Torfichen Wind Farm

Outline Biodiversity Enhancement Management Plan

Technical Appendix 8.6

Document Quality Record

Version	Status	Person Responsible	Date
V0.1	Draft	B. Henry	17/10/2023
V0.2	Reviewed	K. Hobbs	17/10/2023
V0.3	Updated	B. Henry	19/10/2023
1	Internal Approval	B. Henry	19/10/2023

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1   INTRODUCTION

This Outline Biodiversity Enhancement Management Plan (OBEMP) describes the proposed habitat and conservation management measures in relation to Torfichen Wind Farm (hereafter referred to as the 'Proposed Development').

This OBEMP is set out in the following sections:

- Summary of the Ecological Impact Assessment;

- Biodiversity Net Gain (BNG);

- Biodiversity Enhancement Area;

- Aims, Objectives and Management Prescriptions;

- BNG Assessment;

- Monitoring;

- Reporting and BEMP Review; and

- Management and Monitoring Timetable.

1.1   Target Habitats and Species

The management recommendations within this OBEMP are informed by baseline ecological surveys undertaken for the Proposed Development and the findings of **Chapter 8: Ecology** of the Torfichen Wind Farm Environmental Impact Assessment Report (EIA Report). The main habitats considered in this OBEMP are blanket bog/modified bog, broadleaved woodland, species-rich meadow/grassland, and acid grassland. The habitat enhancements proposed within this OBEMP would also generally have beneficial effects for the local bird assemblage (details of the bird assemblage are provided in **Chapter 9: Ornithology**).

The measures detailed within this OBEMP aim to achieve significant biodiversity enhancement at the site, in line with objectives outlined in National Planning Framework 4 (NPF4) Policy 3[1]. A BNG metric is utilised to demonstrate that the measures proposed for the creation and enhancement of habitats at the Proposed Development would compensate for predicted habitat and biodiversity losses and provide further enhancement that would result in an increase and net gain for biodiversity of 11.8% over and above the baseline and pre-development value of the site post construction.

1.2   Finalisation of the BEMP and Reporting

This OBEMP is based on several identified 'Search Areas' (Search Areas A-E; see also **Figure 8.12**) for each respective habitat management and biodiversity enhancement proposal. These Search Areas were identified through discussions with the Applicant, landowners, and relevant technical specialists in order to create and enhance habitats of biodiversity value. The Search Areas will likely be refined following further specialist surveys and feedback from relevant consultees, and all

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[1] Scottish Government (2023). National Planning Framework 4. Available at: https://www.gov.scot/publications/national-planning-framework-4/ [Accessed June 2023].

search areas may not be taken forward for the final BEMP, and other search areas and/or proposals may also be considered; however, the Applicant remains committed to delivering significant biodiversity enhancement at the Proposed Development.

The OBEMP will be refined and developed into a final BEMP post-consent. The final BEMP will confirm the overarching Biodiversity Enhancement Area (BEA) encompassing all habitat management proposals, and any finalised management units (i.e., the refined Search Areas for specific habitat management proposals) therein, where the aims, objectives and management prescriptions will apply. The final BEMP will be agreed with Midlothian Council (MC) in consultation with NatureScot prior to the commencement of construction of the Proposed Development.

A Biodiversity Management Group (BMG) will oversee and monitor the implementation of the agreed BEMP. The BMG should include representatives from MC, NatureScot and the wind farm owner.

An annual report (for the first five years) will be submitted by the wind farm owner to the BMG detailing the tasks (management and monitoring) completed over the last year and those planned for the year ahead.

Management prescriptions in the BEMP may be amended considering monitoring results to ensure progress towards the stated aims and objectives of the plan.

2 SUMMARY OF ECOLOGICAL IMPACT ASSESSMENT

The site is set within a mixed landscape of undulating farmland, fragmented moorland and forestry (predominately conifer plantation). The site is primarily agricultural, predominately used for livestock farming. The most common and prevalent habitat types within the site are acid grassland, marshy grassland, and dry modified bog (see **Appendix 8.1** and **Figure 8.3** of the EIA Report).

As per **Chapter 8: Ecology**, important ecological features (IEFs) scoped-in to the ecological impact assessment comprise wet dwarf shrub heath, dry modified bog/wet modified bog and commuting/foraging bats; no significant effects are predicted.

The Proposed Development could potentially impact up to 1.51 ha of wet heath (direct permanent loss 0.53 ha, direct temporary loss 0.09 ha, and potential indirect loss 0.89 ha) and up to 4.76 ha of dry modified bog/wet modified bog (direct permanent loss 1.55 ha, direct temporary loss 0.26 ha, and potential indirect loss 2.95 ha). This OBEMP proposes measures that provide more than sevenfold compensation in terms of area for the combined direct impact and potential indirect effects on dry modified bog/wet modified bog habitats, as well as other proposals to provide wider biodiversity enhancement in general.

Potential collision risk impacts to bats will be mitigated in accordance with the proposals detailed in **Chapter 8: Ecology**; however, several measures in this OBEMP will also create and enhance habitats and corridors for bats commuting and foraging (including creation of native woodland and hedgerows), and in the long-term potentially provide roost features.

3   BIODIVERSITY NET GAIN

Biodiversity Net Gain (BNG) is a process which follows the principal of biodiversity enhancement and leaves nature in a better state than before development work started. No Scotland-specific biodiversity metric has yet been proposed or adopted by the Scottish Government or NatureScot; however, as per below, the Scottish & Southern Energy Renewables (SSER) BNG Metric has been used here as an interim measure.

SSER has developed a BNG toolkit[2] for use in Scotland based upon the Natural England Biodiversity Metric[3] which aims to quantify biodiversity based upon the value of habitats for nature. It is a method for demonstrating whether development projects have been able to maintain or increase the biodiversity value of a development site after construction works. This SSER BNG toolkit has been utilised here to undertake a preliminary BNG assessment for the Proposed Development and the measures proposed within this OBEMP.

The scope of the BNG assessment is to quantify the overall potential biodiversity impacts for the Proposed Development; this includes a biodiversity baseline assessment, analysis of habitat losses due to temporary works and permanent structures (e.g., tracks and hardstandings), and analysis of biodiversity gains following reinstatement of habitats in areas of temporary construction work and additional habitat enhancement and creation (whether onsite and/or offsite).

The BNG assessment is based upon National Vegetation Classification (NVC) and habitat surveys undertaken for the EIA Report (**Appendix 8.1** and **Figure 8.3**).

4   BIODIVERSITY ENHANCEMENT AREA

4.1   Overview

This OBEMP proposes a BEA covering approximately 104.8 ha and 2,500 linear metres, comprising five overarching Search Areas (Search Areas A – E; see also **Figure 8.12**), each focussing on a particular habitat or feature type, within which management and monitoring works would be implemented. Habitat and biodiversity management and monitoring works would be undertaken within these respective Search Areas. Details of each Search Area are provided in Sections 4.2-4.6.

The overall goal of the BEMP is to restore, enhance and create habitats of ecological value in these Search Areas, which in turn will benefit existing flora and fauna as well as increase biodiversity in general.

The precise objectives and management prescriptions for the finalised management units within these Search Areas will depend on the current state of the habitat and the factors acting upon it. In order to inform the objectives and detail appropriate management prescriptions, further specific surveys may be required to be undertaken in developing the final BEMP. These surveys may include, but are not limited to, the following:

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[2] https://www.sserenewables.com/sustainability/biodiversity-net-gain/
[3] Natural England (2022) The Biodiversity Metric 3.1.
https://nepubprod.appspot.com/publication/5850908674228224

- Relevant peatland condition assessments in line with Peatland Action guidance[4];

- JNCC Common Standards Monitoring of Upland Habitats[5] or habitat condition assessments utilising the latest Biodiversity Metric[6] condition assessment pro-forma and methodology;

- Hydrology walkover to identify opportunities for drain blocking and restoration of the peatland water table;

- Herbivore Impact Assessment (HIA); and

- Forestry surveys.

4.2 Search Area A – Peatland Restoration/Enhancement

Search Area A is 36.69 ha, split over two connected sub-units (A1 and A2), and is comprised of predominantly blanket bog and dry modified bog habitats. Within the Search Area the aim is to enhance the existing and degraded peatland habitat. This aim would likely be fulfilled through peat hagg reprofiling, drain blocking, stock exclusion/management, and removal of self-seeding trees.

Search Area A is centred on Yorkston Moss and includes part of the Class 1 Peatland[7] within the site. This area has been selected as a suitable candidate area for restoration and enhancement due to the presence of peat hagging and the evident negative impacts from livestock grazing; there also appears to be some drains present in part of the Search Area (as noted above, a detailed drain survey would be carried out to inform any drain damming locations). Following further assessment other management prescriptions would be incorporated as appropriate and necessary, for example there may encroaching and invading self-seeded trees due to the nearby forestry plantation seed sources. The BEMP provides for the removal of self-seeded trees from the Search Area.

Peatlands are important for preventing and mitigating the effects of climate change, preserving biodiversity and minimising flood risk. The improvement of these habitats will also be of benefit to local flora and fauna, including the upland breeding bird assemblage.

4.3 Search Area B – Native Broadleaved Woodland Creation

Search Area B is 17.27 ha, split over seven sub-units (i.e., B1 – B7; **Figure 8.12**). The habitats present are currently mature/maturing conifer plantations.

The aim within Search Area B is to replace the monoculture conifer plantations with more diverse broadleaved woodland in a staggered manner through the operational phase.

The proposals in Search Area B would generally involve the staggered felling and removal of the conifer plantations and replanting with a range of broadleaved species. The woodland and planting would likely largely reflect the canopy composition of W10/W11 NVC woodland types, however

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[4] NatureScot (2021). Peatland Action: Peat Depth and Peatland Condition Survey. https://www.nature.scot/doc/peatland-action-peat-depth-and-peat-condition-survey-guidance-and-recording-form-guidance
[5] https://jncc.gov.uk/our-work/common-standards-monitoring
[6] https://publications.naturalengland.org.uk/publication/6049804846366720
[7] https://soils.environment.gov.scot/maps/thematic-maps/carbon-and-peatland-2016-map/

depending on the character and respective soil conditions within each sub-unit other target NVC types may also be considered.

The replacement of conifer plantation with broadleaved woodland has beneficial biodiversity effects, through increasing species diversity, allowing light to penetrate the field layer and providing more natural and diverse breeding, shelter and foraging habitats for a range of species (from terrestrial invertebrates to birds and various mammal species). The planting proposals may also benefit black grouse which are present on the site and locally through enhanced shelter and increased foraging resources.

4.4   Search Area C – Grassland Restoration

Management Unit C comprises three sub-units (C1 – C3), which total 45.16 ha in extent. The habitats present here are currently large areas of dense and continuous bracken, which are surrounded by areas of, predominately, acid grassland. These types of dense bracken habitats are generally of negligible conservation value.

The aim within Search Area C would be to remove and control the bracken in order to allow the local acid grassland habitats to naturally regenerate and maintain this throughout the lifetime of the Proposed Development. The control of bracken will improve the floral diversity of the area and increase wildflower cover for insects and pollinators.

4.5   Search Area D – Species-Rich Meadow/Grassland Creation

Search Area D is 5.69 ha in extent and comprises one unit (i.e., D1; **Figure 8.12**) and which is currently an arable field.

The aim within Search Area D is to cease arable management and create a species-rich lowland neutral meadow/grassland habitat. This would primarily be achieved through ground preparation, seeding with an appropriate seed mix followed by appropriate ongoing grassland management.

The creation of a species-rich meadow/grassland habitat has multiple biodiversity benefits such as greatly increasing local floral diversity and supporting populations of insects, birds, bats, and many other species which rely on these important, but scarce and declining, habitats. The creation of such a habitat also aligns with the Midlothian Council Biodiversity Action Plan (BAP) aim for the restoration and creation of flower rich habitats.

4.6   Search Area E – Native Hedgerow Creation

Search Area E is linear and covers approximately 2,500 m[8]. In the areas around Esperton Farm and Mauldslie, in and around the Proposed Development, there are areas of post and wire stock fences that create the field boundaries for many of the more improved or managed grassland areas.

The aim for Search Area E is to create native and species-rich hedgerows, these will be planted along existing fences/boundaries. The hedgerows will provide further species diversity and create habitat corridors for a range of species and in general further enhance habitat connectivity and local biodiversity.

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[8] Due to the narrow linear nature of hedgerows and that all the specific locations are yet to be determined, these are not shown on **Figure 8.12**.

5   AIMS, OBJECTIVES AND MANAGEMENT PRESCRIPTIONS

The aims define the general BEMP goals, and the related objectives further define the aims into quantifiable targets. The prescriptions detail the indicative management works to be implemented to achieve these aims and objectives. **Annex A** provides an indicative timetable for the implementation of the associated prescriptions.

As discussed in Section 4.1, detailed appropriate objectives and prescriptions will be developed post-survey for the final BEMP based on additional survey findings and consultation. However, the experience gained from providing and delivering plans for similar sites and habitats would suggest that as an outline, the aims, objectives and prescriptions would likely include or be similar to the below.

5.1   Aim 1: Enhance peatland habitat and improve bog habitat condition (Search Area A)

Objective 1.1	Increase the abundance and distribution of major peat forming species, particularly Sphagna (particularly key blanket mire indicator species such as *Sphagnum papillosum* and *S. medium*).
Objective 1.2	Increase the abundance and structural diversity of dwarf shrubs such as *Calluna vulgaris*, *Erica tetralix* and *Vaccinium* spp. in line with local reference blanket bog.
Objective 1.3	Achieve Good condition blanket bog within 15[9]-20[10] years.

Prescription 1.1	Exclude livestock, or manage livestock numbers, via livestock fencing within Search Area A in agreement with the landowners, to achieve Objectives 1.1, 1.2 and 1.3.
Prescription 1.2	Remove regenerating self-seeded conifer trees and any new broadleaved seedlings from Search Area A annually, by hand or clearance saw, until a time that monitoring shows that regeneration is no longer an issue or frequency of intervention can be reduced.
Prescription 1.3	Dam active drains[11] (even if vegetated) in order that the water level is raised sufficiently to create conditions suitable for a range of blanket bog species, including the species mentioned within Objective 1.1. This should be carried out under the supervision of a suitably qualified Ecological Clerk of Works (ECoW). As detailed within relevant guidance[11, 12, 13], this technique requires donor peat turves to be excavated adjacent to the drain and then keyed into the drain itself. The divot formed by excavating the donor turve is then infilled by pulling and compressing the surrounding peat and peatland vegetation

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[9] For existing blanket bog in Moderate Condition.
[10] For existing modified bog in Poor Condition.
[11] According to methodology detailed in: Peatland Action (2022) Technical Compendium. Available at: https://www.nature.scot/doc/peatland-action-technical-compendium
[12] NatureScot (2019). Peatland Action - Guidance for land managers - installing peat and plastic dams (https://www.nature.scot/doc/peatland-action-guidance-land-managers-installing-peat-and-plastic-dams)
[13] Thom, T., Hanlon, A., Lindsay, R., Richards, J., Stoneman, R. & Brooks, S. (2019). Conserving Bogs: The Management Handbook. (2nd Edition). (https://www.iucn-uk-peatlandprogramme.org/resources/restoration-practice/conservation-handbook)

into this area – the donor turve is taken from alternate sides to avoid a line of restored divots forming along one side of the drain. The reason the donor turve needs to be taken adjacent to the drain is to ensure it retains its consolidated structure which enables its reliable use in damming the drain.

Prescription 1.4   Undertake peat hagg restoration and peat surface re-profiling with a low-pressure excavator and in line with relevant guidance[11, 13].

Prescription 1.5   The following activities would be prohibited within the Search Area:

- clearing out of existing ditches;

- supplementary feeding of livestock;

- application of any insecticides, fungicides or molluscicides;

- application of lime or any other substance to alter the soil acidity;

- cutting or topping of vegetation except to control injurious weed species or to improve the biodiversity of the habitat;

- burning of vegetation or other materials;

- use of roll or chain-harrow;

- planting trees;

- carrying out any earth moving activities;

- use of off-road vehicle activities with the exception of use of low scale agricultural vehicle movements (e.g., quad bike);

- construction of tracks, roads, yards, hardstandings or any new structures (not associated with the Proposed Development); and

- storage of materials or machinery.

5.2   Aim 2: Promote native broadleaved woodland cover (Search Area B)

Objective 2.1   Create areas of native broadleaved woodland and increase diversity within and around the site, seeking to achieve Moderate condition broadleaved woodland in 15 years after planting.

Objective 2.2   Increase and enhance faunal diversity within and around the site by providing more habitat structure and new breeding, shelter and foraging habitats for a range of birds, bats and other small mammals, and invertebrates.

Prescription 2.1   Undertake the staggered felling of the areas of conifer planation within Search Area B and replant with a diverse mix of native broadleaved species.

Given the location, soils and prevailing baseline habitats of the proposed planting areas, and to reflect the character and structure of the existing broadleaved woodlands locally, it is anticipated that the species mixes here would primarily contain oak (*Quercus* spp.), birch (*Betula* spp.) and rowan (*Sorbus aucuparia*). However, it is proposed to increase diversity by also including smaller proportions of species such as aspen (*Populus tremula*), goat willow (*Salix caprea*), hawthorn (*Crataegus monogyna*), hazel (*Corylus avellana*), bird and/or wild cherry (*Prunus* spp.), crab apple (*Malus sylvestris*), small-leaved lime (*Tilia cordata*), wych elm (*Ulmus glabra*) and holly (*Ilex*

aquifolium). Where there are damper soils the species mix may also include alder (*Alnus glutinosa*) and grey willow (*Salix cinerea*).

Proportions of species and their planting locations would be determined by a forester, in agreement with a suitably qualified ecologist, during preparation of the final BEMP.

Tree planting would be carried out between the months of November and March when trees are dormant and more likely to establish successfully. Days when the ground is frozen or when snow or excessive surface water is present are to be avoided.

Prescription 2.2	Fencing of some planting areas may be required to protect new trees from deer and livestock browsing during the establishment phase. Any new fencing within 1 km of the known black grouse leks would follow guidelines in Trout & Kortland (2012)[14] to minimise collision risk for black grouse.

Trees will be planted in 1 m - 1.2 m tree tubes to further protect from browsing damage in areas that remain unfenced, or where deer or livestock may breach fenced areas.

Tree tubes will be removed after approximately 10 years or after adequate establishment of the trees.

Prescription 2.3	Manage deer densities, if required, to allow woodland establishment. Subsequently use the results of vegetation and tree monitoring to determine whether ongoing deer management and culling requires to be reviewed to allow successful establishment of the trees planted.
Prescription 2.4	Prohibited activities noted in Prescription 1.5 above apply (with the exception of planting trees).

5.3   Aim 3: Restore acid grassland habitats (Search Area C)

Objective 3.1	Remove bracken coverage and halt further bracken establishment within Search Area C.
Objective 3.2	Restore the grassland habitats within Search Area C back to locally comparable acid grassland, seeking to achieve a condition category of Moderate in 5 years.

Prescription 3.1	Remove and manage bracken, with ongoing control where this is necessary[15].
Prescription 3.2	Prohibited activities noted in Prescription 1.5 above apply.

5.4   Aim 4: Species-Rich Meadow/Grassland Creation (Search Area D)

Objective 4.1	Create a species-rich lowland neutral meadow/grassland habitat and increase floral diversity through the creation of a 5.69 ha wildflower meadow, seeking to achieve a condition category of Good in 15 years.

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[14] Trout, R. and Kortland, K. (2012). Fence marking to reduce grouse collisions. Forestry Commission Technical Note.

[15] Bracken Control - A Guide to Best Practice | NatureScot (webarchive.org.uk)

Objective 4.2	Increase faunal diversity locally by providing more flower-rich habitat that benefits populations of insects, birds, bats, and many other species.

Prescription 4.1	Convert the arable field in Search Area D into a species-rich meadow/grassland habitat. This will initially involve ground preparation, creating a stale seedbed, and sowing with appropriate native wildflower seed at the correct time of year. The wildflower seed mix will be confirmed within the final BEMP.
Prescription 4.2	Annual grassland management to maintain the habitat in line with best practice and guidance[16]. This will be via grazing or cutting.
	Grazing is usually the preferred management since grazing animals create variety by eating, dunging and trampling unevenly across the field. Cattle are preferred as they are less selective grazers than sheep. If applicable, grazing proposals, including timing and stocking rates will be detailed in the final BEMP.
	Alternatively, the grassland will be managed via cutting in late summer, no earlier than 31st July. Grass cuttings would be baled and removed. Around 5%-10% of the field may remain uncut each year, a different area each time, to vary the sward height and allow seed to set seed. Grazing after cutting (aftermath grazing) will also create variety, if applicable.
Prescription 4.3	No supplementary chemical fertilisers, organic manures or slurry to be applied to the field for the lifetime of the BEMP.
Prescription 4.4	Weed species such as docks, ragwort and creeping thistle will be controlled where they impact negatively on the overall area of species-rich grassland. Weeds can be chemically spot treated.
Prescription 4.5	Prohibited activities noted in Prescription 1.5 above apply.

5.5   Aim 5: Create, and increase the extent of, native hedgerows (Search Area E)

Objective 5.1	Create approximately 2,500 m of new species-rich hedgerow[17] and link with existing hedgerows to create and enhance habitat corridor connectivity, seeking to achieve a condition category of Good in 12 years.

Prescription 5.1	Plant approximately 2,500 m of new native species-rich hedgerows. The hedgerows are likely to consist of 60-80% hawthorn with crab apple, hazel, blackthorn and holly generally making up the remainder of the species-mix.

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[16]   For example see https://www.ruralpayments.org/topics/all-schemes/agri-environment-climate-scheme/management-options-and-capital-items/species-rich-grassland-management/guidance-for-species-rich-grassland-management/, http://www.magnificentmeadows.org.uk/ and https://www.nature.scot/doc/species-rich-grasslands-guidance-leaflet#:~:text=Species%20rich%20grasslands%20have%20a,amphibians%20and%20many%20other%20animals.

[17] In line with Scottish Government (2017). Supporting guidance for Planting or Replanting of Hedges. Available at: https://www.ruralpayments.org/topics/all-schemes/agri-environment-climate-scheme/management-options-and-capital-items/planting-or-replanting-of-hedges/guidance-for-planting-or-replanting-of-hedges/ [Accessed June 2023]

Some trees may also be included within the hedge (such as oak, birch, rowan and cherry).

Planting should be in double-staggered rows at a density of six plants per metre.

When planting, the minor component species would be planted first, to get a suitable distribution, and then areas in-filled with the hawthorn. Plant the same species in groups of at least one metre, to avoid single plants being outcompeted by other species.

Prescription 5.2   Protect young and developing hedge plants from browsing by animals via livestock fencing and guards/tree tubes. The fence would be situated a minimum of 1 m away from the centre line of the hedge to allow space for the hedge's expansion and to leave room for trimming, coppicing or laying the hedge in the future.

Prescription 5.3   Control competing vegetation in the first two years of establishment. Using strimming, a mulch, or if necessary, an appropriate herbicide.

Prescription 5.4   The hedgerow would be managed in line with best practice and relevant guidance[18], including the following key aspects:

- Light, regular, trimming of the hedgerow will be undertaken in its early and establishment years to encourage dense, bushy growth.

- After establishment, the hedge may be cut just once every two or three years. Alternatively, cut just one side or the top each year, and not trimming the same length of hedge annually. Each time let the hedge grow out and up a little and do not cut back to the same height each trimming cycle.

- Hedge trimming must only be undertaken between 1 December and the last day in February.

- Leave occasional berry or fruit bearing trees to grow to maturity. These would be identified in the establishment years and not trimmed in order to allow them to mature and in the longer term create a hedge with scattered trees.

6   BIODIVERSITY NET GAIN ASSESSMENT

6.1   Overview

The SSER biodiversity toolkit[2] was used to quantify the biodiversity value of the Application Boundary based upon the habitats present and to demonstrate the project would achieve biodiversity enhancements in line with NPF4 Policy 3 requirements. This includes:

- Quantitative assessment to determine the biodiversity baseline of the site boundary prior to development based on the habitats data collected for the Proposed Development (**Appendix 8.1** and **Figure 8.3**);

- Assessing the loss of habitat during construction; and

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[18] e.g., https://hedgelink.org.uk/

- Analysis of the biodiversity value following works, with retention and creation/restoration/enhancement of habitats onsite and offsite.

Habitat quality (distinctiveness, condition, strategic significance and connectivity) was determined for each Phase 1 habitat type by reviewing the habitats survey data and surveyor experience, and referring to the following guidance:

- SSER BNG Toolkit User Guide[2];

- Natural England Biodiversity Metric 4.0[19] – User Guide, Technical Supplements, and Habitat Condition Assessment; and

- JNCC Common Standards Monitoring (CSM) criteria[5] (used to aid some habitat condition assessments).

The boundary for the baseline biodiversity assessment equates to the site boundary.

6.2   BNG Assessment Results

6.2.1   Biodiversity Baseline

The biodiversity baseline for the Proposed Development covers 852.3 ha and is based upon the habitat quality scores (distinctiveness, condition, strategic significance and connectivity), the area of the habitats and the resulting number of Biodiversity Units (BU) each type of habitat contributes. Habitat types of less than 0.01 ha are under the minimum mappable unit (MMU) and were not included in line with SSER metric guidance[2], as they are not large enough to be considered a viable habitat and be effectively managed to increase overall biodiversity. **Figure 8.3** displays the habitats across the site and wider survey area, and which comprises the biodiversity baseline.

The main habitat types within the site comprise unimproved acid grassland (34.5%), marshy grassland (21.0%), dry modified bog (12.5%), improved grassland (7.0%), bracken (5.5%) and semi-improved acid grassland (5.0%); see **Chapter 8: Ecology** and **Appendix 8.1** for full details. Using the SSER BNG toolkit, the biodiversity value of the site baseline was calculated to be 3805.6 BU.

6.2.2   Biodiversity Change during Construction

During the construction of the Proposed Development, habitats will be lost, either temporarily or permanently, to provide construction compounds, access roads, and the turbine/hardstandings infrastructure footprints. The majority of habitat, and biodiversity, under infrastructure footprint areas is therefore lost during works.

The BU that will be removed to accommodate the Proposed Development are summarised in **Table 6-1** below. The results highlight a 13.71 ha loss of habitat for permanent infrastructure. The SSER BNG Metric user guide[2] states that in situations where habitats will be temporarily impacted by any works and will be fully restored to its baseline condition (or improved) within two years, it can be considered as retained habitat within the toolkit. Therefore, temporary working areas in habitats such as bracken and dry acid/neutral/improved grasslands are considered to fall within this category (here covering approximately 13.1 ha). However, certain habitat types temporarily

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[19] https://publications.naturalengland.org.uk/publication/6049804846366720

impacted at the Proposed Development will likely take more than two years to recover to their previous condition and therefore this cannot be considered a 'temporary' loss and must be recorded in the BNG calculation tool as having been permanently lost. Resultantly, a further 1.76 ha loss of habitat for temporary working areas in habitats such as marshy grasslands, wet heath and modified bog is predicted, and these have been considered a loss in the toolkit.

Overall, this equates to a -2% loss of biodiversity (i.e., 65.4 BU) during construction. The majority of BU lost are from unimproved acid grassland (i.e., 34.1 BU).

During construction of the Proposed Development, 836.8 ha of habitat would therefore be classified as retained, comprising a total of 3740.2 BU.

6.2.3   Following Works

At the end of construction any temporary working areas will be restored following best practice methods and guidance. It is assumed that in general and where feasible and practicable, reinstated habitats in the temporary works areas will be 'like for like, or better', compared to the baseline habitat and in line with guidance principles.

Biodiversity enhancement and an increase in BU would be delivered onsite and offsite through the enhancement/restoration and creation of habitat types following the construction of the Proposed Development, as proposed for the habitat types and Search Areas as outlined in Section 4 above and **Figure 8.12**.

The proposals within this OBEMP would result in the restoration and enhancement of 36.69 ha of blanket bog and modified bog habitats, the replacement of 17.27 ha of conifer plantation with broadleaved woodland, the restoration of 45.16 ha of acid grassland through bracken control, the conversion of 5.69 ha of arable land to species-rich meadow/grassland, and 2,500 m of new species-rich hedgerows, all of which will enhance flora and fauna biodiversity at and around the Proposed Development on top of the retained baseline habitats.

The value of these habitats in terms of BU, and the increased BU produced due to the enhancement and creation of habitats is summarised in **Table 6-1**.

6.2.4   Summary of Overall Biodiversity Change

Table 6-1 summarises the change in BU from the baseline, during works (lost and retained habitats), and after works actions involving site reinstatement, and enhancement and creation of habitats following completion of construction and as set out within this OBEMP. Overall, following construction, site reinstatement, and BEMP implementation as outlined here and subsequent habitat management, the Proposed Development would have a predicted value of 4256.2 BU. This compensates for the BU lost during construction and for permanent infrastructure, and equates to the net creation of an additional 450.6 BU over and above the baseline and pre-development BU value, this is equivalent to an 11.8% net gain for biodiversity.

Table 6-1: Biodiversity Unit Change at each Stage of Development

Stage	Biodiversity Units	Biodiversity Units Gained/Lost from Baseline
Baseline	3805.6	N/A
During works	3740.2	-65.4 (-2%)
After works: site reinstatement of temporary working areas	3742.4	-63.21 (-2%)
After works: OBEMP – habitat enhancement/creation	4256.2	+450.6 (+11.8%)

6.2.5 Limitations to the BNG Assessment

The post-development biodiversity unit calculations are based on the difficulty to create habitats (delivery risk) and the time (in years) to reach their target condition (temporal risk) which are based on published guidance[6] and previous project experience, these are generally average values and as such there may be natural variation around the time to reach target condition.

The BNG assessment has been undertaken on the data currently available, the infrastructure layout and proposals for construction of the Proposed Development as set out in **Chapter 3: Project Description**, and the biodiversity enhancement proposals outlined within this OBEMP. Should any of these elements change then there may be a change in the BNG calculations for the Proposed Development. Therefore, the BNG toolkit and assessment would be refined/updated and detailed in the final BEMP post-consent/pre-construction, in line with the most up to date proposals for the Proposed Development, consultation feedback, and the final agreed BEA, Management Units and associated proposed enhancement measures.

7 MONITORING

Monitoring will establish whether the proposed management prescriptions are achieving the various aims and objectives and in turn will inform adaptive management to ensure the aims and objectives are achieved through the life of the BEMP.

The Sections below outline the likely monitoring required for the proposals detailed above, however the detailed monitoring proposals will be provided in the final BEMP to be submitted post-consent and pre-construction when the BEA, Management Units based on the above Search Areas and associated proposed enhancement measures have been finalised. An indicative monitoring timetable is provided in **Annex A**.

7.1 Aim 1: Restore/enhance peatland habitat and improve bog habitat condition (Search Area A)

The following monitoring would be undertaken to evaluate the success of this aim:

- Habitat/vegetation monitoring would evaluate the success of restoration and enhancement of peatland. This would be achieved by recording changes to the structure

and composition of the vegetation and species abundance, evenness and diversity. Recording of impacts from deer/livestock would also be included in the monitoring programme, using the HIA methodology described in MacDonald *et al.* (1998)[20] guidance.

A representative sample of permanent quadrats would be established within Search Area A's finalised Management Unit to gather sufficient data to inform future management and assess the trajectory of plant species and habitats. The respective monitoring surveys would be carried out at the most appropriate times of year (e.g., flora surveys versus browsing impact surveys). Repeat surveys would be carried out in the same month in each monitoring year (Years 1, 3, 5, 10, 15) to gather comparable data. Photographs would also be taken of each sample quadrat, as well as overview photographs of the Management Unit.

In addition, should finalised Management Unit A be fenced off and livestock excluded, a number of quadrat monitoring locations would also be set up outwith the enclosed Management Unit and in nearby and similar habitat in order to allow a temporal comparison of the habitats inside and outside the enclosure over the lifetime of the BEMP.

- A blanket bog condition assessment utilising i) the latest Biodiversity Metric[6] condition assessment pro-forma and methodology, and/or ii) a CSM[5] blanket bog site condition survey, at representative locations within finalised Management Unit A.

- Any peat hagg or surface reprofiling works, and any installed peat dams, would be monitored to ensure works are successful over the first three years after works are completed. Remedial measures would be undertaken if restoration works have failed.

- The presence of encroaching self-seeded conifer trees and new broadleaved seedlings would be monitored.

7.2　　Aims 2 and 5: Promote native broadleaved woodland cover and hedgerows (Search Areas B and E)

Monitoring would be undertaken in Management Units B and E to ensure the establishment of the broadleaved woodland and hedgerows planted.

A professional forester would monitor the planted areas in Years 1-5 following planting to ensure successful establishment, specifically looking for evidence of damage (e.g., browsing) or disease. Failed specimens should be replaced in the consecutive winter (i.e., between November and March). The forester would also advise on whether any further management or maintenance is required to ensure the establishment of the trees or hedgerows. Any additional measures would be discussed and agreed within the BMG.

These areas would be monitored again by a professional forester in operational Year 10 to ensure that there are no issues with disease or invasive species and to determine if any thinning at this stage would benefit woodland establishment. Monitoring would be undertaken again in operational Year 20 when some thinning operations may be required in woodland in order to

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[20] MacDonald, A., Stevens, P., Armstrong, H., Immirzi, P and Reynolds, P. (1998). A Guide to Upland Habitats - Surveying Land Management Impacts - Volume 2, Field Guide. Scottish Natural Heritage, Edinburgh.

encourage growth of better trees and create more open woodland, further new enhancement/enrichment planting may also be considered at this stage. This would aid regeneration of seedlings and begin the process of establishing a mixed age structure.

Each finalised Management Units respective target habitat type and target condition category would also be assessed and monitored using the latest Biodiversity Metric[6] condition assessment pro-forma and methodology with the following habitat specific intervals:

- Management Unit B – Broadleaved Woodland: Year 10 (after planting) and every 5 years thereafter; and

- Management Unit E – Hedgerows: Years 3, 5, 7, 10 and every 5 years thereafter.

7.3   Aim 3: Restore acid grassland habitats (Search Area C)

Monitoring in finalised Management Unit C would likely include:

- Bracken monitoring, such as mapping extent and change over time.

- Grassland monitoring through the establishment of a representative sample of permanent quadrats to record changes to the composition of the vegetation and species abundance, evenness and diversity.

   The respective monitoring surveys would be carried out at the most appropriate times of year. Repeat surveys would be carried out in the same month in each monitoring year (Years 1, 3, 5, 10, 15) to gather comparable data. Photographs would also be taken of each sample quadrat, as well as overview photographs of the Management Unit.

- A relevant grassland condition assessment utilising i) the latest Biodiversity Metric[6] condition assessment pro-forma and methodology, and/or ii) a CSM[5] grassland site condition survey, at representative locations within Management Unit C.

7.4   Aim 4: Species-rich meadow/grassland creation (Search Area D)

Monitoring in finalised Management Unit D would likely include:

- Vegetation monitoring through the establishment of a representative sample of permanent quadrats to record changes to the composition of the vegetation and species abundance, evenness and diversity.

   The respective monitoring surveys would be carried out at the most appropriate times of year (and prior to any cutting). Repeat surveys would be carried out in the same month in each monitoring year (Years 1, 3, 5, 7, 10, 15) to gather comparable data. Photographs would also be taken of each sample quadrat, as well as overview photographs of the Management Unit;

- A relevant grassland condition assessment utilising i) the latest Biodiversity Metric[6] condition assessment pro-forma and methodology, and/or ii) a CSM[5] grassland site condition survey;

- A pollinator survey (specifically bees, moths and butterflies) in each monitoring year (Years 1, 3, 5, 7, 10, 15) to track species presence and abundance over time. Surveys would be conducted in the summer on warm sunny days, prior to any cutting (if applicable); and

- Sward height monitoring over a number of transects within the Management Unit (the sward should mostly be between 5 cm – 20 cm for a neutral meadow[21]); and

- Target Notes of any substantial areas of injurious weeds such as docks, ragwort and creeping thistle.

8 REPORTING & BEMP REVIEW

A report would be submitted by the wind farm owner to the BMG in Years 1, 3 and 5 of operation, the frequency of reporting after Year 5 would be agreed by the BMG. This report will detail:

- Management undertaken in the past year(s);

- Monitoring undertaken, results and discussion of results; and

- Management and monitoring proposed for the following year(s).

The BMG may meet periodically to discuss the reports and management of the site, if this is considered necessary by the members of the BMG.

Where monitoring indicates any management objectives are not met, further management prescriptions or interventions would be agreed by the BMG.

The requirement for the measures, monitoring and reporting following year 15 of the operational phase would be dependent on the results of the monitoring which would be discussed and agreed within the BMG in year 15, or as agreed in writing with the BMG.

In addition, the BEMP would be reviewed by the BMG every five years from its commencement, or earlier if the BMG consider it necessary. The purpose of the review will be to assess the effectiveness of the proposed management prescriptions at achieving the aims and objectives of the BEMP. If necessary, such measures may be amended by the BMG at any time.

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[21]   https://www.ruralpayments.org/topics/all-schemes/agri-environment-climate-scheme/management-options-and-capital-items/species-rich-grassland-management/guidance-for-species-rich-grassland-management/

ANNEX A. MANAGEMENT AND MONITORING TIMETABLE

Table A-1 Indicative Management and Monitoring Timetable

Year	0*	1**	2	3	4	5	6	7	8	9	10	11	12	13	14	15...
Work Item	**Year of Implementation**															
Management Prescriptions																
Peat hagg reprofiling and drain blocking (Management Unit A)	✓	✓														
Livestock exclusion fencing (Management Units A & E)	✓															
Livestock/deer exclusion fencing (Management Unit B)	As required following staggered felling and replanting															
Deer management, if required (Management Unit B)		✓	Throughout lifetime of BEMP, as necessary and informed by BEMP monitoring													
Conifer regeneration/broadleaved seedling removal (Management Unit A)		✓	Throughout lifetime of BEMP, as necessary and informed by BEMP monitoring													
Bracken control & management for grassland restoration (Management Unit C)	✓	✓	Throughout lifetime of BEMP, as necessary and informed by BEMP monitoring													
Ground preparation and sowing (Management Unit D)	✓															
Excluded activities as per Prescription 1.5 (Management Units A – D) and Prescription 4.3 (Management Unit D)	Throughout lifetime of BEMP															
Native hedgerow planting/creation (Management Unit E)	✓	✓														
Grassland management vis grazing or mowing/baling (Management Unit D)		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Injurious weed control (Management Unit D)		Throughout lifetime of BEMP, as necessary and informed by BEMP monitoring														
Control competing vegetation in the first two years of hedgerow establishment (Management Unit E)	✓	✓														
Removal of tree tubes (Management Units B & E)											✓[22]					
Hedgerow management as per Prescription 5.4 (Management Unit E)			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

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[22] Fast growing species may require the removal of trees guards before Year 10, to prevent damage. This would be informed by forestry monitoring surveys.

Year	0*	1**	2	3	4	5	6	7	8	9	10	11	12	13	14	15...
Monitoring																
Inspection of peat hagg reprofiling and drain blocking/peat dams (Management Unit A)		✓	✓	✓												
Vegetation monitoring and condition assessments (Management Units A and C)		✓		✓		✓					✓					✓
Bracken extent mapping/monitoring (Management Unit C)		✓		✓		✓	Throughout lifetime of BEMP, as necessary and informed by BEMP monitoring									
Vegetation monitoring, condition assessments, sward height monitoring and injurious weeds target notes (Management Unit D)		✓		✓		✓		✓			✓					✓
Pollinator survey (Management Unit D)		✓		✓		✓		✓			✓					✓
Woodland & hedgerow establishment/growth monitoring – (Management Units B & E[23])		✓	✓	✓	✓	✓	As required following staggered felling & replanting in Management Unit B									
Broadleaved woodland condition assessment (Management Unit B)											✓					✓
Hedgerow condition assessment (Management Unit E)				✓		✓		✓			✓					✓
Reporting / Reviews																
BEMP Report		✓		✓		✓	Reporting schedule after Year 5 to be agreed by the BMG									
BMG 5-year review of BEMP						✓					✓					✓

* Construction Phase

**First year after final commissioning of the Proposed Development.

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[23] Following initial planting, any failed specimens recorded during forestry monitoring surveys would be replaced during a "beating up" second planting period to be determined.