

# TECHNICAL APPENDIX 8.5: OUTLINE HABITAT MANAGEMENT PLAN (OHMP)

**Balmeanach Wind Farm**  
Prepared for: **Balmeanach Wind Farm Limited**

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## 1.0 Introduction

### 1.1 Background

Balmeanach Wind Farm Limited (the Applicant) is applying to The Highland Council (THC) for planning permission to develop a wind farm on land approximately 3km to the south of the settlement of Edinbane, approximately 8km to the east of Dunvegan and approximately 7km to the north of Struan on the Isle of Skye. The Proposed Development would be located to the immediate south-east of the consented Ben Sca Wind Farm and would comprise 10 wind turbines and associated infrastructure including foundations, hardstanding, access tracks, a met mast, substation and construction compound.

The site, centred on NGR 133900, 846750 is located in the north west of the Isle of Skye, on the Bracadale Estate, on the Balmeanach and Caroy Common Grazings, and partly on the Coishletter Estate. The site, which measures approximately 680ha, is currently grazed by sheep and deer. Access to the site would be via the existing Ben Aketil Wind Farm access track from the A850, and then south east via the consented Ben Sca Wind Farm site access track onto the hillside.

The planning application is supported by an Environmental Impact Assessment (EIA) Report, which describes the Proposed Development in detail and assesses the predicted environmental impacts of the scheme. **Technical Appendices 8.1 to 8.4** and the **Chapter 8: Ecology**, consider the potential impacts on ecological features. As noted in **Chapter 8: Ecology**, it is estimated that 34.4 hectares (ha) of peatland habitat (blanket bog, wet heath and dry heath) would be permanently or temporarily lost as a result of the Proposed Development. It is proposed that this area of peatland would be compensated for through the implementation of this Outline Habitat Management Plan (OHMP). There is limited opportunity for habitat creation within the moorland area of the site. Therefore, it has been proposed that the Habitat Management Area (HMA) should focus on forest to bog restoration adjacent to the already consented Ben Sca and Ben Sca Extension Habitat Management Areas (HMA) (**Figure 8.5.1**).

### 1.2 Scope

This OHMP sets out the proposed habitat restoration and management measures in relation to the Proposed Development, which would remain in place for the lifetime of the scheme. These measures are required to provide compensation for negative effects on important ecological features, notably blanket bog, and to provide biodiversity enhancements, in accordance with Scotland's National Planning Framework (NPF4), Policy 3: Biodiversity as set out in **Chapter 4: Policy Context**.

This OHMP has been prepared by SLR Consulting Limited (SLR) on behalf of the Applicant. The OHMP is intended as a precursor to a more detailed HMP, which would be produced and agreed with THC, in consultation with NatureScot and Scottish Environmental Protection Agency (SEPA) post consent, prior to the commencement of construction.

This OHMP has been prepared with reference to relevant HMP, peatland restoration and forestry guidance (NatureScot, 2015; SEPA, SNH, FCS, 2014; NatureScot, 2016; NatureScot, 2018; Forestry Commission Scotland, 2015) including the International standards for Habitat Restoration (Society for Ecological Restoration, 2019). It has been written to be compatible with the Ben Sca Wind Farm HMP (SLR, 2020) and Ben Sca Wind Farm Extension HMP (SLR, 2021) areas, which apply to the area directly north east to and adjacent to the proposed HMP area (**Figure 8.5.1**).

The aim of the OHMP is to establish the key objectives and principles by which an area of habitat, similar to that found on the site would be restored and managed to the benefit of biodiversity, which would then form the basis for the more detailed HMP. It is not the intention for this document to provide full details of proposed management, many of which cannot be determined fully at this stage.

The OHMP is intended to cover the restoration, management and monitoring of peatland habitats during the operational life of the wind farm. Issues relating specifically to the construction of the wind farm (e.g. control of water runoff, disturbance to birds and other protected species such as reptiles and otter (*Lutra lutra*)) are not considered here.

### 1.2.1 Hierarchy of Terms for Restoration Planning

The following terms (Society for Ecological Restoration, 2019), have been used to structure this OHMP:

- The **Scope** is the broad geographic or thematic focus of the project.
- The **Vision** is a general summary of the desired condition one is trying to achieve through the work of the project.
- The **Targets** identify the native ecosystems to be restored at the site as informed by the reference model, along with any social outcomes or constraints expected of the project.
- **Goals** are formal statements of the medium to long-term desired ecological or social condition, including the level of recovery sought. Goals must be clearly linked to targets, measurable, time-limited, and specific.
- **Objectives** are formal statements of the interim outcomes along the trajectory of recovery. Objectives must be clearly linked to targets and goals, and be measurable, time-limited, and specific.
- **Indicators** are specific, quantifiable measures of attributes that directly connect longer-term goals and shorter-term objectives. Ecological indicators are variables that are measured to assess changes in the physical, chemical, or biotic ecosystem attributes as guided by the reference model.

## 1.3 Outline Habitat Management Plan Vision

The vision of this OHMP is as follows:

- To as far as reasonably practical, restore c. 77.75ha of peatland habitat within the afforested area to the north west of the site, adjacent to the consented HMAs for Ben Sca Wind Farm and Ben Sca Wind Farm Extension (the area targeted for restoration is shown on **Figure 8.5.1**), so that within 40 years (the lifetime of the Proposed Development) the hydrological conditions suitable for the development and maintenance of carbon sequestering bog would be largely self-sustaining.

Further details, including specific goals and objectives, are provided in **Section 3.0**.

## 1.4 Target Features for Management Action

The features which form the targets of the OHMP have been determined through consideration of the relative importance of ecological features present at the site based on surveys conducted on site and habitats targeted in the Local Biodiversity Action Plan (LBAP) (Skye and Lochalsh Biodiversity Group, 2003). The extent to which habitats may be affected by the Proposed Development (as set out in the EIA Report), and their potential to benefit from restoration or management has been considered.

The impact on birds has also been considered, with management goals in this report aimed at providing habitat for breeding and foraging waders, raptors and passerines. The key issues for consideration are raptor flight activity, the potential for displacement from the Proposed Development to other adjacent areas and the potential for collision as it is important that any monitoring programme addresses the species that may be affected by the Proposed Development. It should be recognised however that 'such monitoring should only be required where there is a gap in understanding or where the scale and extent of impact is uncertain' (SNH, 2009).

The post consent ornithological monitoring programmes for the adjacent Edinbane Wind Farm and Ben Aketil Wind Farm have produced a vast amount of information over a long period of time, and it is broadly understood how raptors respond to operational wind farms in this part of Skye. The operational monitoring data show that there is some displacement of flight activity away from the turbines although this has not apparently affected the long-term population trends for golden eagle which remain stable and white-tailed eagle which have increased. What is not fully understood, however, is the potential cumulative effect of an increasing number of renewable energy developments in the future, on the populations of both eagle species on the Isle of Skye.

Taking the above into consideration, the OHMP relates primarily to blanket bog. Recommendations for ornithological monitoring have been considered in **Section 4.1.5**.

Other important ecological features were identified in **Technical Appendices 8.1 to 8.4** and **Chapter 9: Ornithology** of the EIA report and by the Ben Sca Wind Farm EIA Report (SLR, 2020b; SLR, 2020c) and Ben Sca Wind Farm Extension EIA Report (SLR, 2021), including otter, bat species, fish, flush and spring, acid grassland, running water. However, it was established through the impact assessment process that none of these are likely to be significantly affected by either the Proposed Development or the consented developments (subject to the implementation of standard good practice mitigation measures during the construction phase) and therefore these receptors are not considered priorities for management action in the OHMP.

## 2.0 Implementation

### 2.1 Roles and responsibilities

The Applicant is ultimately responsible for meeting the commitments made in this OHMP. The implementation of the final HMP would be overseen by a suitably qualified person or persons, appointed by the Applicant.

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

### 2.2 Monitoring and Review - Overview

In accordance with NatureScot guidance (NatureScot, 2016) relevant, appropriately timed monitoring is important to enable the success of HMP tasks to be determined and identify whether remedial measures are required, if objectives are not being met.

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

### 2.3 Programme

An indicative programme showing the restoration, management and monitoring tasks specified in this OHMP, is provided in **Section 4.0**. A detailed programme would be provided in the detailed HMP.

## 3.0 Peatland Restoration

### 3.1 Background and Rationale

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

Peatland is a general term for a wide range of peat soils and habitats that occupy more than 20% of Scotland's land area (NatureScot, 2015). Scotland holds around 60% of the UK's peatlands soils (SEL, 2009). Peatland has been identified as a national conservation priority within Scotland's National Peatland Plan (SNPP (NatureScot, 2015)), for its importance for biodiversity, water quality, and as a carbon store. The SNPP states that peatland restoration is one of the priority projects highlighted in the Scottish Biodiversity Strategy Route Map towards meeting the EU biodiversity target (European Commission & Environment Agency, 2021) of restoring at least 15% of degraded ecosystems. The most extensive and deepest peat soils occur under blanket bog and raised bogs. These habitats cover an area of around 1.9 million ha in Scotland and are recognised as internationally important under the EU Habitats Directive (as Annex 1 habitats). Blanket bog is also listed on the Scottish Biodiversity List (Scottish Government, 2013) and for Skye and Lochalsh (Skye and Lochalsh Biodiversity Group, 2003) is subject to a Habitat Action Plan (HAP) (as part of the Mountain and Moorland HAP). Blanket bog is therefore considered to be a priority habitat for conservation both nationally and locally.

The targeted restoration and management of peatland habitat proposed here is intended to compensate for the permanent or temporary loss of blanket bog due to the Proposed Development and to provide biodiversity enhancement. Wet heath has also been considered for restoration, however, has not been recommended for direct restoration action as blanket bog habitat has higher value and will compensate for wet heath habitats. Further justification for the extent of the area to be restored is provided in **Section 3.1.2**.

#### 3.1.2 Identification of Restoration and Management Area, and Consideration of Alternatives

##### Background

SLR was commissioned by the Applicant in May 2019 to undertake a range of non-avian ecological surveys at the site. As part of this commission UKHab habitat and National Vegetation Classification (NVC) surveys of the site were carried out in summer 2020 and updated in 2022 after a change in the proposed layout. One of the aims of these surveys was to inform an assessment of the site's potential to benefit from habitat restoration or management. The results of these surveys are provided in **Technical Appendix 8.1: Vegetation Survey and Habitat Mapping Report**. Limited opportunities for biodiversity enhancements were found within the main part of the site, as blanket bog habitats were in good condition, however substantial opportunity for forest to bog restoration were identified to the north west of the site close to Ben Sca Wind Farm. Habitat surveys for the adjacent Ben Sca Wind Farm Extension were undertaken in the summer of 2021. These surveys identified a number of areas of poorly growing conifers in peat habitat that appear suitable for forest to bog restoration work. The OHMPs and associated HMAs for Balmeanach and Ben Sca have therefore been considered in tandem, with the division of land appointed to each wind farm in the potential bog restoration area based on the relative size of each wind farm.

The proposed HMA for Balmeanach Wind Farm is adjacent to the Ben Sca Wind Farm HMA and Ben Sca Wind Farm Extension HMA, also recommended for forest to bog restoration, increasing the value of any additional restoration by providing a larger contiguous area of peatland habitat. A survey of the proposed HMA was conducted by Crosscut Forestry Ltd. in April and May 2023, to assess the suitability of woodland on site for conversion to blanket bog as reported in **Technical Appendix 3.3: Assessment of Potential Areas for Woodland Removal for Peatland Restoration** (Crosscut Forestry Ltd., 2023). The proposed HMA totals c. 77.75ha, most of which will be the site of forest to bog peatland restoration. Of this area, 20.5ha is identified as currently supporting dead trees; with the remaining 57.25ha identified as very low yield class sitka spruce and lodgepole pine. The approximate boundary of this area is shown on **Figure 8.5.1**.



There are open areas within the Proposed Development site, dominated by blanket bog and wet heath, which are in relatively good condition, despite the fire that damaged some of the area in 2018. These areas are relatively unmodified (e.g. they have not been drained), and there is therefore limited restoration potential. Due to the high value of blanket bog and the significant restoration potential for this habitat, bog restoration has been targeted in this OHMP.

### Size of Area to be Restored

The estimated total loss of habitat within the Balmeanach Wind Farm would be 34.4ha, including a loss of 26ha of blanket bog, 5.5ha of wet heath, 2.9ha of dry heath and <0.1ha of acid grassland. 16.1ha of this will be directly lost and 18.2ha will be indirectly lost.

#### Direct Habitat Loss

Where existing habitat would be replaced by proposed infrastructure, it would be permanently lost from the site at least for the duration of the wind farm's operation. Based on a worst-case scenario it has been assumed that all habitat within the borrow pit search areas would be lost directly, however, in reality only parts of those areas would be likely to be used/lost. The habitat loss calculation is therefore considered to be precautionary.

#### Indirect and Temporary Habitat Loss (e.g. drying)

Where bog and other wet peatland habitats are close to proposed infrastructure it is likely that changes in hydrological conditions, in particular drainage, will lead to permanent change to existing habitats (with wetter habitats likely replaced by drier ones). A precautionary approach has been taken which assumes that habitat change of this type would effectively result in the loss of the affected peatland habitats. For the purposes of habitat loss calculations, we have considered the effect to extend 10m beyond infrastructure<sup>1</sup>. For other habitats an allowance for temporary loss of 5m is included to allow for possible temporary loss due to damage during construction.

For the purposes of assessment, a precautionary approach has been taken which assumes that direct habitat loss (all habitats) and indirect loss of bog habitats, e.g. blanket bog and wet modified bog, represents a permanent, irreversible negative effect, although in practice some areas indirectly affected may be able to be restored, e.g. during reinstatement following construction. Temporary loss of heath habitat caused during construction, for example by vehicles driving around the construction footprint and storage of materials, is anticipated to recover following reinstatement works within 5 years (Gilbert & Anderson, 1998).

The proposed area for forest to bog restoration comprises 77.75ha of non-native conifer plantation, connected to the existing Ben Sca and Extension HMAs and the open wet heath area surrounding Ben Aketil Wind Farm. This represents 2.2 x the total habitat that will be lost, and 2.9 x the blanket bog habitat that will be lost. The remaining blanket bog and heath habitat on site will be retained in good condition.

### Summary of Factors Considered in Site Selection

The following factors have been considered in concluding that the area selected is the most appropriate option for peatland restoration:

- the area was densely planted with non-native Sitka spruce (*Picea sitchensis*) and Lodgepole pine (*Pinus contorta*) trees in 1990, but the growth rates are generally poor and many of the trees are stunted or dead (**Photo 3-1**);
- the peat depth surveys undertaken during the forestry assessment (**Technical Appendix 3.3**) indicates that of those areas surveyed within the proposed HMA, peat depth is typically over 0.5m;

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<sup>1</sup> This figure is in line with similar assessments for other projects, and although arbitrary, is considered precautionary based on experience at other sites.

- the rides between the forest coupes support blanket bog habitat, suggesting that the vegetation within the densely planted forest coupes used to support similar blanket bog communities to those found in the rides, before being planted;
- the area has been modified via drains to lower the water table and help tree growth, indicating that it has restoration potential via tree felling and ditch blocking to raise the water table;
- the area is adjacent to the existing Ben Sca Wind Farm and Ben Sca Wind Farm HMAs and therefore will have an enhanced benefit by increasing the patch size of restored bog; and
- the area connects with the open hill and other bog and heath habitats and therefore will have an enhanced benefit by increasing habitat connectivity.



**Photo 3-1: Poorly growing lodgepole pine and Sitka spruce**

### Forestry Considerations

Inappropriate planting on peat is known to degrade the peatland habitat, can reduce biodiversity, and cause release of greenhouse gases when tree growth is poor and peat soils are heavily drained and disturbed (Forestry Commission Scotland , 2015). As such, restoration of peatland involving tree felling is considered appropriate in this situation.

The Scottish Government's Policy on Control of Woodland Removal (FCS, 2009) lists criteria where woodland removal, without a requirement for compensatory planting, is most likely to be appropriate. This includes two criteria which are applicable to the Proposed Development, specifically '*where it would contribute significantly to enhancing priority habitats and their connectivity*' (i.e. peatlands including blanket bog), and '*where it would contribute significantly to improving conservation of water or soil resources*' (i.e. restoring peatlands to encourage peat formation through the re-establishment of Sphagnum mosses, and increasing the ability of the habitat to improve water quality). Using these criteria, it can be concluded that the removal of the woodland without a requirement for compensatory planting is in line with Scottish Government Policy.

Peat probing undertaken during the forestry site visit in April 2023 (reported in **Technical Appendix 3.3**) confirmed that peat depths are consistently over 0.5m. In addition, the report identifies that the combination

of peat depth >0.5m and a very low yield class of trees, indicates that felling without the need for restocking is appropriate in this area.

## 3.2 Goals and Objectives

Setting of goals and objectives for this OHMP has taken into account the key ecosystem attributes required to characterise, evaluate and monitor habitat condition<sup>Error! Bookmark not defined.</sup> (Society for Ecological Restoration, 2019)(see Table 3-1).

**Table 3-1: Ecosystem Attributes for Goal and Objective Setting**

Attribute	Description	Relevance to Proposed HMA
Absence of threats	Direct threats to the ecosystem such as overutilization, contamination, or invasive species are absent.	Potential threats include: conifer regeneration, grazing, construction work and fire.
Physical conditions	Environmental conditions (including the physical and chemical conditions of soil and water, and topography) required to sustain the target ecosystem are present.	Regeneration of target of bog and heath will require removal of overshadowing conifers and management of water levels within the peat.
Species composition	Native species characteristic of the appropriate reference ecosystem are present, whereas undesirable species are absent.	Species composition should be similar to areas of existing target habitats within or adjacent to the HMA.
Structural diversity	Appropriate diversity of key structural components, including demographic stages, trophic levels, vegetation strata and spatial habitat diversity are present.	As habitat matures different canopy levels should develop including moss and dwarf shrub layers etc.
Ecosystem function	Appropriate levels of growth and productivity, nutrient cycling, decomposition, species interactions, and rates of disturbance.	The habitat should be self-perpetuating over time with little or no active management and should start to sequester carbon.
External exchanges	The ecosystem is appropriately integrated into its larger landscape or aquatic context through abiotic and biotic flows and exchanges.	The habitat should be connected to the wider habitat network.

### 3.2.1 Goals

The goals of the OHMP are to as far as reasonably practical:

- to create 77.75ha of wet blanket bog via forest to bog peatland restoration; and
- to within 40 years have created hydrological conditions suitable for the development and maintenance of carbon sequestering bog habitat that are largely self-sustaining.

### 3.2.2 Objectives

The following specific objectives are proposed for the HMA (see **Figure 8.5.1**):

- fell trees within a 77.75ha area of conifer plantation within the HMA;
- treat the ground surface post-felling to increase its suitability for bog regeneration, e.g. through surface smoothing;

- increase the water table across the HMA, and create bog pools through ditch blocking;
- address species composition and integration into the wider ecosystem network by seeding or encouraging self-setting of species representative of reference ecosystems and of local genetic origin;
- to maintain the HMA free of trees, particularly non-native conifer regeneration;
- to control threats to regenerating bog habitats such as grazing and fire;
- to monitor bog regeneration to assess if the necessary conditions have been created that should, in time, increase the abundance and distribution of bog plants, particularly peat forming *Sphagnum* mosses, and facilitate its recovery back to active peatland habitat; and
- to facilitate the monitoring and evaluation process by identifying areas of reference habitats within/ adjacent to the HMA against which regeneration progress can be measured and collecting baseline data within these and the proposed restoration locations.

### 3.3 Initial Restoration Treatment Prescriptions

The proposed restoration methods are based on published literature e.g. (Artz, Faccioli, Roberts, & Anderson, 2018), and case studies where these approaches have been effective, such as within the RSPB Forsinard Flows Reserve (NatureScot, 2015b).

The proposed restoration prescriptions are detailed below (refer to **Section 4.0** for indicative timescales).

#### 3.3.1 Felling

All conifer trees within the HMA would be felled (i.e. an area of 77.75ha), to promote recovery of the bog habitat. The trees would either be felled using the whole timber harvesting method (whereby trees are severed at the stump and the whole trees are then extracted to roadside where they are chipped and delivered to the biomass market), or whole tree mulching (whereby the trees are reduced to smaller particles that are spread across the cleared site), or a mixture of the two methods, if feasible. Other methods are not considered here as the trees are in poor condition and many are not commercially viable. The preferred method is whole tree extraction due to potential water-quality issues associated with mulching.

The final method of felling would be agreed prior to construction and confirmed within the detailed HMP. Any spreading of brash would need to be undertaken in strict accordance with SEPA guidance, involving spreading chipped material in a thin layer, allowing for 25% light penetration with brash 'particles' of between 5-30cm in length. Should tree mulching be undertaken, some of the brash would also be used to aid ground smoothing (e.g. within furrows) as detailed within **Section 3.3.5**. Tree felling would be undertaken outside of the mid-March to August inclusive, nesting bird season, or the area (and appropriate buffer) would be subject to nesting bird checks for any works required within the nesting season, as detailed within **Chapter 9: Ornithology** of the EIA.

Tree felling would be undertaken in accordance with Forestry Commission good practice guidelines (Forestry Commission, 2011). The guidelines state that the effects of tree harvesting on surface water acidity are difficult to discern when 20% or less of a catchment is felled within any three-year period. The proposed felling represents considerably less than 20% of the catchment and thus it can be expected that acidification of the watercourses would not occur as a consequence of tree felling.

#### 3.3.2 Reference habitats

Reference areas of established target vegetation types would be identified against which restoration progress could be monitored.

### 3.3.3 Vegetation Monitoring

A botanical monitoring survey would be undertaken in the areas to be restored and reference areas to establish an up to date baseline for the vegetation types present. The botanical survey, paired with aerial monitoring (if practical), would then be used as a baseline for ongoing monitoring (see **Section 3.5** for further details). Baseline botanical monitoring would be undertaken between May and August, following tree felling but prior to ditch blocking.

### 3.3.4 Ditch Blocking Survey

A drain slope survey and mapping exercise would be undertaken across the proposed HMA. Taking levels of the drain water surface would allow for the creation of drain slope profiles across the restoration area. In general terms, the aim would be to insert a dam for each 10cm drop in level of the drain – this is intended to ensure that the water level across the restoration site is maintained within 10cm of the bog surface in order to allow for the growth of peat-forming plants. Depending on access to forestry, the drain slope survey would be undertaken either immediately before or after tree felling. The final schedule would be confirmed within the detailed HMP.

### 3.3.5 Ground Smoothing

In order to remove the stump/ridge furrow legacy of the conifer plantation, ground smoothing would be undertaken, subject to feasibility and the felling method adopted. Ground smoothing has been found to be successful in trials at improving water levels (Short & Robson, 2016). This would involve un-ploughing the ground by overturning tree stumps into existing plough furrows. When combined with tracking by low-ground-pressure machinery, this results in a flattened surface providing protection from erosion.

Conifer regeneration on recovering peatland is detrimental to peatland recovery. Ground smoothing has also been shown to be effective in the control of regenerating trees, which were found to fail to survive the treatment, and in the absence of further sources of seed, long-term regeneration was expected to be limited within the trial. Strips of untreated land would be left at intervals within the treated area and at the periphery to act as buffers to help reduce sediment export. Literature encourages undertaking ground smoothing in stages where large areas are involved, to minimise the risk of adverse effects on local water chemistry (particularly dissolved organic carbon, water colour and suspended solids). However, in this instance, due to the relatively small area involved, staging of ground smoothing is not considered necessary.

The water chemistry would be monitored for a period before, during and after the tree felling and ground smoothing works in order to quickly identify and potential issues. In the unlikely event any downstream water quality issues were identified, remedial measures would be employed as appropriate. The methods, location and schedule of the water monitoring, and the nature of any remedial measures, if required, would be agreed as part of the detailed Construction Environmental Management Plan (CEMP), an outline of which is included in **Technical Appendix 3.1: Outline CEMP**.

### 3.3.6 Ditch Blocking

Active drains would be dammed to raise the water level sufficiently to create conditions suitable for the growth of *Sphagnum* mosses. A decision on the type of dam to be used would be made once the profile of the restoration site has been ascertained. Peat turf dams are the preferred option to be used, which are most suitable for smaller drains. Consideration would also be given to the use of plastic or wooden dams on any larger drains, as these have also been used successfully in the UK over the last twenty years.

### 3.3.7 Re-vegetation

Following tree clearance and drain blocking the area would be allowed to revegetate naturally as it is anticipated that there will be a sufficient seed bank available from the existing rides between the planted areas and from the large area of blanket bog adjacent to the east and southeast. In addition, there are likely to be viable heather seeds (and seeds of other Ericoids) within the existing seedbank from before the area was planted with trees in 1990 – relatively large heather seed banks can survive beneath conifer plantations for 40 years and under some circumstances for more than 70 years (Pywell, et al., 2002). Restoration projects on other afforested sites have had success without using re-seeding/re-vegetation methods (Artz, Faccioli, Roberts, & Anderson, 2018), and re-seeding/re-vegetation is only reported to be necessary in restoration of bare peat areas with significant erosion (Artz, Faccioli, Roberts, & Anderson, 2018). On the basis of the above, there is a high likelihood that the natural regeneration of bog and heathland vegetation would be successful. However, this would be monitored and in the unlikely event that the natural regeneration of bog and heathland vegetation does not take place within a reasonable timescale, remedial measures would be considered (see **Section 4.0**).

### 3.3.8 Fencing

It has been assumed that due to some (albeit low) grazing pressure at this site fencing would be required to protect the regenerating habitats within the HMP area from sheep, at least during the early successional stages. However, this potential requirement should be reviewed ahead of restoration works commencing. It is recommended that any proposed fencing surrounds all areas designated for blanket bog restoration, and that fencing areas are discussed and agreed with THC in collaboration with Ben Sca and Ben Sca Extension HMP areas, to ensure connectivity of the proposed restored habitats.

## 3.4 Ongoing Management

### 3.4.1 Grazing Control

No specific control of grazing is proposed for the HMA, as there is currently no formal stock grazing at the site (and therefore no potential for livestock to enter the HMA). It is understood that crofter's sheep do move onto the site occasionally (unofficially), however this is at very low levels, and occurs in the southern portion of the site away from the HMA. Otherwise, the only grazing is by deer. Grazing pressure at the HMA would be monitored as part of the botanical monitoring (see **Section 4.0**). The requirement for any future grazing control would be reviewed in light of the results of the botanical monitoring.

### 3.4.2 Conifer Regeneration Control

It is expected that following ground smoothing, conifer regeneration would be reduced. However, due to the presence of conifer plantation within areas adjacent to the HMA, some conifer regeneration is expected. Therefore, conifer regeneration would be monitored, and the removal of regenerating conifers when they are small enough to hand pull should be undertaken when required, to maintain open vegetation and avoid the area reverting back to forest. The frequency at which regenerating conifers would need to be removed would be subject to the speed of regeneration and would be determined following initial monitoring.

### 3.4.3 Peat dam maintenance

Research indicates that most peat dams remain intact for six years (Artz, Faccioli, Roberts, & Anderson, 2018), but some show evidence of erosion. Therefore, peat dams would be checked during vegetation monitoring, to check for signs of erosion or other form of damage. Should the dams be eroded or otherwise damaged, or the dams found to not be functioning as intended, then corrective works would be undertaken as required.



## 4.0 Monitoring and Review

### 4.1.1 Aims

The purpose of the proposed monitoring is to determine whether the restoration project is on track to meeting its targets, goals, and objectives, or needs adjustment. Monitoring should reflect the key ecosystem attributes as summarised in **Table 4-1: Monitoring Requirements**.

**Table 4-1: Monitoring Requirements**

Attribute	Relevance to Balmeanach Wind Farm	Monitoring Requirement
Absence of threats	Potential threats include: conifer regeneration, grazing, construction work, fire.	Signs of conifer regeneration, fire, ground disturbance and grazing impacts should be recorded during vegetation monitoring.
Physical conditions	Regeneration of target of bog and heath will require removal of overshadowing conifers and management of water levels within the peat.	Confirm completion of felling, ground smoothing, stump flipping and ditch blocking. Monitor water levels in peat.
Species composition	Species composition should be similar to areas of existing target habitats within or adjacent to the HMA.	Information on species composition and how reference and restored areas compare to each other in terms of blanket bog and heath condition should be made possible via vegetation monitoring.
Structural diversity	As habitat mature different canopy levels should develop including moss and dwarf shrub layers etc.	Information on vegetation structure should be recorded during vegetation monitoring.
Ecosystem function	The habitat should be self-perpetuating over time with little or no active management and should start to sequester carbon.	A record of management requirements should be kept, this could be used to illustrate declining intervention needs over time. Peat accumulation data or other measures of peatland productivity should be taken to assess if the habitat is healthy enough to sequester carbon.
External exchanges	The habitat should be connected to the wider habitat network.	This will have largely been achieved via choosing which locations to restore bog in. Immigration of plant species from the surrounding area will help to confirm habitat connectivity.

### 4.1.2 Botanical Monitoring

The methods of botanical monitoring would be provided in the detailed HMP and are likely to be bespoke to allow for the specific monitoring against the HMP objectives, but are likely to be based on the Common Standards Monitoring (CSM) protocol for upland habitats (JNCC, 2005), which assesses habitat condition. To assess if the goals and objectives of the HMP are being met the criteria recorded should include: signs of fire, grazing or ground disturbance; vegetation structure; and vegetation species composition.

Botanical monitoring would be undertaken during the optimal survey period for plant species (May to August inclusive). The first year of botanical monitoring would be undertaken in one visit during the summer following

tree felling (but prior to other restoration measures), to provide a baseline. Further monitoring (to assess changes to the baseline) would then take place once annually in the first three years following restoration, and then again in year 5 and 10 post-restoration, with the need for further monitoring determined in year 10.

To permit accurate mapping of vegetation cover and change over time, aerial imagery of a suitable resolution should also be obtained, ideally for the same month but at least for the same season, in each monitoring year. Potential sources of imagery that could be obtained for specific times and locations include satellite data, and specially commissioned drone and fixed wing aircraft surveys.

#### 4.1.3 Monitoring of Water Table Height

Monitoring of water table height would take place by the installation and monitoring of dipwells within the restoration area. If feasible, some dipwells would be installed prior to ditch blocking in the open areas of the HMA, in order to provide a baseline. These dipwells would need to be removed prior to restoration works and dipwells would be re-installed for long-term monitoring following ditch blocking, these should be installed at a density equivalent to approximately one per hectare. Dipwells would likely be monitored quarterly in each monitoring year (once in each season) in order to capture maximum seasonal variations. Following ditch blocking, dipwell monitoring years would be annually in the first three years following restoration, and then again in year 5 and 10 post-restoration, with the need for further monitoring determined in year 10.

#### 4.1.4 Peat Accumulation

A range of approaches to monitoring peatland productivity are available (Short & Robson, 2016), for the purposes of this project it is considered that a rough measure of whether or not new peat and organic matter are accumulating would be a sufficient indicator of peatland restoration success. Methods that would be considered include:

- erosion pins, these are placed in the ground and the distance from the ground surface to the top of the pin is measured (Natural England, 2011); and
- sediment cores, here a core of the soil/ peat would be taken and the distance from the layer containing forestry debris (baseline) to the soil surface measured (Lucchese M., et. al., 2010).

A combination of the above methods may provide the most reliable results. Measurements should be taken quarterly in each monitoring year, at the same times as water table monitoring to allow for contraction and expansion of peat through seasonal cycles.

#### 4.1.5 Ornithology Monitoring

As set out in **Chapter 9: Ornithology** a programme of post consent monitoring is proposed. The requirements of the monitoring should be coordinated with the adjacent Ben Sca and Extension Wind Farm and the neighbouring Glen Ullinish Wind Farm (both consented). The exact scope of works would be confirmed after consultation but is likely to include collision monitoring, flight activity surveys and breeding raptor surveys. It is important that any monitoring is designed to assess the actual versus predicted impacts on birds and to allow for a flexible monitoring plan to be undertaken during the post consent period.

It is proposed that ornithological monitoring should take place during and post-construction, in line with NatureScot guidance (SNH, 2009) as outlined below:

- year-round collision monitoring: carcass searches, carcass persistence trials and observer efficiency trials should be completed at least once per month throughout the first year, to determine whether actual bird collisions are in line with predicted values. Carcasses of all species found on site should be recorded;



- flight activity surveys should be undertaken from the same VP locations used during baseline surveys to monitor the flight activity of target species. This would help establish any disturbance/displacement effects of the operational turbines on the resident bird species; and
- targeted raptor surveys should also be undertaken to monitor the status of ground-nesting raptor species within the vicinity of the Proposed Development, in order to further determine the displacement effect.

Given this broad range of existing data a reduced but flexible monitoring programme is recommended and should be undertaken at reasonable intervals throughout the lifespan of the Proposed Development. For example, the above monitoring can take place annually during construction, and after the Proposed Development becomes operational, during years 1-3, 5, 10 and 15, with the requirement for further surveys to be determined based on previous survey results.

Availability of carrion is a key aspect influencing eagle flight activity in a particular area. It is recommended that fallen stock / deer removal within 500m of each turbine is carried out and a plan for this is secured via planning condition.

Furthermore, it is proposed that a close collaboration with the HRSG is established in order to facilitate a research programme aimed at furthering understanding of white-tailed eagle and golden eagle population prospects in the light of an increasing number of renewable energy projects on the Isle of Skye. The overarching objective of this research programme would be the monitoring of the breeding populations of the two eagle species, and the effects of the wind farm developments in the northern part of Skye on these species. It is envisaged that GPS or suitable alternative technology could be used to understand eagle movement patterns and use of breeding and non-breeding areas. This approach would allow to explore their habitat use and home ranges across the annual cycle, and also to monitor any collisions and displacement effects that might occur as a result of already existing and proposed wind farm developments.

This research initiative would work best as a collaborative effort between a number of wind farm developers whose renewable energy assets are located in the northern part of Skye and the Applicant is committed to pursuing these discussions through the Skye Developer Forum<sup>2</sup>.

#### 4.1.6 Report and Review

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

A reporting template, data collection form and database structure would be provided as part of the detailed HMP. This will facilitate a standardised approach to data collection, storage, analysis and reporting through the restoration project's lifespan, even if the people/ organisations working on the project change. The database should be updated every monitoring year and should be made available in an electronic format alongside reports.

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<sup>2</sup> The Skye Developer Forum is a group of Wind Development companies set up by the Scottish Government in 2022 to create collaborative working across the Isle of Skye.

## 5.0 Indicative Programme

**Table 5-1** details the indicative timings of restoration and management tasks contained within this OHMP. These are indicative only and would be finalised within the detailed HMP and subject to review following ongoing monitoring.

Year 0 represents the year of implementation of the HMP, and Year 1 would be the first year following restoration. Implementation of the HMP would either begin during wind farm construction or within the year after the completion of construction.

**Table 5-1: Indicative Programme**

Year/Activity	0	1	2	3	5	10	15	20	25	30	35	40
Tree felling	X											
Baseline monitoring: aerial survey and botanical monitoring	X											
Post-restoration monitoring: aerial survey and botanical monitoring		X	X	X	X	X	The need for further monitoring determined by monitoring results in Y10					
Ditch mapping/ slope surveys for dams	X											
Installation of any peat accumulation monitoring equipment and baseline peat accumulation monitoring (quarterly)	X											
Installation of peat dams within ditches	X											
Ground smoothing	X											
Post-restoration monitoring: checking of peat dams and peat accumulation		X	X	X	X	X	The need for further monitoring determined by monitoring results in Y10					
Installation of dipwells and baseline dipwell monitoring (quarterly)	X											
Post-restoration monitoring: Re-installation of dipwells and dipwell monitoring (quarterly)		X	X	X	X	X	The need for further monitoring determined by monitoring results in Y10					
Check and reporting on implementation works	X											
Ongoing management: clearing of tree re-growth	Frequency determined by rate of re-growth and monitoring results											
Ornithological monitoring	X	X	X	X	X	X	The need for further monitoring determined by monitoring results in Y10					
Ornithological Reporting and Review	X	X	X	X	X	X	The need for further monitoring/reporting determined by monitoring results in Y10					

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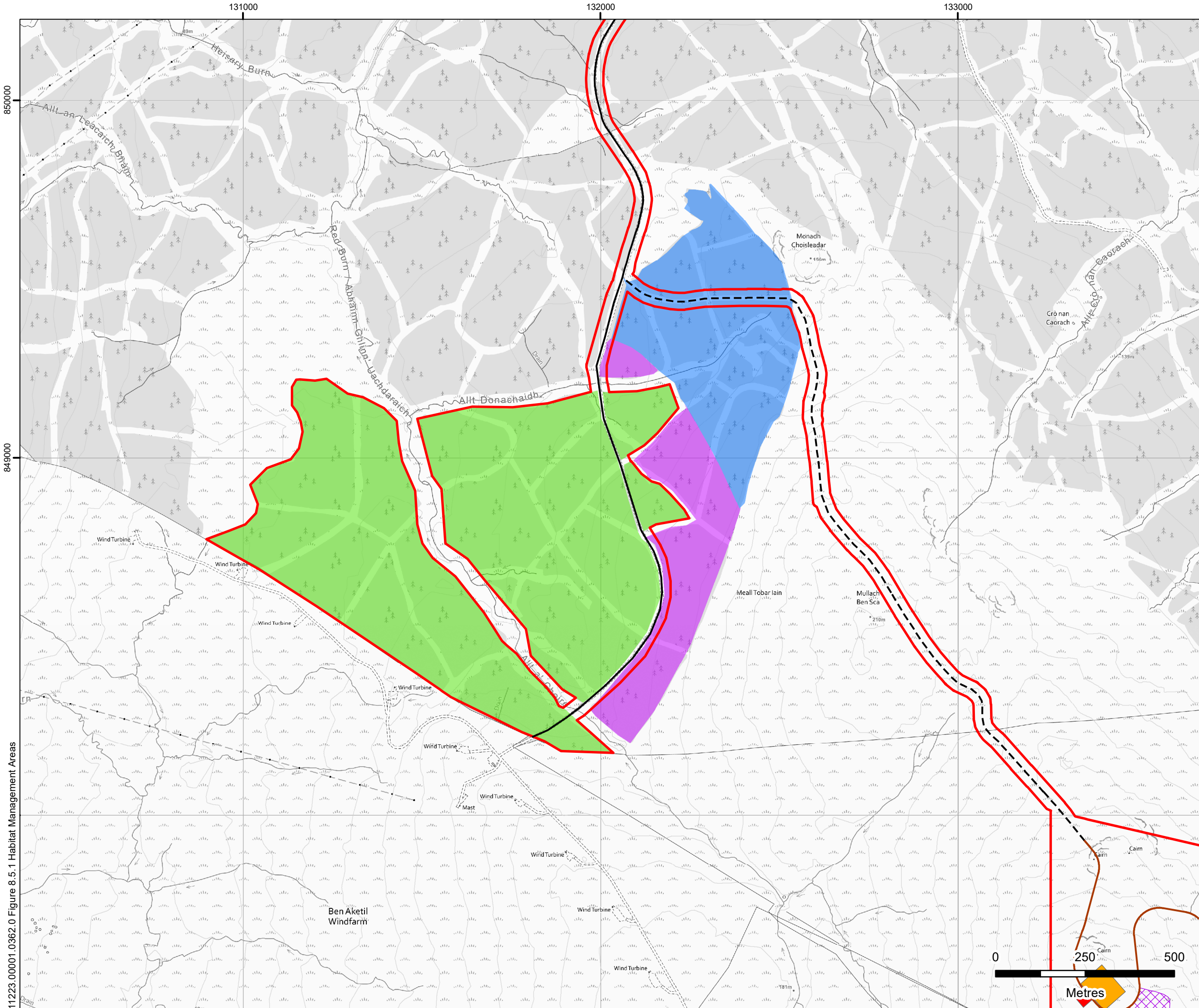
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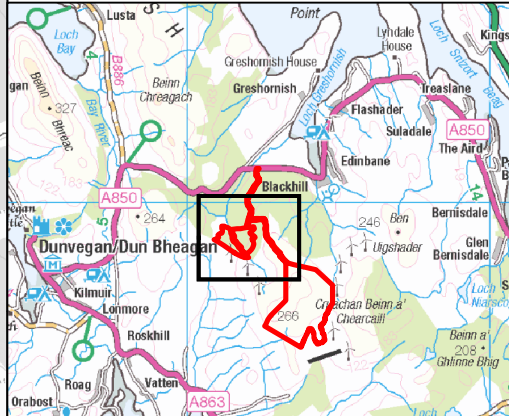
## FIGURES





**LEGEND**

- Application Site Boundary
- Proposed Construction Compound
- Proposed Substation
- Potential Borrow Pit
- Existing Access Track
- Consented Access Track
- Proposed Track Alignment**
- Proposed
- Habitat Management Areas**
- Ben Sca Habitat Management Area (23.60 ha)
- Ben Sca Extension Habitat Management Area (14.93 ha)
- Balmeanach Habitat Management Area (77.75 ha)



**BALMEANACH  
WIND FARM LIMITED**

**SLR**  
4/5 LOCHSIDE VIEW  
EDINBURGH PARK  
EDINBURGH  
EH12 9DH  
T: +44 (0)131 335 6830  
www.slrconsulting.com

**BALMEANACH WIND FARM - EIA  
TA 8.5 - OUTLINE HABITAT  
MANAGEMENT PLAN  
HABITAT MANAGEMENT AREAS  
FIGURE 8.5.1**

Scale 1:10,000 @ A3 Date JULY 2023

11223.00001.0362.0 Figure 8.5.1 Habitat Management Areas

## EUROPEAN OFFICES

### United Kingdom

#### AYLESBURY

T: +44 (0)1844 337380

#### BELFAST

belfast@slrconsulting.com

#### BRADFORD-ON-AVON

T: +44 (0)1225 309400

#### BRISTOL

T: +44 (0)117 906 4280

#### CARDIFF

T: +44 (0)29 2049 1010

#### CHELMSFORD

T: +44 (0)1245 392170

#### EDINBURGH

T: +44 (0)131 335 6830

#### EXETER

T: + 44 (0)1392 490152

#### GLASGOW

glasgow@slrconsulting.com

#### GUILDFORD

guildford@slrconsulting.com

#### LONDON

T: +44 (0)203 805 6418

#### MAIDSTONE

T: +44 (0)1622 609242

#### MANCHESTER (Denton)

T: +44 (0)161 549 8410

#### MANCHESTER (Media City)

T: +44 (0)161 872 7564

#### NEWCASTLE UPON TYNE

T: +44 (0)191 261 1966

#### NOTTINGHAM

T: +44 (0)115 964 7280

#### SHEFFIELD

T: +44 (0)114 245 5153

#### SHREWSBURY

T: +44 (0)1743 23 9250

#### STIRLING

T: +44 (0)1786 239900

#### WORCESTER

T: +44 (0)1905 751310

### Ireland

#### DUBLIN

T: + 353 (0)1 296 4667

### France

#### GRENOBLE

T: +33 (0)6 23 37 14 14