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Technical Appendix 8.4: Outline Habitat Management Plan

Windburn Wind Farm

Windburn Wind Farm Limited

Prepared by:

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Making Sustainability Happen

Revision Record

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Table of Contents

1.0	Introduction	5
1.1	Background	5
1.2	Site Description	5
1.3	Purpose and Scope of this Report	6
1.4	Evidence of Technical Competence and Experience	6
2.0	Methodology	7
2.1	Baseline Data Collection	7
2.2	Hierarchy of Terms for Restoration Planning	8
3.0	Baseline Data and Impact Assessment Summary	9
3.1	Habitats	9
3.2	Ornithology	.10
3.3	Protected and Notable Species	.11
4.0	HMP Working Group and Review	.12
5.0	Outline Habitat Management Plan	.13
5.1	Scope and Vision	.13
5.2	Targets	.13
5.3	Rationale for the Extent and Location of Habitat Restoration and Enhancement Proposals	.18
5.3.1	Blanket Bog Restoration	.18
5.3.2	Grazing Management for Wet Heath, Dry Heath, Upland Grassland, flush, fen and Blanket Bog	.20
5.3.3	Riparian Tree Planting	.21
5.3.4	Reptile Hibernacula	.21
5.3.5	Further Rationale for the Extent of Compensation and Enhancement Areas for Non- bog Habitat Types	.22
5.4	Goals and Objectives	.22
5.5	Outline Habitat Creation / Restoration Methods	.25
5.5.1	Active Blanket Bog Restoration (Objective 1.1)	.25
5.5.2	Habitat Restoration through Grazing Management (Objectives 1.2 and 2.1)	.26
5.5.3	Tree planting in Riparian Corridors (Objective 3.1)	.27
5.5.4	Reptile Hibernacula (Objective 4.1)	.28
5.5.5	Habitat Reinstatement (Objective 5.1)	.28
5.6	External Factors	.29
5.7	Ongoing Management and Maintenance	.29
6.0	Monitoring and Review	.30
6.1	Botanical Monitoring	.30



7.0	Indicative Programme	. 35
6.7	Reporting and Review	.34
6.6	Remedial Action	. 33
6.5	Monitoring of Reptile Hibernacula	.33
6.4	Ornithological Monitoring	. 32
6.3	Checks of Blanket Bog Restoration Dams	. 32
6.2	Monitoring of Peatland Restoration Water Table Height	. 32
6.1.4	Riparian Tree Planting	. 32
6.1.3	Blanket Bog Condition	. 32
6.1.2	Common Standards Monitoring (CSM)	. 31
6.1.1	Drone survey	. 30

Tables in Text

Table 3-1 Summary of Habitat Loss	. 9
Table 3-2 Summary of Ornithological Species of Local Importance or Greater and Potentia Effects	l 10
Table 3-3 Summary of Faunal Species Groups of Local Importance or Greater (and / or Legally Protected), and Potential Effects	11
Table 5-1 HMP Targets and Rationale Outline	14
Table 5-2 Proposed HMP Goals and Objectives	23
Table 5-3 Recommended Livestock Units (LU) for Upland Habitats at Windburn	27
Table 7-1: Outline Schedule of Works	35

Figures

Figure 8.4.1: Outline Habitat Management Plan

Annexes

Annex A: Peatland Condition Appraisal

Acronyms and Abbreviations

CEMP	Construction Environmental Management Plan
CIEEM	Chartered Institute of Ecology and Environmental Management
CSM	Common Standards Monitoring
ECoW	Ecological Clerk of Works
EIA	Environmental Impact Assessment
HMP	Habitat Management Plan
LNCS	Local Nature Conservation Site
LU	Livestock Units
NPF4	National Planning Framework 4
NVC	National Vegetation Classification
OHMP	Outline Habitat Management Plan
PMP	Peat Management Plan
RSPB	Royal Society for the Protection of Birds
SBL	Scottish Biodiversity List
SEPA	Scottish Environmental Protection Agency
SER	in Society for Ecological Restoration
SNIFFER	Scotland and Northern Ireland Forum for Environmental Research
SNH	Scottish Natural Heritage (now NatureScot)
SNPP	Scotland's National Peatland Plan
SSSI	Site of Special Scientific Interest
TWIC	The Wildlife Information Centre
UKHab	UK Habitat
VP	Vantage Point

1.0 Introduction

1.1 Background

SLR Consulting (SLR) was commissioned by Windburn Wind Farm Limited ('The Applicant') to produce an Outline Habitat Management Plan (OHMP) for the proposed Windburn Wind Farm, to accompany the Environmental Impact Assessment (EIA) Report for the proposed development. This report forms the OHMP.

1.2 Site Description

The proposed development is located in the Ochil Hills approximately 4.5km north of Alva, directly west of the existing Burnfoot East Wind Farm and Rhodders Wind Farm. The site area spans land within the Clackmannanshire and Perth and Kinross council areas. The 'site' refers to all land within the application boundary.

The site is characterised by open habitats such as bog and acid grassland, with some small plantations and lowland habitats to the north of the site where the proposed access track meets the existing public Sheriffmuir Road. There are several watercourses within the site boundary including the Danny Burn, the River Devon, the Finglen Burn and Alva Burn. The Upper and Lower Glendevon reservoirs are present outwith the site boundary to the east.

The proposed Alva Moss Local Nature Conservation Site (LNCS) overlaps with the application boundary to the south of the site. The LNCS has not been formally designated but has undergone a detailed peatland restoration feasibility assessment to inform proposed works on the LNCS¹.

The site is immediately west of the existing Burnfoot Hill Wind Farm and Rhodders Wind Farm. Some of the proposed habitat enhancements included in this OHMP are adjacent to an area of blanket bog restoration to be completed by Rhodders Wind Farm. Habitat restoration methods utilised in support of the adjacent wind farms will be considered in this OHMP with the aim of complimenting the measures and providing a continuous habitat.

Detailed UK Habitat Classification (UKHab), National Vegetation Classification (NVC) and protected mammal surveys have been carried out in 2023 for the proposed Habitat Management Plan (HMP) area, which includes the proposed infrastructure footprint plus additional area within the redline boundary (see **Technical Appendix 8.1** for full details). The study area primarily comprises blanket bog, some of which is degraded, and upland acid grassland, with small patches of dry heath, damp neutral grassland and flush and fen habitats in the upland areas. The area to the north, close to the Sheriffmuir Road differs distinctly to the upland part of the site with mostly neutral and modified grassland and conifer plantation, with patches of heath and tall herb communities. Other ecological findings within the proposed HMP area are detailed in technical appendices associated with EIA Report **Chapter 8: Ecology**, ornithology findings are detailed in **Chapter 9: Ornithology** and associated technical appendices.

This OHMP includes the site application boundary plus some areas outside the application boundary, this area is referred to as the HMP Area. See **Figure 8.4.1**.

¹ Central Environmental Services (2019). Peatland Restoration Feasibility Survey of Menstrie Moss (Ochil Hills) 2019/20 for Friends of the Ochils.



1.3 Purpose and Scope of this Report

This OHMP outlines proposed habitat restoration and enhancement measures that would form part of the proposed development.

It details the habitat management and monitoring that is proposed to compensate for the direct loss and indirect effects on sensitive / semi-natural habitats, notably blanket bog, and upland grassland. The proposed habitat management and monitoring in this report demonstrates that compensation is appropriate and that substantial enhancements are provided², in accordance with planning policy requirements, including Policy 3b of National Planning Framework 4 (NPF4)³.

This OHMP is intended as a precursor to a more detailed Habitat Management Plan (HMP), which would be produced and agreed with Clackmannanshire Council and Perth and Kinross Council, in consultation with NatureScot and Scottish Environment Protection Agency (SEPA) post consent, prior to the commencement of construction. 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.

Factors relating specifically to the construction of the proposed development (e.g. pollution control, disturbance to fauna) are not considered here. Further information about ecological mitigation measures to be employed during the construction period is included in **Chapter 8**. An outline Construction Environmental Management Plan (CEMP) is also included in **Technical Appendix 3.1** of the EIA Report.

The spatial scope of the OHMP is contained within land which forms part of Rhodders Farm and Blackford Estates (see **Figure 8.4.1**). The outline proposals presented here have been discussed and agreed with the landowners.

The detailed HMP would remain in place for the lifetime of the development.

1.4 Evidence of Technical Competence and Experience

This OHMP has been authored by Kirstie Hazelwood ACIEEM PhD, Senior Ecologist with SLR Consulting. Kirstie has over ten years' experience within ecological consultancy and ecological research, and is a competent and experienced terrestrial ecologist, who specialises in upland habitat assessments.

This report has been technically reviewed by Sara Toule ACIEEM, Principal Ecologist with SLR Consulting. Sara is an ecologist with over 13 years' professional experience, with a focus on the renewable energy sector.

This report has been authorised by Duncan Watson MCIEEM CEnv, Technical Director with SLR Consulting. Duncan is an Ecologist with over 26 years' professional experience, much of which relates to projects in the renewable energy sector.

This document has been compiled incorporating specialist input from Botanaeco Ltd. for peatland restoration (see **Annex A**). Author details are contained within **Annex A**.

² No metric was used to assess compensation and enhancements on this Site due to the limited scope for current metrics to account for high distinctiveness upland habitats such as blanket bogs.

³ Scottish Government. 2023. National Planning Framework 4. [Available online at <u>https://www.transformingplanning.scot/national-planning-framework/</u>. Accessed April 2024]

2.0 Methodology

The aim of this OHMP is to establish the key objectives and principles by which parts of the site would be restored and managed to the benefit of biodiversity and in order to comply with NPF4, which would then form the basis for a more detailed HMP, post consent. This OHMP has been prepared with reference to relevant peatland restoration and other habitat management guidance^{4,5,6,7}.

2.1 Baseline Data Collection

This OHMP has been informed by data collected during desk-study, habitat and speciesspecific surveys, carried out as part of the EIA. Full details are provided in the relevant appendices to the EIA Report, and a summary is provided below:

- Desk study collating protected and notable species records and non-statutory designated sites within 2km of the Site supplied by The Wildlife Information Centre (TWIC) (data obtained in January 2024), EIA reports from the existing Burnfoot East Wind Farm and Rhodders Wind Farm (see **Technical Appendix 8.2**);
- Habitat Survey Report, which provides baseline UKHab and NVC survey results for the proposed HMP area, undertaken in July and August 2023 using standard methodology^{8,9} (see **Technical Appendix 8.1**);
- Peatland Restoration Feasibility Study, which provides recommendations for peatland restoration on the Alva Moss LNCS¹; and
- Protected Mammal Survey Report, which provides results of baseline surveys for otter *Lutra lutra*, water vole *Arvicola amphibius*, badger *Meles meles*, red squirrel *Sciurus vulgaris*, pine marten *Martes martes* and Scottish wildcat *Felis silvestris*, for the proposed infrastructure footprint and 250m buffer, undertaken in summer 2023 using standard methodologies using standard methodologies^{10,11,12,13,14,15};

management [Accessed in March 2024]

¹⁵ Dean, M., Strachan, R., Gow, D. and Andrews, R. (2016). *The Water Vole Mitigation Handbook* (The Mammal Society Mitigation Guidance Series). Eds Fiona Matthews and Paul Chanin. The Mammal Society, London.



⁴ NatureScot (2016). *Planning for development: What to consider and include in Habitat Management Plans. Version 2.* Retrieved from <u>https://www.nature.scot/guidance-planning-development-what-consider-and-include-habitat-management-plans</u> [Accessed in March 2024].

⁵ NatureScot (2022) Peatland ACTION – Technical Compendium. Retrieved from: <u>https://www.nature.scot/doc/peatland-action-technical-compendium</u> [Accessed in December 2023]

<u>%20WEB_1.pdf</u> [Accessed in December 2023]

⁷ NatureScot (2023) Advising on peatland, carbon-rich soils and priority peatland habitats in development management. Published June 2023, revised November 2023. Retrieved from <a href="https://www.nature.scot/doc/advising-peatland-carbon-rich-soils-and-priority-peatland-habitats-development-type-rich-soils-and-priority-peatland-habitats-type-rich-soils-and-priority-peatland-habitats-type-rich-soils-and-priority-peatland-habitats-type-rich-soils-and-priority-peatland-habitats-type-rich-soils-and-priority-peatland-habitats-type-rich-soils-and-priority-peatland-habitats-type-rich-soils-and-priority-peatland-habitats-type-rich-soils-and-priority-peatland-habitats-type-rich-soils-and-priority-peatland-habitats-type-rich-soils-and-priority-peatland-habitats-type-rich-soils-and-priority-peatland-habi

⁸ UKHab Ltd (2023). UK Habitat Classification Version 2.0 (at https://www.ukhab.org)

⁹ Rodwell, J.S. (2006) NVC Users' Handbook, JNCC, Peterborough.

¹⁰ Bang, P. and Dahlstrøm, P. (2001) Animal Tracks and Signs. Oxford University Press.

¹¹ Sargent, G. and Morris, P. (2003) How to find and identify mammals. The Mammal Society, London.

¹² Davis, A. R. & Gray, D. (2010) *The distribution of Scottish wildcats (Felis silvestris) in Scotland (2006-2008).* Scottish Natural Heritage Commissioned Report No. 360.

¹³ Scottish Natural Heritage (2011) Scottish Wild Cat Naturally Scottish Series. SNH Battleby. <u>http://www.snh.org.uk/pdfs/publications/naturallyscottish/wildcats.pdf</u> [Accessed in September 2023]

¹⁴ Neal, E. and Cheesman, C. (2006) *Badgers*. Poyser Natural History, Cambridge, UK.

- Bat Survey report, which provides results of bat habitat and preliminary roost assessments, bat activity survey (using static detector sampling) and bat emergence / re-entry surveys of trees within the site, undertaken in summer and autumn 2023, in line with guidance in place at the time of survey^{16,17} (see Technical Appendix 8.5);
- Bird Survey Reports, which provide results of breeding bird surveys undertaken between April and late-July, vantage point surveys undertaken year-round, and breeding raptor surveys undertaken between April and July from 2021-2023, based on standard methodologies^{18,19} (see **Technical Appendix 9.1**); and
- Fish Habitat Survey Report which provides details of aquatic baseline surveys undertaken by Mhor Environmental Ltd in October 2023 (see **Technical Appendix 8.3**).

In addition to the above, desk-based and field survey work to identify suitable areas for blanket bog restoration across the wider Rhodders Farm and Blackford Estate has been undertaken by Botanaeco Ltd. Areas were initially identified using a desk-top study, utilising data sources such as the 2016 Carbon and Peatland Map²⁰ and aerial imagery. Areas of potential suitability were then surveyed via walkover survey in December 2023 to determine their condition and suitability for restoration. No additional areas with the potential for blanket bog restoration outside the redline boundary were located. Full details are contained within Botanaeco Ltd's Peatland Restoration Assessment Report, provided in **Annex A**.

2.2 Hierarchy of Terms for Restoration Planning

The following terms have been used to structure this OHMP, as outlined in Society for Ecological Restoration (SER) principles and standards guidance²¹:

- 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 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.

²¹ Society for Ecological Restoration (2019) International Principals and Standards for the Practice of Ecological Restoration: Second Edition. International Standards for the Practice of Ecological Restoration - Society for Ecological Restoration (ser.org).



¹⁶ Collins, J. (2016) Bat Surveys for Professional Ecologists. Good Practice Guidelines. Third edition. Bat Conservation Trust, London.

¹⁷ Bat Conservation Trust (2022) Interim Guidance Note: Use of night vision aids for bat emergence surveys and further comment on dawn surveys.

¹⁸ Scottish Natural Heritage (2017). *Recommended Bird Survey Methods to Inform Impact Assessment of Onshore Wind Farms V2.* Scottish Natural Heritage, Inverness.

¹⁹ A. F. Brown & K. B. Shepherd (1993). A method for censusing upland breeding waders. Bird Study, 40:3, 189-195, DOI: 10.1080/00063659309477182

²⁰ NatureScot (2016) Carbon and Peatland 2016 map. Retrieved from <u>https://www.nature.scot/professional-advice/planning-and-development/planning-and-development-advice/soils/carbon-and-peatland-2016-map</u> [Accessed in December 2023]

3.0 Baseline Data and Impact Assessment Summary

Baseline data and impact assessment are set out in **Chapters 8** and **9** of the EIA Report. A summary of relevant baseline data and the key effects upon important ecological features are summarised in **Sections 3.1 – 3.2** below.

3.1 Habitats

Information on the baseline survey of potential blanket bog restoration areas across the Site is provided in **Annex A**, and in the published Ochil Hills Peatland Restoration Feasibility Study¹ and summarised in Section 5.3.1. The main UKHab types recorded were blanket bog, degraded blanket bog and upland acid grassland, with smaller areas of dry and wet heath, flushes and fens, broadleaved and mixed woodland and scrub, non-native conifer plantation, neutral grassland and cropland.

Direct habitat loss was calculated as all habitat lost to proposed infrastructure and borrow pits. Indirect habitat loss includes areas within the working corridor that will be disturbed / damaged during construction, and reinstated following construction where feasible. Indirect loss has also been calculated for bog habitats which lie within 30m of infrastructure, to allow for drying effects and vegetation changes due to construction works. The 30m buffer accords with NatureScot⁷ guidance and is considered precautionary. Drying effect buffers have been reduced to 10m around degraded blanket bog, on the basis that drying effects out to 30m are not predicted in this circumstance, where drying has already taken place. For other habitats a 5m indirect effect buffer has been applied from infrastructure. The 5m buffer is in line with similar assessments for other projects, and although arbitrary, is considered precautionary based on experience at other sites.

A total of 18.86ha of habitat would be permanently lost (via infrastructure), and 54.95ha would be temporarily or indirectly affected. Habitat loss of note includes 1.16ha total loss of Annex 1 heath, 45.05ha total loss of Annex 1 blanket bog and 8.4ha total loss of degraded blanket bog. **Table 3-1** summarises the habitats recorded on site that would be affected by the Proposed Development.

Habitat	UK Habitat Category	Associated NVC Communities	Direct Habitat Loss (ha)	Indirect Habitat Loss (ha)	Total Loss (ha)
	g1b6 Other Upland Acid	U4, U5, U6	4.1	4.35	8.45
	Grassland	M23, M25	0.55	0.62	1.17
	g1c Bracken	U20	0.02	0.05	0.07
	g3c Other Neutral Grassland	OV24, OV27	0.2	0.58	0.78
Grassland	g3c5 Arrhenatherum neutral grassland	MG1	1.49	0.91	2.4
	g3c6 Lolium-Cynosurus neutral grassland	MG6	1.09	2.07	3.16
	g3c7 Deschampsia neutral grassland	MG9	0.21	0.17	0.38
	g3c8 Holcus-Juncus neutral grassland	MG10	0.38	0.32	0.7
	g4 Modified Grassland	MG6	0.00	0.19	0.19

Table 3-1 Summary of Habitat Loss

Habitat	UK Habitat Category	Associated NVC Communities	Direct Habitat Loss (ha)	Indirect Habitat Loss (ha)	Total Loss (ha)
	w1g Other Woodland; Broadleaved	W10	0.00	0.02	0.02
Woodland	w1h Other Woodland; Mixed	W10	0.00	0.01	0.01
	w2c Other Coniferous Woodland	N/A	0.2	0.34	0.54
	h1b5 Dry heaths; upland (H4030)	H12	0.17	0.97	1.14
Heath	h1b6 Wet heathland with cross-leaved heath; upland (H4010)	M15	0.01	0.01	0.02
Scrub	h3e Gorse scrub	W23	0.19	0.37	0.56
Plankat bag	f1a5 Blanket Bog (H7130)	M17, M18, M19, M20	7.25	37.8	45.05
bialiket bog	f1a6 Degraded Blanket Bog	M19, M20	2.78	5.62	8.4
Wetland	f2c Upland Flushes, Fens and Swamps	M6	0.06	0.24	0.3
Crop	c1c7 Other Cereal Crops	N/A	0.16	0.31	0.47
Total			18.86	54.95	73.81

3.2 Ornithology

Table 3-2 summarises the bird species that were recorded using the site, which have been assessed as being of local importance or greater. **Table 3-2** also summarises potential effects upon these species (once embedded mitigation and good practice measures have been applied) (see **Chapter 9** of the EIA report for full details).

Table 3-2 Summary of Ornithological	Species of Local Importance or Greater and
Potential Effects	

Species	Evaluation	Potential Effects
Red kite <i>Milvus milvus</i>	Regional	Habitat loss/ disturbance/ displacement is considered not significant.
		Collision mortality (annual rate of 0.27 is not considered significant in the context of background mortality and an increasing population).
Kestrel Falco tinnunculus	Local	Habitat loss/ disturbance/ displacement is considered not significant.
		Collision mortality (annual rate of 0.67 is not considered significant in the context of background mortality and size of population).

Species	Evaluation	Potential Effects
Golden plover <i>Pluvialis</i> apricaria	Local	Collision mortality (annual rate of 0.25 is not considered significant in the context of background mortality and a large non-breeding season population).
Common snipe <i>Gallinago</i> gallinago	Local	Habitat loss/ disturbance/ displacement, potential loss of 2 breeding pairs. This is not considered significant in the context of the local or regional population.
Curlew <i>Numenius</i> arquata	Local	Habitat loss/ disturbance displacement, no potential loss of any breeding birds, therefore no significant effects.

3.3 Protected and Notable Species

Table 3-3 summarises the species or species groups for which the site was found to support, or have the potential to support, which have been assessed as being of local importance or greater, and / or are legally protected. **Table 3-3** also summarises potential effects upon these receptors due to habitat loss (once embedded mitigation and good practice measures have been applied), along with potential effects which have licensing implications.

Table 3-3 Summary of Faunal Species Groups of Local Importance or Greater (and / or Legally Protected), and Potential Effects

Receptor	Evaluation	Potential effects due to habitat loss
Fish	Local	No significant effects (small-scale habitat loss is non-significant)
Reptiles	Local	No significant effects due to habitat loss (loss of 55ha of habitat suitable for reptiles)
Mountain Hare	Local	No significant effects (small scale habitat loss is non-significant)
Otter	Local	No significant effects due to habitat loss (small- scale habitat loss is non-significant)
Red squirrel	Less than local (but legally protected)	No significant effects due to habitat loss (small- scale habitat loss is non-significant)
Badger	Less than local (but legally protected)	No significant effects due to habitat loss (small- scale habitat loss is non-significant)
Bat Assemblage	Regional	No significant effects on foraging or commuting bats due to habitat loss (small-scale habitat loss)
Deer	Local	No significant effects due to habitat loss

4.0 HMP Working Group and Review

As part of the preparation of the detailed HMP, post consent, a group of key stakeholders would be invited to form a HMP working group, their role would be to provide input into and comment on the detailed HMP and subsequent revisions to the HMP during the lifetime of the proposed development.

It is envisaged that the following stakeholders would be invited to join the HMP working group:

- The applicant (Windburn Wind Farm Ltd) and their ecological advisor(s);
- The landowners (Rhodders Farm and Blackford Estate);
- Clackmannanshire Council;
- Perth and Kinross Council;
- NatureScot;
- SEPA; and
- RSPB.

Further details, including terms of reference for the HMP working group, would be provided in the detailed HMP, post consent.

The HMP would be reviewed and updated on a regular basis, based on monitoring of progress toward achieving its goals and objectives and to inform active management. Proposed review timescales are set out in **Table 7-1** in Section 7.0.

The applicant is ultimately responsible for meeting the commitments made in the detailed HMP. The implementation of the detailed HMP would be undertaken by suitably experienced contractors and all monitoring would be undertaken by suitably qualified and experienced environmental professionals.

5.0 Outline Habitat Management Plan

5.1 Scope and Vision

The geographical scope of the HMP covers the area within the application boundary, plus some areas to the south of the application boundary where riparian corridors extend into Rhodders Farm as shown in **Figure 8.4.1**. A rationale for the extent and location of proposed HMP areas is provided in Section 5.3.1.

The overall vision of the OHMP is to enhance the extent and condition of target habitats within the proposed HMP areas.

5.2 Targets

Table 5-1 details the species and habitats (features) that will be the targets of the HMP, which will benefit from the management prescriptions. A rationale for their inclusion as targets is also provided. Associated objectives, outlined in **Table 5-2**, are included for reference.

The features which form the targets of this OHMP have been determined through consideration of the relative importance of ecological features present at the site, the extent to which they may be affected by the proposed development (as set out in the EIA Report), their potential to benefit from restoration or management, local biodiversity priorities (i.e. within the Clackmannanshire Biodiversity Action Plan²² and/or the Tayside Biodiversity Action Plan²³) and national biodiversity priorities.

²² Clackmannanshire Biodiversity Action Plan 2012-2017 [available online at <u>https://www.clacks.gov.uk/document/meeting/227/475/3801.pdf</u>. Accessed April 2024.

²³ Tayside Local Biodiversity Action Plan, 2nd Edition 2016-2026. Available online at <u>https://www.angus.gov.uk/sites/default/files/Tayside%20Local%20Biodiversity%20Action%20Plan%202016_2026</u> .pdf Accessed April 2024]



Table 5-1 HMP Targets and Rationale Outline

Restoration/ Enhancement	Target	Area of Compensation/ Enhancement	Feature(s) Benefitting	Rationale	Relevant Objectives (see Table 5-2)
Restoration	Blanket bog restoration	251.31ha	 Blanket bog Degraded blanket bog Breeding raptors and waders Reptiles Invertebrate assemblage Small pearl bordered fritillary 	Peatland is a general term for a wide range of peat soils and habitats that occupy more than 20% of Scotland's land area ²⁴ and Scotland holds around 60% of the UK's peatlands soils ²⁵ . Peatland has been identified as a national conservation priority within Scotland's National Peatland Plan (SNPP) for its importance for biodiversity, water quality, and as a carbon store. The most extensive and deepest peat soils occur under blanket bog and raised bogs. These habitats cover an area of around 1.9 million hectares 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 ²⁶ and is listed on both Clackmannanshire and Tayside Biodiversity Action Plans ^{22,23} . Restoration of peatlands, including blanket bogs, is also identified as a priority under NPF4, Policy 5. Blanket bog is therefore considered to be a priority habitat for conservation, both nationally and locally, and forms a core part of the OHMP proposals. Blanket bog on site shows signs of erosion and has good potential for successful restoration. Areas of blanket bog would be lost and degraded as a result of the proposed development, and as such, the proposed peatland restoration	1.1

²⁴ SNH (2015) *Scotland's National Peatland Plan: Working for our future*. [Online] Available at: <u>https://www.nature.scot/doc/scotlands-national-peatland-plan-working-our-future</u> [Accessed in March 2024]

²⁵ IUCN Peatland Programme (2019) *What's so special about peatlands? The truth behind the bog.* [Online] Available at: <u>https://www.iucn-uk-peatlandprogramme.org/sites/default/files/2019-06/Peatland_Leaflet_ONLINE_V2.pdf</u> [Accessed March 2024]

²⁶ NatureScot (2023) Scottish Biodiversity List SBL [online] Retrieved from: <u>https://www.nature.scot/doc/scottish-biodiversity-list</u> [Accessed March 2024]

Restoration/ Enhancement	Target	Area of Compensation/ Enhancement	Feature(s) Benefitting	Rationale	Relevant Objectives (see Table 5-2)
				works, focussed on blanket bog areas, are also likely to benefit local priority bird species including hen harrier, merlin, short-eared owl, curlew, golden plover and snipe.	
				Peatland restoration would also benefit reptiles, small pearl bordered fritillary and invertebrate assemblage, which utilise this moorland habitat.	
Restoration and Enhancement	Grazing management	Degraded Blanket bog: 360.59ha Grassland/heathland: 162.39ha	 Heathland Acid grassland Blanket bog Breeding raptors and waders Reptiles Invertebrate assemblage Small pearl bordered fritillary 	Wet and dry heath are recognised as internationally important under the EU Habitats Directive (as Annex 1 habitats). These habitats are widespread in the Scottish uplands, with Scotland being a stronghold for upland heath in Europe, estimated to cover 21-31% of Scottish land. Heathland is also listed on the Scottish Biodiversity List ²⁶ and is listed on both Clackmannanshire and Tayside Biodiversity Action Plans ^{22,23} . Heathland is therefore considered to be a priority habitat for conservation, both nationally and locally, and forms a core part of the OHMP proposals. Grazing by sheep and wild deer can impact upland habitats such as upland grasslands, dry heath, wet heath, blanket bog and flush and fen habitats, where more palatable plants such as heather are selectively grazed and heaths and bogs are degraded to species poor acid grassland habitats ^{27,28,29} . Limited areas of heath would be lost or degraded due to the proposed development, however it is likely that the species- poor acid grassland communities on site represent a habitat	1.1 and 2

²⁷ Averis, A., Averis, B., Birks, J., Horsfield, D., Thompson, D., Yeo, M. (2004) An Illustrated Guide to British Upland Vegetation. Pelagic Publishing, Exeter.

²⁸ Bardgett, R.D., Marsden, J.H. and Howard, D.C., 1995. The extent and condition of heather on moorland in the uplands of England and Wales. *Biological Conservation*, 71(2), pp.155-161.

²⁹ IUCN Peatland Programme (2014) IUCN UK Committee Peatland Programme. Briefing Note No.7. Grazing and Trampling.

Restoration/ Enhancement	Target	Area of Compensation/ Enhancement	Feature(s) Benefitting	Rationale	Relevant Objectives (see Table 5-2)
				degraded from wet or dry heath originally ²⁸ so lost acid grassland and heath habitats will be compensated for with reduced livestock grazing, aimed at allowing heath to recover.	
				Restoration of wet and dry heath is likely to benefit local priority bird species including hen harrier, merlin, short-eared owl, curlew, golden plover, black grouse and snipe.	
				Heathland restoration would also benefit protected reptiles and invertebrate assemblage. Small pearl bordered fritillary, which may utilise the Site, will benefit from decreased grazing pressure in this upland mosaic habitat, where plant species diversity is increased, potentially providing food (<i>Viola sp.</i>) for this species.	
				Grazing management will also benefit areas of degraded blanket bog where lower grazing pressure will allow blanket bog vegetation to return ²⁹ .	
Enhancement	Riparian woodland creation	14.43ha	 Native woodland Rivers/streams Black Grouse Breeding passerines Fish Aquatic and terrestrial 	Native tree planting in riparian zones has been shown to improve water quality, reduce river temperatures, help with flood management and enhance biodiversity ³⁰ . Biodiversity enhancements associated with riparian planting include: improved habitat for fish, aquatic and terrestrial invertebrates (including small pearl bordered fritillary that utilise woodland edge habitat), otters, and bat and bird species ³¹ , including habitat and connectivity for black grouse and breeding passerines.	3

³⁰ Scottish Forestry (2023). Boosting tree planting around rivers and streams. [Online] Available at: <u>https://forestry.gov.scot/news-releases/boosting-tree-planting-around-rivers-and-streams</u> [Accessed in March 2024]

³¹ SEPA (2009). *Riparian Vegetation Management. Engineering in the Water Environment Good Practice Guide.* [Online] Available at: https://www.sepa.org.uk/media/151010/wat_sg_44.pdf [Accessed in March 2024]

Restoration/ Enhancement	Target	Area of Compensation/ Enhancement	Feature(s) Benefitting	Rationale	Relevant Objectives (see Table 5-2)
			 invertebrate assemblage Small pearl bordered fritillary Otters Bats 	Existing riparian zones in the upland part of the site are currently not forested, with steep gullies vulnerable to erosion and little habitat for aquatic species. Evidence of the prior existence of woodland along riparian zones within the site is provided by the presence of remnant woodland understory plants (see Technical Appendix 8.1 Habitat Report).	
Enhancement	Provision of six reptile hibernacula		Reptiles: • Common lizard • Adder • Slow-worm	Providing reptile hibernacula would provide compensation for the loss of potentially suitable reptile habitat. These features would also benefit invertebrates.	4

5.3 Rationale for the Extent and Location of Habitat Restoration and Enhancement Proposals

The following sections describe the rationale for the extent of the proposed habitat restoration and enhancement areas, and the locations proposed. The proposals incorporate a bespoke approach, where like-for-like compensation have not been provided for all habitat types (for example where creation of heath habitat is preferred to restoration of species-poor upland acid grassland). The overall package is considered to provide significant positive effects, which will offset the significant negative effects of the proposed development and provide significant enhancement.

5.3.1 Blanket Bog Restoration

Blanket bog was found throughout the upland part of the site, in degraded condition. The total area of bog habitat that would be directly and indirectly affected by the proposed development, including blanket bog and degraded blanket bog is 53.45ha. These habitat loss calculations are based on the precautionary assumption that indirect loss of bog habitats represents a permanent, irreversible negative effect, although in practice some areas indirectly affected may be able to be restored during the restoration works. It is also based on the assumption that bog habitats within 30m of infrastructure would be indirectly affected from drying effects, in accordance with NatureScot guidance⁷. This 30m buffer is also considered precautionary; for example where deep gullies exist within this 30m buffer and in blanket bog areas uphill of infrastructure are unlikely to see significant levels of drying. As such, the total area of loss set out in this document is considered to be a worst-case scenario, and it is anticipated that the true loss would be a smaller area.

Current NatureScot guidance⁷ recommends a compensation ratio in the order of 1:10 in terms of blanket bog restoration (534.5ha in this case), with additional restoration required for enhancement (in the region of an additional 10% of the baseline assessment of the extent of priority peatland habitat (approximately c. 73ha in this case) to comply with the NPF4 guidance¹, with a total of 607.5 ha required.

Areas of blanket bog with potential for restoration within Rhodders Farm and Blackford Estate were investigated by Botanaeco Ltd for blanket bog restoration suitability (see Annex A). There are two types of blanket bog restoration potential on site. The area to the south, primarily within the Rhodders Farm landholding and overlapping with Alva Moss proposed LNCS, has heavy erosion with exposed peat. The peatland assessment conducted by Botanaeco (Annex A) recommends a reduction in grazing to prevent erosion and allow peat to recover combined with bunding to raise the water table. Habitat enhancement works associated with the adjacent Rhodders Wind Farm are due to take place in an area of blanket bog hydrologically connected to the area proposed for restoration within this OHMP. Methods proposed in the Rhodders Farm HMP include re-profiling and turfing of the peat haggs and re-profiling/blocking any erosion gullies³². It is acknowledged that restoration methods differ slightly between this OHMP and Rhodders Wind Farm works. Re-profiling is not recommended at this stage as it is noted that many haggs further into the HMP area associated with Windburn Wind Farm are partially revegetated, so the primary aim is to carry out bunding to slow water flow. The requirement for re-profiling will be reviewed with the detailed peat management plan, with consideration of works undertaken in the Rhodders Farm HMP area and the needs for continuity across the two restoration areas.

³² MacArthur Green (2024). Rhodders Wind Farm Revised Habitat Management Plan 2021-2040.

This OHMP proposes active restoration combined with grazing reduction in this area, subject to a detailed peat restoration assessment and plan as part of the detailed HMP. The area proposed for active blanket bog restoration is c. 251.31ha.

The blanket bog and degraded blanket bog to the north, within Blackford Estate, shows signs of erosion and many areas lack the peat forming *Sphagnum* species required to continue forming blanket bog. This degradation has been caused by grazing³³ and there is little scope for active restoration works with no ditches or invading trees in these areas. Any areas of hagging are old and mostly revegetated, making them unsuitable for reprofiling. These areas lack peat forming species due to the continued presence of livestock, and research suggests that removal of grazers would allow good recovery of blanket bog^{33,34}, with a good seed bank present in the nearby blanket bog on Rhodders farm. The area proposed for blanket bog restoration through grazing management is c. 360.59ha (see also Section 5.3.2).

Although the complete success of all restoration areas can never be guaranteed in any blanket bog restoration scheme, the blanket bog restoration areas proposed within this OHMP incorporate areas that are deemed to have good deliverability and a high chance of restoration success, based upon survey data, recognised techniques, and the experience of the peatland restoration specialists.

5.3.1.1 Rationale for the Extent of Compensation for Loss of Blanket Bog Habitats

The 251.31ha of active blanket bog restoration proposed and the 360.59ha of proposed blanket bog restoration through grazing management are illustrated in **Figure 8.4.1**. The total area of active restoration to habitat loss is 4.7 times the area of direct and indirect blanket bog and degraded blanket bog loss. It is acknowledged that this falls under the 1:10 compensation ratio recommended by NatureScot. NatureScot's current guidance⁷ advises that applications proposing less than the 1:10 restoration should provide justification, which is as follows.

While active blanket bog restoration is 4.7 times the area of blanket bog loss, the additional area of blanket bog restoration through grazing management is 6.7 times the area of blanket bog loss. If this is considered in tandem, the proposed restoration represents 10 times the area of blanket bog loss, plus an additional 77.4ha of enhancement, more than the required 73ha. While it is acknowledged that grazing management alone is not considered as offsetting under NatureScot guidance⁴, professional recommendations for this site indicate that grazing management is the most effective way to improve the condition of the blanket bog habitat in some parts of this site and without grazing management the condition of the bog habitat in these areas may decline further in value. Should the proposed development be consented and constructed, this would establish a grazing management regime for the lifetime of development, which may otherwise not be implemented. The grazing management proposed here is therefore essential for the condition of this habitat to be improved.

The assumption that blanket bog will be lost out to 30m from infrastructure, and that no blanket be will be restored within this buffer is precautionary (see Section 5.3.1), therefore the ratio of loss to restoration may be higher in reality to that cited here.

³⁴ IUCN Peatland Programme (2014). Briefing Note No.7. Grazing and Trampling. [Available online at: <u>https://www.iucn-uk-peatlandprogramme.org/sites/default/files/2019-</u>05/7%20Grazing%20and%20trampling%20final%20-%205th%20November%202014.pdf Accessed March 2024]



³³ Thom, T., Hanlon, A., Lindsay, R., Richards, J., Stoneman, R., Brooks, S. (2019). *Conserving Bogs the Management Handbook*

When the total area of proposed blanket bog restoration, both active and through grazing management (611.9ha) is considered alongside the large area of proposed heath restoration and grassland enhancement (162.39ha, see below), this constitutes a significant gain to biodiversity.

These factors are all considered relevant when considering blanket bog compensation requirements. Overall, it is considered that the blanket bog restoration proposals would provide adequate compensation for the loss of / impact to blanket bog habitat as a whole, plus additional enhancement, with substantial additional enhancement in line with the requirements of NPF4 Policy 3, also being provided by the proposed heath restoration and grassland enhancement.

5.3.2 Grazing Management for Wet Heath, Dry Heath, Upland Grassland, flush, fen and Blanket Bog

It is proposed that grazing is managed throughout the upland part of the site on Blackford Estate. Grazing by sheep and deer can impact upland grasslands, dry heath, wet heath, blanket bog and flush and fen habitats, where more palatable plants such as heather are selectively grazed. Where high levels of grazing have taken place, heathland plants such as heather are depleted until the habitat is changed to an upland acid grassland community, often species-poor and dominated by unpalatable species such as mat-grass *Nardus stricta* or heath rush *Juncus squarrosus* in damper habitats.

Limited areas of heath would be lost or degraded due to the proposed infrastructure, however it is likely that the species-poor acid grassland communities on site represent a habitat degraded from wet or dry heath originally (see **Table 5-1**), so on this site compensation for lost acid grassland and heath habitats would both be provided by reduced livestock grazing, aimed at allowing wet and dry heath to recover from acid grassland.

An area of reduced grazing is proposed in order to promote heath recovery. This area is considered in combination with the degraded blanket bog within Blackford Estate described in Section 5.3.1, and the new grazing management scheme applies to both bog habitats described in Section 5.3.1 and non-bog habitats described in this section. The entire area encompasses primarily acid grassland and blanket bog, with smaller patches of dry heath, flush and fen habitats, all of which would benefit from a reduced grazing regime. The acid grassland areas are likely to respond well to reduced grazing, promoting high botanical diversity and the recovery of heather, forming the basis of the target upland heath habitat^{27,28}. Acid grassland areas are a mix of dry and wetter areas, with damper areas dominated by heath rush, and some areas a drier mix of grasses, dwarf shrub heaths and pleurocarpous mosses. It is likely that the wetter areas of acid grassland will recover to wet heath and the dry areas of acid grassland will recover to dry heath, however it is difficult to predict where this will happen currently. Some areas may not recover to heath and may remain acid grassland, particularly the rush dominated M23 areas, though it is likely that a reduction in grazing will increase species diversity in these areas.

The habitat on Blackford Estate is likely to move from a mosaic of acid grassland, degraded blanket bog and occasional flush and fen, to a mosaic of wet and dry heath, acid grassland, flush and fen and blanket bog with peat forming species (see Section 5.3.1) with reduced grazing.

The creation of wet and dry heath provides nesting and foraging habitat for a number of protected bird species including hen harrier, merlin, short-eared owl, curlew, black grouse, snipe and golden plover. Heathland also provides habitat for reptile species including common lizard, adder and slow worm. Invertebrate communities will benefit from improved plant species diversity resulting from lower grazing impact, including the small pearl



bordered fritillary, particularly where increased plant diversity may favour their food plant (*Viola sp.*).

In summary, the grazing management area would aim to deliver the enhancement of a total of c. 522.98ha of retained terrestrial habitat via the reduction of livestock and natural regeneration. *Circa* 162.39ha represents the transformation through reduction of grazing and natural regeneration of dry or wet heath from acid grassland and c.360.59ha represents the improvement in the condition of degraded blanket bog habitat (see Section 5.3.1). Small patches within the acid grassland parts of the grazing management area comprise flush and fen habitats that are also expected to benefit from the exclusion of grazing.

5.3.3 Riparian Tree Planting

Riparian tree planting is proposed in a number of riparian zones throughout the site. Within the upland part of the site watercourse corridors form steep gullies that are mostly open with few or no trees, with mostly acid grassland habitat. The upland areas are recommended for riparian planting as they represent areas that have likely held woodland in the past, as evidenced by the shallow soil on steep ground that would not hold peat and the occasional woodland understory species still present.

The watercourses on site drain into two rivers; Finglen Burn draining to the east into Glen Devon reservoir and Alva Burn draining to the south into the River Devon.

Riparian corridors benefit from tree cover for a number of reasons. Trees along riparian corridors can help to reduce erosion by strengthening the river banks when the banks are bound together by the roots. Riparian planting can also help reduce pollution and reduces the risk of flooding where high flow can be slowed by vegetation³¹.

Tree cover along riparian zones also provide habitat for a variety of bird, mammal, invertebrate (including small pearl bordered fritillary, which utilise woodland edge habitat) and plant species. Riparian tree cover provides habitat for protected species such as otters and bats, and food and shelter for aquatic species such as trout. Riparian corridors also provide habitat connectivity, creating corridors along which fauna can commute between larger habitat blocks. Bird species that benefit from riparian tree planting include black grouse, which is red listed³⁵ and listed on the SBL³⁶. Black grouse are not currently utilising the site but have been recorded in low numbers in the surrounding area. Riparian tree planting provides important habitat and commuting corridors for black grouse and a number of other bird species.

Proposed riparian planting will create c.14.43ha of riparian habitat through planting in patches along the watercourses assuming a minimum of 20m width along the length of each watercourse.

5.3.4 Reptile Hibernacula

Common lizard has been recorded on site and potentially suitable habitat exists throughout the upland part of the site for common lizard, adder and slow worm. These species are protected in Scotland under the Wildlife and Countryside Act 1981 (as amended in Scotland) and an important part of the upland biodiversity in Scotland.

The proposed development will result in the loss of 55ha of potentially suitable habitat for reptiles. To compensate for this loss, it is proposed that reptile hibernacula are provided in

at:<u>https://www.bto.org/sites/default/files/publications/bocc-5-a5-4pp-single-pages.pdf</u> [Accessed April 2024] ³⁶ SBL (2013) Updated Scottish Biodiversity List [online] Available at: <u>http://www.biodiversityscotland.gov.uk [Accessed April 2024]</u>



³⁵ BTO. 2021. Birds of Conservation Concern 5. Available online

line with guidance^{37,38} in order to provide compensation for the potential loss of hibernacula and provide additional habitat for reptile species. Habitat enhancements outlined in Sections 5.3.1 and 5.3.2 will also improve habitat for reptiles, providing further compensation for habitat loss.

5.3.5 Further Rationale for the Extent of Compensation and Enhancement Areas for Non-bog Habitat Types

The proposed development would result in the direct permanent loss, and the indirect / temporary loss, of 20.36ha of non-bog terrestrial habitats.

Restoration of c. 162.39ha of non-bog habitats within the grazing management area, as detailed in Section 5.3.2, along with tree planting in riparian corridors (c. 14.43ha, see Section 5.3.4) would provide holistic compensation for the loss of, and impact to, non-bog terrestrial habitats, as well as a significant enhancement. This conclusion is based on the overall scale over which habitat restoration and enhancement measures are proposed, as well as the diversity and high value of habitat types being restored and positively managed.

Overall, a total of 788.72ha of terrestrial habitat is being restored, created or positively managed.

5.4 Goals and Objectives

The proposed goals and objectives of the HMP are set out in Table 5-2.

Timescales and indicators are covered in more detail in Section 6.0 and **Table 7-1** respectively.

³⁸ Cathrine, C. (2024). ARG UK Advice Note 10: Reptile Survey and Mitigation Guidance for Peatland Habitats. Version 2. Amphibian and Reptile Groups of the United Kingdom.



³⁷ https://www.nature.scot/doc/developing-nature-guidance

Table 5-2 Proposed HMP Goals and Objectives

	Goal	Objective	Targets	Quantity	Location	Timescales	Indicators
1.	Blanket bog restoration	1.1 Undertake active blanket bog restoration to restore eroded blanket bog	Blanket bog	251.31ha	Active blanket bog restoration Areas within Rhodders Farm and part of Blackford Estate (see Figure 8.4.1)	Implementation to commence during construction period, with capital restoration works to be undertaken over 3-5 years.	Bog habitat condition. Water table raised.
		1.2 Undertake blanket bog restoration through grazing management to restore degraded blanket bog	Blanket bog and degraded blanket bog	360.59ha	Blanket bog and degraded blanket bog restoration areas through grazing management on Blackford Estate (see Figure 8.4.1)	Fencing to be erected and grazing management to commence at the start of construction.	Bog habitat condition.
2.	Heathland restoration and grassland enhancement	2 Create native wet and dry heath from existing acid grassland and improve existing grasslands through grazing management	Acid and neutral grassland	162.39ha	Acid and neutral grassland within the grazing management areas on Rhodders Farm and Blackford Estate (see Figure 8.4.1)	Fencing to be erected and grazing management to commence at the start of construction.	Extent of wet and dry heath cover. Habitat condition.
3.	Riparian tree planting	4 Create natural riparian tree cover along riparian corridors	Native woodland, upland aquatic ecosystems	14.43ha	Riparian zones Finglen Burn and Alva Burn on Rhodders Farm and Blackford Estate (see Figure 8.4.1)	Fencing to be erected at the start of construction, with targeted planting completed during construction period.	Extent of woodland cover (natural regeneration and tree survival). Habitat condition.

	Goal	Objective	Targets	Quantity	Location	Timescales	Indicators
4.	Enhance reptile habitat	5 Create reptile hibernacula	Reptiles (common lizard, adder, slow- worm)	Six reptile hibernacula, number of log piles to be confirmed at the detailed HMP stage	Upland blanket bog	To be installed after blanket bog restoration works have been undertaken.	N/A
5.	Reinstate habitats disturbed during construction	6 Reinstate habitats temporarily disturbed during construction within the working corridor.	A range of upland habitats.	Within 5m of infrastructure where necessary.	Working corridor surrounding infrastructure footprint	Implementation within one year of completion of construction	Habitat condition.

5.5 Outline Habitat Creation / Restoration Methods

5.5.1 Active Blanket Bog Restoration (Objective 1.1)

Areas suitable for restoration, within which 251.31ha of active blanket bog restoration would be undertaken, are shown in **Figure 8.4.1**. The proposed restoration methods are based on published literature and established restoration methods³⁹.

The methods set out below are a high-level overview of the approach to be taken. This will be discussed with key stakeholders, including NatureScot and the chosen contractor, and the agreed approach and finalised locations will be set out in detail in the detailed HMP post consent. The restoration areas would require a range of tailored approaches, which would be developed at the detailed HMP / implementation stage (post consent). Methods should be informed by Peatland Action³⁹ and by further detailed survey work and consideration of restoration techniques available at the time of implementation, including an assessment of the works carried out on the adjacent Rhodders Wind Farm and consideration for matching methodologies.

A peat depth survey and peat slide risk assessment of blanket bog restoration areas have been undertaken and results are outlined in the **Technical Appendix 10.2: Peat Management Plan (PMP)**.

For all proposed blanket bog restoration areas, the following preparation work is proposed:

- A botanical monitoring survey would be undertaken to establish an up-to-date baseline for the vegetation types present. The botanical survey paired with drone monitoring or other aerial photography, would then be used as a baseline for ongoing monitoring (see Section 6.1 for further details). Baseline botanical monitoring would be undertaken at an appropriate time of year, prior to restoration works commencing.
- 2) A drain slope survey and mapping exercise would be undertaken across all blanket bog restoration areas, prior to restoration works, including hags and gullies. Taking levels of the drain water surface would allow for the creation of drain slope profiles across the restoration areas. In general terms, the aim would be to insert a dam for each 10cm drop in level of each drain / gully – this is intended to ensure that the water level across each restoration area is maintained within 10cm of the bog surface to allow for the growth of peat-forming plants. Analysis and mapping from drone orthomapping would also be undertaken, to derive the lengths of restoration (drains / gullies / hags), the extent and location of bare areas.
- 3) A Peatland Restoration Plan for peatland restoration works would be produced as part of a detailed HMP.

Bunding will be used to restore the hydrological integrity of the area. Turves will be used to block water discharge through the gullies created by eroded peat so that water is retained and the water table is raised (see peatland condition appraisal **Annex A**). Vegetation in the lower part of the gullies should be removed before peat turves are laid on top. Peat turves removed during construction should be used preferentially before any new peat turves are cut for the purpose of restoration (see **Technical Appendix 10.2: Peat Management Plan (PMP)**.

³⁹ NatureScot (2022) *Peatland ACTION – Technical Compendium*. Retrieved from: <u>https://www.nature.scot/doc/peatland-action-technical-compendium</u> [Accessed in December 2023]

The peatland condition appraisal (**Annex A**) also recommends ditch blocking as part of the restoration. This action, however, applies to a small area to the west of the Site that is not included within the redline boundary and is outwith the scope of this OHMP.

These works would be undertaken outwith the breeding bird season (April to July), or if this is not practical following checks for breeding birds to allow mitigation to avoid disturbance to sensitive species and / or damage to active nests.

Grazing impacts at proposed restoration areas would be managed via livestock fencing, enclosing the entire restoration area. Livestock should be completely removed for the first 3 years after restoration to allow the blanket bog to recover, after which low levels of grazing should be maintained. The recommended grazing level for blanket bogs is 0.02 Livestock Units (LU)/ha/year (0.1 sheep/ha/year), with reduced or removed grazing during the winter⁴⁰.

5.5.2 Habitat Restoration through Grazing Management (Objectives 1.2 and 2.1)

The natural regeneration of blanket bog, upland grassland and flush and fen, and the creation of wet and dry heath would be achieved through the management of grazing in Blackford Estate.

Areas suitable for restoration are shown in **Figure 8.4.1**. The restoration area includes 360.59ha of blanket bog restoration and 162.39ha of upland grassland enhancement or transformation to wet and dry heath through grazing management.

Livestock fencing is currently in place on Blackford Estate, any additional fencing should be added to existing fencing in the area. Recommended livestock grazing varies for the different habitats in this area, see **Table 5-3**^{40,41}. These recommended livestock grazing levels are aimed at reducing erosion through trampling, allowing bare peat to revegetate and reduce grazing on heath, favouring the hares-tail cottongrass *Eriophorum vaginatum* that currently dominates the degraded blanket bog on site. It is recommended that grazing over winter (December to March) is minimised, as the water table is higher during the winter and blanket bog and flush/fen habitats are more prone to erosion, furthermore, there are fewer palatable species within the grassland sections of site over winter, forcing livestock to select sensitive blanket bog and heath habitats for grazing.

For this site it is recommended that grazing pressure is initially set to that of blanket bog recommended stocking densities for the whole area, including non-blanket bog areas. Current livestock grazing levels are at approximately 0.33 sheep/ha/year, which is the recommended summer sheep stocking density for blanket bog, recommended year-round grazing density is 0.13 sheep/ha/year. We recommend a stocking density of 0.33 sheep/ha/year should now apply only from spring to autumn (April to October), with highest stocking densities aimed at summer/early autumn (August to September). Livestock should be removed entirely for the winter period (particularly December to March). Habitat condition should be reassessed after 3-5 years and stocking densities should be changed to suit conditions if necessary.

Roe deer are present throughout the Site and it is likely deer grazing is contributing to the current grazing pressure. It is understood that a deer management plan is currently being developed with the aim to reduce deer densities in this area, this will contribute towards the lowered grazing impact in this area and alongside the proposed management of livestock

⁴¹ Farm Advisory Service (2017). Conservation Grazing for Semi-Natural Habitats. Technical Note TN686 [Available online at: https://www.fas.scot/downloads/tn686-conservation-grazing-semi-natural-habitats/ Accessed March 2024]



⁴⁰ NatureScot Peatland Action (2014). *Guidance for Land Managers – Grazing peatland* [Available online at: <u>https://www.nature.scot/doc/peatland-action-peatland-management-guidance-grazing-and-muirburn</u>. Accessed March 2024]

grazing, should improve habitat condition. The detailed HMP should collaborate with the formulation of the deer management plan.

Habitat	Recommended Grazing levels per ha/year	Seasonal Variation	Max Recommended summer grazing per ha
Blanket Bog	0.02 LU 0.13 sheep 0.25 roe deer	Highest grazing levels in summer (June to September), grazing reduced from December to March	0.05 LU 0.33 sheep
Wet Heath	0.08 LU 0.53 sheep 1.00 roe deer	Highest grazing levels in summer (June to September), grazing reduced from December to March	0.1 LU 0.67 Sheep
Dry Heath	0.12 LU 0.8 sheep 1.5 roe deer	Highest grazing levels in summer (June to September), grazing reduced from December to March	0.2 LU 1.33 sheep
Flush and Fen	0.1 LU 0.7 sheep 1.25 roe deer	Grazing concentrated in late summer/early autumn (August to September), grazing removed entirely from December to March	NA

5.5.3 Tree planting in Riparian Corridors (Objective 3.1)

Tree planting is proposed along riparian corridors across the site. Areas suitable for riparian tree planting are shown in **Figure 8.4.1**. The enhancement area includes 14.43ha of riparian zone habitat.

The habitat should comprise a patchwork of tree planting and open glade habitats. Consistency of shade along the watercourse influences the botanical, aquatic invertebrate and fish communities, and it is generally recommended that partial shade is achieved by leaving gaps in the shade along the watercourse in the planting plan³¹.

Riparian planting will be composed of native upland broadleaved trees such as silver birch *Betula pendula* and rowan *Sorbus aucuparia*, or trees such as alder *Alnus glutinosa* or downy birch *Betula pubescens* in wetter areas. Tree planting along riparian corridors will only be undertaken in acid and neutral grassland habitats, any areas of blanket bog or degraded blanket bog and species rich flush communities will not be planted with trees. Heather dominated heath communities may begin to establish along the tree planting areas as a result of reduced grazing in certain areas, this habitat will be encouraged and allowed to naturally regenerate as it provides a natural upland woodland habitat.

Where the riparian zones coincide with the grazing management areas outlined in Section 5.5.2 and **Figure 8.4.1**, it is not anticipated that additional livestock fencing should be required due to the low numbers of livestock due to be in this area. The areas outside of the reduced livestock areas will require livestock fencing to protect the young trees.

5.5.4 Reptile Hibernacula (Objective 4.1)

Six reptile hibernacula in the form of log piles would be constructed to compensate for the loss of reptile habitat, following guidance³⁸. The design features would follow those detailed in the Reptile Habitat Management Handbook⁴². The hibernaculum would be located in suitable reptile habitat, including blanket bog areas on Rhodders Farm, away from areas with potential to flood or become waterlogged blanket bog following restoration activities.

Suitable areas for hibernacula will be identified by an experienced ecologist prior to construction or restoration works starting on Site, and constructed prior to the active season (April to August). Construction and restoration works should take place in the active season to allow reptiles to move from disturbed areas to artificial hibernaculum prior to hibernation (September to March). Artificial hibernaculum will be protected from disturbance during construction and restoration works with a 30m buffer. Specific locations for log piles would be identified and agreed within the detailed HMP.

Materials such as timber, tree roots, inert hardcore and rocks that can be won during habitat clearance would be used for the construction of the hibernacula where possible, however care will be taken to avoid brash derived from non-native conifers that may seed in the blanket bog and damage the habitat.

Hibernacula will be a minimum of 4m long by 2m wide, and 1m high, with access points for reptiles, and should be placed on the surface rather than dug in, to remain above the water table. Hibernaculum would be situated on drier areas of the blanket bog habitats and on the margins of newly created riparian woodland areas, facing a southern aspect for sunny conditions.

5.5.5 Habitat Reinstatement (Objective 5.1)

Reinstatement of areas subject to temporary disturbance / damage during construction (i.e., within the working corridor, but beyond the permanent infrastructure areas) would be undertaken as soon as reasonably practical following construction. Prompt implementation of reinstatement measures would aim to reduce the effects of compaction of subsoil (which can lead to inhibited drainage and root growth), and exposed ground (which can cause loss of topsoil, dust and water pollution through wind blow and erosion). Prompt reinstatement would also help to ensure integrity of the vegetation seed bank is maintained.

Planned reinstatement would be informed by further consultation with stakeholders, preconstruction surveys and site conditions. Reinstatement details would be included and confirmed in the CEMP and detailed HMP, post consent. Reinstatement is likely to comprise the following considerations and measures:

- Temporary working areas will be reinstated to their original condition and returned to their previous use, usually within the autumn following the construction phase;
- Excavated materials will be stored according to good practice taking care to separate turves, topsoils, soils and peat layers;
- Reinstatement will ensure that soils are carefully replaced in the correct soil profile, and that turves are replaced on the surface;
- Where compaction may have occurred a 'sub-soiler', which lifts and shatters the subsoil will be used before the topsoil is reinstated, if necessary;
- Stripped soil will be reinstated as close to where it was removed as possible; and

⁴² Edgar, P., Foster, J. and Baker, J. (2010). Reptile Habitat Management Handbook. Amphibian and Reptile Conservation, Bournemouth



• Reinstatement works will be undertaken in suitable weather conditions, avoiding very wet conditions or very hot, dry and windy conditions, if possible.

Natural regeneration of habitats will be promoted, as advised by the Ecological Clerk of Works (ECoW).

Once construction has finished and the soils and turves have been replaced in the correct profile, it is expected that grassland and heathland vegetation will be allowed to naturally regenerate from the seed bank within the soil and seeds from the turves and adjacent vegetation.

In addition, 37.8ha of bog habitats occur within the temporary working corridor, within 30m or proposed infrastructure. Habitat loss calculations are based on the precautionary assumption that these bog areas would be permanently lost, although in practice every effort will be made to preserve these blanket bog habitats, where possible. In a worst-case scenario, these areas would likely revert to heathland or modified bog, rather than being lost. Details of treatment and reinstatement of peat turves would be provided in a **Technical Appendix 10.2: Peat Management Plan (PMP).**

5.6 External Factors

It is important to note that external factors such as climate change can influence habitat restoration success. Over the lifetime of the HMP it is possible that climate change will affect the habitats on site and in the surrounding area. This should be taken into account during monitoring and reporting.

5.7 Ongoing Management and Maintenance

The requirement for ongoing management and maintenance will be determined based on monitoring results (see Section 6.0). Requirements are likely to include:

- Blanket bog restoration areas:
 - Ongoing grazing management throughout the lifetime of the project as outlined in Section 5.5.1 and 5.5.2.
 - Repair of any dams that are eroded or otherwise damaged, as required, subject to the outcome of monitoring (see Section 6.3).
- Grazing management areas:
 - Ongoing grazing management throughout the lifetime of the project as outlined in Section 5.5.2.
 - Ongoing repair of any damaged fencing. The fence line would be inspected regularly for damage or weaknesses and repaired as required.
- Riparian woodland planting:
 - Weeding or beating up of trees in the tree planting areas, applying fertiliser (if required), as required during the first five years of establishment, informed by monitoring (see Section 5.5.4).
 - Removal of tree tubes once trees are large enough.
- Reptile hibernacula
 - Replacing any damaged or missing hibernacula.

Further remedial action may be required if monitoring indicates that the HMP goals and objectives detailed in Section 5.4 are not met.

6.0 Monitoring and Review

The aims of the proposed monitoring are as follows:

- Monitoring would aim to document the development of habitats within the HMP areas, which would determine the extent to which the overall goals and objectives of the HMP are being met;
- Monitoring would aim to assess the ongoing impact of the wind farm on breeding and foraging birds on site;
- Monitoring would inform the need for ongoing adaptive management and remedial action.

Monitoring would record the following indicators, as appropriate, to monitor progress towards achieving the HMP goals and objectives:

- Condition of managed, restored, created and reinstated habitats, including herbivore impacts;
- Water table;
- Tree growth and survival;
- Bird use of the site;
- Bird collision risk and mortality; and
- Uptake / functionality of reptile hibernaculum.

An outline of the monitoring timetable is shown in **Table 7-1**.

6.1 Botanical Monitoring

6.1.1 Drone survey

A drone survey or other aerial photography survey would be undertaken of the HMP areas, to document the baseline and monitor vegetation changes using drone-captured high-resolution aerial images. This survey technique would first be undertaken prior to restoration measures to provide an up to date baseline (**Table 7-1**). This would then be undertaken in Year 1 and Year 5 after completion of the initial restoration measures, and repeated every five years until at least Year 20, with the frequency of further monitoring determined in Year 20. The drone surveys would be undertaken during summer, at a similar time of year each year, to allow for comparison of the captured aerial photographs to be undertaken to establish if, and to what extent, restoration of the target vegetation has taken place. The survey would also be used to monitor tree regeneration extent.

The drone survey would be supported by ground-based botanical monitoring. The methods of botanical monitoring would be detailed in the HMP and would be bespoke to allow for the specific monitoring against the HMP objectives. The likely methodologies are summarised below in Section 6.1.2 to 6.1.4.

6.1.2 Common Standards Monitoring (CSM)

Ground-based botanical monitoring is likely to be based on the CSM protocol for upland habitats⁴³ (or successor if this is updated prior to monitoring commencing), which assesses habitat condition.

CSM provides a detailed insight into changes in vegetation and some abiotic factors that pick-up trends in vegetation condition that are valuable to understanding the progress of habitat restoration and enhancement works and informing further management. CSM is designed to assess whether features (e.g., habitats) are in favourable or unfavourable condition and whether condition is being maintained, recovering, or declining over time. The assessment is based on habitat-specific criteria involving key indicator species and vegetation structure.

Areas for CSM surveys will include the following:

- Active blanket bog restoration areas following reprofiling works, to be assessed against blanket bog CSM criteria;
- Areas of blanket bog restoration through grazing management, to be assessed against blanket bog CSM criteria;
- Upland acid grassland in U4, U5, U6 and M25 NVC categories to be assessed against wet *and* dry heath CSM criteria; and
- Upland acid grassland in M23, MG9 and MG10 NVC categories to be assessed against grassland CSM criteria.

The thresholds in CSM that delineate habitats in favourable condition from those in unfavourable condition were designed to equate to the minimum standard for Site of Special Scientific Interest (SSSI) site selection⁴⁴. The objective of this HMP is to improve habitat condition compared to baseline condition, not to meet the minimum standard for SSSI site selection. The threshold conditions would therefore be adjusted accordingly following the first round of CSM data collection. CSM targets would then be updated in each subsequent HMP revision.

CSM transect lines would be set up in a sample of each of the habitat restoration areas to give representative coverage of each restoration area. Grid references would be recorded to allow re-location on return monitoring visits. Quadrat sampling along the transect lines would use 2m x 2m quadrats.

The criteria used to assess the data from each quadrat would depend on the vegetation community within the quadrat. CSM guidance provides a list of which NVC communities compose each of the broader habitat types that CSM relates to. Therefore, the surveyor would record the NVC community for each quadrat to make sure that it is assessed using the correct criteria.

CSM surveys would take place prior to construction and restoration works, in the first year following construction and restoration works and every five years thereafter (see **Table 7-1**).

⁴⁴ JNCC (2004) Common Standards Monitoring Guidance for Habitats. Peterborough: Joint Nature Conservation Committee



⁴³ Joint Nature Conservation Committee (2005) *Common Standards Monitoring Guidance for Upland Habitats*. Version May 2005. Joint Nature Conservation Committee, Peterborough.

6.1.3 Blanket Bog Condition

Blanket bog condition would also be monitored using criteria within NatureScot's Peatland Action Peatland Condition Assessment Guide⁴⁵, with the blanket bog restoration areas being classified as in 'near-natural, modified, drained or actively eroding' condition. A condition of 'near-natural' would be targeted for blanket bog restoration areas. This assessment would be undertaken alongside the CSM monitoring, following the same programme (**Table 7-1**).

6.1.4 Riparian Tree Planting

All broadleaf tree planting should be monitored once a year between April and September for five years after planting (**Table 7-1**) for tree survival and condition and the condition of tree tubes, stakes and fencing (Section 5.5.4).

6.2 Monitoring of Peatland Restoration Water Table Height

Monitoring of water table height within active blanket bog restoration areas would take place by the installation and monitoring of hand-driven dipwells (or a similar method for monitoring water table levels). Where feasible, dipwells would be installed prior to blanket bog restoration actions, to enable a baseline to be established. The location and density of dipwells would be confirmed within the detailed HMP.

Unless the water table monitoring method selected allows for continuous data logging at set intervals, quarterly monitoring of dipwells would be undertaken in each monitoring year, to measure water levels and assess if they are high enough to promote bog vegetation growth.

Dipwell monitoring would be undertaken prior to the blanket bog restoration works to provide a baseline (where feasible), as well as in the first year and fifth year following restoration, with the need for further monitoring determined in year five, depending on monitoring results (**Table 7-1**).

6.3 Checks of Blanket Bog Restoration Dams

For the blanket bog restoration to be successful the dams that are created during the restoration process need to remain effective. During ditch / gully blocking, all the dam locations would be recorded.

In the first two monitoring years all the dam locations would be checked for signs of effectiveness, damage and requirements for maintenance. In subsequent monitoring years (alongside the botanical monitoring), especially if dam performance has been good with little maintenance requirement, then it may be appropriate to spot check only a proportion of dam locations (**Table 7-1**).

6.4 Ornithological Monitoring

As set out in the **Chapter 9: Ornithology** a programme of post consent monitoring is proposed. The exact scope of works would be confirmed in the detailed HMP, following consultation, but is likely to include carcass searches, collision monitoring, flight activity surveys and breeding raptor and wader 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.

⁴⁵ <u>https://www.nature.scot/sites/default/files/2023-02/Guidance-Peatland-Action-Peatland-Condition-Assessment-Guide-A1916874.pdf</u> [Accessed in January 2024]



It is proposed that ornithological monitoring should take place during and post-construction, in line with NatureScot guidance (SNH, 2009⁴⁶) as outlined below:

- Year-round ad-hoc collision monitoring should be completed by site operational staff as part of standard maintenance activities. Carcasses of all species found on site should be reported to NatureScot⁴⁷;
- Breeding bird surveys focusing on breeding wader, grouse and raptor species should be undertaken to monitor the numbers and status of these species within the vicinity of the proposed development, in order to monitor the success of habitat management actions undertaken as part of the HMP. The consequences of any management actions may not become apparent for a number of years. Monitoring is suggested annually during construction, and after the proposed development becomes operational, during years 1, 5, and 10, with the requirement for further surveys to be determined based on previous survey results.

6.5 Monitoring of Reptile Hibernacula

The reptile hibernacula (listed in Section 5.5.5) would require a regime of inspection, such that any damaged features can be identified, fixed, or replaced. Monitoring should take place one year after construction and restoration works have taken place, and every five years thereafter (**Table 7-1**). Monitoring should take place outside of the hibernation season between April and August to avoid disturbance. The precise details will be developed and contained within the final HMP.

6.6 Remedial Action

Should the monitoring find that target conditions, and therefore the goals and objectives of the HMP are not being met, then remedial action would be employed, and the HMP updated accordingly, in consultation with the HMP Working Group.

Remedial actions would be dependent on the habitat and nature of the goal / objective not being met. Possible remediation measures could include:

- If bog plants are not successfully regenerating in blanket bog restoration areas as expected, then re-seeding / re-vegetation techniques may be explored;
- If monitoring shows that herbivore impacts are too high, and are resulting in blanket bog restoration objectives or other relevant restoration objectives not being met, then livestock densities could be reduced or other measures employed to allow the objectives to be met;
- If monitoring shows that the water table is not sufficient to support a stable blanket bog habitat then additional peat restoration works may be explored;
- If monitoring shows that dams are damaged or not functional then these should be mended or replaced; and
- If ornithological monitoring shows that the wind farm is having a significant adverse impact on breeding or wintering bird populations then measures to protect birds should be explored.

⁴⁶ Scottish Natural Heritage (SNH) (2009). Monitoring the impact of onshore wind farms on birds. Scottish Natural Heritage, Inverness.

⁴⁷ <u>https://www.nature.scot/doc/bird-collision-incident-recording-form-updated-july-2018</u>

6.7 Reporting and Review

Monitoring results would be reported annually (in years when monitoring takes place) and recommendations made for changes to management prescriptions if objectives are not being met, as appropriate. As such, the detailed HMP would be a live document, such that it can be altered following monitoring results, unexpected events or evolving guidance. Any amendments to the HMP because of the outcome of monitoring would be agreed with the HMP Working Group in advance of any such revised prescriptions being implemented (see Section 4.0). The HMP would be reviewed every five years.

7.0 Indicative Programme

An indicative programme for the implementation of the management and monitoring works set out in this OHMP is provided in **Table 7-1**. A more detailed programme would be provided in the detailed HMP, post consent.

Table 7-1: Outline Schedule of Works

Task	Pre-	Construction		Post-Construction							
	construction		Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 10	Yr 15	Yr 20	Beyond Yr 20
Enabling Tasks											
Formation of HMP working group											
Detailed HMP preparation and finalisation											
Drain mapping / slope surveys, peat depth survey, Peat Slide Risk Assessment, drone orthomapping analysis, botanical monitoring and CEMP, for blanket bog restoration areas.											
Dipwell installation in blanket bog restoration areas (where feasible)											
Capital Works and Ongoing Management											
Blanket bog restoration works											
Livestock fence installation for grazing management area (where necessary) and riparian planting zones											
Ongoing grazing management											
Riparian tree planting											
Ongoing aftercare of planted trees											
Checks and repair of fence lines											
Create reptile hibernacula											

Task	Pre-	Construction		Post-Construction							
	construction		Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 10	Yr 15	Yr 20	Beyond Yr 20
Re-instatement of habitats within temporary construction corridors											
On-going adaptive management and maintenance											
Monitoring and Associated Reporting											
Drone survey											Requirement
Botanical monitoring and blanket bog condition surveys											for further monitoring to be determined
Monitoring new woodland establishment in riparian corridors											by monitoring results in Year 20
Dipwell monitoring											
Drain blocking checks											
Ornithological Monitoring											
Monitoring functionality of reptile hibernacula											
HMP Review and Adaptation											
HMP review and updates											Every five years for lifetime of project
Ongoing adaptive management via agreement with HMP working group (if required throughout)											

Table key:

UNDERTAKE IF REQUIRED



Figures

Technical Appendix 8.4: Outline Habitat Management Plan

Windburn Wind Farm

Windburn Wind Farm Limited

SLR Project No.: 428.V12959.00001

2 June 2025





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Annex A:

Peatland Condition Appraisal

Technical Appendix 8.4: Outline Habitat Management Plan

Windburn Wind Farm

Windburn Wind Farm Limited

SLR Project No.: 428.V12959.00001

2 June 2025



Windburn Wind Farm

Peatland condition appraisal

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Please note: this report is designed for viewing on a screen and can be printed legibly at A4. Formatting is at A3, the scale for printing if full map resolution is required.

Contents

Кеу	points	.1
1	Introduction	.1
	Remit	.1
	Aim & objectives	.1
	The site	.1
2	Approach	.1
	Survey boundary & buffers	.1
	Desk study	.1
3	Baseline	.2
	General description	.2
	Designations	.2
	Condition assessment survey	. 2
4	Assessment	.5
	Modifying factors	.5
	Potential management	.5
5	Conclusions	.6

	Tables
Table 1: Areas of drained habitat	
	Maps
Map 1: Carbon & Peatland Map	
Map 2: Drained peatland distribution	



 	 •••••	 	 	•••••	 	5
 	 	 	 		 	3
 	 	 	 		 	4

Key points

The peatland condition is extensively 'Modified', by historic erosion & ongoing grazing. Minor areas outside the site are 'Drained' (45 ha) and very minor areas are 'Actively eroding'.

Peatland management options include:

- Grazing reduction across the site.
- Bunding within gulleys.
- Damming of drains within 45 ha.

Introduction 1

Remit

This report describes the results of a peatland-condition-focused walk-over of the proposed, 1.1 Windburn Wind Farm. This site is located on upland moorland across the Clackmannanshire -Perth & Kinross boundary, around 4 km north of Alva.

Aim & objectives

The aim of the report is to describe the potential for peatland restoration within the site of the 1.2 wind farm, and its environs, by meeting the following objectives:

Identification of peatland condition.

Identification of areas with potential for restoration.

The site

- Windburn Wind Farm is proposed across almost 1,500 ha of upland moorland at an altitude of up 1.3 to 631 m. The site is currently managed as extensive pasture for sheep-grazing.
- Topography across the site is gently rolling, with low to moderate slope angles below the broadly 1.4 level summits. Extensive peatland habitat has been identified by previous habitat survey across the broad, rounded summits & ridges, and onto the moderate slopes below.

Approach 2

In preparation of the baseline, a desk-based study of environmental information is undertaken, 2.1 to identify relevant data (on designations, etc), and then a field-based survey. The resulting, desk study & survey data is then assessed to identify peatland restoration potential. Details on the methods & sources are provided in the following sections.

Survey boundary & buffers

The survey area is defined in Map 1 et seq. 2.2

Desk study

- A desk study is undertaken to identify habitat designations, including: 2.3
 - Sitelink¹ to identify nature conservation designations.
 - Carbon & Peatland Map² to identify 'Class 1' or 'Class 2' peatland, or Class 5 peat soils.

Peatland Condition Assessment

- 2.4 Peatland Condition Assessment³ is employed in the field to determine the condition of the peatland habitat. This assessment classifies the peatland into four classes:
 - Near-Natural
 - Modified
 - Drained
 - Actively Eroding.
- 2.5 Field-based assessment of a series of key indicators identifies the appropriate class for each area of peatland. These indicators include features such as the Sphagnum cover & vegetation condition; evidence of fire frequency & intensity; bare peat; and scrub/tree invasion⁴.

Deep peat

A systematic peat depth survey is not undertaken but *ad hoc* measurements were made using a 2.6 short probe (1.5 m long) and from observations in the flanks of eroded gullies. This low-resolution peat depth data is used to broadly discriminate shallow peat (<0.5 m deep), shallow deep peat (0.5 m to 1.5 m deep) &/or very deep peat (>1.5 m deep); and its distribution in relation to habitat features.



¹ SiteLink data, including mapping & site documentation available at https://sitelink.nature.scot/home. Accessed 20/12/2023. ² Carbon & Peatland Map details are available at <u>https://soils.environment.gov.scot/maps/thematic-maps/carbon-and-peatland-2016-map/</u>. Accessed 20/12/2023

³ NatureScot 2017. Peatland Condition Assessment. Available for download from https://www.nature.scot/sites/default/files/2017-10/Guidance-Peatland-Action-Peatland-Condition-Assessment-Guide-A1916874.pdf. Accessed 20/12/2023. ⁴ List & descriptions of Habitats Directive Annex I habitats available at http://jncc.defra.gov.uk/Publications/JNCC312/UK habitat list.asp. Accessed 20/12/2023.

Baseline 3

In this section, the habitat baseline of the site is described in relation to its general characteristics, 3.1 designations, habitats, vegetation communities & notable plant species.

General description

- The broad summits within & around the site of Windburn Wind Farm are extensively covered by 3.2 blanket bog, with depths of peat averaging around 1 m to 2 m deep, and reaching up to around 3 m. The depth of peat is exposed in the flanks of eroded gulleys that are widespread and indicative of a historical phase of severe erosion. Since that phase, vegetation recovery has been extensive, so that only small areas of bare peat persist. Persistent bare peat is occasionally associated with exposed, vertical faces in the flanks of the gullies, and where trampling by sheep prevents the re-establishment of vegetation.
- Hare's-tail bog-cotton dominates the vegetation cover of the blanket bog. Its dominance relates 3.3 the influence of grazing that disproportionately impacts on the sub-shrub cover (e.g. heather). The M20 hare's-tail bog-cotton NVC community is therefore identified as the most extensive vegetation type and there are smaller areas of the M18 cross-leafed heath - bog-moss & M19 heather - hare's-tail bog-cotton communities, where there is extensive bog-moss cover or persistent heather, respectively. Areas from which peat has been completely or almost wholly removed (by erosion) are now associated with the U5 mat-grass - heath bedstraw community, or more locally (and where very shallow depths of peat persist [≈ 0.3 m]: the U6 heath rush - sheep'sfescue community.

Designations

In this section, statutory & non-statutory nature conservation designations associated with the 3.4 site are identified. The distribution of designated habitats & sites is illustrated in Map 1.

Statutory designations

- Statutory nature conservations designations provide a legal basis to the protection of certain sites 3.5 and their specified features.
- There are no statutory designations associated with the site. The closest such areas are located 3.6 at a distance of 1.7 km or more.

Carbon & Peatland Map

The Carbon & Peatland Map² predicts that there is extensive, nationally-important Class 1 3.7 peatland across the summits, flanked by minor areas of Class 2 peatland & Class 5 peat soils (see Map 1). Class 1 & 2 peatland defines "nationally important carbon-rich soils, deep peat and priority peatland habitat"². These classes are distinguished by Class 1's likelihood of "high conservation value" and Class 2's "potentially high conservation value and restoration potential". Class 5 relates the potential for peat soils not necessarily associated with peatland habitat.

Condition assessment survey

In this section, the baseline is described in relation to the site walkover. Background to the survey 3.8 staff & conditions are provided ahead of a description of the site.

Background

The condition assessment survey was undertaken on the 18th of December, 2023, by Dr Andy 3.9 McMullen, Principal Botanist at Botanæco, in the company of Kirstie Hazelwood, Senior Ecologist at SLR, who has undertaken the habitat & vegetation survey of the site. Weather conditions on the day were not ideal: there was light wind, rain & mist; and moderate temperatures. However, visibility was maintained to 300 m or more. As such, conditions were sufficient for an appraisal of the site, in terms of the peatland condition, and at a scale appropriate for management considerations.

Condition assessment

- At a broad scale, the condition of the peatland habitat within the wind farm site is assessed to be 3.10 Modified. This relates the extent of erosion-related features, especially gulleys, and around the peatland periphery: isolated lobes of peat with persistent, M20 peatland vegetation, or U6 heath rush grassland. Revegetation since this historical erosion has been extensive so there are only scattered, minor areas of persistent bare peat located over low, water-shedding, peat ridges or the vertical flanks of gulleys. These very minor, scattered areas (<1 % cover) are classed as Actively Eroding.
- Widespread slumping of the gulley flanks has assisted revegetation by creating gentle slopes 3.11 amenable to recolonisation. These slumped flanks also conform, broadly, to the perched water table of elevated peat units. This latter feature assists restoration of the hydrological balance. Consequently, the Modified peatland has undergone similar processes to those involved with active management (reprofiling, etc) so it remains in viable, albeit modified, condition.







Carbon & Peatland Map				
	Class 1			
	Class 2			
	Class 5			
Physical features				
•	Point height (m)			
	Contour (10 m)			
	Building			
	Crags			
_	Primary Road			
	Minor Road			
	Waterbody			
	Watercourse			
	Woodland			





Map 2:		
Drained	peatland	distribution.

Windburn Wind Farm

Drained peatland

Legend

•

Site boundary (approx)

- Drained peatland
- Peatland Marginal peatland
- Physical features
- Point height (m) Contour (10 m) Building Crags Primary Road

 - Minor Road Waterbody
 - Watercourse
- Woodland

Scale: 1:30,000 at A3



Map contains: • OS data © Crown copyright and database right (2024).

- Despite recovery of the vegetation & steep gulley-flanks, the hydrological integrity of the blanket 3.12 bog will have been disrupted and this is apparent in the relatively dry conditions underfoot and the general scarcity of bog-mosses, for example. Furthermore, in the north, the scarcity of heather, despite the suitable dry conditions, and widespread evidence of sheep (dung & tracks) relates modification of the vegetation, by grazing, that has resulted in the dominance of grazingresistant hare's-tail bog-cotton. As a result, the vegetation is now very 'tussocky' in the north (rather than 'hummocky' with bog-mosses) and the bog-cotton tussocks exclude other species, including the bog-mosses. In the south, grazing is less intensive so there is a canopy of heather and peat-forming bog-mosses are frequent to occasional. Their frequency here suggests that the bog-mosses may be limited by trampling in the north.
- Dewatering associated with the historic erosion and related degradation of the peatland 3.13 hydrology will also be partly responsible for the spread of hare's-tail bog-cotton and the loss of bog-mosses (and it would otherwise encourage the cover of heather, but for the influence of grazing). These hydrological & grazing influences collectively diminish the distinction of the vegetation that is consequently dominated by a species-poor assemblage of common generalists (although distinctive peatland species, such as cranberry or Sphagnum magellanicum & Sphagnum papillosum, are scattered here & there).
- In addition to the modifying influence of historical erosion & grazing, a 45 ha area of peatland 3.14 habitat adjacent to the south-western periphery of the site has been impacted by drainage. The extent of this adjacent area is illustrated in Map 2 and its extent is specified in Table 1. In this table, a 34 ha area of apparent deep peat (>0.5 m) is discriminated from a marginal, 11 ha of peatland on shallow peat (<0.5 m). However, the precise depth & extent of deep peat (>0.5 m) requires to be confirmed by probing.

Table 1: Areas of drained habitat.

Habitat type	Total	
(& estimated peat depth)	На	%
Peatland (peat >0.5 m)	34.0	76.4
Marginal peatland (peat <0.5 m)	10.5	23.6
Totals:	44.5	100.0

Additional drained areas are scattered further west where they become increasingly smaller & 3.15 more marginal. The drains are small in cross section, in the range of around 0.3 m wide by 0.5 m deep and they are spaced at varied intervals of 10 m to 50 m. Some of the lengths of drain are associated with vegetation regeneration but this is unlikely to fully impede drainage, so the drains remain active and the peatland would very likely benefit from their damming.

Assessment 4

In this section of the report, the potential for management of the peatland is described. The 4.1 modifying factors are identified ahead of potential management options.

Modifying factors

- Three key factors are associated with modification of the peatland habitat: 4.2
 - Historical erosion
 - Ongoing grazing
 - Persistent drainage.
- 4.3 phase of historic erosion is complete and broadly comparable to what is achieved through active management (on sites that are actively eroding). However, gulleys persist from the historical erosion that disrupted the original, hydrological integrity of the blanket bog.
- Grazing is responsible for maintenance of some of the minor areas of bare peat, where sheep 44 trampling is active. However, grazing is more extensively responsible for the loss of heather and the concomitant spread of hare's-tail bog-cotton, as well as more subtle vegetation changes. (Historical muirburn may also be somewhat responsible). Drainage has been undertaken across, and continues to impact, an area to the southwest of the site.

Potential management

- 4.5 grazing. A reduction, even in the short-term (<3 years), will likely result in a more even vegetation assemblage and recovery of the sub-shrub component, as well as other grazing-sensitive features (e.g. bog-moss can be impacted indirectly by the spread of hare's-tail bog-cotton, or by trampling, even though it is not directly grazed). Persistent areas of bare peat subject to trampling will also benefit from a reduction of grazing. Grazing levels could be raised following recovery of the vegetation & bare peat; and be maintained at sustainable levels to sustain peatland biodiversity & function. Monitoring of grazing management could be undertaken by following recovery of the sub-shrub & bog-moss layers and of the minor areas of bare peat; and the decline of hare'stail bog-cotton dominance. Adjustments to grazing density can be based on the monitoring outcomes.
- 4.6 These bunds are intended to reduce the discharge of water through the gulleys, so that it is retained, to encourage the development of peatland vegetation rich in bog-mosses and peatformation. This will further contribute to restoration of the hydrological integrity by further raising the water-level in the adjacent peat mass.



A few, scattered minor areas of bare peat aside, spontaneous recovery of the peatland from a

The most extensively impactful management of the peatland habitat is related to changes to

Restoration of the hydrological integrity can be facilitated by bunds in the base of the gullies.

Drainage of the dams should be relatively straightforward to achieve - they are small in section 4.7 (around 0.3 m x 0.5 m) and are amenable to damming because of this and their location on gentle to moderate slopes. The primary focus is the 35 ha of peatland on deep peat and peat depthprobing will clarify the potential of the 9 ha of marginal peatland. Additional damming potential exists to the west but on increasingly small & marginal areas of peatland.

Conclusions 5

- The **peatland condition** is extensively 'Modified', by historic erosion & ongoing grazing. Minor 5.1 areas are Drained (45 ha) and very minor areas are 'Actively eroding'.
- Peatland management options include: 5.2
 - Grazing reduction across the site.
 - Bunding within gulleys.
 - Damming of drains within 45 ha.







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