ULSTER
ARCHÆOLOGICAL
SOCIETY

# Survey Report

Reference: Geophysical Survey No. 1

Author: Malachy Conway

Location:

Minnowburn
National Trust Property
Ballynahatty
County Down

In association with:

National Trust

**Licence Ref AE/16/218**

Ulster Archaeological Society

c/o School of Natural and Built Environment

The Queen's University of Belfast

Belfast BT7 1NN

Cover illustration: Minnowburn National Trust site *Google Earth*

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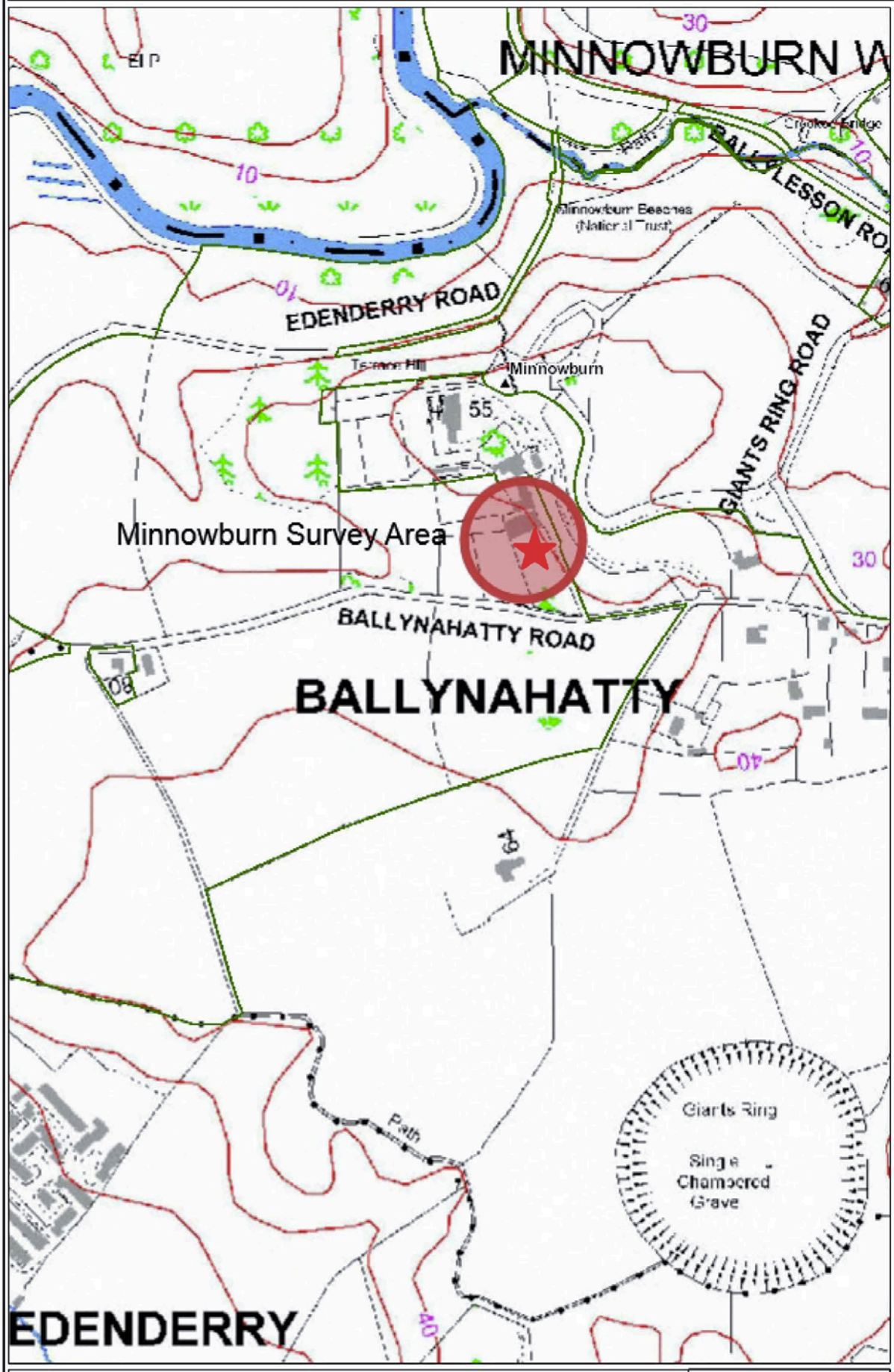
Fig. 1. Location map showing Minnowburn Survey Area

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**Legend**

- Definitive Properties (NI)
- NT Ownership (NI)

N

**Scale: 1: 5,000**

**Date: 14-Nov-2017**

0.2 0 Distance / 2 0.2 Miles

TM65_Irish_Grid



**Notes**

This map was automatically generated using Geocortex Essentials.

This map is a user generated static output from an Internet mapping site and is for reference only. Data layers that appear on this map may or may not be accurate, current, or otherwise reliable.

THIS MAP IS NOT TO BE USED FOR NAVIGATION

## 1. Introduction

A characterisation resolution electrical resistance survey was carried out over a total area of 1600m² at a field in Ballynahatty Townland (known locally as Minnowburn Warden's Base), the area of which is pasture and owned by the National Trust. The site is located 785m due south of Shaws Bridge on the River Lagan, 640m to the north-east of Edenderry Village and 447m north-north-west of The Giant's Ring (Dow 009:036) (Figure 1).

The survey area was chosen as a site for a training session by the Ulster Archaeological Society in the use of newly acquired electrical resistance survey equipment. The field adjacent to the Minnowburn NT warden's base contained no previously recorded archaeological features and lies immediately outside and to the north of the Giant's Ring Area of Special Archaeological Interest (LN 06) (Figure 2).

The survey was undertaken under a Licence issued through the Historic Environment Division (DfC), **Licence Ref AE/16/218** and the site survey training was carried out on 16th and 17th December 2016.

During survey training, electrical resistance data was gathered at 1m and 0.5m probe-spacing to facilitate the interpretation of any geophysical anomalies recorded.

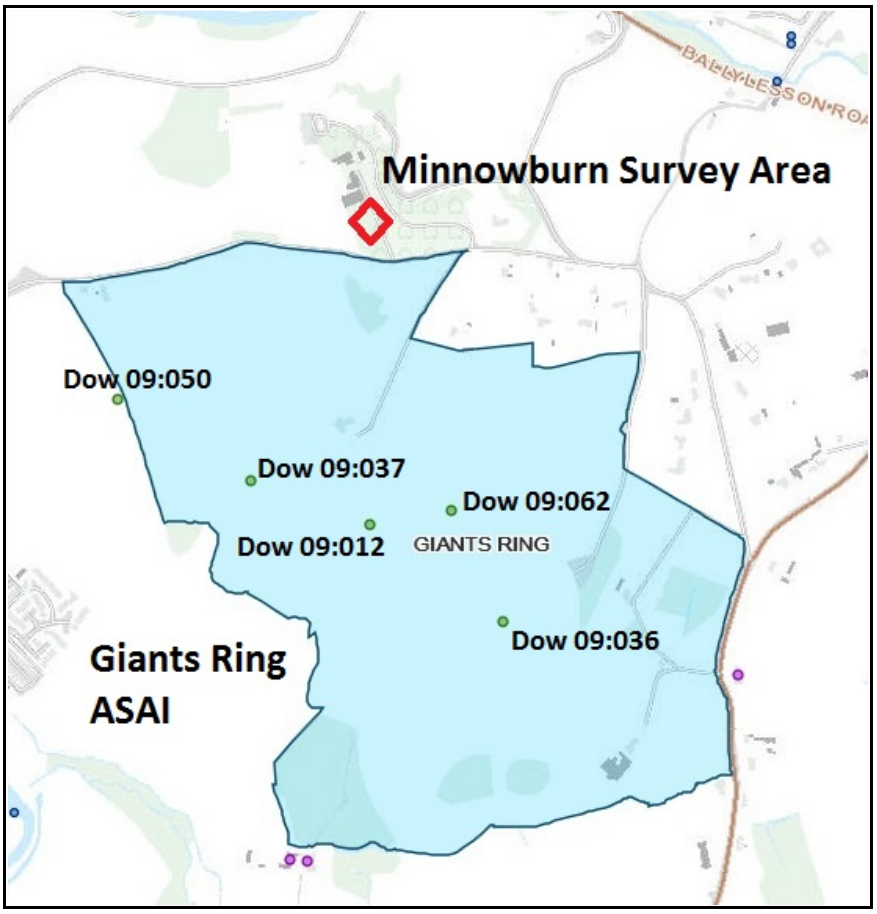


**Figure 2: Location of Geophysical Survey Area in relation to Giants Ring ASAI**

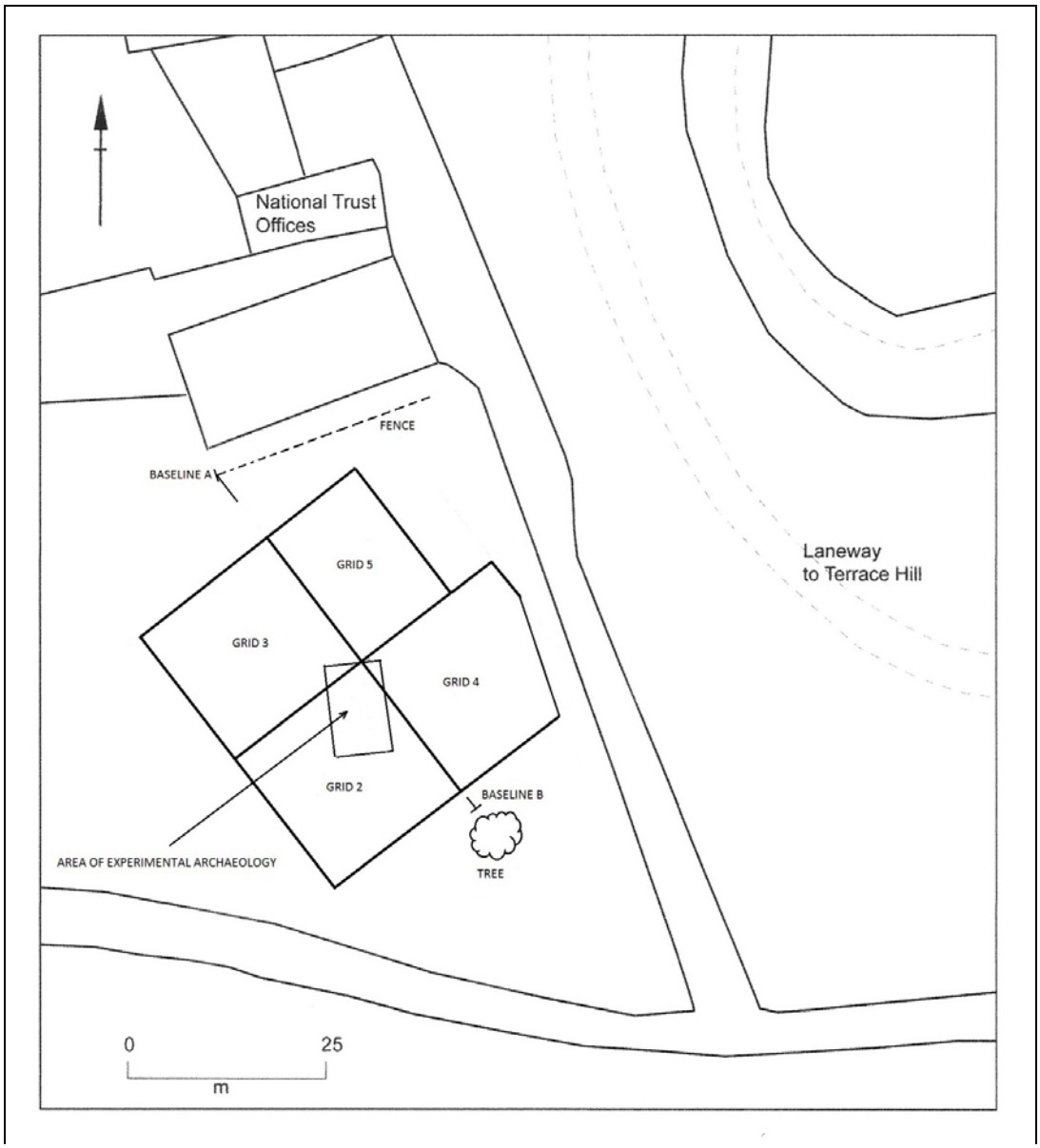


**Figure 3: Detailed site plan of the Geophysical survey gird area located at Minnowburn Wardens Base**

## 2. Site Specific Information

Site name: National Trust Minnowburn, Belfast
Townland: Ballynahatty
SMR: Not in SMR
Grid Ref: J 3252 6824
County: Down
Date of Survey: 16 and 17 December 2016
Surveyors Present: Malachy Conway, Harry Welsh, Patrick O'Neill, Ian Gillespie, Ken Pullin, Randal Scott, Colin Boyd, Hilary Boyd, David Craig, Lee Gordon, Chris Stevenson, David Irving, Sarah McCalmont, Anne McDermott and Paula Sandford.
Size of site surveyed: 40m x 40m
Weather Conditions: Cold and dry

Current Land Use: Pasture
Intended Land Use: Pasture
Geology: Underlying bedrock in the region comprises mainly Lower Palaeozoic greywacke and shale
Soils: Soils are dominated by mixed glacial sands, gravels and clays.

## 3. Survey methodology overview

Instrumentation: *Frobisher TAR-3*
Survey type: Electrical resistance
Probe spacing: Two probe array (0.5m x 2)
Grid size: 20m x 20m
Traverse internal: 1m/1m
Sample internal: 1m
Traverse pattern: Zig-zag
Station setup and recording: A floating grid tied into ING using best-fit to OSNI basemaps. The location of the survey grids were recorded using a *Leica Sprinter* electronic measuring device.

**Plate 2: Aerial photograph taken directly over the area of the Geophysical survey grid at Minnowburn. Photograph by David Craig (IrishSights Ltd)**

## 4. Data processing

The geophysical data was processed in *Snuffler* software. The primary processes applied were high pass filtering (HPF) to remove geological background noise and low pass filtering (LPF) which helps to eradicate minor spikes in the data. The datasets were also interpolated which creates a smoothing effect.

## 5. Summary of survey results

A characterisation resolution electrical resistance survey was carried out over a total area of 0.16 hectares located within a field used for stock grazing to the south side of an area of hard standing containing a large agricultural storage shed and on the west side of an access laneway leading into the Minnowburn Wardens Base from the Ballynahatty Road (Figure 3). No anomalies or features of clear archaeological significance were identified from the survey. Results generated into a greyscale plot of processed data gathered with a 0.5m probe spacing are presented in Fig 8 below and the interpretation of high resistance anomalies R2, R4, R5 is assessed as reflecting natural geology and ground conditions and the R3 low resistance anomalies as possibly representing features related to an experimental archaeology project undertaken on the site in 2006.

## 6. Digital archive

The geophysical datasets were collected, processed and archived in accordance with Archaeological Data Services best practice and have been archived with the National Trust.

## 7. Historical and archaeological background

The field survey site is located 447m to the north-north-west of Ballynahatty passage tomb and embanked enclosure, or henge (SMR DOW 009:036). This townland is an area rich in archaeological remains, particularly dating from the prehistoric period.

| Monument | SMR | IG Reference |
|---|---|---|
| Passage tomb and embanked enclosure | DOW 009:036 | J 3272 6770 |
| Megalithic tomb | DOW 009:037 | J 3238 6789 |
| Megalithic tomb | DOW 009:050 | J 3220 6800 |
| Flat cemetery | DOW 009:053 | J 3200 6700 |
| Timber circles, cist burial and burials | DOW 009:062 | J 3265 6785 |

**Table 1: Recorded monuments within Ballynahatty townland**

The Ballynahatty complex, comprises numerous extant and non-extant monuments of Neolithic and Early Bronze Age date, signifying a long tradition of ritual and

ceremonial activity within a relatively confined area (MacAdam and Getty, 1855; Hartwell, 1998, 2002).

The earliest known human activity in the Ballynahatty area is represented by finds of possible Early Neolithic (c.4000-3600 cal BC) pottery and lithics (Gormley, 2004). Extant archaeological remains at the Ballynahatty complex are somewhat later in date and include a simple passage tomb, a henge (the Giant's Ring, Dow 009:036) and a standing stone (Dow 009:012), (Figs. 2 & 4). The passage tomb is generally attributed to the Mid-Neolithic (c.3600-3100 cal BC), and at least two other possible megalithic tombs (Dow 009:037, Dow 009:050), now destroyed, and two Neolithic cists were recorded to the northwest of the Giant's Ring in the 19th century (MacAdam and Getty, 1855). Further evidence for a passage tomb cemetery comes from four excavated cists on a low ridge north of the Giants Ring (Dow 009:062), (Fig. 4). Although smaller, these contained characteristic cremations in Carrowkeel Ware pots and were of similar morphology to the passage tomb (Hartwell, 1998). The Giants Ring henge was built to encircle the passage tomb and is one of the largest of its kind in Ireland, measuring 190m in diameter with an earthen bank over 4m high. Its age is uncertain but other Irish henges are known to have been built in the Late Neolithic (c.3100-2500 cal BC) or the beginning of the Early Bronze Age (c.2500-2000 cal BC).

Stratigraphically later are two double-palisaded enclosures, Ballynahatty 5 and 6 (BNH5 and BNH6, Dow 009:062). First recognised on aerial photographs, excavations from 1990 to 2000 confirmed a sophisticated layout with 2m deep postholes demarcating a series of oval, rectangular and circular timber constructions allowing entry to the interior (Hartwell, 1998, 2002; Fig. 2).

BNH6 (16m diameter), the first to be built, was located within the eastern end of the larger, oval enclosure BNH5 (c.100m long) and was linked through it to an elaborate, multiphase, outer annexe and entrance (Hartwell, 2002). BNH6 enclosed a square setting of four substantial postholes and a central square feature, possibly representing an excarnation platform. Cremation pits associated with BNH6, at least one of which appears to have been a foundation deposit, confirms a mortuary function. A series of 14C determinations show that the timber complex was used, deliberately burnt and dismantled sometime between 3080 and 2490 cal BC (Gormley, 2004). A 14C sample from one of the postholes of BNH6 yielded an age range of 3770-3640 cal BC, a result that is anomalously early in the context of this site and is most likely derived from an earlier phase of activity at the site (Gormley, 2004).

A palynological study of a small fen wetland Ballynahatty Bog (also known as Kettle Lake) located within the catchment of the multi-period prehistoric complex at Ballynahatty on the south side of the Ballynahatty Road, provides a reconstructed vegetation history of the area, particularly during the early prehistoric period (Plunkett et al 2007, Fig.4).

The pollen record from Ballynahatty Bog reveals tentative evidence for Mesolithic activity in the area at 6410-6220 cal BC, with woodland disturbance identified during the Mesolithic-Neolithic transitional period c.4430-3890 cal BC. A more significant impact on the landscape was observed in the Early Neolithic from 3950 to 3700 cal BC, with an opening up of the forest and the establishment of a mixed agricultural economy. This activity precedes and continues to be evident through the Mid-

Neolithic during which the megalithic tombs and related burial sites were constructed at Ballynahatty (Plunkett et al 2007).

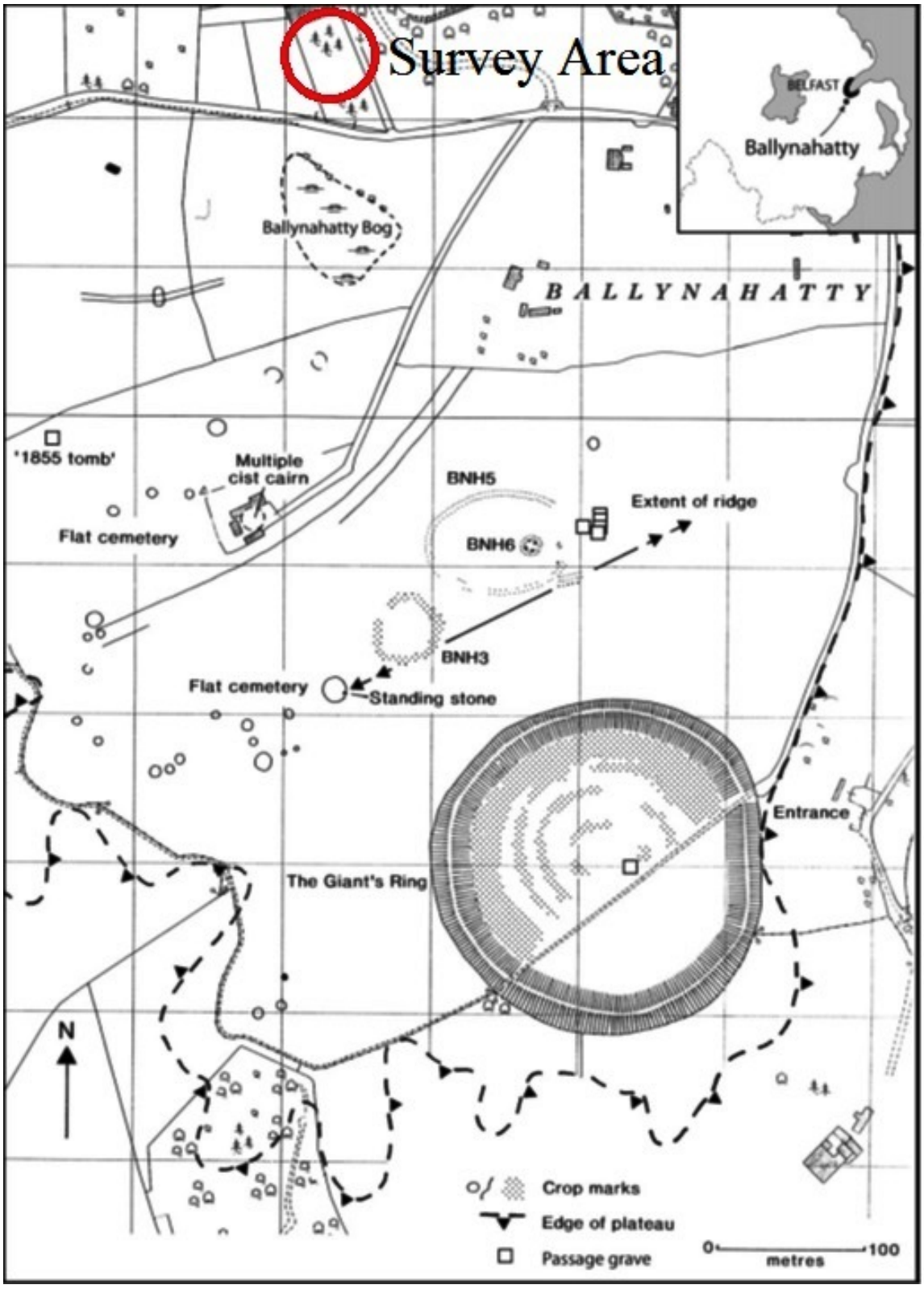


**Figure 4: Plan of the Ballynahatty area, showing sites located within the prehistoric complex and location of survey area (after Hartwell)**

From c.3610 cal BC, the pollen record shows an increase in grasses and a reduction in the tall canopy trees. This implies expanded clearance and that arable agriculture is represented until at least c.3290 cal BC. The results of the palynological study by Plunkett el al suggests that land-use in the vicinity of Ballynahatty did not change in character as the locality first became monumentalised and the monuments themselves appear to have been constructed within a 'domesticated landscape' (Plunkett et al 2007, 8).

It is worth mentioning also that two archaeological excavations were carried out at the Giant's Ring, first in 1917 by H. C. Lawlor, which examined the 'dolmen' and the south-eastern part of the area enclosed by the bank along with a section through the rampart and then small scale investigation in 1954 by A.E.P Collins which excavated another section of the bank and a small area close to the 'dolmen'. Neither excavation revealed any clear signs of occupation or burial remains however Collins' work demonstrated conclusively the existence of the inner quarry ditch and found that not only was there originally a small outer marker or retaining bank, but that the inner face may have been consolidated by a facade of stones.

Within the Geophysical survey area (see Fig. 3), an experimental archaeology exercise had been carried out in 2006 when a number of wooden posts of varying thickness were placed in the ground and burnt *in situ*. This project was undertaken by Dr Harry Welsh (QUB) as part of his study into recording and understanding the processes by which features such as the post-holes, for example from BNH6, were formed and their associated residue archaeological remains produced (Welsh 2006, see Plate 3).

**Plate 3: Experimental Archaeology recording a wooden post burning exercise at Minnowburn 2006**

## 8. Description and interpretation of anomalies

As summarised in 4 and 5 above, the data collected using the *Frobisher TAR-3* over the 1600m² survey grid was processed in Snuffler software (Fig. 5). The primary processes applied were high pass filtering (HPF), to remove geological background noise and low pass filtering (LPF), which helps eradicate minor spikes in the data. The datasets were also interpolated, which creates a smoothing effect (see Figures 6 & 7).

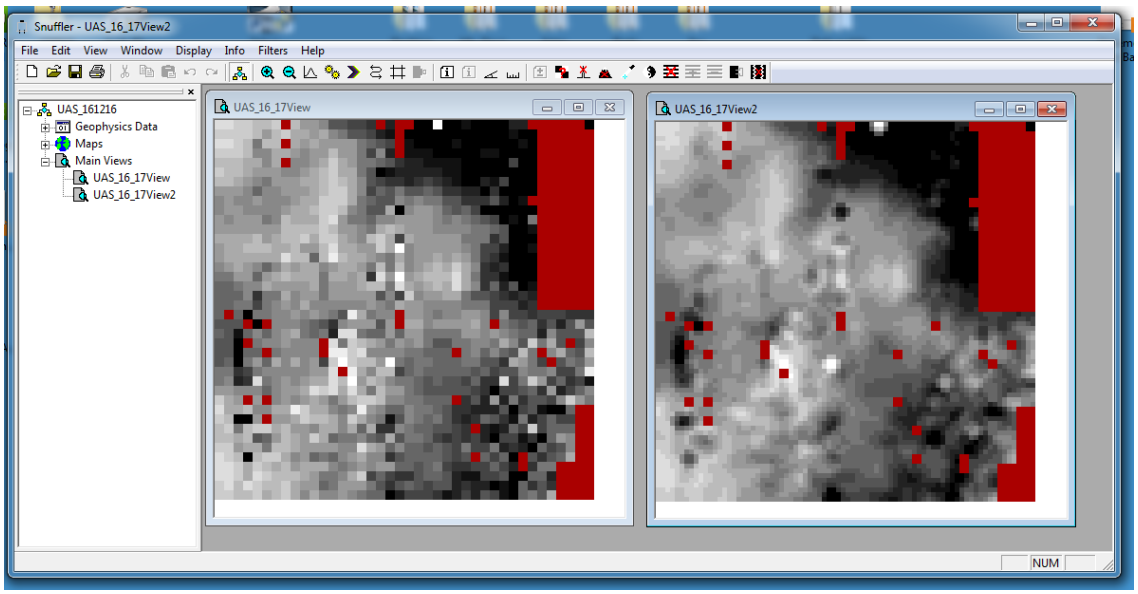


**Figure 5. Screen-shot of Greyscale Raw and Processed data in Snuffler software**

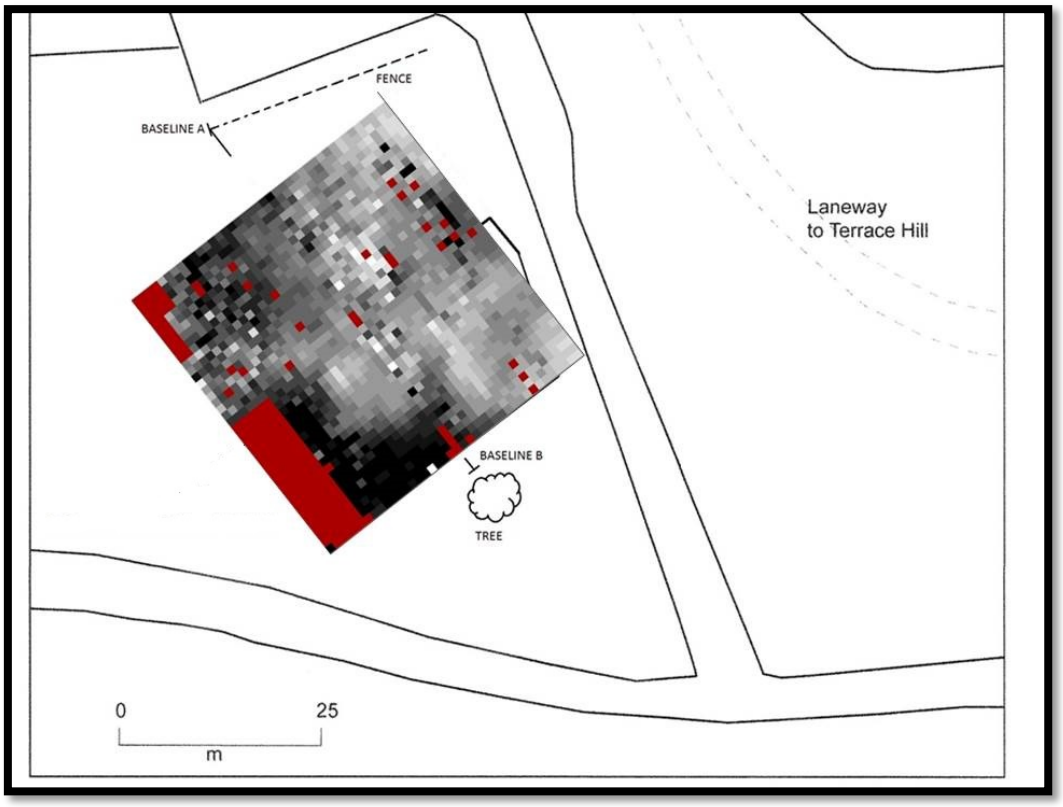


**Figure 6. Greyscale Plot of Raw data**

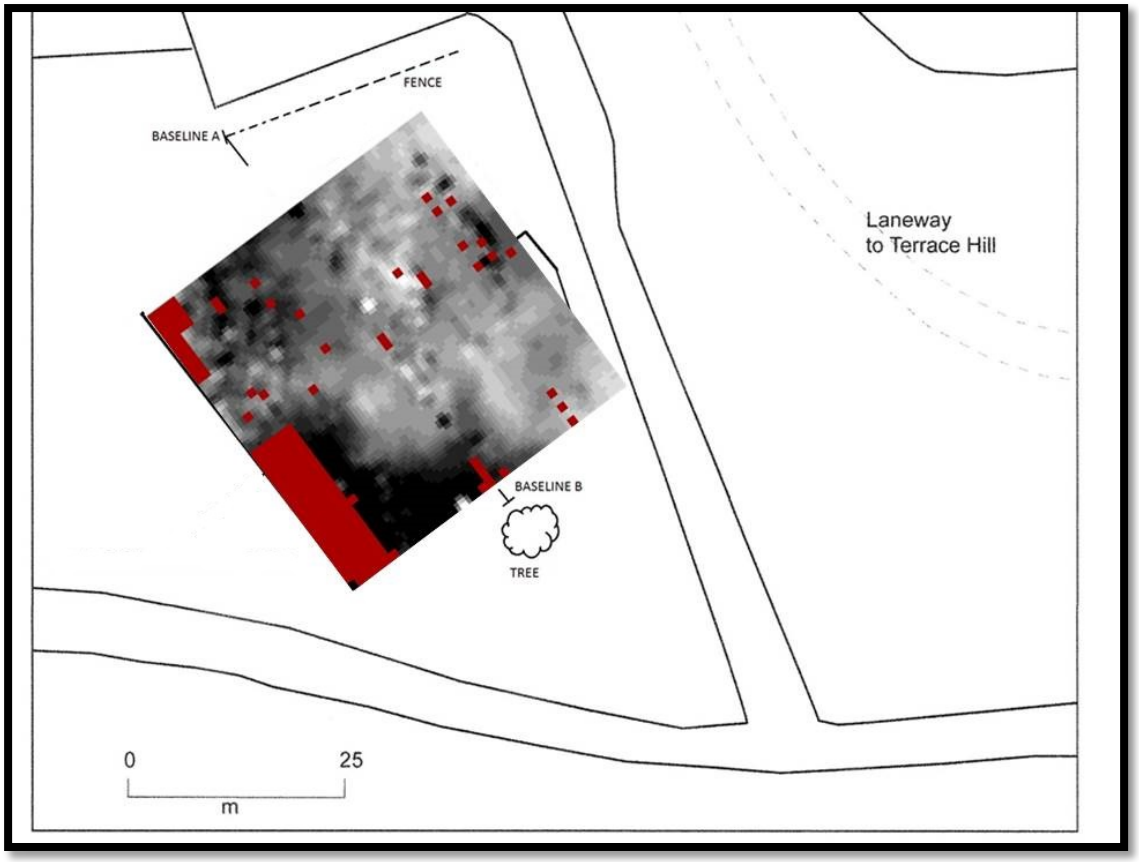


**Figure 7. Greyscale Plot of Processed data**

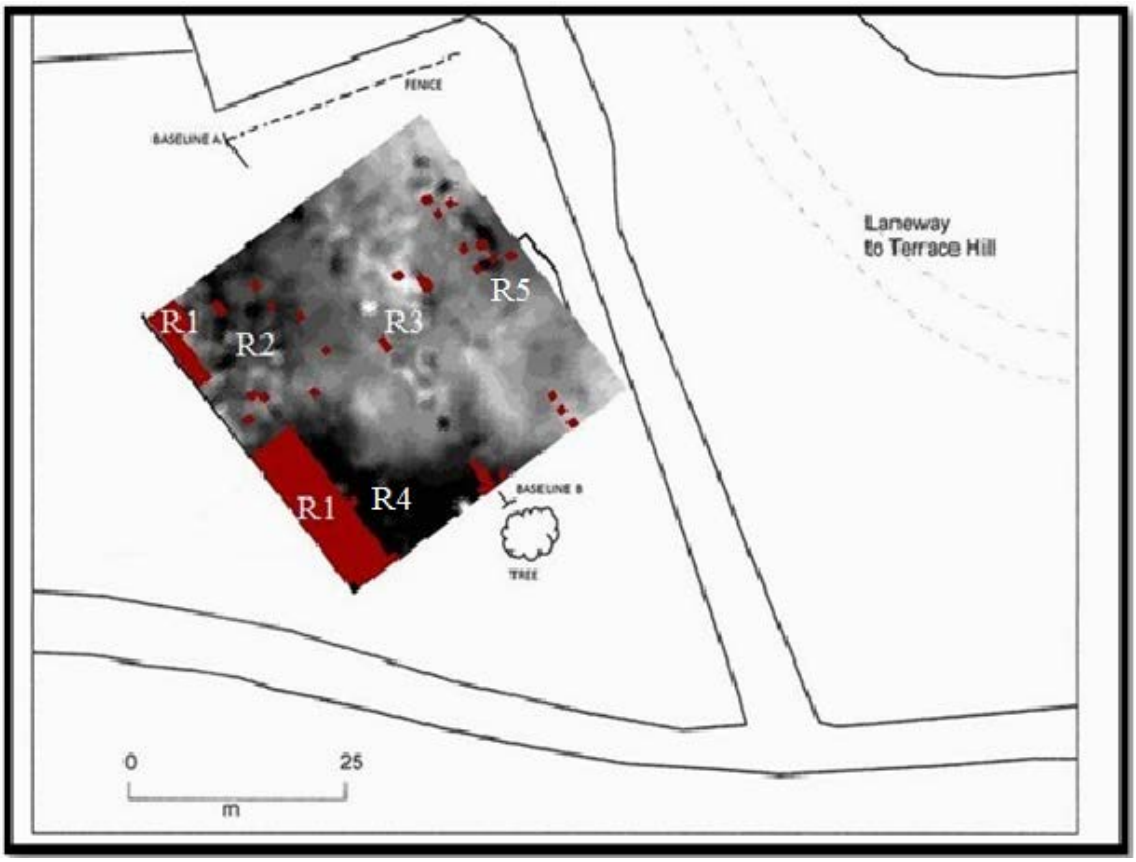


**Figure 8. Abstraction and Interpretation of Anomalies**

| Code | Description | Interpretation |
|---|---|---|
| R1 | Blank readings, shown as red coloured squares within the greyscale plot | Due to the training nature of the survey, these results were deliberate blanks, created by the survey team members in order to practice this feature of the instrument and therefore do not represent obstructions or features such as protruding stones or dense vegetation within the survey grids |
| R2 | Cluster of high resistance readings | This cluster of high resistance readings most likely represents a scatter of near-surface features, most likely of geological origin and therefore not of archaeological significance. The arc formed by the cluster of anomalies strongly corresponds to a natural break in the surface slope of the field at this northwest corner of the survey grid. |
| R3 | Rectilinear patches of low resistance readings | No obvious interpretation, although the position is close to the area of the experimental archaeology work undertaken in 2006 and therefore may suggest pits, possibly the remains of the experimental post-holes |
| R4 | Amorphous patch of high resistance readings | This patch of high resistance readings is located at the southwest corner of the survey grid in an area where the surface ground slopes sharply to the southwest. It is probable that these readings are of geological rather than archaeological origin |
| R5 | Linear patches of high resistance readings | No obvious interpretation. |

**Table 2: Description and interpretation of anomalies (Refer Fig. 8)**

## 9. Discussion

Earth Resistance survey method relies on the relative inability of soils (and objects within the soil) to conduct an electrical current which is passed through them. As resistivity is linked to moisture content, and therefore porosity, hard dense features such as rock will give a relatively high resistivity response, while features such as a ditch or large pit which retains moisture give a relatively low response. Though the values being logged are actually resistances in ohms they are directly proportional to resistivity (ohm-metres) as the same probe configuration was used through-out the survey. Readings were taken at 1.0m centres along traverses 1.0m apart. This equates to 1600 sampling points in a 40m x 40m grid. All traverses were surveyed in “zigzag” mode. The 0.5m probe spacing of a twin probe array has a typical depth of penetration of 0.5m to 1.0m. The collection of data at 1.0m centres with a 0.5m probe spacing

provides slightly less than an optimum resolution, which would be achieved with collection of data at 0.5m centres with a 0.5m probe spacing.

The presentation of the data for the site survey involves a print-out of the raw data as a grey scale plot (Figure 6), together with a grey scale plot of the processed data (Figure 7). Anomalies have been identified and plotted onto the 'Abstraction and Interpretation of Anomalies' (Figure 8).

Low resistance areas are caused by areas of moisture retention such as cut features and these low resistance features may be caused by cut features. The rectilinear patches of low resistance seen in the centre north of the survey grid (R3) could therefore be the remains of the former 2006 experimental archaeology project which was carried out on the site. The area of high resistance responses (R2, R4, R5) may relate to sub surface stone, areas of compacted earth or geological variation within the subsoil.

No anomalies or features of archaeological significance are clearly identified from the Minnowburn electrical resistance survey.

## 10. Recommendations

As the work was undertaken purely as a training exercise and no features of archaeological significance were identified within the dataset, no further geophysical survey work is planned for this site at this time. A ground truthing exercise is also not being considered or recommended at present.

## 11. Bibliography

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