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MORLAIS, YNYS GYBI, YNYS MÔN

Gwerthusiad Archeolegol: Arolwg Geoffisegol Ardaloedd 2, 3, 7 ac 8

Archaeological Evaluation: Geophysical Survey Areas 2, 3, 7 and 8

Ymddiriedolaeth Archaeolegol Gwynedd
Gwynedd Archaeological Trust

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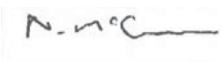
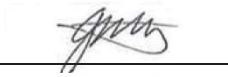
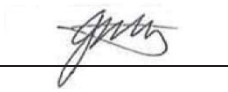
Originated by	Document Author	Neil McGuinness		09/04/20
Reviewed by	Document Reviewer	John Roberts		09/04/20
Approved by	Principal Archaeologist	John Roberts		09/04/20

Revision History			
Rev No.	**Summary of Changes**	**Ref Section**	**Purpose of Issue**
2	Changed the word ‘major’ to ‘substantial’	5	GAPS request

CONTENTS

LIST OF FIGURES

CRYNODEB ANHECHNEGOL

Comisiynwyd Ymddiriedolaeth Archeolegol Gwynedd gan Menter Môn i gynnal cyfres o arolygon geoffisegol ar draws 5.75 ha o laswelltir o fewn 4 ardal (Ardaloedd 2, 3, 7 ac 8) sy'n rhan o ôl troed daearol Prosiect Morlais, ar Ynys Gybi, Ynys Môn. Ni nodwyd unrhyw nodweddion archeolegol pendant. Nododd yr arolwg geoffisegol ddwy nodwedd archeolegol bosibl yn Ardal 8: nodwedd anheddu claddedig neu furiog bosibl ac olion anheddiad cromliniol posibl neu gaead seremonïol. Mae dwy ffin cae tebygol hefyd wedi'u nodi yn Ardal 3 ac Ardaloedd 7 ac 8, ynghyd â thair cyn ffin cae bosibl yn Ardal 3 ac Ardal 8. Mae nifer o anghysonderau ar draws y pedair ardal wedi'u neilltuo i'r categori ansicr a gallant fod yn ddraeniau tir a phyllau neu ganlyniad gweithgaredd amaethyddol modern neu nodweddion sy'n digwydd yn naturiol. Mae ardaloedd o ymateb amrywiol wedi'u nodi yn Ardaloedd 3, 7 ac 8. Credir bod y rhain yn adlewyrchu amrywiadau pridd lleol. Mae pibell wasanaeth wedi'i nodi a'i mapio yn Ardal 8.

Mae arolwg magnetomedr ar wahân o bedair ardal arall (Ardaloedd 8 (gogledd), 10, 24 a 25) wedi'i gynnal gan SUMO Geophysics Ltd. Ni chanfuwyd unrhyw ymatebion magnetig yn yr ardaloedd hyn y gellid eu dehongli fel rhai o ddiddordeb archeolegol. Mae sawl anghysondeb wedi'u categoreiddio fel rhai ansicr a chofnodwyd ffin cae blaenorol yn Ardal 10. Mae ymatebion cromlin ac amorffaidd i'w gweld trwy'r set ddata i gyd ac maent oherwydd prosesau naturiol. Mae pibell gwasanaeth i'w gweld yn y data magnetig yn Ardal 24.

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NON-TECHNICAL SUMMARY

Gwynedd Archaeological Trust was commissioned by Menter Môn to undertake a series of geophysical surveys across 5.75 ha of grassland within 4 areas (Areas 2, 3, 7 and 8) that form part of the terrestrial footprint of the Morlais Project, on Ynys Gybi, Ynys Mon. No definite archaeological features have been identified. The geophysical survey did identify two possible archaeological features in Area 8: a possible buried banked or walled settlement feature and the remains of a possible curvilinear settlement or ceremonial enclosure. Two probable former field boundaries have also been identified in Area 3 and Areas 7 and 8, along with three possible former field boundaries in Area 3 and Area 8. A number of

anomalies across all four areas have been assigned to the category of uncertain and may be land drains and pits or the result of modern agricultural activity or naturally occurring features. Areas of variable response have been identified in Areas 3, 7 and 8. These are thought to reflect localised soil variations. A service pipe has been identified and mapped in Area 8.

A separate magnetometer survey of four other areas (Areas 8 (north), 10, 24 and 25) has been carried out by SUMO Geophysics Ltd. No magnetic responses have been detected in these areas that could be interpreted as being of archaeological interest. Several anomalies have been categorised as uncertain and a former field boundary has been recorded in Area 10. Sinuous and amorphous responses are visible throughout the dataset and are due to natural processes. A service pipe is visible in the magnetic data in Area 24.

A further programme of archaeological evaluation is recommended for the two possible archaeological features in Area 8 to verify the survey results and characterise the features. Consideration should be given to a wider scheme of archaeological evaluation across the areas given the high potential for archaeological remains and the possibility that some remain undetected due to the impact of local geological factors on the results of the survey.

1 INTRODUCTION

Gwynedd Archaeological Trust (GAT) was commissioned by Menter Môn to undertake a series of geophysical surveys in support of a consent application for the Morlais Project, a proposed 240MW generating capacity offshore tidal energy development within the Morlais Demonstration Zone off the west coast of Ynys Môn. The offshore array area will be connected to the shore by offshore export cables which will make landfall on the west coast of Holy Island. Onshore infrastructure will include a substation and an onshore cable which runs from the proposed landfall location at Abraham's Bosom, South Stack, Ynys Gybi (NGR SH21488082; LL65 2LS) to the proposed National Grid connection at the Orthios site (previously Anglesey Aluminium) at Penrhos, Holyhead, Ynys Gybi (NGR SH27018068; LL65 2UX) (see Appendix II).

Geophysical surveys are required by Menter Môn within 9 delineated areas along the length of the onshore element of the scheme (Table 1.1). This report details the results of the geophysical surveys in Areas 2, 3, 7 and the southern and central parts of Area 8 (Figure 01; Figure 02). SUMO Geophysics Ltd has been subcontracted by GAT to undertake geophysical surveys on the northern part of Area 8 and Areas 10, 24 and 25 and these areas have been reported on separately (SUMO Report 17248, 2020; Appendix I). Two areas, 22 and 23, are yet to be surveyed.

Area ID	NGR	Area (ha)	Notes
2	SH 21370 81608	0.26839	Survey completed by GAT
3	SH 21443 81609	1.10564	Survey completed by GAT
7	SH 21700 81680	1.00745	Survey completed by GAT
8	SH 21712 81755	3.35593	Survey completed by GAT / SUMO Report 17248, 2020
10	SH 21909 81893	1.02034	SUMO Report 17248, 2020
22	SH 23988 80847	0.587673	Awaiting access permission
23	SH 24244 80782	0.642343	Awaiting access permission
24	SH 24092 80767	1.36631	SUMO Report 17248, 2020
25	SH 24402 80804	0.600109	SUMO Report 17248, 2020

Table 1.1 Morlais geophysical survey areas

The geophysical survey was undertaken between March and April 2020, in accordance with the following guidelines:

- *Geophysical Survey in Archaeological Field Evaluation* (English Heritage, 2008);
- *Guidance for the Submission of Data to the Welsh Historic Environment Records (HERs)* Version 1.1 (The Welsh Archaeological Trusts, 2018);
- *Guidelines for digital archives* (Royal Commission on Ancient and Historic Monuments of Wales, 2015);
- *Guidelines for the Use of Geophysics in Archaeology: Questions to Ask and Points to Consider* (European Archaeological Council, 2015);
- *Management of Archaeological Projects* (English Heritage, 1991);
- *Management of Research Projects in the Historic Environment: The MoRPHE Project Managers' Guide* (Historic England, 2015); and
- *Standard and Guidance for Archaeological Geophysical Survey* (Chartered Institute for Archaeologists, 2014).

The geophysical survey was monitored by the Gwynedd Archaeological Planning Service and was undertaken in accordance with an approved Written Scheme of Investigation (Appendix II). In line with the Gwynedd Historic Environment Record (HER) requirements, the HER was contacted at the onset of the project to ensure that any data arising was formatted in a manner suitable for accession to the HER under the guidelines set out in *Guidance for the Submission of Data to the Welsh Historic Environment Records (HERs)* (The Welsh Archaeological Trusts, 2018). The HER was informed of the project start date, location including grid reference and estimated timescale for the work. The GAT HER enquiry number is GATHER1222 and the event primary reference number is 45789. A bilingual event summary has been prepared for submission to the HER in accordance with their guidance.

GAT is certified to ISO 9001:2015 and ISO 14001:2015 (Cert. No. 74180/B/0001/UK/En) and is a Registered Organisation with the Chartered Institute for Archaeologists and a member of the Federation of Archaeological Managers and Employers (FAME).

1.1 Site Details

NGR / Postcode	Areas 2 and 3	SH 21443 81609 / LL65 1YH
	Areas 7 and 8	SH 21700 81680 / LL65 1YH
Location	The survey areas are located approximately 1.3km to the southeast of South Stack, Ynys Gybi, Ynys Môn (Figure 01). Areas 2 and 3 are bounded by South Stack Road to the northeast, cliffs and foreshore to the south, pasture fields to the west and the house at Henborth and pasture fields to the east (Figure 02). Areas 7 and 8 lie on the other side of South Stack Road and are bounded by the road to the southeast and southwest, Ty-Mawr Farm to the northeast and pasture fields to east and south. A northwest-southeast aligned access track runs from the South Stack Road to Ty-Mawr Farm bisecting Area 8 (Figure 02).	
HER	Gwynedd Archaeological Trust HER	
District	Ynys Môn	
Parish	Trearddur	
Topography	Areas 2 and 3 slope from northwest to southeast. The highest point is in the northern corner of Area 2 at approximately 52m AOD. The lowest point is in the southern part of area 3 closest to the cliff edge at a height of approximately 39m AOD. Areas 7 and 8 also slope from northwest to southeast. The highest point in these areas is in the part of Area 8 to the southwest of Ty Mawr Farm at approximately 58m AOD. The lowest point is in the southern corner of Area 7 at 33m AOD.	
Current land use	Generally pasture fields divided by overgrown dry stone walls and post and wire fences. The southern part of Area 8 is a dedicated camping area with a small electricity substation and number of electrical and water service provision points along its north-western edge. These are located alongside a grassed-	

	over access trackway which runs from the South Stack Road to the southwest to Ty Mawr Farm.	
Geology	Solid: South Stack Formation - Metamorphic psammite and pelite.	
	Superficial: Till, Devensian - Diamicton (BGS, 2020).	
Soils	Freely draining slightly acid loamy soil (Soilscapes, 2020).	
Survey methods	Magnetometer survey (fluxgate gradiometer)	
Study area	Total size	5.75 ha
	Area 2	0.27 ha
	Area 3	1.11 ha
	Area 7	1.01 ha
	Area 8	3.36 ha

1.2 Geophysical survey aims and objectives

The key aim and objective of the geophysical survey is to:

- establish the extent to which potential archaeological remains survive at the location of the development.

If previously unknown potential archaeological features are identified through geophysical survey, they may need to be evaluated with trial trenches or targeted excavation to confirm their existence and to establish their date and function, and following on from this, to assess the implications of the findings on the current understanding of the historical development of the area. Any archaeological features encountered during the trial trenching or targeted excavation may require preservation by record, i.e. further investigation, or preservation in-situ that may require amending the layout of the proposed development.

2 BACKGROUND

Wessex Archaeology was commissioned by Royal Haskoning on behalf of Menter Môn Cyf, to prepare a terrestrial archaeology desk-based assessment of the onshore elements of the entire Morlais project (Wessex Archaeology Report 213020.01, 2019). The report aimed to "assess the known and potential heritage resource within the development area and the surrounding area and to assess the likely impacts of the development proposals on this resource" (*Ibid.* 11). The report formed the baseline assessment for an Environmental Impact Assessment Cultural Heritage chapter prepared by Royal Haskoning (Royal Haskoning, 2019a; 2019b; 2019c). The assessment report established that "there is potential for archaeological remains to be present within much of the development area, in particular relating to prehistoric and post-medieval periods. The proposed development area runs through a landscape with high potential for remains from the prehistoric period. Designated and non-designated monuments and finds show a well-utilised landscape during the prehistoric periods, with many examples of settlement and associated artefacts and agricultural remains" (*ibid.*).

No known archaeological sites lie within the survey area. A number of designated prehistoric archaeological sites are however located in the vicinity of Areas 2, 3, 7 and 8 (Figure 01). They lie less than 500m to the southeast of the Holyhead Mountain Hut Circles unenclosed hut circle (scheduled monument AN016). The hillfort Caer y Twr (scheduled monument AN019) lies approximately 0.8km to the north while the Gogarth Bay round cairn (scheduled monument AN147) and the Enclosed Hut Circle Settlement at Capel Llochwydd (scheduled monument AN133) are located approximately 1km to the north. The Penrhos Feilw Standing Stones (scheduled monument AN017) are located 1.1km to the southeast of the survey area as are the Plas Meilw Hut Circles (scheduled monument AN033) which are 1.3km distant (not shown on Figure 01).

Undesignated prehistoric archaeological sites in the vicinity of the survey area include the Hut Group and Finds, Site of, Pen y Bonc (GAT HER PRN 3808) 130m to the south, the location of a Cist Burial, Site of, Nr. Pen y Bonc (GAT HER PRN 3802) 170m to the southeast, and the Cist Burial, Site of, Nr. Porth y Gwyddel (GAT HER PRN 3,796) 440m to the south (Figure 01). The Hut Group and Finds, Site of, Twr (GAT HER PRN 3,806) are located 200m to the northwest of the survey area, while the Burnt Mound, Holyhead (GAT HER PRN 65,534) is 300m to the north.

The magnetometer survey carried out by SUMO Geophysics Ltd of the northern part of Area 8, Area 10, Areas 23 and 24 was completed in March 2020 (SUMO Report 17248, 2020; Appendix I). Large parts of Area 24 were overgrown and covered in dense shrubbery and so were unsuitable for survey. The report concluded that no magnetic responses that could be interpreted as being of archaeological interest had been identified in the surveyed areas. Several discrete and linear trends were interpreted as features of uncertain origin and thought to be likely due to natural or modern agricultural processes. A former field boundary was identified in Area 10 whilst large amorphous and sinuous responses throughout the dataset are likely to be due to natural processes. A modern service pipe was also identified in Area 24.

3 METHODOLOGY

3.1 Technical detail

The GAT survey was carried out in a series of traverses within 20x20m grids covering the footprint of Areas 2, 3, 7 and the central and southern parts of Area 8 (Figure 02). The grids were tied into the Ordnance Survey National Grid using a Trimble R8S high precision GPS. The survey was conducted using a Barrington Grad 601-2 dual fluxgate gradiometer and carried out at standard resolution with a 1.0m traverse interval and 0.25m sample interval.

The SUMO survey was carried out in a series of traverses within 30x30m grids in Areas 8 (north), 10, 24 and 25. The grids were tied into the Ordnance Survey National Grid using a Trimble R8 high precision GPS. The survey was conducted using a Barrington Grad 601-2 dual fluxgate gradiometer and carried out at standard resolution with a 1.0m traverse interval and 0.25m sample interval (for full methodology see SUMO Report 17248, 2020; Appendix I).

3.2 Instrumentation

The Bartington Grad 601-2 is a handheld dual fluxgate gradiometer which uses a pair of Grad-01-100 sensors. These are high stability fluxgate gradient sensors with a 1.0m separation between the sensing elements, giving a strong response to deeper anomalies. Each sensor consists of two vertically aligned fluxgates set 1000mm apart. Their cores are driven in and out of magnetic saturation by a 1,000Hz alternating current passing through two opposing driver coils. As the cores come out of saturation, the external magnetic field can enter them producing an electrical pulse proportional to the field strength in a sensor coil. The high frequency of the detection cycle produces what is in effect a continuous output. The magnetic variations are measured in nanoTeslas (nT). The earth's magnetic field strength is about 48,000 nT; typical archaeological features produce readings of below 15nT although burnt features and iron objects can result in changes of several hundred nT. The machine is capable of detecting changes as low as 0.1nT and anomalies down to a depth of approximately one meter.

The instrument detects variations in the earth's magnetic field caused by the presence of iron in the soil. This is usually in the form of weakly magnetized iron oxides which tend to be concentrated in the topsoil. Features cut into the subsoil and backfilled or silted with topsoil, therefore contain greater amounts of iron and can, therefore, be detected with the

gradiometer. This is a simplified description as there are other processes and materials which can produce detectable anomalies. The most obvious is the presence of pieces of iron in the soil or immediate environs which usually produce very high readings and can mask the relatively weak readings produced by variations in the soil. Strong readings are also produced by archaeological features such as hearths or kilns as fired clay acquires a permanent thermo-remnant magnetic field upon cooling. This material can also get spread into the soil leading to a more generalized magnetic enhancement around settlement sites.

Not all surveys can produce good results as results can be masked by large magnetic variations in the bedrock or soil or high levels of natural background “noise” (interference consisting of random signals produced by material within the soil). In some cases, there may be little variation between the topsoil and subsoil resulting in undetectable features.

3.3 Data collection

The gradiometer includes an on-board data-logger. Readings are taken along parallel traverses of one axis of a 20m x 20m grid. The traverse interval is 1.0 m. Readings are logged at intervals of 0.25m along each traverse. Marked guide ropes are used to ensure high positional accuracy during the survey.

3.4 Data processing

The data collected in each 20m x 20m grid is transferred from the data-logger to a personal computer where it is compiled and processed using TerraSurveyor v.3.0.33.10 software. Additional analysis of the data is carried out using MagPick v3.25.

The numeric data are converted to a greyscale plot where data values are represented by modulation of the intensity of a greyscale within a rectangular area corresponding to the data collection point within the grid. This produces a plan view of the survey and allows subtle changes in the data to be displayed. X-Y trace plots of the collected data are also used to aid interpretation.

The Bartington Grad 601-2 captures raw data in the range of +/- 3000 nT. When raw data is presented in greyscale format all but the extreme high or low readings are rendered in the central range of the greyscale and therefore not visible against the background. The data is minimally processed by clipping as archaeological features tend to produce readings within the +/-15nt range.

Corrections may also be made to the data to compensate for instrument drift and other data collection inconsistencies. These corrections may include:

- de-striping using *zero mean traverse* which sets the background mean of each traverse within each grid to zero, removing striping effects and edge discontinuities;
- de-staggering in order to correct for slight differences in the speed of walking on forward and reverse traverses;
- de-spiking to remove high or low readings caused by stray pieces of iron, fences, etc. in order to reduce background magnetic noise;
- the application of a high pass filter to remove low frequency, large scale spatial detail for example a slowly changing geological background;
- the application of a low pass filter to remove high frequency, small scale spatial detail in order to smooth data or to enhance larger weak anomalies; and
- interpolation to produce a smoothed grayscale plot with more but smaller pixels in order to aid clarity.

3.5 Presentation of results and interpretation

The results of the survey are presented as a minimally processed greyscale plot (raw data clipped to +/- 15nT) and a processed greyscale plot if further processing or enhancement has been performed. X-Y trace plots of the collected data may also be included if they are necessary to support the interpretation of specific anomalies visible on the greyscale plots.

Magnetic anomalies are identified, interpreted and plotted onto an interpretative plot with reference numbers linking the anomalies to descriptions in the written report. When interpreting the results, several factors are taken into consideration, including the shape, scale and intensity of the anomaly and the local conditions at the site (geology, pedology, topography, etc.). Anomalies are categorised by their potential origin. Where responses can be related to other existing evidence, the anomalies will be given specific categories, such as Abbey Wall or Roman Road. Where the interpretation is based largely on the geophysical data, levels of confidence are implied, for example: *Probable*, or *Possible* Archaeology. The former is used for a confident interpretation, based on anomaly definition and/or other corroborative data such as cropmarks. Poor anomaly definition, a lack of clear patterns to the

responses and an absence of other supporting data reduces confidence, hence the classification *Possible*.

3.6 Interpretation categories

In certain circumstances (usually when there is corroborative evidence from desk-based or excavation data) very specific interpretations can be assigned to magnetic anomalies (for example, Roman Fort, Wall, etc.) and where appropriate, such interpretations will be applied. The list below outlines the generic categories commonly used in the interpretation of the results.

Archaeology / Probable Archaeology	*This term is used when the form, nature and pattern of* the responses are clearly or very probably archaeological and/or if corroborative evidence is available. These anomalies, whilst considered anthropogenic, could be of any age.
Possible Archaeology	These anomalies exhibit either weak signal strength and/or poor definition, or form incomplete archaeological patterns, thereby reducing the level of confidence in the interpretation. Although the archaeological interpretation is favoured, they may be the result of variable soil depth, plough damage or even aliasing as a result of data collection orientation.
Industrial / Burnt-Fired	Strong magnetic anomalies that, due to their shape and form or the context in which they are found, suggest the presence of kilns, ovens, corn dryers, metalworking areas or hearths. It should be noted that in many instances modern ferrous material can produce similar magnetic anomalies.
Former Field Boundary (probable and possible)	Anomalies that correspond to former boundaries indicated on historic mapping, or which are clearly a continuation of existing land divisions. *Possible* denotes less confidence where the anomaly may not be shown on historic mapping but nevertheless the anomaly displays all the characteristics of a field boundary.
Ridge and Furrow	Parallel linear anomalies whose broad spacing suggests ridge and furrow cultivation. In some cases, the response may be the result of more recent agricultural activity

Agriculture (ploughing)	Parallel linear anomalies or trends with a narrower spacing, sometimes aligned with existing boundaries, indicating more recent cultivation regimes.
Land Drain	Weakly magnetic linear anomalies, quite often appearing in series forming parallel and herringbone patterns. Smaller drains may lead and empty into larger diameter pipes, which in turn usually lead to local streams and ponds. These are indicative of clay fired land drains.
Natural	These responses form clear patterns in geographical zones where natural variations are known to produce significant magnetic distortions.
Magnetic Disturbance	Broad zones of strong dipolar anomalies, commonly found in places where modern ferrous or fired materials (e.g. brick rubble) are present.
Service	Magnetically strong anomalies, usually forming linear features are indicative of ferrous pipes/cables. Sometimes other materials (e.g. PVC) or the fill of the trench can cause weaker magnetic responses which can be identified from their uniform linearity.
Ferrous	This type of response is associated with ferrous material and may result from small items in the topsoil, larger buried objects such as pipes, or above-ground features such as fence lines or pylons. Ferrous responses are usually regarded as modern. Individual burnt stones, fired bricks or igneous rocks can produce responses similar to ferrous material.
Uncertain Origin	Anomalies which stand out from the background magnetic variation, yet whose form and lack of patterning give little clue as to their origin. Often the characteristics and distribution of the responses straddle the categories of *Possible Archaeology / Natural* or (in the case of linear responses) *Possible Archaeology / Agriculture*; occasionally they are simply of an unusual form.

Where appropriate some anomalies will be further classified according to their form (positive or negative) and relative strength and coherence (trend: low and poorly defined).

4 RESULTS

The geophysical survey has been conducted across four survey areas (Areas 2, 3, 7 and 8; Figure 02). In places the survey grids overlapped into adjacent Areas 4 and 6 and the results from these areas have also been included. The results are presented as a minimally processed greyscale plot (raw data clipped to +/- 15nT; Figure 03), a processed greyscale plot (raw data clipped to +/- 15nT and de-striped; Figure 04) and an interpretative plan (Figure 05). Specific anomalies have been given numerical labels which appear in the text below, as well as on the interpretative plan (Figure 05).

The SUMO survey was conducted across four survey areas (Areas 8 (north), 10, 24 and 25). Large parts of Area 24 were overgrown and covered in dense shrubbery and so were unsurveyable. The full results are not reproduced here but are included in SUMO Report 17248 (Appendix I, Section 5) and also discussed in Section 6 below.

4.1 Probable Archaeology

No definitive archaeological responses have been identified in the results.

4.2 Possible Archaeology

A relatively well defined ‘C’ shaped low-moderate negative anomaly [1] has been identified on the northwestern edge of Area 8. The negative anomaly encloses an area of moderately strong positive response. It may represent a buried banked or walled feature, and given the presence of prehistoric hut circles in the vicinity, it is possible that this could be a previously unknown example within the survey area. It is however located adjacent to a toilet block situated on the field boundary to the southwest and it is possible that any signals here are an artefact of, or impacted by, high levels of ferrous disturbance in the local magnetic field.

A poorly defined low magnitude positive curvilinear anomaly [2] in the northwestern part of Area 8 may be the archaeological remains of a ditched feature of unknown date, possibly a ceremonial or settlement site. It is however also possible that it may represent natural variation in the underlying soil.

4.3 Uncertain Origin

A number of linear trends of uncertain origin have been identified within the survey area. Three relatively well defined northwest-southeast aligned parallel straight linear examples [3] are located in Areas 2 and 3. Two are low negative polarity and the westernmost is low

positive polarity. They may be related to modern agricultural activity or they may represent land drains running downslope in this area. Another, less well defined northwest-southeast aligned straight linear low positive polarity trend with a possible spur at its southern end is visible running downslope in Areas 7 and 8 [4]. Again, it may be related to modern agricultural activity or it may be a land drain.

A group of three small low-moderate magnitude positive anomalies of uncertain origin have also been identified on the eastern side of the southern part of Area 8 [5]. They consist of a sub-circular or 'C' shaped anomaly approximately 3m in diameter, a discreet pit-like feature and the end of an east-west aligned straight linear cut feature. They may be archaeological cut features, natural anomalies, or have a modern agricultural origin. They are all located at the very edge of the surveyed area and lie outside of the limit of development.

A number of small discrete areas of low to moderate positive polarity have also been identified across the survey area. Only the most prominent of these are highlighted on the Interpretative plot and they are not individually numbered. These are generally characteristic of in-filled cut features. They may be pits of archaeological origin however as they form no clear pattern they may also be modern features, or possibly tree bowls or other naturally occurring depressions in the ground and their origin is therefore uncertain.

4.4 Former Field Boundaries (probable/possible)

The lines of two probable former field boundaries depicted on the 1841 Holyhead Tithe Map and the 1889 First Edition 1:2500 County Series Ordnance Survey map have been identified. One is in one in Area 3 [6], and one in Area 7/8 [7].

A possible field boundary has been identified in Area 8. A straight linear low – moderate magnitude positive anomaly [8] in the central part of Area 8 may be the remains of a previously unknown field boundary ditch of unknown date or may be due to modern agricultural processes. Two other possible former field boundaries have also been identified in Area 3 [9]. They are both low magnitude negative straight linear anomalies with associated low magnitude positive responses along their lengths. They do not correspond with any boundaries on the early mapping but their appearance, position and alignment suggest they may represent the ploughed out remains of former field divisions pre-dating the mapped features.

4.6 Services

A very high magnitude straight linear dipolar anomaly [10] has been identified in the central part of Area 8. It runs in a northwest-southeast direction and appears to lead from Ty Mawr Farm to the lower boggy ground in the southern corner of Area 7 and may be a ferrous waste water drain pipe from the farm.

4.7 Ferrous / Magnetic Disturbance

High magnitude ferrous responses close to field boundaries are due to adjacent metal fences and gates. The high number of discreet high magnitude responses in the southern part of Area 8 are due to the small electricity substation and electrical and water service provision points in this area.

Smaller-scale ferrous anomalies consisting of consists of a single high magnitude positive anomaly with an associated negative response ("iron spikes") are present throughout the data and are characteristic of small pieces of ferrous debris (or brick/tile) in the topsoil; they are commonly assigned a modern origin. Only the most prominent of these are highlighted on the interpretative plot.

The extreme southern corner of Area 3 contains an area of high magnetic disturbance. This area was noted to be heavily disturbed during the survey with a high proportion of overgrown dumped soil and domestic and agricultural debris.

5 DATA APPRAISAL AND CONFIDENCE ASSESSMENT

English Heritage guidelines (English Heritage, 2008, Table 4) states that magnetometer survey can be effective over metamorphic solid geology, but that magnetic response is generally poor on glacial till drift geologies. Despite this, this magnetometer survey has yielded evidence of a possible archaeological feature, anomalies of uncertain origin and former field boundaries. Consequently, the technique is likely to have detected any substantial archaeological features, if present. It is still however possible that archaeological features remain undetected due to the nature of the local geology.

6 CONCLUSIONS AND RECOMMENDATIONS

The magnetometer survey of Areas 2, 3, 7 and the central and southern part of Area 8 has not revealed any definite archaeological anomalies. However, two anomalies of possible archaeological provenance have been identified: a possible buried banked or walled feature [1] and a possible curvilinear ditched feature [2]. A number of linear trends and small discrete areas of magnetic response have been assigned to the category of uncertain. The trends may be as a result of modern agricultural activity or possibly land drains; the discrete anomalies may be pits or modern or naturally occurring features. Two probable former field boundaries identified on historic mapping have been identified, one in Area 3 [6] and one in Areas 7 and 8 [7]. Three possible former field boundaries, one in Area 8 [8] and two in Area 3 [9] are not depicted on historic mapping. A service pipe [10] has been identified and mapped in Area 8. Areas of variable response have been identified in Areas 3, 7 and 8. These are thought to reflect localised soil variations.

The magnetometer survey of Areas 8 (north), 10, 24 and 25 (Appendix I) has not detected any magnetic responses that could be interpreted as being of archaeological interest. Several discrete and linear trends have been assigned to the category of uncertain; these are likely to be due to natural or modern agricultural processes. A former field boundary is visible in the magnetic data in Area 10. Sinuous and amorphous responses are visible throughout the dataset and are due to natural processes. The location of a service pipe has been marked in Area 24.

Given the identification of possible archaeological remains in Area 8, it is recommended that a further programme of archaeological evaluation (trial trenching or targeted excavation) is implemented for anomalies [1] and [2] to verify their existence and determine their character, function and date. Trial trenching in apparently archaeologically sterile areas might also be considered given the possibility of undetected archaeological features in an area of high archaeological potential. Any further archaeological evaluation should take place prior to the commencement of any proposed construction related groundwork.

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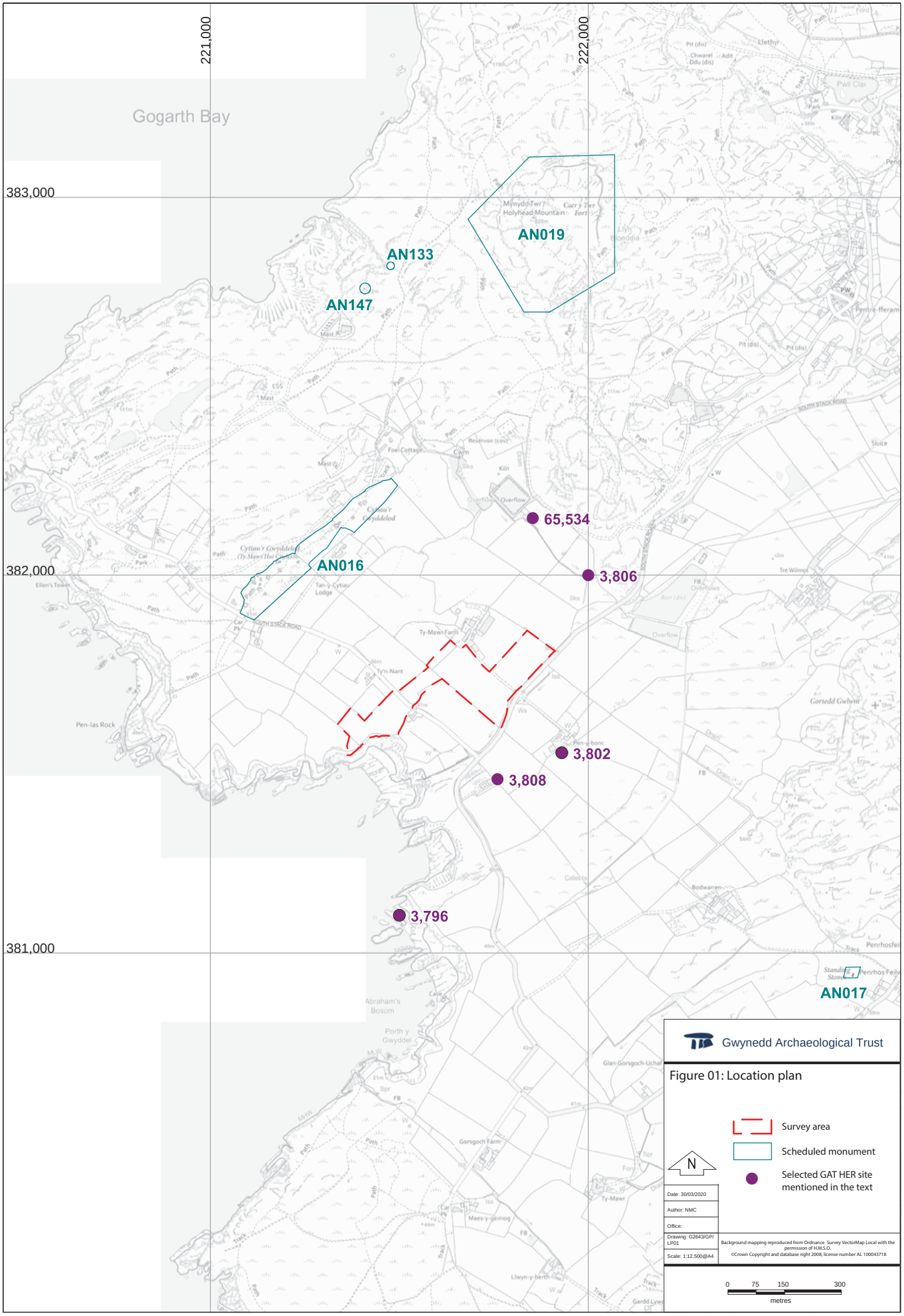
FIGURES


221,000
222,000
383,000
382,000
381,000
Gogarth Bay
AN019
AN133
AN147
AN016
AN017
65,534
3,806
3,802
3,808
3,796
Gwynedd Archaeological Trust
Figure 01: Location plan
Survey area
Scheduled monument
Selected GAT HER site mentioned in the text
N
Date: 30/03/2020
Author: NMC
Office:
Drawing: G2643/GP/LP01
Scale: 1:12,500@A4
Background mapping reproduced from Ordnance Survey VectorMap Local with the permission of H.M.S.O.
©Crown Copyright and database right 2008, license number AL 100043718
0 75 150 300
metres

221,500

221,750

381,750

381,500

Ty-Mawr Farm

Ty'n-Nant

56m

41m

W

Ws

Iss

1

2

3

4

5

6

7

8

9

10

Gwynedd Archaeological Trust

Figure 02: Location of survey grids

Survey area showing 20m grid

Development area footprint

N

Date: 30/03/2020

Author: NMC

Office:

Drawing: G2643/GPY SO01

Scale: 1:1,500@A3

0 10 20 40

metres

221,500

221,750

Ty-Mawr Farm

10

9

8

7

6

4

3

2

56m

Ty'n-Nant

381,750

41m

381,500

Gwynedd Archaeological Trust

Figure 03: Geophysical survey greyscale plot (minimally processed, raw data clipped to +/- 15nT)

15 nT

0 nT

-15 nT

N

Date: 30/03/2020	
Author: NMC	
Office:	
Drawing: G2643/GPY MP01	Background mapping reproduced from Ordnance Survey VectorMap Local with the permission of H.M.S.O.
Scale: 1:1,500@A3	©Crown Copyright and database right 2008, license number AL 100043718

0 10 20 40

metres

221,500

221,750

Ty-Mawr Farm

10

9

8

7

6

56m

Ty'n-Nant

381,750

41m

2

3

4

W

Ws

lss

381,500

Gwynedd Archaeological Trust

Figure 04: Geophysical survey greyscale plot (raw data clipped to +/- 15nT and de-striped)

15 nT

0 nT

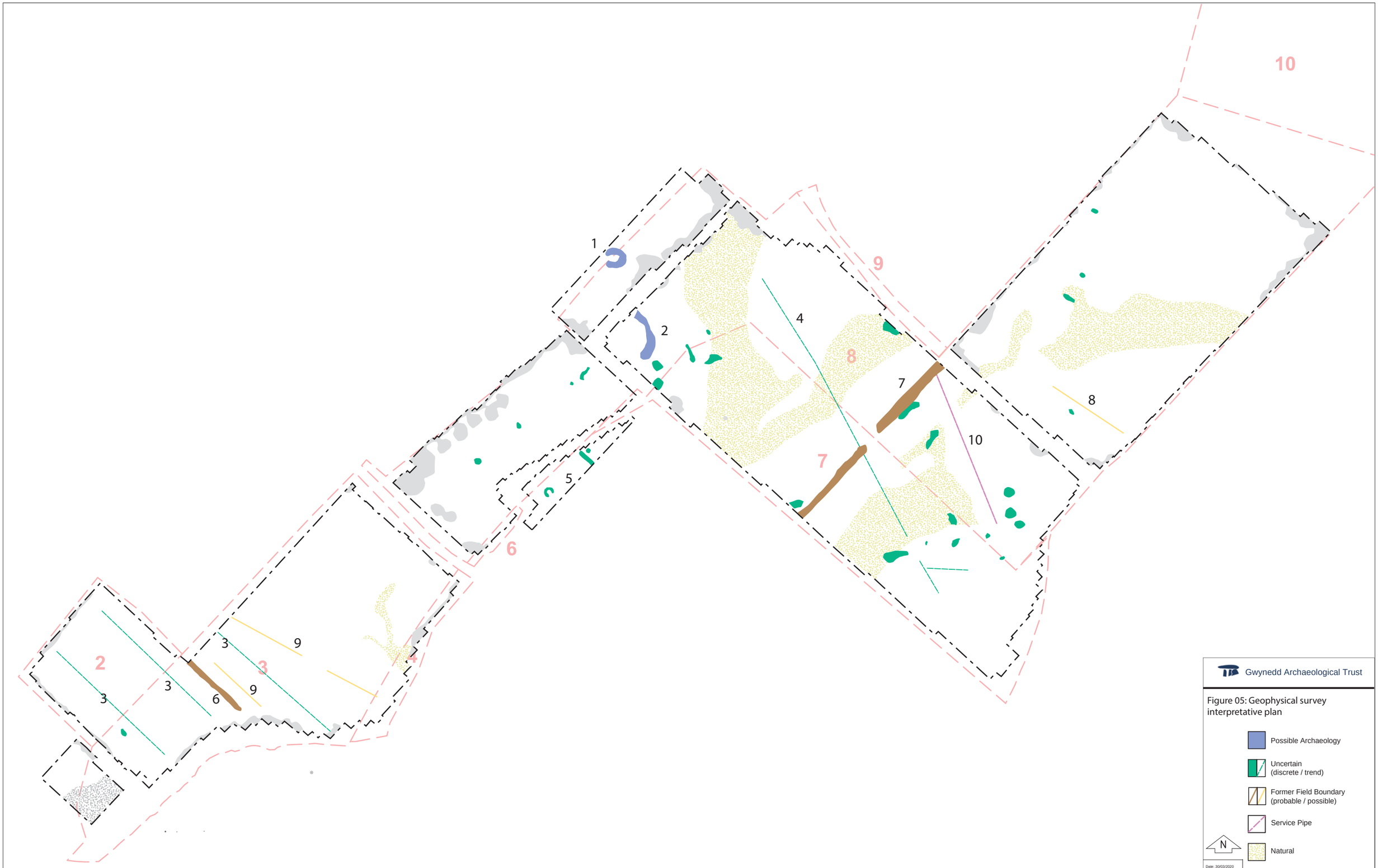
-15 nT

N

Date: 30/03/2020	
Author: NMC	
Office:	
Drawing: G2643/GPY ZMT01	Background mapping reproduced from Ordnance Survey VectorMap Local with the permission of H.M.S.O.
Scale: 1:1,500@A4	©Crown Copyright and database right 2008, license number AL 100043718

0 10 20 40

metres


1
2
3
4
5
6
7
8
9
10
Gwynedd Archaeological Trust
Figure 05: Geophysical survey interpretative plan
Possible Archaeology
Uncertain (discrete / trend)
Former Field Boundary (probable / possible)
Service Pipe
Natural
Ferrous / Magnetic Disturbance
N
Date: 30/03/2020
Author: NMC
Office:
Drawing: G2643/GPI #P01
Scale: 1:1,500@A4
0 10 20 40
metres

APPENDIX I

Sumo Geophysics Ltd, 2020, Morlais, Anglesey, Geophysical Survey, Sumo Report 17248

GEOPHYSICAL SURVEY REPORT

Morlais, Anglesey, Geophysical Survey

Client

Gwynedd Archaeological Trust

For

Morlais Energy / Menter Môn

Survey Report

17248

Date

May 2020

Survey Report 17248: Morlais, Anglesey, Geophysical Survey

Survey dates	24 March 2020
Field co-ordinator	Alicia Senelle BSc MA
Field Team	Connor Rumble MSc Natalie Holt BSc Joseph Howarth MSc
Report Date	27 March 2020
CAD Illustrations	Thomas Cockcroft MSc
Report Author	Thomas Cockcroft MSc
Project Manager	Thomas Cockcroft MSc
Report approved	Dr John Gater BSc DSc(Hon) MCIfA FSA

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1. LIST OF FIGURES

2. SURVEY TECHNIQUE

Detailed magnetic survey (magnetometry) was chosen as the most efficient and effective method of locating the type of archaeological anomalies which might be expected at this site.

Bartington Grad 601-2 Traverse Interval 1.0m Sample Interval 0.25m

3 SUMMARY OF RESULTS

3.1 A magnetometer survey of 3.2ha has been carried out on Anglesey. No magnetic responses have been detected that could be interpreted as being of archaeological interest. Several linear trends and discrete responses have been categorised as uncertain and a former field boundary has been recorded in Area 10. Sinuous and amorphous responses are visible throughout the dataset and are due to natural processes. A service pipe is visible in the magnetic data in Area 24.

3 Crynodeb o'r Canlyniadau

3.1 Fe argymerwyd arolwg magnetomedr 3.2 hectar ar Ynys Môn. Ni chofnodwyd unrhyw adwaith magnetig a oedd o ddiddordeb archeolegol. Categorïwyd y tueddiadau llinellol ac adweithiau annibynnol fel rhai 'ansicr', ac fe nodwyd hen ffin cae ym Mharth 10. Prosesau naturiol oedd yn gyfrifol am yr adweithiau cylchdroeog ac amorffaidd dwy'r data. Roedd piben i weld yn y data magnetig ym Mharth 24.

4 INTRODUCTION

4.1 **SUMO Geophysics Ltd** were commissioned to undertake a geophysical survey of an area outlined for a proposed offshore tidal energy development. This survey forms part of an archaeological investigation being undertaken by **Gwynedd Archaeological Trust** on behalf of **Morlais Energy / Menter Môn**.

4.2 Site details

NGR / Postcode	Areas 8 & 10	SH 218 819 / LL65 1YH
	Areas 24 & 25	SH 241 807 / LL65 2LN
Location	The sites are located on Holyhead Island. Areas 8 & 10 are located 1.2km east of the South Stack and are bounded by South Stack Road to the east and by farmland in all other directions. Areas 24 & 25 are located 0.5km south of Holyhead. Area 24 is bounded to the north by Mill Road and Area 25 is bounded to the south and east by Mill Road.	
HER	Gwynedd Archaeological Trust	
District	Isle of Anglesey	
Parish	Areas 8, 10 & 24	Trearddur
	Area 25	Holyhead
Topography	Undulating	
Current Land Use	Pasture / heathland	
Geology (BGS 2020)	Bedrock: South Stack Formation - psammite and pelite Superficial: Till, Devensian - diamicton	
Soils (CU 2020)	Soilscape 6: Freely draining slightly acid loamy soils	
Archaeology (GAT 2020)	The four areas within this survey are small sections of a much larger linear scheme. There is potential for archaeological remains to be present, in particular relating to prehistoric and post-medieval periods. Designated and non-designated monuments and finds show a well utilised landscape during the prehistoric periods, with many examples of settlement and associated artefacts and agricultural remains.	
Survey Methods	Magnetometer survey (fluxgate gradiometer)	
Study Area	3.2 ha	

4.3 Aims and Objectives

To locate and characterise any anomalies of possible archaeological interest within the study area.

5 RESULTS

The survey has been divided into four survey areas (Areas 8, 10, 24 and 25). Large parts of Area 24 were overgrown and covered in dense shrubbery and so were unsurveyable.

5.1 *Probable / Possible Archaeology*

5.1.1 No magnetic responses have been recorded that could be interpreted as being of archaeological interest.

5.2 *Uncertain*

5.2.1 Several fairly weak and ill-defined pit-like responses have been detected in the east of Area 24. They lack the defined morphology of anomalies that would normally be interpreted as being of an archaeological provenance; they are isolated and form no obvious pattern. These anomalies probably reflect variations in the pedology, underlying geologies or could be due to modern agricultural processes. Therefore, the responses have been categorised as *Uncertain*.

5.2.2 A couple of fairly well-defined negative linear trends have been recorded in Areas 8 and 10. Given the regular nature of the responses it is likely they have a modern origin; they could possibly be land drains or due to other modern agricultural processes. Two linear trends have also been detected in the east of Area 24; whilst probably natural, these may be the results of past agricultural activity. Hence, these linear trends have been assigned to the category of *Uncertain*.

5.3 *Former Field Boundary (Corroborated)*

5.3.1 A linear negative response is visible in the magnetic data, located in the west of Area 10. A former field boundary is recorded on historic mapping and appears to correlate with the location of the negative responses; therefore, it has been interpreted as a former field boundary.

5.4 *Natural / Geological / Pedological / Topographic*

5.4.1 Throughout all survey areas a number of amorphous and sinuous anomalies are present. These responses are generally ill-defined and have weak magnetic signatures. It is likely they are a result of variations in the pedology, geology or due to topographical variations.

5.5 *Service Pipe*

5.5.1 A strong dipolar response has been detected in the west of Area 24 and marks the location of a service pipe which may lad to a recorded well in the area.

5.6 *Ferrous / Magnetic Disturbance*

5.6.1 Area 25 is more magnetically ‘noisy’; this could be due to agricultural processes or be an effect of the current land use, i.e., horse pasture / paddocks. Ferrous responses close to boundaries are due to adjacent fences and gates. Smaller scale ferrous anomalies ("iron spikes") are present throughout the data and are characteristic of small pieces of ferrous debris (or brick / tile) in the topsoil; they are commonly assigned a modern origin. Only the most prominent of these are highlighted on the interpretation diagram.

6 DATA APPRAISAL & CONFIDENCE ASSESSMENT

6.1 Historic England guidelines (EH 2008) Table 4 states that the typical magnetic response on the local soils / geology is variable. The results from this survey indicate the presence of a former field boundary and uncertain linear anomalies; as a consequence, there is no *a priori* reason why archaeological features would not have been detected, if present.

7 CONCLUSION

7.1 The magnetometer survey has not detected any magnetic responses that could be interpreted as being of archaeological interest. Several discrete and linear trends have been assigned to the category of uncertain; these are likely to be due to natural or modern agricultural processes. A former field boundary is visible in the magnetic data in Area 10 while large amorphous and sinuous responses throughout the dataset are likely to be due to natural processes. The location of a service pipe has been marked in Area 24.

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Appendix A - Technical Information: Magnetometer Survey Method, Processing and Presentation

Standards & Guidance

This report and all fieldwork have been conducted in accordance with the latest guidance documents issued by Historic England (EH 2008) (then English Heritage), the Chartered Institute for Archaeologists (CIfA 2014) and the European Archaeological Council (EAC 2016).

Grid Positioning

For hand held gradiometers the location of the survey grids has been plotted together with the referencing information. Grids were set out using a Trimble R8 Real Time Kinematic (RTK) VRS Now GNSS GPS system.

An RTK GPS (Real-time Kinematic Global Positioning System) can locate a point on the ground to a far greater accuracy than a standard GPS unit. A standard GPS suffers from errors created by satellite orbit errors, clock errors and atmospheric interference, resulting in an accuracy of 5m-10m. An RTK system uses a single base station receiver and a number of mobile units. The base station re-broadcasts the phase of the carrier it measured, and the mobile units compare their own phase measurements with those they received from the base station. This results in an accuracy of around 0.01m.

Technique	Instrument	Traverse Interval	Sample Interval
Magnetometer	Bartington Grad 601-2	1m	0.25m

Instrumentation: Bartington *Grad* 601-2

Bartington instruments operate in a gradiometer configuration which comprises fluxgate sensors mounted vertically, set 1.0m apart. The fluxgate gradiometer suppresses any diurnal or regional effects. The instruments are carried, or cart mounted, with the bottom sensor approximately 0.1-0.3m from the ground surface. At each survey station, the difference in the magnetic field between the two fluxgates is measured in nanoTesla (nT). The sensitivity of the instrument can be adjusted; for most archaeological surveys the most sensitive range (0.1nT) is used. Generally, features up to 1m deep may be detected by this method, though strongly magnetic objects may be visible at greater depths. The Bartington instrument can collect two lines of data per traverse with gradiometer units mounted laterally with a separation of 1.0m. The readings are logged consecutively into the data logger which in turn is daily down-loaded into a portable computer whilst on site. At the end of each site survey, data is transferred to the office for processing and presentation.

Data Processing

Zero Mean Traverse	This process sets the background mean of each traverse within each grid to zero. The operation removes striping effects and edge discontinuities over the whole of the data set.
Step Correction (De-stagger)	When gradiometer data are collected in 'zig-zag' fashion, stepping errors can sometimes arise. These occur because of a slight difference in the speed of walking on the forward and reverse traverses. The result is a staggered effect in the data, which is particularly noticeable on linear anomalies. This process corrects these errors.

Display

Greyscale/ Colourscale Plot	This format divides a given range of readings into a set number of classes. Each class is represented by a specific shade of grey, the intensity increasing with value. All values above the given range are allocated the same shade (maximum intensity); similarly, all values below the given range are represented by the minimum intensity shade. Similar plots can be produced in colour, either using a wide range of colours or by selecting two or three colours to represent positive and negative values. The assigned range (plotting levels) can be adjusted to emphasise different anomalies in the data-set.

Presentation of results and interpretation

The presentation of the results includes a ‘minimally processed data’ and a ‘processed data’ greyscale plot. Magnetic anomalies are identified, interpreted and plotted onto the ‘Interpretation’ drawings.

When interpreting the results, several factors are taken into consideration, including the nature of archaeological features being investigated and the local conditions at the site (geology, pedology, topography etc.). Anomalies are categorised by their potential origin. Where responses can be related to other existing evidence, the anomalies will be given specific categories, such as: Abbey Wall or Roman Road. Where the interpretation is based largely on the geophysical data, levels of confidence are implied, for example: Probable, or Possible Archaeology. The former is used for a confident interpretation, based on anomaly definition and/or other corroborative data such as cropmarks. Poor anomaly definition, a lack of clear patterns to the responses and an absence of other supporting data reduces confidence, hence the classification Possible.

Interpretation Categories

In certain circumstances (usually when there is corroborative evidence from desk-based or excavation data) very specific interpretations can be assigned to magnetic anomalies (for example, *Roman Road, Wall,* etc.) and where appropriate, such interpretations will be applied. The list below outlines the generic categories commonly used in the interpretation of the results.

Archaeology / Probable Archaeology	This term is used when the form, nature and pattern of the responses are clearly or very probably archaeological and /or if corroborative evidence is available. These anomalies, whilst considered anthropogenic, could be of any age.
Possible Archaeology	These anomalies exhibit either weak signal strength and / or poor definition, or form incomplete archaeological patterns, thereby reducing the level of confidence in the interpretation. Although the archaeological interpretation is favoured, they may be the result of variable soil depth, plough damage or even aliasing as a result of data collection orientation.
Industrial / Burnt-Fired	Strong magnetic anomalies that, due to their shape and form or the context in which they are found, suggest the presence of kilns, ovens, corn dryers, metal-working areas or hearths. It should be noted that in many instances modern ferrous material can produce similar magnetic anomalies.
Former Field Boundary (probable & possible)	Anomalies that correspond to former boundaries indicated on historic mapping, or which are clearly a continuation of existing land divisions. Possible denotes less confidence where the anomaly may not be shown on historic mapping but nevertheless the anomaly displays all the characteristics of a field boundary.
Ridge & Furrow	Parallel linear anomalies whose broad spacing suggests ridge and furrow cultivation. In some cases, the response may be the result of more recent agricultural activity.
Agriculture (ploughing)	Parallel linear anomalies or trends with a narrower spacing, sometimes aligned with existing boundaries, indicating more recent cultivation regimes.
Land Drain	Weakly magnetic linear anomalies, quite often appearing in series forming parallel and herringbone patterns. Smaller drains may lead and empty into larger diameter pipes, which in turn usually lead to local streams and ponds. These are indicative of clay fired land drains.
Natural	These responses form clear patterns in geographical zones where natural variations are known to produce significant magnetic distortions.
Magnetic Disturbance	Broad zones of strong dipolar anomalies, commonly found in places where modern ferrous or fired materials (e.g. brick rubble) are present.
Service	Magnetically strong anomalies, usually forming linear features are indicative of ferrous pipes/cables. Sometimes other materials (e.g. pvc) or the fill of the trench can cause weaker magnetic responses which can be identified from their uniform linearity.
Ferrous	This type of response is associated with ferrous material and may result from small items in the topsoil, larger buried objects such as pipes, or above ground features such as fence lines or pylons. Ferrous responses are usually regarded as modern. Individual burnt stones, fired bricks or igneous rocks can produce responses similar to ferrous material.
Uncertain Origin	Anomalies which stand out from the background magnetic variation, yet whose form and lack of patterning gives little clue as to their origin. Often the characteristics and distribution of the responses straddle the categories of *Possible Archaeology* / *Natural* or (in the case of linear responses) *Possible Archaeology* / *Agriculture*; occasionally they are simply of an unusual form.

Where appropriate some anomalies will be further classified according to their form (positive or negative) and relative strength and coherence (trend: weak and poorly defined).

Appendix B - Technical Information: Magnetic Theory

Detailed magnetic survey can be used to effectively define areas of past human activity by mapping spatial variation and contrast in the magnetic properties of soil, subsoil and bedrock. Although the changes in the magnetic field resulting from differing features in the soil are usually weak, changes as small as 0.1 nanoTeslas (nT) in an overall field strength of 48,000 (nT), can be accurately detected.

Weakly magnetic iron minerals are always present within the soil and areas of enhancement relate to increases in *magnetic susceptibility* and permanently magnetised *thermoremanent* material.

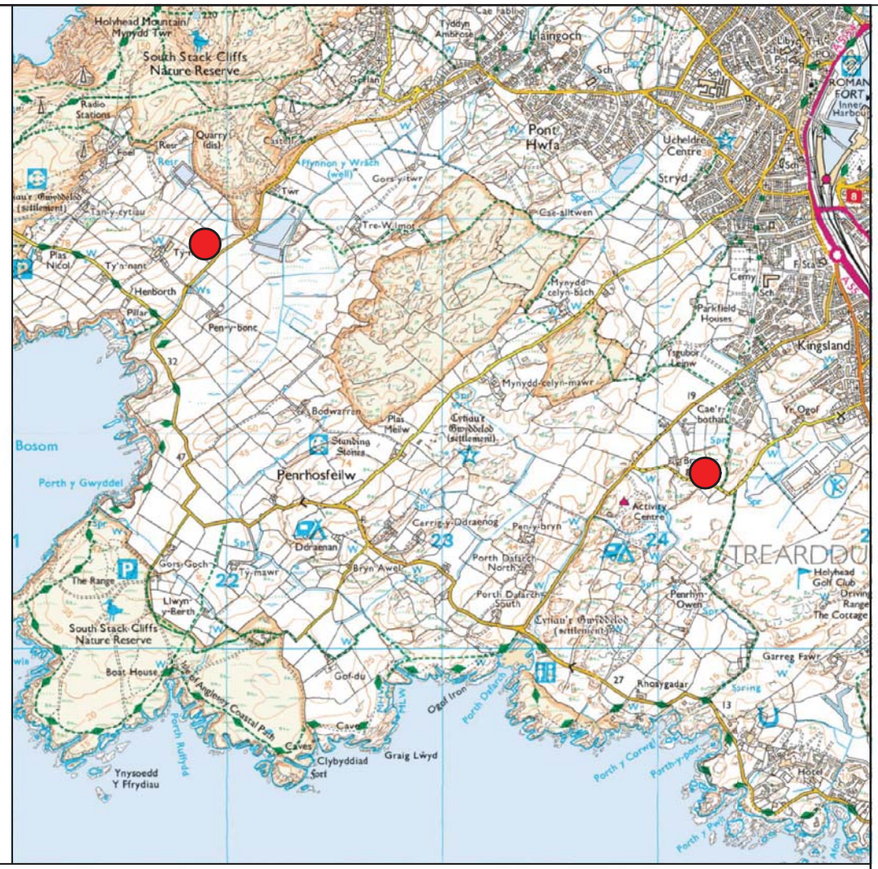
Magnetic susceptibility relates to the induced magnetism of a material when in the presence of a magnetic field. This magnetism can be considered as effectively permanent as it exists within the Earth's magnetic field. Magnetic susceptibility can become enhanced due to burning and complex biological or fermentation processes.

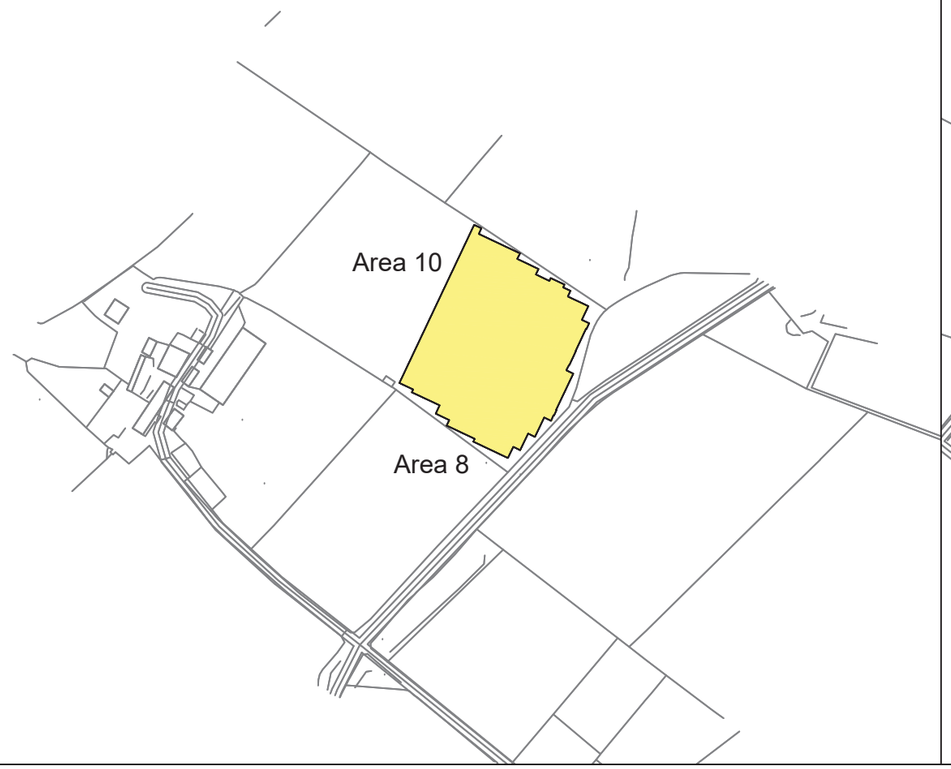
Thermoremanence is a permanent magnetism acquired by iron minerals that, after heating to a specific temperature known as the Curie Point, are effectively demagnetised followed by re-magnetisation by the Earth's magnetic field on cooling. Thermoremanent archaeological features can include hearths and kilns; material such as brick and tile may be magnetised through the same process.

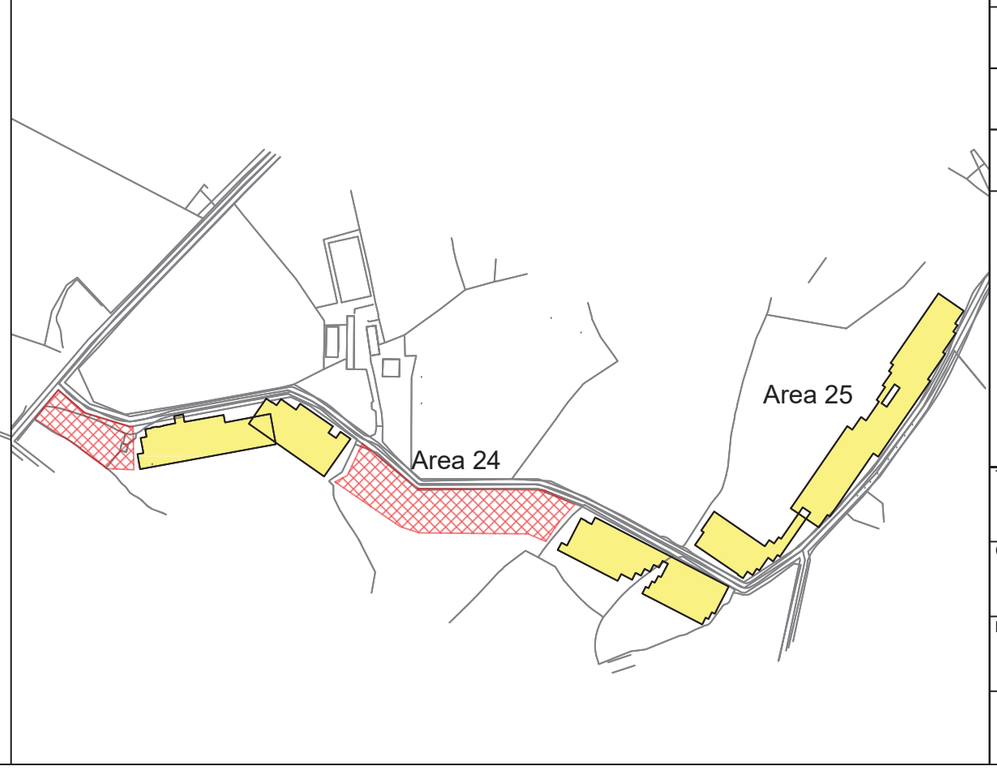
Silting and deliberate infilling of ditches and pits with magnetically enhanced soil creates a relative contrast against the much lower levels of magnetism within the subsoil into which the feature is cut. Systematic mapping of magnetic anomalies will produce linear and discrete areas of enhancement allowing assessment and characterisation of subsurface features. Material such as subsoil and non-magnetic bedrock used to create former earthworks and walls may be mapped as areas of lower enhancement compared to surrounding soils.

Magnetic survey is carried out using a fluxgate gradiometer which is a passive instrument consisting of two sensors mounted vertically 1m apart. The instrument is carried about 30cm above the ground surface and the top sensor measures the Earth's magnetic field whilst the lower sensor measures the same field but is also more affected by any localised buried feature. The difference between the two sensors will relate to the strength of a magnetic field created by this feature, if no field is present the difference will be close to zero as the magnetic field measured by both sensors will be the same.

Factors affecting the magnetic survey may include soil type, local geology, previous human activity and disturbance from modern services.







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	Site Location
	Unsurveyable
	Magnetometer Survey

sumo Survey
GEOPHYSICS FOR ARCHAEOLOGY & ENGINEERING

Title: Site Location

Client: Gwynedd Archaeological Trust

Project: 17248 Morlais, Anglesey, Geophysical Survey

not to scale

Fig No: 01

Area 10

Area 8

2
nT
-1

Area 10

Area 8

5
nT
-3

N

sumo Survey
GEOPHYSICS FOR ARCHAEOLOGY & ENGINEERING

Title:
Magnetometer Survey [Areas 8 & 10]
Greyscale Plots

Client:
Gwynedd Archaeological Trust

Project:
17248 Morlais, Anglesey, Geophysical Survey

Scale:
0 metres 60
1:1200 @ A3

Fig No:
02

Area 10

Area 8

N

KEY

	Uncertain (Discrete / Trend)
	Former Field Boundary (Corroborated)
	Natural (Discrete / Zone)
	Service Pipe
	Ferrous

sumo Survey
GEOPHYSICS FOR ARCHAEOLOGY & ENGINEERING

Title:
Magnetometer Survey [Areas 8 & 10]
Interpretation

Client:
Gwynedd Archaeological Trust

Project:
17248 Morlais, Anglesey, Geophysical Survey

Scale:
0 metres 50
1:1000 @ A3

Fig No:
03

N

sumo Survey
GEOPHYSICS FOR ARCHAEOLOGY & ENGINEERING

Title:
Magnetometer Survey [Areas 24 & 25]
Greyscale Plots

Client:
Gwynedd Archaeological Trust

Project:
17248 Morlais, Anglesey, Geophysical Survey

Scale:
0 metres 100
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Fig No:
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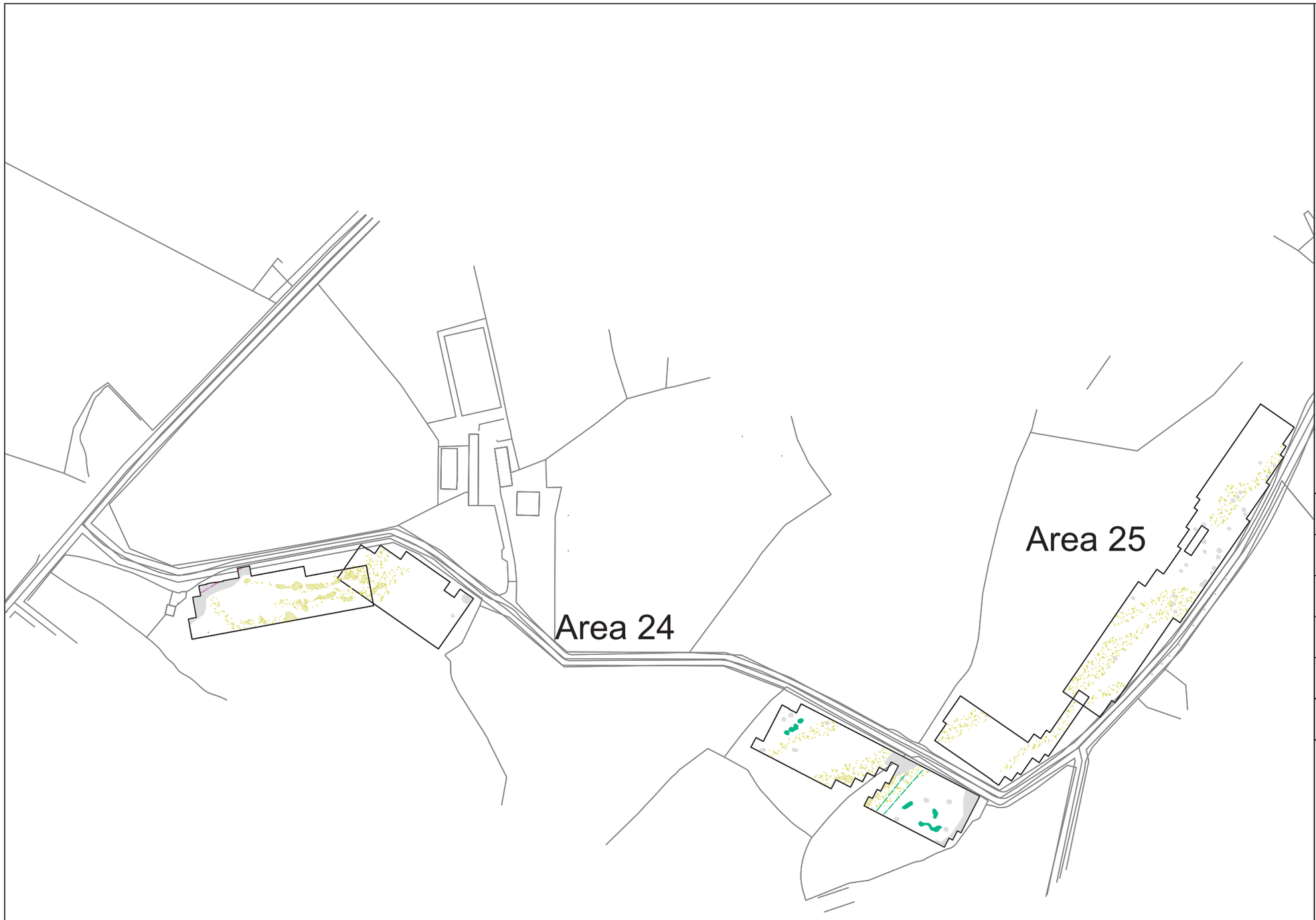


N

KEY

	Uncertain (Discrete / Trend)
	Former Field Boundary (Corroborated)
	Natural (Discrete / Zone)
	Service Pipe
	Ferrous

sumo Survey
GEOPHYSICS FOR ARCHAEOLOGY & ENGINEERING

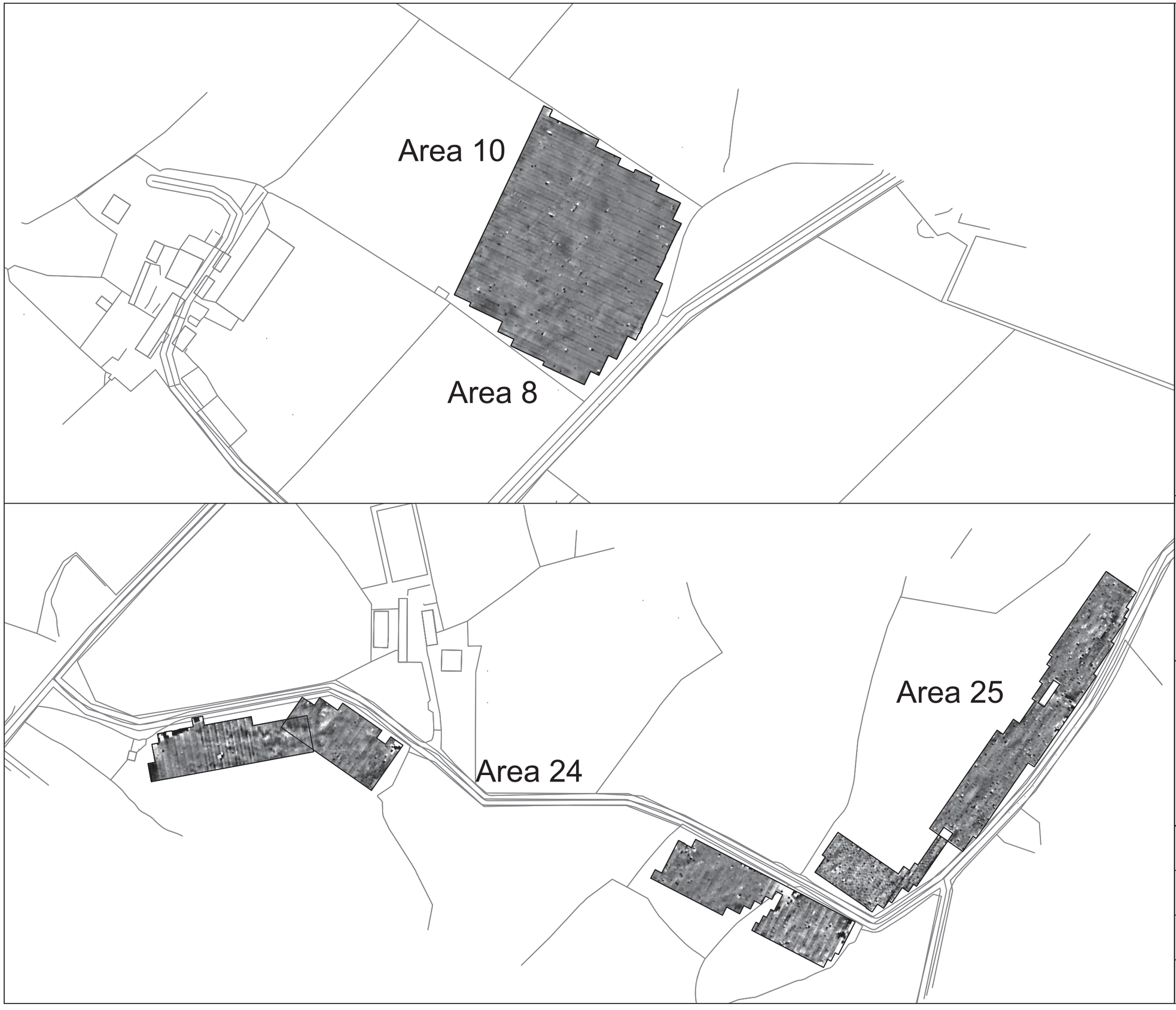
Title:
Magnetometer Survey [Areas 24 & 25]
Interpretation

Client:
Gwynedd Archaeological Trust

Project:
17248 Morlais, Anglesey, Geophysical Survey

Scale:
0 metres 100
1:2000 @ A3

Fig No:
05



N

2
nT
-1

sumo Survey
GEOPHYSICS FOR ARCHAEOLOGY & ENGINEERING

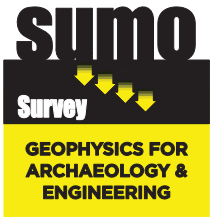
Title:
Magnetometer Survey [Areas 24 & 25]
Preliminary Greyscale Plots

Client:
Gwynedd Archaeological Trust

Project:
17248 Morlais, Anglesey, Geophysical Survey

Scale:
0 metres 100
1:2000 @ A3

Fig No:
06



- Archaeological
- Geophysical
- Laser Scanning
- Measured Building
- Topographic
- Utility Mapping

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Company Registration No.4275993.
Registered Office Unit 8 Hayward Business Centre, New Lane, Havant, Hampshire, PO9 2NL

APPENDIX II

Gwynedd Archaeological Trust Approved Written Scheme of Investigation

MORLAIS, CAERGYBI (G2643)

WRITTEN SCHEME OF INVESTIGATION FOR GEOPHYSICAL SURVEY

Prepared for Menter Môn

February 2020

Ymddiriedolaeth Archaeolegol Gwynedd
Gwynedd Archaeological Trust

All GAT staff should sign their copy to confirm the project specification is read and understood and retain a copy of the specification for the duration of their involvement with the project. On completion, the specification should be retained with the project archive:

Name Signature Date

MORLAIS, CAERGYBI (G2643)

WRITTEN SCHEME OF INVESTIGATION FOR GEOPHYSICAL SURVEY

Prepared for *Menter Môn*, February 2020

CONTENTS

1 INTRODUCTION

Gwynedd Archaeological Trust (GAT) has been asked by Menter Môn to prepare a written scheme of investigation for a geophysical survey in support of a consent application for the Morlais Project, a proposed offshore tidal energy development of 240MW of generating capacity within the Morlais Demonstration Zone off the west coast of Ynys Môn (Figures 01 to 08). The offshore array area will be connected to shore by offshore export cables which will make landfall on the west coast of Holy Island. The onshore infrastructure will include an onshore cable and substation with associated infrastructure between the proposed landfall location and National Grid connection. The locations of the final landfall options, onshore infrastructure and onshore cable are defined on Menter Môn Drawings Nos. MOR/WLP/SHEET1/v2 to MOR/WLP/SHEET8/v2 (cf. Figures 01 to 08). Archaeological surveys are required by Menter Môn within the delineated areas and selected additional areas prior to final project design. Currently, this will be a geophysical survey of all accessible land located between Abraham's Bosom, South Stack (NGR SH21488082; postcode: LL65 2LS) and to the Orthios site (previously Anglesey Aluminium) at Penrhos (NGR SH27018068; postcode: LL65 2UX). Based on the results of the geophysical survey, further archaeological works may be recommended, which could include targeted trial trenching. Any such works will be defined in future written schemes of investigation further to client and stakeholder agreement.

The geophysical survey will be undertaken from February 2020 and will conform to the following guidelines:

- *Guidance for the Submission of Data to the Welsh Historic Environment Records (HERs)* Version 1.1 (The Welsh Archaeological Trusts, 2018);
- *Guidelines for digital archives* (Royal Commission on Ancient and Historic Monuments of Wales, 2015);
- *Management of Archaeological Projects* (English Heritage, 1991);
- *Management of Research Projects in the Historic Environment: The MoRPHE Project Managers' Guide* (Historic England, 2015); and
- *Standard and Guidance for Archaeological Geophysical Survey* (Chartered Institute for Archaeologists, 2014).

GAT is certified to ISO 9001:2015 and ISO 14001:2015 (Cert. No. 74180/B/0001/UK/En) and is a Registered Organisation with the Chartered Institute for Archaeologists and a member of the Federation of Archaeological Managers and Employers (FAME).

1.1 Monitoring Arrangements

The archaeological mitigation will be monitored by the Gwynedd archaeological Planning Service (GAPS). The content of this WSI and all subsequent reporting by GAT must be approved by GAPS prior to final issue.

1.2 Historic Environment Record

In line with the Gwynedd Historic Environment Record (HER) requirements, the HER will be contacted at the onset of the project to ensure that any data arising is formatted in a manner suitable for accession to the HER and follows the guidance set out in *Guidance for the Submission of Data to the Welsh Historic Environment Records (HERs)* (The Welsh Archaeological Trusts, 2018). The HER will be informed of the project start date, location including grid reference, estimated timescale for the work, and further relevant information associated with the project.

The GAT HER Enquiry Number for this project is GATHER1222 and the Event PRN is 45789. If relevant, the HER will also be responsible for supplying Primary Reference Numbers (PRN) for any new assets identified and recorded.

2 BACKGROUND

The locations of the final landfall options, onshore infrastructure and onshore cable are within areas of known and potential archaeological activity.

Wessex Archaeology was commissioned by Royal Haskoning on behalf of Menter Môn Cyf, to prepare a terrestrial archaeology desk-based assessment of the onshore elements of the Morlais project (Wessex Archaeology Report 213020.01, 2019; IN DRAFT). The aim of report was to "assess the known and potential heritage resource within the development area and the surrounding area, and to assess the likely impacts of the development proposals on this resource" (*Ibid.* 11). The report formed the baseline assessment for an Environmental Impact Assessment Cultural Heritage chapter prepared by Royal Haskoning (Morlais Document No.: MOR/RHDHV/APP/0042 and MOR/RHDHV/APP/0043). The assessment report established that "there is potential for archaeological remains to be present within much of the development area, in particular relating to prehistoric and post-medieval periods. The proposed development area runs through a landscape with high potential for remains from the prehistoric period. Designated and non-designated monuments and finds show a well utilised landscape during the prehistoric periods, with many examples of settlement and associated artefacts and agricultural remains" (*ibid.*).

3 METHODOLOGY

3.1 Introduction

The locations of the final landfall options, onshore infrastructure and onshore cable are contained within a delineated area, as highlighted on Menter Môn Drawings Nos. MOR/WLP/SHEET1/v2 to MOR/WLP/SHEET8/v2 (cf. Figures 01 to 08). The routes are subdivided into 51 land parcels of varied size and composition, including foreshore, agricultural land and the local road network. Based on this information GAPS require 9 land parcels to be targeted for geophysical survey, as summarised in para. 3.1.1 and Figures 01 to 08 (all targeted land parcels highlighted in green). Specific land parcels will require scrub clearance before survey and all land parcels selected for survey will need to be free of any livestock. Where practical, service plans will also be consulted prior to survey, to assist with subsequent interpretation.

3.1.1 Proposed magnetometer survey areas

Area ID	Survey planned	NGR	Map sheet	Area (ha)	Notes
1	NO	SH2145481465	1		Beach area between MLW and MHW – not suitable for survey; **geophysical survey not required by GAPS.**
2	**YES**	SH2137081608	1	0.26839	Area outside of limit of deviation but included as required as equipment laydown area
3	**YES**	SH2144381609	1	1.10564	Within GAT project area G2163.04
3a	NO	SH2141381550	1		Cliffs – not suitable for survey
4	NO	SH2150481612	1	0.07975	Area outside of limit of deviation - spoil storage area; **geophysical survey not required by GAPS.**
5	NO	SH2150681674	1		Tarmac road - not suitable for survey; **geophysical survey not required by GAPS.**
6	NO	SH2154681668	1	0.07975	Area outside of limit of deviation - equipment laydown area; **geophysical survey not required by GAPS.**
7	**YES**	SH2170081680	1	1.00745	Area outside of limit of deviation but included as required as spoil storage area
8	**YES**	SH2171281755	1	3.35593	Within GAT project area G2163.04
9	NO	SH2170881779	1	0.0466094	Area outside of limit of deviation, incorporates farmtrack that is to be improved; **geophysical survey not required by GAPS.**
10	**YES**	SH2190981893	1	1.02034	Within GAT project area G2163.04

Area ID	Survey planned	NGR	Map sheet	Area (ha)	Notes
11	NO	SH2195581837 to SH2446680877	1 - 6		Tarmac road - not suitable for survey
12	NO	SH2167581496	1	0.0584342	Within GAT project area G2163.04; **geophysical survey not required by GAPS.**
13	NO	SH2167681351	1	0.0510112	Within GAT project area G2163.04; **geophysical survey not required by GAPS.**
14	NO	SH2182680852	2	0.0885641	Within GAT project area G2163.04; **geophysical survey not required by GAPS.**
15	NO	SH2182680689	2, 3	0.0660621	Within GAT project area G2163.04; **geophysical survey not required by GAPS.**
16	NO	SH2200180606	3	0.0707317	Within GAT project area G2163.04; **geophysical survey not required by GAPS.**
17	NO	SH2204280606	3	0.0492323	Area outside of limit of deviation - equipment laydown area; **geophysical survey not required by GAPS.**
18	NO	SH2241180686	3	0.0621171	Within GAT project area G2163.04; **geophysical survey not required by GAPS.**
19	NO	SH2262180523	3	0.0527526	Within GAT project area G2163.04; **geophysical survey not required by GAPS.**
20	NO	SH2305880282	4	0.07598	Within GAT project area G2163.04; **geophysical survey not required by GAPS.**
21	NO	SH2359780434	4	0.0592232	Within GAT project area G2163.04; **geophysical survey not required by GAPS.**
22	**YES**	SH2398880847	5	0.587673	Within GAT project area G2163.04
23	**YES**	SH2424480782	5	0.642343	Within GAT project area G2163.04. Parts of the west and centre of area may require scrub clearance prior to survey for full coverage
24	**YES**	SH2409280767	5	1.36631	Within GAT project area G2163.04 Central part of area may require scrub clearance prior to survey for full coverage
25	**YES**	SH2440280804	5	0.600109	Within GAT project area G2163.04
26	NO	SH2438680745	5	0.0602724	Area outside of limit of deviation - equipment laydown area; **geophysical survey not required by GAPS.**
27	NO	SH2450880844	5	0.230551	Within GAT project area G2163.04; **geophysical survey not required by GAPS.**
28	NO	SH2453980798	5	0.0105088	Within GAT project area G2163.04; **geophysical survey not required by GAPS.**

Area ID	Survey planned	NGR	Map sheet	Area (ha)	Notes
29 (part)	NO	SH2471280749	6	0.279686	This portion of area covered by tarmac road - not suitable for survey; **geophysical survey not required by GAPS.**
29 (part)	NO	SH2458680745	6	0.308158	Within GAT project area G2163.01-0. This is the portion of area to the west of the sports ground; **geophysical survey not required by GAPS.**
29 (part)	NO	SH2471380738	6	0.159164	Within GAT project area G2163.01-0. This is the portion of the area to the south of the tarmac road; **geophysical survey not required by GAPS.**
30 (part)	NO	SH2483280865	6	0.460378	This is the portion of the area covered by a tarmac road and carpark - not suitable for survey; **geophysical survey not required by GAPS.**
30 (part)	NO	SH2478080828	6	0.0955062	Within GAT project area G2163.01. This is the portion of the area to the north of the tarmac road; **geophysical survey not required by GAPS.**
30 (part)	NO	SH2479180797	6	0.0302693	Within GAT project area G2163.01.This is the portion of the area to the south of the tarmac road; **geophysical survey not required by GAPS.**
31	NO	SH2487280936	6	0.0567723	Within GAT project areas G2163.04 and G1812; **geophysical survey not required by GAPS.**
32	NO	SH2495280985	6	0.0446665	2.5m wide grass verge along roadside and bounded by a metal chain link fence – not suitable for survey; **geophysical survey not required by GAPS.**
33	NO	SH2495780983	6		Tarmac road – not suitable for survey; **geophysical survey not required by GAPS.**
34	NO	SH2501781025	6	0.0245729	Tarmac road, footpath and grass verge alongside modern roundabout – not suitable for survey; **geophysical survey not required by GAPS.**
35	NO	SH2509481067	6		Within Parc Cybi Business Park. Area already surveyed and entire area subject to archaeological strip map and sample excavation prior to the construction of the park. GAT project area G1701; **geophysical survey not required by GAPS.**
36	NO	SH2503981005	6	0.0101881	Tarmac road, footpath and grass verge alongside modern roundabout – not suitable for survey; **geophysical survey not required by GAPS.**

Area ID	Survey planned	NGR	Map sheet	Area (ha)	Notes
37	NO	SH2513281066	6		Within Parc Cybi Business Park. Area already surveyed and entire area subject to archaeological strip map and sample excavation prior to the construction of the park. GAT project area G1701; **geophysical survey not required by GAPS.**
38 (part)	NO	SH2569680875	6, 7		Within Parc Cybi Business Park. Area already surveyed and entire area subject to archaeological strip map and sample excavation prior to the construction of the park. GAT project area G1701; **geophysical survey not required by GAPS.**
38 (part)	NO	SH 25759 80864	7	0.304422	This is the portion of the area at its extreme western end, just to the north of the limit of the G1701 GAT project area; **geophysical survey not required by GAPS.**
38A	NO	SH2567280873	7	0.125539	Within Parc Cybi Business Park. Area already surveyed and entire area subject to archaeological strip map and sample excavation prior to the construction of the park. GAT project area G1701; **geophysical survey not required by GAPS.**
39	NO	SH2588980774	7	0.342804	**Geophysical survey not required by GAPS.**
40 (part)	NO	SH2607480687	7	0.616744	Western end of area. Already surveyed by Wessex Archaeology, Projects 106200 and 10621; **geophysical survey not required by GAPS.**
40 (part)	NO	SH2640580588	7, 8	0.988407	Eastern end of area. Will require scrub / tree clearance to enable survey; **geophysical survey not required by GAPS.**
41	NO				G**eophysical survey not required by GAPS.**
42 (part)	NO	SH2662680531	8	0.029772	Eastern end of area. Already surveyed by Wessex Archaeology, Projects 106200 and 10621; **geophysical survey not required by GAPS.**
42 (part)	NO	SH2662080531	8	0.0307543	Western end of area; **geophysical survey not required by GAPS.**
43	NO	SH2692980472	8	1.52849	Already surveyed by Wessex Archaeology, Projects 106200 and 10621; **geophysical survey not required by GAPS.**
44	NO				**Geophysical survey not required by GAPS.**
45	NO	SH2694880515	8		A55 tarmac road – not suitable for survey; **geophysical survey not required by GAPS.**

Area ID	Survey planned	NGR	Map sheet	Area (ha)	Notes
46	NO	SH2695580551	8		Railway line and sidings - not suitable for survey; **geophysical survey not required by GAPS.**
47	NO	SH2695780569	8		Railway line and sidings - not suitable for survey; **geophysical survey not required by GAPS.**
48	NO	SH2698180574	8		Tarmac road – not suitable for survey; **geophysical survey not required by GAPS.**
49 (part)	NO	SH2699080663	8	0.984858	Parts of area 49 including tarmac road. electricity substation and industrial yards - not suitable for survey; **geophysical survey not required by GAPS.**
49 (part)	NO	SH2702380695	8	0.169551	Grassed area to the north; **geophysical survey not required by GAPS.**
49 (part)	NO	SH2694580620	8	0.835828	Grassed area at centre; **geophysical survey not required by GAPS.**
50	NO	SH2699180713	8	0.0450959	**Geophysical survey not required by GAPS.**
51	NO	SH2714880540	8		Area outside of limit of deviation – survey not required. Tarmac road - not suitable for survey; **geophysical survey not required by GAPS.**

3.2 Geophysical Survey

3.2.1 Summary

The geophysical survey will be undertaken by GAT staff and will incorporate the specified land parcels listed in para. 3.1.1 and located on Figures 01 to 08. The survey will be carried out in a series of 20m grids, which will be tied into the Ordnance Survey grid using a Trimble R8 high precision GPS system. The survey will be conducted using a Bartington Grad 601-2 dual fluxgate gradiometer with a 1.0m traverse interval and a 0.25m sample interval.

3.2.2 Instrumentation

The Bartington Grad 601-2 dual fluxgate gradiometer uses a pair of Grad-01-100 sensors. These are high stability fluxgate gradient sensors with a 1.0m separation between the sensing elements, giving a strong response to deeper anomalies. The instrument detects variations in the earth's magnetic field caused by the presence of iron in the soil. This is usually in the form of weakly magnetized iron oxides which tend to be concentrated in the topsoil. Features cut into the subsoil and backfilled or silted with topsoil, therefore contain greater amounts of iron and can therefore be detected with the gradiometer. This is a simplified description as there are other processes and materials which can produce detectable anomalies. The most obvious is the presence of pieces of iron in the soil or immediate environs which usually produce very high readings and can mask the relatively weak readings produced by variations in the soil. Strong readings are also produced by archaeological features such as hearths or kilns as fired clay acquires a permanent thermo-remnant magnetic field upon cooling. This material can also get spread into the soil leading to a more generalized magnetic enhancement around settlement sites. Not all surveys can produce good results as results can be masked by large magnetic variations in the bedrock or soil or high levels of natural background "noise" (interference consisting of random signals produced by material with in the soil). In some cases, there may be little variation between the topsoil and subsoil resulting in undetectable features. The Bartington Grad 601 is a hand held instrument and readings can be taken automatically as the operator walks at a constant speed along a series of fixed length traverses. The sensor consists of two vertically aligned fluxgates set 500mm apart. Their cores are driven in and out of magnetic saturation by a 1,000Hz alternating current passing through two opposing driver coils. As the cores come out of saturation, the external magnetic field can enter them producing an electrical pulse proportional to the field strength in a sensor coil. The high frequency of the detection cycle produces what is in effect a continuous output. The gradiometer can detect anomalies down

to a depth of approximately one meter. The magnetic variations are measured in nanoTeslas (nT). The earth's magnetic field strength is about 48,000 nT; typical archaeological features produce readings of below 15nT although burnt features and iron objects can result in changes of several hundred nT. The machine is capable of detecting changes as low as 0.1nT.

3.2.3 Data Collection

The gradiometer includes an on-board data-logger. Readings are taken along parallel traverses of one axis of a 20m x 20m grid. The traverse interval is 1.0m and readings are logged at intervals of 0.25m along each traverse. Marked guide ropes are used to ensure high positional accuracy during the high resolution survey. The data is transferred from the data-logger to a computer where it is compiled and processed using ArchaeoSurveyor2 software. The data is presented as a grey scale plot where data values are represented by modulation of the intensity of a grey scale within a rectangular area corresponding to the data collection point within the grid. This produces a plan view of the survey and allows subtle changes in the data to be displayed. This is supplemented by an interpretation diagram showing the main feature of the survey with reference numbers linking the anomalies to descriptions in the written report. It should be noted that the interpretation is based on the examination of the shape, scale and intensity of the anomaly and comparison to features found in previous surveys and excavations etc. In some cases the shape of an anomaly is sufficient to allow a definite interpretation e.g. a Roman fort. In other cases all that can be provided is the most likely interpretation. The survey will often detect several overlying phases of archaeological remains and it is not usually possible to distinguish between them. Weak and poorly defined anomalies are most 4 susceptible to misinterpretation due to the propensity of the human brain to define shapes and patterns in random background "noise". An assessment of the confidence of the interpretation is given in the text.

3.2.4 Data Processing

The data is presented with a minimum of processing although corrections are made to compensate for instrument drift and other data collection inconsistencies. High readings caused by stray pieces of iron, fences, etc. are usually modified on the grey scale plot as they have a tendency to compress the rest of the data. The data is however carefully examined before this procedure is carried out as kilns and other burnt features can produce similar readings. The data on some 'noisy' or very complex sites can benefit from 'smoothing'. Grey-scale plots are always somewhat pixellated due to the resolution of the

survey. This at times makes it difficult to see less obvious anomalies. The readings in the plots can therefore be interpolated thus producing more but smaller pixels and a small amount of smoothing based on a low pass filter can be applied. This reduces the perceived effects of background noise thus making anomalies easier to see. Any further processing is noted in relation to the individual plot.

3.2.5 Aims

The report will include a discussion of the grey scale plot and an interpretation of the any anomalies identified; these anomalies will be presented as either positive or negative, suggesting whether they could be cut features (ditches, pits etc.), or built sub-surface features (e.g., banks). Figures will be included for the grey scale plot and for the anomaly interpretation. The results of the geophysical survey will be used to inform further recommendations for archaeological evaluation and/or mitigation (if relevant)

3.3 Report compilation

Following completion of the stages outlined above, a report will be produced incorporating the following:

1. Front cover;
2. Inner cover;
3. Figures and Plates List;
4. Non-technical summary (Welsh/English);
5. Introduction;
6. Methodology;
    i. Geophysical survey;
7. Results;
8. Conclusions and recommendations;
    a. Conclusion and recommendations;
9. Acknowledgements;
10. Bibliography;
    a. Primary sources;
    b. Secondary sources;
11. Figures; inc.:
    - location plan;
    - grey scale plot;
    - anomaly identification and interpretation;
12. Appendix I (approved written scheme of investigation);
13. Appendix II (Sites listed on GAT Historic Environment Record);
14. Appendix III (Definition of mitigation terms);
15. Back cover.

Illustrations will include plans of the location of the study area; historical maps, when appropriate and if copyright permissions allow, will be included.

A full archive including plans, photographs, written material and any other material resulting from the project will be prepared. The archaeological evaluation outlined in this written scheme of investigation will be submitted in draft format in April 2020; a final report will be submitted to the Historic Environment within six months of submitting the draft report.

The following dissemination will apply:

- A digital report(s) will be provided to the client/consultant and GAPS (draft report then final report);
- A paper report plus a digital report will be provided to the regional Historic Environment Record, Gwynedd Archaeological Trust; this will be submitted within six months of project completion (final report only), along with any relevant, digital

information such as the project database and photographs. All digital datasets submitted will conform to the required standards set out in *Guidance for the Submission of Data to the Welsh Historic Environment Records (HERs)* (Version 1.1); and

- A digital report and archive (including photographic and drawn) data will be provided to Royal Commission on Ancient and Historic Monuments, Wales (final report only), in accordance with the *RCAHMW Guidelines for Digital Archives Version 1*. Digital information will include the photographic archive and associated metadata.

4 PERSONNEL

The project will be managed by John Roberts, Principal Archaeologist GAT Contracts Section. The evaluation will be completed by a team of Project Archaeologists who will have responsibility for completing and compiling the survey data, interpreting the results, preparing the subsequent report and archive. The project manager will be responsible for reviewing and approving the report prior to submission.

5 INSURANCE

5.1 Public/Products Liability

Limit of Indemnity- £5,000,000 any one event in respect of Public Liability
INSURER Aviva Insurance Limited
POLICY TYPE Public Liability
POLICY NUMBER 24765101CHC/UN/000375
EXPIRY DATE 21/06/2020

5.2 Employers Liability

Limit of Indemnity- £10,000,000 any one occurrence.
The cover has been issued on the insurers standard policy form and is subject to their usual terms and conditions. A copy of the policy wording is available on request.
INSURER Aviva Insurance Limited
POLICY TYPE Employers Liability
POLICY NUMBER 24765101 CHC / UN/000375
EXPIRY DATE 21/06/2020

5.3 Professional Indemnity

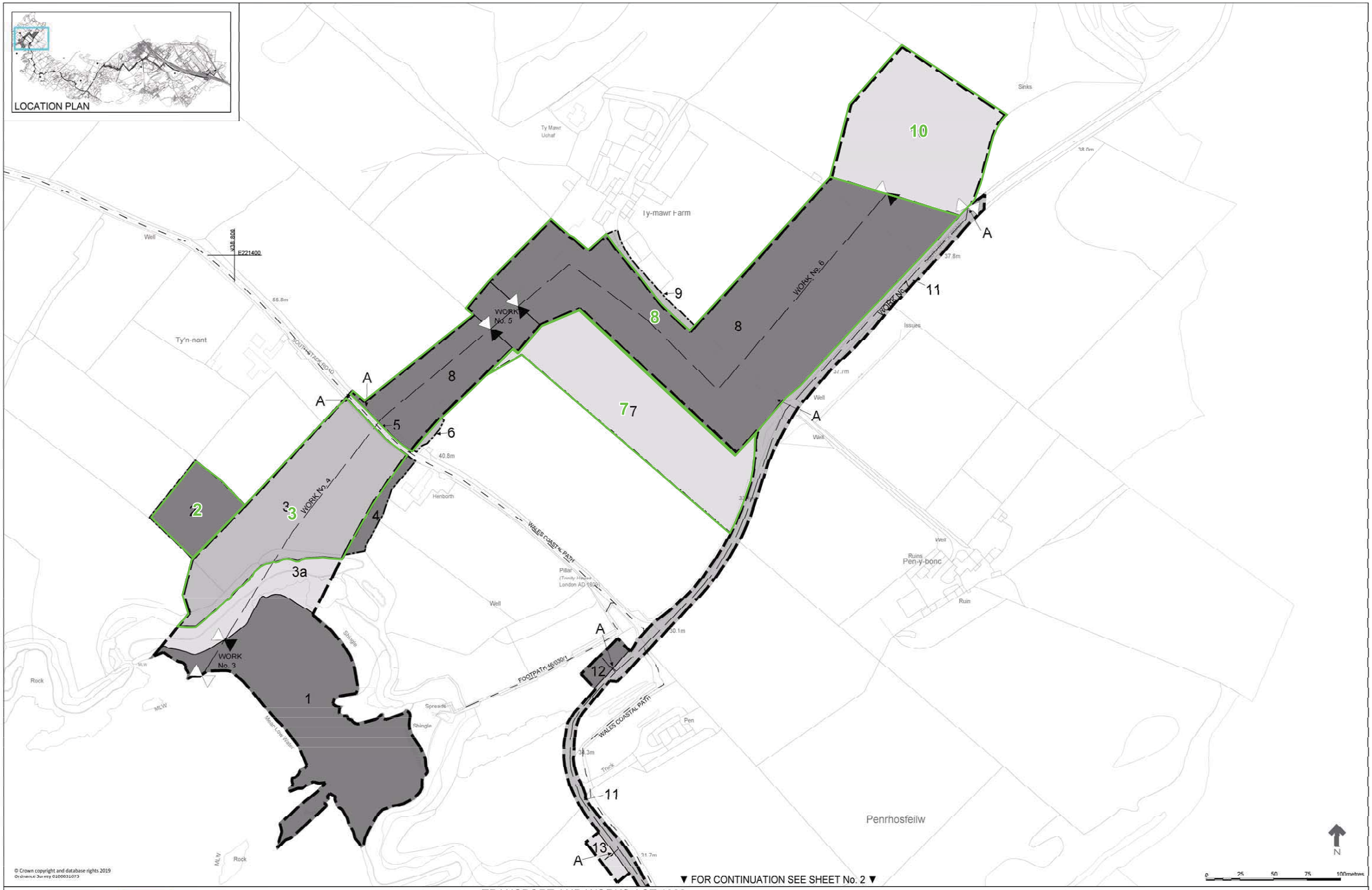
Limit of Indemnity- £5,000,000 in respect of each and every claim
INSURER Hiscox Insurance Company Limited
POLICY TYPE Professional Indemnity
POLICY NUMBER 9446015
EXPIRY DATE 22/07/2020

6 SOURCES CONSULTED

1. English Heritage, 1991, Management of Archaeological Projects
2. English Heritage, 2015, Management of Research Projects in the Historic Environment (MoRPHE).
3. *Guidance for the Submission of Data to the Welsh Historic Environment Records (HERs)* (Version 1.1)
4. Royal Commission on Ancient and Historic Monuments of Wales 2015 *Guidelines for digital archives*
5. Standard and Guidance for Archaeological Geophysical Survey (Chartered Institute for Archaeologists, 2014).
6. Royal Haskoning 2019. Morlais Project Environmental Statement Chapter 20: Onshore Archaeology and Cultural Heritage Volume I. Morlais Document No.: MOR/RHDHV/DOC/0041
7. Royal Haskoning 2019. Morlais Project Environmental Statement Chapter 20: Onshore Archaeology and Cultural Heritage Volume II. Morlais Document No.: MOR/RHDHV/DRW/0094
8. Royal Haskoning 2019. Morlais Project Environmental Statement Chapter 20: Onshore Archaeology and Cultural Heritage Volume III. Morlais Document No.: MOR/RHDHV/APP/0042 and MOR/RHDHV/APP/0043
9. Wessex Archaeology 2019 Morlais Project - PB5034 Desk-Based Assessment – Terrestrial Archaeology and Walkover Survey. Wessex Archaeology Document reference 213020.01. IN DRAFT

FIGURE 01

Reproduction of Menter Môn Drawings Nos. MOR/WLP/SHEET1/v2. All targeted land parcels area highlighted in green.



TRANSPORT AND WORKS ACT 1992
MORLAIS DEMONSTRATION ZONE ORDER
WORKS AND LAND PLAN
ISLE OF ANGLESEY/YNYS MÔN

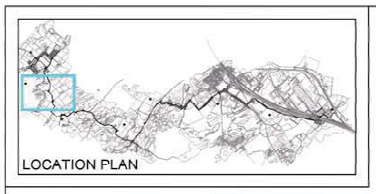
The area enclosed by any limit of deviation or by any limit of land to be acquired or used is the area extending to the outer edge of the line marking those limits

Key
Limits of Deviation
Limits of Land to be Acquired or Used
Public Rights of Way
Commencement of Work
Commencement & Termination of Work
Termination of Work

Drawing: MOR/WLP/SHEET1/v2
Scale: 1:1250 @ A1, (1:2500 @ A3)
Date: 29.08.2019

FIGURE 02

Reproduction of Menter Môn Drawings Nos. MOR/WLP/SHEET2/v2. All targeted land parcels area highlighted in green.



N381200
E221300

▲ FOR CONTINUATION SEE SHEET No. 1 ▲

WALES COASTAL PATH

WORK No. 1

11

14

A

15

39.5m

40.2m

42.3m

Collects

Pond

Rock

Boulders

Mean High Water

Mean Low Water

MLW

MHW

Rocks

Shingle

MH and MLW

MH & MLW

▼ FOR CONTINUATION SEE SHEET No. 3 ▼

N

0 25 50 75 100metres

The area enclosed by any limit of deviation or by any limit of land to be acquired or used is the area extending to the outer edge of the line marking those limits

TRANSPORT AND WORKS ACT 1992
MORLAIS DEMONSTRATION ZONE ORDER
WORKS AND LAND PLAN
ISLE OF ANGLESEY/YNYS MÔN

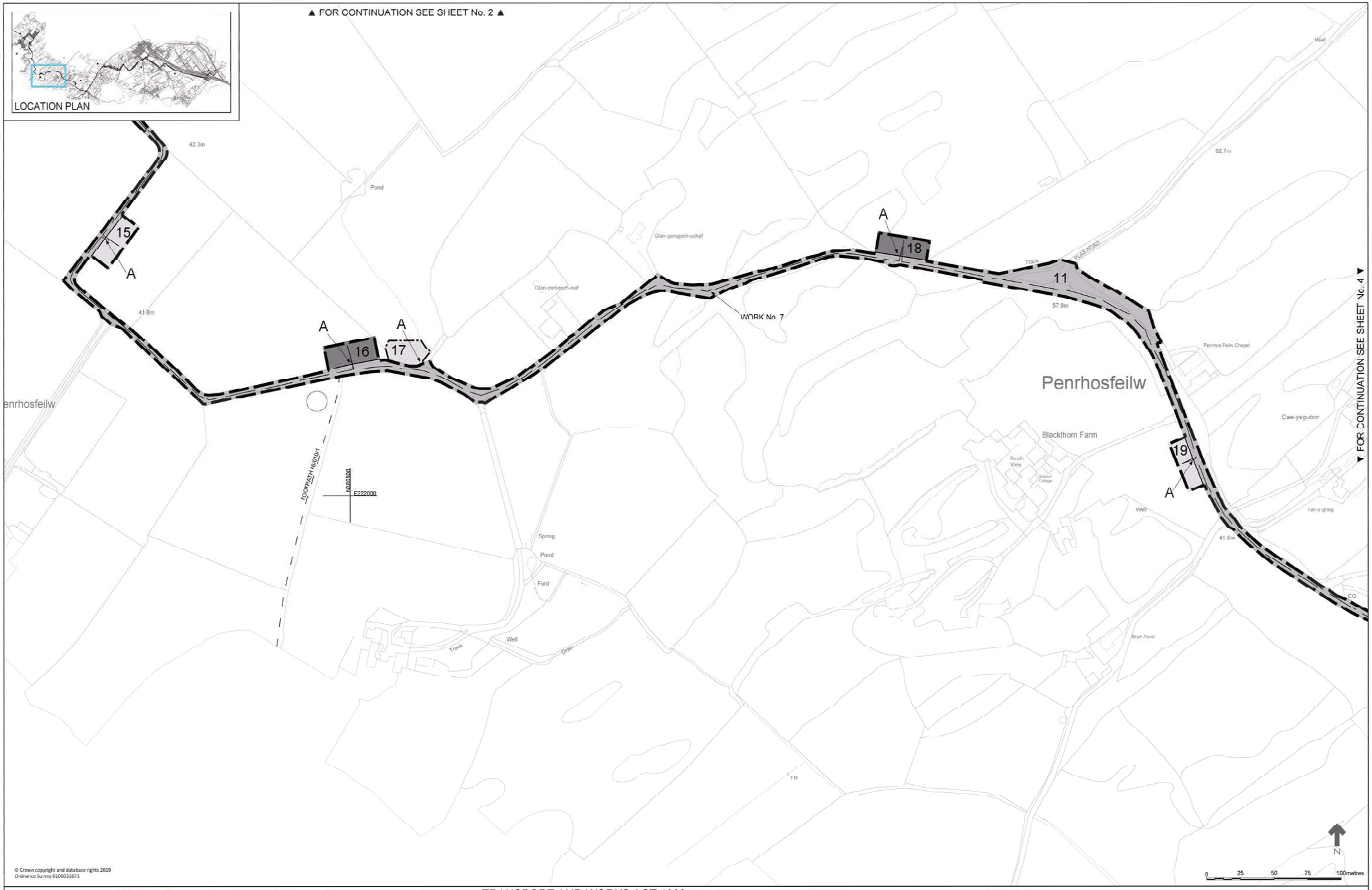
Key

Centre Line of Work
Limits of Deviation
Limits of Land to be Acquired or Used
Access point
Commencement of Work
Commencement & Termination of Work

Drawing: MOR/WLP/SHEET 1&2
Scale: 1:1250 @ A1, (1:2500 @ A3)
Date: 25.06.2010

FIGURE 03

Reproduction of Menter Môn Drawings Nos. MOR/WLP/SHEET3/v2. All targeted land parcels area highlighted in green.



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TRANSPORT AND WORKS ACT 1992
MORLAIS DEMONSTRATION ZONE ORDER
WORKS AND LAND PLAN
ISLE OF ANGLESEY/YNYS MÔN

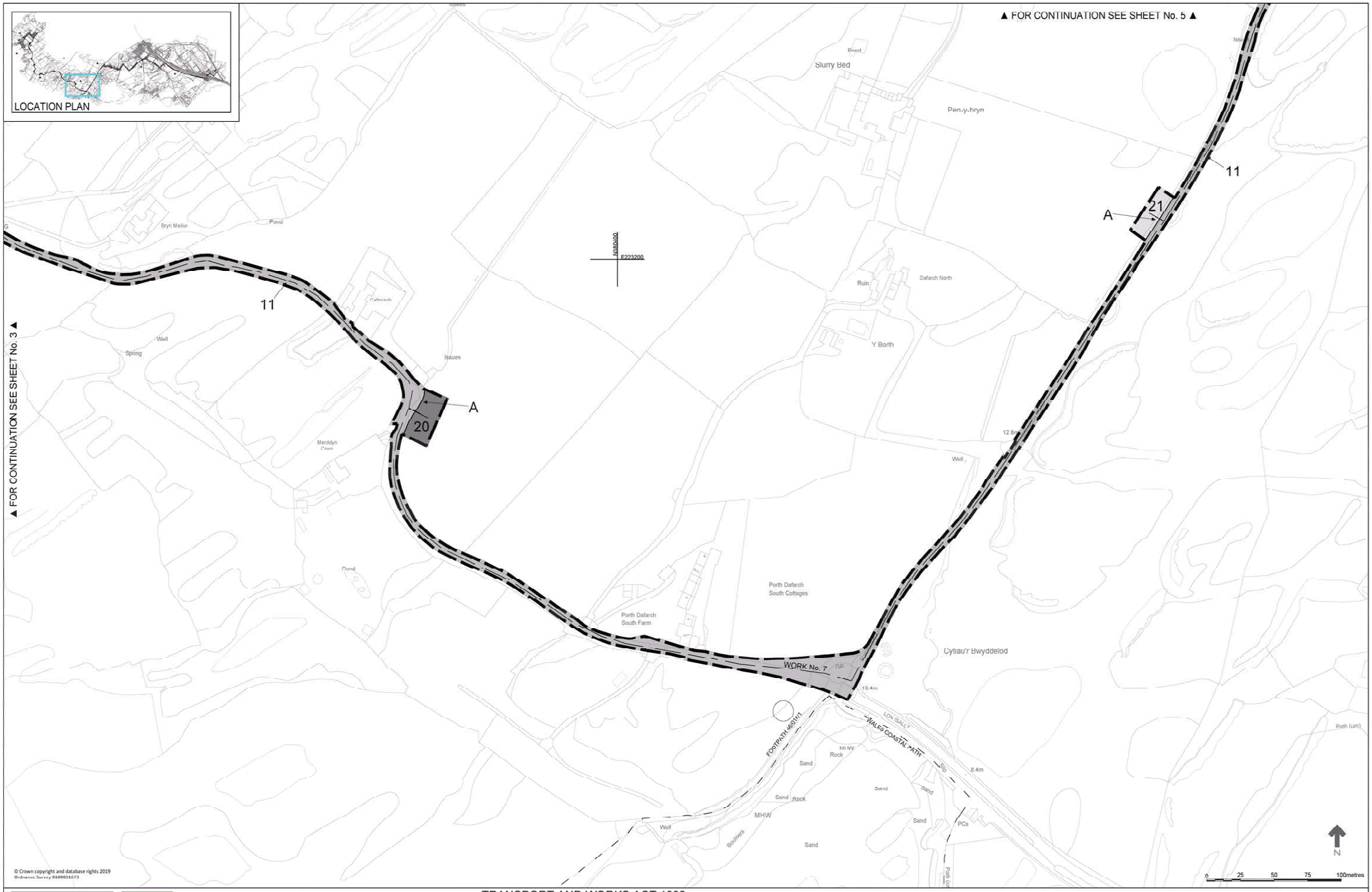
Key

- Centre Line of Work
- Limits of Deviation
- Limits of Land to be Acquired or Used
- Public Rights of Way
- A Access point
- Commencement of Work
- Commencement & Termination of Work
- Termination of Work

Drawing: MOR/WLP/SHEET3/v2
Scale: 1:1250 @ A1, (1:2500 @ A3)
Date: 29.08.2019

FIGURE 04

Reproduction of Menter Môn Drawings Nos. MOR/WLP/SHEET4/v2. All targeted land parcels area highlighted in green.



TRANSPORT AND WORKS ACT 1992
MORLAIS DEMONSTRATION ZONE ORDER
WORKS AND LAND PLAN
ISLE OF ANGLESEY/YNYS MÔN

The area enclosed by any limit of deviation or by any limit of land to be acquired or used is the area extending to the outer edge of the line marking those limits

Key
- Limits of Deviation
- Limits of Land to be Acquired or Used
- Public Rights of Way
- Commencement of Work
- Commencement & Termination of Work
- Termination of Work

Drawing: MOR/WLP/SHEET4/v2
Scale: 1:1250 @ A1, (1:2500 @ A3)
Date: 29.08.2019

FIGURE 05

Reproduction of Menter Môn Drawings Nos. MOR/WLP/SHEET5/v2. All targeted land parcels area highlighted in green.

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TRANSPORT AND WORKS ACT 1992
MORLAIS DEMONSTRATION ZONE ORDER
WORKS AND LAND PLAN
ISLE OF ANGLESEY/YNYS MÔN

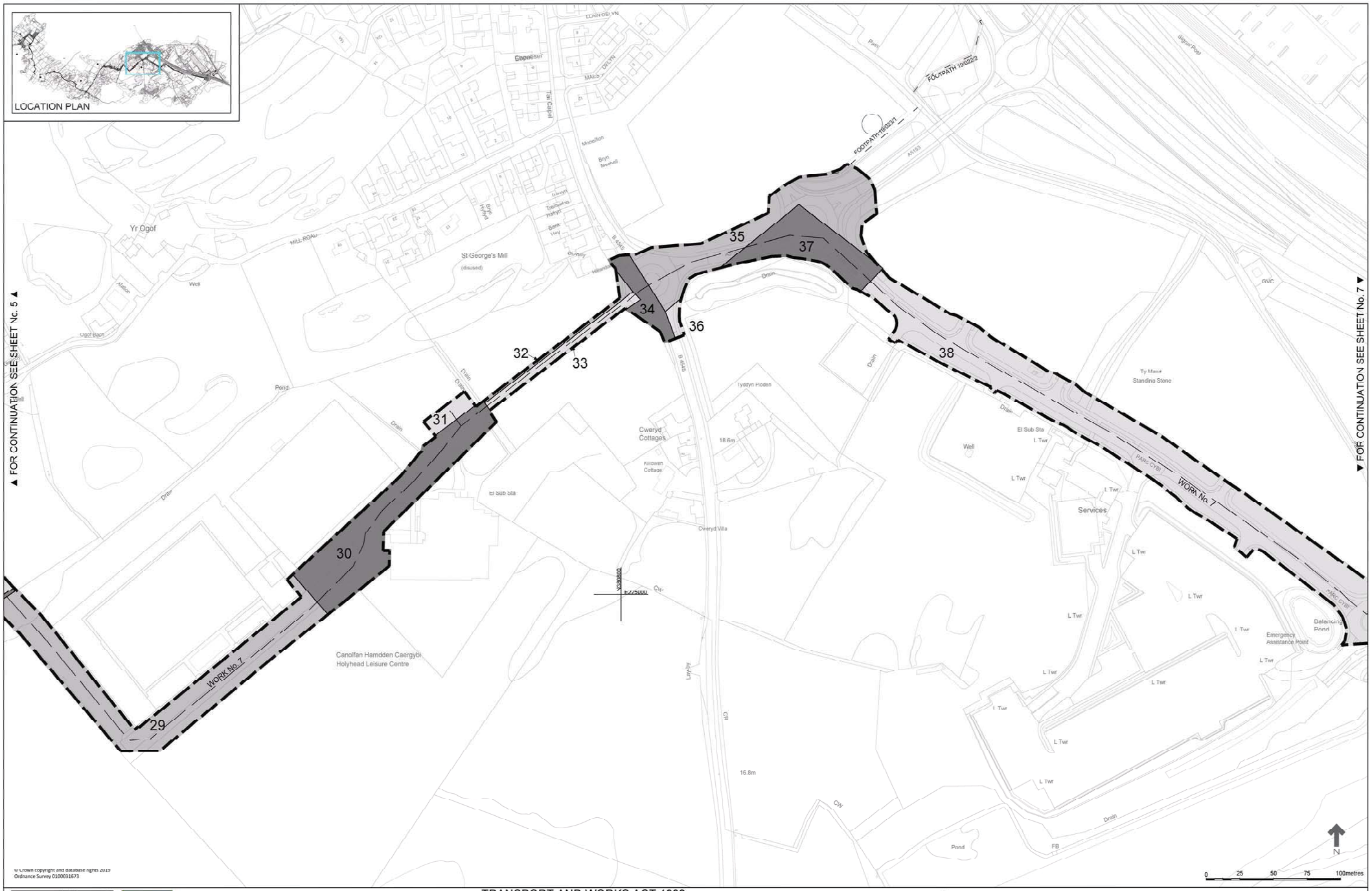
Key

Centre Line of Work
Limits of Deviation
Public Rights of Way
A Access point
Commencement of Work
Termination of Work

Drawing: MOR/WLP/SHEET6/v2
Scale: 1:1250 @ A1, (1:2500 @ A3)
Date: 29.08.2019

FIGURE 06

Reproduction of Menter Môn Drawings Nos. MOR/WLP/SHEET6/v2. All targeted land parcels area highlighted in green.



TRANSPORT AND WORKS ACT 1992
MORLAIS DEMONSTRATION ZONE ORDER
WORKS AND LAND PLAN
ISLE OF ANGLESEY/YNYS MÔN

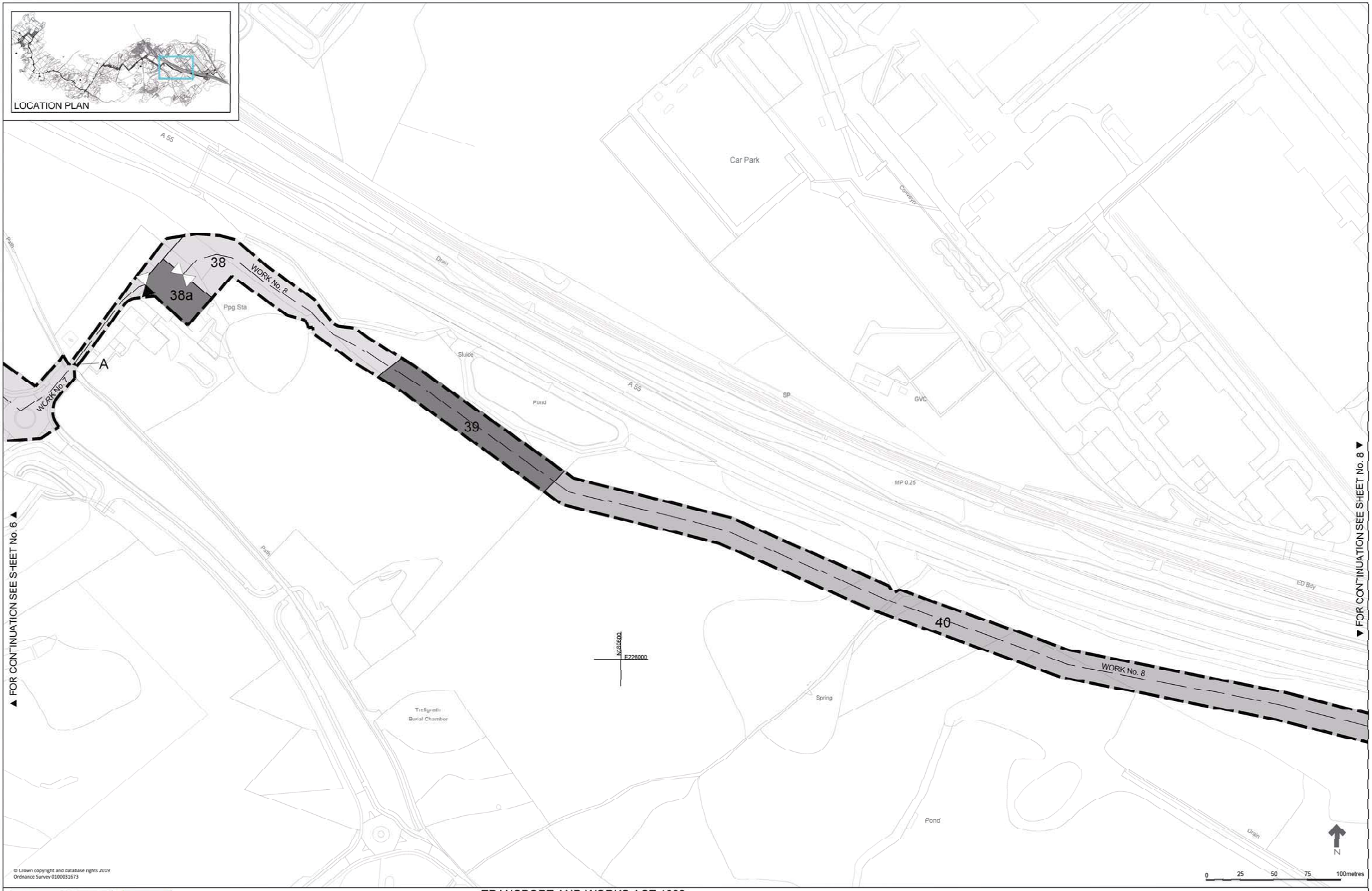
The area enclosed by any limit of deviation or by any limit of land to be acquired or used is the area extending to the outer edge of the line marking those limits

Key
- Centre Line of Work
- Limits of Deviation
- Limits of Land to be Acquired or Used
- Public rights of way
- A Access point
- Commencement of Work
- Commencement & Termination of Work
- termination of work

Drawing: MOR/WLP/SHEET6/v2
Scale: 1:1250 @ A1. (1:2500 @ A3)
Date: 29.06.2019

FIGURE 07

Reproduction of Menter Môn Drawings Nos. MOR/WLP/SHEET7/v2. All targeted land parcels area highlighted in green.



morlais
MENTER MÔN

BAILEYS
& Partners

The area enclosed by any limit of deviation or by any limit of land to be acquired or used is the area extending to the outer edge of the line marking those limits

TRANSPORT AND WORKS ACT 1992
MORLAIS DEMONSTRATION ZONE ORDER
WORKS AND LAND PLAN
ISLE OF ANGLESEY/YNYS MÔN

Key

- Centre Line of Work
- Limits of Deviation
- Limits of Land to be Aquired or Used
- Public Rights of Way
- A Access point
- Commencement of Work
- Commencement & Termination of Work
- Termination of Work

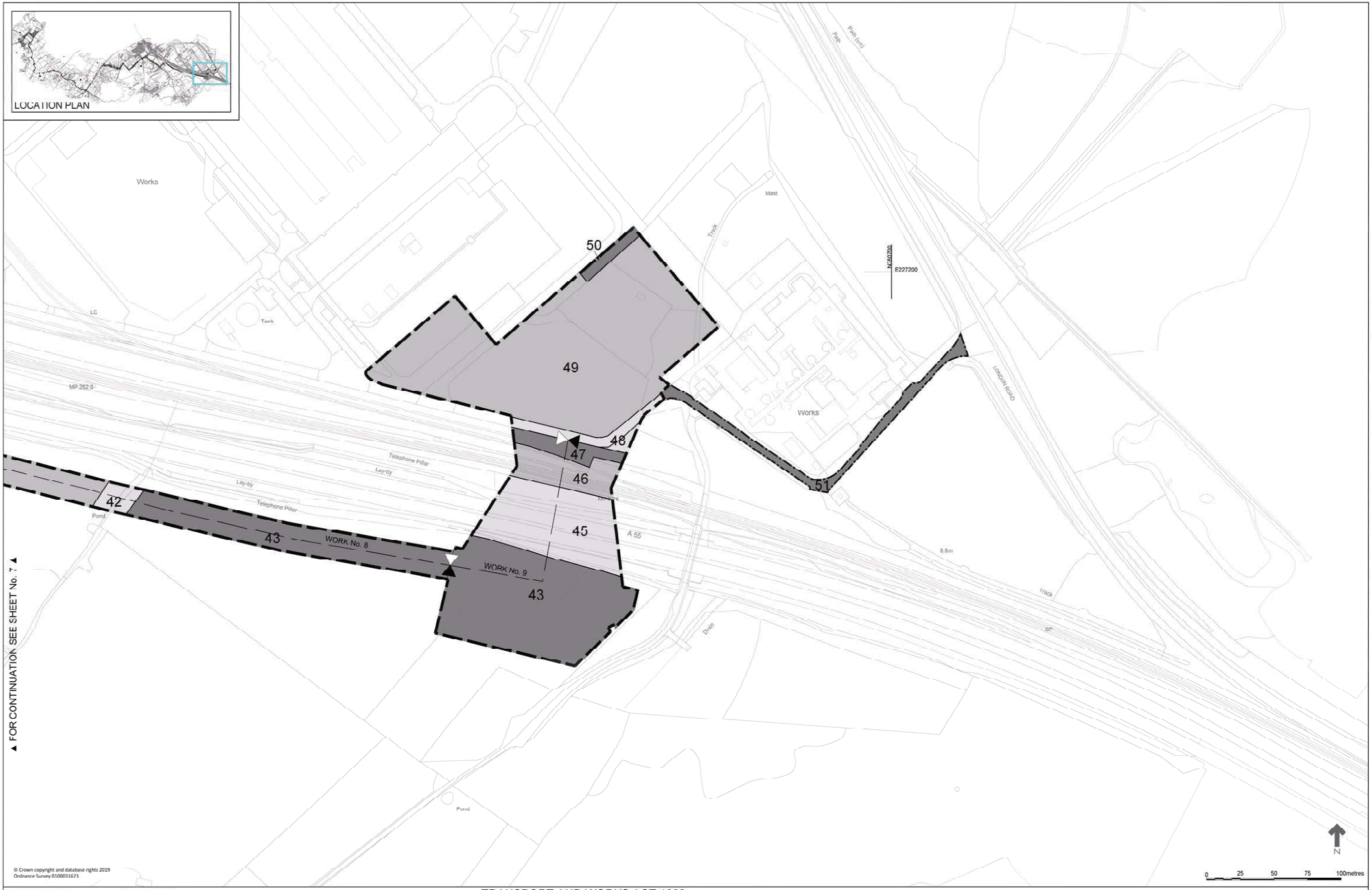
Drawing: MOR/WLP/SHEET7/v2

Scale: 1:1250 @ A1 (1:2500 @ A3)

Date: 29.05.2019

FIGURE 08

Reproduction of Menter Môn Drawings Nos. MOR/WLP/SHEET8/v2. All targeted land parcels area highlighted in green.



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- A Access point
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- Commencement & Termination of Work
- Termination of Work

Drawing: MOR/WLP/SHEET8/v2

Scale: 1:1250 @ A1, (1:2500 @ A3)

Date: 29.08.2019

Gwynedd Archaeological Trust
Ymddiriedolaeth Archaeolegol Gwynedd

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