

# *Archaeology Wales*

## **Bluestone Resort Phase 4, Canaston Wood, Pembrokeshire**

### Geophysical Survey Report



by

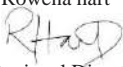
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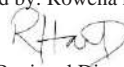
Report No. 1931

# *Archaeology Wales*

## **Bluestone Resort Phase 4, Canaston Wood, Pembrokeshire**

Prepared for Archaeology Collective (part of HCUK Group),  
on behalf of Bluestone Resorts Ltd

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Position: Regional Director  
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Report No.1931

**October 2020**

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### Appendix 1 Written Scheme of Investigation

## Summary

*This report results from work carried out by Archaeology Wales Ltd (AW) for Archaeology Collective (part of HCUK Group), on behalf of Bluestone Resorts Ltd. The work has been requested by Dyfed Archaeological Trust - Development Management (DAT-DM) in their role as advisors to Pembrokeshire Coast National Park Authority and Pembrokeshire County Council. This report draws on the results of an investigative geophysical survey undertaken on land at Bluestone Resort, Canaston Wood, Narberth, Pembrokeshire, SA67 8DE, prior to the proposed Phase 4 lodges development. The location of the survey was centred on NGR SN 0651 1307 (henceforth "the site").*

*The aim of the geophysical survey was to determine the nature and extent of any buried archaeological features within the proposed development area. The work was undertaken using a Bartington Grad601 dual fluxgate gradiometer.*

*A negative circular feature encompassed by positive responses was identified. The circular feature measured c.36m in diameter and is possible a Medieval or Iron Age ringwork. This confirms the site of a circular feature discovered through Lidar in a Desk Based Assessment by Archaeology Collective in 2020. In particular, the circular feature has been interpreted as a raised bank encompassed by small ditches. Numerous positive anomalies within the circle are possible stakeholes or postholes, especially those which appear to form a smaller circle. Larger positive anomalies just outside the circle could be pits, though could also be natural features. Other positive and negative linears immediately west of the circular feature could be related, but the response from the water main makes them difficult to interpret.*

*The work was carried out to the Standard and Guidance set out by the Chartered Institute for Archaeologists for archaeological geophysical survey (CIfA 2014), and completed in accordance with EAC Guidelines for the Use of Geophysics in Archaeology (Historic England 2016).*

## Crynodeb

*Mae'r adroddiad hwn yn ganlyniad i waith a wnaed gan Archaeology Cymru Cyf ar ran Archaeology Collective (rhan o Grŵp HCUK), ar ran Bluestone Resorts Cyf. Gwnaed cais i'r gwaith gael ei wneud gan Ymddiriedolaeth Archeolegol Dyfed – Rheoli Datblygiadau yn ei rôl fel cynghorwr i Awdurdod Parc Cenedlaethol Arfordir Sir Benfro a Chyngor Sir Benfro. Mae'r adroddiad hwn yn tynnu ar ganlyniadau arolwg geoffisegol archwiliadol a gynhaliwyd ar dir ym Mhentref Gwyliau Bluestone, Coedwig Canaston, Arberth, Sir Benfro, SA67 8DE, cyn y gwaith arfaethedig Cam 4 o ddatblygu 4 bwthyn. Roedd canolbwynt lleoliad yr arolwg yn NGR SN 0651 2307 (a elwir "y safle" o hyn allan).*

*Amcan yr arolwg geoffisegol oedd pennu natur a graddau unrhyw nodweddion archeolegol sydd wedi'u claddu o fewn ardal y datblygiad arfaethedig. Gwnaed y gwaith gan ddefnyddio gradiomedr 'fluxgate' deuol Bartington Grad601.*

*Canfuwyd nodwedd gron negyddol wedi'i hamgylchynu gan ymatebion positif. Roedd y nodwedd gron yn mesur c.36m mewn diamedr ac mae'n bosibl ei bod yn amddiffynfa gylch ganoloesol neu o'r Oes Haearn. Mae hyn yn cadarnhau safle nodwedd gron a ganfuwyd drwy Lidar mewn Asesiad Desg gan Archaeology Collective yn 2020. Yn benodol, mae'r nodwedd gron wedi'i dadansoddi fel llethr uwch wedi'i hamgylchynu gan ffosydd bychan. Mae'r anomaleddau positif niferus o fewn y cylch yn dyllau polion neu byst posibl, yn enwedig y rheini yr ymddengys eu bod yn ffurfio cylch llai. Gallai'r anomaleddau positif mwy yn union y tu allan i'r cylch fod yn byllau, er y gallant fod yn nodweddion naturiol hefyd. Gallai'r nodweddion unionlin positif a negyddol eraill yn union i'r gorllewin o'r nodwedd gron fod â chysylltiad, ond mae'r ymateb o'r brif ffynhonnell ddŵr yn ei gwneud yn anodd eu dadansoddi.*

*Gwnaed y gwaith yn unol â'r Safonau a'r Canllawiau a luniwyd gan Sefydliad Siartredig yr Archeolegwyr ar gyfer arolwg geoffisegol archeolegol (2014) a chafodd ei gwblhau yn unol â Chanllawiau Cyngor Archeolegol Ewrop ar gyfer y Defnydd o Geoffiseg mewn Archeoleg (Historic England 2016).*

# **1 Introduction**

## **1.1 Location and scope of work**

On 15 and 16 October 2020, Archaeology Wales Ltd (AW) carried out a geophysical survey on the site at the Bluestone Resort in Pembrokeshire. The archaeological advisor to the local planning authority is the Dyfed Archaeological Trust Development Management (henceforth – DAT - DM).

The Site occupies an area of c.10ha and is approximately centred on NGR SN 0651 1307. The proposed Phase 4 Lodges development lies on the southwestern side of the existing holiday resort. It lies to the west and northwest of the newly constructed Serendome. The central/eastern area was not surveyed as set out in the WSI due to previous disturbance of this area. Administratively the Phase 4 proposals lie almost entirely within the Pembrokeshire Coast National Park Authority area with a small part on the southeastern edge lying within the jurisdiction of Pembrokeshire County Council.

Subsequently, a Written Scheme of Investigations (WSI) was prepared by James Meek of Archaeology Collective. It provided information on the methodology to be employed during a geophysical survey of the site. The WSI was submitted to, and approved, by DAT-DM prior to the survey being undertaken.

The work was managed by Rowena Hart *BSc (Hons) MA MCIfA, Archaeology Wales*, and the site work was undertaken by Jennifer Muller *BA (Hons) MA* and Jerry Bond *BA (Hons) ACIfA*. The report was prepared by Jennifer Muller.

## **1.2 Site Description and Geology**

The Tournament Field area of the site lies on the western side of the proposed development area, with all other areas of the site having been previously disturbed or not suitable for geophysical survey. The field is laid to grass and has a gentle slope down to the south/southwest. The centre of the field has areas of bunds and earthworks associated with the existing attractions for the resort, but the majority of the area is well suited to geophysical survey.

The British Geological Survey identifies the underlying solid geology across the Site as Milford Haven Group - Argillaceous Rocks And [subordinate/subequal] Sandstone and Conglomerate, interbedded sedimentary Bedrock formed approximately 408 to 427 million years ago in the Devonian and Silurian Periods. At that time the local environment was dominated by rivers. This is suitable for geophysical survey.

### **1.3 Archaeological and Historical Background**

Although there are no known archaeological remains within the site recorded on the Dyfed HER or NMRW, this assessment has identified a possible ringwork of around 36m diameter in the southern part of Tournament Field. The feature is just visible on Lidar information, dated February 2003, pre-dating the construction of the holiday resort. There are no visible above ground remains of the feature and the route of a water main runs across its western edge. This may represent a medieval or Iron Age ringwork.

## **2 Aims and Objectives**

### **2.1 Geophysical Survey**

The primary objective of the work was to locate and describe archaeological features that may be present within the survey area. The work attempts to elucidate the presence or absence of archaeological material that might be affected by the development, its character, distribution, extent and relative significance, providing sub-surface data to inform any future on-site works.

It is the aim of this report to provide information which is sufficiently detailed to allow the archaeological resource to be better understood. The information could then be used to help inform further archaeological work undertaken in association with the proposed development or to allow the developer to adjust their plans.

## **3 Methodology**

### **3.1 Geophysical Survey**

The survey was carried out using a Bartington Grad601-2 dual sensor fluxgate gradiometer. This instrument has been chosen due to its proven efficient and effective method of locating sub-surface archaeological anomalies on greenfield sites. The machine consists of two high stability fluxgate sensors suspended on a single frame, accurately aligned, that can detect localised magnetic anomalies compared with the general magnetic background. When mapped in a systematic manner this allows changes in the magnetic field resulting from differing features in the soil to be plotted. Strong magnetic anomalies will be generated by iron-based objects or areas modified by heat, such as hearths and kilns. More subtle anomalies may be generated by changes, typically in the iron-oxide content, of underlying soils, compared to the natural subsoil. This enables the detection of material infilling sub-surface archaeological features such as ditches, pits and structural remains. Data from this may be mapped at closely spaced regular intervals, to produce an image that may be interpreted to locate buried archaeological features (Clark, 1997) (Aspinall *et al*, 2011).

Moreover, Fluxgate gradiometry has the advantage of being able to identify the broadest range of sub-surface archaeological feature types and can detect such anomalies at a range of soil depths (typically 0.3-1m).

The site was located by GPS. All survey points were located with the GPS and plotted onto an OS base map.

The on-site survey was undertaken in a single phase lasting two days. Detailed survey was carried out in grids of 30m x 30m along zig-zag and parallel traverses spaced at 1m intervals, recording data points spaced at 0.25m intervals to a maximum instrument sensitivity of 0.1nT in accordance with Historic England Guidelines. The survey mode was set to bi-directional (traverses walked alternately northwest-southeast/southeast-northwest). Incomplete survey lines resulting from irregular area boundaries or obstacles were completed using the 'dummy log' key. At regular intervals the data was downloaded in the field onto a laptop computer for storage and assessment.

### **3.2 Data Processing and Presentation**

Following the completion of the detailed survey, processing and analysis took place using the TerraSurveyor v.3 software package.

A composite of each detailed survey area has been created and processed using Terrasurveyor v.3. The report includes raw and unclipped data in both greyscale, colour, and x-y trace plots. Every effort has been made to reduce the instrument directional sensitivity in the field rather than reliance on post data-collection processing.

The final results have been presented at an appropriate scale tied to the Ordnance Survey National Grid.

The most typical method of visualising the data is as a greyscale image (Figure 3). In a greyscale plot, each data point is represented as a shade of grey, from black to white at either extreme of the data range. A limited number of standard operations can be carried out to process the data, including clipping and graduated shade. The data was analysed using a variety of parameters and styles and the most useful of these were saved as \*.TIF images and displayed (Figures 3-5) using Adobe Illustrator software. The results of the survey were then overlaid onto a digital map of the study area. This was then used to produce interpretation figures.

All works were undertaken in accordance with the standard required by The Chartered Institute for Archaeologists' *Standard and Guidance for Archaeological Geophysical Survey* (2014) and current Health and Safety legislation.



## **4 Geophysical Survey Results**

The survey was undertaken during a period of cool, partly cloudy weather.

### **4.1 Limitations**

The survey area contained numerous obstacles due to the nature of the site. A post-and-rope fence was located in the centre of the open, grassy area and surrounded the tournament field. In the south-eastern part of the field it could be loosened to allow the surveyor to walk over the rope. However, in the rest of the grassy area it was nailed into the posts, and this resulted in incomplete survey lines which required using the 'dummy log' key to complete them. It also resulted in interfering with the ability to walk the grids regularly, resulting in some irregular results (see south-west corner of circular feature in Figs 3-5).

The various outbuildings (at the western, northern and eastern ends of the field), as well as activity equipment located at the eastern end of the field were avoided due to metal content so as not to interfere with the magnetometer readings.

### **4.2 Results of the Survey (Figs 3-5)**

The survey has identified a feature that is of probable archaeological origin. This is a circular feature (F1) of negative polarity. It measures approximately 36m in diameter. Negative features are often raised banks of earth with a lower magnetic magnitude, whereas positive features are often infilled, cut features.

There are several other features of possible archaeological origin located in and around the circular feature. However they are obscured by the positive linear anomaly with associated negative response (F2) that is clearly the water main as shown in the WSI running north-east/south-west through the entire site.

A negative linear with a slight positive response that divides into two (F3) runs along the west side of the circle (F1) in a general north-west/south-east direction. It appears similar to the circular feature in both size of response and in formation. It is visible towards the north-west end of the circle, where it separates into a v-shape with one part of it running more westward. Located next to F3 are several large positive features with no corresponding negative response (F4). These, like the positive linears, are usually created by in-filled, cut features that can be either natural or archaeological in nature.

At the south-west part of the circle is a positive area (F5) encompassed by negative linears that start to conjoin towards the southern border of the survey area. The feature stops at the circle.

Within the circle are a number of positive features, mostly in the form of small, positive anomalies. In the centre are several points with no apparent pattern (F6). There appears to be a single row of positive points which separate and curve away from each other. One of these, towards the north-west, appears to create a small circle (F7), approximately 8m in diameter. The western side of this is obscured by the response of the water main. The other row, which curves towards the south (F8), looks to be forming another circle, but most of it is obscured by the water main and a dipolar anomaly (which was caused by a sign on a post).

There is one dipolar anomaly within the circle (F9), located in the south-west inner edge. Dipolar anomalies are caused by magnetic objects, usually either iron or thermoremanent material such as fired clay or stone. The anomaly has a high amplitude, which indicates it could be a ferrous object in the ground as nothing was visible on the surface.

Many other, smaller dipolar anomalies appear generally throughout the site (F10). They are especially concentrated near/along the gravel trackway and building at the western end and near the play equipment with another gravel walkway at the eastern end. There are also a few small positive points with no negative response at the south-west corner of the survey (F11). Again, with no negative response these could be infilled holes.

An area of magnetic disturbance at the north-east corner of the survey was due to walking too close to some play equipment (F12). One service was noted (F13) due to its bipolar response in the northern part of the survey running roughly north-west/south-east. It runs directly towards the public toilets and intersects the water main. Another possible service was noted at the north-west edge of the survey along the edge of the road (F14) running towards the Steep Ravine activity building. Though it looks like a bipolar response it is not entirely clear due to the limit of the survey.

An alternating positive/negative set of linears (F15) at the eastern end of the survey were noted while on site. These were deep ridges and furrows thought to be made by a vehicle, perhaps when the ground was wet.

Lastly, two areas appear shaded: the long section running east/west, east of the circle (F16), may be an area of depression where topsoil has built up, possibly created when the landscaping for the centre area was done; the shaded area west of the circle (F17) is more possibly natural/geological.

## **5 Interpretation and Discussion**

The response of the circular feature suggests a raised bank in between two smaller ditches (F1), which is indicative of a defended enclosure. The positive points within the

enclosure – F6, F7 and F8 – could represent in-filled post holes that, in the case of F7, may have held the posts of a roundhouse or some other structure/enclosure.

The large, positive points (F4) located outside of the circular feature could signify in-filled pits due to their proximity to the feature. One of them is close to the Steep Ravine activity building, and could be related to landscaping works around the building. The small positive points (F11) south-west of the circle have no visible pattern to them, but because there are several close together they have archaeological potential.

The linears north-west of the circle (F3) are of a more questionable nature. These linears appear mostly very straight, and their direction towards the building for the Steep Ravine adventures could be indicative of a non-metallic service. The water main (F2) unfortunately makes any connection, if any, between F3 and F1 difficult to ascertain. The linear to the south (F5), with its positive polarity in between negative linears, could be a ditch. Though it appears connected to the circular enclosure it may not be contemporary with it. If it is contemporary it could represent a boundary or part of an entranceway. The placement of the ferrous object (F9) creating such a large response just inside the circle where the linear (F5) and circle (F1) meet is an interesting coincidence.

The amplitude of many of the dipolar responses (F10) around the site was high, indicative of ferrous objects. The location where the dipoles were greatest, at the eastern end, is the area which has been most disturbed for landscaping and likely has heavier footfall. A gravel path in this section also may contain some magnetic rocks, like granite or basalt, which could have caused lower amplitude responses.

## **6 Conclusions**

The survey has established the potential for archaeological features within the development site as evidenced by potential features F3-F9. This is confirmed in the circular feature F1, which matches aerial images and processed Lidar data by Archaeology Collective in their Desk Based Assessment and WSI (Meek, J. 2020). This circular feature is likely to be either a medieval or Iron Age ring work. According to the same documents (ibid.), most of the survey site has undergone little to no landscaping or topsoil stripping. This would suggest that if there is archaeology at this site it has the potential to be well preserved.

## 7 Bibliography and References

**Aspinall, A, Gaffney, C & Schmidt, A. 2011.** *Magnetometry for Archaeologists*. Altamira, London

**British Geological Society, 2020.** Online map resource  
(<http://mapapps.bgs.ac.uk/geologyofbritain/home.html>)

Chartered Institute for Archaeologists. 2015. Standards and Guidance for Geophysical Surveys.

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**Google Maps, 2020.** Online map resource  
(<https://www.google.co.uk/maps/>)

**Meek, J. 2020.** Archaeological Desk Based Assessment: Bluestone Resort Phase 4, Canaston Wood, Pembrokeshire. Archaeology Collective.

**Meek, J. 2020.** Written Scheme of Investigation: Archaeology. Geophysical Survey at Bluestone Resort Phase 4, Canaston Wood, Narbeth, Pembrokeshire. Archaeology Collective.

**Schmidt A. et al. 2015.** EAC Guidelines for the Use of Geophysics in Archaeology, Questions to ask and points to consider 2015. EAC Guidelines 2

## 6. Conclusions

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**Meek, J. 2020.** *Written Scheme of Investigation: Archaeology. Geophysical Survey at Bluestone Resort Phase 4, Canaston Wood, Narbeth, Pembrokeshire*. Archaeology Collective.

**Schmidt A. et al. 2015.** *EAC Guidelines for the Use of Geophysics in Archaeology, Questions to ask and points to consider 2015*. EAC Guidelines 2





Figure 1. Location Plan



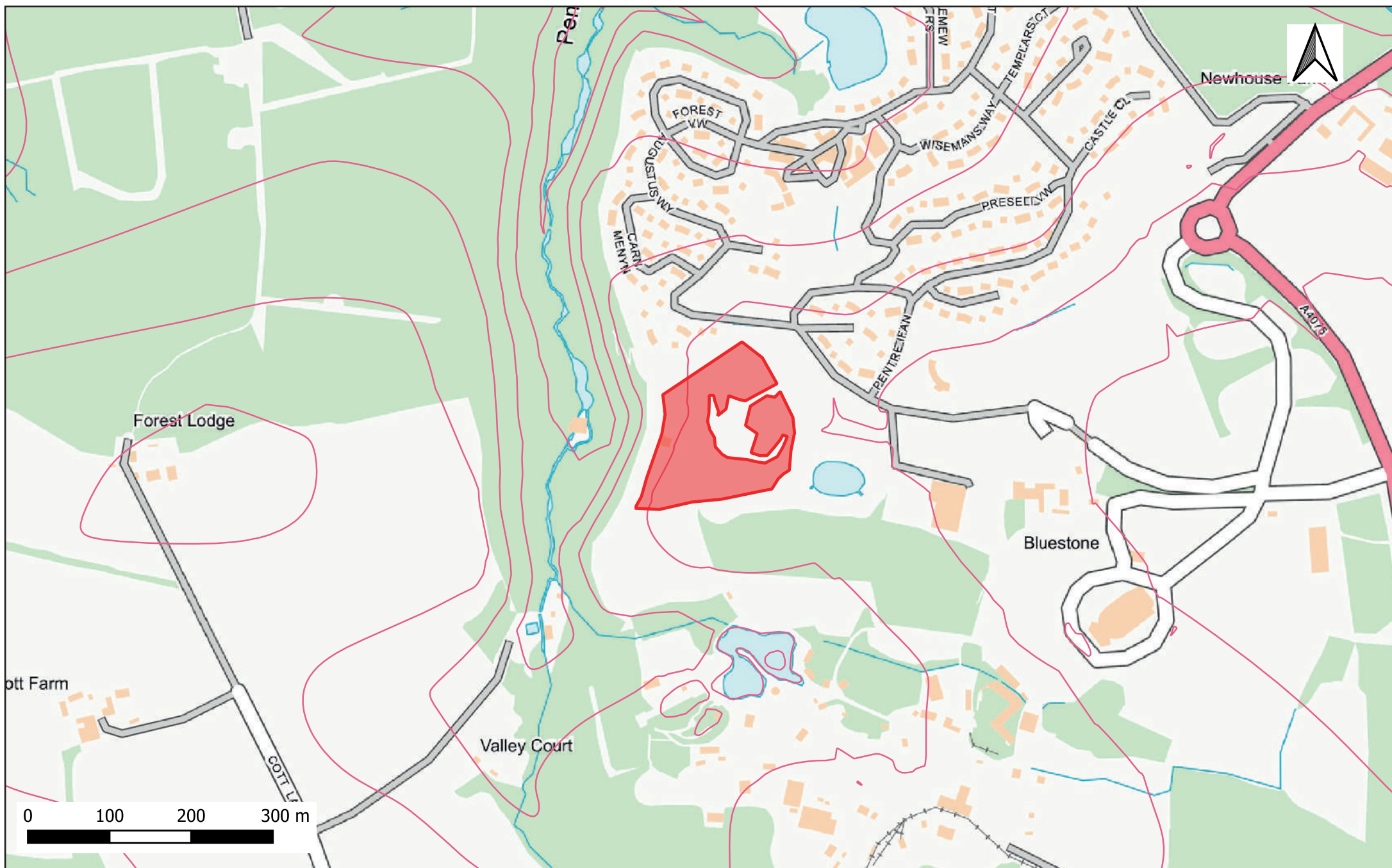


Figure 2. Plan of site boundary and topographic detail

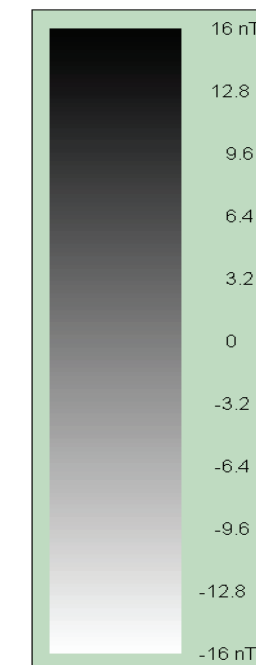


Figure 3: Raw geophysical  
survey results Bluestone  
Tournament Field

Scale 1:1100



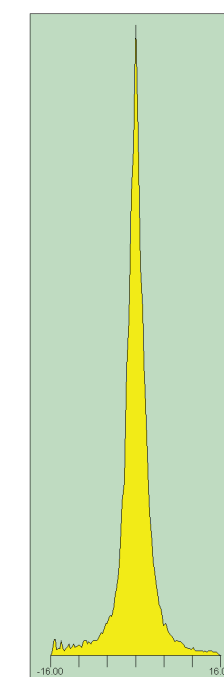
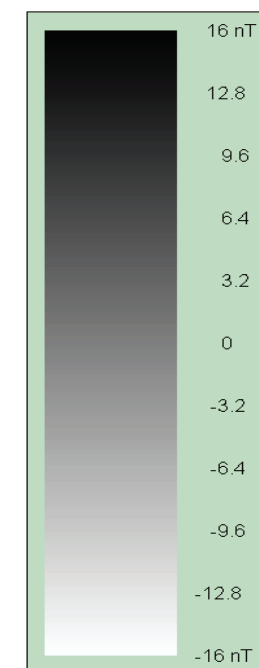


Figure 4: Processed geophysical survey results clipped  $\pm 16$  Bluestone Tournament Field

Scale 1:1100



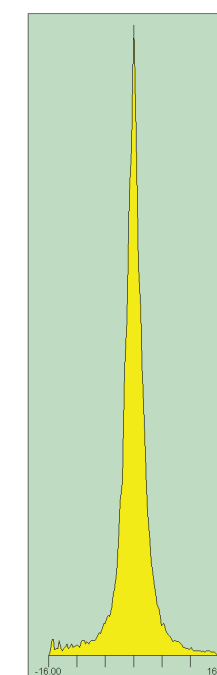
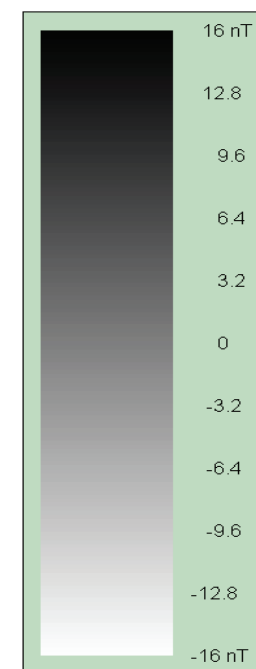
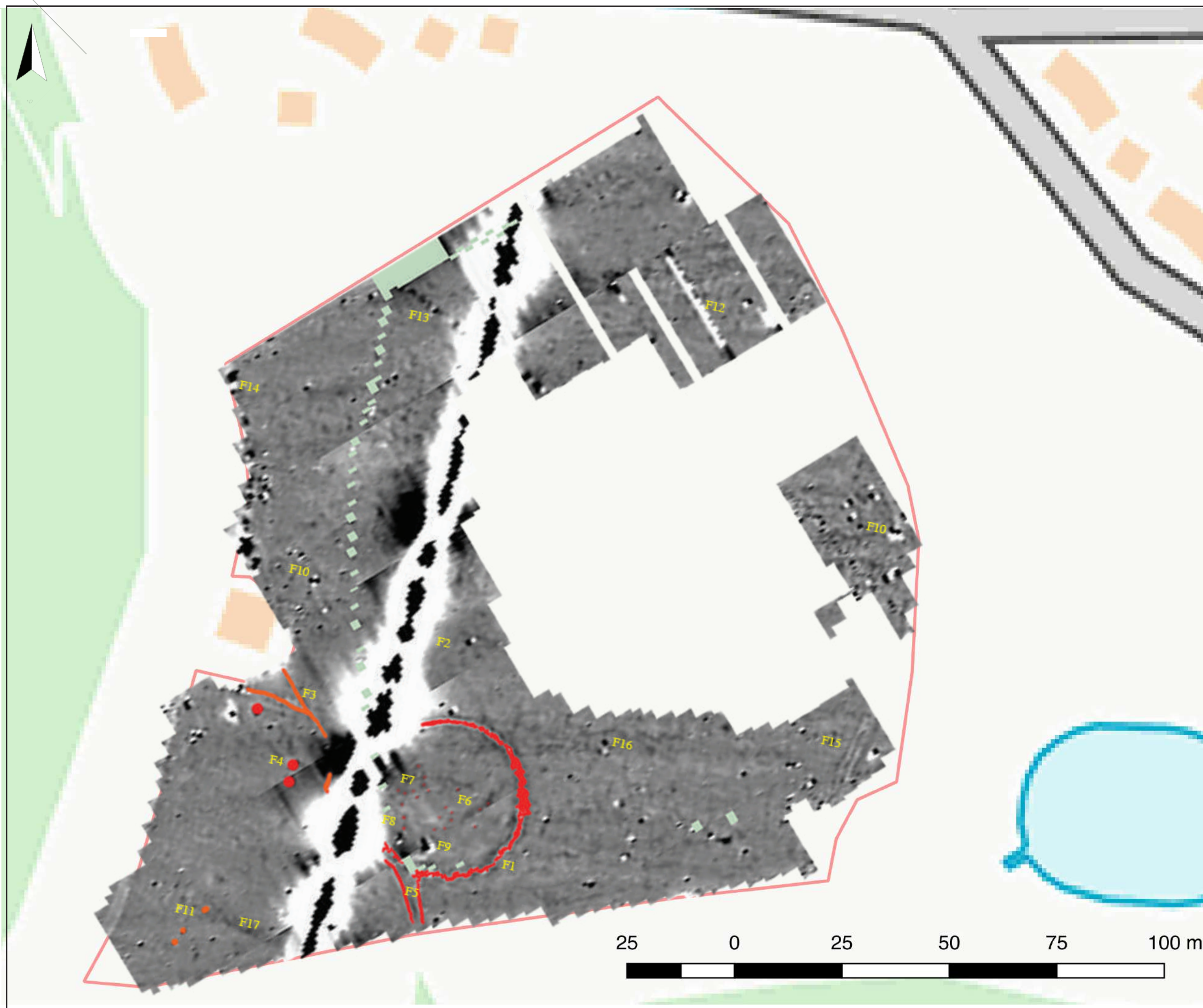


Figure 5: Interpreted geophysical survey results Bluestone Tournament Field

Scale 1:1100





*Plate 1. Southern part of the field, looking west*



*Plate 2. Southern part of the field, looking north*





*Plate 3. North-western part of the field, looking south*



*Plate 4. Northern part of the field, looking east*



*Plate 5. Northern part of the field, looking south-east*



*Plate 6. Eastern part of the field, looking south-west*





# Written Scheme of Investigation: Archaeology

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Geophysical Survey  
at Bluestone Resort  
Phase 4,  
Canaston Wood,  
Narbeth,  
Pembrokeshire



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# 1. Introduction

- 1.1** This written scheme of investigation (WSI) details a proposal for a scheme of archaeological investigative works for the proposed Bluestone Resort Phase 4 development, Canaston Wood, Narberth, Pembrokeshire, SA67 8DE (Figure 1). This WSI assessment has been written and prepared by James Meek, Director of Archaeology Collective (part of HCUK Group), on behalf of Bluestone Resorts Ltd. .
- 1.2** The Site occupies an area of c.10ha and is approximately centred on NGR SN 0651 2307. The proposed Phase 4 Lodges development lies on the southwestern side of the existing holiday resort. It lies to the west and northwest of the newly constructed Serendome. Administratively the Phase 4 proposals lie almost entirely within the Pembrokeshire Coast National Park Authority area with a small part on the southeastern edge lying within the jurisdiction of Pembrokeshire County Council.
- 1.3** This document will outline a scheme of archaeological work, the results of which will be used to support planning permission for the development that will be sent to Pembrokeshire Coast National Park Authority (PCNPA).
- 1.4** An archaeological desk-based assessment has been prepared by Archaeology Collective for the site which concluded the following: *Based on the information within the HER, supplemented by historic mapping, the Site is considered to have the following potential for archaeological remains, with the considered importance also noted. This also includes reference to the possible ring work noted on Lidar and aerial photographs in brackets.*

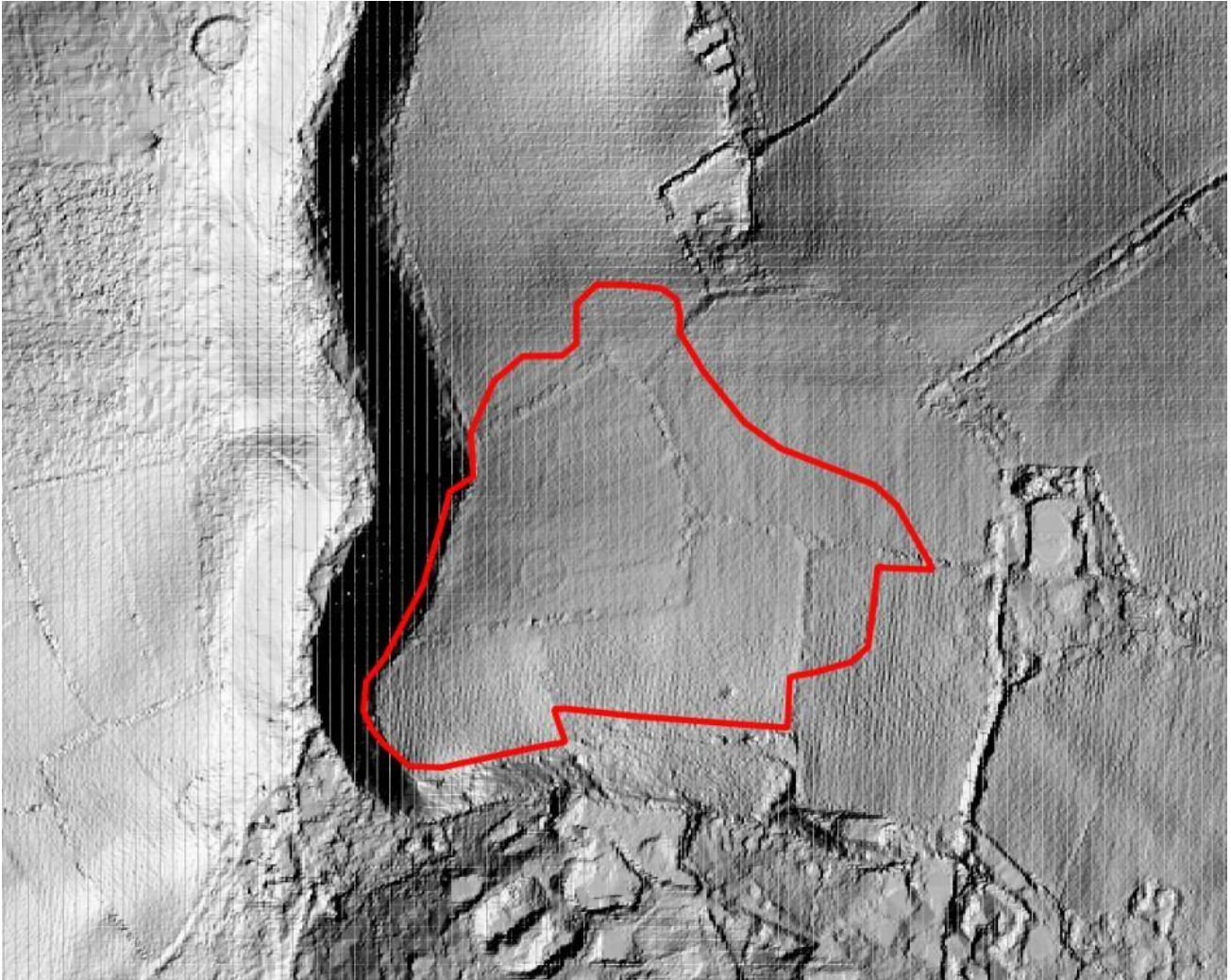
Table 1: Archaeological Potential and Importance

Period	Potential	Considered Importance
Palaeolithic	Negligible	Regional
Mesolithic, Neolithic	Low	Local to regional
Bronze Age	Low	Local to regional
Iron Age	Moderate (High?)	Regional
Roman	Low	Regional
Early Medieval	Low	Local to regional
Medieval	Moderate (High?)	Local
Post Medieval	Low	Local to negligible

- 1.5** *The construction of the existing Bluestone resort is considered to have caused areas of previous disturbance to parts of the Site. Previous disturbance will have been*

*greatest in the southeastern part of the Site, including the car park for the Events centre, the attenuation lake and the large bunded area and spoil heap west of the Serendome. It is considered likely that there is a very low to negligible potential for any archaeological remains to survive in these areas.*

- 1.6** *It is known that the areas to the northeast, north and northwest of the Tournament Field were previously topsoil stripped as part of the development of the resort. Some landscaping may also have occurred. Archaeological survival in these areas is possible, but any remains will have suffered some truncation and disturbance.*
- 1.7** *The southwestern field has been used for agricultural practices for many years including most recently for willow used as biofuel. It is known as the 'potato field' (Liz Weedon pers. comm.) indicating that it will have had quite intrusive agricultural practices undertaken over the years. This will have caused disturbance to any archaeological remains that may be present and there is considered to be a low potential for archaeological survival. Any remains that may be present will have suffered from some truncation and disturbance.*
- 1.8** *The area of Tournament Field, taking up the remainder of the site, has a small area of relatively low level landscaping in its centre associated with the archery range, access and buildings, which will have had a low impact on the survival of archaeological remains. The remainder of the field is laid to grass (with perimeter paths) and has had very little previous disturbance. There would be a good potential for archaeological survival in this area.*
- 1.9** *Although there are no known archaeological remains within the Site recorded on the Dyfed HER or NMRW, this assessment has identified a possible ring work of around 35m diameter in the southern part of Tournament Field. The feature is just visible on Lidar information, dated February 2003, pre-dating the construction of the holiday resort (Plate 1). There are no visible above ground remains of the feature and the route of a water main runs across its western edge. This may represent a medieval or Iron Age ringwork.*



**Plate 1:** Processed Lidar data based on sn0613\_dtm\_2m.asc and sn0612\_dtm\_2m.asc (dated 15<sup>th</sup> February 2003, predating Bluestone Resort)

The data has been processed using QGIS hillshade setting at 45° altitude; 107° azimuth and with a Z factor of 4. The ring ditch can be clearly seen just west of centre of the site area.

Minwear Ringwork is visible to the northwest of the site area

- 1.10** Following discussion with the client and initial consultation with the Dyfed Archaeological Trust Development Management Team (DAT-DM) the archaeological advisors to the planning authority, it has been agreed that in the first instance a geophysical survey of the area of Tournament Field should be carried out to learn more about the possible ringwork and also determine if any other archaeological remains may be present within the Tournament Field area. Due to previous disturbance mentioned above this is the only field where geophysical survey will be possible or have the potential to yield any geophysical results.

- 1.11** The site work will be managed on behalf of the client by James Meek of Archaeology Collective. The archaeological contractor to undertake the geophysical survey will be appointed following approval of this WSI.
- 1.12** This WSI details the methodology for the archaeological works which will be undertaken and has been prepared in accordance with the Chartered Institute for Archaeologists (CIFA) Standard and Guidance for archaeological geophysical survey (CIFA 2014). The appointed archaeological contractor will also undertake the works in accordance with the above standard and guidance and abide by the CIFA Code of Conduct (CIFA 2014).
- 1.13** This WSI will need to be approved by the archaeological advisors to the planning authority DAT-DM prior to the works commencing.

## Topography and Site Conditions

- 1.14** The Tournament Field area of the site lies on the western side of the proposed development area, with all other areas of the site having been previously disturbed or not suitable for geophysical survey (Figure 2). The field is laid to grass and has a gentle slope down to the south / southwest. The centre of the field has areas of bunds and earthworks associated with the existing attractions for the resort, but the majority of the area is well suited to geophysical.
- 1.15** The British Geological Survey identifies the underlying solid geology across the Site as Milford Haven Group - Argillaceous Rocks And [subordinate/subequal] Sandstone and Conglomerate, interbedded sedimentary Bedrock formed approximately 408 to 427 million years ago in the Devonian and Silurian Periods. At that time the local environment was dominated by rivers. This will be suitable for geophysical survey.
- 1.16** The site area lies within an occupied holiday resort with visitors having access across the field to be surveyed. It is not intended to restrict access during the survey, although smaller areas could be fenced off during survey and moved as the survey progresses.

## 2. Aims of Project

### Aims

**2.1** The general aims of the overall archaeological investigations are:

- To determine the presence or absence of archaeological deposits or remains,
- To record the character, date location and preservation of any archaeological remains on site that are affected by the proposed new works,
- To record the nature and extent of any previous damage to archaeological deposits or remains on site in the area of the new works.

**2.2** The specific aims of the investigation are:

- To undertake a geophysical survey of the Tournament Field area using a fluxgate gradiometer,
- To determine the likely presence or absence of any archaeological remains within the field, and find out more about the possible ringwork within the southern part of the Tournament Field
- To establish the character and extent of any potential archaeological remains within the site area that could be affected by the proposed works;
- To inform the need (or otherwise) for any future archaeological works on the site by means of an illustrated report on the geophysical survey.

**2.3** The objectives of the project are:

- to undertake work in accordance with national best practice and guidelines,
- to archaeologically record through geophysical survey, any deposits, features or structures of significance,
- to analyse any remains with reference to the existing documentary evidence for historical development and land use,
- to produce a written account to include: summary; site description; anomaly descriptions, possible interpretation and conclusions,
- Provide an ordered archive.



## 3. Methodology

### Geophysical Survey Methodology

- 3.1** A fluxgate gradiometer will be used for the survey, which detects variations in the earth's magnetic field. This methodology has been shown to work well on sandstone geology.
- 3.2** Readings will be taken on traverses of 0.5m wide and every 0.25m within 20m x 20m grids across the site. The full area of the proposed development site will be surveyed, some 2.3ha in total (Figure 3).
- 3.3** A Total station or GPS system will be used to accurately tie the survey grid into the local Ordnance Survey grid.
- 3.4** Processing will be performed using TerraSurveyor or similar industry approved software. The data will be presented with a minimum of processing. The presence of high values caused by ferrous objects, which tend to hide fine details and obscure archaeological features, will be 'clipped' to remove the extreme values allowing the finer details to show through.
- 3.5** The processed data will be presented as grey-scale plots overlaid on local topographical features. The main magnetic anomalies will be identified and plotted onto the local topographical features as a level of interpretation.
- 3.6** The resulting survey results and interpretation diagrams should not be seen as a definitive model of what lies beneath the ground surface, not all buried features will provide a magnetic response that can be identified by the gradiometer. In interpreting those features that are recorded the shape is the principal diagnostic tool, along with comparison with known features from other surveys.
- 3.7** The intensity of the magnetic response could provide further information, a strong response for example indicates burning, high ferric content or thermoremnancy in geology. The context may provide further clues but the interpretation of many of these features is still largely subjective.
- 3.8** All measurements given will be approximate as accurate measurements are difficult to determine from fluxgate gradiometer surveys. The width and length of identified features can be affected by its relative depth and magnetic strength.
- 3.9** The interpretation diagrams will be used to identify the presence/absence of potential archaeological deposits.

- 3.10** All works will be carried out in accordance with the Code of Approved Practice as set out by the Chartered Institute for Archaeologists. Accordingly the project team will abide by the CIfA's code of approved practice. This specification is in accordance with the Chartered Institute for Archaeologists Standard and Guidance for archaeological geophysical survey (CIfA 2014).

## Recording System

- 3.11** A site code will be allocated ahead of any fieldwork commencing, ideally using an Event Record Number obtained from the Dyfed Historic Environment record prior to the works commencing on-site. This code will be used to label all data, plans and other drawings and all photographs (but not negatives); and all other elements of the documentary archive.
- 3.12** A site location plan at an appropriate scale will be prepared showing investigation area and development site in relation to surrounding locality.
- 3.13** This will be supplemented by a detailed plan, also at an appropriate scale, which will show the location of the areas subject to geophysical survey in relation to the overall site boundary.
- 3.14** The site grid will be accurately laid out and tied to the Ordnance Survey grid.
- 3.15** A short photographic record should be made of the process and also to assist with tying in the survey grids to adjacent land forms and field boundaries. A register of all photographs taken will be kept on standardised forms.

## Public Outreach

- 3.16** On site staff will be allowed to answer questions from members of the public regarding the archaeology of the area and potential archaeology of the site as described in publicly available documents. The site area is part of the Bluestone Holiday resort and visitors will be present within and around the survey area. The appointed archaeologists should be prepared to discuss the project with members of the public as part of the project. This may include asking them, politely, to keep away from the actual survey area but also letting them know what the works are doing and why we need to keep them away from the survey instrument.
- 3.17** Detailed inquiries from members of the public regarding the results of the works, or sensitive information, will be directed to the client's archaeological representative, James Meek of Archaeology Collective.

## 4. Reporting

### Project Specific Reporting Requirements

**4.1** A formal report on the results of the archaeological geophysical survey will be prepared on completion of the fieldwork. The report will conform to Annex 2 of the Chartered Institute for Archaeologists Standards and Guidance for a Geophysical Survey<sup>1</sup>. The guidance states the following: :

*The specific requirements of any report will necessarily vary according to the scope of works, the nature of the results or other factors. However, the following sections will occur in most reports:*

- **Non-technical summary:** This should outline in plain, non-technical language the principal reason for the work, its aims and main results. It should include reference to authorship and commissioning body. **This will also need to be produced in Welsh.**
- **Introductory statements:** These could include acknowledgements, circumstances of the project such as planning background, the archaeological background, an outline nature of work, the site description (including size, geology and topography, location), when the project was undertaken and by whom.
- **Aims and objectives:** These should reflect or reiterate the aims set out in the project design or specification.
- **Methodology:** The methods used and reasons for this choice, including the detail of any variation to the agreed project design or specification should be set out carefully, and explained as appropriate. The Methodology should also include the date(s) of field work and grid location; the geophysical instruments used; their configuration and sample intervals; the method(s) of data capture, data processing and presentation.
- **Results:** The format of this section will depend on the clarity, simplicity or complexity of the results. A factual account of the survey results, followed by a section on their interpretation and discussion can be used, alternatively, a blend of objective description and explanatory interpretation drawn upon supporting information from other sources may be presented. However, anomaly by anomaly narrative detail is often tedious and should be avoided. Nevertheless, this section should demonstrate that the archaeological potential of all anomalies located during the survey has been considered and the maximum use should be made of data plots and interpretation plans in this regard. Since the cause of anomalies often cannot be unambiguously determined based

<sup>1</sup> Chartered Institute for Archaeologists 2014.



on geophysical measurements alone, the text should also be clear about the degree of uncertainty pertaining to inferences drawn from the results

- **Conclusions:** The conclusions should address the survey results with references to the original aims. It is appropriate to include a section which sums up and interprets the results, and conclusions may be drawn, where necessary, about the need for future survey or research. Other elements should include a confidence rating on techniques used, or on limitations imposed by particular factors (e.g. weather or problems of access). Recommendations on further work may also be required by the archaeologist, but in most circumstances within the planning framework this will be the responsibility of the relevant planning archaeologist or curator.
- **Archive location:** The final destination of the archive (records and data) should be noted in the report.
- **Appendices:** These should contain essential technical detail and supporting information.
- **Plans/plots:** As a minimum the following plans/plots should be included:
  - a. Survey grid location (1:2500 minimum)
  - b. Plot(s) of minimally processed data (1:1000 preferred minimum)
  - c. Minimally enhanced X-Y traces of magnetic data, where appropriate
  - d. Plot(s) of enhanced data (1:1000 preferred minimum), grey tone or dot density
  - e. Interpretation diagram (1:1000 preferred minimum)
- **References and bibliography:** A list of all sources used should be appended to the report, including electronic sources.
- **Other:** Contents list, disclaimers

**4.2** The archaeological contractor will retain full copyright of any report under the Copyright, Designs and Patents Act 1988 with all rights reserved; excepting that it hereby provides an exclusive licence to the client in all matters directly relating to the project as described in this document.

**4.3** Any information deposited in the Historic Environment Record can be freely copied without reference to the originator for research or planning purposes.

## 5. Staffing and Programming

### Staffing

- 5.1** The project will be managed by James Meek of Archaeology Collective on behalf of Bluestone Resorts Limited. Other Archaeology Collective staff and trusted sub-contracted specialists will contribute as necessary. Details of the appointed archaeological sub-contractor appointed to carry out the works will be provided prior to the start of the works. Summary staff CVs can be supplied as required.
- 5.2** The start date for the commencement of the site works is to be confirmed. It is understood that the works are likely to start relatively soon. Once an indicative start date has been confirmed, a projected timetable will be provided and the name of the archaeological contractor.

### Monitoring

- 5.3** The project will be monitored by DAT-DM. A minimum of one week's notice of the intention to commence fieldwork will be given. Archaeology Collective will make every effort to allow proper monitoring of the archaeological investigation. Any variations to the brief or this specification will be put in writing and approval sought.

### Access and Safety

- 5.4** Reasonable access to the site will be arranged for DAT-DM to make site inspections to ensure that the archaeological investigations are progressing satisfactorily.
- 5.5** Before any site work commences, a full risk assessment document will be produced setting out the site specific health and safety policies that will be enforced in order to reduce to an absolute minimum any risks to health and safety. In addition to this risk assessment, the following considerations will also be made:
- All relevant health and safety regulations will be followed.
  - At present the site is laid to grass.
  - All current Covid-19 H&S guidance will be followed, this will be especially important within the Holiday resort. Covid-19 questionnaires will need to be

filled in by all attending personnel or monitoring bodies for approval before attending site (to be supplied by Bluestone Resorts Ltd).

- The main access to the site is via the main Bluestone Resort entrance. Cars will need to be left in the car park and access will either be on foot or via electric buggies (supplied by the resort if required).

## 6. Archive and Dissemination

### Archive

- 6.1** The site code will be used to label all plans, drawings, photographs and data recovered from the investigation.
- 6.2** The site archive will be organised so as to be compatible with current requirements of the appropriate Museum or digital archive to be deposited with the National Monuments Record of Wales (NMRW) in Aberystwyth.
- 6.3** All data recovered during the archaeological works will be collated into a site archive structured in accordance with the specifications in Archaeological Archives: a guide to best practice in creation, compilation, transfer and curation (Brown 2011), and the procedures recommended by the National Monuments Record of Wales, Aberystwyth. The National Standards for Wales for Collecting and Depositing Archaeological Archives produced by the Federation of Museums and Art Galleries of Wales will also be adhered to.
- 6.4** Digital archives will be collated using the Royal Commission on the Ancient and Historical Monuments of Wales systems (2015) and deposited with the RCAHMW.
- 6.5** Pursuant to these agreements, the archive will be presented to the appropriate local repository within 6 months of the completion of the fieldwork (unless alternative arrangements have been agreed in writing with DAT-DM). In addition, written confirmation from the client will be provided for the transfer of ownership.
- 6.6** The recipient of the archive (excluding finds) shall be granted licence for the use of the archive for educational purposes, including academic research, as long as such use is non-profit making and conforms to the Copyright and Related Rights Regulation 2003.

### Dissemination

- 6.7** A fully illustrated report on the archaeological geophysical survey will first be submitted to Archaeology Collective for review before being submitted for approval to DAT-DM.
- 6.8** A digital copy of the report will be submitted the Dyfed Historic Environment Record. The report will include the findings of the investigation as detailed above and a summary in Welsh to comply with HER Guidelines.

## 6.9

The results of the fieldwork should be published in the following sources:

- An appropriate journal/publication at least to a summary level (i.e. round up in Archaeology in Wales) shall be undertaken in the year following the archaeological field work. Details of the intended publication should be notified to the Dyfed Historic Environment Record.
- A summary account of the work should be submitted to the journal and any other relevant period journals not later than the 31st March of the year following completion of the field work.

## 7. References

### Bibliographic

Brown, D., 2011, *Archaeological Archives: a guide to best practice in creation, compilation, transfer and curation*. Archaeological Archives Forum Publication

Chartered Institute for Archaeologists 2014a. *Standard and guidance for the collection, documentation, conservation and research of archaeological materials*. Institute of Field Archaeologists.

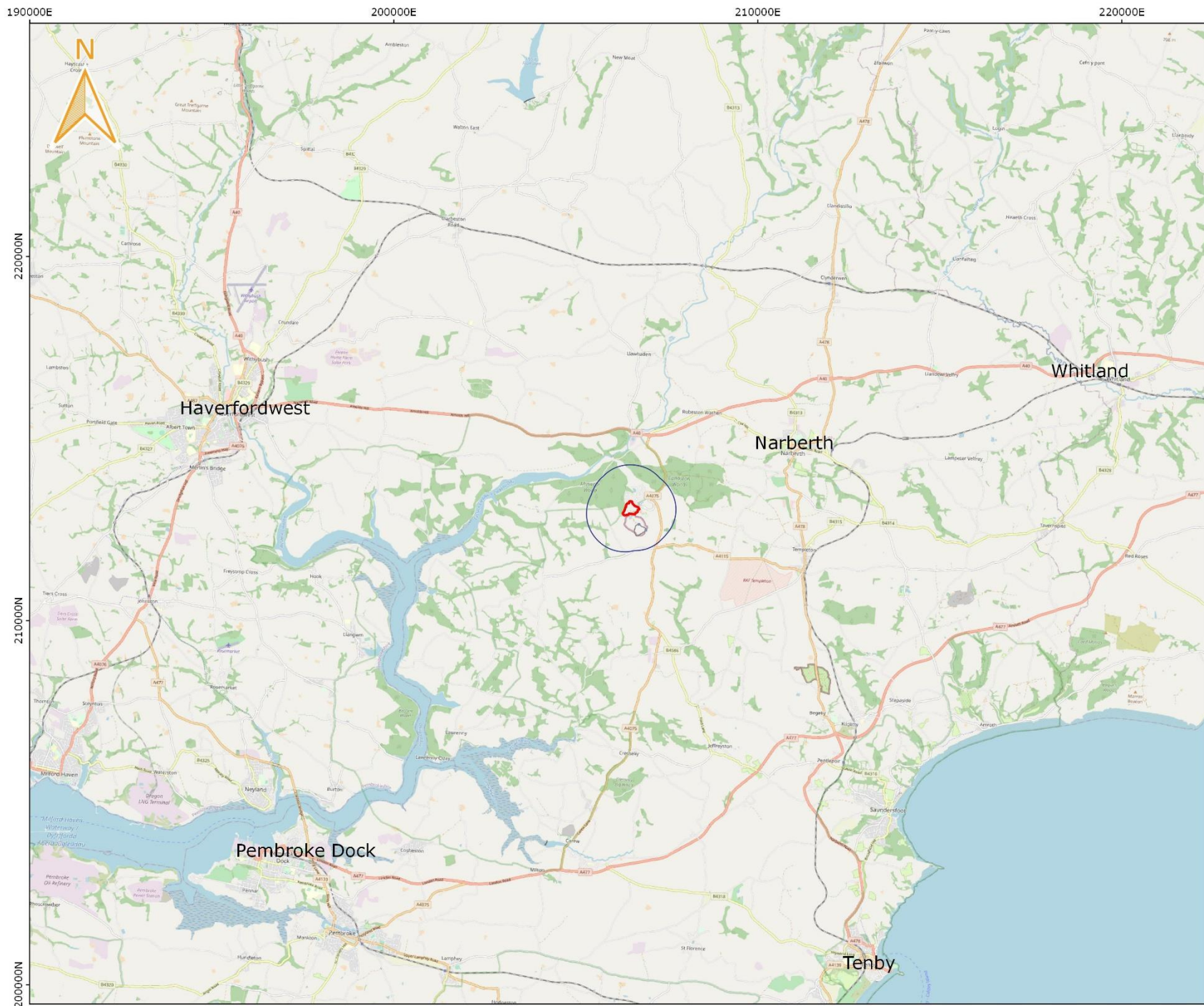
Chartered Institute for Archaeologists 2014b. *Standard and Guidance for an archaeological geophysical survey*. Institute of Field Archaeologists.

Federation of Museums and Art Galleries of Wales, 2019, *The National Standards for Wales for Collecting and Depositing Archaeological Archives*

Museums and Galleries Commission 1992. *Standards in the Museum Care of Archaeological Collections*. Museums and Galleries Commission.

United Kingdom Institute for Conservation 1983 *Packaging and Storage of Freshly Excavated Artefacts from Archaeological Sites*. Conservation Guidelines No. 2.






**Key:**


Site boundary

Written Scheme of  
Investigation for  
Geophysical Survey

1000 0 1000 2000 m

Scale @A3: 1:100000


 Archaeology  
Collective

 HCUK  
GROUP

**Bluestone Resort Phase 4,  
Canaston Wood,  
Pembrokeshire**

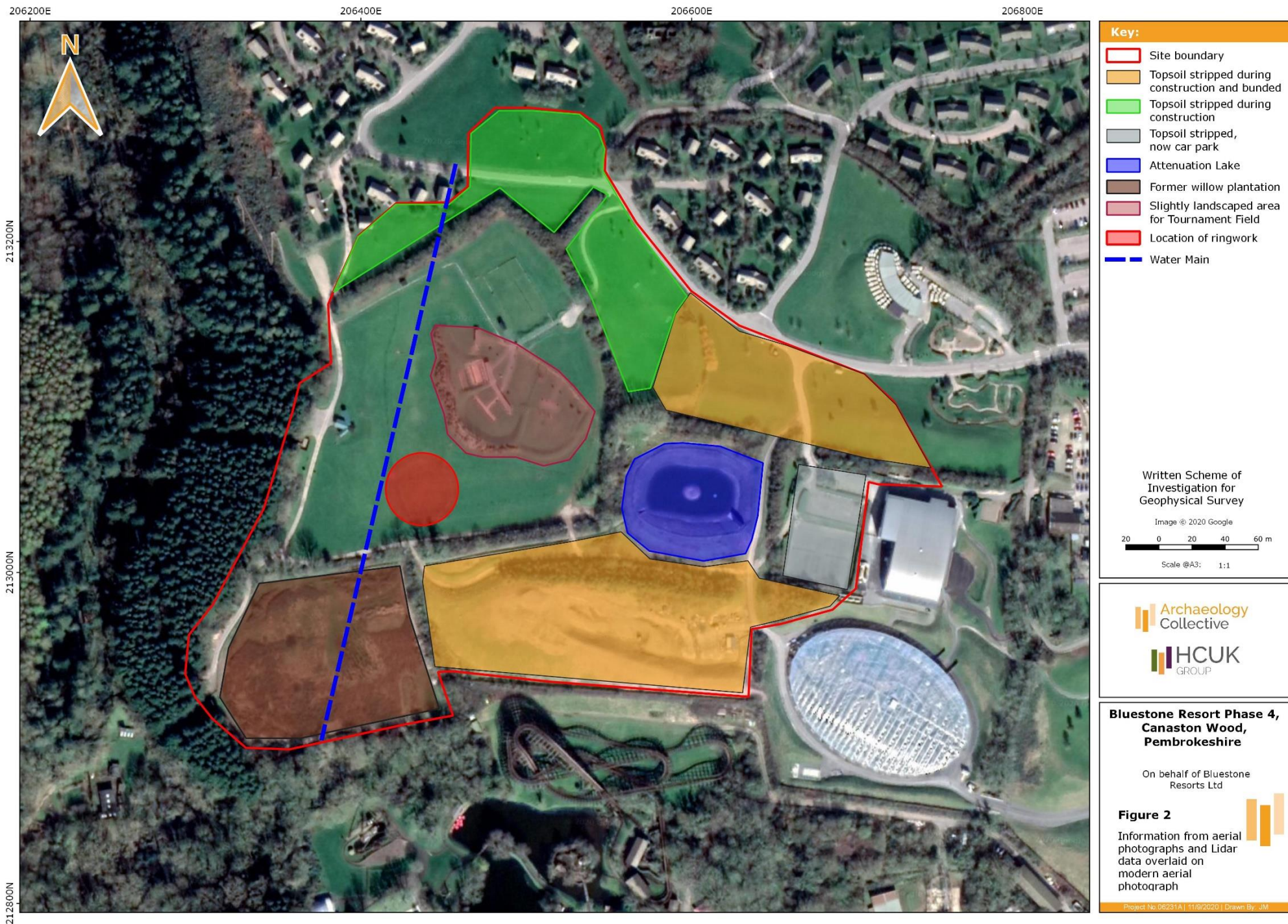
On behalf of Bluestone  
Resorts Ltd

**Figure 1**  
Site Location Plan



Project No 06231B | 11/6/2020 | Drawn By: JM





# **Bluestone Resort Phase 4, Canaston Wood, Pembrokeshire**

On behalf of Bluestone  
Resorts Ltd

## **Figure 2**

Information from aerial  
photographs and Lidar  
data overlaid on  
modern aerial  
photograph



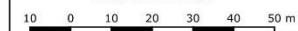


#### Key:

- Site boundary
- geophys area
- ringditch

Written Scheme of  
Investigation for  
Geophysical Survey

Image © 2020 Google



Scale @A3: 1:1

**Archaeology**  
Collective

**HCUK**  
GROUP

**Bluestone Resort Phase 4,  
Canaston Wood,  
Pembrokeshire**

On behalf of Bluestone  
Resorts Ltd

#### Figure 3

Geophysical survey  
area overlaid on  
modern aerial  
photograph, showing  
location of ringwork

Project No: 06231A | 11/6/2020 | Drawn By: JM

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