25 August 2025

# Mynydd Maen Wind Farm

## Request for further information: Peatland Resource Response (Rigare)

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| Date | 25/08/2025 |
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# Contents

# 1 Introduction

## 1.1 Overview

1.1.1 This document has been prepared in response to a formal request for further information issued by Planning and Environment Decisions Wales (PEDW) as part of the ongoing planning application for the Mynydd Maen Wind Farm (DNS/3276725). The request forms part of the regulatory framework under Regulation 24 of the Environmental Impact Assessment (EIA) Regulations and Regulation 15(2) of the Development of National Significance (DNS) regulations. The regulations mandates consultation and submission of supplementary technical information to support the determination of the application and the formal request was made by PEDW in a letter addressed to the Applicant dated 03 June 2025.

1.1.2 The application has undergone consultation with statutory consultees and stakeholders, and this document aims to address specific queries and provide clarifications as requested by the appointed inspector. Each topic has been addressed by subject matter experts to ensure the responses are robust, evidence-based, and aligned with regulatory expectations.

## 1.2 Author

1.2.1 The technical note has been prepared by Dr Rob Low. A chartered Geologist and Fellow of the Geological Society of London.

1.2.2 Dr Low has a PHD from University of East Anglia, gained through studying the hydrogeology of the Chalk aquifer of East Anglia and also carried out post-doctoral research on the Chalk aquifer. Dr Low has 30 years' professional experience as a consultancy hydrogeologist and 20 years' as a wetland hydrologist and ecohydrologist.

1.2.3 In 2008, Dr Low founded Rigare Ltd who provide expert services in groundwater and wetland hydrological science who have been acting as external consultants for the proposed development in relation to the above matters.

1.2.4 The document has been compiled and coordinated by Renewable Energy Systems (RES).

## 1.3 Stakeholder Concerns

1.3.1 The following primarily addresses comments within the Land Quality Advice Service (LQAS) response relating to irreplaceable habitats, primarily peatland. As such, the sections in this note correspond with the sections in the LQAS response, specifically LQAS's Sections 2 (addressed in Section 2 here) and Section 3 (addressed in Section 3 here).

1.3.2 Relevant comments from other responses, including Natural Resources Wales' comments on Peat, Hydrology and Hydrogeology, are addressed implicitly below.

# 2 Peat Soils and Peatland Habitats

2.1.1 Section 2 of the LQAS response notes that, in its view;

'*if approved, [the application] would involve the loss of peatland habitat and peat soil contrary to Chapter 6 of Planning Policy Wales 12*. It further notes that *Chapter 6 of PPW12 sets out that there should be no development on peatland defined as irreplaceable habitat unless in wholly exceptional circumstances.'*

2.1.2 RES has divided the peat resource on Mynydd Maen into two categories:

- Peat less than 0.4 m thickness. There are wholly exceptional circumstances (*sensu* PPW12), as detailed in Section 2.1, which give scope for development on this resource.
- Greater than 0.4 m thickness. There are no wholly exceptional circumstances to allow proposals for development on this irreplaceable habitat. It, and importantly the natural resources which underpin it, are safeguarded within the proposal, as detailed in Section 2.2.

## 2.2 Peat less than 0.4m thick

### Mynydd Maen's hydro-climatic marginality for peat accumulation

2.2.1 There are no obvious signs of extensive peat mining on Mynydd Maen, and therefore the existing thickness of peat appears largely to be a function of peat accumulation under historical hydro-climatic conditions. Peat has accumulated on the site since the Pleistocene glaciation, i.e., during the c. 10,000 years of the Holocene period. A peat thickness of 0.4 m gives an average accumulation rate of 0.04 mm/a, and very extensive areas of Mynydd Maen have peat thicknesses between 0.1 and 0.3 m (ES Volume 3, Figure 9.3) implying average accumulation rates of 0.01-0.03 mm/a. These peat accumulation rates are between 25- and 100-times less than the 1.0 mm/a quoted in the LQAS response. They are also much less than implied accumulation rates in North and West Wales for blanket mire in similar topographic situations; blanket mire thicknesses in these areas of 1-4 m give an implied accumulation rate of 0.1-0.4 mm/a, an order of magnitude greater than at Mynydd Maen.

2.2.2 It is reasonable to conclude from the above that Mynydd Maen has been, and is, hydro-climatically marginal for peat accumulation. As noted in ES Technical Appendix 9.5, rainfall at Mynydd Maen is relatively low because of its rain-shadow location to the east of higher ground in South Wales, and its southerly location means that evapotranspiration is relatively high because of warmer temperatures. This is demonstrated quantitatively in Figure 2.1 which shows long-term (1960-2023) daily effective rainfall for Mynydd Maen, along with the same for various locations in Wales which are associated with deeper peat deposits. Effective rainfall is simply rainfall minus potential evapotranspiration; the data here are taken from daily values for rainfall[1] and potential evapotranspiration[2] available for 1 km grid squares covering the UK:

- The Tywi Forest, southern Cambrian Mountains.
- Lake Vyrnwy, western Berwyn.
- Capel Curig, northern Snowdonia.

[1] Hollis, D.; McCarthy, M.; Kendon, M.; Legg, T. (2023). HadUK-Grid Climate Observations by UK countries, v1.2.0.ceda (1836-2022). NERC EDS Centre for Environmental Data Analysis, 30 August 2023. doi:10.5285/3d30627eee5a48be844c32723b7b6be8

[2] Environment Agency (2025) Environment Agency Potential Evapotranspiration Dataset. Available from **https://environment.data.gov.uk/dataset/f8836b22-ba9a-4bd1-8a42-d44b68ef837e**

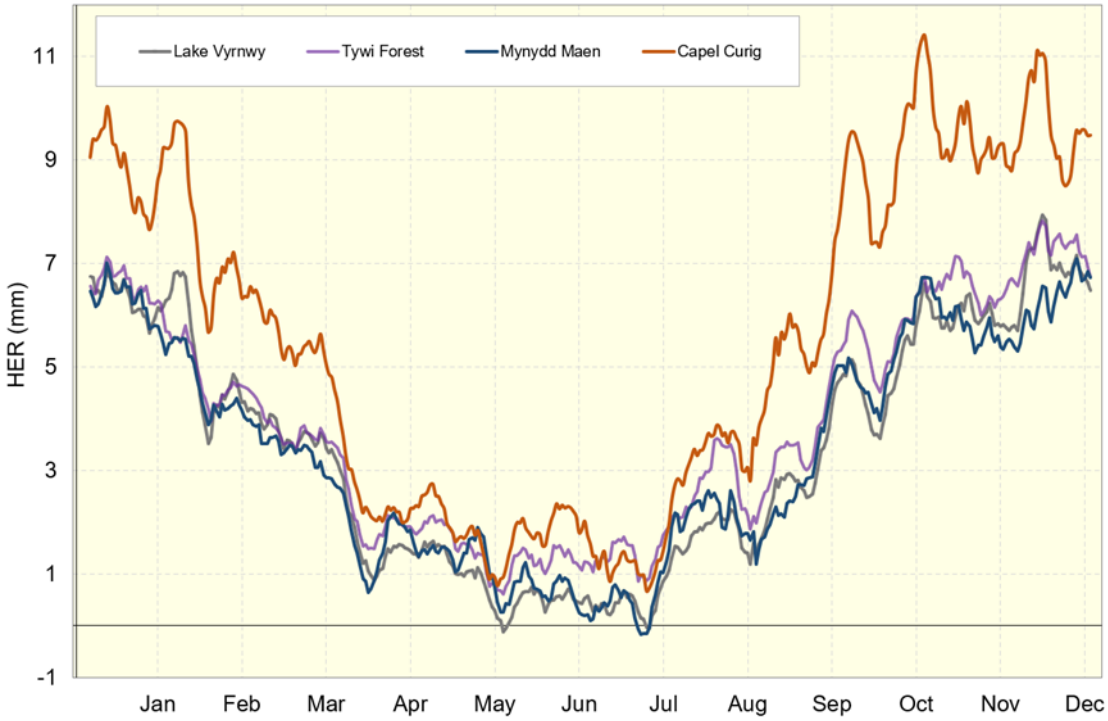


Figure 2.1 - Long-term average (1960-2023) daily effective rainfall for various locations across Wales.

2.2.3 Higher values of effective rainfall generally indicate a greater proclivity for accumulation of peat, especially during the warmer months of the year (April to September inclusive) when conditions are generally drier. It can be seen from Figure 2.1 that effective rainfall at Mynydd Maen is low compared to the sites further north and west within Wales, demonstrating that its relative proclivity for peat accumulation under recent climatic conditions is low.

2.2.4 It is also very likely that the current peat resource is smaller than its historical maximum as it has been lost to oxidation as a result of recent low water tables relative to the ground surface (e.g., Section 3.8.1, ES Technical Appendix 9.3). The low water tables are being caused by:

- Climate change to date:
  - Higher temperatures (approaching +1.5 ºC compared to pre-industrial times) have caused an increase in potential evapotranspiration.
  - A reduction in warmer-month (April-September inclusive) period rainfall. Combined with the above, this has caused a decrease in warmer-month period effective rainfall (rainfall minus evapotranspiration).
  - Higher intensity rainfall, meaning that more water is lost from the site during and immediately after rainfall to surface runoff.
- Enhanced transpiration from the dominant dry heath vegetation

## Current water table elevation regimes

2.2.5 Five dipwells were installed within the site, equipped with automatic water level recorders (AWLRs), on 23rd July 2025. Details of the dipwells are given in Table 2.1, and a map showing dipwell locations (Figure 3.1) is provided at the end of this document. The dipwells were all installed within the small areas of deeper (0.3-0.65 m) peat within the site, as given in Table 2.1.

2.2.6 The AWLRs were download on 12th August 2025, giving a monitoring period to date of 20 days, i.e., just a snapshot of the water table elevation (WTE) regimes at the site. The AWLRs have been left in place to collect more data.

Table 2.1 Details of dipwells installed on 23rd July 2025, Mynydd Maen.

| Dipwells | Easting | Northing | Elevation | Extension | Depth | Peat thickness |
|---|---|---|---|---|---|---|
| | | | (maOD) | (maGL) | (mbGL) | (m) |
| MM RES DW1 | 325780.4 | 196284.6 | 443.498 | 0.05 | 0.95 | 0.34 |
| MM RES DW2 | 325819.5 | 196984.3 | 457.383 | 0.04 | 0.96 | 0.30 |
| MM RES DW3 | 325893.9 | 197954.6 | 470.352 | 0.01 | 0.99 | 0.60 |
| MM RES DW4 | 325489.6 | 198526 | 458.376 | 0.17 | 0.83 | 0.30 |
| MM RES DW5 | 326017.5 | 198769.2 | 449.195 | 0.04 | 0.96 | 0.65 |

2.2.7 During the visit on 12th August 2025, it was found that all five dipwells were dry to their bases (given as 'depth, mbGL' in Table 2.1). Inspection of the logged data showed that the water table had been below the bases of all the dipwells throughout the short monitoring period.

2.2.8 Reference to the monthly Hydrological Summary for the United Kingdom for June 2025[3] shows that Wales received 70% of long-term average (1991-2020) rainfall for March-June 2025 inclusive, and the dry weather extended through July and into early August 2025. Even though this represents a prolonged dry period, the fact that the water table has been below at least 0.95 mbGL in DW1-3 and DW5, and below 0.83 mbGL in DW4, for the entire monitoring period, indicates that the peat on the site is extremely dry. It seems reasonable to infer that:

- Over the extensive areas where peat is less than 0.4 m thick, the water table lies below the base of the peat for significant parts of the warmer-month period each year.
- The organic matter (peat) lost to aerobic decomposition under this circumstance will greatly exceed any accumulation of organic matter during the colder-month period, and therefore the peat mass is reducing through time.

## Future climate change

2.2.9 Reference to the Met Office's UK Climate Projections 2018 (UKCP18) suggests that the climate trends noted above will continue into the future. Figure 2.2 shows the projected average mean air temperature anomaly for 2030-2058:

- From the baseline of 1961-1990;

[3] HS_202506v3.pdf

- For the 25 km grid-square including Mynydd Maen.
- For an intermediate-high representative (emissions) concentration pathway (RCP6.0).

2.2.10 For the same criteria, Figure 2.3 shows that summer rainfall is projected to decrease by c. 10%. The combined effect of these two projections is that effective rainfall will be much reduced during the warmer-month period, which tends to be the critical period for peatland water tables. It is considered very likely that the historically marginal hydro-climate for peat accumulation will transition to a hydro-climate which is unsuitable for peat accumulation in the near future.

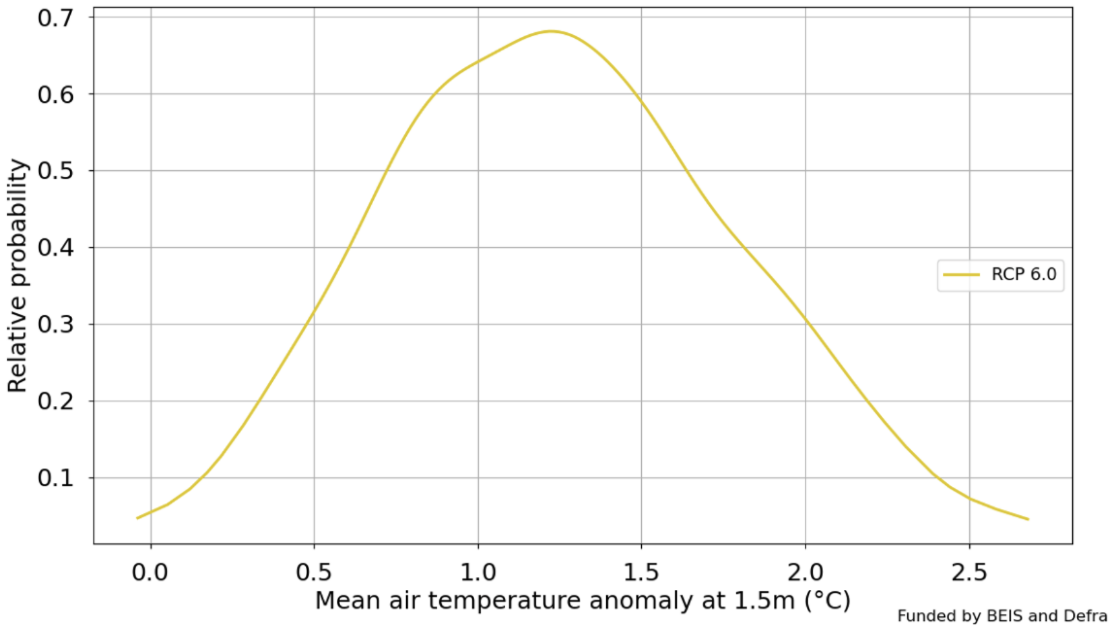


Figure 2.2 - UKCP18 projected mean air temperature, 2030-2058 (see text for details).

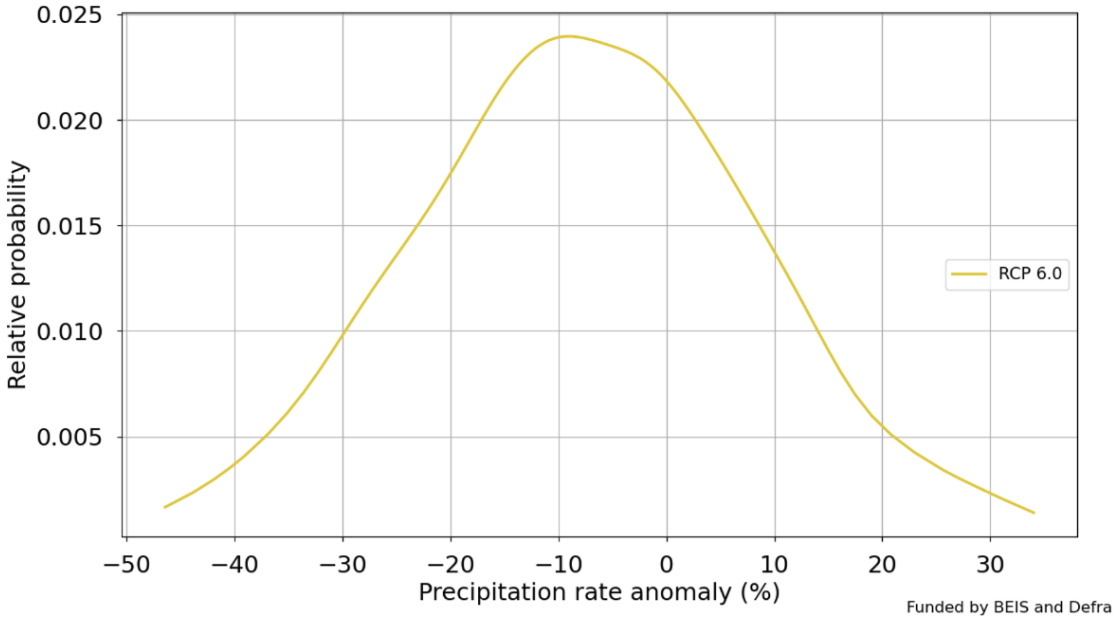


Figure 2.3 - UKCP18 projected summer (Jun-Aug incl.) rainfall anomaly, 2030-2058 (see text for details).

## Summary

2.2.11 In summary:

- Accumulation of 0.4 m and less of peat over a time period of c. 10,000 years, at an implied rate of 0.01-0.04 mm/a, demonstrates that Mynydd Maen has been and is hydro-climatically marginal for peat accumulation.
- Recent monitoring of WTE at Mynydd Maen has shown that the water table is very low; the peat is extremely dry.
- Consideration of the existing and future effects of climate change suggests that the hydro-climate at Mynydd Maen has become unsuitable for peat accumulation during the industrial period, and will become more unsuitable in the future. It is almost certain that the existing peat will gradually be lost, i.e., low water tables will cause loss of the peat to oxidation through time.

2.2.12 It is concluded that the long-term existence of peat where current thickness is 0.4 m or less on Mynydd Maen is very unlikely. It is also important to note that the thinner deposits occur on open hillsides, where the potential for peat accumulation is wholly related to the incident hydro-climate, and where any kind of peatland restoration would be extremely difficult and unlikely to succeed.

## 2.3 Peat Greater than 0.4m thick

2.3.1 On Mynydd Maen peat greater than 0.4 m thick occurs in a number of relatively small areas distributed widely across the site (ES Volume 3, Figure 9.3). In contrast to the extensive areas with thinner peat, this very discontinuous thicker peat has generally developed in locations:

1. With an upslope hydrological catchment, which increases water supply through surface runoff and/or shallow groundwater flow, and/or;
2. Where there were small, water-retaining closed depressions in the post-glacial (pre-peat) topography.

2.3.2 These factors mean that peat accumulation was not and is not solely reliant on the incident hydro-climate (see 2.2), and the enhanced water supply (1 above) and water retention (2 above) allowed the development of deeper peat. Therefore, because of the hydrological locations in which deeper (>0.4 m) peat occurs, it is possible that its long-term existence, and that of associated peatland habitats, can be secured. In this context, the wind farm proposal has been developed such that:

- The wind farm infrastructure avoids deep (>0.4 m) peat in all but a very few cases, which are unavoidable in terms of infrastructure design.
- The *natural resources which underpin* (*sensu* PPW12) the deeper peat (i.e., irreplaceable habitat) are fully safeguarded in the proposal.

2.3.3 The latter is set out in ES Technical Appendix 9.5 which is founded on the overarching principle of hydrological neutrality, specifically in the context of; 1) on-site water-dependent ecological features and habitats (GWDTEs[4]), and 2) peat, as receptors. The main proposed approach to achieve hydrological neutrality is interception of hillslope (surface runoff and shallow groundwater) flow immediately upslope of infrastructure, culverted transfer of water across the infrastructure, and re-distribution of water to runoff and shallow groundwater flow immediately downslope. In relation to the deeper peat on site, this means that any water which is supplied from upslope hydrological catchments (see 1 above) will be safeguarded.

[4] Groundwater-Dependent Terrestrial Ecosystems

# 3 Appendix

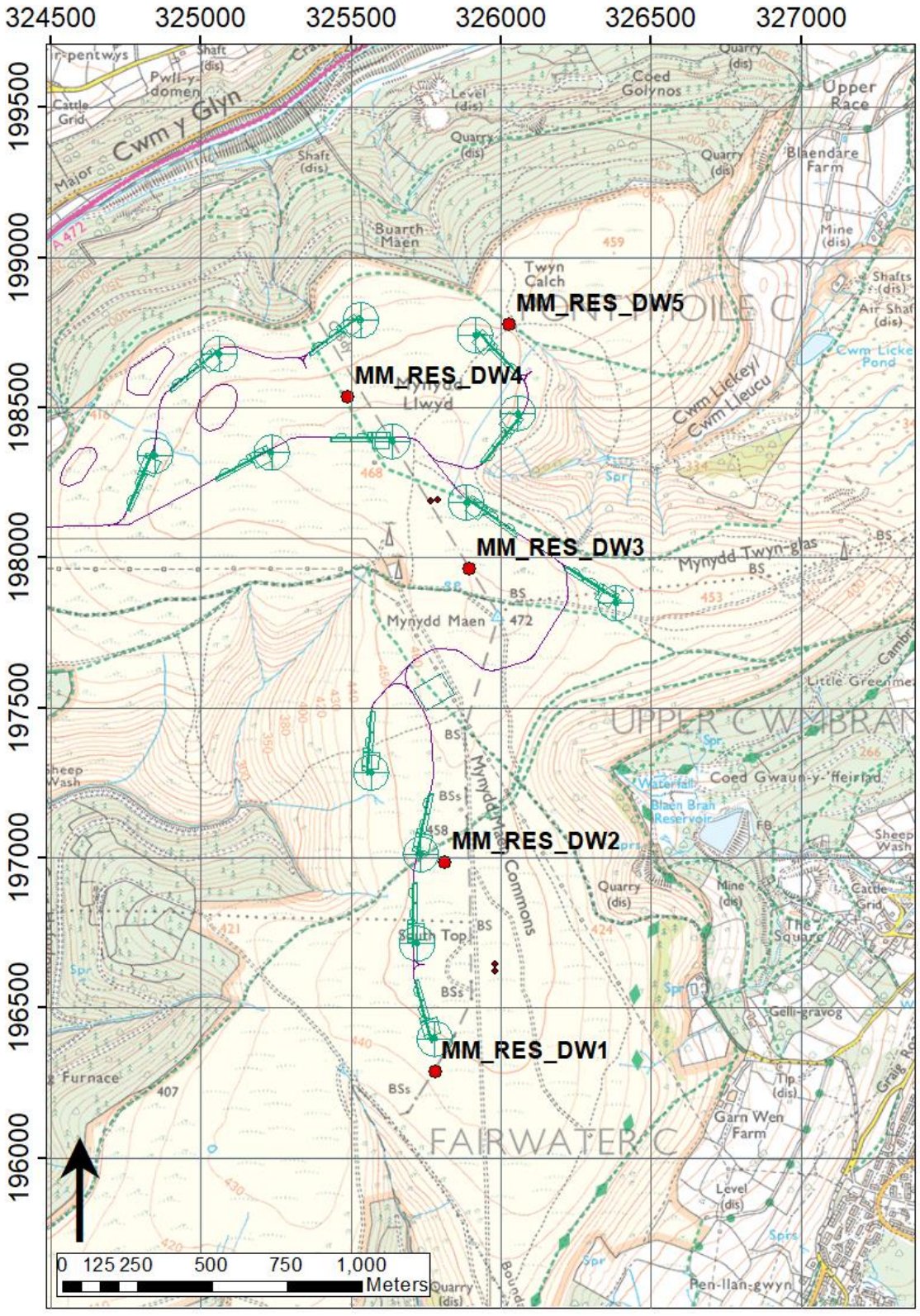


Figure 3.1 - Map showing locations of recently installed dipwells, Mynydd Maen