

TIR I'R GOGLEDD-DDWYRAIN O ORSAF  
PEN Y BONT, Y BALA, GWYNEDD:  
Arolwg Geoffisegol

LAND TO THE NORTHEAST  
OF PEN Y BONT STATION, BALA, GWYNEDD:  
Geophysical Survey





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Ysgrifenydd gan / Written by: Neil McGuinness

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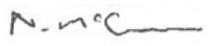
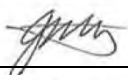

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## CONTENTS

CRYNODEB ANHECHNEGOL .....	4
NON-TECHNICAL SUMMARY .....	4
1 INTRODUCTION .....	5
1.1 Site Details.....	7
1.2 Geophysical survey aims and objectives .....	9
2 BACKGROUND.....	10
3 METHODOLOGY .....	11
3.1 Technical detail .....	11
3.2 Instrumentation .....	11
3.3 Data collection.....	12
3.4 Data processing.....	12
3.5 Presentation of results and interpretation .....	13
3.6 Interpretation categories.....	13
4 RESULTS.....	16
4.1 Probable / Possible Archaeology .....	16
4.2 Services.....	16
4.3 Magnetic Disturbance.....	16
4.4 Ferrous.....	17
5 DATA APPRAISAL AND CONFIDENCE ASSESSMENT.....	18
6 CONCLUSIONS .....	19
7 SOURCES CONSULTED .....	20
FIGURES	

## **LIST OF FIGURES**

Figure 01: Site location

Figure 02: Reproduction of Caulmert Drawing No. 4267-CAU-XX-XX-DR-C-1800 P05

Figure 03: Ordnance Survey First Edition 25 inch to 1 mile County Series Map 1888

Figure 04: Location of survey grids

Figure 05: Geophysical survey minimally processed greyscale plot (raw data clipped to +/- 15nT)

Figure 06: Geophysical survey processed greyscale plot (raw data clipped to +/- 15nT and interpolated)

Figure 07: Geophysical survey interpretative plan

## CRYNODEB ANHECHNEGOL

*Comisiynwyd Ymddiriedolaeth Archeolegol Gwynedd gan Ymddiriodolaeth Rheilffordd Llyn Tegid i wneud arolwg geoffisegol ar lain o dir pori 0.13 ha i'r gogledd-ddwyrain o Orsaf Pen y Bont, Y Bala, Gwynedd. Nid oes unrhyw anghysondebau archeolegol tebygol neu bosibl wedi'u nodi. Fodd bynnag, gall presenoldeb yr hyn sy'n ymddangos yn bibell wasanaeth metel fferrus ar ochr ddwyreiniol ardal yr arolwg a swm sylweddol o aflonyddwch magnetig a achosir gan falurion yn yr uwchbridd guddio ymddangosiad unrhyw anghysondebau archeolegol yn ardal yr arolwg os ydynt yn bresennol.*

## NON-TECHNICAL SUMMARY

*Gwynedd Archaeological Trust was commissioned by Bala Lake Railway Trust to undertake a geophysical survey on a 0.13 ha plot of pasture to the northeast of Pen y Bont Station, Bala, Gwynedd. No probable or potential archaeological anomalies have been identified. The presence of what appears to be a ferrous metal service pipe on the eastern side of the survey area and a significant amount of magnetic disturbance caused by debris in the topsoil may however mask the appearance of any archaeological anomalies within the survey area if they are present.*

## 1 INTRODUCTION

Gwynedd Archaeological Trust (GAT) has been asked by Bala Lake Railway Trust to undertake a geophysical survey as part of a programme of archaeological evaluation in advance of the construction of a proposed extension to the Bala Lake Railway, Gwynedd. The Bala Lake Railway, opened in 1972 as a 2'/600mm gauge heritage railway, is constructed on part of the route of the former Great Western Railway's Ruabon to Barmouth branch line. It currently runs for a distance of 7.2km along the southern side of Bala Lake between termini at Llanwchllyn to the southwest and Pen-y-Bont to the northeast. The proposed works will extend the heritage railway for a distance of approximately 1.2km from its current terminus at Pen y Bont to take it northwards around the northeastern shores of the lake into a new station at Heol Aran in Bala town centre (Caulmert Drawing No. 4267-CAU-XX-XX-DR-C-1800 P05; Figure 02). The geophysical survey has been requested for a small, 0.13ha, triangular plot of land that lies between Pen y Bont station and the B4403 to the north (NGR SH9296235002; LL23 7PH; Figure 01), the route of the first 70m of the proposed extension. A programme of archaeological trial trenching at the northern end of the scheme, the location of the new station at Heol Aran, was completed by GAT in January 2023 and has been reported on separately (Lynes 2023).

The geophysical survey was undertaken on the 13<sup>th</sup> of April 2023 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 2.0 (The Welsh Archaeological Trusts 2022);
- *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 2020).

The geophysical survey has been monitored by the Gwynedd Archaeological Planning Service (GAPS) on behalf of the Eryri National Park Authority and was undertaken in accordance with a GAPS approved Written Scheme of Investigation.

In accordance with the Gwynedd Historic Environment Record (HER) requirements, the HER was contacted at the onset of the project. The HER was informed of the project start date, location, including grid reference, and estimated timescale for the work. The GAT HER Event Primary Reference Number (EPRN) for the survey is 46630. A bilingual event summary has been prepared for submission to the HER and data arising out of the project has been 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* (The Welsh Archaeological Trusts 2018).

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

<b>NGR / Postcode</b>	NGR SH9296235002 / LL23 7PH
<b>Location</b>	<p>The survey area is located at the northeastern eastern edge of Bala Lake. It lies 1km to the south of the southern edge of the town of Bala, Gwynedd, on the opposite, southern, bank of the River Dee. It sits immediately to the northeast of Pen y Bont station and the trackway and sidings of the Bala Lake Railway bound it to the south. It is bounded to the north by the B4403 and Pen y Bont cottage. A pedestrian footpath, providing access to the station, runs southwest from the road along the western side of the plot. It is bounded to the east by a curving stream which may mark the boundary of the former bailey of the Castell Gronw medieval motte (Scheduled Monument ME067; GAT HER PRN 3203) which lies 38m to the east (Figure 01; Figure 03).</p>
<b>HER</b>	Gwynedd Archaeological Trust HER
<b>District</b>	Gwynedd
<b>Planning Authority</b>	Eryri National Park
<b>Parish</b>	Llangower
<b>Topography</b>	<p>The survey area is triangular in shape, up to 49.0m wide along its southern boundary and 52.4m long, tapering to a point at its northern end. It is generally flat at its southern end but starts to fall away to the north about three-quarters of the way along its length. The highest parts at the southern edge of the field sit at a height of approximately 165.74m AOD. The lowest parts are in the northern corner where the ground height is approximately 163.71m AOD.</p>
<b>Current land use</b>	<p>The field is currently under pasture and actively utilised for grazing. Access to it is gained via a metal gate in the southwestern corner that opens onto the access pathway for</p>



Pen y Bont station. The field is bounded on all sides by modern post and wire stock fencing.

**Geology**

Solid: Glyn Gower Siltstones. Sedimentary bedrock formed between 455.25 and 454 million years ago during the Ordovician period (BGS 2023).

Superficial: Till, Devensian - Diamicton. Sedimentary superficial deposits formed between 116 and 11.8 thousand years ago during the Quaternary period (BGS 2023).

**Soils**

Freely draining acid loamy soils over rock (Soilscapes 2023).

**Survey methods**

Magnetometer survey (fluxgate gradiometer)

**Study area**

0.13 ha

## **1.2 Geophysical survey aims and objectives**

The aims and objectives of the geophysical survey are to:

- Identify if any archaeological features survive within the field and understand the archaeological potential of the development site to allow for a better-informed planning recommendation through the application of a geophysical survey, supported by sufficient desk-based research to aid interpretation of any archaeological evidence encountered. The development site lies in close proximity to an area of known Medieval settlement.

## 2 BACKGROUND

A full archaeological desk-based assessment for the railway extension scheme was completed by Archaeological Research Services Ltd in 2021 (Brown 2021). The assessment identified that the survey area lies 40m to the west of the Castell Gronw medieval motte (Scheduled Monument ME067; GAT HER PRN 3203; Figure 03). The motte, which survives as a partially wooded earthen mound, would have originally been the site of a timber castle. An enclosed courtyard or *bailey* would have been located at the foot of the motte, and the curving nature of the ditched field boundary on the eastern side of the survey area is suggestive of a former bailey enclosure here. The motte was a defensive structure and it was most likely located here to guard a former crossing point over the River Dee just to the north.

The current bridge over the former route of the river lies 15m to the north of the northern edge of the survey area. Pont Mwnwgl-y-llyn (Grade II Listed Building LB4675; GAT HER PRN 3222; Figure 03) is a stone-built bridge that formerly carried the road leading south from Bala over the River Dee. Its oldest parts date to the early 18<sup>th</sup> century, however the proximity of the Castell Gronw motte suggests a bridge in this location from at least the medieval period onwards.

The desk-based assessment (Brown 2021) concluded that, given the proximity of known and potentially medieval activity, ‘... there is the potential for medieval remains of some importance to be present...’ within the survey area.

On the 1844 Parish of Llangower Tithe Award Map, the survey plot forms the northeast corner of a large sub-rectangular field *Cae'r pant* to the southwest of Pen y Bont cottage. The Bala and Dolgelley Railway Company opened its Ruabon - Barmouth branch line in 1868. The route of the railway, now incorporated into the Bala Lake Railway, bisected the field shown on the 1844 map skirting the southern edge of the survey area. The 1888 First Edition Ordnance Survey County Series Map (Figure 3) shows a roofed rectangular building labelled ‘Station (Disused)’ in the southwestern corner of the survey area, probably the old Bala Lake Halt and Station (GAT HER PRN 93457). By the time the Second Edition County Series Map was published in 1901, the building appears to have been demolished.

The 1888 First Edition Ordnance Survey County Series Map (Figure 3) also shows what appears to be a trackway running concentric with and along the western side of the current curvilinear field boundary on the eastern side of the survey area. It appears to lead from the Pont Mwnwgl-y-llyn to the north and provided access to the railway line to the east of the then station building. This trackway also appears to have been removed by 1901.

### **3 METHODOLOGY**

#### **3.1 Technical detail**

The survey was carried out in parallel traverses within a series of 20x20m grids that cover the footprint of the proposed development site (Figure 07). 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 grids were tied into the Ordnance Survey National Grid using a Trimble R8S high-precision GPS.

#### **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 nano Teslas (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 are transferred from the data-logger to a personal computer and compiled and processed using TerraSurveyor v.3.0.33.10 software. Additional analysis of the data is carried out using MagPick v.3.25.

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-stripping 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.

<i>Archaeology / Probable Archaeology</i>	<i>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.</i>
<i>Possible Archaeology</i>	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.
<i>Industrial / Burnt-Fired</i>	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.
<i>Former Field Boundary (probable and possible)</i>	Anomalies that correspond to former boundaries indicated on historic mapping, or which are clearly a continuation of existing land divisions. <i>Possible</i> 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.
<i>Ridge and Furrow</i>	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
<i>Agriculture (ploughing)</i>	Parallel linear anomalies or trends with a narrower spacing, sometimes aligned with existing boundaries, indicating more recent cultivation regimes.
<i>Land Drain</i>	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.
<i>Natural</i>	These responses form clear patterns in geographical zones where natural variations are known to produce significant magnetic distortions.
<i>Magnetic Disturbance</i>	Broad zones of strong dipolar anomalies, commonly found in places where modern ferrous or fired materials (e.g. brick rubble) are present.

<i>Service</i>	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.
<i>Ferrous</i>	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.
<i>Uncertain Origin</i>	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 <i>Possible Archaeology / Natural</i> or (in the case of linear responses) <i>Possible Archaeology / Agriculture</i> ; 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 was conducted in overcast and occasionally wet conditions on Thursday 13<sup>th</sup> April 2023. The results are presented as a minimally processed greyscale plot (raw data clipped to +/- 15nT; Figure 05), a processed greyscale plot (raw data clipped to +/- 15nT and interpolated; Figure 06) and an interpretative plan (Figure 07). Specific anomalies have been given numerical labels which appear in the text below, as well as on the interpretative plan (Figure 07).

### 4.1 Probable / Possible Archaeology

No definitive, probable or possible archaeological responses have been identified in the results

### 4.2 Services

A very high magnitude straight linear dipolar anomaly [1] has been identified on the eastern side of the survey area. It runs from north-south from the northern corner of the survey area before turning to run in a northwest-southeast direction, apparently exiting the survey area in its southeastern corner. It appears to approximately follow the line of the western boundary of the trackway depicted on the 1888 First Edition Ordnance Survey map (Figure 03), however, the high amplitude response suggests a ferrous metal service pipe rather than a former boundary. A ferrous metal manhole cover, most likely to provide access to the service pipe, was also noted in the northern part of the field during the survey. The strength of the response from the service pipe may mask the presence of less magnetically strong archaeological anomalies in proximity.

### 4.3 Magnetic Disturbance

The central and southern parts of the survey area contained an extensive area of moderate magnitude dipolar responses representing magnetic disturbance [2], phenomena that usually result from disturbed ground or fired material such as brick/tile in the topsoil. Numerous fragments of coke, cinders and brick were noted in molehills here during the survey, most likely resulting from the demolition of the former station building, which stood in the southwestern corner of the survey area (Figure 03), and waste material dumped in proximity to the railway line. The extent of the resultant magnetic disturbance here may mask the presence of weaker anomalies that might be archaeologically significant.

#### **4.4 Ferrous**

High magnitude ferrous responses close to the field boundaries are due to adjacent metal fences, gates and ferrous material that has accumulated against the boundaries. Smaller-scale ferrous anomalies consisting of a single high magnitude positive anomaly with an associated negative response ("iron spikes") are present throughout the data. They are characteristic of small pieces of ferrous debris in the topsoil and are commonly assigned a modern origin. Only the most prominent of these are highlighted on the interpretative plot.

## **5 DATA APPRAISAL AND CONFIDENCE ASSESSMENT**

English Heritage guidelines (English Heritage, 2008, Table 4) state that magnetometer survey can be recommended over any sedimentary solid geology, but that magnetic response is generally poor on glacial till drift geologies. The results from this magnetometer survey did not indicate the presence of possible archaeological features, however, the strong magnetic response from the suspected service pipe and the broad area of magnetic disturbance identified in the southern and central part of the survey area mean that it is possible that archaeological features remain undetected.

## **6 CONCLUSIONS**

The magnetometer survey of the proposed development plot to the northeast of Pen y Bont Station, Bala, Gwynedd has not revealed any probable or potential archaeological anomalies. The presence of what appears to be a ferrous metal service pipe on the eastern side of the survey area and a significant amount of magnetic disturbance caused by debris in the topsoil may however mask the appearance of any archaeological anomalies within the survey area if they are present.

## 7 SOURCES CONSULTED

British Geological Survey, 2023, BGS Geology Viewer, website  
<https://geologyviewer.bgs.ac.uk/> [accessed 25/04/2023]

Brown, A, 2021, *Llyn Tegid Railway Extension, Bala, Snowdonia National Park: Archaeological Desk-Based Assessment*, Archaeological Research Services Ltd Report 2020/153

Chartered Institute for Field Archaeologists, 2020, *Standard and Guidance for Archaeological Geophysical Survey*

English Heritage, 1991, *Management of Archaeological Projects*

English Heritage, 2015, *Management of Research Projects in the Historic Environment (MoRPHE)*

English Heritage, 2008, *Geophysical Survey in Archaeological Field Evaluation*

European Archaeological Council, 2015, *Guidelines for the use of Geophysics in Archaeology: Questions to Ask and Points to Consider*

Lynes, M, 2023, *Pen y Bont Extension, Bala: Trial Trenching*, GAT Report 1685

Royal Commission on Ancient and Historic Monuments of Wales, 2015, *Guidelines for digital archives*

Soilscapes, 2023, *Cranfield Soil and Agrifood Institute Soilscapes viewer*, website  
<http://www.landis.org.uk/soilscapes/> [accessed 25/04/2023]

The Welsh Archaeological Trusts, 2022, *Guidance for the Submission of Data to the Welsh Historic Environment Records (HERs)* (Version 2.0)

**FIGURES**

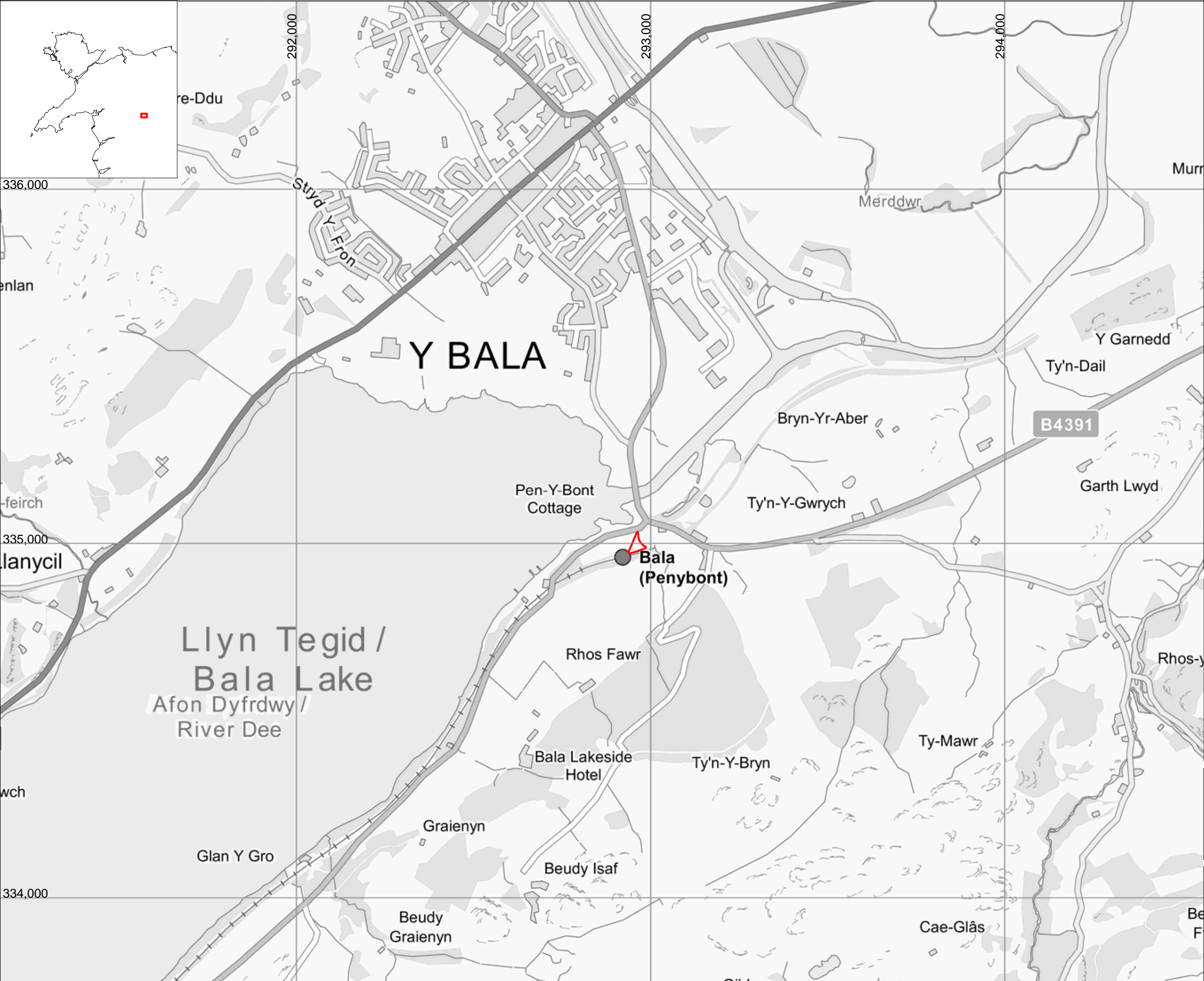
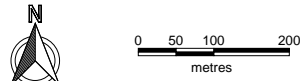


Figure 01: Survey location



Co-ordinate System OSGB 1936 / British National Grid EPSG:27700  
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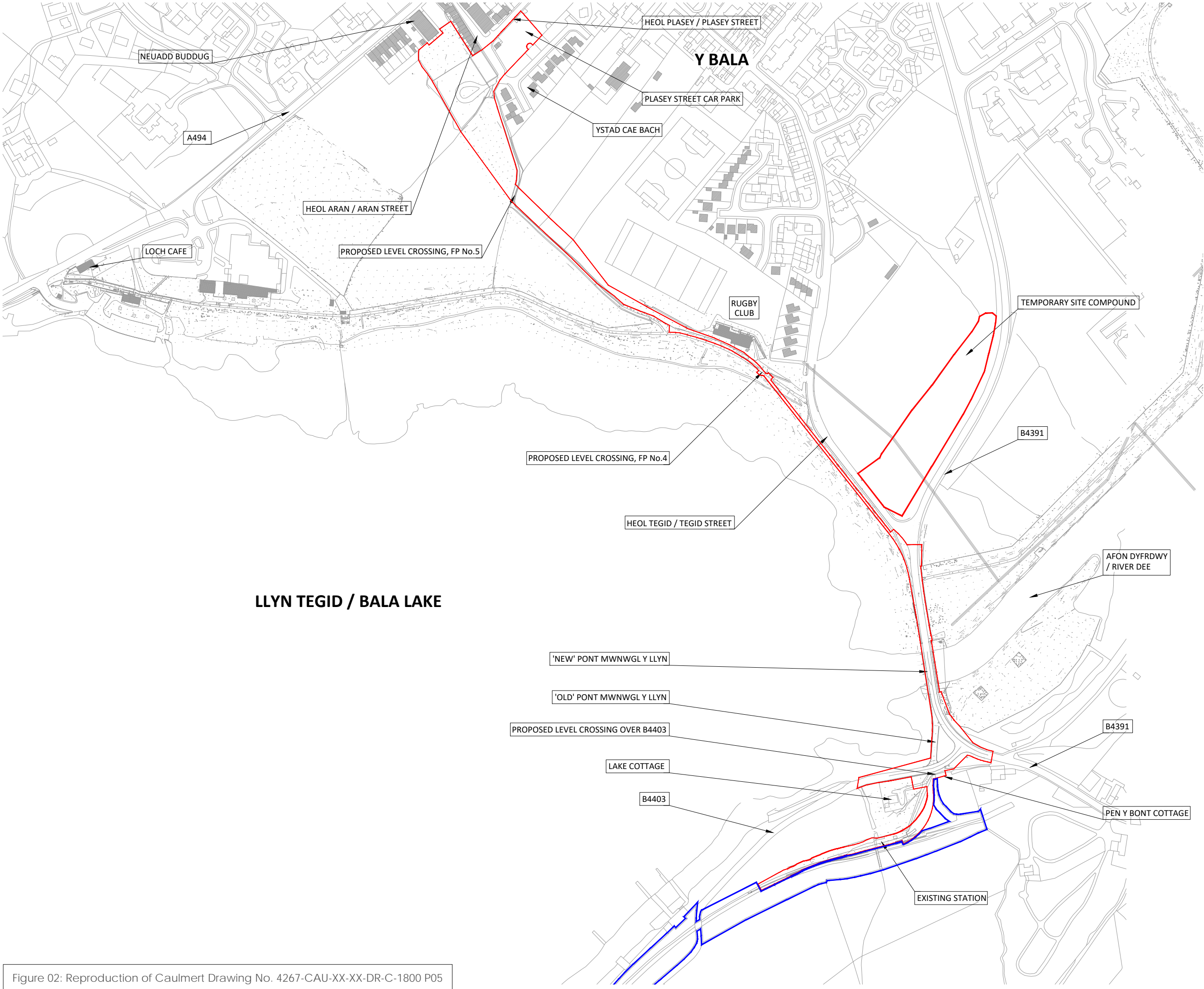
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Bala Lake Railway Trust

SITE:  
Land to the Northeast of  
Pen y Bont Station, Bala,  
Gwynedd

SCALE AT A3: 1:10000	DATE: 25/04/23	DRAWN: NMC	CHECKED: JR
PROJECT NO: G2749	DRAWING NO: GP/01	REVISION: A	





- NOTES
1. DO NOT SCALE FROM THIS DRAWING, WORK FROM FIGURED DIMENSIONS ONLY. ALL DIMENSIONS ARE IN METRES AND ALL LEVELS ARE IN METRES ABOVE ORDNANCE DATUM UNLESS NOTED OTHERWISE.

2. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS, ENGINEERS AND SPECIALIST DRAWINGS AND SPECIFICATIONS.

LEGEND

EXTENT OF PLANNING APPLICATION

OTHER LAND UNDER CONTROL OF THE APPLICANT



P04	BLUE BOUNDARY AMENDED	DA	DH	DH	19.11.21		
P04	BLUE BOUNDARY AMENDED	DA	DH	DH	02.07.21		
P03	RED BOUNDARY AMENDED	LJ	DH	DH	08.12.19		
P02	RED/BLUE BOUNDARYS AMENDED	EJD	DH	DH	02.12.19		
P01	ISSUED FOR DISCUSSION	DA	CR	DH	02.12.19		
REV	MODIFICATIONS	BY	RE	AP	DATE		
PURPOSE OF ISSUE				STATUS			
FOR INFORMATION				S2			
CLIENT:							
							
PROJECT:							
NEW LINE (PEN Y BONT)							
TITLE:							
LOCATION PLAN							
DESIGNED BY	DH	DRAWN BY	DA	REVIEWED BY	CR	AUTHORISED BY	DH
DATE	02.12.19	SCALE @ A2	1:2500	JOB REF:	4267	REVISION	P05
DRAWING NUMBER							
4267-CAU-XX-XX-DR-C-1800							
							

Figure 02: Reproduction of Caulmert Drawing No. 4267-CAU-XX-XX-DR-C-1800 P05



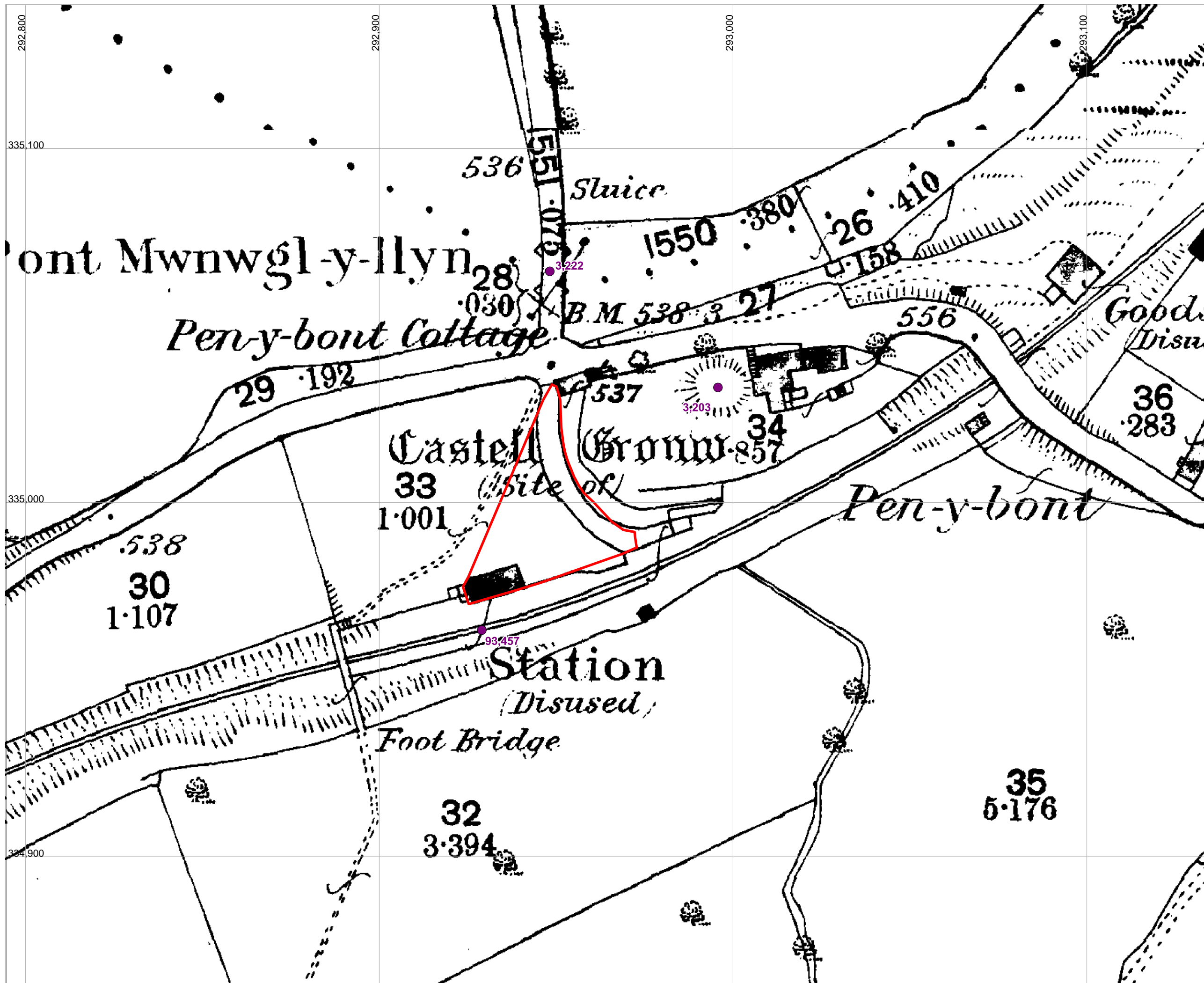
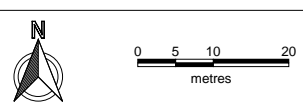


Figure 03: Ordnance Survey First Edition 25 inch to 1 mile County Series Map 1888

- 3,203 Gwynedd HER Site with PRN
- Survey area

Co-ordinate System OSGB 1936 / British National Grid EPSG:27700



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CLIENT:  
Bala Lake Railway Trust

SITE:  
Land to the Northeast of  
Pen y Bont Station, Bala,  
Gwynedd

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PROJECT NO: G2749	DRAWING NO: GP/03	REVISION:	A

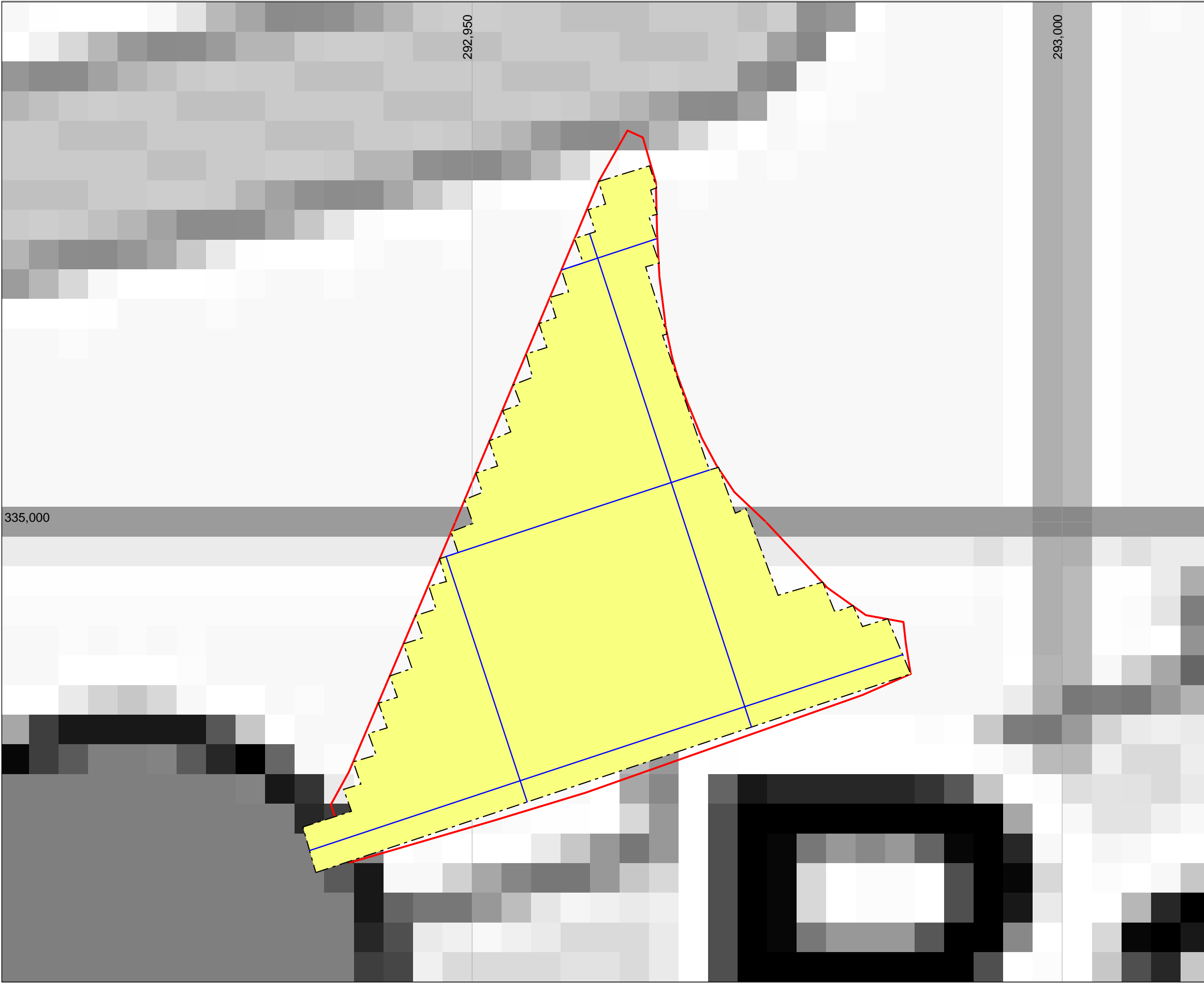




Figure 04: Location of survey grids




Survey extent showing  
20m grid



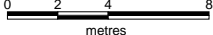
Survey area

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PROJECT NO: G2749	DRAWING NO: GP/04	REVISION: A	

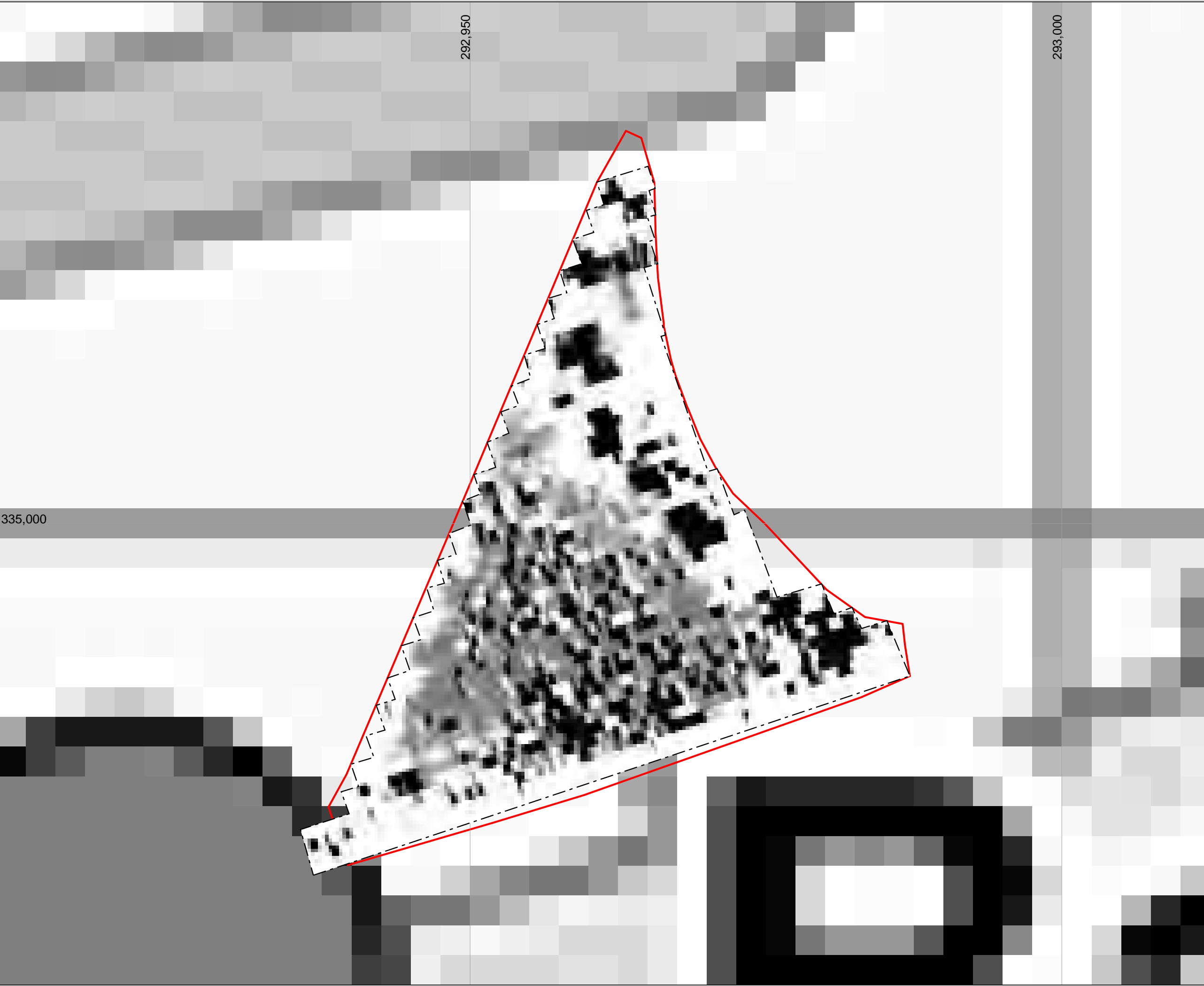
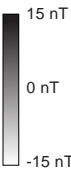
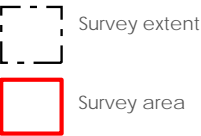
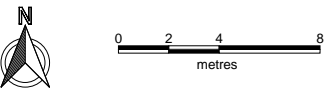


Figure 05: Geophysical survey  
minimally processed greyscale plot  
(raw data clipped to +/- 15 nT)



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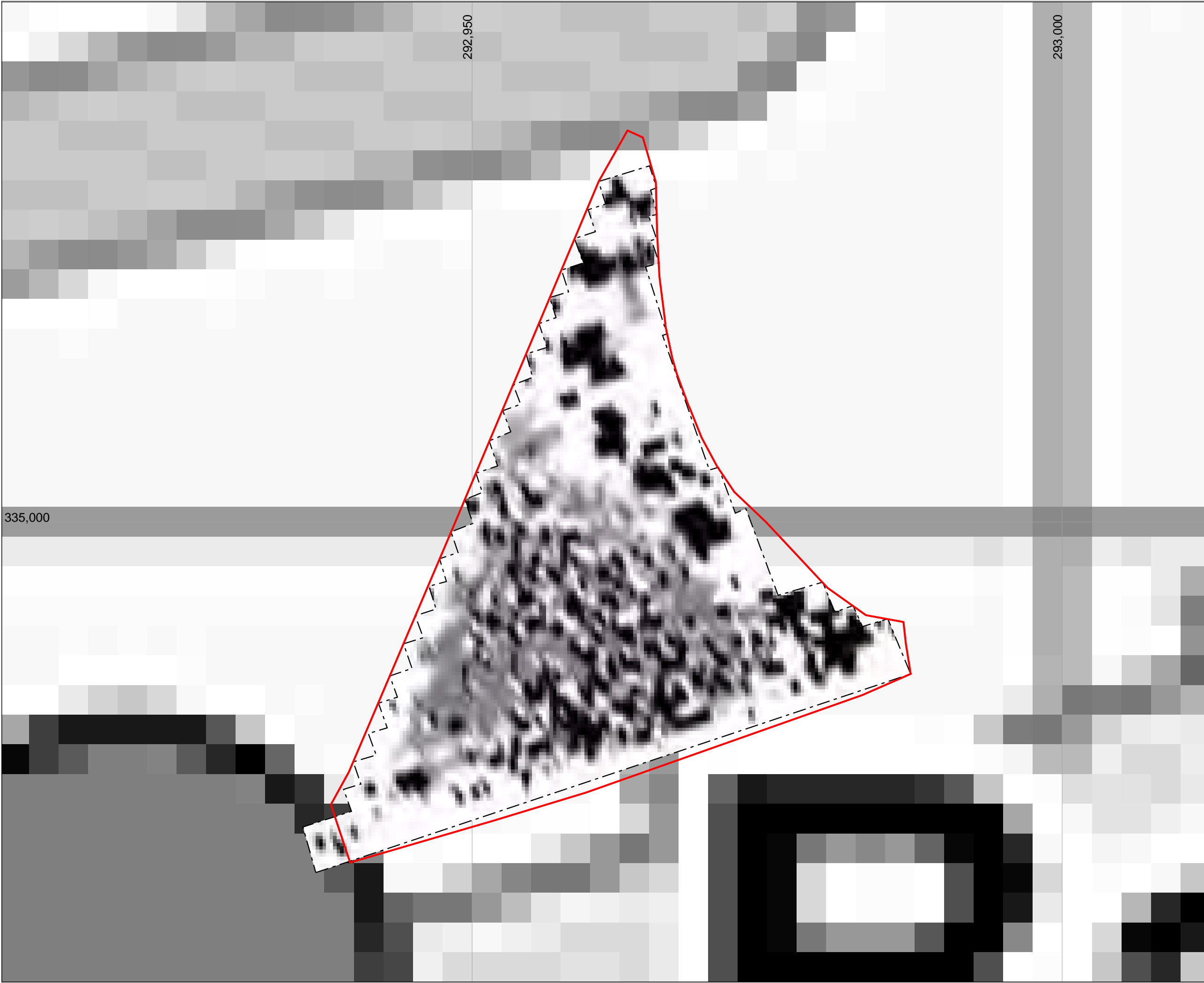
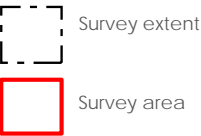
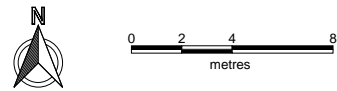


Figure 06: Geophysical survey processed greyscale plot (raw data clipped to +/- 15 nT and interpolated)



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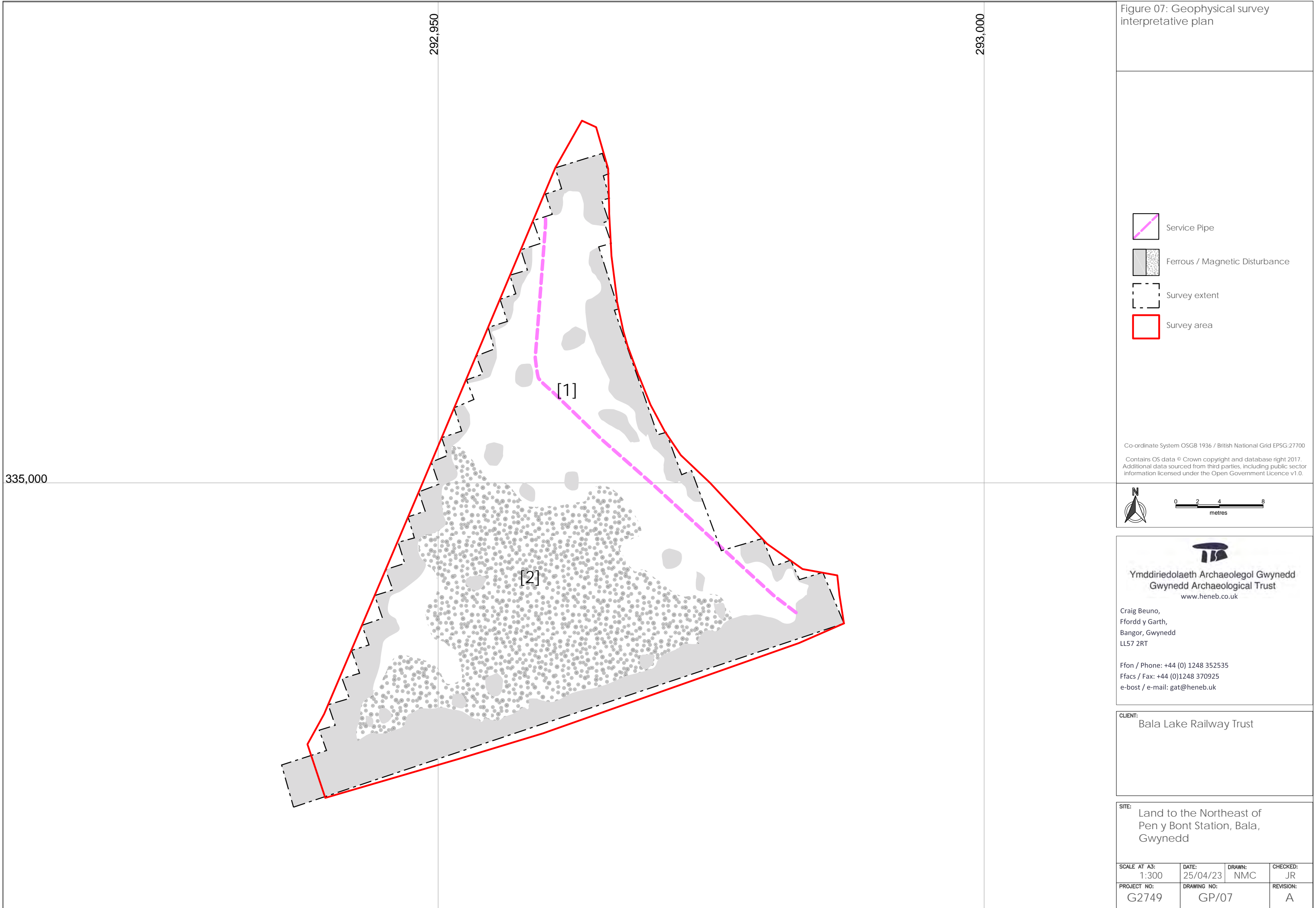
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