



MacArthur  
Green

# Vale of Leven Wind Farm

## Outline Biodiversity Enhancement Management Plan

### Technical Appendix 6.6

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## 1 INTRODUCTION

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

This OBEMP is set out in the following sections:

- Summary of the Ecological and Ornithological Impact Assessments;
- 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 and ornithological surveys undertaken for the Proposed Development and the findings of **Chapter 6: Ecology** and **Chapter 7: Ornithology** of the Vale of Leven Wind Farm Environmental Impact Assessment Report (EIAR). The key habitats considered in this OBEMP are blanket bog/wet modified bog, broadleaved woodland (including ancient woodland present on the Ancient Woodland Inventory (AWI)), scrub, and calcareous grassland. The key ornithological species considered is black grouse (*Tetrao tetrix*).

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<sup>1</sup>. 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 13.3% 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 as shown in Figure 6.11a) for each respective habitat management and biodiversity enhancement proposal. These Search Areas were identified through discussions with the Applicant, landowner, and relevant technical specialists in order to enhance, create and connect habitats of biodiversity value. The Search Areas will likely be refined following further specialist surveys and feedback from relevant

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

consultees, and all 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 West Dunbartonshire Council (WDC) 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 WDC, 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 AND ORNITHOLOGICAL IMPACT ASSESSMENTS

### 2.1 Ecology

The Site is upland in character and dominated by a mix of blanket bog, marshy grassland, wet dwarf shrub heath and acid grassland (see **Appendix 6.1** and **Figure 6.3** of the EIA Report), all of which is grazed all year round by sheep. The westernmost third of the Site Access passes through improved farmland by Murroch Farm, whereas the eastern two thirds of the Site Access primarily traverses *Molinia caerulea* dominated marshy grassland on thin peaty/organo-mineral soils.

As per **Chapter 6: Ecology**, important ecological features (IEFs) scoped-in to the ecological impact assessment comprise ancient woodland, blanket bog/wet modified bog and commuting/foraging bats; no significant effects are predicted.

The Proposed Development would impact up to 0.06 hectares (ha) of ancient woodland at Barr Wood and up to 17.13 ha of blanket bog (direct permanent 5.00 ha, direct temporary 3.76 ha, and potential indirect 8.37 ha) and 1.28 ha of wet modified bog (direct permanent 0.47 ha, direct temporary 0.34 ha, and potential indirect 0.47 ha). This OBEMP proposes measures to compensate for the direct impact on blanket bog/wet modified bog habitats and ancient woodland, 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 **paragraph 6.2.38** of **Chapter 6: Ecology**; however, the 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.

## 2.2 Ornithology

As per **Chapter 7: Ornithology**, during the ornithology baseline surveys, osprey and goshawk were recorded breeding several kilometres from the Site. Several other raptor and wader species were recorded occasionally around the Site and the wider survey area, but no other breeding raptors and only very low number of breeding waders were recorded. A Breeding Bird Protection Plan (BBPP) is proposed to mitigate impacts during the construction phase.

A historical black grouse lek site was recorded in 2009 at Auchenreoch ruins outwith the Application Boundary (**Figure 7.8** of the EIA Report). In further baseline surveys from 2019-2022 only two black grouse flights and no leks were recorded, with the historical lek site considered likely to be no longer in use.

The important ornithological features (IOFs) scoped-in to the ornithological impact assessment comprise osprey, goshawk and black grouse; no significant effects are predicted. However, several measures in this OBEMP would create and enhance habitat close to the historic lek site for any black grouse that persist in the local area.

## 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<sup>2</sup> for use in Scotland based upon the Natural England Biodiversity Metric<sup>3</sup> 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 EIAR (**Appendix 6.1** and **Figure 6.3**).

<sup>2</sup> <https://www.sserenewables.com/sustainability/biodiversity-net-gain/>

<sup>3</sup> Natural England (2022) The Biodiversity Metric 3.1.

<https://nepubprod.appspot.com/publication/5850908674228224>

## 4 BIODIVERSITY ENHANCEMENT AREA

### 4.1 Overview

This OBEMP proposes a BEA covering 220.8 ha and 2000 linear metres, comprising five overarching Search Areas (Search Areas A – E; see **Figure 6.11a**), each focussing on a particular habitat of 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:

- Relevant peatland condition assessments in line with Peatland Action guidance<sup>4</sup>;
- JNCC Common Standards Monitoring of Upland Habitats<sup>5</sup> or habitat condition assessments utilising the latest Biodiversity Metric<sup>6</sup> 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
- Walkover surveys by a forester to further inform and refine woodland and scrub enhancement and planting proposals and details.

### 4.2 Search Area A – Peatland Enhancement

Search Area A is 89.94 ha, split over nine sub-units (A1 – A9), and is comprised of predominantly blanket bog habitat. Within the Search Area the aim is to enhance peatland habitat. This aim would likely be fulfilled primarily through drain blocking. The specific areas selected for this Search Area (as per **Figure 6.11a**) appear from a desk-based review of aerial imagery to contain historical moor grips that will have over time lowered the water table in these areas. Some drains, which now may be largely occluded and revegetated, are still likely be having a minor adverse effect on the peatland hydrology. As noted above, a detailed drain survey will be carried out to inform drain damming locations.

<sup>4</sup> 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>

<sup>5</sup> <https://jncc.gov.uk/our-work/common-standards-monitoring>

<sup>6</sup> <https://publications.naturalengland.org.uk/publication/6049804846366720>



Following further assessment of these sub-units other management prescriptions would be incorporated as appropriate and necessary, for example in some areas (e.g., sub-unit A9) there are encroaching and invading self-seeded non-native conifers due to the nearby commercial plantation seed sources. The BEMP provides for the removal of self-seeded conifers from these sub-units.

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, such as upland passerines and wader species.

#### 4.3 Search Area B – Native Broadleaved Woodland Enhancement, Creation & Connectivity

Search Area B is 111.41 ha, split over six sub-units (i.e., B1 - B6; **Figure 6.11a**). The habitats present are currently predominately dense bracken with some patches of common acid and species poor *Molinia caerulea* dominated marshy grasslands. Bracken, although a native species, can become problematic, inhibiting grasslands and woodland regeneration and expansion.

The aim within Search Area B is to create areas of semi-natural appearing broadleaved woodland, enhancing and expanding existing areas and connecting existing and often small and fragmented stands, many of which are ancient woodland (see **Figure 6.1**). Many of the areas are riparian, but also extend out further into suitable areas for planting on low sensitivity habitats, such as bracken. Some planting is also proposed around the substation perimeter to provide screening from the historic black grouse lek<sup>7</sup>.

The proposals in Search Area B would generally involve bracken management and the planting and establishment of a range of broadleaved species in non-uniform patterns and densities within the respective sub-units. The woodland and planting will largely aim to reflect the canopy composition of W4/W7/W11 NVC woodland types depending on the character and respective soil conditions within each sub-unit. There is no sensitive deep peatland nor sensitive potential groundwater dependent terrestrial ecosystems (GWDTes)<sup>8</sup> within Search Area B, and as such it would generally all be suitable for planting; however, any small patches of heaths, blanket bog habitat or deeply incised gullies would not be planted and remain as open ground to form openings and woodland glades in the long term.

Search Area B also contains 15.05 ha of existing woodland of varying quality, much of which is listed on the ancient woodland inventory and outside, but in proximity to, the Application Boundary; sub-unit B1 covers part of the Application Boundary and the ancient woodland at Barr Wood (see **Figure 6.11b**). The aim will also be to enhance these stands of woodland where applicable. For instance, the existing ancient woodland at Barr Wood covered by these proposals is in decline, comprising of mainly two rows of veteran/mature beech trees, large gaps in the woodland, little/no natural tree regeneration and the lack of an underscrub layer (for more details see **Appendix 6.1** and **Appendix 15.1**). In areas such as this enhancement measures would be undertaken, such as enrichment planting. Furthermore, the trees felled as part of the Site Access works through Barr Wood would be moved nearby and placed and retained within the section of Search Area B

<sup>7</sup> N.B. Due to the scale of the Figure, **Figure 6.11a** does not show proposed perimeter planting at the substation.

<sup>8</sup> <https://forestry.gov.scot/publications/117-briefing-note-18-publication-of-gwdte-practice-guide>

covering Barr Wood (i.e., B1), this will create deadwood habitat and provide an opportunity for those invertebrates and fungi resident within the tree to relocate. Soils excavated during Site Access works through Barr Wood would also be translocated within sub-area B1 to allow the transfer of ancient woodland soil biota and seedbank.

The creation, expansion, enhancement and connection of woodland fragments has multiple beneficial biodiversity effects such as creating structure and new breeding, shelter and foraging habitats for a range of species, from terrestrial and aquatic invertebrates to birds, bats and fish. There are also many secondary benefits of woodland creation, such as natural flood management, shade, carbon sequestration and helping to mitigate the effects of climate change.

Riparian planting would improve the ecological quality of watercourses (e.g., through allochthonous material inputs, thermoregulation, erosion reduction), create shelter opportunities (e.g., for otter), establish improved habitat corridors (e.g., for bats) and provide shading to watercourses and a source of nutrient inputs and aiding in temperature regulation and cover for fish. The wider planting proposals would also benefit black grouse through enhanced shelter and foraging habitats and the connectivity of these.

#### 4.4 Search Area C – Grassland Restoration

Management Unit C comprises a single sub-unit C1, which is 12.19 ha in extent and covers the area of Auchenreoch Glen SSSI.

Auchenreoch Glen SSSI is designated for lowland calcareous grassland and springs (including flushes)<sup>9</sup>. The lowland calcareous grassland was last assessed as in Favourable Maintained condition on 19 August 2010 but with a negative pressure of invasive species; the springs feature was assessed as Favourable Maintained on 10 August 2013. The condition assessment for the lowland calcareous grassland is considered outdated having not been assessed since 2010 and that the results of the NVC surveys for the Proposed Development in 2020 and 2021 indicate that, when compared with NatureScots SSSI designation NVC data, much of the SSSI area has now been taken over by dense and continuous bracken which has resulted in the commensurate loss of the grassland habitats (see **Appendix 6.1** and **Figure 6.3**). The condition status of the calcareous grassland is now more likely to be Unfavourable and without intervention it is expected that bracken will continue to encroach and expand to take over suitable grassland habitats within the SSSI, and the condition may be considered Unfavourable declining in line with NatureScot definitions<sup>10</sup>.

NatureScots SSSI designation NVC data indicates that whilst it is designated for calcareous grassland (CG10) there is a complex mosaic of various grasslands here, as well as the calcareous CG10 there are also areas of neutral MG5, acidic U4, and some more improved MG6. Although CG10, MG5 and U4 were all still recorded as present within the SSSI during NVC surveys for the Proposed Development, all their extents were much reduced due to dense bracken encroachment.

The aim within Search Area C would be to remove and control the bracken in order to allow the various grassland habitats to naturally regenerate, return the SSSI to Favourable condition, and

<sup>9</sup> <https://sitelink.nature.scot/site/100>

<sup>10</sup> <https://www.nature.scot/professional-advice/protected-areas-and-species/protected-areas/site-condition-monitoring/assessment-condition>

maintain this throughout the lifetime of the Proposed Development. The control of bracken will also improve the flora diversity of the area and increase wildflower cover for insects and pollinators, considering the species-richness of the remaining patches of CG10.

#### 4.5 Search Area D – Native Mixed Scrub Enhancement/Creation

Search Area D is 7.25 ha in extent and split between two sub-units (i.e., D1 and D2; **Figure 6.11a**), and is predominantly comprised of M25b *Molinia caerulea* marshy grassland with some small fragments of other habitat types such as acid grassland. Search Area D is also adjacent some areas of W23 *Ulex europaeus* (gorse) scrub.

The aim within Search Area D is primarily to create a mosaic of scattered native mixed scrub around the edges of some existing woodlands and woodlands proposed for creation as part of Search Area B. This would involve the planting of a range of scrub species in scattered and non-uniform patterns and densities, a low number of broadleaved trees would also be included within the planting mix to further enhance the long-term structure, diversity and connectivity with abutting areas of woodland.

Scrub is very scarce within the survey area for the Proposed Development, with just a few small patches of gorse or hawthorn scrub recorded. The enhancement of the scrub and the creation of more diverse and species-rich scrub will provide biodiversity enhancement and create new shelter and foraging habitats for a range of species, as well as provide a scrub zone around some areas of woodland and enhancing woodland and scrub connectivity.

#### 4.6 Search Area E – Native Hedgerow Creation

Search Area E is linear and covers approximately 2000 m<sup>11</sup>. In the areas around Merkins Farm and Highdykes surrounding 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 post and wire fences. 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.

## 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 upland sites and habitats would

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<sup>11</sup> Due to the narrow linear nature of hedgerows and that the specific locations are yet to be determined, these are not shown on **Figure 6.11a**.

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.
- Prescription 1.1 Manage deer numbers within and surrounding Search Area A if required and in agreement with the landowner, to achieve Objectives 1.1 and 1.2.
- 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<sup>12</sup> (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<sup>12, 13, 14</sup>, 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 into this area – the donor turve is taken from alternate sides to avoid a line of restored divots forming long 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 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;

<sup>12</sup> According to methodology detailed in: Peatland Action (2022) Technical Compendium. Available at: <https://www.nature.scot/doc/peatland-action-technical-compendium>

<sup>13</sup> 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>)

<sup>14</sup> 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>)

- 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 through enhancement, expansion and connectivity (Search Area B)**

Objective 2.1 Enhance, create, expand, and connect areas of native broadleaved woodland and ancient woodland and increase diversity within and around the Site through the enhancement of 15.05 ha of existing woodland and the planting of 111.41 ha of new woodland.

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 instance for black grouse, woodland passerines, bats and other small mammals, and invertebrates.

Prescription 2.1 Undertake new native broadleaved woodland planting within the open ground of Search Area B and respective sub-units. Planting will be non-uniform patterns and of variable densities on advice from a professional forester and utilise low impact ground preparation techniques such as screening or inverted mounding<sup>15</sup>.

Given the location, soils and prevailing baseline habitats of the proposed planting areas, and to reflect the character and structure of the existing 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.), and holly (*Ilex aquifolium*). Where there are damper soils the species mix would primarily include birch, rowan, 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 initiated during construction and be completed by the end of the operational Year 1. Tree planting would be carried out between the months of November and March when trees are dormant and more likely to

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<sup>15</sup> Scottish Forestry. (2021). Cultivation for upland productive woodland creation sites: applicants' guidance. <https://forestry.gov.scot/publications/1032-cultivation-for-upland-productive-woodland-creation-sites-applicant-s-guidance>

establish successfully. Days when the ground is frozen or when snow or excessive surface water is present are to be avoided.

- Prescription 2.2 Undertake enrichment planting within suitable existing woodland areas within Search Area B and respective sub-units. The enrichment planting will aim to assist woodland regeneration and increase species diversity. Locations for enrichment planting will be identified by a professional forester during finalisation of the BEMP. Enrichment planting would be completed by the end of the operational Year 1.
- Prescription 2.3 Trees to be felled and soils to be excavated for the Site Access works through Barr Wood will be translocated within sub-unit B1 to create deadwood habitats and to allow the transfer of ancient woodland tree and soil biota and underlying seedbank to aid in the enhancement of existing woodland and establishment of new woodland.
- Prescription 2.4 Control and manage bracken, with ongoing control where this is necessary, to allow tree establishment<sup>16</sup>.
- Prescription 2.5 Fencing of some planting/enhancement 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 historical black grouse lek would follow guidelines in Trout & Kortland (2012)<sup>17</sup> to minimise collision risk for black grouse.  
All trees will be planted in 1 - 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 2.6 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 2.7 Prohibited activities noted in Prescription 1.4 above apply (with the exception of planting trees).

### 5.3 Aim 3: Restore grassland habitats within Auchenreoch Glen SSSI (Search Area C)

- Objective 3.1 Remove bracken coverage and halt further bracken encroachment within Auchenreoch Glen SSSI.

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<sup>16</sup> [Bracken Control - A Guide to Best Practice | NatureScot \(webarchive.org.uk\)](#)

<sup>17</sup> Trout, R. and Kortland, K. (2012). Fence marking to reduce grouse collisions. Forestry Commission Technical Note.



- Objective 3.2 Restore the grassland habitats within Auchenreoch Glen SSSI back to Favourable condition.
- Prescription 3.1 Remove and manage bracken, with ongoing control where this is encroaching on the SSSI or a 50 m buffer thereof<sup>f16</sup>.
- Prescription 3.2 Prohibited activities noted in Prescription 1.4 above apply.

#### 5.4 Aim 4: Promote species-rich native scrub cover (Search Area D)

Objective 4.1 Create and enhance areas of native mixed scrub and increase floral diversity through the planting of 7.25 ha of native scrub.

Objective 4.2 Increase faunal diversity locally by providing more habitat structure and new breeding, shelter and foraging habitats.

Prescription 4.1 Undertake scrub planting within Search Area D. Planting will be non-uniform patterns and of variable densities on advice from a professional forester and utilise low impact ground preparation techniques such as screefing or inverted mounding. Planting will also be scattered in order to retain areas of grassland and to allow the formation of grassland glades/openings and a mixed scrub – grassland mosaic.

The locality already contains some patches of gorse nearby, abutting sub-unit D2 to the east and south of sub-unit D1. The scrub planting will supplement this with primarily hawthorn, but the planting species mix would also include blackthorn (*Prunus spinosa*), common juniper (*Juniperus communis*), hazel and holly.

In addition, a low number of scattered broadleaved tree species would be included (e.g., oak, birch, willow and rowan) to further enhance the long-term structure and diversity.

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.

Scrub planting would be initiated during construction and be completed by the end of the construction period. 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 4.2 As per Prescription 2.4 above.

Prescription 4.3 As per Prescription 2.5 above.

Prescription 4.4 As per Prescription 2.6 above.

Prescription 4.5 Prohibited activities noted in Prescription 1.4 above apply (with the exception of planting scrub/trees).

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

Objective 5.1 Create approximately 2000 m of new species-rich hedgerow<sup>18</sup> and link with existing hedgerows/scrub to create and enhance habitat corridor connectivity.

Prescription 5.1 Plant approximately 2000 m of new native species-rich hedgerows. The hedgerows are likely to consist of 60-80% hawthorn with crab apple (*Malus sylvestris*), hazel, blackthorn and holly generally making up the remainder of the species-mix. 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<sup>19</sup>, 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.

<sup>18</sup> 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]

<sup>19</sup> e.g., <https://hedgelink.org.uk/>



- 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<sup>2</sup> 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 Application Boundary prior to development based on the habitats data collected for the Proposed Development (**Appendix 6.1** and **Figure 6.3**);
- Assessing the loss of habitat during construction; and
- 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<sup>2</sup>;
- Natural England Biodiversity Metric 4.0<sup>20</sup> – User Guide, Technical Supplements, and Habitat Condition Assessment; and
- JNCC Common Standards Monitoring (CSM) criteria<sup>5</sup> (used to aid some habitat condition assessments).

The boundary for the baseline biodiversity assessment equates to the Application Boundary.

### 6.2 BNG Assessment Results

#### 6.2.1 Biodiversity Baseline

The biodiversity baseline for the Proposed Development covers 330.25 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<sup>2</sup>, as they are not large enough to be considered a viable habitat and be effectively managed to increase overall biodiversity. **Figure 6.3** displays the habitats across the Application Boundary and wider survey area, and which comprises the biodiversity baseline.

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<sup>20</sup> <https://publications.naturalengland.org.uk/publication/6049804846366720>

The main habitat types within the Application Boundary are blanket bog (53.0%), marshy grassland (20.4%), wet heath (8.8%), acid/neutral flush (4.5%) and acid grassland (4.3%); see **Chapter 6: Ecology** and **Appendix 6.1** for further details. Using the SSER BNG toolkit, the biodiversity value of the Application Boundary baseline was calculated to be 5095 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 an 18.12 ha loss of habitat (10.33 ha permanent infrastructure and 7.79 ha temporary working areas) and an overall -5% loss of biodiversity (i.e., 247 BU). The majority of BU lost are from blanket bog (i.e., 185 BU). During construction of the Proposed Development, 312.13 ha of habitat would be retained and directly unaffected by the Proposed Development, comprising a total of 4848 BU.

### 6.2.3 Following Works

At the end of construction any temporary working areas will be restored following best practice methods and guidance. The SSER BNG Metric user guide<sup>2</sup> 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. However, many of the habitat types 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. 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 6.11a**.

The proposals within this OBEMP would result in the enhancement of 89.94 ha of blanket bog, the restoration of 12.19 ha of species-rich grasslands, the creation of 111.41 ha of broadleaved woodland, the enhancement of 15.05 ha of broadleaved woodland, the creation 7.25 ha of species-rich scrub and 2000 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 result in the creation of 929 BU which results in a net gain for biodiversity of 676 BU (i.e., +13.3%) over and above the baseline and pre-development value.

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

Stage	Biodiversity Units	Biodiversity Units Gained/Lost from Baseline
Baseline	5095	N/A
During works	4848	-247 (-5%)
After works: Site reinstatement of temporary working areas	4944	-151 (-3%)
After works: OBEMP – habitat enhancement/creation	5771	+676 (+13.3%)

### 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<sup>6</sup> 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 2: Proposed Development**, 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: Enhance peatland habitat and improve blanket bog habitat condition (Search Area A)**

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

- Habitat 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)<sup>21</sup> guidance at a landscape scale.

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.

- A blanket bog condition assessment utilising i) the latest Biodiversity Metric<sup>6</sup> condition assessment pro-forma and methodology, and/or ii) a CSM<sup>5</sup> blanket bog site condition survey, at representative locations within finalised Management Unit A.
- 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, 4 and 5: Promote native broadleaved woodland/scrub/hedgerow cover and increased biodiversity (Search Areas B, D and E)**

Monitoring would be undertaken in Management Units B, D and E to ensure the establishment of the trees, scrub and hedgerow 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, scrub 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

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<sup>21</sup> 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.

stage would benefit woodland/scrub establishment. Monitoring would be undertaken again in operational Year 20 when some thinning operations may be required in woodland in order to 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<sup>6</sup> condition assessment pro-forma and methodology with the following habitat specific intervals:

- Management Unit B – Broadleaved Woodland: Year 10 and every 5 years thereafter;
- Management Unit D – Mixed Scrub: Years 3, 5, 7, 10 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 grassland habitats within Auchenreoch Glen SSSI (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 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.

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<sup>6</sup> condition assessment pro-forma and methodology, and/or ii) a CSM<sup>5</sup> grassland site condition survey, at representative locations within Management Unit C.

## 8 **REPORTING & BEMP REVIEW**

A report would be submitted by the wind farm owner to the BMG in Years 1 - 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.

## ANNEX A. MANAGEMENT AND MONITORING TIMETABLE

Table A-1 Management Timetable

Year	0*	1**	2	3	4	5	6	7	8	9	10	11	12	13	14	15...
<b>Work Item</b>	<b>Year of Implementation</b>															
<b>Management Prescriptions</b>																
Drain blocking (Management Unit A)	✓	✓														
Deer management (Management Units A, B & D)		✓	Throughout lifetime of BEMP, as necessary and informed by BEMP monitoring													
Conifer regeneration removal (Management Unit A)		✓	Throughout lifetime of BEMP, as necessary and informed by BEMP monitoring													
Excluded activities as per Prescription 1.3 (Management Units A – D)	Throughout lifetime of BEMP															
Bracken control & management for woodland establishment (Management Units B, C & D)	✓	✓	As necessary and informed by woodland monitoring by a professional forester.													
Bracken control & management for grassland restoration (Management Unit C)	✓	✓	Throughout lifetime of BEMP, as necessary and informed by BEMP monitoring													
Felled ancient woodland trees and soils translocation as per Prescription 2.3 (Management Unit B)	✓															
Tree & scrub planting & woodland enhancement (Management Units B & D)	✓	✓														
Native hedgerow planting/creation (Management Unit E)	✓	✓														
Stock fencing as required to facilitate trees/ scrub/ hedgerow establishment	✓	✓														
Control competing vegetation in the first two years of hedgerow establishment (Management Unit E)	✓	✓														
Removal of tree tubes (Management Units B & D)											✓ <sup>22</sup>					
Hedgerow management as per Prescription 5.4 (Management Unit E)			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

<sup>22</sup> 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...	
<b>Monitoring</b>																	
Inspection & maintenance of drain blocking/peat dams (Management Unit A)		✓	✓	✓													
Vegetation monitoring and condition assessments (Management Unit A)		✓		✓		✓		✓			✓					✓	
Vegetation monitoring and condition assessments (Management Unit C)		✓		✓		✓		✓			✓					✓	
Bracken Extent Monitoring (Management Unit C)		✓		✓		✓	Throughout lifetime of BEMP, as necessary and informed by BEMP monitoring										
Woodland/scrub/hedgerow establishment/growth monitoring – (Management Units B, D and E <sup>23</sup> )		✓	✓	✓	✓	✓					✓						
Broadleaved woodland condition assessment (Management Unit B)											✓					✓	
Mixed scrub condition assessment (Management Unit D)				✓		✓		✓			✓					✓	
Hedgerow condition assessment (Management Unit E)				✓		✓		✓			✓					✓	
<b>Reporting / Reviews</b>																	
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.

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