



Renewable Energy Systems Limited

# Mynydd Maen Wind Farm

Phase 2 Site Investigation - Coal Mining Risk Assessment

315198-R02 (03)



## RSK GENERAL NOTES

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**Project No.:** 315198

**Title:** Phase 2 Site Investigation - Coal Mining Risk Assessment: Mynydd Maen Wind Farm, Cwmbran NP11 5AY

**Client:** Renewable Energy Systems Limited

**Date:** September 2023

**Office:** RSK Environment Limited, The Old School House, Stillhouse Lane, Bedminster, Bristol, BS3 4EB. Tel 0117 947 1006

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Where field investigations have been carried out, these have been restricted to a level of detail required to achieve the stated objectives of the work.

# CONTENTS

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<b>EXECUTIVE SUMMARY .....</b>	<b>1</b>
<b>1 INTRODUCTION .....</b>	<b>3</b>
1.1 Commissioning .....	3
1.2 Objectives .....	3
1.3 Scope of works .....	3
1.4 Existing reports .....	3
1.5 Limitations .....	4
<b>2 SITE DETAILS .....</b>	<b>5</b>
2.1 Site location .....	5
2.2 Site description .....	5
2.3 Surrounding land uses .....	5
2.4 Development plans .....	5
2.5 Summary of previous investigations .....	6
<b>3 SITE INVESTIGATION STRATEGY &amp; METHODOLOGY .....</b>	<b>7</b>
3.1 Introduction .....	7
3.2 Objectives .....	7
3.3 Selection of investigation methods .....	7
3.4 Investigation strategy .....	7
<b>4 SITE INVESTIGATION FACTUAL FINDINGS .....</b>	<b>9</b>
4.1 Ground conditions encountered .....	9
4.2 Groundwater and surface water .....	10
4.3 Coal Mining Hazards .....	10
<b>5 CONCLUSIONS AND RECOMMENDATIONS .....</b>	<b>11</b>
5.1 Coal Mining Risk Assessment .....	11
5.2 Recommendations .....	11
<b>REFERENCES .....</b>	<b>12</b>

## FIGURES

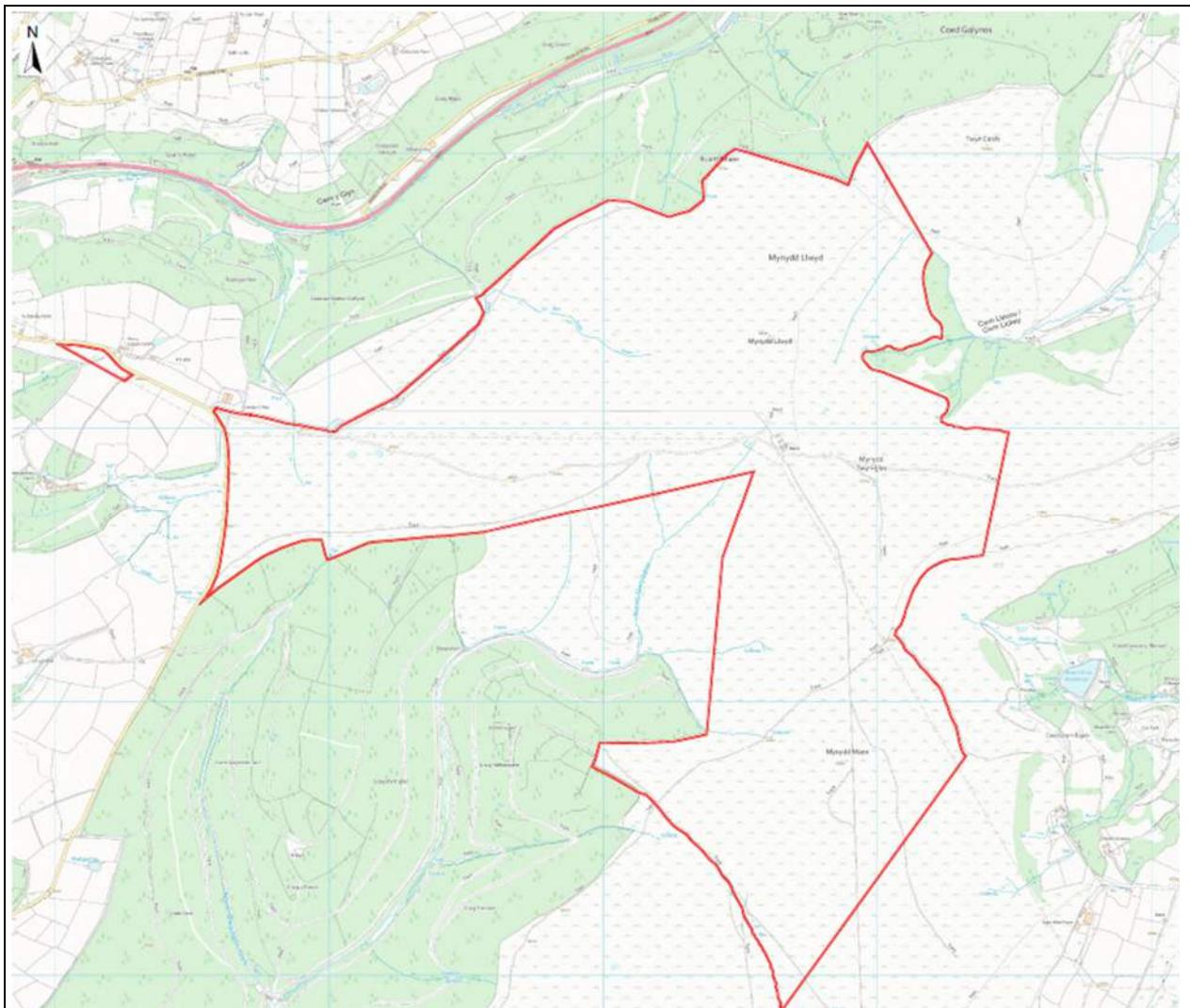
Figure 1	Site location plan
Figure 2	Site layout plan
Figure 3	Exploratory hole location plan

## APPENDICES

Appendix A	Service constraints
Appendix B	Development drawings
Appendix C	Utility service plans
Appendix D	Photographs
Appendix E	Technical background
Appendix F	Exploratory hole records

# EXECUTIVE SUMMARY

<b>Commissioning and purpose of assessment</b>	RSK Environment Limited (RSK) was commissioned by Renewable Energy Systems Limited to carry out a Phase 2 Site Investigation - Coal Mining Risk Assessment of the land at Mynydd Maen Wind Farm, Cwmbran, NP11 5AY, grid reference ST 25754, 97735. The overall aim of this work was to assess potential coal mining risks identified in an earlier phase of work.
<b>DESK-BASED ASSESSMENT</b>	
<b>Site description and proposed development</b>	The site currently comprises of rough moorland and covers approximately 2000 hectares.  The proposed development is a wind farm.
<b>Previous site investigation (SI) reports</b>	In March 2023, RSK undertook a desk based CMRA for Mynydd Maen based on the available data at that time. The site specific coal mining risk which required further assessment (by subsequent intrusive investigation the findings of which are presented in this report) included the possible presence of shallow underground workings in the Mynyddislyn coal seam.
<b>Geology and environmental setting</b>	The site is underlain by peat, over the Hughes member sandstone according to published geological data.  Records from the Coal Authority indicate the potential presence of 4 shallow coal seams across the site including the Tillery Rider No.2, Mynyddislyn Lower Leaf, Cefn Glas and Brittdir coal seam.
<b>INTRUSIVE INVESTIGATION &amp; ASSESSMENT</b>	
<b>SI scope</b>	Four rotary open hole boreholes and four trial pits at each of four proposed turbine locations (T3, T7, T8 and T11).
<b>SI factual findings</b>	The site is underlain by a layer of peat (between 0.20m to 0.6m thick) over varying amounts of clay, sands and gravels with sandstone bedrock encountered at 1.0m to 2.1m bgl. Generally groundwater was not encountered except for a small seepage found in trial pit T3(RO) at 0.6mbgl.  No evidence of coal seams or workings were recorded in any of the exploratory holes.
<b>Coal Mining Risk Assessment</b>	Based on the exploratory findings, it is considered that there is a low or negligible risk from coal mining related hazards at the assessment site, which will have little or no effect on the proposed development.
<b>Recommendations including issues for further assessment</b>	No further investigation or remediation with regards to coal mining hazards is required at the assessment site.
<p><i>The information given in this summary is necessarily incomplete and is provided for initial briefing purposes only. The summary must not be used as a substitute for the full text of the report.</i></p>	



Site Name	Mynydd Maen Wind Farm	NGR	ST 25754, 97735
Site Address	Cwmbran NP11 5AY	Site area (ha.)	366

# 1 INTRODUCTION

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## 1.1 Commissioning

RSK Environment Limited (RSK) was commissioned by Renewable Energy Systems Limited to carry out a Phase 2 Site Investigation - Coal Mining Risk Assessment of the land at Mynydd Maen Wind Farm, Cwmbran NP11 5AY. The project was carried out to an agreed brief as set out in RSK's proposal (reference T315198, dated 20 January 2023). This commission follows an earlier, desk-based assessment completed by RSK and presented in RSK report, Mynydd Maen Wind Farm Coal Mining Risk Assessment, document reference 315198 R01 (02), dated March 2023.

The work is subject to RSK's Service Constraints, which are included in **Appendix A**.

The site in question is being considered for development for commercial use as a wind farm.

## 1.2 Objectives

The objective of the work is to assess the risk of the presence of potential shallow historical coal workings, identified in the desk based study undertaken by RSK in early March 2023 (Coal Mining Risk Assessment Report ref 315198 R01), at proposed wind turbine locations T3, T7, T8 and T11.

## 1.3 Scope of works

The scope of this assessment has been developed in accordance with relevant British Standards and authoritative technical guidance as referenced through the report. It is also compliant with relevant planning policy and guidance.

The scope of the intrusive investigation has been designed in line with the recommendations of BS5930:2015+A1:2020 Code of practice for ground investigations (BSI, 2020), which maintains compliance with BS EN 1997-1 and 1997-2 and their related standards. It has also been developed in general accordance with BS 10175: 2011 + A2 2017.

The scope of works for the assessment has included the following:

### **Intrusive investigation**

- design and implementation of an intrusive investigation
- interpretation of ground conditions to develop an updated risk level from coal mining
- preparation of this interpretative report.

## 1.4 Existing reports

The following reports detailing previous works at the site were made available for review:

- RSK report, Mynydd Maen Wind Farm Coal Mining Risk Assessment 315198 R01 (02), March 2023 (NB this included review of an earlier report carried out by Geoinvestigate Limited "Coal Mining Risk Assessment (CMRA), Mynydd Maen Wind

Farm, Torfaen, between Newbridge and Cwmbran NP4 6US. 13 November 2020.  
Project ID4412, Ref. G20374")

Pertinent information from these reports has been summarised in Section 2.

## 1.5 Limitations

This report is subject to the RSK Service Constraints given in **Appendix A** and limitations that may be described through this document.

## 2 SITE DETAILS

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### 2.1 Site location

Site location details are presented in Table 1 and a site location plan is provided on **Figure 1**.

**Table 1 Site location details**

<b>Site name</b>	Mynydd Maen Wind Farm
<b>Full site address and post code</b>	Mynydd Maen, Cwmbran NP11 5AY
<b>National Grid reference (approximate centre of site)</b>	ST 25754, 97735

### 2.2 Site description

The site is located between Newbridge and Cwmbran, south of the A472 highway. The site covers an area of approximately 366 hectares comprising rough open moorland and trackways, surrounded by a variety of woodlands and valleys. There are a number of significant watercourses running through the open moorland.

An existing telecoms mast is located roughly in the centre of site at 325660, 197923, and a number of underground services cross through the development area.

The site boundary and current layout are presented in **Figure 2**.

### 2.3 Surrounding land uses

The site is located on the moorland above Cwmbran. Immediate surrounding land uses are described in Table 2.

**Table 2 Surrounding land uses**

<b>North</b>	A472 road and the Tirpentwys nature reserve beyond
<b>East</b>	Pontypool and Cwmbran
<b>South</b>	Moorland, agricultural land, Cwmcarn forest
<b>West</b>	Fields, agricultural land, Cwmcarn forest, Newbridge and Abercarn

### 2.4 Development plans

The proposed layout of the site, at the time of preparing this report, is shown in **Appendix B**.

The proposed development is understood to be a wind farm comprised of up to 13 turbines, a substation and associated trackways.

## 2.5 Summary of previous investigations

A summary of pertinent information from previous investigations is included in Table 3.

**Table 3 Summary of previous investigation reports**

<b>Report Details</b>	RSK, 315198 R01 (02), Coal Mining Risk Assessment: Mynydd Maen Wind Farm, March 2023.
<b>Site coverage</b>	Entire site.
<b>Summary scope of works</b>	Desk based assessment of available coal mining records (including Geoinvestigate CMRA report from November 2020).
<b>Key findings</b>	<p>There are underground workings in a number of coal and one ironstone seams beneath the site between 171m and 627m depth.</p> <p>There are 4 coal seams at potentially shallow depth beneath parts of the site including the Tillary Rider No.2, Mynyddislyn Lower Leaf, Cefn Glas and Brithdir coal seam. Four proposed turbines (T3, T7, T8 and T11) are located in the vicinity of the Mynyddislyn coal seam. Although records indicate that unrecorded shallow workings (&lt;30m) are not probable directly beneath site, the Coal Authority have indicated on their interactive viewer that parts of site are considered development high risk based on coal seam outcrops and have the potential to have been worked.</p> <p>A number of shafts are recorded around the perimeter of site, the nearest being over 300m to the north east of proposed turbine 1. Given that no entries are present in the vicinity of development, no further consideration of these features is required.</p> <p>There are a number of geological faults recorded beneath or close to the site. They are generally of limited extent and not thought to have resulted in significant structural movement.</p> <p>Given the significant depth of workings, the lack of any known potential direct migration pathway and the proposed form of development, the risk posed by mine gases is considered negligible.</p> <p>The potential presence of shallow workings in the Mynyddislyn coal seam at the four proposed turbine locations is the only identified risk that requires further assessment.</p>

## **3 SITE INVESTIGATION STRATEGY & METHODOLOGY**

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### **3.1 Introduction**

RSK carried out intrusive investigation works between 6 and 14 March 2023.

### **3.2 Objectives**

The specific objective of the investigation was to establish the ground conditions and assess the identified risk from coal shallow coal workings at the four proposed turbine locations (T3, T7, T8 and T11).

### **3.3 Selection of investigation methods**

The techniques adopted for the investigation were chosen with consideration of the objectives and site constraints, which are described below.

Mechanically excavated trial pits were chosen to allow for rapid assessment of shallow ground conditions where coal was suspected to occur near surface in the vicinity of certain turbine locations. Rotary open hole drilling was conducted following the initial trial pitting exercise in search for evidence of historical shallow mine workings in coal seams beneath the site (such as coal arisings, broken ground or voids), drilling was completed to a maximum depth of 20m bgl.

Prior to conducting intrusive works, utility service plans were obtained and buried service clearance undertaken in line with RSK's health and safety procedures. Copies of statutory service records obtained by RSK as part of the agreed scope of works are contained in **Appendix C**.

### **3.4 Investigation strategy**

The ground investigation was carried out using intrusive ground investigation techniques in general accordance with the recommendations of BS5930:2015+A1:2020, which maintains compliance with BS EN 1997-1 and 1997-2 and their related standards. Whilst every attempt was made to record full details of the strata encountered in the boreholes, techniques of hole formation will inevitably lead to disturbance, mixing or loss of material in some soils and rocks.

The investigation strategy involved targeted boreholes and trial pits following the results of a desk based report undertaken by RSK in March 2023. The report identified that four proposed turbines (T3, T7, T8 and T11) are located in the vicinity of the Mynyddislyn coal seam and could potentially be at risk from coal mining related hazards.

The constraints to the investigation were as follows:

- overhead and underground services
- boggy terrain
- large distances between exploratory locations

- access issues during extreme weather conditions (snow and strong winds)

Details of the investigation locations and rationale are presented in Table 4. Machine excavated trial pits were dug at each of the four proposed turbine locations (T3, T7, T8 and T11) to a maximum depth of 2.50m bgl before being backfilled with arisings. Four rotary open holes were drilled at each of the four turbine locations to a maximum depth of 20m bgl before being backfilled with bentonite. An exploratory hole location plan is shown on **Figure 3**.

**Table 4 Exploratory hole and monitoring well location rationale**

Investigation type	Number	Location – investigation method	Rationale
Trial-pits excavated by mechanical excavator	4	T3 - TP T7 - TP T8 - TP T11 - TP	To investigate shallow ground conditions beneath proposed turbine locations T3, T7, T8 and T11.
Boreholes by rotary open hole	4	T3 - RO T7 - RO T8 - RO T11 - RO	To prove or disprove the presence of shallow mine workings beneath proposed turbine locations T3, T7, T8 and T11.
T3 etc denotes turbine location and reference number, TP denotes mechanically excavated trial pit, RO denotes rotary open hole borehole			

### 3.4.1 Implementation of investigation works

The site investigation works were carried out in general accordance with the UK Specification for Ground Investigation (UKSGI), third edition (AGS, 2022).

The exploratory holes were logged by an engineer in general accordance with the recommendations of BS5930:2015+A1:2020 (which incorporates the requirements of BS EN ISO 14688-1, 14688-2 and 14689-1).

## 4 SITE INVESTIGATION FACTUAL FINDINGS

The results of the intrusive investigation undertaken are detailed below.

### 4.1 Ground conditions encountered

The descriptions of the strata encountered, notes regarding visual or olfactory evidence of contamination and field observations of soil and groundwater are included on the exploratory hole records presented in **Appendix F**.

At all trial pit and borehole locations the same sequence of lithologies were recorded which varied slightly in thickness. The exploratory holes revealed that the site is underlain by a layer of peat over varying amounts of clay, sands and gravels with sandstone bedrock encountered at relatively shallow depths.

For the purpose of discussion, the ground conditions encountered during the fieldworks are summarised in Table 5 with the strata discussed in subsequent subsections.

**Table 5 General succession of strata encountered**

Stratum	Exploratory holes encountered	Depth to top of stratum m bgl	Proven thickness (m)
<b>Peat</b>	All four trial pits All four boreholes	0.0	0.20 - 0.60
<b>Clay/ sand/ gravel</b>	All four trial pits All four boreholes	0.20 – 0.60	0.65 - 1.80
<b>Sandstone bedrock</b> (believed to be the Hughes member of the Pennant Sandstone Formation)	All four trial pits All four boreholes	1.00 - 2.10	18.60 - 19.00

#### 4.1.1 Peat

Peat was encountered at all locations directly beneath the grass or moss at surface up to a depth of between 0.20m and 0.60m bgl. The peat was generally black in colour, amorphous, sandy or clayey, plastic or spongey and often contained rootlets.

#### 4.1.2 Variable cohesive and granular unit

This stratum was encountered at all locations at a depth of between 0.20m and 0.6m below ground level and varied between 0.65m and 1.8m in thickness. Cohesive layers were generally orange brown slightly sandy gravelly clay. Granular layers were comprised of primarily sand or gravel with varying amounts of secondary components including clay, silt, sand or gravel. All gravel observed was comprised of sandstone.

#### **4.1.3 Hughes Member of the Pennant Sandstone Formation**

Bedrock (believed to represent the Hughes member of the Pennant Sandstone Formation) was encountered at all locations at a depth of between 1.00m and 2.10m below ground level and comprised of grey fine to coarse sandstone. The layer of sandstone had a minimum thickness of 18.6m.

### **4.2 Groundwater and surface water**

#### **4.2.1 Groundwater encountered during intrusive works**

Groundwater was not encountered during the investigation works. A seepage of perched groundwater was encountered at the base of the peat in borehole T3 (RO) at 0.60 mbgl.

### **4.3 Coal Mining Hazards**

Ground conditions which may be evidence of possible shallow underground coal mining, such as; intact coal seams; voids; broken or highly fractured ground; soft or backfilled materials within bedrock; or rapid drilling progress or unexpected loss of drilling flush, were **not** encountered in any of the exploratory boreholes.

In summary the boreholes recorded intact sandstone bedrock throughout and there was no evidence of any underground coal mining to the full depths of drilling.

## 5 CONCLUSIONS AND RECOMMENDATIONS

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### 5.1 Coal Mining Risk Assessment

The investigation has **not** encountered **any** evidence of shallow coal seams or unrecorded shallow workings beneath site up to a maximum depth of 20m bgl in all exploratory locations.

Adequate minimum rock cover (18m to 19m) has been proved in turbine locations T3, T7, T8 and T11; should as a worst case, the seam be present immediately below the base of the borehole.

Based on the above findings, there is a **low or negligible risk** from coal mining related hazards at the assessment site and will have little/no effect on the proposed development.

### 5.2 Recommendations

No further investigation or remediation with regards to coal mining hazards is required at the assessment site.

# REFERENCES

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## Previous SI reports and other site related information

RSK, 315198 R01 (02), Coal Mining Risk Assessment: Mynydd Maen Wind Farm, March 2023.

OR

## Standards and guidance

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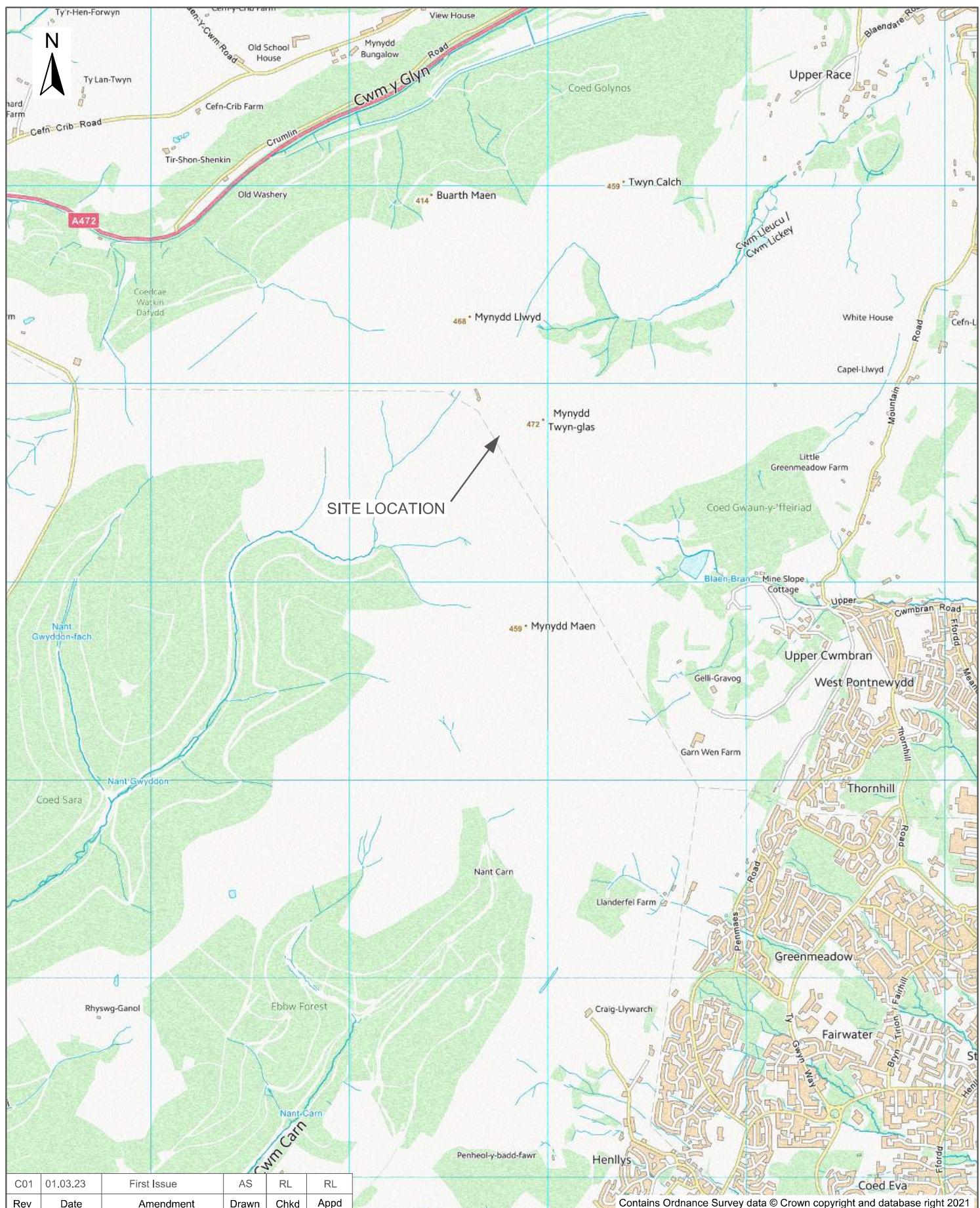
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## **FIGURES**

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## FIGURE 1 SITE LOCATION PLAN



The Old School  
Stillhouse Lane  
Bristol  
BS3 4EB

Tel: +44(0)1414 180471  
Email: info@rsk.co.uk  
Web: www.rsk.co.uk

**Client**  
Renewable Energy Systems Limited  
**Project Name**  
Mynydd Maen Wind Farm  
**Description**  
Site Location Plan

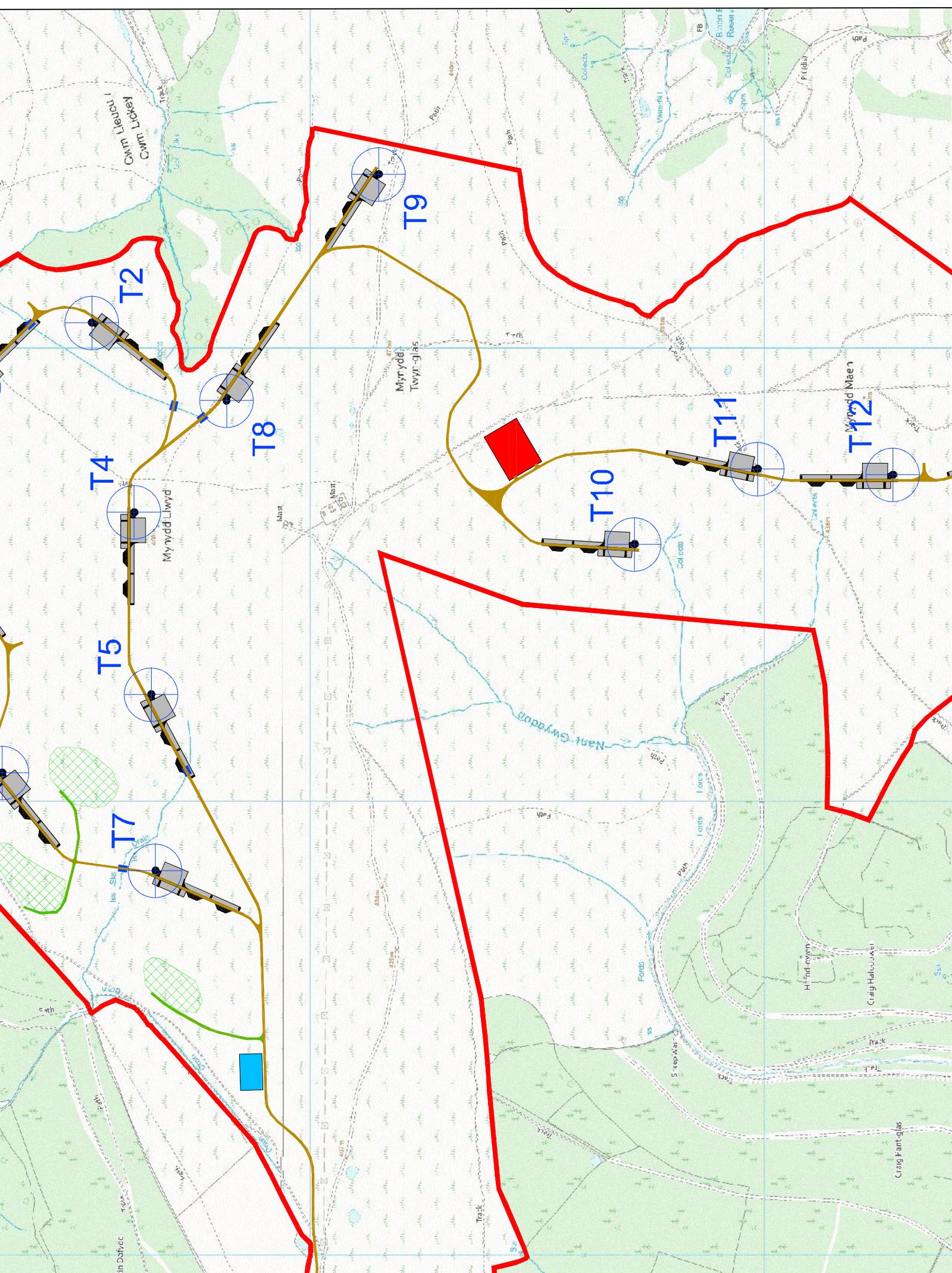
Dimension	Size	Scale	Geolocation	Project ID	Drawing no.	Rev	File name
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## FIGURE 2 SITE LAYOUT PLAN

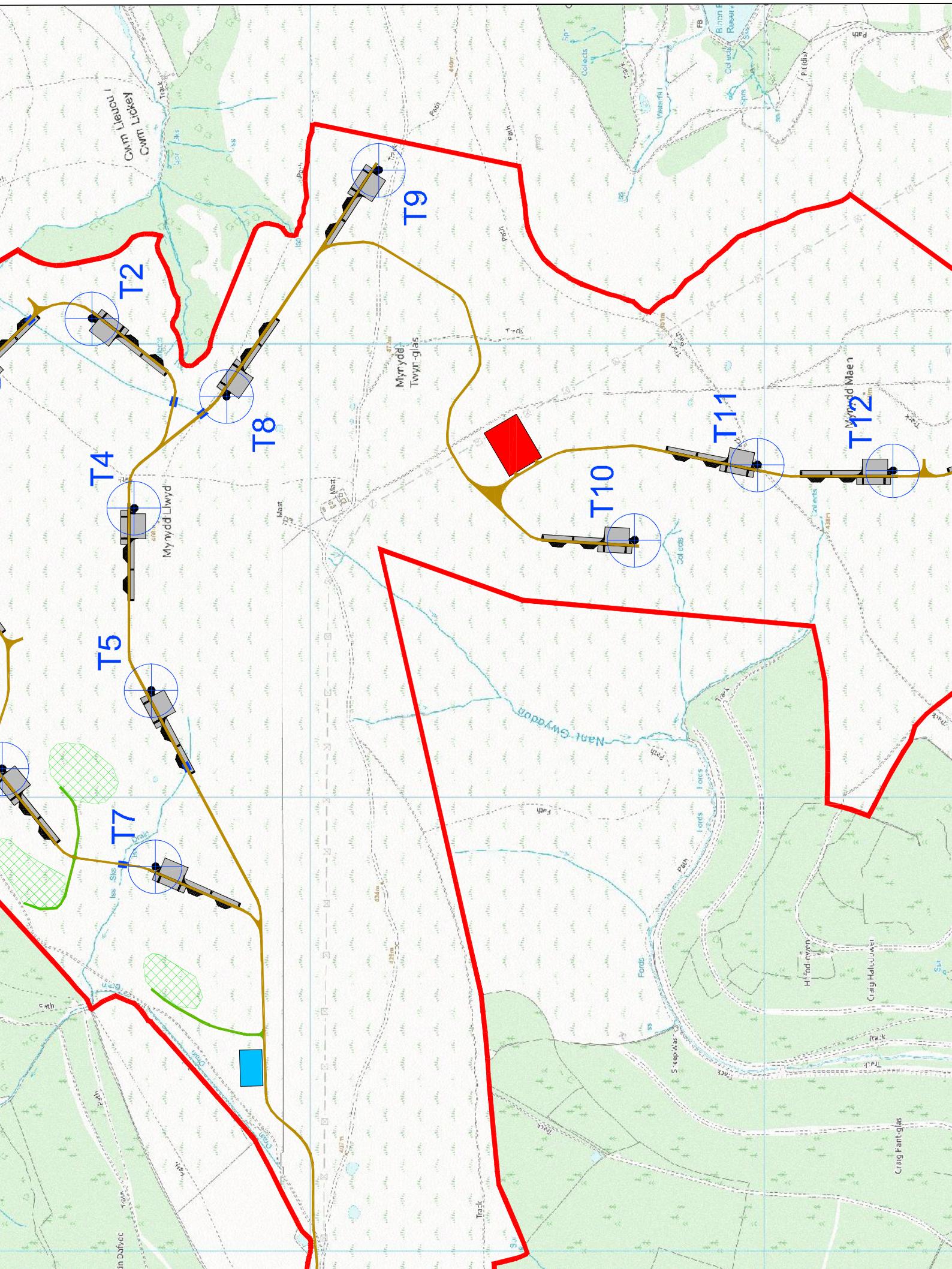
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NOTES:





## FIGURE 3 EXPLORATORY HOLE LOCATION PLAN

