leave Tara the way it is, though 12% wished to see further development.

Interpretation

Most of the visitors (79%) (85%) did not use a guide though 37% said that they had little or no knowledge of the site prior to visit. Of the respondents, 43% did indicate that they had some knowledge. Some 46% of the respondents said they knew that the site was on the WHS Tentative list. Over half of the visitors (56%) to the site had a positive opinion of the interpretative panels and signage, which is very different from the 55% in 2003 who did not find the information provision adequate.

Other Sites Visited

Newgrange was the most popular site of other heritage sites visited with 57% (16%) of the sample having visited the tomb. Kells and the Boyne Valley had been visited by 31% and 25% respectively.

While it is difficult to make any assumptions based on a survey of 148 people on one sunny summers day in 2018 it would appear that the number of local people visiting the site has increased for the purpose of exercise and recreation. This was not a considered use in 2003. The coffee shop is certainly an attraction and together with the hill provides a good family day out. Within the mix are the visitors, many of whom are heritage focused; providing the right balance so that both markets can be catered for could be considered a difficult task. What came across strongly was the positive impact the site had on the visitors, both Irish and non-Irish. An emotional connection was evident in a number of responses and also the desire that the place should not change, or perhaps incur minimal change, with very few talking of interpretive centres/facilities. There seemed to be a sense of ownership, and that the site is very much part of the community as it provides an amenity, and indeed kites, many dogs and a variety of footballs were in evidence throughout the day.

The Tara archaeological site is a significant heritage site. Sustainable management from the perspective of tourism use of the site under the constructs of economic, socio-cultural and environment need consideration. From an economic perspective, methods of discrete revenue generation and additional promotion of the church facility should be explored to help offset management of the site. From a socio-cultural perspective, community engagement and visitation of the site by local people and its use as a recreational facility, does indicate their sense of ownership of the place. This was further endorsed by the positive commentary. Further engagement

with local schools feeding into local families would help develop further understanding and respect for the place. Safety is a concern in relation to the present layout of the carpark, as was observed on the day of the survey. This needs to be addressed.

From an environmental perspective, both the physical and perceptual carrying capacity needs to be considered, particularly in light of the promotion of the site by the 'Ireland's Ancient East' brand. Discrete interpretation capitalising on the use of technology (e.g., QR codes www.dublinstalkingstatues.ie) could convey the information in both an educational and creative manner without detracting from the site itself. Further survey work would provide deeper understanding of the site and its requirements.

6.0 Summary of the Experience as a Volunteer

Emylli Rissi Santana Souza

According to my observation and experience as volunteer on the 18th July 2018, while interviewing visitors to Hill of Tara; it was visible that most of the visitors were local or somehow lived close to the area. The majority were with their family members such as kids, grandparents or parents and also bringing their pets. These visitors were mostly enjoying a day out, as the weather was great. In addition, they commented to be having a day or evening out. Some people also visit Tara to exercise themselves, listen music and talk to friends. Thus, it was understood that they frequently (repeat visitors) visit the area, usually using cars to get to the place. On the other hand, some visitors from overseas were also present (first time). They came in a bus, or with friends that already knew the place. One point that got my attention was the length of time spent in the region. The tourists coming with the bus company where in a rush, and it was very difficult to interview them as they were there just for more or less 30min. In my own opinion, the time was not enough to explore the area, or enjoy the experience.

Another important observation was related to the Video provided in the Church. Almost every visitor said that they had never watched it. However, one visitor from Canada told me that she watched and it was an amazing experience because it made her understand the whole history about the place. Furthermore, it was considered by her as an important part of the experience and that probably she would not enjoy Tara as much as she did without the information gained from the video.

Tour guides were not used in the Tara experience, people in general used their own knowledge, maps, audio guides or information displayed.

Considering the panels available, the local people claim that this information are enough and that they do not want Tara to be full of signs or marks as that can destroy the authenticity of the area. In other words, those local residents believe that Tara is a mystical and holy place which involves knowledge and also people's imagination too. Conversely, some people had mentioned that they do want to see more signs and information displayed. One point is due to the fact that they don't really know the Tara and stays only on the Hill itself. However, if more signs such as walking trail were provided they could explore more the area.

A particular resident claimed that Tara is open and welcome visitors, but the information is not well displayed or clear enough. Signs are written in Irish and the English is really small on the side. Furthermore, he mentioned that the path is not properly safe for walking and the entrance gates are confusing as it seems to be closed at all the time. He also reported an injury as a lady fell because of the stones on the ground.

People certainly stay mostly in the coffee shop (very busy all the time), in the church area (passing by) and on the hill itself. Again, many people don't really go too far due to the lack of signs (they don't have idea of how many km are they going to walk or if it is safe to go). However, most of them says that the place meet their expectations.

In summary in general people mostly enjoyed the experience, locals or from overseas. However as mentioned some of them do not want any changes which makes difficult to identify possible development needs. Other people believe that Tara needs to be more developed and suitable for tourists in general. The main questions now are "Should Tara be conserved as it is? Or should be more developed and attractive for Tourists in General"?

Gabija Stasiulyte

I always heard people talk good things about Hill of Tara but, I've never been there which seems crazy because it takes 15 minutes to get there from where I live. I finally visited Hill of Tara and I can say that it succeeded my expectations. I thought that it will be just a hill and that's it but there is so much more to it there is a church on the site and they offer an audio visual about the history of the hill for the additional charge. Also, there is a gift shop and a restaurant/coffeeshop which is worth a visit. I did not expect to meet that much people in the Hill of Tara. At the start of the week. I knew that Hill of Tara is popular amongst tourists from all around the world but, I did not know that so much local people visit Hill of Tara every day. I asked local people why they visit this place and they said that it is the closest place for hikes, walks, and day outs. Also, many people said that this place just makes them feel good because it has something magical about it, which I agree hill of Tara has this mystical feel

about it that I can't explain it. I recommend everyone that hasn't been there to visit Hill of Tara it will exceed your expectations you will experience this magical and mysterious place and it is a must to visit gift- shop and restaurant.

I highly enjoyed partaking in the survey but would like to stress that we ended up surveying many Irish people in our trip for two reasons; firstly the language barrier between us and the buses of tourists and secondly due to the sheer amount of local people walking the site. A market the council should be aware of.

Kevin Fogarty

The hill site was surprising to me in terms of how much physical evidence of its history present. In primary school we were told stories of the myths and it was wonderful to see how much of them actually have left their physical mark upon that Hill.

Even more surprising to me was how difficult it was to find those landmarks. There is only one sign or information area on the entire site and that is at the gateway which doesn't even tell you where to go to get to any of the sights. Because of this, the majority of people we questioned had only visited the main part of the hill and couldn't tell me where the other half dozen attractions were.

This coupled with the lack of information at the sight proper that even those who knew where the other locations were, could not tell me what they were unless they walked back to the main entrance and read over the information there, rather than having the information at the sight where they can survey the history they are reading about.

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Appendix 1

Questionnaire

Visitor Profile of Tara County Meath July 2018

Day/Date:

Time of survey:

Wet Dry Sunny Overcast

Consent given

Administrator:

1. Nationality

Irish	
Non-Irish (name place of origin)	

If Irish, where do you live?

Local (within 10km)		Dublin	
Meath (>10km)		Other(name)	

2. Can you please tell me, why have you come here today?

To visit the site of Tara (heritage)		Day out	
To exercise (walk, run)		Other (please state)	

3. Have you been here before?

Yes	
No	

4. What type of visitor are you?

Single		Family	
Couple		Tour Group	
		If part of a tour group, what company	

5. Can you please tell me how you got to this site?

Walked/ran/bicycle	
Car	
Bus	

6. Did you know that the Hill of Tara is on the World Heritage Site Tentative list?

Yes	
No	

7. How long did you spend at the site (approx.)?

<10mins		30 – 59mins	
11 – 29mins		More than an hour	

8. Is the current information, signs and panels ...

Excellent	Good	No Opinion	Not good	Very poor
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9. What did you visit at the Hill of Tara? Can you please show me where you went on the map (on the reverse)

The Hill itself		The coffee shop	
The AV show in the church		Craftshop	

10. Using one word describe Tara as a place to visit.

11. Have you visited any other heritage sites/key archaeological monuments (within the last 6 months)?

Newgrange		Boyne Valley	
LoughCrew		Kells	
Other (Name)			

12. What level of knowledge did you have of the significance of Tara prior to your visit?

A great deal of knowledge	
Some knowledge	
Little or no knowledge	
I know about it – I live locally	

13. Which of the following did you do at Tara?

Go on a guided tour	
Had your own guide	
Used your own map	
Used an audio guide	
Did not use any guide at all	

14. Did your visit to Tara....

Meet your expectations	
Did not meet your expectations	
Was better than your expectations	

15. Gender

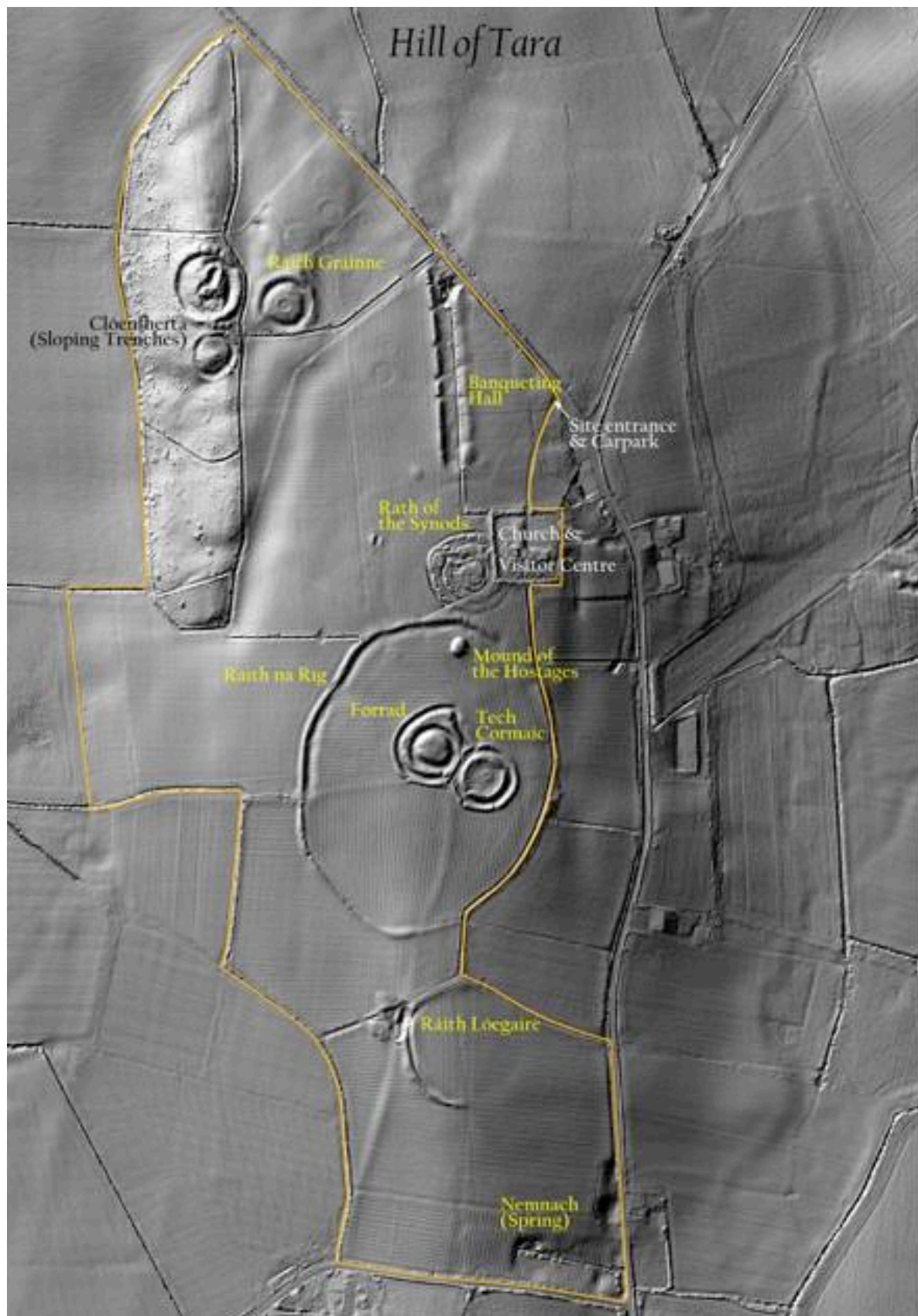
Male	
Female	

16. Age category

18 – 24		45 – 64	
25 – 44		65 +	

Any Comments

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The information from the map was not interpreted as the day of data collection was very windy and it was difficult to administer. Other methods of collecting data on spatial use and mobility need to be considered.

Appendix 2. All Tables 2018 Data

QUESTION 1. Nationality

Q.1 Nationality			
	Response Indicator	Frequency	%
Irish	Yes	97	66
Non-Irish	No	51	34
	Total	148	100

Country of Origin	
Nationality	Frequency (n)
Spain	9
US	8
Australia	7
Germany	4
Italy	4
UK	4
Switzerland	3
Canada	2
Belgium	1
Denmark	1
France	1
Japan	1
Hungary	1
Total	46
NA= 5	

If Irish, where do you live?		
Response Indicator	Frequency	%
Local	41	42
Dublin	11	11
Meath	27	28
Other	18	19
Total	97	100

QUESTION 2. Reason to Visit

Q.2 Can you please tell me, why you have come here today?		
Response Indicator	Frequency	Percentage
To visit the site of Tara (Heritage)	44	30
To exercise/walk/run	23	16
Day Out	48	32
Other	6	4
Heritage/Day Out	17	11
Heritage/Exercise	3	2
Day out/Exercise	7	5
Total	148	100

QUESTION 3. Previous Visit**Q.3 Have you been here before?**

	Response Indicator	Frequency	%
	Yes	86	59
	No	61	41
NA=1	Total	147	100

QUESTION 4. Party Composition**Q.4 What type of visitor are you?**

	Response Indicator	Frequency	Percentage
	Single	19	13
	Couple	29	20
	Family	84	58
	Tour Group	7	5
	Other type Group	7	5
NA=2	Total	146	100

QUESTION 5. Mode of Transport to Site**Q.5 Can you please tell me how you got to this site?**

Response Indicator	Frequency	%	
Walked/Ran/Bicycle	3	2	
Car	136	92	
Bus	9	6	
Total	148	100	

QUESTION 6. Knowledge of WHS Tentative List**Q.6 Did you know that the Hill of Tara is on the World Heritage Site Tentative list?**

	Response Indicator	Frequency	%
	Yes	66	46
	No	78	54
NA=4	Total	144	100

QUESTION 7. Time at Site**Q.7 How long did you spend at the site (approx.)?**

	Response Indicator	Frequency	Percentage
	<10mins	0	0
	11-29mins	23	16
	30-59 mins	60	42
	More than an hour	61	42
NA=4	Total	144	100

QUESTION 8. Opinion of current information, signs and panels**Q.8 Is the current information, signs and panels...**

	Response Indicator	Frequency	Percentage
	Excellent	12	8
	Good	68	48
	No opinion	26	18
	Not good	32	18
	Very poor	5	3
NA=5	Total	143	100

QUESTION 9. Places Visited at Site**Q.9 What did you visit at the Hill of Tara?**

	Response Indicator	Frequency	Percentage
	The Hill itself	49	35
	The AV show in the church	0	0
	The coffee shop	2	1
	Craft shop	0	0
	Hill and coffee shop	46	33
	Hill, coffee shop and craft shop	18	13
	Hill, church and coffee shop	6	4
	All	5	4
	Hill and church	11	8
	Craft shop and coffee shop	1	1
	Hill, church and craft shop	2	1
NA=8	Total	140	100

QUESTION 10. WordCloud

QUESTION 11. Other sites visited**Q.11 Have you visited any other heritage site/key archaeological monument (within the last 6 months)?**

	Response Indicator	Frequency	Percentage
	Newgrange	31	23
	LoughCrew	3	2
	Boyne Valley	3	2
	Kells	5	4
	Other	11	8
	LC and Kells	3	2
	NewG and LC	8	6
	All	13	9
	No	27	20
	Newg and Other	2	1
	NewG/LC/Bo	2	1
	NG+Boy+Kells	11	8
	NewG+BV	2	1
	NewG+Kells	7	5
	NewGLCBV	4	3
	BVKells	2	1
	LCBVKells	3	2
NA=11	Total	137	100

QUESTION 12. Prior Level of Knowledge of Site**Q.12 What level of knowledge did you have of the significance of Tara prior to your visit?**

	Response Indicator	Frequency	Percentage
	A great deal of knowledge	18	12
	Some knowledge	63	43
	Little or no knowledge	53	37
	I know about it - I live locally	11	8
NA=3	Total	145	100

QUESTION 13. Use of Guide**Q.13 Which of the following did you do at Tara?**

	Response Indicator	Frequency	Percentage
	Go on a guided tour	7	5
	Had your own guide	5	3
	Used your own map	10	7
	Used an audio guide	2	1
	Did not use any guide at all	116	79
	Own map and audio guide	4	3
	Guided tour and audio guide	1	1
	Own guide, own map and audio guide	1	1
NA=2		146	100

QUESTION 14. Expectations**Q.14 Did your visit to Tara**

	Response Indicator	Frequency	%
	Meet your expectations?	106	76
	Not meet your expectations?	16	12
	Was better than your expectations	17	12
NA= 9	Total	139	100

QUESTION 15. Gender**Q.15 Gender**

	Response Indicator	Frequency	%
	Male	52	36
	Female	94	64
NA=2	Total	146	100

QUESTION 16. Age Category**Q.16 Age Category**

	Response Indicator	Frequency	Percentage
	18-24	23	16
	25-44	48	34
	45-64	53	37
	65+	19	13
NA=5	Total	143	100



Appendix F

A Survey of the Usage by Bats of Habitats Occurring at the Hill of Tara, Navan, Co. Meath

Prepared September 2018 by:
Forest Environmental Research and Services Ltd
Sillogue
Kilberry
Navan
Co. Meath

Executive Summary

In August of 2018 FERS Ltd was commissioned to undertake bat monitoring at the Hill of Tara, Co. Meath, on behalf of the Office of Public Works. Monitoring was required at four locations over a period of one week:

- St Patrick's Church bell tower;
- The adjoining graveyard;
- Tree at northern end of site; and
- Tree at southern end of site.

A Pettersson D500X unit was deployed at each of these locations on 24 August 2018 and remained in place until 31 August 2018. These units were programmed to record all bat activity occurring during the period between 30 minutes pre-sunset and 30 minutes post-sunrise. A temperature and relative humidity datalogger was deployed with the unit within the bell tower of St Patrick's Church.

This document comprises a report of bat activity recorded during the period.

During surveys, a minimum of six species of bat were recorded: Common Pipistrelle, Soprano Pipistrelle, Nathusius' Pipistrelle, Leisler's Bat, Whiskered Bat and Brown Long-eared Bat.

The monitor placed in the tower recorded no bat passes over the survey period.

A considerable degree of bat activity was detected within the graveyard adjoining St Patrick's Church, indicating that there is a maternity roost of (at least) Soprano Pipistrelle and Brown Long-eared Bats within the fabric of the church building.

While some activity was detected along the hedgerow at the southern end of the site, no "feeding buzzes" and a low number of calls containing elements of "social calls" indicate that the southern end of the site is used largely by commuting bats.

Activity within the wooded area at the northern end of the site indicates that there is a Leisler's roost within the woodland. Over 30% of bat passes detected were Leisler's Bat, and of these almost 60% contained social calls (primarily males). The results of the monitor placed at this location are indicative of a potential swarming site and over-winter Leisler's Bat roost. Relatively few of these hibernacula have been recorded for Leisler's Bat. The results obtained from the static monitors indicate that the habitats present at the Hill of Tara site are important for a number of species, primarily Common Pipistrelle, Soprano Pipistrelle, Leisler's Bat and Brown Long-eared Bat. Surprisingly, there was no activity of Myotis species detected within the area of woodland to the north-west of the site (approximately 5ha) during the survey.

It is recommended that further surveys be undertaken at St Patrick's Church and within the wooded area in the north-east of the site.

1. Introduction

1.1 FERS Ltd company background

Forest, Environmental Research and Services (FERS) Ltd has been conducting ecological surveys and research since the company's formation in 2005 by Dr Patrick Moran and Dr Kevin Black. Dr Moran, the Principal Ecologist with FERS, holds a first-class honours degree in Environmental Biology (UCD), a Ph.D. in Ecology (UCD), a Diploma in EIA and SEA management (UCD), a Diploma in Environmental and Planning Law (King's Inn) and an M.Sc. in Geographical Information Systems and Remote Sensing (University of Ulster, Coleraine). Dr Moran has over 20 years of experience in carrying out ecological surveys on both an academic and a professional basis. Dr Emma Reeves, Senior Ecologist with FERS, holds a first-class honours degree in Botany, and a Ph.D. in Botany. Dr Reeves has over 10 years of experience in undertaking ecological surveys on an academic and professional basis. Ciarán Byrne, a Senior Ecologist with FERS, holds a first-class honours degree in Environmental Management (DIT) and an M.Sc. in Applied Science/Ecological Assessment (UCC). Mr Byrne has in excess of five years of experience undertaking ecological surveys on an academic and professional basis.

FERS' client list includes National Parks and Wildlife Service, An Bord Pleanála, various County Councils, the Heritage Council, University College Dublin, the Environmental Protection Agency, Inland Waterways Association of Ireland, Teagasc, the Department of Agriculture, the Office of Public Works and Coillte, in addition to numerous private individuals and companies. FERS undertakes short- and long-term bat assessments nationwide. Dr Patrick Moran has in excess of 10 years of experience in undertaking bat surveys.

1.2 Background to and aim of this report

In August of 2018, FERS was commissioned by the Office of Public Works to undertake monitoring of bat activity at a number of locations at the Hill of Tara. The habitats present include St Patrick's Church and associated graveyard, a steeply sloping area of wooded habitat of approximately 5ha in area (present on the 1st edition OSI map) and an extensive area of grassland with some associated hedgerows.

The location of the survey site is indicated in Figure 1, Figure 2, Figure 3 and Figure 4. Monitors were deployed at four locations within the survey area:

- Within the bell tower of St Patrick's Church;
- Within the graveyard adjoining St Patrick's Church;
- Within a tree in the wooded habitat in the north-eastern corner of the site; and
- Within a hedgerow at the southern end of the site.



Figure 4: Aerial imagery (Digital Globe) of survey area (1:5,000)

1.3 Legislation and bats in Ireland

There are currently nine (possibly 10) species of bat known to breed in Ireland. All species and their roost sites are strictly protected under both domestic and European legislation including:

1.3.1 The Wildlife Act 1976 and Wildlife (Amendment) Act 2000

All Irish species of bat are protected under this, Ireland's primary domestic legislation for the protection of wildlife. Under the Wildlife Act, it is a criminal offence to intentionally harm or disturb a bat in its place of rest.

1.3.2 The EU Habitats Directive, Council Directive (92/43/EEC) on the Conservation of Natura Habitats and of Wild Fauna and Flora 1992

All Irish bat species are listed on Annex IV of the EU Habitats Directive and, as such, must be strictly protected wherever they occur.

1.4 Conservation status of Irish bat species

In the cooler climate of Ireland and many other temperate countries, bats eat exclusively invertebrates (insects, spiders, etc.), which they actively hunt by catching them in flight or plucking them from foliage or off the ground/water. Different species of bat may specialise in catching different types of invertebrates (for example, the relatively large Leisler's Bat (*Nyctalus leisleri*) feeds on larger invertebrates while the Common Pipistrelle (*Pipistrellus pipistrellus*) concentrates on smaller prey, such as midges). Bats gather to feed wherever there are large invertebrate populations. During the winter in Ireland, when there are few invertebrates available for feeding bats, they hibernate. Under Irish law (the Wildlife Act 1976 and Wildlife (Amendment) Act 2000) it is a criminal offence to harm or disturb a bat in its place of rest.

Bats are at their most vulnerable when roosting and form different roost types at different times of the year (see Figure 5, taken from Irish Wildlife Manuals No. 25, Bat Mitigation Guidelines for Ireland). Owing to their metabolic and social requirements, which vary throughout the year, most bats will utilise a variety of roost types depending on the time of year.

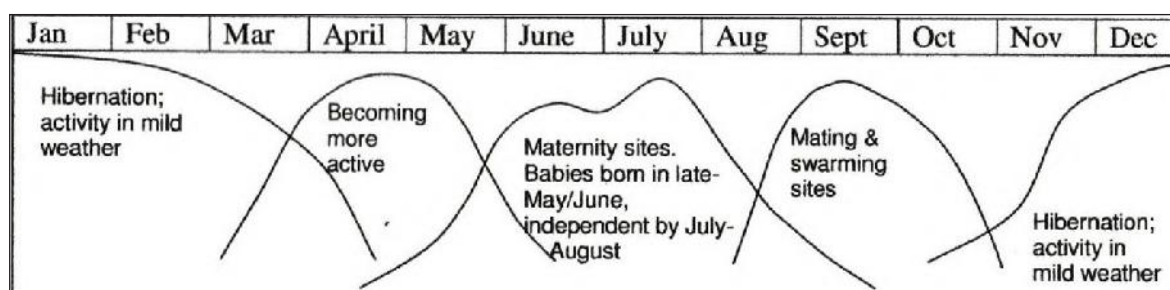


Figure 5: The "Bat Year"

The conservation status of the nine resident Irish bat species (taken from the NPWS 2013 document "The status of EU protected habitats and species in Ireland") is outlined below:

1.4.1 Lesser Horseshoe Bat, *Rhinolophus hipposideros* (1303)

The Lesser Horseshoe Bat (*Rhinolophus hipposideros*) is widely distributed through western, central and southern Europe and as far east as Kashmir, northern Africa and Arabia. Ireland represents the most north-westerly limit of the species' distribution and here it is confined to six west coast counties: Mayo, Galway, Clare, Limerick, Cork and Kerry. A single animal has also been recorded in Co. Roscommon. Although this bat has declined in many European countries, Ireland is considered a stronghold for the species. Lesser Horseshoe Bats are faithful to their roost site and will return to the same site each year. Summer roosts are often in the attics of old or derelict buildings. Hibernation sites are typically caves, souterrains, cellars and icehouses. Lesser Horseshoes rely on linear landscape features (for example, treelines, stonewalls and hedgerows) to navigate and commute from roosts to feeding sites and are reluctant to fly out in the open. The bats forage on flying insects

predominantly in deciduous woodland and riparian vegetation normally within a few kilometres of their roosts. Lesser Horseshoe Bats are sensitive to disturbance and normally do not occupy the same buildings as humans. Loss of roosting sites due to deterioration or renovation of old buildings, loss of commuting routes linking roosts to foraging sites, and unsympathetic management of foraging habitats are the major threats to this species. The population is estimated at approximately 12,000–14,000 animals and both short-term and long-term population trends show slight increases. The identified threats are considered manageable, and a significant proportion of this bat's summer and winter roosts are protected within Special Areas of Conservation. The overall conservation status of this species is assessed as "Favourable".

1.4.2 Common Pipistrelle, *Pipistrellus pipistrellus*, (1309)

The Common Pipistrelle (*Pipistrellus pipistrellus*) is one of Ireland's smallest mammals. It is widespread throughout the country although it may be less common or even absent from some parts of the far west. It is very general in its habitat preference, foraging in woodland, riparian habitats and parkland, along linear features in farmland, and in towns and cities. Some association with broadleaved woodland and riparian habitats at a local scale has been identified, while mixed forestry may be more important at a wider scale in the landscape. Only areas of bog, marsh and heath appear to be avoided. Maternity roosts of this species are often in buildings, typically in the attics of dwelling houses, although it is occasionally found roosting under bridges and in trees. Bats normally disperse in autumn and hibernate over winter. The species has rarely been found hibernating in Ireland, but the available records for bats in winter are from modern dwelling houses. Recent estimates for this species suggest a population size in the order of 1–2 million animals. The population size is stable and may even be increasing. Furthermore, there is no indication of any major pressures currently impacting this species; therefore, the overall status is assessed as "Favourable".

1.4.3 Soprano Pipistrelle, *Pipistrellus pygmaeus*, (5009)

The Soprano Pipistrelle (*Pipistrellus pygmaeus*) overlaps with the Common Pipistrelle across much of central Europe, but while the Soprano Pipistrelle appears to be absent from much of France and northern Iberia, its range does extend into southern Scandinavia and Greece. The species is abundant and widespread in Ireland, occurring in all counties. Recent monitoring suggests that it may be most abundant in the western half of the country. Summer roosts are usually in buildings, including modern suburban houses, old, abandoned mansions, churches, amenity buildings and farm sheds. The bats normally roost in very confined spaces, such as behind window sashes, under tiles and weatherboards, behind fascia and soffits, and within the cavities of flat roofs. Roosts of >1000 Soprano Pipistrelles are known. The species is thought to hibernate in buildings and trees but has seldom been recorded in winter. Although this bat is known to forage in a broad range of habitats, it shows some preference for aquatic habitats – riparian woodland, rivers and lakes. Recent estimates for this species suggest a population size in the order of 500,000–1,000,000 animals, with evidence for a recent increase. As there is no indication of any major pressures currently impacting populations the overall status of this species is assessed as "Favourable".

1.4.4 Nathusius' Pipistrelle, *Pipistrellus nathusii*, (1317)

The Nathusius' Pipistrelle (*Pipistrellus nathusii*) was first detected in the Republic of Ireland in 1997. This pipistrelle is a long distance migrant over much of its range; it is found in eastern Europe only in summertime and is found in south-western Europe only in the winter. Ireland and the UK appear to lie in a transitional region, with resident bats being supplemented during winter by migratory individuals. To date, although maternity colonies have been located in Northern Ireland, no maternity roost has been found in the Republic of Ireland. Nathusius' Pipistrelle is a relatively recent addition to the Irish fauna. It appears to have spread from Northern Ireland and the north-east remains its stronghold on the island. Initial indications suggested that this species was spreading rapidly. However, data from recent years are more ambiguous. Only 31 x 10km cells hold records for the current reporting period and these are scattered throughout the country giving no real impression of an established range. Consequently, range has been assessed as "Unknown". Despite the years of survey work, there is still no evidence of any breeding colonies of this species in the Republic of Ireland and it is not clear if a viable breeding population exists. As a result, population has also been assessed as "Unknown". There is, however, a significant area of suitable habitat available to be colonised by the species. The extent of these habitats appears to be stable and in general these habitats appear to be in good condition. Future prospects, however, are hard to define given the lack of other information and further work is required to clarify the true status of this bat species in Ireland. Therefore, the overall status is assessed as "Unknown".

1.4.5 Natterer's Bat, *Myotis nattereri*, (1322)

The Natterer's Bat (*Myotis nattereri*) is widespread across Europe and found from Portugal and north-west Africa to the Urals and the near East. It is also widely distributed in Ireland, though seldom recorded. Summer roosts are normally in buildings although bridge roosts are also known. Although some large roosts (>50 bats) have been found in churches, typically only small numbers of bats are present, often between rafters and felt and in other narrow spaces where they are difficult to locate. Recent surveys of swarming roosts have also located this species. In winter individuals have been observed in bridges, mines and caves. Woodland habitats and river corridors appear to be favoured for foraging. The Natterer's Bat has a disjunct distribution in Ireland, but its range and population are in good condition and the area of suitable habitat appears to be increasing. Woodland management and the renovation of old buildings and bridges have been identified as potential concerns. The overall status is, however, assessed as "Favourable".

1.4.6 Daubenton's Bat, *Myotis daubentonii*, (1314)

The Daubenton's Bat (*Myotis daubentonii*) is found throughout Ireland. It is particularly associated with rivers and lakes due to its preference for foraging over water. It is positively associated with good water quality and invertebrate diversity and favours waterways with riparian vegetation, particularly broadleaf woodlands. It is less likely to be present where there are street lights. It also tends to avoid areas of peatland and is negatively associated with increasing altitudes. Daubenton's tend to roost in uninsulated structures, with bridges accounting for over 50% of its roost records in Ireland. The remaining roosts are found in buildings, with occasional records for caves and trees. Confirmed hibernacula for the species are extremely rare in Ireland. In recent years several cave locations have been confirmed as autumnal swarming sites for the species, but it is unknown whether these sites also function as hibernation roosts. Recent estimates for this species suggest a population size in the order of 57,000–79,000 animals. The population size is stable and there is no indication of any major pressures currently impacting on the species. Therefore, the overall status is assessed as "Favourable".

1.4.7 Whiskered Bat, *Myotis mystacinus* (1330)

The Whiskered Bat (*Myotis mystacinus*) is widespread across much of Europe although it is absent from northern Scotland and northern Scandinavia. There are records from throughout Ireland, from Donegal to Wexford, but the species is not common, and its distribution appears to be naturally dispersed and disjunct. Summer roosts are normally in old stone buildings. Usually only small numbers of bats are present, often between rafters and felt and in other narrow spaces where they are difficult to locate. Bridge roosts are also known. Wintering animals are rarely found, but a small number has been recorded in caves. This bat is known to be a woodland specialist, foraging selectively in broadleaved and mixed woodland as well as riparian corridors. Although the Whiskered Bat has a dispersed and disjunct distribution, the area of suitable habitat appears to be increasing. Building renovation and loss of foraging habitat are potential threats but there are no significant pressures currently impacting this species. Therefore, the overall status is assessed as "Favourable".

1.4.8 Brown Long-eared Bat, *Plecotus auritus* (1326)

The Brown Long-eared Bat (*Plecotus auritus*) is widely distributed in Ireland and across Europe. Its slow flight limits the distance that this species can travel at night-time and studies have found that almost all bats will forage within 1.5km of the roost. However, its manoeuvrability means that it can access cluttered habitats, and flightless arthropod prey makes up a large proportion of its diet confirming the importance of gleaning as a foraging strategy for the species. Modelling indicates that the Brown Long-eared Bat selects areas with broadleaf woodland and riparian habitats on a local scale, while the presence of mixed woodland at a wider landscape level is also important. It can cope with low levels of urbanisation, but wetlands such as bog, marsh and heath are avoided. Brown Long-eared Bats rely heavily on man-made structures for roosting. Most of the roosts recorded in Ireland are in buildings, with very small numbers in bridges, trees and bat boxes, although the natural summer roost of this species across Europe is tree holes. Brown Long-eared Bats show a high degree of roost fidelity and will often use traditional roosts for generations. While the species has been found in a range of building types, from old mills to bungalows, churches or large mansions typically support the largest numbers. Recent estimates put the Irish population of Brown Long-eared Bats at 60,000–100,000 animals. Monitoring data suggest a recent significant increase in numbers. There is no indication of any major pressures currently impacting the population; therefore, the overall status is assessed as "Favourable".

1.4.9 Leisler's Bat, *Nyctalus leisleri* (1331)

Leisler's Bat (*Nyctalus leisleri*) has been described as a 'typically Irish bat' due to its abundance in Ireland compared to the rest of the Europe, where it is uncommon or absent. Its abundance in Ireland has been attributed to the absence of larger competing species, such as the closely related Common Noctule (*N. noctula*). On continental Europe, Leisler's Bat is considered a tree-dwelling species across most of its distribution. The majority of roosts of this species in Ireland, however, have been found in buildings although roost records from trees and bat boxes are also known. Of all the Irish bat species, Leisler's have the most specific maternity roosting habitat requirements, selecting sites with adjacent woodland and freshwater and avoiding areas of arable land and coniferous woodland. Surveys and modelling of foraging preferences indicate that woodlands, riparian habitats and small amounts of urbanisation are favoured, while peatlands and areas of dense urbanisation are avoided. Recent estimates for this species suggest a population size of 60,000–110,000 animals with a recent increase in numbers. There are no major population level pressures identified; therefore, the overall status is assessed as "Favourable".

2 Survey Methodology

2.1 Deployment of monitors

The survey area was visited during daylight hours on the morning of 24 August by Dr Patrick Moran and Dr Emma Reeves in order to deploy the monitoring units. The units used were Pettersson D500X Mark II ultrasound recording units. The triggering system allows the device to start recording as a sound is detected. The D500X detects the full spectrum of ultrasound and records in real time, providing much more detailed data than either frequency division or time expansion detectors. The Mark II units are powered by C-Cell batteries, allowing up to 10 nights' surveying without the use of an external battery. (Mark I units are restricted to three nights' surveying using AA batteries.) In public places, the use of units without an external battery is preferable as units are easier to conceal.

The Pettersson D500X units were programmed to record all bat activity between 30 minutes pre-sunset and 30 minutes post-sunrise. The recording settings utilised were:

- Input Gain – 45;
- Trigger Level – 30; and
- Interval – 5.

Trigger sensitivity was set to “Medium” in the units placed outside. Trigger sensitivity was set to “Very High” in the unit within the St Patrick’s Church tower, as the unit was placed at the base of a ladder leading to the (locked) trapdoor entrance to the tower. The unit within the church was powered by an external battery as utilising a trigger sensitivity of “Very High” greatly increases the recording of non-bat activity. The identification of bats from the calls recorded on the Pettersson D500X was accomplished through a combination of sound-analysis software (SonoChiro and BatSound) and manual interpretation.

2.2 Placement of monitors

Four Pettersson D500X units were deployed during the period between 24 August and 31 August 2018. The locations are indicated in Figure 6 and described below:

- (1) Church tower of St Patrick’s Church – the unit was located at the base of the ladder leading to the bell tower;
- (2) Adjoining graveyard – the unit was located within a Yew tree in the location indicated in Figure 6. The majority of trees within the graveyard were not suitable for concealing the unit.
- (3) Hedgerow at southern end of site – the unit was located within a Hawthorn tree within the hedgerow as indicated in Figure 6; and
- (4) Wooded habitat at north-western corner of the site – the unit was located within a Hawthorn tree as indicated in Figure 6.



Figure 6: Locations of deployed Petterson D500X units

3. Results

The four units were retrieved on the morning of 31 August 2018. All units were still powered on retrieval and had recorded for the full seven-night period. A temperature and relative humidity data logger was placed with the unit in the bell tower of the church. Temperature did not drop below 12°C during the survey period.

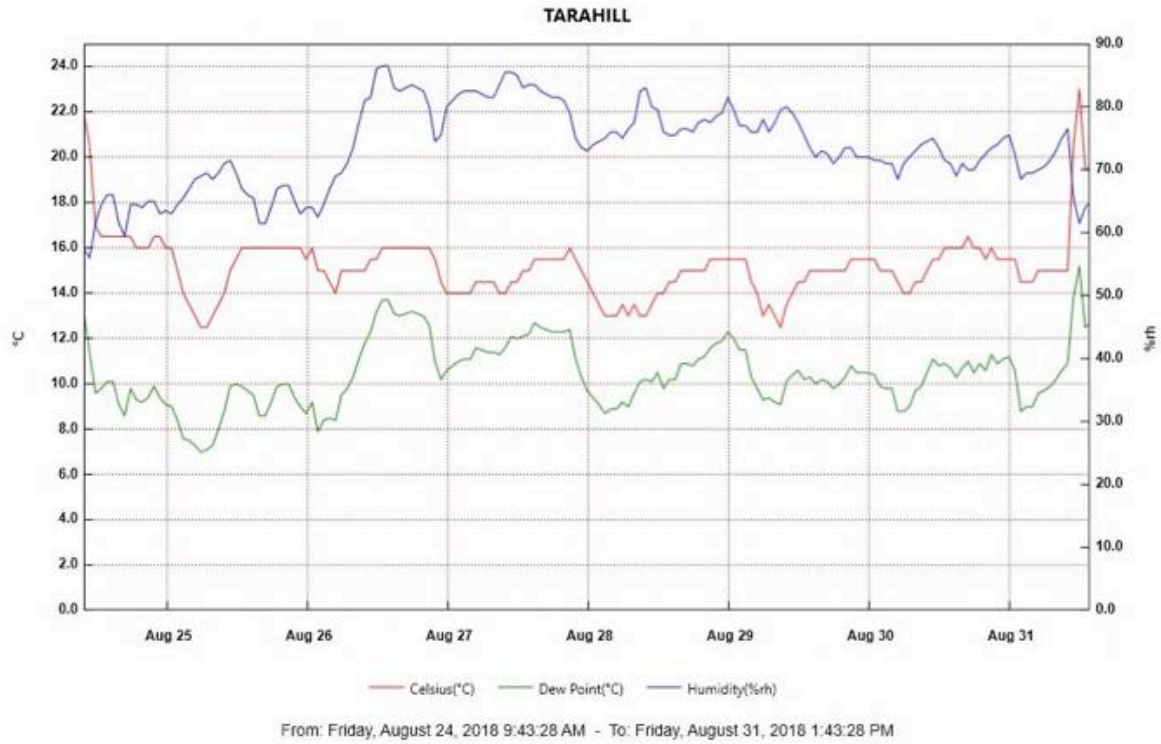


Figure 7: Graph indicating results from temperature and relative humidity data logger located in bell tower

3.1 Unit (1) – base of ladder in church bell tower

The D500X monitor was positioned with the directional microphone facing upward toward the trap door, with the trigger sensitivity set to “Very High”. An inspection of the stairs when placing the unit did yield evidence of bats in the form of bat droppings, but droppings were scarce and of indeterminate age. Upon collection, the unit was found to have an almost full memory as might be expected owing to the trigger setting. Upon analysis of the data, however, no bat passes were recorded on the unit within the bell tower.

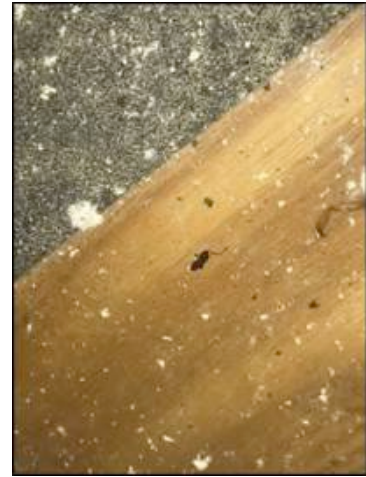


Figure 8: Photograph of bat droppings on the staircase of the bell tower

3.2 Unit (2) – graveyard adjoining St Patrick’s Church

Unit (2) was located within a small Yew tree to the south of the church within the graveyard. The majority of the trees were mature broadleaves (largely Beech) and were not suitable for concealing the Pettersson D500X units. During the week-long survey period, a total of 446 bat passes were recorded of a minimum of six species (272 Soprano Pipistrelle, 77 Common Pipistrelle, 2 Nathusius’ Pipistrelle, 53 Leisler’s Bat, 36 Brown Long-eared Bat and 6 Myotis species, likely Whiskered Bat).

Most of the activity was that of Soprano Pipistrelle (over 60% of bat passes). Of the total bat passes recorded over seven nights, only circa 25% were recorded within 90 minutes post-sunset or 90 minutes pre-sunrise. This would indicate that bat activity within the graveyard continued throughout the entire night. Only 10 bat passes, however, contained “feeding buzzes” while 339 of the passes (over 75%) contained elements of “social calls”. Almost 80% of Soprano Pipistrelle Bat passes and over 95% of Brown Long-eared Bat passes contained elements of social calls (Brown Long-eared Bats have very quiet echolocation calls, and numbers are likely underestimated as the bats are required to pass close to the location of the ultrasound recorder to register). The results obtained from Unit (2) indicate that there is a maternity roost of Soprano Pipistrelle and Brown Long-eared bats within St Patrick’s Church. It is likely that small numbers of Common Pipistrelle and Leisler’s Bat may also occupy the roost. An emergence and dawn survey is required to establish with certainty the location of any roost, the numbers within and species composition. An example of a sonogram and oscillogram of a Soprano Pipistrelle call, including a social call, is illustrated in Figure 9. The power spectrum of the main echolocation call in Figure 9 is illustrated in Figure 10, with the call having a Frequency of Maximum Energy (FME) of approximately 56kHz.

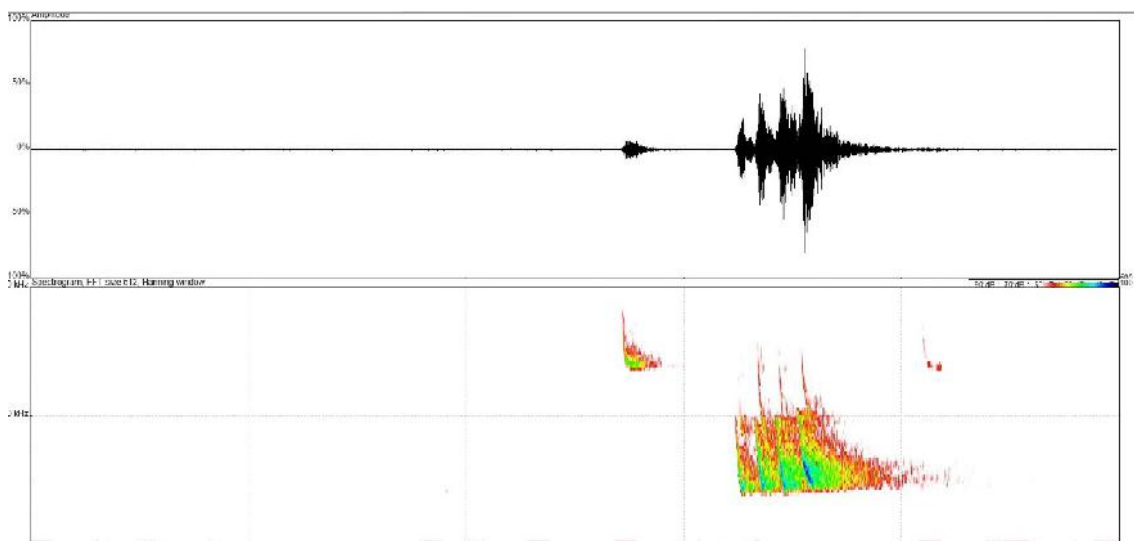


Figure 9: Sonogram and oscillogram of Soprano Pipistrelle call with social call

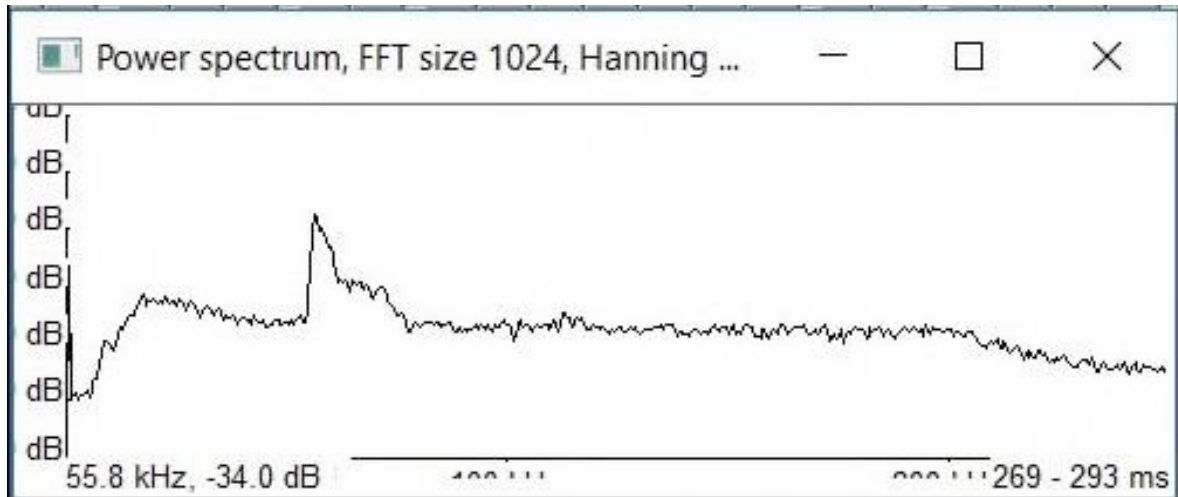


Figure 10: Power spectrum of Soprano Pipistrelle call with FME of 55.8kHz

3.3 Unit (3) – hedgerow at southern end of site

The unit in the hedgerow at the southern end of the site recorded only 102 bat passes of four species (28 Soprano Pipistrelle, 39 Common Pipistrelle, 34 Leisler’s Bat and 1 Whiskered Bat) over the seven-night survey period. Of the 102 bat passes, almost 50% occurred within 90 minutes of sunset or sunrise. No feeding buzzes were recorded and only 13 of the 102 passes contained social call elements. These results would indicate that the hedgerow (which is quite isolated and does not form part of a major hedgerow network) is utilised as a commuting corridor by a small number of bats (on average only 15 bats passes per night were recorded).

3.4 Unit (4) – wooded habitat at north-western corner of the site

Unit (4) was located within a Hawthorn tree on the fringe of the woodland habitat in the north-western corner of the site. Of note was the presence of an occupied tent in the woodland area, as any fire or artificial light in the habitat could impact on the species of bats occurring/utilising the habitat. A total of 422 bat passes of four species (24 Soprano Pipistrelle, 49 Common Pipistrelle, 347 Leisler’s Bat and 2 Brown Long-eared Bat) were recorded during the survey period. The large number of Leisler’s Bat passes (over 80% of total) was unexpected given the habitat. A very high number of the Leisler’s Bat passes (over 70%) contained elements of social calls, and the majority of these appear to be male bats. Activity was recorded throughout the night. The results obtained from Unit (4) would indicate a strong possibility that this is a mating swarm site, and that the trees within the site are utilised by Leisler’s Bat as over-wintering hibernation sites. This woodland habitat is present on the 1st Edition OSI mapping and, given the steepness of the terrain, there is a good possibility that the site has been wooded for hundreds of years. Few winter hibernacula of Leisler’s Bat in Ireland are recorded, and this woodland could be an important mating swarm and winter hibernacula site. Further surveying (static monitors and emergence/dawn surveys) is required to verify this. Although there were two Brown Long-eared Bat passes recorded, there was a noticeable lack of the presence of species typically associated with broadleaved woodland habitats such as Whiskered Bat and Natterer’s Bat. The occupied tent within the woodland, observed when deploying Unit (4) on 24 August, was still in place and appeared occupied on 31 August when Unit (4) was retrieved for analysis. It is possible that the presence of the campsite temporarily displaced such species, which are very sensitive to any light pollution such as that associated with a campfire.

4. Conclusions

During the period 24–31 August 2018 the usage of habitats by bats at the Hill of Tara was monitored utilising four Pettersson D500X ultrasound recording units. Within the survey area, a minimum of six species (Soprano Pipistrelle, Common Pipistrelle, Nathusius' Pipistrelle, Leisler's Bat, Whiskered Bat and Brown Long-eared Bat) occur, but most of the activity is comprised of three species – Soprano Pipistrelle, Common Pipistrelle and Leisler's Bat.

There were indications of some use of the bell tower of St Patrick's Church (droppings on the stairs) by bats, but no activity was recorded during the survey period despite the ultrasound monitor trigger sensitivity being set to the highest level. Droppings may be a result of a single bat or small numbers of bats entering by accident (in particular juveniles). The results obtained from the unit deployed in the adjacent graveyard clearly indicate the presence of a multi-species maternity roost (primarily Soprano Pipistrelle and Brown Long-eared Bat) in the immediate vicinity, almost certainly within the fabric of St Patrick's Church. The exact location and numbers utilising/species composition of such a roost requires further surveys – likely several emergence and dawn surveys during June/July. The levels of bat activity were unexpectedly high given the rather exposed and isolated location of the site. (The church and graveyard are not connected to the wider countryside by a large, contiguous hedgerow/treeline although there is a remnant hedgerow to the south of the church.) There may in the past have been better interconnectivity between the church and the woodland habitat to the north-west of the church.

Activity along the hedgerow at the southern end of the site was low, with no trees particularly suitable for a maternity roost, and the hedgerow itself is an isolated "spur". Activity at this location appears to be largely confined to commuting.

Activity within the woodland habitat in the north-eastern corner of the survey area was dominated by Leisler's Bat. The prevalence of male social calls indicates a high likelihood that the habitat here may support mating swarms of Leisler's Bat and hibernating roosts, which are little recorded in Ireland for this species. The lack of detected activity of Whiskered Bat or Natterer's Bat, and only two passes of Brown Long-eared Bat, all of which are typically associated with woodland habitat, may have been due to the presence of a campsite, with the same (seemingly occupied) tent being observed on the day the equipment was deployed and again when the equipment was retrieved. Further surveys are required to verify if trees within this habitat are indeed utilised by hibernating Leisler's Bats.

5. Appendices

5.1 Appendix I – Bat passes record within St Patrick’s Church graveyard

SPECIES	DATE	TIME
Soprano Pipistrelle	24-08-18	20:45
Common Pipistrelle	24-08-18	21:11
Soprano Pipistrelle	24-08-18	21:28
Soprano Pipistrelle	24-08-18	21:32
Common Pipistrelle	24-08-18	21:44
Common Pipistrelle	24-08-18	22:03
Common Pipistrelle	24-08-18	22:08
Common Pipistrelle	24-08-18	22:35
Common Pipistrelle	25-08-18	0:28
Leisler’s Bat	25-08-18	2:12
Leisler’s Bat	25-08-18	2:12
Common Pipistrelle	25-08-18	20:38
Leisler’s Bat	25-08-18	20:58
Common Pipistrelle	25-08-18	20:59
Common Pipistrelle	25-08-18	21:00
Nathusius’ Pipistrelle	25-08-18	21:00
Common Pipistrelle	25-08-18	21:00
Common Pipistrelle	25-08-18	21:00
Common Pipistrelle	25-08-18	21:01
Common Pipistrelle	25-08-18	21:01
Common Pipistrelle	25-08-18	21:01
Common Pipistrelle	25-08-18	21:01
Common Pipistrelle	25-08-18	21:01
Common Pipistrelle	25-08-18	21:02
Common Pipistrelle	25-08-18	21:02
Common Pipistrelle	25-08-18	21:02
Common Pipistrelle	25-08-18	21:02
Common Pipistrelle	25-08-18	21:38
Common Pipistrelle	25-08-18	21:39
Brown Long-eared Bat	25-08-18	21:42
Common Pipistrelle	25-08-18	21:44
Common Pipistrelle	25-08-18	21:50
Common Pipistrelle	25-08-18	21:50
Leisler’s Bat	25-08-18	21:55
Common Pipistrelle	25-08-18	22:05
Common Pipistrelle	25-08-18	22:06
Common Pipistrelle	25-08-18	22:13
Soprano Pipistrelle	25-08-18	22:21
Common Pipistrelle	25-08-18	22:26
Common Pipistrelle	25-08-18	22:28
Soprano Pipistrelle	25-08-18	22:29
Soprano Pipistrelle	25-08-18	22:30
Soprano Pipistrelle	25-08-18	22:31
Common Pipistrelle	25-08-18	22:32

SPECIES	DATE	TIME
Soprano Pipistrelle	25-08-18	22:32
Soprano Pipistrelle	25-08-18	22:33
Common Pipistrelle	25-08-18	22:35
Soprano Pipistrelle	25-08-18	22:35
Soprano Pipistrelle	25-08-18	22:35
Common Pipistrelle	25-08-18	22:52
Nathusius’ Pipistrelle	25-08-18	22:56
Soprano Pipistrelle	25-08-18	22:57
Soprano Pipistrelle	25-08-18	22:58
Soprano Pipistrelle	25-08-18	22:59
Soprano Pipistrelle	25-08-18	23:00
Soprano Pipistrelle	25-08-18	23:01
Soprano Pipistrelle	25-08-18	23:02
Soprano Pipistrelle	25-08-18	23:03
Soprano Pipistrelle	25-08-18	23:04
Common Pipistrelle	25-08-18	23:04
Soprano Pipistrelle	25-08-18	23:05
Common Pipistrelle	25-08-18	23:07
Soprano Pipistrelle	25-08-18	23:08
Soprano Pipistrelle	25-08-18	23:08
Soprano Pipistrelle	25-08-18	23:09
Soprano Pipistrelle	25-08-18	23:09
Soprano Pipistrelle	25-08-18	23:09
Soprano Pipistrelle	25-08-18	23:09
Soprano Pipistrelle	25-08-18	23:10
Soprano Pipistrelle	25-08-18	23:10
Brown Long-eared Bat	25-08-18	23:12
Soprano Pipistrelle	25-08-18	23:12
Soprano Pipistrelle	25-08-18	23:13
Soprano Pipistrelle	25-08-18	23:13
Soprano Pipistrelle	25-08-18	23:13
Soprano Pipistrelle	25-08-18	23:14
Soprano Pipistrelle	25-08-18	23:22
Soprano Pipistrelle	25-08-18	23:22
Soprano Pipistrelle	25-08-18	23:23
Soprano Pipistrelle	25-08-18	23:24
Soprano Pipistrelle	25-08-18	23:26
Soprano Pipistrelle	25-08-18	23:29
Soprano Pipistrelle	25-08-18	23:30
Soprano Pipistrelle	25-08-18	23:32
Soprano Pipistrelle	25-08-18	23:33
Soprano Pipistrelle	25-08-18	23:34
Soprano Pipistrelle	25-08-18	23:35

SPECIES	DATE	TIME
Soprano Pipistrelle	25-08-18	23:36
Soprano Pipistrelle	25-08-18	23:36
Soprano Pipistrelle	25-08-18	23:38
Soprano Pipistrelle	25-08-18	23:38
Soprano Pipistrelle	25-08-18	23:41
Soprano Pipistrelle	25-08-18	23:42
Leisler's Bat	25-08-18	23:42
Soprano Pipistrelle	25-08-18	23:43
Soprano Pipistrelle	25-08-18	23:43
Common Pipistrelle	25-08-18	23:47
Soprano Pipistrelle	25-08-18	23:50
Soprano Pipistrelle	25-08-18	23:50
Soprano Pipistrelle	25-08-18	23:54
Soprano Pipistrelle	25-08-18	23:55
Leisler's Bat	25-08-18	23:55
Soprano Pipistrelle	25-08-18	23:55
Soprano Pipistrelle	25-08-18	23:56
Soprano Pipistrelle	25-08-18	23:56
Soprano Pipistrelle	25-08-18	23:58
Soprano Pipistrelle	26-08-18	0:01
Soprano Pipistrelle	26-08-18	0:03
Soprano Pipistrelle	26-08-18	0:04
Soprano Pipistrelle	26-08-18	0:04
Soprano Pipistrelle	26-08-18	0:06
Soprano Pipistrelle	26-08-18	0:07
Soprano Pipistrelle	26-08-18	0:08
Soprano Pipistrelle	26-08-18	0:10
Common Pipistrelle	26-08-18	0:18
Soprano Pipistrelle	26-08-18	0:30
Soprano Pipistrelle	26-08-18	0:31
Soprano Pipistrelle	26-08-18	0:31
Common Pipistrelle	26-08-18	0:32
Common Pipistrelle	26-08-18	0:33
Soprano Pipistrelle	26-08-18	0:34
Soprano Pipistrelle	26-08-18	0:38
Common Pipistrelle	26-08-18	0:48
Common Pipistrelle	26-08-18	0:48
Leisler's Bat	26-08-18	0:53
Brown Long-eared Bat	26-08-18	1:00
Soprano Pipistrelle	26-08-18	1:02
Soprano Pipistrelle	26-08-18	1:03
Soprano Pipistrelle	26-08-18	1:03
Soprano Pipistrelle	26-08-18	1:06
Soprano Pipistrelle	26-08-18	1:06
Common Pipistrelle	26-08-18	1:23
Common Pipistrelle	26-08-18	1:26
Common Pipistrelle	26-08-18	1:27
Soprano Pipistrelle	26-08-18	1:34
Soprano Pipistrelle	26-08-18	1:34

SPECIES	DATE	TIME
Soprano Pipistrelle	26-08-18	1:35
Leisler's Bat	26-08-18	1:47
Soprano Pipistrelle	26-08-18	2:00
Soprano Pipistrelle	26-08-18	2:02
Soprano Pipistrelle	26-08-18	3:06
Leisler's Bat	26-08-18	3:06
Common Pipistrelle	26-08-18	3:12
Soprano Pipistrelle	26-08-18	3:21
Soprano Pipistrelle	26-08-18	3:25
Soprano Pipistrelle	26-08-18	3:25
Soprano Pipistrelle	26-08-18	3:31
Common Pipistrelle	26-08-18	3:33
Soprano Pipistrelle	26-08-18	3:46
Leisler's Bat	26-08-18	4:30
Soprano Pipistrelle	26-08-18	21:17
Leisler's Bat	26-08-18	21:17
Leisler's Bat	26-08-18	21:17
Whiskered Bat	26-08-18	21:17
Leisler's Bat	26-08-18	21:17
Leisler's Bat	26-08-18	21:18
Leisler's Bat	26-08-18	21:22
Leisler's Bat	26-08-18	21:25
Brown Long-eared Bat	26-08-18	21:40
Soprano Pipistrelle	26-08-18	21:54
Soprano Pipistrelle	26-08-18	22:35
Soprano Pipistrelle	26-08-18	23:59
Soprano Pipistrelle	27-08-18	0:00
Soprano Pipistrelle	27-08-18	0:00
Soprano Pipistrelle	27-08-18	0:00
Soprano Pipistrelle	27-08-18	0:00
Common Pipistrelle	27-08-18	0:24
Soprano Pipistrelle	27-08-18	0:31
Leisler's Bat	27-08-18	0:57
Leisler's Bat	27-08-18	0:57
Soprano Pipistrelle	27-08-18	1:10
Leisler's Bat	27-08-18	1:34
Leisler's Bat	27-08-18	1:34
Brown Long-eared Bat	27-08-18	1:34
Brown Long-eared Bat	27-08-18	3:40
Soprano Pipistrelle	27-08-18	4:49
Soprano Pipistrelle	27-08-18	4:49
Common Pipistrelle	27-08-18	5:12
Leisler's Bat	27-08-18	5:31
Leisler's Bat	27-08-18	5:46
Soprano Pipistrelle	27-08-18	5:54
Whiskered Bat	27-08-18	6:07
Whiskered Bat	27-08-18	21:15
Leisler's Bat	27-08-18	21:16
Leisler's Bat	27-08-18	21:36

SPECIES	DATE	TIME
Soprano Pipistrelle	27-08-18	21:42
Soprano Pipistrelle	27-08-18	21:58
Soprano Pipistrelle	27-08-18	22:01
Soprano Pipistrelle	27-08-18	22:03
Soprano Pipistrelle	27-08-18	22:03
Common Pipistrelle	27-08-18	22:04
Soprano Pipistrelle	27-08-18	22:08
Common Pipistrelle	27-08-18	22:12
Soprano Pipistrelle	27-08-18	22:13
Soprano Pipistrelle	27-08-18	22:16
Soprano Pipistrelle	27-08-18	22:17
Soprano Pipistrelle	27-08-18	22:20
Soprano Pipistrelle	27-08-18	22:24
Soprano Pipistrelle	27-08-18	22:24
Brown Long-eared Bat	27-08-18	22:32
Common Pipistrelle	27-08-18	22:38
Common Pipistrelle	27-08-18	22:39
Soprano Pipistrelle	27-08-18	22:43
Soprano Pipistrelle	27-08-18	22:50
Soprano Pipistrelle	27-08-18	22:52
Common Pipistrelle	27-08-18	22:55
Soprano Pipistrelle	27-08-18	22:57
Soprano Pipistrelle	27-08-18	23:14
Soprano Pipistrelle	27-08-18	23:14
Soprano Pipistrelle	27-08-18	23:15
Common Pipistrelle	27-08-18	23:18
Leisler's Bat	27-08-18	23:20
Soprano Pipistrelle	27-08-18	23:21
Leisler's Bat	27-08-18	23:25
Soprano Pipistrelle	27-08-18	23:29
Soprano Pipistrelle	27-08-18	23:31
Soprano Pipistrelle	27-08-18	23:44
Soprano Pipistrelle	27-08-18	23:44
Soprano Pipistrelle	27-08-18	23:46
Soprano Pipistrelle	27-08-18	23:47
Soprano Pipistrelle	27-08-18	23:49
Soprano Pipistrelle	27-08-18	23:50
Brown Long-eared Bat	28-08-18	0:00
Soprano Pipistrelle	28-08-18	0:02
Soprano Pipistrelle	28-08-18	0:03
Soprano Pipistrelle	28-08-18	0:03
Soprano Pipistrelle	28-08-18	0:05
Soprano Pipistrelle	28-08-18	0:08
Soprano Pipistrelle	28-08-18	0:09
Leisler's Bat	28-08-18	0:32
Soprano Pipistrelle	28-08-18	0:51
Soprano Pipistrelle	28-08-18	1:06
Leisler's Bat	28-08-18	1:15
Soprano Pipistrelle	28-08-18	1:35

SPECIES	DATE	TIME
Common Pipistrelle	28-08-18	1:36
Brown Long-eared Bat	28-08-18	1:38
Soprano Pipistrelle	28-08-18	1:38
Soprano Pipistrelle	28-08-18	1:46
Soprano Pipistrelle	28-08-18	2:01
Soprano Pipistrelle	28-08-18	2:03
Brown Long-eared Bat	28-08-18	2:47
Soprano Pipistrelle	28-08-18	2:55
Soprano Pipistrelle	28-08-18	3:17
Common Pipistrelle	28-08-18	4:33
Soprano Pipistrelle	28-08-18	5:00
Brown Long-eared Bat	28-08-18	5:01
Leisler's Bat	28-08-18	5:17
Brown Long-eared Bat	28-08-18	5:21
Leisler's Bat	28-08-18	5:23
Soprano Pipistrelle	28-08-18	5:26
Soprano Pipistrelle	28-08-18	5:27
Soprano Pipistrelle	28-08-18	5:27
Soprano Pipistrelle	28-08-18	5:28
Soprano Pipistrelle	28-08-18	5:29
Soprano Pipistrelle	28-08-18	5:29
Soprano Pipistrelle	28-08-18	5:29
Soprano Pipistrelle	28-08-18	5:30
Soprano Pipistrelle	28-08-18	5:31
Soprano Pipistrelle	28-08-18	5:34
Soprano Pipistrelle	28-08-18	5:34
Leisler's Bat	28-08-18	5:44
Soprano Pipistrelle	28-08-18	20:40
Soprano Pipistrelle	28-08-18	20:40
Leisler's Bat	28-08-18	20:59
Common Pipistrelle	28-08-18	21:13
Common Pipistrelle	28-08-18	21:14
Common Pipistrelle	28-08-18	21:14
Common Pipistrelle	28-08-18	21:14
Soprano Pipistrelle	28-08-18	21:15
Leisler's Bat	28-08-18	21:31
Soprano Pipistrelle	28-08-18	21:32
Common Pipistrelle	28-08-18	21:37
Soprano Pipistrelle	28-08-18	21:46
Soprano Pipistrelle	28-08-18	21:46
Soprano Pipistrelle	28-08-18	21:47
Soprano Pipistrelle	28-08-18	21:47
Common Pipistrelle	28-08-18	21:57
Common Pipistrelle	28-08-18	21:57
Common Pipistrelle	28-08-18	21:58
Common Pipistrelle	28-08-18	22:01
Common Pipistrelle	28-08-18	22:01
Brown Long-eared Bat	28-08-18	22:05
Soprano Pipistrelle	28-08-18	22:05

SPECIES	DATE	TIME
Brown Long-eared Bat	28-08-18	22:19
Brown Long-eared Bat	28-08-18	22:22
Brown Long-eared Bat	28-08-18	22:28
Soprano Pipistrelle	28-08-18	22:28
Soprano Pipistrelle	28-08-18	22:28
Soprano Pipistrelle	28-08-18	22:30
Brown Long-eared Bat	28-08-18	22:31
Soprano Pipistrelle	28-08-18	22:32
Soprano Pipistrelle	28-08-18	22:32
Soprano Pipistrelle	28-08-18	22:34
Soprano Pipistrelle	28-08-18	22:34
Soprano Pipistrelle	28-08-18	22:35
Soprano Pipistrelle	28-08-18	22:37
Soprano Pipistrelle	28-08-18	22:44
Whiskered Bat	28-08-18	22:47
Common Pipistrelle	28-08-18	22:54
Brown Long-eared Bat	28-08-18	22:55
Soprano Pipistrelle	28-08-18	22:56
Soprano Pipistrelle	28-08-18	22:57
Soprano Pipistrelle	28-08-18	23:02
Brown Long-eared Bat	28-08-18	23:02
Brown Long-eared Bat	28-08-18	23:03
Soprano Pipistrelle	28-08-18	23:04
Brown Long-eared Bat	28-08-18	23:04
Soprano Pipistrelle	28-08-18	23:04
Soprano Pipistrelle	28-08-18	23:05
Common Pipistrelle	28-08-18	23:06
Soprano Pipistrelle	28-08-18	23:17
Soprano Pipistrelle	28-08-18	23:17
Brown Long-eared Bat	28-08-18	23:17
Soprano Pipistrelle	28-08-18	23:18
Soprano Pipistrelle	28-08-18	23:19
Leisler's Bat	28-08-18	23:19
Brown Long-eared Bat	28-08-18	23:19
Soprano Pipistrelle	28-08-18	23:20
Leisler's Bat	28-08-18	23:23
Leisler's Bat	28-08-18	23:25
Brown Long-eared Bat	28-08-18	23:25
Leisler's Bat	28-08-18	23:26
Soprano Pipistrelle	28-08-18	23:41
Common Pipistrelle	28-08-18	23:46
Brown Long-eared Bat	28-08-18	23:48
Brown Long-eared Bat	29-08-18	0:01
Whiskered Bat	29-08-18	0:06
Brown Long-eared Bat	29-08-18	0:27
Soprano Pipistrelle	29-08-18	0:34
Leisler's Bat	29-08-18	0:44
Soprano Pipistrelle	29-08-18	4:21
Leisler's Bat	29-08-18	5:49

SPECIES	DATE	TIME
Leisler's Bat	29-08-18	20:34
Common Pipistrelle	29-08-18	20:58
Common Pipistrelle	29-08-18	21:00
Soprano Pipistrelle	29-08-18	21:07
Leisler's Bat	29-08-18	21:13
Soprano Pipistrelle	29-08-18	21:13
Leisler's Bat	29-08-18	21:33
Soprano Pipistrelle	29-08-18	21:34
Common Pipistrelle	29-08-18	21:41
Soprano Pipistrelle	29-08-18	21:45
Soprano Pipistrelle	29-08-18	21:56
Soprano Pipistrelle	29-08-18	22:00
Soprano Pipistrelle	29-08-18	22:12
Whiskered Bat	29-08-18	22:18
Soprano Pipistrelle	29-08-18	22:30
Soprano Pipistrelle	29-08-18	22:39
Soprano Pipistrelle	29-08-18	22:51
Soprano Pipistrelle	29-08-18	23:15
Soprano Pipistrelle	29-08-18	23:16
Soprano Pipistrelle	29-08-18	23:24
Common Pipistrelle	29-08-18	23:31
Brown Long-eared Bat	30-08-18	0:12
Soprano Pipistrelle	30-08-18	0:42
Soprano Pipistrelle	30-08-18	1:34
Leisler's Bat	30-08-18	3:27
Leisler's Bat	30-08-18	5:45
Common Pipistrelle	30-08-18	21:22
Soprano Pipistrelle	30-08-18	21:36
Leisler's Bat	30-08-18	21:36
Common Pipistrelle	30-08-18	21:36
Soprano Pipistrelle	30-08-18	21:46
Leisler's Bat	30-08-18	21:48
Leisler's Bat	30-08-18	21:58
Soprano Pipistrelle	30-08-18	21:59
Leisler's Bat	30-08-18	22:19
Soprano Pipistrelle	30-08-18	22:23
Soprano Pipistrelle	30-08-18	22:46
Soprano Pipistrelle	30-08-18	22:47
Soprano Pipistrelle	30-08-18	22:51
Brown Long-eared Bat	30-08-18	23:00
Common Pipistrelle	30-08-18	23:22
Brown Long-eared Bat	30-08-18	23:24
Soprano Pipistrelle	30-08-18	23:24
Soprano Pipistrelle	30-08-18	23:25
Soprano Pipistrelle	30-08-18	23:26
Soprano Pipistrelle	30-08-18	23:36
Soprano Pipistrelle	30-08-18	23:48
Soprano Pipistrelle	30-08-18	23:49
Soprano Pipistrelle	30-08-18	23:53

SPECIES	DATE	TIME
Soprano Pipistrelle	30-08-18	23:55
Leisler's Bat	30-08-18	23:57
Soprano Pipistrelle	31-08-18	0:00
Soprano Pipistrelle	31-08-18	0:01
Leisler's Bat	31-08-18	0:02
Soprano Pipistrelle	31-08-18	0:02
Brown Long-eared Bat	31-08-18	0:03
Soprano Pipistrelle	31-08-18	0:03
Soprano Pipistrelle	31-08-18	0:04
Soprano Pipistrelle	31-08-18	0:04
Brown Long-eared Bat	31-08-18	0:04
Soprano Pipistrelle	31-08-18	0:05
Soprano Pipistrelle	31-08-18	0:05
Soprano Pipistrelle	31-08-18	0:06
Soprano Pipistrelle	31-08-18	0:08
Soprano Pipistrelle	31-08-18	0:08
Brown Long-eared Bat	31-08-18	0:08
Soprano Pipistrelle	31-08-18	0:08
Soprano Pipistrelle	31-08-18	0:09
Soprano Pipistrelle	31-08-18	0:10
Soprano Pipistrelle	31-08-18	0:10
Soprano Pipistrelle	31-08-18	0:10
Soprano Pipistrelle	31-08-18	0:11
Soprano Pipistrelle	31-08-18	0:11
Brown Long-eared Bat	31-08-18	0:12
Soprano Pipistrelle	31-08-18	0:13
Soprano Pipistrelle	31-08-18	0:13
Brown Long-eared Bat	31-08-18	0:13
Common Pipistrelle	31-08-18	0:13
Soprano Pipistrelle	31-08-18	0:22
Soprano Pipistrelle	31-08-18	0:22
Soprano Pipistrelle	31-08-18	0:22
Soprano Pipistrelle	31-08-18	0:23
Soprano Pipistrelle	31-08-18	0:23
Soprano Pipistrelle	31-08-18	0:26
Soprano Pipistrelle	31-08-18	0:26
Soprano Pipistrelle	31-08-18	0:27
Soprano Pipistrelle	31-08-18	0:27
Soprano Pipistrelle	31-08-18	0:28
Soprano Pipistrelle	31-08-18	0:28
Soprano Pipistrelle	31-08-18	0:29
Leisler's Bat	31-08-18	0:29
Soprano Pipistrelle	31-08-18	0:30
Soprano Pipistrelle	31-08-18	0:30
Soprano Pipistrelle	31-08-18	0:30
Soprano Pipistrelle	31-08-18	0:31
Soprano Pipistrelle	31-08-18	0:31
Soprano Pipistrelle	31-08-18	0:32

SPECIES	DATE	TIME
Common Pipistrelle	31-08-18	0:32
Soprano Pipistrelle	31-08-18	0:35
Soprano Pipistrelle	31-08-18	0:35
Soprano Pipistrelle	31-08-18	0:40
Soprano Pipistrelle	31-08-18	0:40
Soprano Pipistrelle	31-08-18	0:47
Soprano Pipistrelle	31-08-18	0:47
Soprano Pipistrelle	31-08-18	0:48
Soprano Pipistrelle	31-08-18	0:48
Soprano Pipistrelle	31-08-18	0:48
Soprano Pipistrelle	31-08-18	0:48
Soprano Pipistrelle	31-08-18	0:49
Common Pipistrelle	31-08-18	1:11
Soprano Pipistrelle	31-08-18	3:11
Leisler's Bat	31-08-18	3:27
Brown Long-eared Bat	31-08-18	4:28
Soprano Pipistrelle	31-08-18	5:26
Soprano Pipistrelle	31-08-18	5:26
Soprano Pipistrelle	31-08-18	5:38
Leisler's Bat	31-08-18	6:11

5.2 Appendix 2 – Bat passes recorded at hedgerow at south of site

SPECIES	DATE	TIME
Soprano Pipistrelle	24-08-18	21:18
Soprano Pipistrelle	24-08-18	21:19
Soprano Pipistrelle	24-08-18	21:20
Leisler's Bat	24-08-18	21:20
Leisler's Bat	24-08-18	21:21
Soprano Pipistrelle	24-08-18	21:24
Soprano Pipistrelle	24-08-18	21:26
Soprano Pipistrelle	24-08-18	21:28
Soprano Pipistrelle	24-08-18	21:49
Common Pipistrelle	24-08-18	22:17
Common Pipistrelle	25-08-18	0:43
Leisler's Bat	25-08-18	6:08
Leisler's Bat	25-08-18	21:22
Common Pipistrelle	25-08-18	21:54
Common Pipistrelle	25-08-18	22:03
Common Pipistrelle	25-08-18	22:05
Common Pipistrelle	25-08-18	22:58
Common Pipistrelle	25-08-18	23:26
Soprano Pipistrelle	25-08-18	23:40
Common Pipistrelle	25-08-18	23:45
Common Pipistrelle	25-08-18	23:50
Leisler's Bat	26-08-18	0:15
Common Pipistrelle	26-08-18	0:30
Common Pipistrelle	26-08-18	0:39
Common Pipistrelle	26-08-18	0:52
Common Pipistrelle	26-08-18	0:54
Common Pipistrelle	26-08-18	0:54
Common Pipistrelle	26-08-18	1:11
Common Pipistrelle	26-08-18	1:15
Common Pipistrelle	26-08-18	1:24
Leisler's Bat	26-08-18	1:29
Common Pipistrelle	26-08-18	1:46
Common Pipistrelle	26-08-18	2:09
Soprano Pipistrelle	26-08-18	2:15
Soprano Pipistrelle	26-08-18	2:16
Leisler's Bat	26-08-18	21:08
Leisler's Bat	26-08-18	21:14
Common Pipistrelle	26-08-18	21:21
Leisler's Bat	26-08-18	21:22
Soprano Pipistrelle	26-08-18	21:27
Common Pipistrelle	26-08-18	22:02
Soprano Pipistrelle	26-08-18	22:17
Common Pipistrelle	26-08-18	22:30
Leisler's Bat	26-08-18	23:20
Common Pipistrelle	26-08-18	23:25
Leisler's Bat	27-08-18	1:34
Soprano Pipistrelle	27-08-18	5:19

SPECIES	DATE	TIME
Common Pipistrelle	27-08-18	5:23
Leisler's Bat	27-08-18	5:26
Leisler's Bat	27-08-18	20:53
Leisler's Bat	27-08-18	21:05
Common Pipistrelle	27-08-18	21:07
Common Pipistrelle	27-08-18	21:19
Soprano Pipistrelle	27-08-18	21:38
Common Pipistrelle	27-08-18	21:58
Common Pipistrelle	27-08-18	22:44
Soprano Pipistrelle	27-08-18	22:54
Common Pipistrelle	27-08-18	22:58
Common Pipistrelle	27-08-18	23:05
Common Pipistrelle	27-08-18	23:13
Leisler's Bat	27-08-18	23:20
Soprano Pipistrelle	27-08-18	23:39
Soprano Pipistrelle	28-08-18	0:05
Common Pipistrelle	28-08-18	0:15
Soprano Pipistrelle	28-08-18	0:50
Common Pipistrelle	28-08-18	1:49
Leisler's Bat	28-08-18	2:06
Soprano Pipistrelle	28-08-18	3:30
Soprano Pipistrelle	28-08-18	3:32
Leisler's Bat	28-08-18	20:52
Leisler's Bat	28-08-18	20:52
Soprano Pipistrelle	28-08-18	21:00
Common Pipistrelle	28-08-18	21:19
Common Pipistrelle	28-08-18	21:52
Leisler's Bat	28-08-18	21:54
Leisler's Bat	28-08-18	21:54
Leisler's Bat	28-08-18	23:01
Leisler's Bat	28-08-18	23:18
Common Pipistrelle	28-08-18	23:46
Soprano Pipistrelle	29-08-18	0:06
Leisler's Bat	29-08-18	5:39
Soprano Pipistrelle	29-08-18	21:40
Soprano Pipistrelle	29-08-18	22:05
Leisler's Bat	29-08-18	22:50
Soprano Pipistrelle	30-08-18	0:32
Leisler's Bat	30-08-18	0:44
Common Pipistrelle	30-08-18	4:49
Soprano Pipistrelle	30-08-18	21:10
Leisler's Bat	30-08-18	21:21
Common Pipistrelle	30-08-18	21:39
Leisler's Bat	30-08-18	22:07
Common Pipistrelle	30-08-18	22:34
Whiskered Bat	30-08-18	23:15
Leisler's Bat	30-08-18	23:47

SPECIES	DATE	TIME
Leisler's Bat	31-08-18	2:03
Soprano Pipistrelle	31-08-18	4:31
Soprano Pipistrelle	31-08-18	5:52
Leisler's Bat	31-08-18	6:12
Leisler's Bat	31-08-18	6:12
Leisler's Bat	31-08-18	6:14
Leisler's Bat	31-08-18	6:15
Leisler's Bat	31-08-18	6:16

5.3 Appendix 3 – Bat passes recorded in wooded habitat at north-west of site

SPECIES	DATE	TIME
Common Pipistrelle	24-08-18	21:05
Common Pipistrelle	24-08-18	21:05
Common Pipistrelle	24-08-18	21:10
Leisler's Bat	24-08-18	21:19
Leisler's Bat	24-08-18	21:19
Leisler's Bat	24-08-18	21:20
Leisler's Bat	24-08-18	21:20
Leisler's Bat	24-08-18	21:20
Leisler's Bat	24-08-18	21:21
Leisler's Bat	24-08-18	21:33
Leisler's Bat	24-08-18	21:34
Leisler's Bat	24-08-18	21:35
Leisler's Bat	24-08-18	21:56
Leisler's Bat	24-08-18	21:57
Leisler's Bat	24-08-18	21:57
Leisler's Bat	24-08-18	21:57
Leisler's Bat	24-08-18	21:57
Leisler's Bat	24-08-18	21:58
Leisler's Bat	24-08-18	21:59
Leisler's Bat	24-08-18	21:59
Leisler's Bat	24-08-18	21:59
Leisler's Bat	24-08-18	22:06
Leisler's Bat	24-08-18	22:07
Leisler's Bat	24-08-18	22:07
Leisler's Bat	24-08-18	22:07
Leisler's Bat	24-08-18	22:07
Leisler's Bat	24-08-18	22:09
Leisler's Bat	24-08-18	22:09
Leisler's Bat	24-08-18	22:09
Leisler's Bat	24-08-18	22:10
Leisler's Bat	24-08-18	22:10
Leisler's Bat	24-08-18	22:10
Leisler's Bat	24-08-18	22:10
Leisler's Bat	24-08-18	22:11
Leisler's Bat	24-08-18	22:11

SPECIES	DATE	TIME
Common Pipistrelle	24-08-18	21:05
Common Pipistrelle	24-08-18	21:05
Common Pipistrelle	24-08-18	21:10
Leisler's Bat	24-08-18	21:19
Leisler's Bat	24-08-18	21:19
Leisler's Bat	24-08-18	21:20
Leisler's Bat	24-08-18	21:20
Leisler's Bat	24-08-18	21:20
Leisler's Bat	24-08-18	21:20
Leisler's Bat	24-08-18	21:21
Leisler's Bat	24-08-18	21:33
Leisler's Bat	24-08-18	21:34
Leisler's Bat	24-08-18	21:35
Leisler's Bat	24-08-18	21:56
Leisler's Bat	24-08-18	21:57
Leisler's Bat	24-08-18	21:57
Leisler's Bat	24-08-18	21:57
Leisler's Bat	24-08-18	21:57
Leisler's Bat	24-08-18	21:57
Leisler's Bat	24-08-18	21:58
Leisler's Bat	24-08-18	21:59
Leisler's Bat	24-08-18	21:59
Leisler's Bat	24-08-18	21:59
Leisler's Bat	24-08-18	22:06
Leisler's Bat	24-08-18	22:07
Leisler's Bat	24-08-18	22:07
Leisler's Bat	24-08-18	22:07
Leisler's Bat	24-08-18	22:07
Leisler's Bat	24-08-18	22:09
Leisler's Bat	24-08-18	22:09
Leisler's Bat	24-08-18	22:09
Leisler's Bat	24-08-18	22:10
Leisler's Bat	24-08-18	22:10
Leisler's Bat	24-08-18	22:10
Leisler's Bat	24-08-18	22:10
Leisler's Bat	24-08-18	22:11
Leisler's Bat	24-08-18	22:11

SPECIES	DATE	TIME
Leisler's Bat	24-08-18	22:11
Leisler's Bat	24-08-18	22:11
Leisler's Bat	24-08-18	22:12
Leisler's Bat	24-08-18	22:12
Leisler's Bat	24-08-18	22:13
Leisler's Bat	24-08-18	22:13
Leisler's Bat	24-08-18	22:14
Leisler's Bat	24-08-18	22:16
Leisler's Bat	24-08-18	22:16
Leisler's Bat	24-08-18	22:17
Leisler's Bat	24-08-18	22:17
Leisler's Bat	24-08-18	22:18
Leisler's Bat	24-08-18	22:18
Leisler's Bat	24-08-18	22:18
Leisler's Bat	24-08-18	22:18
Leisler's Bat	24-08-18	22:18
Leisler's Bat	24-08-18	22:19
Leisler's Bat	24-08-18	22:19
Leisler's Bat	24-08-18	22:21
Leisler's Bat	24-08-18	22:21
Leisler's Bat	24-08-18	22:21
Leisler's Bat	24-08-18	22:22
Leisler's Bat	24-08-18	22:22
Leisler's Bat	24-08-18	22:22
Leisler's Bat	24-08-18	22:22
Leisler's Bat	24-08-18	22:23
Leisler's Bat	24-08-18	22:23
Leisler's Bat	24-08-18	22:24
Leisler's Bat	24-08-18	22:24
Leisler's Bat	24-08-18	22:24
Leisler's Bat	24-08-18	22:24
Leisler's Bat	24-08-18	22:24
Leisler's Bat	24-08-18	22:25
Leisler's Bat	24-08-18	22:25
Leisler's Bat	24-08-18	22:26
Leisler's Bat	24-08-18	22:26
Leisler's Bat	24-08-18	22:27
Leisler's Bat	24-08-18	22:27
Leisler's Bat	24-08-18	22:27
Leisler's Bat	24-08-18	22:27
Leisler's Bat	24-08-18	22:28
Leisler's Bat	24-08-18	22:30
Leisler's Bat	24-08-18	22:35
Leisler's Bat	24-08-18	23:13
Leisler's Bat	25-08-18	5:17
Soprano Pipistrelle	25-08-18	20:49
Soprano Pipistrelle	25-08-18	20:50
Soprano Pipistrelle	25-08-18	20:50
Common Pipistrelle	25-08-18	21:03

SPECIES	DATE	TIME
Leisler's Bat	25-08-18	21:07
Leisler's Bat	25-08-18	21:25
Common Pipistrelle	25-08-18	21:29
Leisler's Bat	25-08-18	21:33
Leisler's Bat	25-08-18	21:33
Leisler's Bat	25-08-18	21:33
Leisler's Bat	25-08-18	21:39
Leisler's Bat	25-08-18	21:39
Leisler's Bat	25-08-18	21:51
Leisler's Bat	25-08-18	21:52
Leisler's Bat	25-08-18	21:52
Leisler's Bat	25-08-18	21:52
Leisler's Bat	25-08-18	21:53
Leisler's Bat	25-08-18	21:53
Leisler's Bat	25-08-18	21:55
Leisler's Bat	25-08-18	21:57
Leisler's Bat	25-08-18	21:58
Leisler's Bat	25-08-18	21:59
Leisler's Bat	25-08-18	21:59
Leisler's Bat	25-08-18	22:00
Leisler's Bat	25-08-18	22:00
Leisler's Bat	25-08-18	22:00
Leisler's Bat	25-08-18	22:01
Leisler's Bat	25-08-18	22:02
Leisler's Bat	25-08-18	22:02
Leisler's Bat	25-08-18	22:03
Common Pipistrelle	25-08-18	22:51
Common Pipistrelle	25-08-18	23:02
Common Pipistrelle	25-08-18	23:03
Leisler's Bat	25-08-18	23:31
Leisler's Bat	26-08-18	0:10
Common Pipistrelle	26-08-18	0:14
Leisler's Bat	26-08-18	0:38
Leisler's Bat	26-08-18	0:53
Soprano Pipistrelle	26-08-18	20:43
Soprano Pipistrelle	26-08-18	20:43
Common Pipistrelle	26-08-18	20:45
Soprano Pipistrelle	26-08-18	20:46
Soprano Pipistrelle	26-08-18	20:46
Common Pipistrelle	26-08-18	20:47
Leisler's Bat	26-08-18	21:10
Leisler's Bat	26-08-18	21:18
Leisler's Bat	26-08-18	21:18
Leisler's Bat	26-08-18	21:19
Soprano Pipistrelle	26-08-18	21:20
Leisler's Bat	26-08-18	21:21
Leisler's Bat	26-08-18	21:25
Leisler's Bat	26-08-18	21:29
Common Pipistrelle	26-08-18	21:29

SPECIES	DATE	TIME
Common Pipistrelle	26-08-18	21:32
Common Pipistrelle	26-08-18	21:32
Soprano Pipistrelle	26-08-18	21:34
Common Pipistrelle	26-08-18	21:35
Common Pipistrelle	26-08-18	21:37
Leisler's Bat	26-08-18	21:39
Leisler's Bat	26-08-18	21:40
Leisler's Bat	26-08-18	21:41
Common Pipistrelle	26-08-18	21:41
Common Pipistrelle	26-08-18	21:42
Leisler's Bat	26-08-18	21:42
Leisler's Bat	26-08-18	21:44
Leisler's Bat	26-08-18	21:45
Leisler's Bat	26-08-18	21:46
Leisler's Bat	26-08-18	21:47
Leisler's Bat	26-08-18	21:52
Leisler's Bat	26-08-18	21:52
Leisler's Bat	26-08-18	21:53
Leisler's Bat	26-08-18	21:54
Leisler's Bat	26-08-18	21:54
Leisler's Bat	26-08-18	22:44
Leisler's Bat	26-08-18	23:03
Leisler's Bat	26-08-18	23:42
Leisler's Bat	26-08-18	23:42
Common Pipistrelle	27-08-18	0:10
Soprano Pipistrelle	27-08-18	0:23
Soprano Pipistrelle	27-08-18	1:43
Common Pipistrelle	27-08-18	2:15
Leisler's Bat	27-08-18	2:19
Leisler's Bat	27-08-18	2:20
Leisler's Bat	27-08-18	2:21
Leisler's Bat	27-08-18	2:25
Leisler's Bat	27-08-18	2:27
Leisler's Bat	27-08-18	2:27
Common Pipistrelle	27-08-18	2:46
Soprano Pipistrelle	27-08-18	4:28
Soprano Pipistrelle	27-08-18	4:28
Common Pipistrelle	27-08-18	4:35
Leisler's Bat	27-08-18	4:41
Common Pipistrelle	27-08-18	4:50
Common Pipistrelle	27-08-18	5:03
Common Pipistrelle	27-08-18	5:04
Leisler's Bat	27-08-18	5:04
Leisler's Bat	27-08-18	5:07
Common Pipistrelle	27-08-18	5:07
Soprano Pipistrelle	27-08-18	5:07
Leisler's Bat	27-08-18	5:08
Common Pipistrelle	27-08-18	5:14
Leisler's Bat	27-08-18	5:31

SPECIES	DATE	TIME
Leisler's Bat	27-08-18	5:32
Leisler's Bat	27-08-18	5:32
Leisler's Bat	27-08-18	5:32
Leisler's Bat	27-08-18	5:33
Leisler's Bat	27-08-18	5:34
Leisler's Bat	27-08-18	5:35
Common Pipistrelle	27-08-18	5:48
Leisler's Bat	27-08-18	5:59
Leisler's Bat	27-08-18	21:07
Leisler's Bat	27-08-18	21:08
Leisler's Bat	27-08-18	21:08
Leisler's Bat	27-08-18	21:08
Leisler's Bat	27-08-18	21:08
Leisler's Bat	27-08-18	21:08
Leisler's Bat	27-08-18	21:09
Leisler's Bat	27-08-18	21:09
Leisler's Bat	27-08-18	21:09
Leisler's Bat	27-08-18	21:09
Leisler's Bat	27-08-18	21:09
Leisler's Bat	27-08-18	21:09
Leisler's Bat	27-08-18	21:10
Leisler's Bat	27-08-18	21:10
Leisler's Bat	27-08-18	21:10
Leisler's Bat	27-08-18	21:10
Leisler's Bat	27-08-18	21:11
Leisler's Bat	27-08-18	21:11
Leisler's Bat	27-08-18	21:12
Leisler's Bat	27-08-18	21:12
Leisler's Bat	27-08-18	21:12
Leisler's Bat	27-08-18	21:12
Leisler's Bat	27-08-18	21:17
Leisler's Bat	27-08-18	21:20
Leisler's Bat	27-08-18	21:23
Leisler's Bat	27-08-18	21:29
Soprano Pipistrelle	27-08-18	21:31
Leisler's Bat	27-08-18	21:36
Leisler's Bat	27-08-18	21:36
Leisler's Bat	27-08-18	21:37
Leisler's Bat	27-08-18	21:37
Leisler's Bat	27-08-18	21:38
Brown Long-eared Bat	27-08-18	21:38
Leisler's Bat	27-08-18	21:38
Leisler's Bat	27-08-18	21:39
Leisler's Bat	27-08-18	21:42
Soprano Pipistrelle	27-08-18	21:42
Leisler's Bat	27-08-18	21:43
Leisler's Bat	27-08-18	21:43
Leisler's Bat	27-08-18	21:44
Leisler's Bat	27-08-18	21:44
Leisler's Bat	27-08-18	21:44
Leisler's Bat	27-08-18	21:45
Leisler's Bat	27-08-18	21:45
Leisler's Bat	27-08-18	21:48
Leisler's Bat	27-08-18	22:00

SPECIES	DATE	TIME
Leisler's Bat	27-08-18	22:01
Leisler's Bat	27-08-18	22:03
Leisler's Bat	27-08-18	22:03
Leisler's Bat	27-08-18	22:04
Leisler's Bat	27-08-18	22:06
Leisler's Bat	27-08-18	22:06
Leisler's Bat	27-08-18	22:07
Leisler's Bat	27-08-18	22:07
Leisler's Bat	27-08-18	22:08
Leisler's Bat	27-08-18	22:09
Leisler's Bat	27-08-18	22:11
Leisler's Bat	27-08-18	22:11
Leisler's Bat	27-08-18	22:11
Leisler's Bat	27-08-18	22:12
Leisler's Bat	27-08-18	22:13
Leisler's Bat	27-08-18	22:14
Leisler's Bat	27-08-18	22:14
Leisler's Bat	27-08-18	22:15
Leisler's Bat	27-08-18	22:15
Leisler's Bat	27-08-18	22:16
Leisler's Bat	27-08-18	22:42
Leisler's Bat	27-08-18	22:43
Leisler's Bat	27-08-18	22:44
Leisler's Bat	27-08-18	22:44
Leisler's Bat	27-08-18	22:46
Common Pipistrelle	27-08-18	22:57
Leisler's Bat	27-08-18	23:06
Soprano Pipistrelle	27-08-18	23:09
Soprano Pipistrelle	27-08-18	23:11
Leisler's Bat	27-08-18	23:14
Leisler's Bat	27-08-18	23:15
Leisler's Bat	27-08-18	23:18
Leisler's Bat	27-08-18	23:20
Leisler's Bat	27-08-18	23:20
Leisler's Bat	27-08-18	23:42
Leisler's Bat	27-08-18	23:45
Leisler's Bat	27-08-18	23:50
Leisler's Bat	27-08-18	23:50
Leisler's Bat	27-08-18	23:50
Leisler's Bat	27-08-18	23:52
Leisler's Bat	27-08-18	23:53
Leisler's Bat	27-08-18	23:55
Leisler's Bat	28-08-18	0:19
Leisler's Bat	28-08-18	0:28
Leisler's Bat	28-08-18	0:37
Leisler's Bat	28-08-18	0:37
Leisler's Bat	28-08-18	0:54
Leisler's Bat	28-08-18	0:54
Common Pipistrelle	28-08-18	0:54

SPECIES	DATE	TIME
Leisler's Bat	28-08-18	1:10
Leisler's Bat	28-08-18	1:41
Soprano Pipistrelle	28-08-18	1:46
Leisler's Bat	28-08-18	2:20
Leisler's Bat	28-08-18	2:24
Soprano Pipistrelle	28-08-18	2:51
Soprano Pipistrelle	28-08-18	2:51
Leisler's Bat	28-08-18	3:08
Leisler's Bat	28-08-18	3:21
Leisler's Bat	28-08-18	3:22
Leisler's Bat	28-08-18	3:22
Leisler's Bat	28-08-18	3:23
Leisler's Bat	28-08-18	3:23
Leisler's Bat	28-08-18	3:24
Leisler's Bat	28-08-18	3:24
Leisler's Bat	28-08-18	3:25
Leisler's Bat	28-08-18	3:25
Leisler's Bat	28-08-18	4:19
Leisler's Bat	28-08-18	4:19
Leisler's Bat	28-08-18	4:20
Common Pipistrelle	28-08-18	4:21
Common Pipistrelle	28-08-18	4:41
Common Pipistrelle	28-08-18	4:43
Common Pipistrelle	28-08-18	5:00
Leisler's Bat	28-08-18	21:36
Leisler's Bat	28-08-18	21:37
Leisler's Bat	28-08-18	21:43
Leisler's Bat	28-08-18	21:45
Leisler's Bat	28-08-18	21:48
Leisler's Bat	28-08-18	21:53
Leisler's Bat	28-08-18	21:54
Leisler's Bat	28-08-18	21:54
Leisler's Bat	28-08-18	21:55
Leisler's Bat	28-08-18	21:56
Leisler's Bat	28-08-18	21:57
Leisler's Bat	28-08-18	21:58
Leisler's Bat	28-08-18	21:59
Leisler's Bat	28-08-18	22:00
Common Pipistrelle	28-08-18	22:10
Common Pipistrelle	28-08-18	22:38
Leisler's Bat	28-08-18	22:40
Leisler's Bat	28-08-18	22:43
Leisler's Bat	28-08-18	22:45
Leisler's Bat	28-08-18	22:47
Leisler's Bat	28-08-18	22:50
Leisler's Bat	28-08-18	22:50
Leisler's Bat	28-08-18	22:51
Common Pipistrelle	28-08-18	22:58
Common Pipistrelle	28-08-18	23:21

SPECIES	DATE	TIME
Leisler's Bat	28-08-18	23:22
Leisler's Bat	28-08-18	23:23
Leisler's Bat	28-08-18	23:44
Leisler's Bat	28-08-18	23:45
Leisler's Bat	28-08-18	23:45
Leisler's Bat	28-08-18	23:45
Leisler's Bat	28-08-18	23:46
Leisler's Bat	28-08-18	23:46
Leisler's Bat	28-08-18	23:46
Leisler's Bat	29-08-18	0:30
Leisler's Bat	29-08-18	3:05
Leisler's Bat	29-08-18	3:07
Leisler's Bat	29-08-18	3:09
Soprano Pipistrelle	29-08-18	3:14
Leisler's Bat	29-08-18	3:29
Leisler's Bat	29-08-18	3:37
Leisler's Bat	29-08-18	3:48
Leisler's Bat	29-08-18	3:50
Common Pipistrelle	29-08-18	21:06
Common Pipistrelle	29-08-18	21:07
Common Pipistrelle	29-08-18	21:08
Common Pipistrelle	29-08-18	21:14
Common Pipistrelle	29-08-18	21:27
Soprano Pipistrelle	29-08-18	21:48
Brown Long-eared Bat	29-08-18	22:21
Leisler's Bat	29-08-18	22:51
Common Pipistrelle	29-08-18	23:13
Common Pipistrelle	29-08-18	23:14
Common Pipistrelle	29-08-18	23:44
Soprano Pipistrelle	30-08-18	0:29
Common Pipistrelle	30-08-18	0:37
Common Pipistrelle	30-08-18	1:38
Common Pipistrelle	30-08-18	20:43
Leisler's Bat	30-08-18	21:37
Leisler's Bat	30-08-18	21:46
Leisler's Bat	30-08-18	21:46
Leisler's Bat	30-08-18	21:50
Leisler's Bat	30-08-18	21:52
Leisler's Bat	30-08-18	22:13
Leisler's Bat	30-08-18	22:13
Leisler's Bat	30-08-18	22:14
Leisler's Bat	30-08-18	22:14
Leisler's Bat	30-08-18	22:15
Leisler's Bat	30-08-18	22:15
Leisler's Bat	30-08-18	22:15
Leisler's Bat	30-08-18	22:16
Leisler's Bat	30-08-18	22:16
Leisler's Bat	30-08-18	22:27
Leisler's Bat	30-08-18	22:27

SPECIES	DATE	TIME
Leisler's Bat	30-08-18	22:28
Leisler's Bat	30-08-18	22:30
Leisler's Bat	30-08-18	22:44
Leisler's Bat	30-08-18	22:44
Leisler's Bat	30-08-18	22:45
Leisler's Bat	30-08-18	22:51
Leisler's Bat	30-08-18	22:52
Leisler's Bat	30-08-18	22:52
Leisler's Bat	30-08-18	22:53
Leisler's Bat	30-08-18	22:54
Leisler's Bat	30-08-18	22:55
Leisler's Bat	30-08-18	22:55
Leisler's Bat	30-08-18	22:56
Leisler's Bat	30-08-18	22:57
Leisler's Bat	30-08-18	22:57
Leisler's Bat	30-08-18	22:57
Leisler's Bat	30-08-18	22:59
Leisler's Bat	30-08-18	22:59
Leisler's Bat	30-08-18	23:00
Leisler's Bat	30-08-18	23:00
Leisler's Bat	30-08-18	23:00
Leisler's Bat	30-08-18	23:00
Leisler's Bat	30-08-18	23:02
Leisler's Bat	30-08-18	23:23
Leisler's Bat	30-08-18	23:29
Leisler's Bat	30-08-18	23:29
Leisler's Bat	30-08-18	23:30
Leisler's Bat	30-08-18	23:30
Leisler's Bat	30-08-18	23:30
Leisler's Bat	30-08-18	23:32
Leisler's Bat	30-08-18	23:32
Leisler's Bat	30-08-18	23:34
Leisler's Bat	30-08-18	23:35
Leisler's Bat	30-08-18	23:37
Leisler's Bat	30-08-18	23:37
Leisler's Bat	30-08-18	23:38
Leisler's Bat	30-08-18	23:40
Leisler's Bat	30-08-18	23:41
Leisler's Bat	30-08-18	23:41
Leisler's Bat	30-08-18	23:41
Leisler's Bat	30-08-18	23:43
Leisler's Bat	30-08-18	23:43
Leisler's Bat	31-08-18	0:04
Leisler's Bat	31-08-18	0:04

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- www.europa.eu – official website of the European Union, source of information on EU Directives.
- www.epa.ie – official website of the Environmental Protection Agency. www.biodiversityireland.ie – official website of the National Biodiversity Data Centre.



Appendix G

**Assessment of Usage by Bats
of Woodland Habitat
During the Period
December 2018/January 2019**

Prepared March 2019 by:
Forest Environmental Research and Services Ltd
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Executive Summary

During late summer 2018 FERS Ltd was commissioned to undertake bat monitoring at several locations in the environs of the Hill of Tara, Co. Meath, on behalf of the Office of Public Works. Activity at one location within woodland habitat indicated that there is a Leisler's roost within the woodland. Over 30% of bat passes detected were Leisler's Bat, and of these almost 60% contained social calls (primarily males). The August results were indicative of a potential swarming site and over-winter Leisler's Bat roost.

In order to determine if there were any hibernation roosts in the woodland habitat or vicinity, FERS Ltd was commissioned to undertake surveys of the habitat during the period December 2018–January 2019. This survey was undertaken utilising Pettersson D500x ultrasound recording units. Although bats hibernate during the winter months, they do emerge from torpor intermittently to relieve themselves and potentially hunt during mild spells. Detection of activity during this period is indicative of a potential roost(s) in the habitat.

Two Pettersson units were deployed, one within the interior of the woodland, and one at the woodland edge within an area of hedgerow. No activity was recorded on the unit within the woodland interior. Two bats of different species (Leisler's Bat and Common Pipistrelle) were detected on the night of 28 December 2018 (relatively mild with daytime temperatures above 10°C) along the exterior edge of the woodland. This result would indicate a winter roost of these species in the vicinity.

1. Introduction

1.1 FERS Ltd. company background

Forest, Environmental Research and Services (FERS) Ltd has been conducting ecological surveys and research since the company's formation in 2005 by Dr Patrick Moran and Dr Kevin Black. Dr Moran, the Principal Ecologist with FERS, holds a first-class honours degree in Environmental Biology (UCD), a Ph.D. in Ecology (UCD), a Diploma in EIA and SEA management (UCD), a Diploma in Environmental and Planning Law (King's Inn) and an M.Sc. in Geographical Information Systems and Remote Sensing (University of Ulster, Coleraine). Dr Moran has over 20 years of experience in carrying out ecological surveys on both an academic and a professional basis. Dr Emma Reeves, Senior Ecologist with FERS holds a first-class honours degree in Botany, and a Ph.D. in Botany. Dr Reeves has over 10 years of experience in undertaking ecological surveys on an academic and professional basis. Ciarán Byrne, a Senior Ecologist with FERS holds a first-class honours degree in Environmental Management (DIT) and an M.Sc. in Applied Science/Ecological Assessment (UCC). Mr Byrne has in excess of five years of experience undertaking ecological surveys on an academic and professional basis.

FERS' client list includes National Parks and Wildlife Service, An Bord Pleanála, various County Councils, the Heritage Council, University College Dublin, the Environmental Protection Agency, Inland Waterways Association of Ireland, Teagasc, the Department of Agriculture, the Office of Public Works and Coillte in addition to numerous private individuals and companies. FERS undertakes short- and long-term bat assessments nationwide. Dr Patrick Moran has in excess of 10 years of experience in undertaking bat surveys.

1.2 Background to and aim of this report

In August of 2018, FERS was commissioned by the Office of Public Works to undertake monitoring of bat activity at a number of locations at the Hill of Tara. The habitats included wooded habitat in the north-western corner of the site (see Figure 1). The results obtained indicated a strong possibility that the woodland habitat (which is present on the 1st edition OSI map) may be utilised as an over-wintering hibernation. This survey, undertaken during December 2018–January 2019, utilised static monitors (Petterson D500x), deployed on site in order to record any bat activity during the hibernation period. Bats do emerge from hibernation torpor for short spells to relieve themselves and, if possible, hunt, during mild spells. The detection of bat activity during the peak of the hibernation season (December/January) is indicative of a roost in the vicinity. The aim of this survey was to identify if there was any bat activity at this habitat during the hibernation period.



Figure 1: Aerial imagery (Digital Globe) of survey area (1:5,000)

1.3 Legislation and bats in Ireland

There are currently nine (possibly 10) species of bat known to breed in Ireland. All species and their roost sites are strictly protected under both domestic and European legislation including:

1.3.1 The Wildlife Act 1976 and Wildlife (Amendment) Act 2000

All Irish species of bat are protected under this, Ireland’s primary domestic legislation for the protection of wildlife. Under the Wildlife Act, it is a criminal offence to intentionally harm or disturb a bat in its place of rest.

1.3.2 The EU Habitats Directive, Council Directive (92/43/EEC) on the Conservation of Natural Habitats and of Wild Fauna and Flora 1992

All Irish bat species are listed on Annex IV of the EU Habitats Directive and, as such, must be strictly protected wherever they occur.

1.4 Conservation status of Irish bat species

In the cooler climate of Ireland and many other temperate countries, bats eat exclusively invertebrates (insects, spiders, etc.), which they actively hunt by catching them in flight or plucking them from foliage or off the ground/water. Different species of bat may specialise in catching different types of invertebrates (for example the relatively large Leisler’s Bat (*Nyctalus leisleri*) feeds on larger invertebrates while the Common Pipistrelle (*Pipistrellus pipistrellus*) concentrates on smaller prey, such as midges). Bats gather to feed wherever there are large invertebrate populations. During the winter in Ireland, when there are few invertebrates available for feeding bats, they hibernate. Under Irish law (the Wildlife Act 1976 and Wildlife (Amendment) Act 2000) it is a criminal offence to harm or disturb a bat in its place of rest.

Bats are at their most vulnerable when roosting and form different roost types at different times of the year (see Figure 2, taken from Irish Wildlife Manuals No. 25, Bat Mitigation Guidelines for Ireland). Owing to their metabolic and social requirements, which vary throughout the year, most bats will utilise a variety of roost types depending on the time of year.

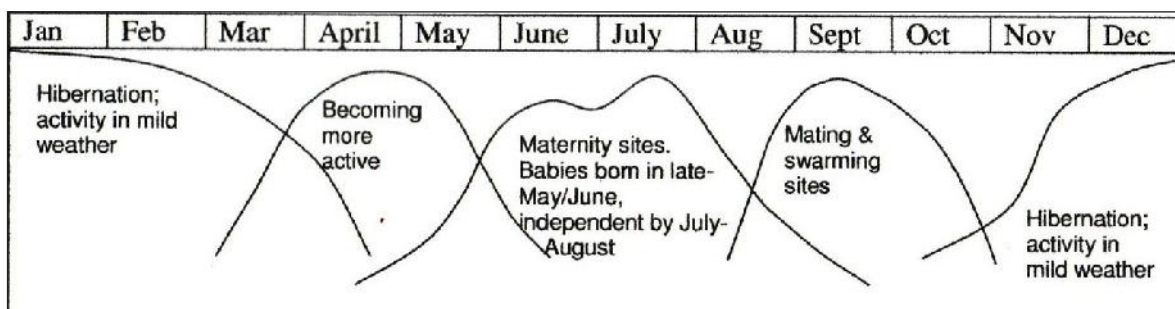


Figure 2: The 'Bat Year'

The conservation status of the nine resident Irish bat species (taken from the NPWS 2013 document “The status of EU protected habitats and species in Ireland”) is outlined below:

1.4.1 Lesser Horseshoe Bat, *Rhinolophus hipposideros* [1303]

The Lesser Horseshoe Bat (*Rhinolophus hipposideros*) is widely distributed through western, central and southern Europe and as far east as Kashmir, northern Africa and Arabia. Ireland represents the most north-westerly limit of the species’ distribution and here it is confined to six west coast counties: Mayo, Galway, Clare, Limerick, Cork and Kerry. A single animal has also been recorded in Co. Roscommon. Although this bat has declined in many European countries, Ireland is considered a stronghold for the species. Lesser Horseshoe Bats are faithful to their roost site and will return to the same site each year. Summer roosts are often in the attics of old or derelict buildings. Hibernation sites are typically caves, souterrains, cellars and icehouses. Lesser Horseshoes rely on linear landscape features (for example, treelines, stonewalls and hedgerows) to navigate and commute from roosts to feeding sites and are reluctant to fly out in the open. The bats forage on flying insects

predominantly in deciduous woodland and riparian vegetation normally within a few kilometres of their roosts. Lesser Horseshoe Bats are sensitive to disturbance and normally do not occupy the same buildings as humans. Loss of roosting sites due to deterioration or renovation of old buildings, loss of commuting routes linking roosts to foraging sites, and unsympathetic management of foraging habitats are the major threats to this species. The population is estimated at approximately 12,000–14,000 animals and both short-term and long-term population trends show slight increases. The identified threats are considered manageable, and a significant proportion of this bat's summer and winter roosts are protected within Special Areas of Conservation. The overall conservation status of this species is assessed as "Favourable".

1.4.2 Common Pipistrelle, *Pipistrellus pipistrellus*, (1309)

The Common Pipistrelle (*Pipistrellus pipistrellus*) is one of Ireland's smallest mammals. It is widespread throughout the country although it may be less common or even absent from some parts of the far west. It is very general in its habitat preference, foraging in woodland, riparian habitats and parkland, along linear features in farmland, and in towns and cities. Some association with broadleaved woodland and riparian habitats at a local scale, has been identified, while mixed forestry may be more important at a wider scale in the landscape. Only areas of bog, marsh and heath appear to be avoided. Maternity roosts of this species are often in buildings, typically in the attics of dwelling houses, although it is occasionally found roosting under bridges and in trees. Bats normally disperse in autumn and hibernate over winter. The species has rarely been found hibernating in Ireland, but the available records for bats in winter are from modern dwelling houses. Recent estimates for this species suggest a population size in the order of 1–2 million animals. The population size is stable and may even be increasing. Furthermore, there is no indication of any major pressures currently impacting this species; therefore, the overall status is assessed as "Favourable".

1.4.3 Soprano Pipistrelle, *Pipistrellus pygmaeus*, (5009)

The Soprano Pipistrelle (*Pipistrellus pygmaeus*) overlaps with the common pipistrelle across much of central Europe, but while the Soprano Pipistrelle appears to be absent from much of France and northern Iberia, its range does extend into southern Scandinavia and Greece. The species is abundant and widespread in Ireland, occurring in all counties. Recent monitoring suggests that it may be most abundant in the western half of the country. Summer roosts are usually in buildings, including modern suburban houses, old, abandoned mansions, churches, amenity buildings and farm sheds. The bats normally roost in very confined spaces, such as behind window sashes, under tiles and weatherboards, behind fascia and soffits, and within the cavities of flat roofs. Roosts of >1000 Soprano Pipistrelles are known. The species is thought to hibernate in buildings and trees but has seldom been recorded in winter. Although this bat is known to forage in a broad range of habitats, it shows some preference for aquatic habitats – riparian woodland, rivers and lakes. Recent estimates for this species suggest a population size in the order of 500,000–1,000,000 animals, with evidence for a recent increase. As there is no indication of any major pressures currently impacting populations the overall status of this species is assessed as "Favourable".

1.4.4 Nathusius' Pipistrelle, *Pipistrellus nathusii*, (1317)

The Nathusius' Pipistrelle (*Pipistrellus nathusii*) was first detected in the Republic of Ireland in 1997. This pipistrelle is a long distant migrant over much of its range; it is found in eastern Europe only in summertime and is found in south-western Europe only in the winter. Ireland and the UK appear to lie in a transitional region, with resident bats being supplemented during winter by migratory individuals. To date, although maternity colonies have been located in Northern Ireland, no maternity roost has been found in the Republic of Ireland. Nathusius' Pipistrelle is a relatively recent addition to the Irish fauna. It appears to have spread from Northern Ireland and the north-east remains its stronghold on the island. Initial indications suggested that this species was spreading rapidly. However, data from recent years are more ambiguous. Only 31 x 10km cells hold records for the current reporting period and these are scattered throughout the country giving no real impression of an established range. Consequently, range has been assessed as "Unknown". Despite the years of survey work, there is still no evidence of any breeding colonies of this species in the Republic of Ireland and it is not clear if a viable breeding population exists. As a result, population has also been assessed as "Unknown". There is, however, a significant area of suitable habitat available to be colonised by the species. The extent of these habitats appears to be stable and in general these habitats appear to be in good condition. Future prospects, however, are hard to define given the lack of other information and further work is required to clarify the true status of this bat species in Ireland. Therefore, the overall status is assessed as "Unknown".

1.4.5 Natterer's Bat, *Myotis nattereri*, (1322)

The Natterer's Bat (*Myotis nattereri*) is widespread across Europe and found from Portugal and north-west Africa to the Urals and the near East. It is also widely distributed in Ireland, though seldom recorded. Summer roosts are normally in buildings although bridge roosts are also known. Although some large roosts (>50 bats) have been found in churches, typically only small numbers of bats are present, often between rafters and felt and in other narrow spaces where they are difficult to locate. Recent surveys of swarming roosts have also located this species. In winter individuals have been observed in bridges, mines and caves. Woodland habitats and river corridors appear to be favoured for foraging. The Natterer's Bat has a disjunct distribution in Ireland, but its range and population are in good condition and the area of suitable habitat appears to be increasing. Woodland management and the renovation of old buildings and bridges have been identified as potential concerns. The overall status is, however, assessed as "Favourable".

1.4.6 Daubenton's Bat, *Myotis daubentonii*, (1314)

The Daubenton's Bat (*Myotis daubentonii*) is found throughout Ireland. It is particularly associated with rivers and lakes due to its preference for foraging over water. It is positively associated with good water quality and invertebrate diversity and favours waterways with riparian vegetation, particularly broadleaf woodlands. It is less likely to be present where there are street lights. It also tends to avoid areas of peatland and is negatively associated with increasing altitudes. Daubenton's tend to roost in uninsulated structures, with bridges accounting for over 50% of its roost records in Ireland. The remaining roosts are found in buildings, with occasional records for caves and trees. Confirmed hibernacula for the species are extremely rare in Ireland. In recent years several cave locations have been confirmed as autumnal swarming sites for the species, but it is unknown whether these sites also function as hibernation roosts. Recent estimates for this species suggest a population size in the order of 57,000–79,000 animals. The population size is stable and there is no indication of any major pressures currently impacting on the species. Therefore, the overall status is assessed as "Favourable".

1.4.7 Whiskered Bat, *Myotis mystacinus* (1330)

The Whiskered Bat (*Myotis mystacinus*) is widespread across much of Europe although it is absent from northern Scotland and northern Scandinavia. There are records from throughout Ireland, from Donegal to Wexford, but the species is not common, and its distribution appears to be naturally dispersed and disjunct. Summer roosts are normally in old stone buildings. Usually only small numbers of bats are present, often between rafters and felt and in other narrow spaces where they are difficult to locate. Bridge roosts are also known. Wintering animals are rarely found, but a small number has been recorded in caves. This bat is known to be a woodland specialist, foraging selectively in broadleaved and mixed woodland as well as riparian corridors. Although the Whiskered Bat has a dispersed and disjunct distribution, the area of suitable habitat appears to be increasing. Building renovation and loss of foraging habitat are potential threats but there are no significant pressures currently impacting this species. Therefore, the overall status is assessed as "Favourable".

1.4.8 Brown Long-eared Bat, *Plecotus auritus* (1326)

The Brown Long-eared Bat (*Plecotus auritus*) is widely distributed in Ireland and across Europe. Its slow flight limits the distance that this species can travel at night-time and studies have found that almost all bats will forage within 1.5km of the roost. However, its manoeuvrability means that it can access cluttered habitats, and flightless arthropod prey makes up a large proportion of its diet confirming the importance of gleaning as a foraging strategy for the species. Modelling indicates that the Brown Long-eared Bat selects areas with broadleaf woodland and riparian habitats on a local scale, while the presence of mixed woodland at a wider landscape level is also important. It can cope with low levels of urbanisation, but wetlands such as bog, marsh and heath are avoided. Brown Long-eared Bats rely heavily on man-made structures for roosting. Most of the roosts recorded in Ireland are in buildings, with very small numbers in bridges, trees and bat boxes, although the natural summer roost of this species across Europe is tree holes. Brown Long-eared Bats show a high degree of roost fidelity and will often use traditional roosts for generations. While the species has been found in a range of building types, from old mills to bungalows, churches or large mansions typically support the largest numbers. Recent estimates put the Irish population of Brown Long-eared Bats at 60,000–100,000 animals. Monitoring data suggest a recent significant increase in numbers. There is no indication of any major pressures currently impacting the population; therefore, the overall status is assessed as "Favourable".

1.4.9 Leisler's Bat, *Nyctalus leisleri* (1331)

Leisler's Bat (*Nyctalus leisleri*) has been described as a 'typically Irish bat' due to its abundance in Ireland compared to the rest of the Europe, where it is uncommon or absent. Its abundance in Ireland has been attributed to the absence of larger competing species, such as the closely related Common Noctule (*N. noctula*). On continental Europe, Leisler's Bat is considered a tree-dwelling species across most of its distribution. The majority of roosts of this species in Ireland, however, have been found in buildings although roost records from trees and bat boxes are also known. Of all the Irish bat species, Leisler's have the most specific maternity roosting habitat requirements, selecting sites with adjacent woodland and freshwater and avoiding areas of arable land and coniferous woodland. Surveys and modelling of foraging preferences indicate that woodlands, riparian habitats and small amounts of urbanisation are favoured while peatlands and areas of dense urbanisation are avoided. Recent estimates for this species suggest a population size of 60,000–110,000 animals with a recent increase in numbers. There are no major population level pressures identified, therefore the overall status is assessed as "Favourable".

2. Survey Methodology

2.1 Static monitor

Two static units were deployed at the approximate locations indicated in Figure 3 on 6 December 2018 and recorded bat activity until 17 January 2019 (the batteries fell below critical voltage during cold weather on the night of 17 January). The units used were Pettersson D500X Mark II ultrasound recording unit utilising an external 12ah battery (lasting 4–8 weeks depending on temperatures and activity). The triggering system allows the device to start recording as a sound is detected. The D500X detects the full spectrum of ultrasound and records in real time, providing much more detailed data than either frequency division or time expansion detectors.

The Pettersson D500X units were programmed to record all bat activity between 30 minutes pre-sunset and 30 minutes post-sunrise. The recording settings utilised were:

- Input Gain – 45;
- Trigger Level – 30; and
- Interval – 5.

Trigger sensitivity was set to “Medium”.

The identification of bats from the calls recorded on the Pettersson D500X was accomplished through a combination of sound-analysis software (SonoChiro and BatSound) and manual interpretation.



Figure 3: Locations of Pettersson D500X units

3. Results

3.1 Woodland interior

The Petterson D500X deployed within the woodland interior was located at the northern end of the woodland (for necessity away from human disturbance). No bat activity was recorded on this unit.

3.2 Woodland edge

The Petterson D500X deployed at the woodland edge was located within the same stretch of hedgerow utilised during previous surveys. There were two species recorded on the night of 28 December 2018 (Leisler's Bat – recorded at 18:08 and Common Pipistrelle – recorded at 20:40). No feeding buzzes were recorded within any of the calls. The sonogram and oscillogram of these calls are illustrated in Figure 4 and Figure 5.

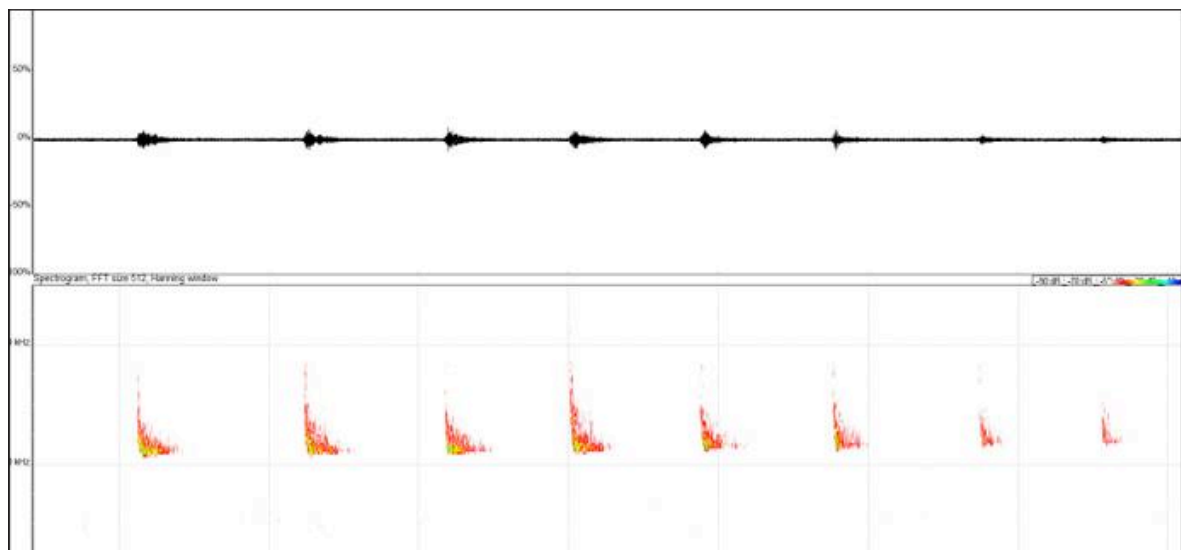


Figure 4: Sonogram/Oscillogram of Common Pipistrelle recorded on 28/12/18

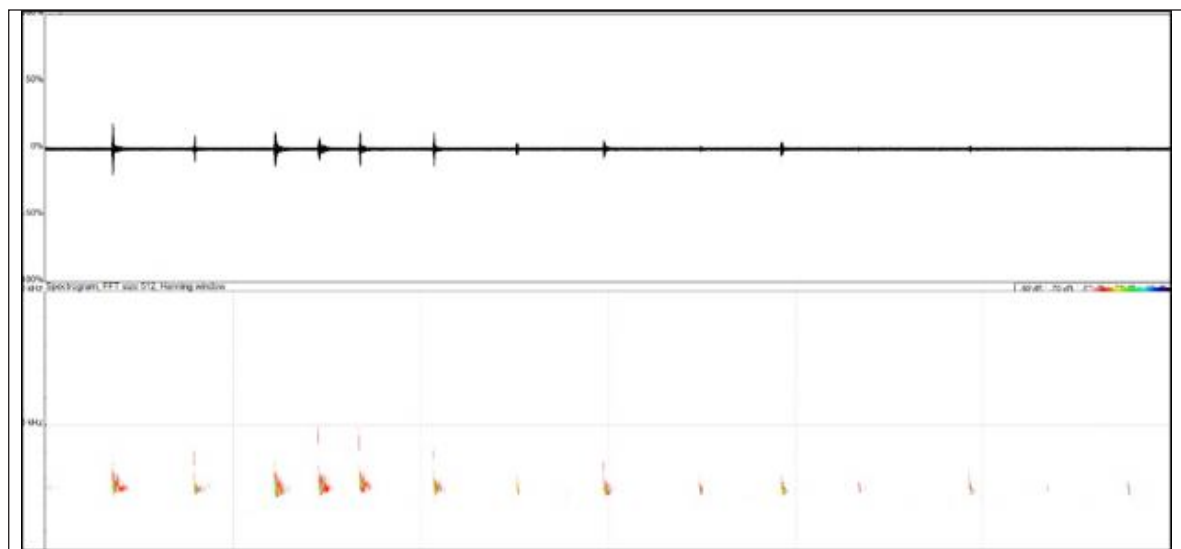


Figure 5: Sonogram/Oscillogram of Leisler's Bat, recorded on 28/12/18

Temperature and relative humidity levels recorded at the site are indicated in Figure 6. The external batteries powering the units both dropped below critical voltage during the cold spell on January 16/17 2019.

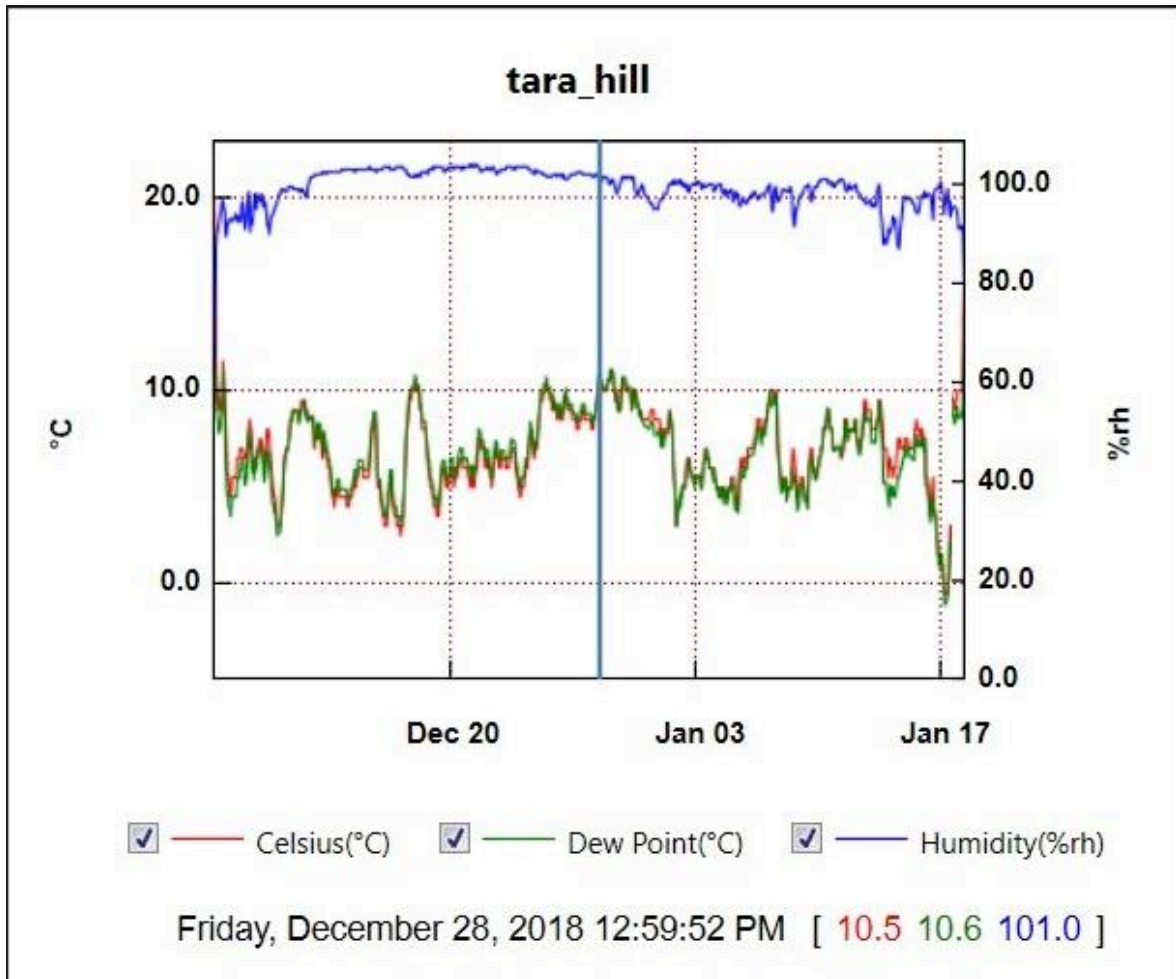


Figure 6: Temperature and relative humidity during survey

4. Conclusions

The results obtained from the Pettersson D500X units during the period December 2018–January 2019 indicate that the woodland habitat is almost certainly utilised as a hibernation roost by Leisler's Bat. Common Pipistrelle was also recorded utilising the habitat during a mild break in the weather on December 28, 2018. The habitat present is subject to significant human disturbance currently, with people camping for medium to long spells, and lighting fires, etc. within the woodland. This disturbance may impact on the usage of this habitat by bats.

It is recommended that the habitat (which has been present for in excess of 150 years) be enhanced for bats by the placement of a minimum of five suitable bat boxes on mature trees (at a height of not less than 4m) within the habitat. It is recommended that a bat box such as the Schwegler 1FW bat box be utilised. This unit consists of a special multi-layered cavity wall, which provides excellent insulation while also allowing air to permeate. This bat box is ideal both for hibernation in winter and for encouraging large maternity colonies in summer. This box is ideal for use on trees or other flat surfaces, and comes with mounting blocks, aluminium nails and fixing instructions. Schwegler boxes last decades and are very successful at attracting inhabitants. This translates to decades of breeding success in real life conditions.

If any works to mature trees are to be undertaken within this habitat (tree removal, tree surgery, ivy removal from mature trees, etc.) a bat survey should be undertaken and a bat conservation management plan (and any relevant derogation) drawn up and implemented if necessary. Please note that as regards routine maintenance works, such as clearing of gorse/furze, bramble, etc. (undertaken during the appropriate season) no bat assessment is required as these works will not interfere with primary bat habitats (trees).

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