



Galileo 03 Ltd.

Mynydd Ty-talwyn Energy Park - Environmental Statement Volume III

Appendix 7.3: Written Scheme of Investigation for Geophysical Survey
(Solar & Substation)

Project Reference: 663870

Note: This document was produced to determine the scope of a geophysical survey, which was agreed with Heneb. The scope reflects the design of the Proposed Development at that point in time

NOVEMBER 2025

RSK

TALW24



Mynydd Ty Talwyn Energy Park, South Wales

Written Scheme of Investigation for Geophysical Survey

**Client: RSK Environment Limited
On Behalf of: Galileo Empower Wales Limited**

v.3

**Headland Archaeology (UK) Ltd
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1 INTRODUCTION

- 1.1 This Written Scheme of Investigation (WSI) has been prepared by Headland Archaeology in advance of a proposed geophysical (magnetometer) survey on selected parcels of land within a redline development area (hereafter “the Site”) located south-east of Margam and west of Tondy in South Wales.
- 1.2 The results of the geophysical survey will be submitted in support of a DNS application for the future development of the Site as an energy park generating electricity from both solar and wind. The results will also inform future archaeological strategy within the Site, if required.
- 1.3 The scheme of work will be undertaken in accordance with the requirements of Planning Policy Wales 2024 (Edition 12, Ch.6 The Historic Environment).
- 1.4 The WSI is produced to the standards laid down in the European Archaeological Council’s guideline publication EAC Guidelines for the Use of Geophysics in Archaeology (*Europae Archaeologia Consilium* 2016), and the Chartered Institute for Archaeologists (CIfA) Standard and Guidance for Archaeological Geophysical Survey (CIfA 2020).

2 DESCRIPTION OF THE SITE

- 2.1 The solar component of the proposed development is the focus of this WSI. There are 12 solar/survey areas covering approximately 119 hectares of permanent pasture (Figure 1).
- 2.2 Five of the survey areas are located approximately 2km west of Tondy to the immediate north, east and west of the hamlet of Ffordd-y-Gyfraith, predominantly on south-facing slopes of Mynydd Baedan at between 160 metres Above Ordnance Datum (AOD) and 240 metres AOD; together, they cover 79.6 hectares.
- 2.3 The remaining 39.4 hectares comprise seven survey areas at three locations in the north and north-west of the Site: west and north of the wooded lower slopes of Mynydd Ty-talwyn at about 240m AOD and immediately west of Maescadlawr at between 120m AOD and 150m AOD.
- 2.4 The bedrock underlying the survey areas are all sedimentary in nature and formed in the Carboniferous period and so should be receptive to magnetometer survey – particularly as there are no overlying superficial deposits recorded in any of the survey areas.
- 2.5 In the two most southerly survey areas (2.8ha and 7ha) the bedrock geology is recorded as comprising mudstone, siltstone and sandstone of the South Wales Middle Coal Measures Formation, formed between 318 and 309.5 million years ago.
- 2.6 To the north (24.5ha, 14.5ha and 30.8ha) the bedrock comprises sandstone of the Rhondda Member formed between 315.2 and 308 million years ago. A narrow band of Llynfi Member mudstone, siltstone and sandstone runs from east to west just north of the southern edge of the largest of these northerly survey areas. This bedrock was formed between 315.2 and 309.5 million years ago.
- 2.7 Rhondda Member sandstone also underlies the four areas (3.7ha, 6.7ha, 2.5ha and 1.6ha) located between the two areas of woodland.
- 2.8 The remaining three areas (4.7ha, 12.5ha and 7.7ha blocks) are all underlain by Brithdir Member sandstone formed between 309.5 and 308 million years ago.
- 2.9 The soils are classified in Soilscape 13 and described as freely draining acid loams over rock across all the upland areas within the site. On the two small lowland areas

(on the Coal Measures geology), the soils are slowly permeable wet very acid soils with a peaty surface and are classified in Soilscape 19 (Cranfield University 2024).

3 ARCHAEOLOGICAL BACKGROUND

- 3.1 The following is an abridged version of the archaeology baseline presented in the draft Heritage Desk-Based Assessment prepared by Pegasus Group. The baseline has been written for a 3km-radius study area measured from the redline boundary of the proposed development site as a whole (“the Site” – see above).

Mesolithic and Neolithic

- 3.2 Prehistoric lithics ranging in date from the Mesolithic to the Early Bronze Age have been found at the south-eastern edge of the woodland covering the slopes of Mynydd Margam, c.1.9km north-west of the Site (02102w, 05028w, 05029w). There is also record of a Neolithic axe having been found at Gelli Lenor in Maesteg (01277m).

Bronze Age

- 3.3 Near Maescadlawr in the northern part of the Site, is a trapezoidal block of sandstone that has been interpreted as a possible Bronze Age standing stone (00165m). It is unclear whether HER record 00990m, described as a standing stone marked on the 1918 OS Map, is a duplicate or a separate monument.
- 3.4 On either side of the lane to the north of Baiden Farm, on the high ground below Mynydd Baeden in the southern-central part of the Site, are recorded two earthwork mounds and nine cropmark ring ditches believed to indicate Bronze Age round barrows and/or ring cairns (04586m, 04587m; 02617m, 04578m–04585m). The findspot of an Early Bronze Age knife fragment is also recorded in the vicinity (06127m).
- 3.5 Known and possible Bronze Age ring cairns are also recorded at Moel Ton-mawr and on the south-east facing slopes of Mynydd Margam in the north-western part of the study area (00755w, 00117m, 00115m, 00753w, 00754w, 00752w, 00751w, 00750w). An Early Bronze Age flint scatter is also recorded to the west of Ton-mawr Farm, c.2.5km west of the Site (02209w).

Iron Age

- 3.6 Also, between Mynydd Margam and Moel Ton-mawr in the north-western part of the 3km study area are the earthworks of fortified enclosures of probable Iron Age date:
- Y Bwlwarcau Hillfort, c.1.3km north-west of the Site (00116m, 01155m);
 - Caer Blaen-y-cwm Enclosure, c.1.5km west of the Site (00759w);
 - Caer Cwmphilip (or Moel Ton-mawr) Earthwork and Cwm Philip West (or Danish Camp), c.1.8km and c.2.3km west of the Site respectively (00774w, 00758w); and
 - Ton-mawr Enclosure, c.1.1km west of the Site (00776w).
- 3.7 Linear earthworks in the vicinity of Caer Cwmphilip (or Moel Ton-mawr) Earthwork and Ton-mawr Enclosure may be associated with these monuments – either serving as additional defensive installations, strategic hollow-ways controlling the approach to these monuments, or territorial boundary markers.

Roman

- 3.8 The Roman road between Cardiff and Neath (RR60) ran south-east/north-west, passing c.200m west and c.1.2km south of the 3km study area. The HER states that this is expressed as a cropmark c.3.8km south-west of the Site (01016.8w, 01016.10w). Roman milestones were formerly located here (01016.11w), and further north near Margam (00790W, 01016.15w).
- 3.9 Another Roman road is thought to be traced by the modern road from Laleston to Cefn Cross to Ffordd-y-Gyfraith through the Site. An embanked Iron Age to Romano-British settlement and findspots of Roman coins are recorded on the west side of the road at Laleston, c.3.7km south of the Site (00188m, 00179m).
- 3.10 Another possible Roman road is recorded at Bryncethin at the eastern edge of the 3km study area (05019m); and other Roman coins have been found at Aberkenfig and Pen-y-Fai, c.1.1km, c.1.5km and c.2.6km from the Site (00180m, 00181m, 01404m).

Early medieval (410 AD – 1066)

- 3.11 The landscape around Mynydd Baeden has been suggested as the location for the Battle of Mons Badonicus, or Battle of Mount Badon. Proponents argue that earthworks found within the Site near Gilfach Uchaf, to the north and east of Mynydd Ty-talwyn, and on the east side of Mynydd Baeden represent 'entrenchments' associated with the battle.
- 3.12 However, RCAHMW interprets the 'entrenchments' at Mynydd Baeden as hollow-ways (424515). Meanwhile the summary in the HER record states: "*A series of parallel trenches, or banks and ditches. They may be the remains of quarrying or other industrial endeavours or part of a Medieval road or trail.*" (04450m).
- 3.13 The 1899 OS Map identifies an old quarry at the head of the earthworks at Gilfach Uchaf, and the 1918 and 1924 editions identify rises, springs, and old coal levels on the east side of the earthworks at Mynydd Baeden. It is therefore possible that some of the earthworks could be associated with historic coal working and/or quarrying. Recent literature has also suggested that some of the earthworks derive from recent farming or forestry work.
- 3.14 Carved stones believed to be of early medieval date have been discovered at Bettws (Carreg Fedyddiol Sculptured Stone), c.2.2km east of the Site (00368m); Sychbant Farm, c.2.7km north-west of the Site (01616m); and a short distance upslope from Y Bwlwarcu hillfort, c.2.3km north-west of the Site (00809w).

Medieval (1066 – 1539)

- 3.15 Near Maescadlawr in the northern part of the Site is a complex of earthworks representing the remains of a medieval settlement (00126m / 15245). It is designated as a Scheduled Monument under the name 'British Fortified Residence' (GM086). Three medieval wells are recorded c.110m to its north (01142m, 01143m, 01144m).
- 3.16 The 'British Fortified Residence' was excavated in the 1930s by Cyril and Aileen Fox, and again in 2011 by volunteers from the Llynfi Valley Historical Society. Fox and Fox originally considered the site, and other nearby house platforms (see below), to be early medieval but later revised their dating to medieval. The recent excavations recovered 14th-century pottery.
- 3.17 Across the central swathe of the Site are numerous earthworks recorded by the HER and RCAHMW as medieval house platforms (00127m–00133m, 06013m, 06129m 06320m – west side of lane; 01712m, 01713m, 01714m, 04228m, 04225m, 00135m – east side of lane)) and associated enclosures (00134m, 01731m / 24328) and

trackways or droveways (08074m, 08075m, 06128m – west side of lane). A medieval well is recorded among the house platforms at Mynydd ty-Talwyn (01145m).

- 3.18 Also recorded within the Site is an enclosure within the north-western boundary near Gilfach (15408); the former location of the Chapel of St Thomas of Creitic, c.295m north-west of Baiden Farm (00138m); a medieval well at Cefn Ydfa Farm (07946m); and the holy well of Ffynnon Gilfach Isaf at the northern boundary of the Site roughly halfway between Gilfach and Bryn Cynan (07946m).
- 3.19 The route of a medieval trackway Ffordd y Gyfraith ('Road of the Law'), allegedly used by officials travelling from the lowlands into the wild hill country, traces the modern road through the Site and branches off to the 'British Fortified Residence' and Mynydd Baeden (03111.0m).

Post-medieval (1540 – 1750), Early Modern (1750 – 1901) and Modern (1901 – present)

- 3.20 The vast majority of HER 'monuments' recorded within the 3km study area (totalling 662) are post-medieval and modern in date. There are 48 such records within the Site, comprising the ruins of farmsteads, houses, field boundaries, sheepfolds, sandstone quarries and bell pit/prospection hollows.
- 3.21 Data from the Coal Authority, available through the British Geological Survey's Interactive Map Viewer, indicates that historic coal mining activity within the Site may have been more widespread than recorded by the HER. Mine adits are identified within Craig yr Aber to the south-west; at Cefn Parc/Ton Philip in the south; at Cwmrisga to the south-east; to the south-east and east of Mynydd Baeden; and at Maescadlaw to the north.
- 3.22 The earliest available historic mapping of the Site is the 1839 tithe map for the parish of Llangynwyd. This shows a patchwork of small rectilinear fields in the north-western, northern, eastern and southern parts of the Site. There is little correlation with extant field systems. There is some survival of the tithe field boundaries in the north and east, but there are considerably fewer fields in the east and south and a plantation has replaced the fields to the north-west.

4 OBJECTIVES

- 4.1 The principal objectives of the programme of geophysical survey are to gather information to establish the presence/absence, character and extent of any archaeological remains within the survey areas, and to inform any further investigation and/or mitigation strategies.
- 4.2 The aims of the survey are:
- to provide information about the nature and possible interpretation of any magnetic anomalies identified,
 - to therefore determine the likely presence/absence and extent of any buried archaeological features, and
 - to produce a comprehensive site archive and report.

5 PROJECT TEAM

- 5.1 The project will be managed for Headland Archaeology by Alistair Webb (Project Manager). The field team will comprise of at least one Supervisor.

- 5.2 The project team will familiarise themselves with the background to the site and will be aware of the project's aims and methodologies.
- 5.3 Headland Archaeology (UK) Ltd is a Registered Archaeological Organisation and abides by the Codes of Conduct and Approved Practice and Standards of the Chartered Institute for Archaeologists. The company has all the necessary technical and personnel resources for the satisfactory completion of the survey.

6 INSURANCE & COPYRIGHT

- 6.1 Headland Archaeology (UK) Ltd is fully indemnified and all necessary insurances can be presented on request.
- 6.2 Copyright will be retained by Headland Archaeology (UK) Ltd. Headland will licence the Client and other bodies as necessary for use in matters relating to the project and for use of the project archive by the relevant museum. This licence will also extend to non-commercial use.

7 HEALTH & SAFETY

- 7.1 All of Headland's work is undertaken in accordance with current H&S legislation. A risk assessment and method statement (RAMS) will be prepared prior to the commencement of fieldwork. All staff will wear appropriate PPE.

8 METHOD

- 8.1 A geophysical (magnetometer - gradiometer) survey will be carried out across all of the survey blocks shown on Figure 1, an area totalling approximately 119 hectares.
- 8.2 The survey will be undertaken using four Bartington Grad601 sensors mounted at 1m intervals (allowing for a 1m traverse interval) onto a rigid carrying frame. The system will be programmed to take readings at a frequency of 10Hz (allowing for a 10-15cm sample interval) on roaming traverses spaced 4m apart. These readings will be stored on an external weatherproof laptop and later downloaded for processing and interpretation. MLGrad601 and MultiGrad601 (Geomar Software Inc.) software will be used to collect and export the data. Terrasurveyor V3.0.35.0 (DWConsulting) software will be used to process and present the data.
- 8.3 The magnetometer system will be linked to a Trimble R8s and R2 Real Time Kinetic (RTK) differential Global Positioning System (dGPS) outputting in NMEA mode to ensure a high positional accuracy of each data point.
- 8.4 At the start of each day the magnetometer will be left idle whilst switched on for approximately 30 minutes to allow the instrument to acclimatise to the site conditions. The instrument will thereafter be balanced when necessary and at least twice during the day.
- 8.5 The survey is expected to commence in August 2024 and to take up to 2 weeks with two teams of surveyors. A draft report will be issued to the Client within 3-4 weeks of completion on site.
- 8.6 Any photographs taken during the survey for archive purposes will consist of high-quality digital images of at least 12 megapixels taken using a DSLR camera of the survey area or areas. It shall be accompanied by a photographic register detailing

as a minimum location, and direction of shot. Digital photographs intended for archive purposes will comply with the latest best practice – i.e. high quality non-proprietary raw files (DNG) or TIFF images. Working shots illustrating ground conditions and areas unsuitable for survey will be included within the report but will not form part of the archive.

- 8.7 It is not expected that surface finds be picked up during the course of the survey unless they contribute significantly to the project objectives or are of particular intrinsic interest. Finds of "treasure" will be reported to the Coroner and treated in accordance with the Treasure Act procedures. Any non-treasure finds recovered will be retained and removed from the site for initial assessment and cataloguing. They will be washed (where appropriate), marked, sorted and packed in accordance with the approved recording system and the practices and guidance described in Preparation of Archaeological Archives: Selection, Retention and Dispersal of Archaeological Collections (2010) and the CIFA documents Standard and Guidance for the collection, documentation, conservation and research of archaeological materials (2014).

9 REPORTING AND ARCHIVE

- 9.1 On completion of the survey, a report will be produced containing all relevant information including (but not necessarily limited to):
- site code/project number; dates for fieldwork visits; grid references; location plan, and a plan showing the limits of the survey area,
 - a non-technical summary of the reason for, aims and main results of the survey,
 - an introduction to outline the circumstances leading to the commission of the project and any restrictions,
 - the aims and objectives of the survey,
 - the methodology,
 - a summary and synthesis of the archaeological results in relation to the methods used together with a confidence rating and the perceived importance in local, regional or national context. This shall be supported by survey location plans and plots of minimally processed (X-Y traceplot) data and fully processed (greyscale) data at a minimum scale of 1:2,500 with larger scale (1:1,000) plots of all areas of clear archaeological potential. Each plan/plot will have a bar scale and accurately orientated north arrow. All data plots and interpretative plots will be georeferenced and supplied in .dwg or .shp formats along with the submission of the survey report so that these can be added to the HER digital material together, and
 - references to all primary and secondary sources consulted.
- 9.2 All figures will be reproduced from Ordnance Survey mapping with the permission of the controller of His Majesty's Stationery Office (© Crown copyright).
- 9.3 The project will be archived in-house in accordance with recent good practice guidelines (http://guides.archaeologydataservice.ac.uk/g2gp/Geophysics_3). The data will be stored in an indexed archive and migrated to new formats when necessary (see attached Data Management Plan).

- 9.4 The project will be archived in accordance with National Panel for Archaeological Archives in Wales (NPAAW) Standards and Guidance (2017), Guidance of the Royal Commission on the Ancient and Historical Monuments of Wales (RCAHMW 2015) and Guidance for the Submission of Data to the Welsh Historic Environment Records (HERS) (2022), including the requirement for the summary page to be bilingual.
- 9.5 One bound copy of the final publication (if required) and a digital copy, in PDF format, will be supplied to the Trust for Welsh Archaeology (Heneb), Glamorgan-Gwent Region Historic Environment Record. Georeferenced data plots and interpretation will also be supplied to Heneb.

10 MONITORING

- 10.1 A standard working day will involve driving to site, condition surveys of the survey area, survey area setting out and detailed geophysical survey. Data will be sent back to the office on a regular basis and progress reports provided to the Client.

Key Contacts

Alistair Webb (Project Manager) 01274 938019

TBC (Supervisor)

11 BIBLIOGRAPHY

Chartered Institute for Archaeologists (CIfA) 2020 Standard and guidance for archaeological geophysical survey (Reading)

http://www.archaeologists.net/sites/default/files/CIfAS%26GGeophysics_2.pdf
accessed 31/07/2024

Cranfield University 2024 Cranfield Soil and Agrifood Institute Soilscales

<http://www.landis.org.uk/soilscales/> accessed 31/07/2024

Europae Archaeologia Consilium (EAC) 2016 AC Guidelines for the Use of Geophysics in Archaeology: Questions to Ask and Points to Consider (Namur, Belgium) <https://historicengland.org.uk/images-books/publications/eac-guidelines-for-use-of-geophysics-in-archaeology/> accessed 31/07/2024

Natural Environment Research Council (NERC) 2024 British Geological Survey

<http://www.bgs.ac.uk/> accessed 31/07/2024

Royal Commission on the Ancient and Historical Monuments of Wales 2024

Historic Wales <https://historic-wales-rcahmw.hub.arcgis.com/> accessed 31/07/24

Planning Policy Wales 2024

https://www.gov.wales/sites/default/files/publications/2024-02/planning-policy-wales-edition-12_1.pdf accessed 31/07/24

12 DATA MANAGEMENT PLAN

Section 1: Project Administration

Site Code	TALW24
Project Name	Talwyn Energy Park, South Wales
Author(s)	Alistair Webb
Origination Date	31/07/2024
Reviser(s)	
Date of last revision	
Project stages covered	Geophysical survey
Version	1.0
Related data management policies	ARC-Digital-Housekeeping-v1.1 ARC-Digital-archive-preparation-(England)-v1.1

Section 2: Data Collection

Data to be collected/created	Method of Data collection/creation	Format at source	Relevant source details
Fluxgate Gradiometer data	Fluxgate Gradiometer data is collected on site with data collection software.	MGR	Original data
Minimally processed/Processed raster images	Data processing software	Tiff/PNG	Minimally/processed survey data - geophysicist
Vector files (XY Trace plot)	Data processing software	DXF	Minimally/processed survey data - geophysicist
Vector Interpretation	Digitisation of data in CAD or GIS package	DXF/SHP	CAD/GIS Drawings

Section 3: Documentation and Metadata

File Type	Metadata required	Relevant guidance
Fluxgate Gradiometer data	Sitecode; Filename; Original filename; caption; subject keyword; period; period date; creator; copyright holder; location; Grid reference; creation date; device; device/software version	ARC-Digital-archive-preparation-(England)-v1.1
Minimally processed/Processed raster images	Sitecode; Filename; Original filename; caption; subject keyword; period; period date; creator; copyright holder; location; Grid reference; creation date; device; device/software version	ARC-Digital-archive-preparation-(England)-v1.1
Vector files (XY Trace plot)	Sitecode; Filename; Original filename; caption; subject keyword; period; period date; creator; copyright holder; location; Grid reference; creation date; device; device/software version	ARC-Digital-archive-preparation-(England)-v1.1
Vector Interpretation	Sitecode; Filename; Original filename; caption; subject keyword; period; period date; creator; copyright holder; location; Grid reference; creation date; device; device/software version	ARC-Digital-archive-preparation-(England)-v1.1

Section 4: Ethics and Legal Compliance

Ownership of Intellectual property rights	Conditions for change of ownership	Ethical issues for the project	Relevant release documents etc.
Copyright will be retained by Headland Archaeology (UK) Ltd as far as it applies to any and all items produced by Headland Archaeology (UK) Ltd or its subcontractors in the course of the works. Headland will licence the client, Local Planning Authority, and relevant archives as necessary for use in matters relating to the project. This licence will also extend to non-commercial use.	To be agreed with Client	As required	As required

Section 5: Data Security: Storage and Backup

File Type	Storage of original	Storage of Backup	Frequency of Backup	Responsible Person	Method of security
Photographs (digital)	iPad / Server	Server; Headland sharepoint; database; iPad chain	Daily	Supervisor / Project Officer	Digital data secured behind Active Directory authentication
Survey data	Toughpad / Server	Server; Headland sharepoint; database;	Daily	Supervisor / Project Officer	Digital data secured behind Active Directory authentication
Reports	Server	Internet/server	Daily	Project Officer/Project Manager	Digital data secured behind Active Directory authentication
CAD	Server	Server; Headland sharepoint;	Daily	Project Officer/Project Manager	Digital data secured behind Active Directory authentication
GIS	Server	Server; Headland sharepoint;	Daily	Project Officer/Project Manager	Digital data secured behind Active Directory authentication
Raster	Server	Server; Headland sharepoint;	Daily	Project Officer/Project Manager	Digital data secured behind Active Directory authentication

Section 6: Selection and Preservation

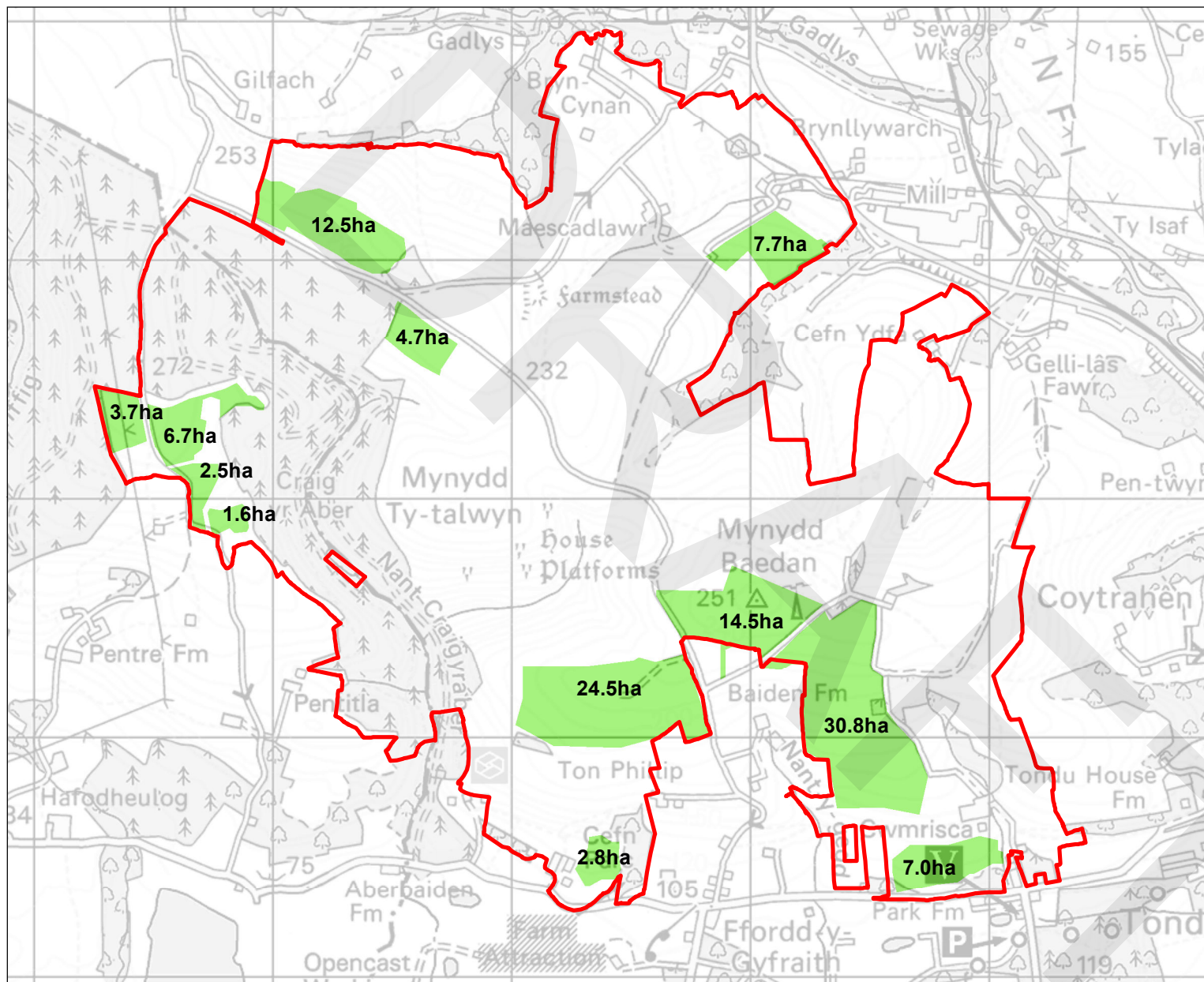
File Type	Preservation by Archive (Y/N)	Preservation format	Selection process
Photographs (digital)	N	N/A	N/A
Survey Data	Y	.csv	All data collected for the report
Reports	Y	.pdf/(A)	Final grey literature report
CAD	Y	.dxf	Vector data used in report production
GIS	Y	.shp	Vector data used in report production
Raster	Y	.TIFF	Images used in report for display of data

Section 7: Data Sharing

Method of data sharing	Relevant file types
Online reports – ADS	.pdf/(A)

Section 8: Responsibilities

Stage of data handling	Responsible person	Primary contact for issues/resolutions
Data collection on site	Supervisor/Project Officer	Project Manager
Digital archive storage	Supervisor/Project Officer	Project Manager
Consolidation of Project archives	Supervisor/Project Officer	Project Manager
Preparation of archive for deposition	Supervisor/Project Officer	Project Manager



KEY

- Site
- Survey Areas

Figure 1: Site Location and Survey Areas

Mynydd Ty-talwyn Energy Park

Client: GGE Wales Ltd

DRWG No: P23-0389

Drawn by: EP

Date: 01/08/2024

Scale: 1:25,000 @ A4

Approved by: GS