



Outline Habitat Management Plan (July 2023 Update)

Pen March Wind Farm

RWE Renewables UK Swindon Ltd

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Basis of Report

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1.0 Introduction

1.1 Background

RWE Renewables UK Swindon Ltd (RWE) is proposing the development of a wind farm at Pen March, north-east of Merthyr Tydfil in Mid Glamorgan (approximate centre site Grid Reference: SO 08654 10182). The site is split across the county boroughs of Merthyr Tydfil and Caerphilly.

The application is supported by an Environmental Statement (ES), which describes the development proposals in detail and assesses the predicted environmental impacts of the scheme. ES Chapter 7: Ecology and Chapter 8: Ornithology consider the potential impacts on biodiversity.

This Outline Habitat Management Plan (OHMP) revises and updates the OHMP submitted as part of the draft ES in November 2022 and proposes habitat restoration and management measures both within and outside the Pen March Wind Farm site. These measures, which would remain in place for the lifetime of the scheme, are designed to provide compensation for the loss of peat, the potential displacement of breeding waders (notably curlew *Numenius arquata*) and the loss of upland habitats located within the Pen March / Traed y Milwyr Llechrhyd and Merthyr Common North Sites of Importance for Nature Conservation (SINCs). The measures would also provide biodiversity enhancements, in accordance with planning policy requirements.

The original OHMP (submitted in November 2022) included details of proposed restoration and management measures on-site (i.e., within the Pen March Wind Farm site) only. These measures were intended to compensate for the loss of upland habitats located within the SINCs and provide some additional biodiversity enhancement and have been retained unchanged within this updated OHMP. At the time of writing the original OHMP, RWE was investigating providing additional compensation for the loss of peat and the potential displacement of breeding curlew, plus additional biodiversity enhancement, off-site. However, at that time off-site proposals had yet to be agreed and as such it was not possible to provide any details within the original OHMP.

This updated OHMP now includes outline details of proposed off-site measures, located on land owned by Dŵr Cymru Welsh Water (DCWW) adjacent to the Pen March site boundary to the east, which have been discussed and agreed in principle with DCWW. Off-site measures are required because the potential to provide beneficial measures for peat and curlew within the site itself is limited due to: a) most of the site being actively grazed common land, making delivery of habitat enhancements challenging¹; and b) a relative lack of suitable areas for peatland restoration.

1.2 Scope

This OHMP has been prepared by SLR Consulting Limited (SLR) on behalf of RWE. The OHMP is intended as a precursor to a more detailed Habitat Management Plan (HMP), which would be produced and agreed with the relevant Local Planning Authorities (Caerphilly County Borough Council (CCBC) and Merthyr Tydfil County Borough Council (MTCBC)) post consent, prior to the commencement of construction.

The aim of the OHMP is to establish the key objectives and principles by which the proposed on-site and off-site habitat management areas (as shown in Drawing 1, Appendix A) would

¹ While it is recognised that grazing could be controlled within the area of common land, the common is extensive and there are a large number of commoners who would all need to agree to the implementation of restrictions on grazing.



be restored and managed to the benefit of biodiversity, which would then form the basis for the more detailed HMP. It is not the intention for this document to provide full details of proposed management, many of which cannot be determined fully at this stage.

The OHMP aims to cover the management and monitoring of habitats and species during the operation of the wind farm. Issues relating specifically to the construction of the wind farm (e.g., control of water runoff, disturbance to birds and other protected species such as reptiles, etc.) are not considered here. Further information about ecological mitigation measures to be employed during the construction period is included in ES Chapters 7 and 8.

The spatial scope of the OHMP covers two separate areas, an on-site area contained wholly within the wind farm site boundary and an off-site area located adjacent to, but outside, the wind farm site boundary to the east (see Drawing 1, Appendix A). Outline proposals for each area are treated separately within this OHMP, with outline proposals for the on-site habitat management area provided in Section 3 and outline proposals for the off-site area provided in Section 4.

1.3 Priority Features for Management Action

The features which form the subject of the OHMP have been determined through consideration of the relative importance of ecological features present at the site, the extent to which they may be affected by the proposed development (as set out in the ES), and the feasibility of providing beneficial measures for them.

Taking the above into consideration, the OHMP relates to the following key features:

- Heathland (on-site and off-site);
- Peatland habitats (off-site only); and
- Breeding waders, notably curlew (off-site only).

No other important ecological features are likely to be significantly affected by the proposed development, subject to the implementation of “standard” good practice mitigation measures during the construction phase (see ES Chapter 7 and 8 for further details). Other ecological features are therefore not priorities for management action in this OHMP. It is noted however that other upland habitat types and a range of associated species are also likely to benefit from the measures proposed.

1.4 Aims and Objectives

The broad principal aims of the OHMP are as follows:

- On-site:
 - Undertake restoration and management activities over an area of 22.6 ha that should in time lead to increased cover of dwarf shrubs and other heathland plant species and facilitate the area’s recovery back to upland heathland.
- Off-site:
 - Undertake restoration and management activities over an area of 149.3 ha, containing a range of upland habitats, that should lead to a significant increase in the extent and quality of priority habitats including modified bog and heathland.
 - Undertake habitat and predator management activities over an area of 149.3 ha with the aim of maintaining, and if possible increasing, the population of breeding waders, including curlew.



2.0 Implementation

2.1 Roles and Responsibilities

As the developer, RWE is ultimately responsible for meeting the commitments made in this OHMP. The implementation of the final HMP, both on-site and off-site, would be overseen by a suitably qualified person or persons, appointed by RWE.

All management tasks carried out under the HMP would be undertaken by suitably experienced contractors and all monitoring would be undertaken by suitably qualified and experienced ecologists.

2.2 Monitoring and Review Overview

Appropriately timed monitoring is important to enable the success of HMP tasks to be determined and identify whether remedial measures are required, if objectives are not being met.

Proposed monitoring is outlined in Section 3.5 (on-site) and Section 4.4 (off-site). Any HMP should be a live document, which can be altered following monitoring results, unexpected events or evolving understanding and guidance. Therefore, each monitoring report would include a review of the performance of the HMP and recommendations for changes to management prescriptions, as appropriate. Monitoring results would be reported on an annual basis (during years in which monitoring takes place), and monitoring reports would be submitted to CCBC and MTCBC. Any changes to management prescriptions would be subject to their agreement.

2.3 Programme

An indicative programme showing the restoration, management and monitoring tasks specified in this OHMP, both on-site and off-site, is provided in Section 5.0. A detailed programme would be provided in the detailed HMP.



3.0 On-site Restoration and Management

3.1 Background and Rationale

As set out in Section 1.3, the priority feature for management action within the proposed on-site habitat management area is heathland. This section presents the rationale for inclusion of heathland as a priority feature within the on-site habitat management area, describes how the heathland restoration and management area has been identified and identifies potential restoration methods.

3.1.1 Rationale for Inclusion of Heathland as a Priority Feature within the OHMP

Heathland is a general term for habitats characterised by the dominance of dwarf shrub species (at least 25% cover) on mineral soils or thin peat less than 0.5m deep (based on the Phase 1 habitat classification definition²). Heathlands occur as both 'dry' heath and 'wet' heath depending on the vegetation communities present, and also 'upland' and 'lowland' heaths depending on their altitude (heathland below 300m altitude is generally considered 'lowland' heath, whilst those between 300-650m are typically considered 'upland').

Heathlands have international conservation significance and are largely confined to the British Isles and the western seaboard of Europe³. Britain and Ireland hold 75% of the European resource and the total UK upland heath resource amounts to between 2 - 3 million hectares (ha), of which approximately 79,000 ha (3-4%) occurs in Wales⁴. Heavy grazing has resulted in the conversion of many Welsh heaths to grassland and is probably the main cause of this relatively low figure⁵.

Both wet and dry heaths are recognised as internationally important under the EU Habitats Directive (as North Atlantic wet heath and European dry heath Annex 1 habitats). Upland heath (which includes both wet and dry heath) is also a habitat of national importance, being listed under Section 7 of the Environment (Wales) Act 2016 as a habitat of principal importance for the purpose of maintaining and enhancing biodiversity in relation to Wales.

The Pen March site and adjacent areas form part of the Pen March / Traed y Milwyr Llechrhyd SINC and Merthyr Common North SINC. Whilst each SINC contains a mixture of upland habitats (including acid grassland, marshy grassland, modified bog, acid flush and heath), they are also typical of unenclosed land within this part of Wales, where heavy grazing and / or fire is likely to have resulted in the dominance of grassland to the detriment of heathland^{5 6 7}.

The ES predicts that the construction of the wind farm would result in the permanent loss of 9.57 ha and temporary loss of 16.38 ha of upland habitat, most of which comprises a mosaic of marshy grassland, wet heath, acid flush, wet modified bog and semi-improved acid

² Joint Nature Conservation Committee (JNCC). (2010). Handbook for Phase 1 Habitat Survey. A technique for environmental audit. Revised re-print. JNCC, Peterborough.

³ UK Upland heathland Habitat Action Plan. Biodiversity: The UK Steering Group Report. Volume II – Action Plans. 1995. London HMSO.

⁴ Jones, P.S. et al, 2003. Priority habitats of Wales: a technical guide. CCW.

⁵ Grant, S.A., Hunter, R.F. & Cross, C., 1963. The effect of muirburning Molinia-dominated communities. Journal Of The British Grassland Society 18, 249-257.

⁶ Grant, S.A. & Maxwell, T.J., 1988. Hill vegetation and grazing by domesticated herbivores: the biology and definition of management options. In: Usher M.B., Thompson D.B.A (Eds) Ecological Change in the Uplands. Blackwell Scientific Publications, Oxford, pp. 201-211.

⁷ Chambers F.M. Mauquoy D. & Todd P. (1999) Recent rise to dominance of Molinia caerulea in environmentally sensitive areas: new perspectives from paleo ecological data. Journal of Applied Ecology 36: 719-733.



grassland. 21.5 ha of the habitat that will be permanently or temporarily lost lies within the Pen March / Traed y Milwyr Llechrhyd SINC and 4.45 ha lies within the Merthyr Common North SINC. All of the habitats affected have been heavily modified by livestock grazing and / or fire which has reduced the species and sward diversity and are generally not considered good examples of their habitat type.

The targeted restoration of heathland proposed on-site would compensate for the loss of upland habitats (and in turn loss of area within the two SINC). It would also contribute to providing additional biodiversity enhancement (alongside proposed off-site measures – see Section 4), by improving the condition of an area of retained habitat within the Pen March / Traed y Milwyr Llechrhyd SINC. The area targeted for heathland restoration on-site contains small fragments of remnant heathland but is mostly dominated by heavily grazed acid grassland and a mosaic of marshy grassland, acid flush and wet heath, parts of which are located on shallow peat (30-50 cm deep). Conversion of these areas to heathland would represent a significant improvement to the condition of the site by increasing the cover of heathland, an international and national conservation priority habitat^{8 9}.

3.1.2 Identification of Heathland Restoration and Management Areas

A Phase 1 habitat survey of the Pen March Wind Farm site, including areas with potential for habitat restoration and management was carried out over several visits between 2019 and 2021. The results of the survey are provided in a Habitat Survey Report¹⁰ included as Technical Appendix 7.2 of the ES.

During the habitat survey, an area of approximately 22.6 ha in the far northeast of the site was identified as containing upland habitat for which heathland restoration and management was considered potentially beneficial (location shown in Drawing 1). Importantly, this area lies outside the Gelligaer and Merthyr Common, where it is very difficult to control grazing levels (see Section 1.1), therefore providing an opportunity within the site to control grazing and other management.

Additional factors considered in concluding that this area is the most appropriate option for heathland restoration on-site include:

- The area comprises a high proportion of species-poor acid grassland and a mosaic of marshy grassland, acid flush and degraded wet heath habitats, which have likely dominated the area as a result of heavy grazing^{5 6}. Conversion of these habitats to a more diverse heathland habitat would represent a significant conservation and biodiversity benefit for the site and the Pen March / Traed y Milwyr Llechrhyd SINC;
- Whilst currently grassland habitats dominate within the proposed on-site habitat management area, there are existing small fragments of heath within the area, and it is likely that a heathland seed bank still exists within the soil. Assessment of surrounding areas during site visits and through aerial photography show that heathland habitat becomes more widespread a short distance north of the proposed heathland restoration and management area (approximately 300m). The proposed heathland restoration would thus represent an extension of the existing heathland habitats in the locality, rather than creation of an isolated fragment;
- The proposed on-site habitat management area is already largely enclosed along its southern boundary by existing fences and stone walls (which, except for a few small

⁸ Marrs, R.H., Phillips, J.D.P., Todd, P.A., Ghorbani, J. & Le Duc, M.G., 2004. Control of *Molinia caerulea* on upland moors. *Journal of Applied Ecology*.

⁹ Bardgett R.D., Marsden, J.H. & Howard, D.C., 1995 The extent and condition of heather moorland in the uplands of England and Wales. *Biological Conservation* 71, 155-161.

¹⁰ SLR Consulting. 2022. Pen March Wind Farm Habitat Survey Report.



breaches, are functional and intact). With additional fencing along the remaining unfenced boundary a functional enclosure around the heathland restoration and management area could be created. This would allow control of the grazing within the area which will be important to ensure appropriate grazing¹¹ to promote heathland restoration and regeneration; and

- The proposed on-site habitat management area is located away from proposed wind farm infrastructure in the far northeast of the site and will therefore not be adversely affected by the proposed scheme. Despite that, it is still relatively easily accessible by the existing network of farmland tracks meaning access for management is relatively straightforward.

Other potential restoration locations were considered less suitable, either due to being on common land (making control of grazing and other management very difficult) and/or less likely to be successful in the reversion to heathland as the existing habitats are more extensively modified^{8,9}. An area of non-common land to the southwest of the site was considered as an option, however, due to the lower altitude and intensity of the grazing the habitats present were considered closer to 'lowland' in character and would have been less representative of the habitats potentially impacted by the development.

3.1.3 Identification of Potential Restoration Methods

The heathland restoration proposals broadly focus on reducing cover / vigour of dominant grasses (e.g., purple moor-grass *Molinia caerulea*, mat grass *Nardus stricta* etc.) and rushes (e.g., soft rush *Juncus effusus*) to allow the increase of the dwarf shrub component within the restoration area. The initial phase should reduce the grassland cover, and if possible, create gaps and suitable niches for the establishment of dwarf shrubs. To optimise restoration success, a 'window' must be created in which competition from vigorous grasses is reduced so that dwarf shrubs can begin to establish before the grasses recover. This 'window' should be at least 18 months long to ensure dwarf shrubs become established and compete effectively with encroaching or re-establishing grasses.

There are three heathland restoration methods which have been studied in the UK that are considered potentially suitable for the Pen March site (burning is not considered a suitable method in this instance and so is not discussed). The three methods are: cutting; herbicide treatment; and controlled grazing, and each method is discussed below. The research completed on these methods in the UK demonstrates that there isn't one clear management prescription that is universally preferable^{8, 12, 13}, and often the most favourable method (or combination of methods) depends on the geographical location and site-specific factors.

3.1.3.1 Cutting

Use of repeated mechanical cutting has been shown, in studies completed in purple moor-grass dominated upland¹², to increase the presence of bare ground, reduce the overall vegetation height, increase vegetative species diversity and reduce cover of purple moor-grass. All of these effects are beneficial in the restoration of heathland on grassland-dominated upland sites as bare ground helps the establishment of dwarf shrub seedlings and reduced vegetation height and cover limits competition for establishing dwarf shrubs¹².

¹¹ Even if grazing is not selected as the primary restoration method, control of grazing to optimize heathland regeneration is likely to be a key element for the other restoration methods proposed and is the most likely form of ongoing management.

¹² Todd, P.A., Phillips, J.D.P., Putwain, P.D. & Marrs, R.H., 2000. Control of *Molinia caerulea* on moorland. *Grass & Forage Science* 55, 181-191.

¹³ A.L. Milligan., et al., 2004. Developing an integrated land management strategy for the restoration of moorland vegetation on *Molinia caerulea*-dominated vegetation for conservation purposes in upland Britain.



One study found that three repeated cuts within a year maintained a reduced cover of purple moor-grass for four years and achieved the highest levels of heather *Calluna vulgaris* seedlings¹³ when compared with herbicide treatment or grazing. However, aftermath grazing was found to maximise the effectiveness of cutting in the regeneration of heathland, and thus implementation of grazing after cutting should also be considered to maximise the effectiveness of this method.

3.1.3.2 Herbicide Treatment

Herbicide treatment has also successfully been used in heathland restoration to control dominant grass species and enable the regeneration of heathland vegetation (Marrs *et al.*, 2004)⁸. In the Marrs *et al.* study application of glyphosate herbicide initially reduced cover of purple moor-grass and had no effect on cover of wavy-hair grass *Deschampsia flexuosa*, heath bedstraw *Galium saxatile*, and heath rush *Juncus squarrosus*. After one year, cover of purple moor-grass was lower in plots that had been sprayed with herbicide (29–45%) than in unsprayed plots (59%). However, this effect diminished after four years, at which time there was no significant difference in the cover of purple moor-grass between sprayed and unsprayed areas. This and other studies thus demonstrate the importance of repeat herbicide applications for the continued control of purple moor-grass¹⁴. Other studies have also highlighted the potential effectiveness of grass-specific herbicide (graminicides) which can reduce grass cover, whilst not affecting other broad-leaved heathland species which are desired¹⁵, although such herbicides may not be approved for use on open moorland. Regardless of the type of herbicide used, the effectiveness of this restoration also relies on subsequent management actions (both controlled burning (not applicable here) and flailing have proven effective) to destroy / remove dead grass litter and create bare ground to encourage the establishment of heathland vegetation¹⁶.

3.1.3.3 Controlled Grazing

Grazing has long been used as a heathland restoration method, however, grazing effects are complex and inappropriate grazing can result in decreased dwarf shrub and increased grass cover¹⁷. Conversely, appropriate grazing can be very effective at targeting species (notably purple moor-grass) for which a decrease in cover is desirable whilst having minimal effect on the cover of existing dwarf shrubs which can then increase in response to reduced competition¹⁴. Studies have shown that sheep grazing¹⁸ and cattle grazing¹³ can both be effective in the restoration of heathland habitats provided the correct stocking density and timings are used.

3.2 Objectives

The following objective is proposed for the on-site habitat management area:

¹⁴ National Trust, 2015. Managing Molinia? Proceedings of a 3-day conference. 14-16 September 2015 in Huddersfield, West Yorkshire, UK.

¹⁵ Milligan, A.L., Putwain, P.D. & Marrs, R.H., 2003b. Testing selective herbicides for Molinia caerulea (L.) Moench control in British upland moorland. British Crop Prot Conference.

¹⁶ DEFRA, 2002. BD1228 Determining Environmentally Sustainable and Economically Viable Grazing Systems for the Restoration and Maintenance of Heather Moorland in England and Wales.

¹⁷ DEFRA, 2004. Survey of moorland and hay meadows in Dartmoor ESA. Defra MA01016 report.

¹⁸ Hulme, P.D., Merrell, B.G., Torvell, L., Fisher, J.M., Small, J.L. & Pakeman, R.J., 2002. Rehabilitation of degraded *Calluna vulgaris* (L.) Hull-dominated wet heath by controlled sheep grazing. Biological Conservation 107, 351-363.



- Undertake restoration and management activities over an area of 22.6 ha that should in time lead to increased cover of dwarf shrubs and other heathland plant species and facilitate the area's recovery back to upland heathland.

A more specific objective (or objectives) would be developed during preparation of the detailed HMP alongside the development of more detailed restoration and management proposals.

3.3 Initial Restoration Proposals

The particular restoration method used would be determined during preparation of the detailed HMP, following consideration of updated baseline survey results, input from local graziers and/or contractors, regulations regarding herbicide use in place at that time and consultation with CCBC and MTCBC Ecologists. At this stage, it is assumed that any one of the methods outlined in Section 3.1, or combination of those methods, could be used to achieve the objective set out in Section 3.2. The broad programme for implementation of restoration would be the same for all three methods, as outlined below.

3.3.1 Baseline Survey

A botanical monitoring survey would be undertaken to establish an up-to-date baseline for the vegetation type(s) and extent(s) present and inform the choice of restoration method(s) to be used. The botanical survey, paired with drone monitoring (or other form of aerial photography), would also be used as a baseline for ongoing monitoring post-restoration (see Section 3.5 for further details). Baseline botanical monitoring would be undertaken at the appropriate time of year (between May and September) to ensure robust and reliable results.

3.3.2 Fencing

Fencing of the on-site habitat management area (or other means of managing livestock, e.g. using GPS collars) will be required to enable control of grazing within the area. Whichever restoration method is used initially, control of grazing will be key to the success of the heathland restoration works as uncontrolled over grazing tends to result in the dominance of grassland at the expense of heathland communities^{6 7 19 20}. If fencing is to be used to manage livestock, fencing to enclose the unenclosed boundaries of the proposed heathland restoration and management area would take place prior to restoration works commencing.

It is noted that the area proposed to be fenced represents access land under the Countryside and Rights of Way (CROW) Act 2000. Provisions for maintaining access would therefore be made as part of the fencing works.

3.3.3 Implementation of Restoration Measures

Broad descriptions of each of the restoration methods being considered are discussed below and are based on DEFRA guidelines¹⁶:

3.3.3.1 Cutting

Repeated cutting would be completed using a tractor-mounted, drum flail-mower (or similar) with the grassland vegetation cut as close as possible to the ground, albeit with the cut height reduced on each of the successive cuts. Any fragments of heathland dominated vegetation should be marked prior to cutting commencing and avoided during the cut. The timing of the cuts should ideally aim to avoid the bird nesting season, with cuts typically

¹⁹ Countryside Council for Wales (CCW), 2005. Upland Heathland – Habitat Action Plan, Natur Gwynedd.

²⁰ Critchley, N. R., et al., 2016. Environmental Stewardship Monitoring and Evaluation Programme - Moorland Habitat Monitoring: A Resurvey of Selected Moorland Agri-environment Agreement Sites. ADAS & FERA.



completed in winter or early spring and then again in late summer / early autumn. One study¹³ has suggested that three cuts per year provided the greatest effect on reducing purple moor-grass cover, when compared with just one or two cuts. The number of cuts required would be determined based on monitoring of grassland regrowth. The use of aftermath grazing should also be considered to improve the effectiveness of cutting, with the timing and extent of this also informed by monitoring of the restoration area and the changes in vegetation following cutting.

3.3.3.2 Herbicide Treatment

Herbicide application in July has been found to be effective¹⁶ in the control of purple moor-grass and soft rush. Glyphosate herbicide (at a rate of 6 litres/ha in 2-300 litres water sprayed) has been proven to be effective on purple moor-grass and is currently approved for use on open moorland. If herbicide treatment is selected as the restoration management method further details of the herbicide and application rate proposed would be provided in the detailed HMP. Following herbicide application, removal of the dead plant litter is recommended via mowing or flailing in early autumn, with the resulting arisings 'windrowed' to ensure open areas are created for the establishment of dwarf shrubs. This process also helps to destroy large purple moor-grass tussocks, further reducing its vigour and capacity to re-establish.

3.3.3.3 Controlled Grazing

Controlled grazing regimes can help to reduce the vigour of competitive grasses (e.g., purple moor-grass etc) in addition to enhancing the vigour of dwarf shrubs and / or providing opportunities for their re-establishment. However, it should be noted that a single regime may do one or the other but not necessarily both simultaneously. Thus, flexibility in the grazing regime and regular monitoring of vegetation change may be required to optimize the restoration of heathland. If selected as the preferred restoration method, the proposed grazing regime would be set out in the detailed HMP, however, it would likely comprise a number of the below elements:

- Cattle and sheep selectively graze purple moor-grass during its growing season consequently reducing its vigour. Purple moor-grass is a highly digestible species and also has a relatively short growing season (late April to late August)¹³. Thus, summer grazing with a relatively high stocking density has proven effective in suppressing growth of purple moor-grass and enabling the regeneration of dwarf shrubs^{13 18}. A high stocking density is likely to be most effective in areas where purple moor-grass is dominant (>40% top cover or >60% frequency) and where heather is present in the understorey and/or the seed bank¹⁶.
- Removing grazing animals during the late autumn and winter months (November – February) will enhance the vigour of dwarf shrubs. At this time of year, when purple moor-grass is not growing, grazing animals preferentially graze dwarf shrubs and heather (which have a lower nutritional value compared to purple moor-grass and thus are not preferentially grazed during the growing period of purple moor-grass).
- The initial stocking densities, timing and types of grazing animal will be detailed in the full HMP. However, it is likely that the grazing regime will be subject to adjustments based on the results of ongoing monitoring.

3.3.4 Heather seeding

It is anticipated, based on the fragments of heathland vegetation and more extensive areas of heathland in the locality, that there may be sufficient dwarf shrub seedbank within the proposed restoration area that additional seeding should not be required. However, the re-establishment of dwarf shrubs would be monitored during the early years of restoration



management and additional seeding (or use of locally harvested heather brash) considered if dwarf shrubs fail to re-establish satisfactorily.

3.4 Ongoing Management

All of the initial restoration methods proposed above are likely to require repeated implementation during the early years of restoration in order to achieve the stated objective, with the frequency of their implementation dependent on the combination of restoration management options selected and the results of initial monitoring. For the purposes of this OHMP it is assumed that initial restoration works would be completed after three years. However, the duration of the initial restoration works will depend on the combination of restoration management options selected and the results of initial monitoring.

Whether or not controlled grazing forms part of the initial restoration, it is envisaged that controlled grazing would provide the most likely means of ongoing management of the on-site heathland restoration and management area, following the end of the initial restoration phase and for the remainder of the wind farm's operational life (up to 35 years). This would be confirmed during preparation of the detailed HMP, following discussions with local graziers, with proposed stocking densities and timings set out in the detailed HMP. If grazing management is not possible in the longer term, ongoing management would take place via cutting, with further details provided in the detailed HMP. The success of ongoing management would be subject to monitoring and review (see Section 3.5).

3.5 Monitoring and Review

3.5.1 Aims

The main purpose of the proposed monitoring of the on-site heathland restoration and management area is to determine whether the objective set out in the OHMP is being met. Monitoring results would also inform the requirement for any changes to restoration methods and/or ongoing management.

3.5.2 Botanical Monitoring

Monitoring would take place via comparison of high-resolution aerial imagery, obtained via a drone survey (or by other aerial survey), to identify vegetation changes over time. This survey technique would first be used during the summer prior to commencing restoration works (Year 0) to provide an up-to-date baseline. It would then be repeated annually in the first three years post-restoration commencing, and then again in Years 5, 7 and 10. The requirement for further monitoring after Year 10 would be decided at the end of Year 10, following consideration of monitoring results at that time.

The drone (or other aerial) surveys would be undertaken during summer, at a similar time of year each year, to allow for comparison of the captured aerial photographs to be undertaken to establish if, and to what extent, re-establishment of heathland vegetation has taken place.

The drone (or other aerial) surveys would be supported by ground-based botanical monitoring. The methods of botanical monitoring would be detailed in the HMP and are likely to be bespoke to allow for the specific monitoring against the HMP objectives. The bespoke methods are likely to be based on the Common Standards Monitoring (CSM) protocol²¹ for upland habitats, which assesses habitat condition, including grazing pressure. Ground-based botanical monitoring would be undertaken alongside the drone/aerial surveys, during

²¹ Joint Nature Conservation Committee (2009) Common Standards Monitoring Guidance for Upland Habitats. Version July 2009. Joint Nature Conservation Committee, Peterborough.



the optimal survey period for plant species (May –September inclusive), at a similar time each year to allow for direct comparison of results from year to year.

3.5.3 Reporting and Review

Monitoring results would be reported annually (in years when monitoring takes place) and recommendations made for changes to management prescriptions if objectives are not being met, as appropriate.



4.0 Off-site Restoration and Management

4.1 Background and Rationale

As set out in Section 1.3, the priority features for management action within the proposed off-site habitat management area are:

- Heathland;
- Peatland habitats; and
- Breeding waders, notably curlew.

This section presents the rationale for inclusion of heathland, peatland habitats and breeding waders as priority features within the off-site habitat management area and describes how the off-site habitat management area has been identified.

4.1.1 Rationale for Inclusion of Priority Features for Management Action

4.1.1.1 Heathland

The wider value of heathland as a habitat type and its conservation importance in Wales is discussed in Section 3.1.1 and is not repeated here.

The ES predicts that the construction of the wind farm would result in the permanent loss of 9.57 ha and temporary loss of 16.38 ha of upland habitat, most of which comprises a mosaic of marshy grassland, wet heath, acid flush, wet modified bog and semi-improved acid grassland, which has been heavily modified by livestock grazing and / or fire. 21.5 ha of the habitat that would be permanently or temporarily lost lies within the Pen March / Traed y Milwyr Llechrhyd SINC.

Like the Pen March site itself, much of the proposed off-site habitat management area lies within the Pen March / Traed y Milwyr Llechrhyd SINC (see Figure 7.1.2 in ES Technical Appendix 7.1). The targeted restoration of heathland proposed within the off-site habitat management area, in combination with the proposed habitat management on-site (see Section 3), would compensate for the loss of upland habitats (and in turn compensate for the loss of area within the SINC). Given the relatively large extent of the off-site area proposed to be managed it would also provide substantial biodiversity enhancement.

4.1.1.2 Peatland Habitats

Active blanket bog, i.e., bog which supports a significant area of vegetation that is normally peat forming, is recognised as internationally important as a priority habitat listed on Annex 1 of the EU Habitats Directive. Blanket bog, including areas supporting semi-natural blanket bog vegetation even if no longer defined as 'active', is also a habitat of national importance, being listed under Section 7 of the Environment (Wales) Act 2016.

Peatlands are estimated to cover over 90,000 ha in Wales (~4.3% of the total land area of Wales) and represent the largest terrestrial ecosystem store of carbon in Wales as well as being important for biodiversity²². Peatland protection and restoration form key parts of the Welsh Government's Climate Change Plan, promoted and enacted by NRW's National Peatland Action Programme (NPAP). The NPAP is a five-year plan for peatland restoration in Wales. The programme is designed to target peatlands that need the most restoration and

²² Evans, C., Rawlins, B., Grebbby, S., Scholefield, P., and Jones, P. 2015 Glastir Monitoring & Evaluation Programme. Mapping the extent and condition of Welsh peat. Welsh Government (Contract reference: C147/2010/11). NERC/Centre for Ecology & Hydrology (CEH Project: NEC04780).



aims to restore 600-800 ha of public and private land every year. Over 650 ha were restored in the first programme year, 2020-21²³.

The Ecology chapter of the ES (ES Chapter 7) predicts that the construction of the wind farm would result in the permanent loss of 1.5 ha and temporary loss of 2.9 ha of wet modified bog habitat (in mosaic with acid flush and wet heath). These habitats have all been heavily modified by livestock grazing and / or fire and are generally not considered good examples of their habitat type. Including shallower peat (habitats located on peat <50cm deep are not classified as bog / modified bog under the Phase 1 habitat classification) the draft Peat Management Plan (PMP) (ES Technical Appendix 6.2) predicts that the total volume of peat excavated during wind farm construction would be 19,318m³.

The targeted restoration and management of peatland habitat proposed within the off-site habitat management area would compensate for the loss of modified bog habitats and other peat. Given the relatively large extent of the off-site area proposed to be managed it would also provide biodiversity enhancement.

4.1.1.3 Breeding Waders (Notably Curlew)

Curlew is a species of national importance, being listed under Section 7 of the Environment (Wales) Act 2016. It is also included on the UK and Wales Birds of Conservation Concern red lists^{24 25}. The population in Wales has experienced a significant decline, approximately 50 % in the last 20 years, and curlew is now considered to be the most pressing bird conservation priority in Wales and subject to the Wales Action Plan for the Recovery of Curlew²⁶.

Two curlew territories were identified within the Pen March site and adjacent land to the east during surveys carried out in 2019 and four territories were identified in the same area in 2020. The Welsh curlew population is estimated at between 400 and 1,700 breeding pairs meaning that the population recorded on and close to the site could, if the lower figure is used for the Welsh population, be considered nationally important.

The Ornithology chapter of the ES (ES Chapter 8) predicts that one pair of curlew could be permanently displaced by the operation of the proposed wind farm. Given the conservation status of this species and its rate of decline, even the loss of one pair is considered to represent a significant negative effect at a regional level.

The proposed management for curlew within the off-site habitat management area would compensate for the predicted loss of one pair of curlew by seeking to improve habitat quality for curlew and provide ongoing management of predators aimed at increasing breeding productivity. The proposed management should also benefit other breeding wader species, notably snipe *Gallinago gallinago*, up to two pairs of which were recorded within the site and adjacent land during surveys to inform the EIA and 2019 and 2020.

²³ Leonard, R., Jones, P., Rumble, A. & Bacon, R. 2021. National Peatland Action Programme: Year 1 Report 2020-2021. Natural Resources Wales.

²⁴ Stanbury A, Eaton MA, Aebischer NJ, Balmer D, Brown A, Douse A, Lindley P, McCulloch N and Win I (2021). The Status of our Bird Populations: the Fifth Birds of Conservation Concern in the United Kingdom, Channel Islands and Isle of Man and Second IUCN Red List Assessment of Extinction Risk for Great Britain. British Birds 114, 723–747.

²⁵ Johnstone, I.G., Hughes, J., Balmer, D.E., Brenchley, A., Facey, R.J., Lindley, P.J., Noble, D.G. and Taylor, R.C. Online First. Birds of Conservation Concern Wales 4: the population status of birds in Wales. Milvus: the Journal of the Welsh Ornithological Society.

²⁶ Gylfinir Cymru / Curlew Wales (2021). A Wales Action Plan for the Recovery of Curlew.



4.1.2 Identification of Proposed Off-site Restoration and Management Areas

Following initial discussions with the landowners, an area of land to the east of the Pen March site, including land owned by DCWW plus an additional land parcel to the south at Pencoedcae Farm, was subject to a Phase 1 habitat survey in April 2023 (see Appendix B). The aim of the survey was to investigate to identify whether parts of the land were suitable to provide the required compensation for impacts on peat and curlew and provide additional biodiversity enhancement.

In terms of the priority features for management action identified within this OHMP, the upland parts of the area surveyed represent the most relevant targets for restoration and enhancement and these have therefore been included within the proposed off-site management area shown in Drawing 1. The rest of the area surveyed comprises more lowland habitats, management of which is unlikely to benefit peatland habitat or curlew. These areas have therefore been excluded from the proposed off-site management area.

4.1.2.1 Heathland

Specific factors considered in concluding that this area is appropriate for heathland restoration and management include:

- The Phase 1 habitat survey carried out in April 2023 (Appendix B) identified up to 113 ha of vegetation with a heathland component within the proposed off-site management area, albeit mostly in mosaic with marshy grassland, acid flush, modified bog and acid grassland. Large parts of these areas are dominated by purple moor-grass and rushes with other areas closely cropped with short swards. Bilberry *Vaccinium myrtillus* is widely present but dwarf shrubs such as heather and cross-leaved heath *Erica tetralix* are generally only present occasionally. The presence of heathland species indicates that restoration of heathland habitats is feasible. Management of these areas, aimed at increasing the heathland component, should lead to a significant improvement to their condition and therefore to a significant improvement in the condition of the Pen March / Traed y Milwyr Llechrhyd SINC.
- The area lies directly adjacent to the proposed on-site habitat management area, which in turn lies within approximately 300m of a much more extensive area of heathland to the north. The proposed restoration and management would therefore have good connectivity and would represent an extension of existing and proposed heathland habitats in the locality.
- The area is currently included in the Glastir scheme so is already subject to management aimed at increasing its conservation value. Precise details of current management were not available at the time of writing, although it is understood that the area is currently mostly grazed by cattle, during both summer and winter, with occasional sheep grazing. The proposed restoration and management would build on existing management arrangements but go beyond them in many aspects. Inclusion in the OHMP would also secure the conservation management of the land for the lifetime of the wind farm, so well beyond the end of the current Glastir scheme, which is due to end in December 2023.
- This area lies outside the Gelligaer and Merthyr Common, meaning it is possible to carry out the proposed management without needing to obtain agreement from commoners, which is likely to be very difficult (see Section 1.1).
- Most of the perimeter of the proposed off-site habitat management area is already fenced. Control of grazing is therefore possible with limited additional fencing (although see Section 4.3.2).



4.1.2.2 Peatland Habitats

Specific factors considered in concluding that parts of this area are appropriate for peatland restoration and management include:

- The Phase 1 habitat survey carried out in April 2023 (Appendix B) identified up to 29.5 ha of vegetation with a wet or dry modified bog component within the proposed off-site management area, albeit mostly in mosaic with flush and wet heath. The area also contains additional areas of flush and wet heath habitats situated on shallower peat.
- A peat depth survey carried out by RSK in April 2023 (see ES Technical Appendix 6.1 (Volume 4)) identified three main areas with peat presence (including peat <50cm depth so not all mapped as wet modified bog under the Phase 1 habitat classification), where restoration activities could be beneficial to development of peat and peaty soils. The three areas are located in the west, east and northeast of the proposed off-site management area. The three areas cover a total of approximately 63 ha and vary in size from 18 to 23 ha.
- Drainage ditches and channels are present within some of the peatland areas identified (see Appendix B), suggesting that peatland condition could be restored across these areas by ditch blocking to increase the water table.
- Evidence that peatland vegetation has been affected by heavy grazing in the past was present throughout the area (see Appendix B), suggesting that peatland condition could be restored by controlling grazing levels.

4.1.2.3 Breeding Waders (Notably Curlew)

Specific factors considered in concluding that this area is appropriate for management to benefit breeding curlew and other waders include:

- Parts of the area are already suitable for curlew, as evidenced by survey results from 2020 (see ES Chapter 9: Ornithology), which identified two curlew territories within the proposed off-site management area. This indicates that the area is likely to be occupied by curlew if managed appropriately.
- The area is already subject to some predator control by the tenant farmer, although further details were not available at the time of writing. The proposed management would build on this and would extend existing arrangements, e.g., to include temporary fencing of nests. It would also secure predator management for as long as it is necessary (for the lifetime of the wind farm if required).
- The area is directly adjacent to the proposed wind farm site so management would directly benefit any birds that may be displaced by the operation of the wind farm.
- Although some of the area (*circa* 57.3 ha) lies within 800m of the closest turbine, the remainder of the area (*circa* 92 ha) lies beyond 800m of the closest turbine and 118.5 ha is at least 500m from the closest turbine. Although this means that birds within part of the area could be subject to displacement during wind farm operation, the potential for displacement is considered to be offset by the benefits of habitat and predator management across a relatively large area that has high potential to be used by curlew (as outlined above).

4.2 Objectives

The following broad objectives are proposed for the off-site habitat management area:



- Undertake restoration and management activities over an area of 149.3 ha, containing a range of upland habitats, that should lead to a significant increase in the extent and quality of priority habitats including modified bog and heathland.
- Undertake habitat and predator management activities over an area of 149.3 ha with the aim of maintaining, and if possible increasing, the population of breeding waders, including curlew.

More specific objectives would be developed during preparation of the detailed HMP alongside the development of more detailed restoration and management proposals.

4.3 Outline Restoration and Management Proposals

Outline proposals for restoration and management of the off-site habitat management area are set out below. More specific proposals would be determined during preparation of the detailed HMP, following consideration of updated baseline survey results, input from the landowner/tenant farmer, input from specialist contractors (as required), regulations regarding herbicide use in place at that time and consultation with CCBC and MTCBC Ecologists.

4.3.1 Baseline Survey

The following surveys would be undertaken to inform the preparation of the detailed HMP:

- A botanical monitoring survey, covering the full extent of the proposed off-site habitat management area, would be undertaken to establish an up-to-date baseline for the vegetation types and extents present and inform the choice of restoration and management methods to be used. The botanical survey, paired with drone monitoring (or other form of aerial photography), would also be used as a baseline for ongoing monitoring post-restoration (see Section 4.4 for further details). Baseline botanical monitoring would be undertaken at the appropriate time of year (between May and September) to ensure robust and reliable results.
- A topographic survey, covering all areas of peatland habitat where ditch blocking may be appropriate, would be carried out to identify ditches/drains which it is feasible to block and determine the location of key damming positions needed to achieve maximum re-wetting of the peat.
- A breeding wader survey, covering the full extent of the proposed off-site habitat management area, would be undertaken to establish an up-to-date baseline and inform the development of detailed management proposals. This would ideally be undertaken in conjunction with proposed baseline monitoring surveys of the Pen March site itself, which are due to take place during the breeding season before construction commences (see ES Chapter 9: Ornithology). The survey would follow the methodology used in 2019 and 2020, i.e., an adapted version of the Brown & Shepherd methodology²⁷, with four visits undertaken between early April and early July.

4.3.2 Fencing

Fencing of the off-site habitat management area (or other means of managing livestock, e.g. using GPS collars) is essential to enable control of grazing within the area. The perimeter of the off-site management area is already mostly fenced. If fencing is to be used to manage

²⁷ Brown, A. F. and Shepherd, K. B. (1993). A Method for Censusing Upland Breeding Waders. Bird Study 40, 189-195.



livestock, any gaps in the perimeter fencing would be filled and repairs carried out where needed, prior to restoration and management works commencing.

The proposed restoration and management works may require the establishment of separate management compartments within the wider off-site management area to enable different prescriptions to be applied within different areas. Indicative compartment boundaries are shown in Appendix B (Drawing 2). Compartment boundaries would be confirmed within the detailed HMP and where necessary, fencing of compartment boundaries would take place prior to restoration and management works commencing. Alternatively, where proposed compartment boundaries are marked by defunct dry-stone walls these could be repaired to provide both a stockproof boundary and habitat for faunal species such as reptiles and invertebrates.

It is noted that part of the off-site management area (to the northeast) represents access land under the CROW Act 2000. Provisions for maintaining access to this area would therefore be made as part of the fencing works.

4.3.3 Heathland Restoration and Management

4.3.3.1 Heathland Restoration

Heathland restoration would be undertaken in areas in which restoration is considered to be beneficial and is most likely to be successful. This would include areas in which the vegetation contains a heathland component but where the vegetation is dominated by purple moor-grass and/or rushes, and/or where there is evidence of dwarf shrubs having been heavily grazed.

Restoration methods that would be considered would be the same as those considered within the on-site habitat management area (see Sections 3.1.3 and 3.3.3 for further details).

4.3.3.2 Ongoing Management

Controlled grazing would provide the most likely means of ongoing management of the off-site management area, following the end of the initial restoration phase and for the remainder of the wind farm's operational life (up to 35 years).

Stocking densities and timings, and the type of livestock to be used, would be confirmed in the detailed HMP and may be different for different management compartments. Stocking densities and timings would be based on relevant literature and good practice, e.g., for heathland recommended stocking densities vary between 0.02 and 0.2 Livestock Units (LU) per hectare per year²⁸, with summer grazing generally preferable to avoid browsing of dwarf shrubs. However, grazing prescriptions would also consider the requirements of other priority features for management action (i.e., peat and breeding waders) and take account of optimal grazing regimes for other habitats present within the off-site management area.

In practice the appropriate number of LU per hectare per year can vary by up to 40% depending on location/rainfall²⁸ and there is "a relative lack of good quality studies on which to base management decisions"²⁹. Stocking densities and timings would therefore be subject to regular review in response to the findings of ongoing monitoring (see Section 4.4).

²⁸ Chapman, P. 2007. Conservation Grazing of Semi-natural Habitats. Technical Note 586. Scottish Agricultural College.

²⁹ Natural England. 2011. Impact of moorland grazing and stocking rates. NEER006.



4.3.4 Peatland Restoration and Management

4.3.4.1 Peatland Restoration

In order to return degraded peatlands to their naturally carbon sequestering state, restoration measures such as drain blocking, grazing reduction and physical removal of non-peatland vegetation and/or introduction of peatland vegetation is often essential³⁰.

The successful development of blanket bog is dependent on hydrological conditions in which the water table generally lies within approximately 10 cm of the ground surface. Where ditches and drains are present within peatland areas (see Appendix B for plans showing the location of larger ditches and drains within modified bog habitats) it is proposed to block them to raise the water table in the adjacent peat. Shallow drains on slopes less than 3° would be blocked using peat dams. Deeper drains and/or drains on steeper slopes would be blocked using plywood, plastic piles or heather bales in accordance with the decision tree for ditch blocking techniques included in Armstrong *et al.* (2009)³¹. Over the last 20 or so years, a large number of peatland restoration projects have been undertaken, and their outcome monitored and published^{30 31 32 33 34 35}. Methods such as ditch blocking have therefore been widely tested and the chances of success are high.

Elements potentially associated with the Dowlais Free Drainage System are located on the western side of the off-site habitat management area. The proposals for the off-site management area involve blocking some of these water channels (as outlined above). However, the drainage channels themselves will not be removed such that the features are still visible in the landscape.

Across all peatland areas, the controlled grazing proposed in relation to heathland (see Section 4.3.3) would also benefit peatland habitats. The recommended stocking density for blanket bog and wet modified bog is 0.06 LU per hectare per year²⁸ and this would be taken into consideration when determining stocking densities and timings at the detailed HMP stage. As highlighted in Section 4.3.3, stocking densities and timings may differ for different management compartments and would be subject to regular review in response to the findings of ongoing monitoring.

The removal of purple moor-grass and rushes proposed for heathland areas (see Section 4.3.3) may also be beneficial in peatland areas and would therefore be implemented in peatland areas where appropriate to do so.

Seeding of peatland areas is considered unlikely to be required given the existing presence of bog plants such as cotton-grasses (*Eriophorum* sp.) and *Sphagnum* mosses in some areas, which indicate that natural regeneration of the area should take place following ditch blocking and reduction of grazing levels. If monitoring results (see Section 4.4) show that

³⁰ Artz, R.R.E., Donnelly, D., Aitkenhead, M., Balana, B. and Chapman, S. (2014). WISE Peatland Choices – a decision support tool for peatland restoration in Scotland. The James Hutton Institute, Version 2, September 2014.

³¹ Armstrong, A., Holden, J., Kaya, P., Foulger, M., Gledhill, S., McDonald, M.T. & Walker, A. (2009). Drain-blocking techniques on blanket peat: A framework for best practice. *Journal of Environmental Management* 90 (2009): 3512–3519.

³² Cris, R., Buckmaster, S., Bain, C. & Bonn, A.(Eds.) (2011) UK Peatland Restoration — Demonstrating Success. IUCN UK National Committee Peatland Programme, Edinburgh. [Online] Available at: IUCN Demonstrating Success Booklet_UK.pdf (iucn-uk-peatlandprogramme.org).

³³ O'Brien, H., Labadz, J.C. & Butcher, D.P. (2007). Review of blanket bog management and restoration. Technical Report to DEFRA. Project No. CTE0513.

³⁴ Schumann, M. and Joosten, H. (2008). Global Peatland Restoration Manual. Institute of Botany and Landscape Ecology, Greifswald University. Version April 18, 2008.

³⁵ Novo, P., Sposato, M., Maynard, C. & Glenk, K. (2021). Understanding the experiences of peatland restoration in Scotland.



natural regeneration is not sufficient, then remedial actions, e.g., seeding with peatland species, would be considered.

4.3.4.2 Ongoing Management

As set out in Section 4.3.3 controlled grazing would provide the most likely means of ongoing management of the off-site management area, including the peatland areas, and that this would take place for the lifetime of the wind farm. Further details were provided in Section 4.3.3.2.

Research indicates that most peat dams remain intact for at least six years³⁶, but some show evidence of erosion. Therefore, peat dams would be checked during vegetation monitoring, to check for signs of erosion or other form of damage. Should dams be eroded or otherwise damaged, or found to not be functioning as intended, then corrective works would be undertaken as required.

4.3.5 Habitat and Predator Management for Breeding Waders

4.3.5.1 Habitat Management

Curlews nest in bogs, on open moorland or rough and damp grassland with rushes and tussocks, and in unimproved hay meadows. Their chicks feed and shelter on rough, wet, tussocky ground, finding food on patches of short vegetation and cover among tussocks or in taller patches of vegetation.

Proposed habitat management would include:

- Management of grazing density and timing;
- Management of tall vegetation (e.g., rushes); and
- Raising the water table through ditch blocking.

The creation of shallow scrapes and pools can also be beneficial for curlew, although this is considered unlikely to be feasible here due to the sloping ground. This would be confirmed during preparation of the detailed HMP, however.

The controlled grazing proposed in relation to heathland (see Section 4.3.3) would be designed to also benefit curlew. Curlews require relatively low intensity grazing in order to create a varied sward structure. Cattle grazing is usually preferred (but is not essential). Grazing would avoid nesting areas when the birds are nesting as this is when the birds are most vulnerable to disturbance from stock (e.g., trampling)³⁷.

Curlews avoid very dense stands of rushes and cutting is recommended when rush cover exceeds 50%³⁷. The proposed heathland restoration (see Section 4.3.3) should therefore benefit curlew. Cutting of rushes and other tall vegetation would only take place outside the breeding season within curlew nesting areas.

Restoring wet ground on moorland by blocking drainage grips will improve feeding habitat for curlew³⁷. The proposed peatland restoration (see Section 4.3.4) should therefore benefit curlew. Ditch blocking would only take place outside the breeding season within curlew nesting areas.

The measures described above would also benefit other wader species such as snipe.

³⁶ Artz, R. E., Faccioli, M., Roberts, M., & Anderson, R. (2018). Peatland restoration – a comparative analysis of the costs and merits of different restoration methods. Dundee: The James Hutton Institute (on behalf of Climate Xchange).

³⁷ RSPB. 2017. Land management for Curlew (*Numenius arquata*). Available at: <https://curlewlife.org/resources/>



4.3.5.2 Predator Management

Recent declines in the curlew population have been driven by changes in land use, leading to greater predation of eggs and chicks, particularly by foxes³⁷ but also by other species, e.g., crows. This reduces recruitment of young birds into the population and the population then declines as the remaining adult birds reach old age and die.

Some lethal predator control already takes place within the proposed off-site habitat management area, although details were not available at the time of writing. The OHMP would secure ongoing lethal predator control for the lifetime of the wind farm (noting that predator control would cease if curlews were no longer present, or numbers recovered sufficiently that predator control was no longer essential to maintain the population). Lethal predator control would be limited to the off-site management area and would not take place within the common. Lethal predator control would specifically target the period between February and July, during and immediately prior to the breeding season³⁸. Lethal predator control aimed at benefitting curlew should also benefit other breeding wader species such as snipe.

In addition to lethal predator control, it is also proposed to use temporary electric fencing to protect curlew nests from foxes and other ground-based predators. This has been found to reduce predation of eggs and significantly increase hatching rates³⁹. Methods would follow those published by Cri'r Gylfinir/Curlew LIFE³⁹ and would link in with proposed monitoring (see Section 4.4). Use of temporary electric fencing would be limited to the off-site management area and would not be possible on common land within the Pen March site.

4.4 Monitoring and Review

4.4.1 Aims

The main purpose of the proposed monitoring of the off-site habitat management area is to determine whether the objectives set out in the OHMP are being met. Monitoring results would also inform the requirement for any changes to restoration methods and/or ongoing management.

4.4.2 Heathland Restoration and Management

Botanical monitoring would take place as proposed for the on-site habitat management area, i.e., using a combination of aerial imagery and ground-based botanical survey (see Section 3.5 for further details). Monitoring would cover the full extent of the off-site management area. As proposed for the on-site management area monitoring would first be used during the summer prior to commencing restoration works (Year 0) to provide an up-to-date baseline. It would then be repeated annually in the first three years post-restoration commencing, and then again in Years 5, 7 and 10. The requirement for further monitoring after Year 10, would be decided at the end of Year 10, following consideration of monitoring results at that time.

4.4.3 Peatland Restoration and Management

4.4.3.1 Botanical Monitoring

Botanical monitoring would take place in conjunction with monitoring of heathland restoration and management areas (see Section 4.4.2).

³⁸ RSPB. Undated. Farming with Curlews and Other Waders leaflet. Available at: <https://curlewlife.org/resources/>.

³⁹ Cri'r Gylfinir/Curlew LIFE. Undated. Ysbyty Ifan and Hiraethog - Installing Temporary Electric Fencing. Available at: <https://curlewlife.org/resources/>.



4.4.3.2 Hydrological Monitoring

Dipwells, or a similar method for monitoring water table levels, would be installed within peatland areas subject to ditch blocking to monitor changes to the water table after ditch blocking has taken place.

Dipwells would be installed at least a year prior to ditch blocking and subject to one year of monitoring to provide a baseline. The number and location of dipwells would be determined following the proposed topographic survey (see Section 4.3.1) but it is anticipated that dipwells would be installed at a density equivalent to approximately one per hectare within areas subject to ditch blocking. Dipwells would be monitored quarterly in each monitoring year (once in each season) in order to capture maximum seasonal variations. Following ditch blocking, dipwell monitoring would be undertaken annually in the first three years following restoration, and then again in Years 5, 7 and 10, with the need for further monitoring determined in Year 10, following consideration of monitoring results at that time.

4.4.4 Breeding Waders

Monitoring of breeding waders within the Pen March site itself is proposed in ES Chapter 9: Ornithology. This would be extended to cover the full extent of the proposed off-site habitat management area. The monitoring surveys proposed in the ES are due to commence during the breeding season before construction commences and continue annually for at least three years post-construction, with the need for further monitoring subject to review at the end of Year 3. The survey would follow the methodology used in 2019 and 2020, i.e., an adapted version of the Brown & Shepherd methodology²⁷, with four visits undertaken between early April and early July. Further details are provided in the ES.

In addition, more detailed surveys for curlew would be undertaken to identify nest locations and enable the installation of predator fencing (see Section 4.3.5.2). These surveys would also seek to determine productivity from each nest recorded and would also note other wader nest locations recorded incidentally. Detailed methods would be provided in the detailed HMP but are likely to include direct observation and the use of remote cameras. These surveys would take place annually for the lifetime of the wind farm (noting that surveys would cease if curlews were no longer present, or numbers recovered sufficiently that nest monitoring was no longer essential to maintain the population).

4.4.5 Reporting and Review

Monitoring results would be reported annually (in years when monitoring takes place) and recommendations made for changes to management prescriptions if objectives are not being met, as appropriate.



5.0 Indicative Programme

Indicative timings for restoration, management and monitoring tasks contained within this OHMP are provided in Table 5-1 for the on-site habitat management area and



Table 5-2 for the off-site management area. These are indicative only and would be finalised within the detailed HMP and subject to review following ongoing monitoring. Year 0 represents the year prior to implementation of the HMP, and Year 1 represents the first year in which initial restoration measures take place.

Implementation of most aspects of the HMP would either begin during wind farm construction or within one year following the completion of construction. Due to the perilous state of the curlew population in Wales and the possibility that they could become extinct at the site in the near future, proposed predator management for curlew within the off-site management area would commence in the first breeding season during wind farm construction, irrespective of when other HMP works are implemented.



Table 5-1 Indicative Programme – On-site Habitat Management Area

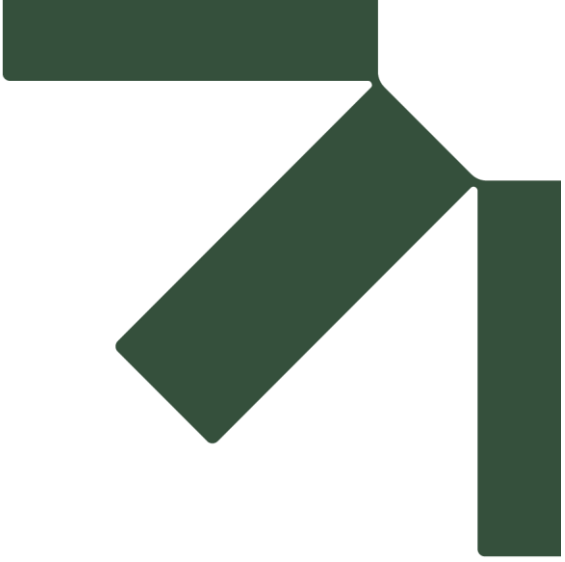
Year / Activity	0	1	2	3	4	5	6	7	8	9	10	11-15	16-20	21-25	26-30	31-35
Baseline Botanical Survey																
Installation of Fencing (if required)																
Heathland Restoration Option: Controlled Grazing																
Heathland Restoration Option: Herbicide Application			Requirement for further treatment determined by monitoring results													
Heathland Restoration Option: Cutting					Requirement for further cutting determined by monitoring results											
Botanical Monitoring												Requirement for further monitoring to be determined in Year 10				
Heathland Seeding					Requirement determined based on results of botanical monitoring survey											
Ongoing Management (Controlled Grazing or Cutting)																



Table 5-2 Indicative Programme – Off-site Habitat Management Area

Year / Activity	0	1	2	3	4	5	6	7	8	9	10	11-15	16-20	21-25	26-30	31-35
Baseline Botanical Survey																
Baseline Topographic Survey (Ditch Blocking Areas)																
Baseline Breeding Wader Survey																
Installation of Fencing (if required)																
Heathland Restoration and Management																
Peatland Restoration – Ditch Blocking																
Peatland Restoration – Grazing Management																
Peatland Restoration – Repair/Replacement of Peat Dams (if required)								Requirement determined by monitoring results								
Habitat Management for Curlew																
Predator Management for Curlew (to start in first breeding season during construction)																
Botanical Monitoring												Requirement for further monitoring to be determined in Year 10				
Hydrological Monitoring – Ditch Blocking Areas												Requirement for further monitoring to be determined in Year 10				
Breeding Wader Monitoring					Requirement for further monitoring to be determined in Year 3											
Curlew Nest Monitoring																





Appendix A Drawing 1: Proposed On-site and Off-site Habitat Management Areas

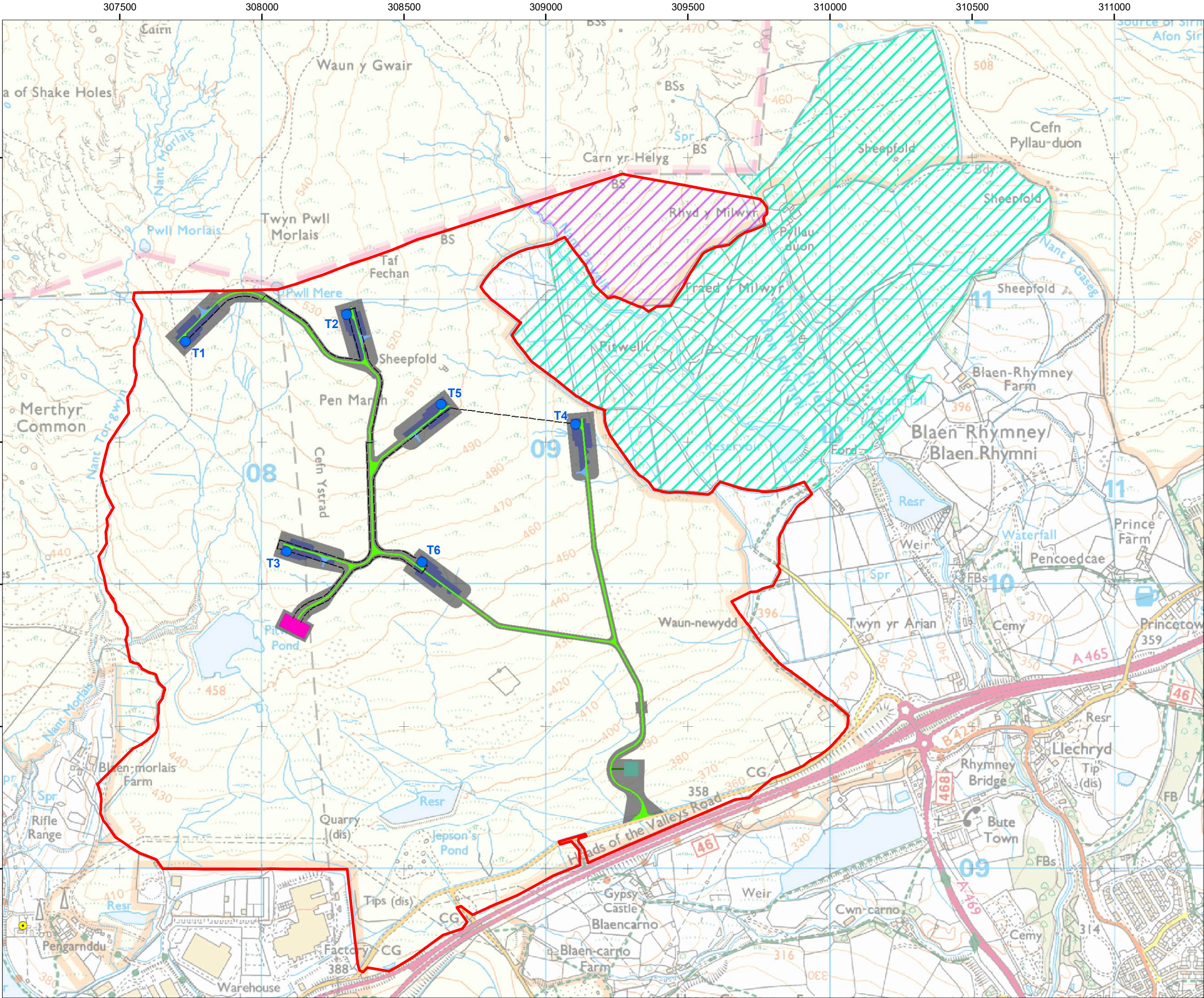
Outline Habitat Management Plan (July 2023 Update)

Pen March Wind Farm

RWE Renewables UK Swindon Ltd

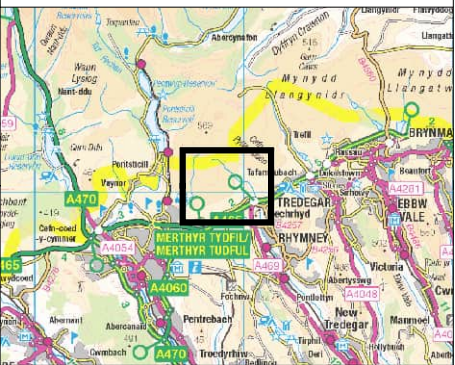
SLR Project No.: 406.V02273.00066

14 July 2023



- Legend:**
- Pen March Site Boundary
 - Proposed Turbine Location
 - Grid Connection
 - Cable
 - Substation and Energy Storage
 - Access Track
 - Access for Construction Compound
 - Turning Head
 - Construction Compound
 - Worst-Case Pad Area
 - Indicative Construction Working Area
 - Proposed On-site Habitat Management Area
 - Proposed Off-site Habitat Management Area

Coordinate System: British National Grid
Projection: Transverse Mercator
Datum: OSGB 1936
Units: Meter



Rev	Date	Description	Drn	Chk	App
01	19/06/2023	Second Revision	CN	SH	DW
01	08/09/2022	First Draft	JK	JO	SD

Pen March Wind Farm

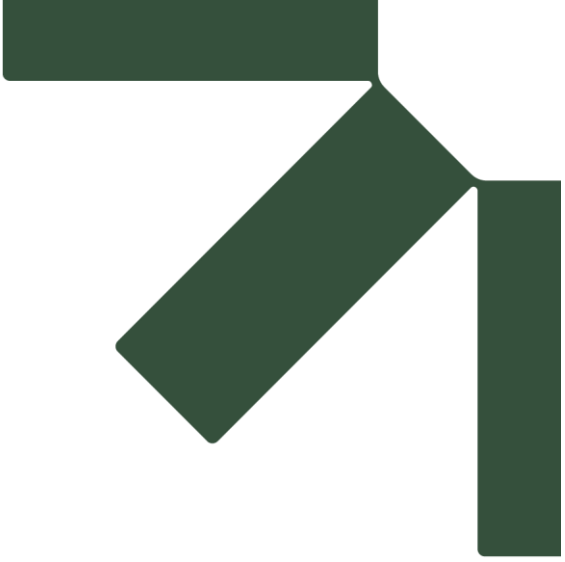
TITLE: Drawing 1
Proposed On-site and Off-site
Habitat Management Areas

0200400Metres

SCALE: 1:12,500 @ A3

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Appendix B Habitat Survey Report – Potential Off-site Habitat Management Areas

Outline Habitat Management Plan (July 2023 Update)

Pen March Wind Farm

RWE Renewables UK Swindon Ltd

SLR Project No.: 406.V02273.00066

14 July 2023



Habitat Survey Report – Potential Off-site Habitat Management Areas

PEN MARCH WIND FARM

RWE Renewables UK Swindon Ltd

Prepared by:

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SLR Project No.: 406.V02273.00066

13 July 2023

Revision: 1

Revision Record

Revision	Date	Prepared By	Checked By	Authorised By
0	9 June 2023	Shannon Davies	Jess Colebrook	Duncan Watson
1	13 July 2023	Shannon Davies	Duncan Watson	Duncan Watson

Basis of Report

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1.0 Introduction

1.1 Background

RWE Renewables UK Swindon Ltd (RWE) is proposing to construct and operate Pen March Wind Farm (henceforth 'the proposed scheme') which would be located north of the A465 Heads of the Valleys road, northwest of the small town of Rhymney and northeast of Merthyr Tydfil.

The proposed scheme represents a Development of National Significance (DNS) and therefore requires Welsh Ministers' consent. In accordance with the DNS process the proposed application, including a draft Environmental Statement (ES), was publicised and consulted on for a period of six weeks in November and December 2022.

Within the draft ES it was highlighted that RWE was investigating providing off-site compensation for potentially significant effects arising from the proposed scheme, specifically the potential loss of peat and peaty soils and the potential disturbance and displacement of breeding curlew during wind farm operation, and providing additional off-site biodiversity enhancement.

Subsequent to the statutory consultation process, initial discussions have taken place with the owners of land adjacent to the proposed scheme boundary to the east, Dŵr Cymru Welsh Water and the owners of land to the south at Pencoedcae Farm, with a view to potentially using part of that land to provide the necessary off-site compensation and additional biodiversity enhancement.

SLR Consulting Ltd (SLR) was commissioned by RWE in April 2023 to undertake a Phase 1 habitat survey of the land owned by Dŵr Cymru Welsh Water and the land at Pencoedcae Farm, to the east of the proposed scheme boundary, as illustrated in Drawing 1. The purpose of the survey was to provide baseline data on the habitats present to inform an initial assessment of their potential to benefit from restoration and management (and therefore their potential to provide off-site compensation and biodiversity enhancement).

1.2 Survey Area

The Habitat Survey Area is shown on Drawing 1. It comprises approximately 248ha of land that is immediately adjacent to the eastern boundary of the proposed scheme.

The Survey Area is broadly south facing and rises from approximately 350m above sea level at the southern boundary up to approximately 490m in the north. The southern part of the Survey Area lies alongside the A465 Heads of the Valleys Road and in general terms comprises low lying enclosed agricultural fields. The Survey Area then rises to the north with the unenclosed hillside comprising wet heath, marshy grassland, modified bog, flush and acid grassland mosaics.

1.3 Scope of Study

This report presents the findings of the Phase 1 habitat survey undertaken in April 2023. The report seeks to:

- establish baseline conditions and identify habitats that are important ecological features (irrespective of animal species they may support); and
- identify areas that have potential for ecological enhancement or restoration.

Details of proposed management and restoration are beyond the scope of this report and are covered separately within an Outline Habitat Management Plan (SLR)¹.

¹ SLR Consulting. 2023. Pen March Wind Farm: Outline Habitat Management Plan (June 2023 Update).



1.4 Evidence of Technical Competence and Experience

This report has been authored by Shannon Davies, who also undertook the survey work. Shannon is a Senior Ecologist at SLR with over five years professional experience in botanical survey and has previously worked on a number of different wind farm developments.

Additional technical support and quality assurance has been provided by Jess Colebrook and Duncan Watson. Both Jess and Duncan have over 22 years' experience as professional ecologists; are Chartered Environmentalists (CEnv) and full members of CIEEM (MCIEEM).



2.0 Methodology

2.1 Phase 1 Habitat Survey Methodology

The Phase 1 Habitat Survey was undertaken between 24th – 27th April 2023. Weather conditions during the survey visit were mild (>13°C), overcast with intermittent showers and sunny spells.

Initial identification of areas of similar habitat (i.e. habitat polygons) via interpretation of aerial imagery was undertaken prior to attending the Survey Area. Each of the polygons identified from aerial interpretation was visited then classified in accordance with the Phase 1 standard JNCC methodology². Any rare or notable plant species (including non-native invasive plant species listed on Schedule 9 of the Wildlife and Countryside Act 1981 (as amended), such as Japanese knotweed (*Fallopia japonica*) and Himalayan balsam (*Impatiens glandulifera*) were recorded where seen and highlighted within the individual target note. No boundary features were mapped as part of this assessment.

Botanical nomenclature in this report follows that of Stace (2010³) for vascular plants.

During the Phase 1 Habitat Survey, in order to assist with the identification of peatland habitat types, a basic assessment of peat depth was made using a probing stick pushed through the substratum until a hard layer was reached. The depth of peat was then measured off the stick and classified as either greater or less than 50cm⁴. In each location where this was completed, a minimum of three sample readings were taken and then averaged to ensure a representative result.

A more comprehensive and detailed peat depth assessment, undertaken by RSK, was provided after the initial Phase 1 Habitat Survey had been completed⁵. This has subsequently been used to more accurately determine the extent of peatland habitats in preference to the more limited peat depth information gathered during the Phase 1 Habitat Survey.

As part of the Phase 1 habitat survey an initial assessment of potential for habitat restoration and management was undertaken, based on the condition of the habitats present.

2.2 Limitations

The Survey Area is dominated by grassland and heathland habitats typical of South Wales including marshy grassland, acid grassland, heath, flush and degraded bog. As is often the case with these habitats they occur as mosaics within the survey area with diffuse boundaries. The accurate mapping of such habitats is therefore extremely difficult, and the habitat maps provided are therefore a best effort to map the habitats present, noting that large areas have necessarily been mapped as mosaics.

No other constraints were noted during the completion of the Phase 1 Habitat Survey and the Survey Area was fully accessible.

² Joint Nature Conservation Committee (JNCC). (2010). *Handbook for Phase 1 Habitat Survey. A technique for environmental audit*. Revised re-print. JNCC, Peterborough.

³ Stace C. (2010) *Field Flora of the British Isles*. Cambridge University Press.

⁴ 50cm was used as the assessment depth for the peat layer as the classification of certain habitats within the Handbook for Phase 1 Habitat Survey (JNCC, 2010) depends on whether the peat depth is greater or less than 50cm.

⁵ See ES Chapter 6, Technical Appendix 6.1 Peat Slide Risk Assessment.



3.0 Results

3.1 Phase 1 Habitat Survey - Summary

The Survey Area mainly comprises a mosaic of Marshy Grassland and Flush, in mosaic with either Wet Heath or Wet Modified Bog, depending on peat depth. Drawing 1 in Appendix A shows the extent and location of each habitat type recorded and the location of any target notes (TN) made (as referenced within the detailed habitat descriptions below).

Table 3-1 lists all habitat types recorded within the Survey Area and gives their extent in hectares (ha).

Table 3-1 also gives the extent of each habitat type recorded within the proposed Management and Restoration Area Boundary (shown in Drawing 2 and later referenced in Section 4.2).

Full descriptions of each of the habitat types present are provided in Section 3.2.

Table 3-1 Summary of Phase 1 Habitats Present within the Survey Area

Habitat	Extent within Survey Area (ha)	Extent within Proposed Management and Restoration Area Boundary (ha)
Wet Heath, Marshy Grassland and Flush Mosaic	73.02	73.02
Semi-improved Neutral Grassland	48.80	0.69
Wet Modified Bog, Flush and Wet Heath Mosaic	31.91	31.91
Improved Grassland	24.85	0.32
Semi-improved Acid Grassland	16.24	16.24
Dry Heath and Scattered Bracken	8.07	8.07
Marsh/Marshy Grassland	6.81	6.67
Dry Heath, Semi-improved Acid Grassland Mosaic	6.28	6.28
Standing Water	4.48	1.29
Hardstanding	4.14	0.74
Broadleaved Woodland	3.71	0.32
Valley Mire	3.16	3.16
Running Water	2.57	1.70
Wet Heath	2.42	2.41
Basin Mire and Flush mosaic	2.14	2.14
Semi-improved Acid Grassland with Scattered Bracken	1.41	1.41
Ditch	1.37	1.14
Acid Grassland, Flush and Scattered Bracken Mosaic	1.29	1.29



Habitat	Extent within Survey Area (ha)	Extent within Proposed Management and Restoration Area Boundary (ha)
Acid/Neutral Flush	1.13	0.33
Dry Modified Bog	0.93	0.93
Semi-improved Acid Grassland and Scattered Trees	0.57	0.57
Coniferous Woodland	0.54	0.14
Dense Scrub	0.51	None
Semi-improved Neutral Grassland - and Scattered Scrub	0.44	None
Building	0.41	0.02
Semi-improved Neutral Grassland with Scattered Trees	0.41	None
Tall Ruderal	0.10	None

3.2 Detailed Habitat Descriptions

3.2.1 Wet Heath, Marshy Grassland and Flush Mosaic

This habitat mosaic is dominated by wet heath covering approximately 60% of the habitat area, with approximately 30% marshy grassland and approximately 10% flush habitat (see Photograph 1). Where peat is more than 50cm deep in areas supporting this same suite of vegetation, they have been classified as wet modified bog mosaics under Phase 1 terminology (see 3.2.2).

The sward is typically dominated by purple moor grass (*Molinia caerulea*) and / or soft rush (*Juncus effusus*) and compact rush (*Juncus conglomeratus*). Heathland vegetation cover comprises gorse (*Ulex sp.*) and bilberry (*Vaccinium myrtillus*), with occasional common heather (*Calluna vulgaris*) and cross-leaved heath (*Erica tetralix*). Other grasses, sedge and broadleaved species are present but rarely dominate, these include species typical of wet, acid conditions such as Yorkshire fog (*Holcus lanatus*), deergrass (*Trichophorum germanicum*), cotton-grass (*Eriophorum sp.*), heath bedstraw (*Galium saxatile*), bog asphodel (*Narthecium ossifragum*), marsh thistle (*Cirsium palustre*) and tormentil (*Potentilla erecta*).

Where rushes gain dominance over the purple moor grass, and where Sphagnum or other bryophytes are present as a ground layer these areas are considered to be acid/neutral flush. Within the flushes or areas in which pools of water are present vegetation includes water crowfoot (*Ranunculus aquatilis*), creeping buttercup, marsh violet (*Viola palustris*), cuckoo flower (*Cardamine pratensis*) and floating sweet-grass (*Glyceria fluitans*). Such areas are present as an intimate mosaic with the marshy grassland and wet heath described above. It was not considered practical or necessary to map these habitats individually due to the fine level of mosaic present.

The majority of areas are closely cropped with swards of <10cm and subject to grazing, nevertheless woody shrubs appear to be in the pioneer or building phase of growth. Other areas particularly associated with the marshy grassland and flush habitats had higher swards of up to 70cm, primarily as a result of rush dominance.





Photograph 1 - Wet Heath and Marshy Grassland Typical of the Survey Area

3.2.2 Wet Modified Bog, Flush and Wet Heath Mosaic

Substantial areas of Wet Modified Bog are present within the Survey Area, based on recorded and interpolated peat depth information. The largest is located at the eastern side of the Survey Area. Throughout the mosaics of Wet Modified Bog across the Survey area, the habitat resembles wet heath habitat described in Section 3.2.1 however is located on areas of peat more than 0.5m deep. This habitat is dominated by purple moor grass tussocks, cotton-grass (*Eriophorum* sp.) and areas of dense soft rush and sedge assemblages including star sedge (*Carex echinata*), carnation sedge (*Carex panicea*) and glaucous sedge (*Carex flacca*). Heathland and dwarf shrubs, as described in Section 3.2.1, are also present in this habitat although cross-leaved heath and deergrass are in higher abundance. The majority of areas are closely cropped with swards of <20cm and subject to grazing, nevertheless, dwarf shrubs appear to be in the pioneer or building phase of growth.

This habitat is generally damp but drained by the network of ditches located within the upland areas, those ditches are as described in Section 3.2.20 and drain much of this habitat. As such this habitat does support Sphagnum mosses within the ground layer, however these were limited in extent and diversity as a likely consequence of reduced water accumulation in the area, as such the bog habitat was classified as Wet Modified Bog under Phase 1 terminology. Other typical bog species such heath rush, marsh violet, heath bedstraw, bog asphodel and tormentil were all present but not abundant.

In all cases the wet modified bog occurs in mosaic with flush and wet heath as described in Section 3.2.1.

3.2.3 Dry Modified Bog

A small area of Dry Modified Bog is located in the centre of the Survey Area (TN 1). This area did not exhibit 'typical' botanical bog communities and was initially recorded as Semi-Improved Neutral Grassland (similar in appearance to Photograph 6) with limited Sphagnum mosses present. The grassland comprises species as described in Section 3.2.9 with areas of relatively dense soft rush along the northern areas of the habitat. However, on review of the peat depth data⁵ the peat in this



area is more than 50cm and therefore this section has been classified as Dry Modified Bog under Phase 1 terminology.

3.2.4 Acid/Neutral Flush

The majority of the flush habitats are dominated by soft rush and sedges, a limited number of grasses are present including Yorkshire fog and floating sweet-grass and a variety of Sphagnum or other bryophytes are present as a ground layer (TN 2). Water was at the surface and the ground was wet underfoot with some areas of shallow standing water, the peat depth in these areas is generally less than 0.5m. Additional species present include brooklime (*Veronica beccabunga*), lesser spearwort (*Ranunculus flammula*), pondweed (*Potamogeton* sp.) water crowfoot, creeping buttercup, marsh violet, cuckoo flower and forget-me-not (*Myosotis* sp.).



Photograph 2 - Acid/Neutral Flush in the centre of the Survey Area

3.2.5 Semi-improved Acid Grassland

The Semi-improved Acid Grassland is typically dominated by common bent (*Agrostis capillaris*), sheep's fescue (*Festuca ovina*), wavy hair grass (*Deschampsia flexuosa*) and mat-grass (*Nardus stricta*), with soft rush present (Photograph 3 and TN3). The grasslands were generally on sloped areas or plateaus which were dry and free-draining, with particularly frequent occurrence of this habitat in the centre and north-east of the Survey Area. These grasslands are relatively species poor and as a result herbaceous and woody shrubs within the grassland were particularly sparse but where present were generally <10cm in height and represented by heath bedstraw, tormentil, bilberry and common heather.





Photograph 3 - Semi-improved Acid Grasslands present in the north-east of the Survey Area

3.2.6 Semi-improved Acid Grassland with Scattered Trees

Semi-improved Acid Grassland, as described in Section 3.2.5, with mature sycamore trees (*Acer pseudoplatanus*) is present in a small area in the centre of the Survey Area. Interspersed within the habitat was scattered stones, a relic from an old stone building and associated stonewalls in a state of disrepair.

3.2.7 Semi-improved Acid Grassland and Scattered Bracken

Semi-improved Acid Grassland, as described in Section 3.2.5, with the addition of scattered bracken is located within the central-western areas of the Survey Area (TN4). The habitat mosaic has formed on the broad banks which descend down to the small Nant Pitwellt stream (described in Section 3.2.20 and Photograph 4). In some areas the bracken is dense, however, more typically it comprises approximately 40% of the vegetation. Within this habitat scattered hawthorn trees (*Crataegus monogyna*) are also present, although they are not a major component of the habitat (Photograph 4). This habitat is also bordered by stonewalls (Photograph 4) which in places are in a state of disrepair.





Photograph 4 - Semi-improved Acid Grassland and Scattered Bracken in the central sections of the Survey Area in association with the Nant Pitwellt stream banks

3.2.8 Semi-improved Acid Grassland, Flush and Scattered Bracken Mosaic

Semi-improved Acid Grassland, Flush and Scattered Bracken Mosaic is present in the central sections of the Survey Area (Photograph 5). The habitat comprises approximately 70% Semi-improved Acid Grassland and 30% Flush and is generally located on the sloping areas and adjacent to the unnamed stream tributary of the Rhymney River.

The acid grassland was dominated by species described in Section 3.2.5. Areas of soft rush and other species typical of wet, acid conditions start to become more frequent in the Flush areas; these include Yorkshire fog, floating sweet-grass, deergrass, jointed rush, numerous sedges and broadleaved species which are present but rarely dominate such as heath bedstraw, marsh thistle and tormentil, water crowfoot, creeping buttercup and marsh violet.

The grassland also comprises a significant proportion of bracken cover which was mostly below 1m in height and was typically restricted to the slightly drier parts of the grassland.

As shown in Photograph 5, stone walls are also located within and bordering this habitat, in the central areas of the Survey Area these stone walls are in a state of disrepair.





Photograph 5 - Semi-improved Acid Grassland flush and Scattered Bracken in the central section of the Survey Area

3.2.9 Semi-improved Neutral Grassland

Many areas of grassland did not exhibit acidic botanical communities and have been recorded as Semi-improved Neutral Grassland (Photograph 6). Improvement of grasslands often reduces the character of grasslands and in this instance it is likely that prolonged agricultural activity has resulted in grassland communities more representative of neutral soils. However, it should be noted that the soil conditions may still be relatively acidic.

These grasslands are dominated by annual meadow grass (*Poa annua*), cock's-foot (*Dactylis glomerata*), false oat-grass (*Arrhenatherum elatius*), Yorkshire fog and creeping bent, along with the occasional tufted hairgrass (*Deschampsia cespitosa*), sweet vernal grass (*Anthoxanthum odoratum*) and crested dog's-tail (*Cynosurus cristatus*). This habitat comprises scattered areas of soft rush and a variety of broad-leaved herbs were also present (albeit closely cropped) and relatively frequent comprising common daisy (*Bellis perennis*), common sorrel (*Rumex acetosa*), common mouse-ear (*Cerastium fontanum*), broad-leaved dock (*Rumex obtusifolius*), creeping thistle, creeping buttercup (*Ranunculus repens*), meadow buttercup (*Ranunculus acris*), white clover (*Trifolium repens*) and areas of dense soft rush. These Semi-improved Neutral Grasslands were typically recorded in relatively damp and heavily grazed areas on the lower slopes to the south of the Survey Area.





Photograph 6 - Semi-improved Neutral Grassland located within the southern areas of the Survey Area

3.2.10 Semi-improved Neutral Grassland with Scattered Trees

Semi-improved neutral grassland, as described in Section 3.2.9, located to the south-west of the Survey Area to the west of the Rhymey River. Mature ash (*Fraxinus excelsior*), willow (*Salix alba*) and hawthorn trees are located along the field boundaries.

3.2.11 Semi-improved Neutral Grassland with Scattered Scrub

A small area of Semi-Improved Neutral Grassland is located on a sloping bank which leads down to the west of the Rhymney Reservoir, to the west of an access track (TN5). The grassland is as described in Section 3.2.9, dominated by meadow grasses, cock's-foot, false oat-grass and sweet vernal grass, with a number of common herbaceous species within the sward such as common daisy, common sorrel, common mouse-ear, creeping buttercup and white clover.

Throughout this habitat areas of dense but scattered scrub are present, including areas of hawthorn stands or dense bramble (*Rubus fruticosus*), up to 3m in height.

3.2.12 Improved Grassland

The southern part of the Survey Area is dominated by extensive areas of improved grassland bounded by wire fencing and defunct species-poor hedgerows (Photograph 7). The grassland sward is dominated by perennial ryegrass (*Lolium perenne*) and cock's-foot with broad-leaved herbs limited to white clover, ribwort plantain (*Plantago lanceolata*), common sorrel and creeping buttercup. The grassland is subject to sheep grazing, has a short sward of approximately 5cm in height and has likely been subject to long-term agricultural improvement.





Photograph 7 - Improved Grassland located within the southern areas of the Survey Area

3.2.13 Marshy Grassland

Marshy Grassland dominated by purple moor grass occurs in several compartments in the southern central section and the eastern section of the Survey Area (Photograph 8) all on gently sloping areas. Other species are occasionally present and widespread including common bent, Yorkshire fog and deergrass, Sphagnum is also frequent but not dominant within the sward. Herbaceous species within the sward were sparse but comprise marsh thistle, foxglove (*Digitalis purpurea*) tormentil and heath bedstraw, the sward was generally no more than 30cm in height.

Scrub cover is <10% in the compartment associated with Rhymney River stream and comprises sparsely scattered gorse and willow. Although notable, such scrub is not a major component of the habitat in this area. This area also contains stone walls in a state of disrepair (Photograph 8).





Photograph 8 - Marshy Grassland located within the southern-central areas of the Survey Area

3.2.14 Marshy Grassland and Semi-improved Neutral Grassland Mosaic

An area of Marshy Grassland and Semi-improved Neutral Grassland forms a distinct mosaic within the south of the Survey Area. It comprises soft rush and occasional sharp-flowered rush dominated grassland interspersed with areas of heavily grazed grassland (Photograph 9) that is much like that described in Section 3.2.9 (i.e. dominated by annual meadow grass, Yorkshire fog and creeping bent).



Photograph 9 - Small area of Marshy Grassland and Semi-improved Neutral Grassland Mosaic located within the southern areas of the Survey Area



3.2.15 Dry Heath and Semi-Improved Acid Grassland Mosaic

Semi-improved Acid Grassland and Dry Heath occur in a complex mosaic in the central and north-eastern sections of the Survey Area.

The area to the north-east is adjacent to the boundary fence line, and the isolated areas in the central section of the Survey Area are both of similar character (Photograph 10 and TN5 and TN6). These areas comprise Dry Heath vegetation growing on well drained slopes, with the heath vegetation accounting for approximately 30-40% of vegetative cover. These areas tend to be dominated by sheep's fescue and other fine-leaved grasses, woody heath vegetation is dominated by bilberry with occasional common heather and broadleaved herbs, with little or no Sphagnum within the sward. These areas are closely cropped with swards of <10cm and subject to grazing. The remainder of the mosaic mainly comprises short grazed Semi-improved Acid Grassland similar to that found in other parts of the Survey Area (described in Sections 3.2.5). Within the north-eastern areas scattered exposures of rock are also present (TN6). The central area is bordered by stone walls in a state of disrepair (Photograph 10).



Photograph 10 - Areas of Dry Heath and Semi-improved Acid Grassland Mosaic habitat in the north-east and central areas of the Survey Area

In the remaining central areas (TN7) the area comprises approximately 50% dry heath with the remaining areas comprising of 50% acid grassland. This area was generally on well-draining slopes with significant coverage of gorse. Although tussocks of purple moor grass and soft rush were more significant in this area particularly around stands of gorse, dwarf shrubs such as bilberry and common heather were also present. The majority of the vegetation is <10cm tall whilst the gorse was >30cm in height.





Photograph 11 - Dry Heath and Semi-improved Acid Grassland Mosaic in the central area of the Survey Area

3.2.16 Dense Continuous Scrub

Dense bramble, hawthorn and willow scrub is present along the western boundary of the Rhymney River reservoir, to the east of an access track (TN8). The scrub is up to 3m in height.

3.2.17 Coniferous Plantation Woodland

There are two isolated areas of coniferous plantation woodland in the central section of the Survey Area (Photograph 12). The woodland parcel in the centre of the Survey Area (TN9) is a monoculture of densely planted mature Larch (*Larix* sp.) and the other is a less dense woodland of Scots Pine (*Pinus sylvestris*) (TN10). The understory of both woodland parcels is open to grazing animals from the adjacent grassland fields.



Photograph 12 - Coniferous Woodland in the central part of the Survey Area



3.2.18 Semi-natural Broadleaved Woodland

Self-sown broadleaved woodland is colonising the steep slopes leading down to the Rhymney River Reservoir and the Rhymney River (Photograph 13). The woodland along the Rhymney River Reservoir comprises relatively young trees with limited age structure. Dominant species include hawthorn, willow species, silver birch (*Betula pendula*) and alder (*Alnus glutinosa*) (TN11).

The woodland along the Rhymney River banks comprises hawthorn, rowan (*Sorbus aucuparia*), willow species, ash and hazel trees below 10m in height. Any gaps in the woodland are filled by small, isolated stands of bracken or patches of semi-improved neutral grassland (TN12).



Photograph 13 - Semi-natural Broad-leaved Woodland belt located in the central and southern lowland sections of the Survey Area

3.2.19 Standing Open Water

Standing open water habitats within the Survey Area are relatively scarce, and are restricted to two reservoirs, namely Rhymney River Reservoir and Nant Pitwellt Reservoir (Photograph 14). Both reservoirs are located in the central and southern lowland sections of the Survey Area.

The Rhymney River Reservoir (named as the Source of the Rhymney River on Ordnance Survey mapping) is approximately 2.7ha in size and is located in the south, within the lowland area of the Survey Area. The southern edge of the reservoir is formed from a soil bund covered by improved grassland and fronted with large stone blocks. Whilst the eastern margin is formed by the deciduous woodland described in Section 3.2.18, and the northern and western sections by scattered areas of hawthorn, willow and bramble scrub, as described in Section 3.2.16, and as a result is more naturalised. The reservoir margins and water are largely devoid of vegetation but the waterbody supports low numbers of waterfowl.

The Nant Pitwellt Reservoir (unnamed on Ordnance Survey mapping) is approximately 1.3ha in size and is located in the central section of the Survey Area. The southern edge of the reservoir is formed from a soil bund covered by improved grassland and fronted with large stone blocks, whilst the northern margin is formed by the hillside and as a result is more naturalised. The margins and water are largely devoid of vegetation, although the banks in part comprise scattered areas of hawthorn, gorse and bracken scrub and the waterbody supports low numbers of waterfowl.





Photograph 14 - Rhymney River Reservoir (left) and Nant Pitwellt Reservoir (right) located in the central and southern lowland sections of the Survey Area

3.2.20 Running Water

Streams

Three streams flowing northwest to south-east are located in the northern upland areas of the Survey Area (Photograph 15). These streams form the Rhymney River (TN13) and Nant Pitwellt (TN14) which lead to the corresponding reservoirs described in Section 3.2.19, and the additional stream pertains to unnamed tributary into the Rhymney River (TN15). All these streams are relatively small, measuring approximately 1m wide and 20-70cm deep, with a rock and gravel substrate. The streams have a moderate flow and are located within deep valleys and are at least 3-5m below the surrounding ground level particularly within the upland areas. The stream channels are generally devoid of aquatic vegetation and are considered likely to be subject to large fluctuations in flow depending on local rainfall. The banks comprise heathland, flushes, marshy grassland, acid grassland, scattered bracken and occasional hawthorn, gorse and willow scrub with stone walls in a state of disrepair beyond (Photograph 15).





Photograph 15 - Rhymney River (left) and Nant Pitwellt (right) located in the upland sections of the Survey Area

Ditches

There are numerous ditches and channels distributed widely across the Survey Area. A network of ditches is present in the west of the Survey Area which are holding water and are forming larger flushes within the wider habitat. Ditches in the eastern areas are generally more open and holding low levels of flowing water (TN16) and providing a more noticeable drainage function. These ditches and channels have likely been dug to aid the drainage of the Survey area, or naturally created through run-off erosion during periods of heavy rainfall (Photograph 16). Some of these ditches and channels are marked on Ordnance Survey mapping but during the survey it was difficult to specifically identify and map all such features as the vegetation within ditches is mostly a continuation of the vegetation present within adjacent areas, with many being dominated by dense stands of purple moor-grass, soft rush and sharp-flowered rush and with some areas becoming areas of flush comprising water crowfoot, pondweed, forget-me not, brooklime and floating sweet-grass.





Photograph 16 - Ditch Habitat in the east of the Survey Area (TN15)

3.2.21 Valley Mire

One small area of Valley Mire habitat (Photograph 17 and TN17) was recorded in the north of the Survey Area. The habitat has formed on the lower slopes and floor of a small valley and receives water from the valley sides, feeding Rhymney River watercourse. The vegetation is dominated by common cotton-grass, Sphagnum sp. and a variety of rushes and sedges including bottle sedge, sharp-flowered rush and jointed rush (*Juncus articulatus*). The peat depth in this area is between 0.3-0.5m based on RSK peat survey data⁵. Drier areas at the edge of the habitat were colonised with soft rush and common bent that dissipates into the dry heath and acid grassland mosaic habitat to the east, as described in Section 3.2.15.





Photograph 17 - Valley Mire Habitat in the north-east of the Survey Area

3.2.22 Basin Mire and Flush Mosaic

One small area of Basin Mire habitat (Photograph 18 and TN18) is present in the north-west of the Survey Area. The habitat is wet but contains very little open water and is formed in an approximate basin of the valleys sloping from the north and with limited through-flow of water; a mosaic of flushes occurs throughout the habitat but particularly located around the edges. The vegetation present is dominated by common cotton-grass, *Sphagnum* sp. mosses and a variety of rushes and sedges including bottle sedge, sharp-flowered rush and jointed rush. Other herbaceous species present included bog asphodel, marsh thistle and marsh violet. The peat depth in this area is between 0.5 - >1m based on RSK peat survey data⁵.





Photograph 18 - Basin Mire and Flush Mosaic Habitat in the north-east of the Survey Area

3.2.23 Tall Ruderal Vegetation

A small area of tall ruderal vegetation is located just north of the Pencoedcae Farm boundary. This habitat is dominated by cock's-foot, false oat-grass and broad-leaved dock (*Rumex obtusifolius*) with occasional rosebay willowherb (*Chamerion angustifolium*), common nettle (*Urtica dioica*) and creeping thistle (*Cirsium arvense*).

3.2.24 Buildings

A number of in-use farm buildings are located across the Survey Area, and a relic of an old stone building is present in the north (TN19).



4.0 Discussion and Evaluation

4.1 Important Habitats

The majority of the habitats present within the Survey Area have been subject to prolonged historic and/or current agricultural use which has reduced the species and sward diversity. Most of the habitats present are relatively species poor and dominated by common, vigorous plant species that are most resilient to the effects of heavy grazing.

Habitats of potential conservation importance are considered to be those listed on Annex I of the Habitats Directive (Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and wild fauna and flora) and / or those listed as 'priority habitats' under Section 7 of the Environment (Wales) Act 2016 as habitats of principal importance for the purpose of conserving biodiversity in Wales. In addition, the peat mapping exercise has identified that large parts of the Survey Area are underlain by at least 30cm of peat, and in many places, peat more than 50cm deep is present. These locations, regardless of the species diversity or vegetation community present, are also considered to be of importance for carbon storage reasons.

The habitats of potential conservation importance occurring within the survey area are summarised in Table 4-1. The habitats listed in the table are listed as individual habitat types even where they have been largely (or entirely) mapped in mosaics.

Table 4-1 Habitats of Potential Conservation Importance occurring within the Survey Area

Phase 1 Habitat Category (including where occurring as mosaics with other habitats):	Conservation Status	Rationale
Dry Heath	Annex I Habitat and Section 7 Habitat	The Dry Heath habitats recorded within the Survey Area are considered to represent Annex I 'European Dry Heath' habitats on account of the vegetation being dominated (>25% cover) by bilberry (only very occasionally common heather) albeit in short successional phases at present ⁶ . In addition, the heath habitats were recorded on free-draining, acidic soils, in areas of less than 50cm peat depth and were subject to regular grazing. These conditions are typical of European dry heath habitats. Due to these characteristics the dry heath habitat recorded within the Survey Area also meets the definition of 'upland heath', a habitat listed under Section 7 of the Environment (Wales) Act 2016 as a habitat of principal importance for the purpose of conserving biodiversity in Wales. However, it should be recognised that this habitat is generally associated with a habitat mosaic with Scattered Bracken or Acid Grassland and is heavily

⁶ [Dry heaths \(European dry heaths\) - Special Areas of Conservation \(jncc.gov.uk\)](https://jncc.gov.uk/dry-heaths-european-dry-heaths)



Phase 1 Habitat Category (including where occurring as mosaics with other habitats):	Conservation Status	Rationale
		degraded and modified as a result of grazing and is invariably in poor condition.
Wet Heath	Annex I Habitat and Section 7 Habitat	The Wet Heath habitats recorded within the Survey Area are considered to represent Annex I European wet heath habitats on account of the vegetation being dominated (>25% cover) by bilberry, common heather, cross-leaved heath and deergrass albeit all in short successional phases at present. This habitat also supports sedges, rushes and Sphagnum mosses within the ground layer, however these were limited in extent and diversity⁷. Wet heath habitats also meet the definition of 'upland heath', as listed under Section 7 of the Environment (Wales) Act 2016 as habitats of principal importance for the purpose of conserving biodiversity in Wales. However, it should be recognised that this habitat is located within a habitat mosaic of Marshy Grassland and Flush habitats and is heavily degraded and modified as a result of grazing and drainage and is invariably in poor condition.
Wet Modified Bog	Annex I Habitat and Section 7 Habitat (Blanket Bog)	The Wet Modified Bog habitats recorded, usually in mosaic with wet heath and flush, are in a very degraded and modified form. Nevertheless, the Wet Modified Bog habitats, although not representing active bog, are considered to represent Annex I Blanket Bog due to the presence of semi-natural bog vegetation. Although these habitats are not large in extent and the peat depth is variable, peat depth on average is >0.5m and semi-natural bog vegetation is present therefore it is considered to meet the criteria of the Section 7 habitat 'Blanket Bog'⁸.
Basin Mire/ Valley Mire	Section 7 Habitat (included under Upland Flushes, Fen and Swamp)	The single areas of basin and valley mire recorded within the Survey Area are dominated by rushes, sedges and their allies (cotton-grasses). Sphagnum and bryophytes are also present although generally limited due to drainage. Although these habitats are not large in extent, they are located in areas of peat >0.5m deep and are considered

⁷ [Wet heathland with cross-leaved heath \(Northern Atlantic wet heaths with Erica tetralix\) - Special Areas of Conservation \(jncc.gov.uk\)](https://jncc.gov.uk/)



Phase 1 Habitat Category (including where occurring as mosaics with other habitats):	Conservation Status	Rationale
		to meet the criteria of the Section 7 habitat 'upland flushes, fens and swamps' ⁸ .
Acid/Neutral Flush	Section 7 Habitat (included under Upland Flushes, Fen and Swamp)	The Acid/Neutral Flush habitat recorded within the survey area is typically dominated by rushes, sedges, a number of grasses and occasional wetland herbs. Sphagnum coverage was present although generally limited due to drainage and some areas were dominated by purple moor-grass. The Flush habitats are considered to meet the criteria of the Section 7 habitat 'upland flushes, fens and swamps' ⁸ . However, it should be recognised the flushes have been heavily degraded and modified as a result of grazing and drainage and are in poor condition.

None of the other habitats recorded during the survey were considered representative of any other type of Annex I habitats on account of the plant species composition and local geological and hydrological context. The potential presence of the purple moor grass meadows Annex I habitat (Annex I Habitat code: 6410) was also considered. However, the purple moor grass dominated grasslands within the survey area are not species-rich and do not include a diverse range of other species (which typically includes rushes, sedges and tall-growing herbs) which are indicative of this habitat type⁹.

A number of other habitats recorded within the Survey Area were also carefully considered, but ultimately discounted, for classification as habitats of principal importance for the purpose of conserving biodiversity in Wales under Section 7 of the Environment (Wales) Act 2016.

The purple moor grass dominated grasslands within the Survey Area are not considered to represent the 'purple moor grass and rush pasture' Section 7 habitat type due to the low diversity of plant species present and general lack of plant species indicative of this habitat. The Section 7 'purple moor grass and rush pasture' habitat is meant to include only the most species-rich examples of this habitat type.

The areas of Acid Grassland recorded within the survey area were not considered to represent the 'Lowland Dry Acid Grassland'⁸ Section 7 habitat type as the acid grassland within the site all occurs over 300m above sea level and thus is not considered a 'lowland' habitat. In addition, the acid grassland present within the site is not managed in functional enclosures which is a key characteristic of the Section 7 habitat type. Areas of Acid Grassland in the upland mosaics, which are managed as free-range rough grazing in association with unenclosed tracts of upland (as occurs within the survey area) are notably excluded from qualification under the Section 7 habitat type.

⁸ UK Biodiversity Action Plan; Priority Habitat Descriptions. BRIG (ed. Ant Maddock) 2008. (Updated 2011)

⁹ <https://sac.jncc.gov.uk/habitat/H6410/>



The areas of Broadleaved woodland (TN11 and TN12) recorded within the Survey Area were not considered to match the priority habitat description of 'Lowland Mixed Woodland'⁸ as the woodland appeared to be of relatively recent in origin (<30 years) with limited age structure and diversity in the canopy and ground flora.

The habitats of potential conservation importance listed in Table 4-1 are generally not considered good examples of their habitat type due to the negative effects of grazing and draining within the Survey Area.

4.2 Potential for Ecological Restoration or Enhancement

In terms of providing compensation for the loss of peat and peaty soils and the potential disturbance and displacement of breeding curlew the upland parts of the Survey Area are most relevant targets for restoration and enhancement. Whilst biodiversity enhancement may also be possible in the lowland parts of the Survey Area, it is unlikely to benefit peatland habitat or curlew.

Most of the upland habitats within the Survey Area, including the habitats of potential conservation importance listed in Table 4-1, are generally not considered good examples of their habitat type due to the negative effects of prolonged agricultural uses.

Upland habitats are present in the north of the Survey Area. This area is indicated on Drawing 2, is approximately 160ha in extent and currently dominated by wet heath, marshy grassland and flush mosaics with further areas of degraded bog, mires and grasslands.

This area has been divided into four indicative compartments and Table 4-2 broadly outlines the measures that could be implemented to restore habitats and provide biodiversity enhancement in each compartment. The location of each compartment is also shown on Drawing 2.

Table 4-2 Areas with Potential for Ecological Restoration or Enhancement

Location Ref (on Drawing 2)	Description	Notes on Potential Measures
Compartment 1	Compartment is dominated by wet modified bog, wet heath, marshy grassland and flush mosaic. The western and southern boundary comprise wet ditches. The peat depth in this compartment is patchy and between <=0.2 - >0.7m based on RSK peat survey data ⁵ .	Blocking of peripheral ditches to increase the water table within peatland habitats. Management of grazing regime to provide stocking levels that are optimal for bog, heath and flush habitats.
Compartment 2	Compartment is dominated by wet heath, marshy grassland and flush mosaic. Modified bog, both dry and wet, valley mire and basin mires are also significant features of this compartment. Ditches are present in this compartment but relatively few. The peat depth in this compartment is patchy and between <=0.2 - >1m based on RSK peat survey data ⁵ .	Blocking of ditches, where possible, to increase the water table within peatland habitats. Management of grazing regime to provide stocking levels that are optimal for bog, heath and flush habitats.

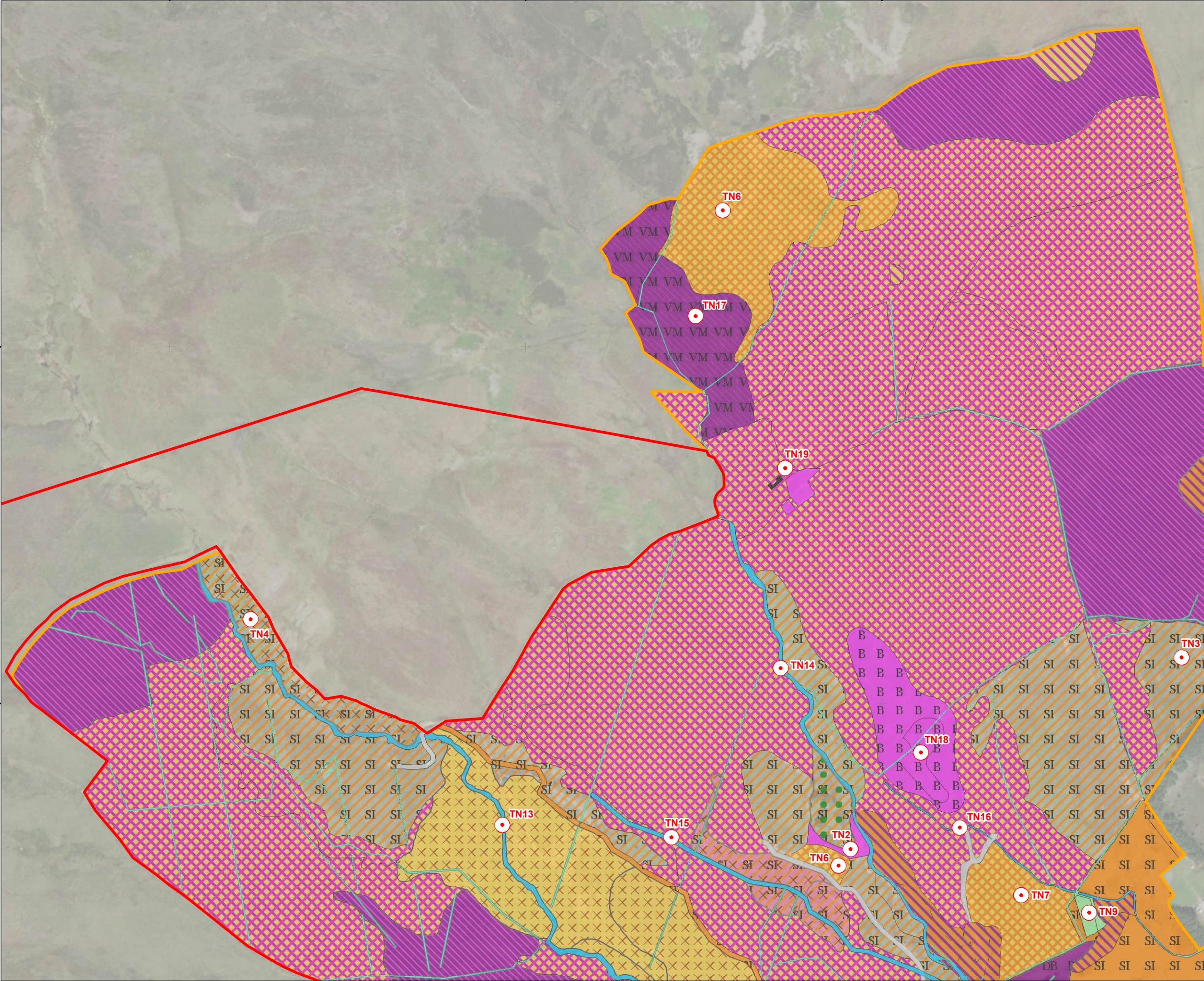


Location Ref (on Drawing 2)	Description	Notes on Potential Measures
Compartment 3	Compartment is dominated by wet heath, marshy grassland and flush mosaic with significant areas of dry and acid grassland mosaics. Ditches are present in this compartment but there are relatively few of significance due to sloping topography. The peat depth in this compartment is $\leq 0.6\text{m}$ based on RSK peat survey data ⁵ .	Repair stone walls to provide refuge for locally recorded herptiles and invertebrates. Management of grazing regime to provide stocking levels that are optimal for heath and flush habitats and more species-rich acid grassland.
Compartment 4	Compartment is dominated by wet heath, marshy grassland and flush mosaic. Wet modified Bog mosaic is also a significant feature of this compartment. Areas of dry and acid grassland mosaics are also present. A network of wet ditches is present in this compartment many of which are overgrown and form flushes. The peat depth in this compartment is patchy and between $\leq 0.2 - 1\text{m}$ based on RSK peat survey data ⁵ .	Blocking of the network of ditches that are scattered across the compartment. Management of grazing regime to provide stocking levels that are optimal for bog, heath and flush habitats. Repair stone walls to provide refuge for locally recorded herptiles and invertebrates.



Drawing 1 – Phase 1 Habitat Survey Plan





Legend:

Pen March Site Boundary

Dŵr Cymru Welsh Water Ownership Boundary

Target Note

Running Water

Ditch

Building

Hardstanding

Phase 1 Code

Coniferous Woodland

SI

Acid grassland - Semi-improved

Acid grassland - Semi-improved and Scattered Bracken

Acid grassland - Semi-improved and Scattered Trees

SI

Acid Grassland, Flush Mosaic with Scattered Bracken

SI

Neutral grassland - Semi-improved

Marsh/marshy grassland

Wet Heath

Wet Heath, Marshy Grassland and Flush Mosaic

Dry Heath Scattered Bracken

Dry Heath Acid Grassland Mosaic

B

Dry Modified Bog

Wet Modified Bog Mosaic, Flush and Wet Heath

Flush

Valley mire

B

Basin Mire and Flush Mosaic

Coordinate System: British National Grid
Projection: Transverse Mercator
Datum: OSGB 1936
Units: Meter

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Pen March Wind Farm

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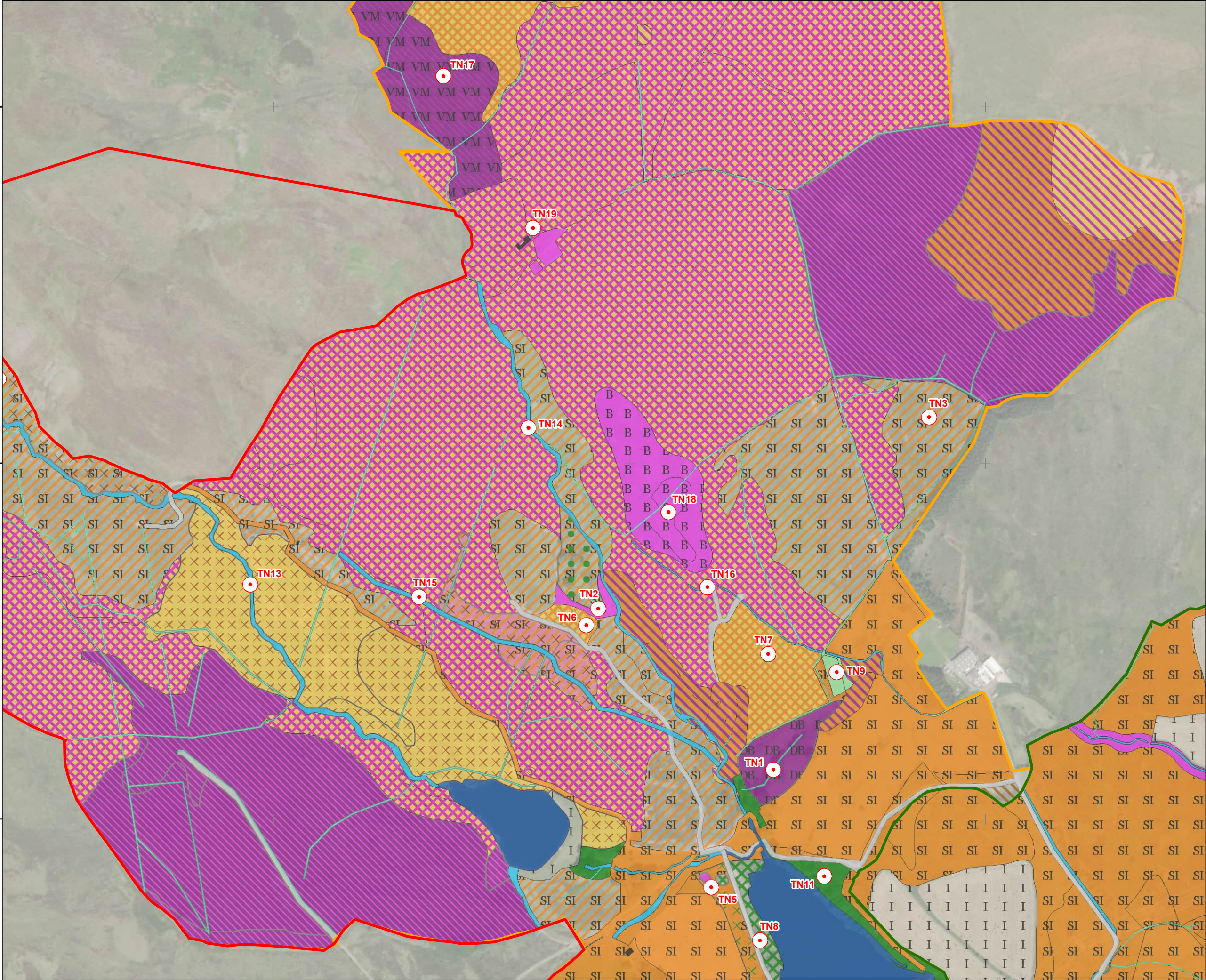
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Legend:

Pen March Site Boundary

Pencoedcae Farm Boundary

Dŵr Cymru Welsh Water Ownership Boundary

Target Note

Broadleaved Woodland

Coniferous Woodland

Dense Scrub

Acid grassland - Semi-improved

Acid grassland - Semi-improved and Scattered Bracken

Acid grassland - Semi-improved and Scattered Trees

Acid Grassland, Flush Mosaic with Scattered Bracken

Neutral grassland - Semi-improved

Neutral grassland - Semi-improved and Scattered Scrub

Improved Grassland

Marsh/marshy grassland

Tall Ruderal

Wet Heath

Wet Heath, Marshy Grassland and Flush Mosaic

Dry Heath Scattered Bracken

Dry Heath Acid Grassland Mosaic

Dry Modified Bog

Wet Modified Bog Mosaic, Flush and Wet Heath

Flush

Valley mire

Basin Mire and Flush Mosaic

Standing Water

Running Water

Ditch

Building

Hardstanding

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Projection: Transverse Mercator
Datum: OSGB 1936
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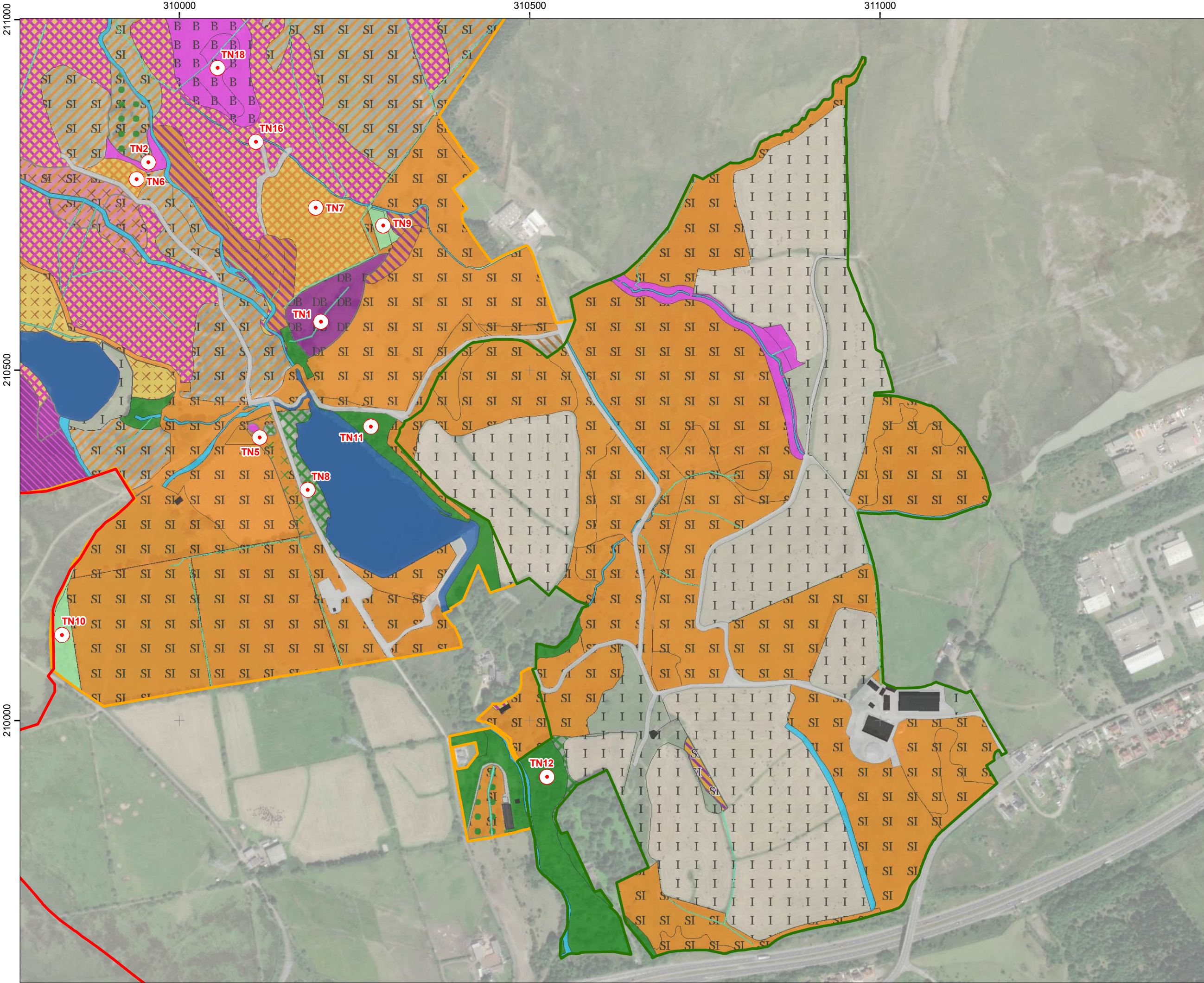
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Legend:

Pen March Site Boundary

Pencoedcae Farm Boundary

Dŵr Cymru Welsh Water Ownership Boundary

Target Note

Broadleaved Woodland

Coniferous Woodland

Dense Scrub

Acid grassland - Semi-improved

Acid grassland - Semi-improved and Scattered Trees

Acid Grassland, Flush Mosaic with Scattered Bracken

Neutral grassland - Semi-improved

Neutral grassland - Semi-improved and Scattered Scrub

Neutral grassland - Semi-improved and Scattered Trees

Neutral grassland - Semi-improved Marshy Grassland Mosaic

Improved Grassland

Marsh/marshy grassland

Tall Ruderal

Wet Heath

Wet Heath, Marshy Grassland and Flush Mosaic

Dry Heath Scattered Bracken

Dry Heath Acid Grassland Mosaic

Dry Modified Bog

Wet Modified Bog Mosaic, Flush and Wet Heath

Flush

Basin Mire and Flush Mosaic

Standing Water

Running Water

Ditch

Building

Hardstanding

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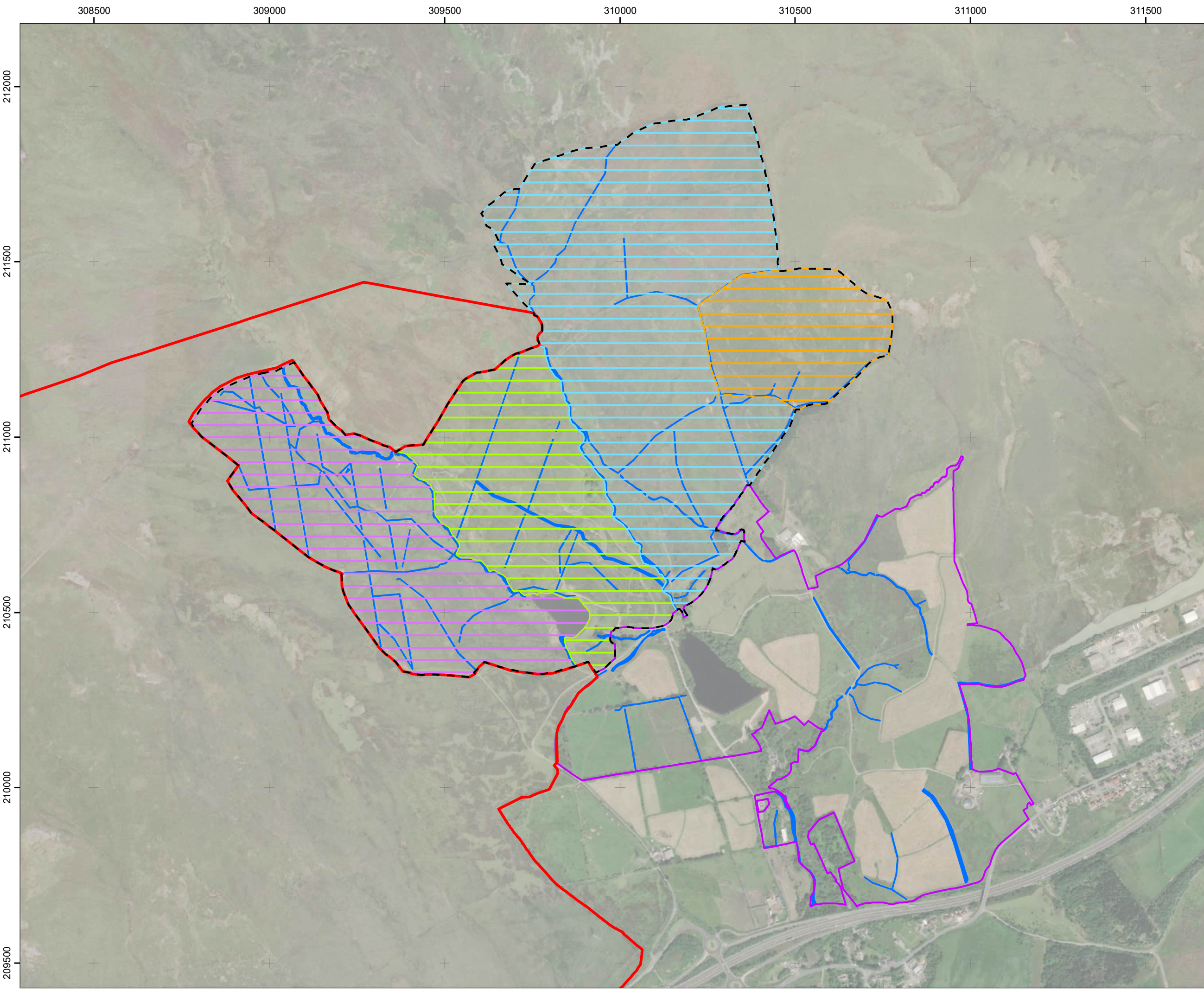
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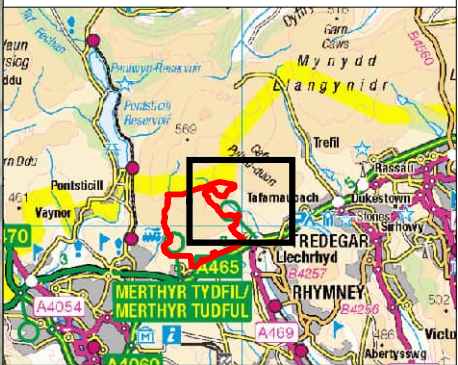
Drawing 2 - Potential Management and Restoration Area Plan





- Legend:**
- Pen March Site Boundary
 - Proposed Restoration and Management Area Boundary
 - Lowland Farmland Area
 - Compartment 1
 - Compartment 2
 - Compartment 3
 - Compartment 4
 - Ditch / Stream

Coordinate System: British National Grid
Projection: Transverse Mercator
Datum: OSGB 1936
Units: Meter



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Pen March Wind Farm

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