

Appendix 7.1 Draft Habitat Management Plan

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Appendix 7.1 Draft Habitat Management Plan

Section 1: Introduction

Background

The Proposed Development is located on northwest Yell, Shetland. The layout is shown on Figure 3.4 of the 2020 SEI. A Habitat Management Plan (HMP) is required to deliver the mitigation and necessary to offset predicted impacts on peatland habitats and associated species. An outline of the key principles of the HMP was prepared by ITP Energised on behalf of the Applicant and submitted as in Appendix 7.7: Outline Habitat Management Plan (OHMP) of the 2019 EIA Report.

The present document (termed the 'Draft HMP' to distinguish it from the 2019 OHMP) is based on the principles within the OHMP but provides greater detail on off-site areas targeted for peatland restoration, and it has been extended to provide provisions for waders and merlin (*Falco columbarius*) as well. As such it replaces the 2019 OHMP. It is intended as an iterative document, which will be further refined into a detailed HMP following grant of consent for the Proposed Development and agreed by The Shetland Islands Council (SIC) in consultation with Scottish Natural Heritage (SNH) and the Scottish Environment Protection Agency (SEPA), and based on the results of monitoring.

It should be noted that the 2019 EIA Report and the 2020 SEI specify a range of mitigation measures to avoid or, where this is not practicable, reduce adverse effects on important ecological features. Where mitigation is not possible in situ, appropriate compensation measures have been proposed instead. Enhancement measures are also specified to achieve benefits for biodiversity, in accordance with planning policy requirements and good practice. Issues relating specifically to construction of the Proposed Development (e.g. preventing pollution of watercourses or disturbance of protected species) are not considered here but are instead detailed in the Schedule of Environmental Commitments presented in Chapter 17 of the 2020 SEI.

Scope of this Document

The overall purpose of the HMP is to implement positive land management for the benefit of nature conservation that will compensate for adverse impacts that the Proposed Development may have on habitats and species of conservation interest. It will be in place for the duration of the operation of the Proposed Development (although some of these measures will commence during the construction period).

The Draft HMP should be read in conjunction with the 2019 EIA Report Chapters 6: Ornithology and 7: Ecology and Nature Conservation, as well as the 2020 SEI Chapters 6: Ornithology and 7: Ecology and Nature Conservation, which collectively consider a complete suite of ecological receptors, including habitats and species. It should also be read in conjunction with 2019 EIA Report Chapter 10: Geology, Peat, Hydrology and Hydrogeology and 2020 SEI Chapter 10: Geology, Peat, Hydrology and Hydrogeology which consider impacts on a range of features relevant to ecology, notably peat. In addition, 2020 SEI Appendix 10.1: Revised Peat Management Plan includes measures relevant to the Draft HMP, notably methods on how peat will be excavated and reinstated within the Proposed Development.

The spatial scope of the Draft HMP includes locations within the Proposed Development site as well as two off-site locations.

Priority Features for Management Action

As described in 2019 EIA Report Chapter 6: Ornithology and Chapter 7: Ecology & Nature Conservation, and confirmed in the 2020 SEI, the site of the Proposed Development supports a range of habitats and species of conservation importance. The receptors which form the priorities for the HMP have been determined through consideration of the relative importance of each receptor and the extent to which they may be affected by the Proposed Development as set out in the 2019 EIA Report and 2020 SEI. Taking the above into consideration, the aims and objectives of the OHMP relate to the following key features:

- Blanket mire;

- Red-throated diver (*Gavia stellata*);
- Waders; and
- Merlin.

Other features of importance are identified in the 2019 EIA Report, including otter and fish. However, it has been established through the EIA process that none of these are likely to be significantly affected by the Proposed Development in EIA terms, subject to the implementation of mitigation measures during the construction phase. Therefore these features are not priorities for management action in the HMP. However, several of these species are likely to benefit from the proposed habitat management measures.

Blanket Mire

As described in 2019 EIA Report Chapter 7: Ecology & Nature Conservation, a total of c1,499 ha of blanket bog is present as M17 *Trichophorum caespitosum-Eriophorum vaginatum* blanket mire in the National Vegetation Classification (NVC) (Rodwell, 1991 *et seq.*) or as the dominant component in a range of mosaics, including bog pools. As described in 2020 SEI Chapter 7: Ecology and Nature Conservation, 23.4 ha blanket bog will be permanently lost under the Proposed Development 2020 Layout. Compensation for this loss will be made through restoration management in two off-site locations elsewhere on Yell.

As described in 2020 SEI Appendix 10.1: Revised Peat Management Plan, seven borrow pits covering a combined total of 151,390 m² will be worked as part of the Proposed Development but subsequently restored to blanket bog using excavated peat. Measures are included in the present document on how these areas will be managed during operation of the Proposed Development.

Red-throated Diver

Red-throated diver is considered of international level importance in the ornithological assessment. As described in 2020 SEI Chapter 6: Ornithology, there are more red-throated divers present on site than suitable breeding habitat. A number of lochans >500 m from the nearest proposed turbine locations that were included in bird surveys in 2016 or 2018 did not support breeding red-throated divers during the surveys. These include lochans and pool complexes within the site boundary.

Waders

Ornithological survey work in 2016 and 2018 recorded the use of the Proposed Development site by breeding curlew (*Numenius arquata*), golden plover (*Pluvialis apricaria*) and dunlin (*Calidris alpina*), all of which, as described in 2020 SEI Chapter 6: Ornithology, are considered of national level importance in the ornithological assessment. While no evidence was recorded to indicate the use of the Proposed Development site by whimbrel (*Numenius phaeopus*), the species was recorded locally, and it too is considered on national importance in the assessment. Curlew (and inferred for whimbrel) are likely to be most affected by post-construction displacement based on the study by Pearce-Higgins *et al.* (2012). Populations of curlew appear to decline by up to 40% during the construction phase within a 620 metre area around the outermost turbines of a wind farm. Breeding waders are priorities on the Shetland Local Biodiversity Action Plan (LBAP), which includes objectives to prevent further declines of breeding wader populations, and to improve the condition and extent of breeding habitats for waders.

Merlin

Ornithological survey work in 2016 and 2018 recorded the use of the Proposed Development site by breeding merlin, which, as described in 2020 SEI Chapter 6: Ornithology, is considered of regional level importance in the ornithological assessment. Two nests were recorded in the north of the site. Merlin is also a priority on the Shetland LBAP, which includes objectives to improve the condition and extent breeding habitat for merlin.

Aims and Objectives

The relative importance of the priority features and, more importantly, the extent to which they could be affected by the Proposed Development, have been used to determine some of the specific aims and objectives

of the Draft HMP. In the absence of the measures proposed in this Draft HMP, the Proposed Development could have a significant adverse effect on these features.

The broad aims and objectives for the priority features are as follows:

- Blanket mire:
 - Management and restoration of blanket mire habitat in borrow pit areas within the Proposed Development site boundary through use of excavated peat and control of grazing.
 - Management and restoration of degraded blanket mire habitat elsewhere on Yell, out with the application boundary of the Proposed Development site, through local hag-reprofiling, stabilisation of bare peat, and control of grazing and peat cutting.
- Red-throated diver:
 - Enhancement of currently unoccupied lochans to increase their potential value to breeding red-throated divers.
 - Restoration of degraded lochans to provide suitable habitat for breeding red-throated divers.
- Waders:
 - Creation of scrapes for waders to improve feeding areas.
 - Protection and, where possible, enhancement of existing pools to improve feeding areas.
 - Maintenance of mosaic habitat.
- Merlin:
 - Restoration and maintenance of heather vegetation which is neither too open and short nor too dense and tall.

Structure of this Document

The Draft HMP is set out as follows:

- Section 2 sets out key elements of the implementation of the HMP;
- Section 3 sets of the detailed objectives as well as a programme for the implementation of tasks and monitoring of blanket bog;
- Section 4 sets of the detailed objectives as well as a programme for the implementation of tasks and monitoring of red-throated diver;
- Section 5 sets of the detailed objectives as well as a programme for the implementation of tasks and monitoring of waders;
- Section 6 sets of the detailed objectives as well as a programme for the implementation of tasks and monitoring of merlin; and
- Section 7 provides the document references used to compile this document.

Section 2: Implementation

Roles and Responsibilities

The Applicant will be responsible for meeting the commitments made in the (detailed) HMP, which will be based on the objectives and principles set out in this Draft HMP. At this stage it is envisaged that these activities will be managed by contractors employed by the Applicant of the Proposed Development.

It is envisaged that the implementation of the final HMP will be a condition of the planning consent for the Proposed Development. Following consent the (detailed) HMP will be agreed with Shetland Islands Council (SIC) in consultation with appropriate consultees, notably Scottish Natural Heritage (SNH) and Scottish Environment Protection Agency (SEPA).

Management actions and monitoring results will be reviewed by the HMP Stakeholder Group. The precise remit and structure of the Stakeholder Group will be agreed post consent but at this stage it is considered that the following organisations are likely to be represented:

- Applicant;
- SIC;
- SNH;
- SEPA;
- Royal Society for the Protection of Birds (RSPB);
- Scottish Water (SW); and
- Shetland Amenity Trust (SAT).

Review and Monitoring

This Draft HMP has been based on the guidance given by SNH in their publication: Planning for development: what to consider and include in Habitat Management Plans (SNH, 2016). This guidance states that the HMP should *“incorporate flexibility and be subject to periodic review. This will ensure that works/actions can be altered in response to monitoring results over time, evolving guidance or unexpected events. Any alterations would be subject to approval of the HMP steering group.”*

In situations when habitat management activities are implemented in spite of uncertainties about their effects, monitoring is the process undertaken to measure and evaluate the effects of the management, and the results are used to inform future management decisions (Elzinga *et al.*, 2001). In other words, relevant, appropriately timed monitoring is important to enable the success of the HMP tasks to be determined and to identify opportunities for further development of habitat management tasks.

Monitoring objectives are outlined for each conservation feature in the sections below. Each monitoring objective will be ‘SMART’ (acronym explained below) and cost effective:

- S – Specifically address the feature;
- M – Measurable, i.e. quantified (for example, in terms of definitive numbers of individuals or proportionate growth of a population);
- A – Achievable;
- R – Relevant, and in compliance with, the overarching HMP aims (which encompass legal, policy and best practice requirements); and
- T – Time-based to ensure that success rates or alternatively remedial actions can be ascertained.

Monitoring results will be reported to the HMP Stakeholder Group. Reporting of monitoring results and the review of management prescriptions will be undertaken by suitably qualified and experienced ecologists. The HMP Stakeholder Group will be responsible for reviewing the results of the monitoring and agreeing amended management prescriptions if necessary.

Duration

The HMP runs from the first commissioning of the Proposed Development to its decommissioning (30 years).

The HMP will be reviewed by the HMP Stakeholder Group on an approximately 5-year cycle until the decommissioning of the Proposed Development.

Section 3: Blanket Mire

Aims

The broad aims are as follows:

1. To restore and manage active blanket mire habitat in the seven borrow pits within the application site for the Proposed Development through re-use of peat excavated for the development and management of livestock grazing.
2. To restore and manage active blanket mire habitat in two locations on Yell, through local slope-reprofiling, seeding, and control of grazing and peat cutting.

Target Areas

Onsite Borrow Pits

2020 SEI Figure 3.4 shows the locations of the seven borrow pit search areas, denoted Borrow Pit Search Areas A-F and H, within the Proposed Development site boundary. As described in 2020 SEI Appendix 10.1: Revised Peat Management Plan, they range from 6,734 m² to 38,468 m² in size and cover a combined area of 151,390 m², or 15.14 ha (excluding drains around the borrow pit search areas that account for an additional 2,938 m², or 0.29 ha).

As described in 2020 SEI Appendix 10.1: Revised Peat Management Plan, up to a total of 41,430 m³ of acrotelm peat and 285,530 m³ of catotelm peat will be excavated from the seven borrow pits. Peat will be reinstated to a depth of 2 m within the borrow pits, corresponding to 22,709 m³ acrotelmic peat and 280,072 m³ catotelmic peat.

Off-site Locations

Using a model developed by Strath Caulaidh Ltd on behalf of ScottishPower Renewables (as cited in ScottishPower Renewables, 2015), by assessing the current condition of the peatland habitats within candidate areas it is possible to quantify the degree of improvement which could be made to these areas through restoration. Table 1 defines the criteria used to assess current habitat condition for blanket bog.

Table 1 – Criteria used to assess condition of existing blanket bog habitats (based on Table 1 in ScottishPower Renewables, 2015)

Aspect of condition	Relative condition class				
	Class 1 Excellent	Class 2 Good	Class 3 Acceptable	Class 4 Poor	Class 5 Very Poor
Distribution of bog vegetation	Complete cover	Cover +/- complete	Widespread	Localised	Generally absent
Distribution of active mire	All active	Generally active	Locally active	Generally inactive	Inactive
Proportion of water table above main peat mass for majority of year	100%	70-99%	40-69%	10-39%	<10%
Natural <i>Sphagnum</i> micro-topography	Widespread	Regularly found	Localised signs	Rare or relict forms	Completely absent

<i>Aspect of condition</i>	<i>Relative condition class</i>				
	<i>Class 1 Excellent</i>	<i>Class 2 Good</i>	<i>Class 3 Acceptable</i>	<i>Class 4 Poor</i>	<i>Class 5 Very Poor</i>
Expected <i>Sphagnum</i> cover	60-90%	20-70%	10-30%	5-15%	0-5%
Proportion of habitat in target condition	100%	75%	50%	25%	0%

Several candidate areas have been identified within Yell based on the guiding principles above. By applying the criteria in Table 1 to the blanket bog habitat within these candidate HMP areas, it is possible to quantify the amount of mitigation which can be achieved through restoration. For example, if 10 ha of Class 2 peatland is present (which is defined as having 75 % of the 10 ha habitat in target condition, i.e. 7.5 ha), the benefit of restoring the area would potentially amount to 2.5 ha.

The results of the calculations for habitats within the candidate HMP areas are shown in Table 2.

Table 2 – Quantification of mitigation provided by the restoration of blanket bog within HMP areas (other than borrow pits)

Area, location		Relative condition class					Total (ha)
		Class 1	Class 2	Class 3	Class 4	Class 5	
Area A, West Yell Eroded blanket bog on summit, subject to sheep grazing	Overview	None	None	Vegetated peatland. Mainly dry with only localised <i>Sphagnum</i>	Dry hags abutting bare peat	Much bare peat, in places eroded to mineral substrate	
	Existing cover (ha)	0.00	0.00	6.80	8.50	1.70	17.00
	Mitigation benefit (ha)	0.00	0.00	3.40	6.38	1.53	11.31
Area B, West Yell Grazed blanket bog with haggling	Overview	Some areas in target condition	Some haggling but peatland generally active	None	None	None	
	Existing cover (ha)	20.00	95.0	0.00	0.00	0.00	115.00
	Mitigation benefit (ha)	0.00	23.75	0.00	0.00	0.00	23.75
Area C, East Yell	Overview	Some areas in target condition	Disturbed, locally cut peatland. Drying but retains regular areas with <i>Sphagnum</i> topography and generally active	Disturbed peatland, still being worked. Locally active areas	Generally inactive peat with only localised vegetation	Bare, eroding peat	
	Existing cover (ha)	0.00	33.00	40.00	0.00	0.00	73.00
	Mitigation benefit (ha)	0.00	8.25	20.00	0.00	0.00	28.25

Area, location		Relative condition class					Total (ha)
		Class 1	Class 2	Class 3	Class 4	Class 5	
Area D, East Yell	Overview	None	Hagged/locally cut peatland. Drying but retains regular areas with <i>Sphagnum</i> topography and is generally active	Hagged/locally cut peatland, still being worked. Locally active areas	Generally inactive peat with only localised vegetation	None	
	Existing cover (ha)	0.00	2.00	4.00	2.00	3.00	11.00
	Mitigation benefit (ha)	0.00	0.50	2.00	1.50	2.70	6.70

Locations of Areas A-D are currently confidential. Overall they cover c.216 ha, with the net benefit of undertaking restoration works amounting to c70 ha. Areas A-D in Table 2 are in two landownerships, and agreement with landowners has been reached in principle for restoration management within these areas.

Areas A-D are representative of the range of degraded blanket bog areas on Yell. Two main factors, peat cutting and livestock grazing, have contributed to the degraded site conditions and often occur simultaneously. Drainage channels occur locally where they serve to dry peat, which will subsequently be cut, but they are relatively rare features.

Blanket mire conditions on Yell are the result of extremely high rainfall and cool temperatures. Moorland habitats comprising a mosaic of blanket mire and, on shallower peats, wet/dry heath dominate each candidate HMP area and its wider surroundings. They are naturally occurring habitats, which would be expected to occur in a system unaltered by anthropogenic influences. However, the condition of the habitats as they currently exist in the landscape are mainly the result of climatic, topographic, biotic, anthropogenic and geological factors. It is the relative combination of these factors, which shape the condition of the habitat within a given locale.

Areas A-D all contain peat substrates and are typically dominated by heather (*Calluna vulgaris*), deergrass (*Trichophorum germanicum*), hare’s-tail cottongrass (*Eriophorum vaginatum*) and/or common cotton-grass (*Eriophorum angustifolium*), with areas of bare peat also present. However, there is considerable variation both within and between areas, which reflects variations in microhabitats and the range of condition classes present within the areas, as well as differences in site management, history, topography and aspect. As such, the range of associates varies but often includes one or more of heath rush (*Juncus squarrosus*), mat-grass (*Nardus stricta*), crowberry (*Empetrum nigrum*), tormentil (*Potentilla erecta*), *Sphagnum* mosses, such as red bog-moss (*Sphagnum capillifolium* subsp. *rubellum*), feathery bog-moss (*Sphagnum cuspidatum*) and papillose bog-moss (*Sphagnum papillosum*), pleurocarpous mosses, such as springy turf-moss (*Rhytidiadelphus squarrosus*), little shaggy-moss (*Rhytidiadelphus loreus*), red-stemmed feather-moss (*Pleurozium schreberi*), acrocarpous mosses, such as woolly fringe-moss (*Racomitrium lanuginosum*), and lichens such as *Cladonia impexa*. In addition, Area B includes a minimum of 15 lochans.

Objectives

The long-term aspiration (>5 years) is to restore the blanket mire habitat to a high quality, including a relatively diverse plant assemblage in which *Sphagnum* mosses are abundant. The precise species structure which would be expected is difficult to define, due to differences in the micro-climates as described previously, and variation is anticipated and accepted. Blanket mire habitat is therefore defined as all terrestrial habitats within the target areas that have a peat substrate. No attempt is made to define the habitat from the depth of the peat substrate, because peat cutting and erosion have locally reduced the depth of the peat to below 50cm (which is often defined as the threshold between shallow and deep peat and between wet heath and blanket mire), even though conditions for peat formation may remain or be restorable

A number of indicators have been used to formulate objectives which reflect different aspects of blanket bog quality over time. These will be compared against suitable reference areas, where possible, to allow the quality of the restored blanket mire to be assessed in context. The objectives are stated in Table 3.

Table 3 – Objectives for blanket bog

Feature	Objective	Definition
Sphagnum and peat	3.1	At least one species of <i>Sphagnum</i> is present in the sample plot
	3.2	<i>Sphagnum papillosum</i> is present in the sample plot
	3.3	<i>Sphagnum</i> spp. account for at least 30% of basal cover in the sample plot
	3.4	Visible trampling or uprooting impacts of large grazing mammals on <i>Sphagnum</i> is absent in the sample plot
	3.5	Bare peat arising from trampling or from disturbance by machinery comprises <1% of ‘basal’ cover in the sample plot

<i>Feature</i>	<i>Objective</i>	<i>Definition</i>
Higher plants	3.6	Cotton-grasses are present in the sample plot
	3.7	Heather is present in the sample plot
	3.8	Heather with at least 10cm average canopy height and with <20% of leading shoots browsed by sheep on average, is present in the sample plot
	3.9	'True grasses' foliar cover should be less than 5% in the sample plot
	3.10	The combined cover of heather, cotton-grasses and deergrass should account for no more than 75% of foliar cover in the sample plot

Management Methodology

Background

A considerable body of evidence is accumulating on the types of peatland restoration techniques and their efficacy. A compendium of UK case studies has been published by the International Union for the Conservation of Nature (IUCN) and is provided in Cris *et al.* (2011). The IUCN report does not include examples from Shetland.

Large-scale blanket mire restoration is proposed as part of the Viking Wind Farm project on Central Mainland, Shetland, as described in the HMP for the scheme (Viking Energy Partnership, 2010). This document does not refer to case studies of blanket mire restoration on Shetland, but instead describes setting up a pilot area where proposed management techniques can be trialled. The partners involved in overseeing the implementation of the Viking HMP (including academic institutes and environmental consultancies, Shetland Amenity Trust, Moors for the Future Partnership, Royal Society for the Protection of Birds (RSPB), Scottish Environment Protection Agency (SEPA), Scottish Agricultural College (SAC), Scottish Natural Heritage (SNH), Shetland Islands Council, and others) will input to guidance and methodologies used. It is stated in the Viking HMP document that, given the scale of the proposed works, the HMP will likely develop best practice guidance applicable to windy, wet maritime sites.

If developed, Viking Wind Farm will not be operational until 2024 at the earliest, and it is therefore unlikely that blanket mire restoration techniques will have been trialled at the Viking scheme by the time the Energy Isles Wind Farm HMP is implemented.

The Outline HMP for Beaw Field Wind Farm (Peel Wind Farms (Yell) Limited, 2016), a consented wind farm north of Burravoe on Yell, cites evidence from West Yell which suggests that a large scale reduction in grazing pressure may result in bare peat surfaces and hags naturally revegetating with little or no other interventionist management, and that this process can be fast.

Shetland Amenity Trust (SAT) has pioneered innovative peatland restoration techniques on Shetland and have outlined their work on the IUCN UK peatland programme website (SAT, 2016). These include using new materials (waste salmon farm pipes, redundant salmon smolt net and sisal tubes) for blocking erosion gullies and for repairing extensive areas of bare peat, and these techniques may effectively represent current best practice for restoration of erosion gullies and bare peat areas on Shetland. As stated in SAT (2016) the work demonstrates that even bog in exposed conditions and in a highly degraded condition can be restored using straightforward techniques and locally available materials. It is further stated on the website that the methods that have been tried out are being used to inform local wind farm Habitat Management Plans.

This Draft HMP is based on information drawn from the above, where available and relevant. It also includes measures developed by the Yorkshire Peat Partnership (YPP) that are widely used in peatland restoration schemes, albeit mainly on the UK mainland. Measures in this Draft HMP will be updated as and when new information on effective and appropriate techniques become available.

Proposed techniques

Peatland restoration will take place through a range of measures: In areas with significant grazing pressures, reducing stock numbers or preventing sheep entirely may be necessary. Hags may locally require reprofiling,

and areas of bare peat will require stabilising and seeding. Monitoring the development of the vegetation will be key to assessing if objectives are being met and for informing adaptive management where they are not.

Management methods will be further developed post consent, in agreement with the HMP Stakeholder Group, and incorporating lessons learnt from other restoration schemes in Shetland (as described above) as well as from baseline survey work.

However, the methods are likely to include some or all of the methods described below, or variations of these.

Borrow pit restoration

The Proposed Development site is dominated by blanket mire, which accounts for 1499 ha of the site. Apart from the permanent land take and the potential modification of habitat adjacent to infrastructure, the blanket mire will be safeguarded during the operational life of the Proposed Development, with maintenance of the hydrology of the peatland being key to maintaining the structure and quality of the vegetation and for maintaining suitable conditions for species such as red-throated diver.

Acrotelmic, catotelmic and amorphous peat excavated during construction of the Proposed Development will be used in the borrow pit restoration. Catotelmic and amorphous peat will be considered together, as no clear basal layer of amorphous peat was recorded on the Proposed Development site. As described in SEI Appendix 10.1: Revised Peat Management Plan, all of the peat excavated for the Proposed Development will be re-used within the development site boundary. No peat will be taken off site. As detailed in Chapter 10 of the 2020 SEI, SEPA are content with the proposed approach to peat re-use. The borrow pits are suitable receptor areas for excavated peat as they comprise excavations surrounded by peatland which can be built up using excavated peat to achieve a topography, which will mirror the surrounding, uncut peat and tie into the hydrology of the surrounding peatland. This is predicted to result in active peat formation within the restored borrow pits.

As described in SEI Appendix 10.1: Revised Peat Management Plan, excavated peat will be separated during the excavation and temporarily stored in separate areas, before being reinstated in the same order within the seven borrow pits. The following principles will be followed:

- Areas of peat within the footprint of any excavation will have the top layer of vegetation stripped off as turf prior to construction by an experienced specialist contractor. When excavating areas of peat, excavated turfs will be as intact as possible, which will typically be achieved by removing large turves up to 500mm.
- Excavated soils and turves will be handled so as to avoid cross contamination between distinct horizons and ensure reuse potential is maximised. Excavated peat will be stored in separate horizons.
- Turves will be stored adjacent to the construction area in a way that ensures they remain moist and viable. Turves will be stored vegetation side up.
- Peat will be kept damp. The moisture content of stored/stockpiled peat will be monitored monthly and if it falls below 25% of that in surrounding, intact peat then it will be watered.
- Peat will be reinstated as soon as practicable following excavation.
- The amount of time any bare peat will be exposed will be minimised to preserve its integrity.
- The phasing of work will be carried out to minimise the total amount of exposed ground at any one time. By stripping turves and replacing as soon as possible after peat has been re-distributed there will be minimal areas of bare peat.
- Reinstatement will be done to a detailed plan, which will divide each borrow pit into smaller units.
- The height of the restored surface will match that of the adjacent peat.

- Any peat areas on steep ground or that remains partially bare will be covered using geotextile or a similar method to stop erosion.
- Any areas of bare peat, where vegetation is not re-growing, will be seeded with a seed mixture obtained from the existing habitat or commercial seeds of local genetic provenance.
- The re-vegetated areas will be monitored.
- Low ground pressure diggers will be used for both excavation and reinstatement of the peat to minimise the risk of peat compression and damage to vegetation.
- Livestock will be excluded during the establishment phase and controlled thereafter.

Ending peat cutting (all target areas)

There will be no peat cutting within the blanket bog management areas.

Ending muirburn (all target areas)

There will be no muirburn within the blanket bog management areas.

Grazing control (all target areas)

Sheep grazing of blanket bog at low to moderate levels can be beneficial and help maintain and enhance vegetation diversity and productivity. However, high levels of grazing intensity can be damaging to blanket bog habitat, leading to severe vegetation degradation and extensive peat erosion in Shetland. Managing appropriate grazing levels is therefore a crucial element to achieving the objectives for blanket bog.

Because of natural variability in the productivity of grazing land, it is not possible to define exact figures for the stocking density, which should be adjusted according to the condition of the vegetation and substrate rather than to a rigid figure. However, as an approximate guideline, stock figures should not exceed 0.4 sheep per hectare during the summer months (IUCN, 2014).

Hag reprofiling (off-site target areas)

As described above, where grazing is the main degrading agent, control of this is expected to lead to rapid natural recovery of hagged peat. However, where monitoring demonstrates this is not sufficient, hag reprofiling may be required. Monitoring will therefore be carried out to determine if additional management intervention is required, where and when.

Yorkshire Peat Partnership (YPP) (no date) describes hags as the exposed edges of a peat block that continue to erode away due to the combined effects of freeze-thaw action, cantilever collapse of large blocks followed by desiccating wind erosion during drier periods. These factors are relevant to Shetland too, although the relative severity of wind desiccation may be more extreme. Actively eroding and exposed hags are hostile environments for plants and need to be stabilised before any vegetation can be re-established.

The YPP guidance states the aim should be to achieve a hag or gully edge that has no more than about a 33–35° stable slope and which is well vegetated. To achieve this a 1-2 m length of vegetation on the top of the hag can be ‘rolled’ back or undermined (to a depth that retains the root structure of the vegetation) far enough to enable the underlying peat to be cut and moved to the foot of the hag to create a stable 33° sloping bank. The vegetation is then rolled back and compacted to cover the newly profiled slope.

Where the vegetation does not completely cover the newly re-profiled slope and natural re-vegetation is considered unlikely further treatment of the bare peat will be required. This can be a geo-textile spread across the peat, as recommended by YPP, or a local alternative such as the redundant salmon smolt nets used by SAT. The material is staked in and can then be seeded with blanket bog species.

Bare peat (off-site target areas)

As described above, where grazing is the main degrading agent, control of this is expected to lead to rapid natural recovery. However, where monitoring demonstrates this is not sufficient, further management such as

mulching, stabilising with geotextiles or other materials, and seeding may be required. Monitoring will therefore be carried out to determine if additional management intervention is required, where and when.

Monitoring Methodology

The objective of the monitoring will be to determine the effectiveness of the management and assess the need to alter management prescriptions, e.g. mechanical control of undesirable species, such as tall rushes, stabilisation of still eroding areas with geotextiles, or changes in the grazing regime.

Dipwells will be installed within each of the restored borrow pits, with a control in adjacent intact peatland. These will monitor the water table level annually within the first five years of the HMP, after which the need for continued monitoring will be evaluated and agreed with the HMP Stakeholder Group.

During the first five years of operation of the Proposed Development, vegetation monitoring will consist of simple assessments which will be undertaken on a regular basis. After year five, the need for continued monitoring will be evaluated in consultation with the HMP Stakeholder Group.

Although the exact monitoring regime will be defined once management techniques have been finalised, and in agreement with the HMP Stakeholder Group, it will be designed to specifically allow robust assessment of whether the objectives stated in Table 3 are being met or whether a change in management is required, e.g. to control weedy species or stabilise still eroding areas.

Section 4: Red-throated Diver

Aims

The broad aims are as follows:

1. To create conditions for red-throated diver in lochans not currently used by the species.

Target Areas

On site

A number of lochans >500 m from the nearest proposed turbine locations that were included in bird surveys in 2016 or 2018 did not support breeding red-throated divers during the surveys. These include lochans and pool complexes within the site boundary: Several are present on and south of Hill of Vigon, west of the Turbine 6 location, and three lochans and several pool complexes are present south of Grud Waters and 500-800 m west of Turbines 10 and 12. The sizes of these waterbodies vary; most are <1 ha but two are up to 6 ha in size. Locally, notably south of Hill of Vigon and south of Grud Waters, several former waterbodies have been lost or partially drained owing to the collapse of peat banks. The result is a number of very shallow waterbodies or entirely drained areas of bare peat that are not suitable for use by nesting divers.

Off site

Area B listed in Table 2 (Section 3: Blanket Mire) includes a minimum of 15 lochans or varying sizes. These are also available for red-throated diver management.

Objectives

There is scope for enhancing lochans, or locally for restoring degraded lochans in the areas identified above, to create waterbodies with the characteristics suitable for breeding red-throated divers.

A number of indicators have been used to formulate objectives which reflect different aspects of red-throated diver habitat over time. These will be compared against suitable reference areas, where possible, to allow the quality of the restored blanket mire to be assessed in context. The objectives are stated in Table 4.

Table 4 – Objectives for red-throated diver management

<i>Feature</i>	<i>Objective</i>	<i>Definition</i>
Red-throated diver	4.1	The total percentage of lochan margins within each management area suitable for nesting is increased to at least 50%
	4.2	At least 50% of lochans within each management area achieve stabilised water levels
	4.3	The total percentage cover of higher plants at the margins of all lochans within each management area is increased
	4.4	Grazing pressure / poaching at lochan margins is decreased
	4.5	There is diver uptake and then continued use of enhanced lochans
	4.6	Monitoring records stable or increasing population (in comparison to pre-intervention baseline) within on and off-site management areas

Management Methodology

Background

Red-throated diver management is also proposed as part of the Viking Wind Farm project on Central Mainland, Shetland, as described in the HMP for the scheme (Viking Energy Partnership, 2010). The document states that during the course of the Viking studies, it became apparent that many breeding lochans used by divers are detrimentally affected by existing peatland erosion processes and that several lochans appear to have been destroyed or rendered unsuitable through erosion in the relatively recent past. It is stated in the Viking HMP that at many sites the erosion processes are clearly active and ongoing, leading to a strong expectation that the condition of some lochans, including some that are currently rated as high and medium importance to breeding divers, will deteriorate relatively quickly to a point when they are of little or no value to divers. The primary aim of the planned Viking HMP work is therefore to create conditions on lochans conducive to the protection/enhancement/restoration of breeding red-throated divers.

The Outline HMP for Beaw Field Wind Farm (Peel Wind Farms (Yell) Limited, 2016), a consented wind farm north of Burravoe on Yell, also includes a range of measures for red-throated diver. Similar to Viking, it was identified that erosion of peat can result in drainage of lochan water with the result that several formerly suitable red-throated diver lochans have either dried out or become too shallow to be used by nesting divers in recent years. Therefore, the focus of the Beaw Field HMP is on restoring lochans using dams.

Bundy (1978) described lochans of less than 1 ha as being most favoured by red-throated divers. Lochans greater than 5ha were the least favoured but in his study nevertheless had an occupancy rate of more than 50%. Bundy (1978) described breeding waters as needing to be sufficiently free of vegetation and deep enough (>70cm) to enable chicks to dive when disturbed. The banks must be easy of access, suitable for nesting and preferably grassy. He also concluded that there were no successful nests at sites where disturbance from both human beings and avian predators was considered high. He noted that whereas human disturbance on Yell was negligible, pressure from avian predators was probably heavier than ever before following a recent, very considerable increase in the numbers of moorland-breeding gulls (*Laridae*) and skuas (*Stercorariidae*). However, when divers were assigned a value of either 'shy' (an adult with chicks that readily leaves a loch at the approach of human intruders) or 'tame' (at least one adult remains with young during visits), it was apparent that of the successful pairs on both Yell and Unst, 33.8 % were shy and 66.2 % were tame, likely because predation by avian predators was reduced when adults remain near the nest.

Proposed techniques

A detailed specification for the works, tailored to the specific conditions within individual management areas within the site and in the off-site Area B, will be informed by baseline survey work, which will aim to establish:

- The baseline use of the management parcels by red-throated diver through targeted survey work.
- The baseline condition of lochans within the management parcels, including water levels, bank erosion, and dam integrity.
- The cover of heather and condition of blanket bog habitats (through recording of *Sphagnum* cover and presence of other indicator species).

In addition, Information obtained from desk study and observation will be used to assess the baseline disturbance effects of nearby roads and infrastructure, and the occurrence of deleterious farming practices (such as over-grazing and muirburn).

Management methods will be developed post consent, in agreement with the HMP Stakeholder Group. However, broad principles for the restoration management are provided below.

Restoration of degraded lochans

For a lochan to be suitable to breeding red-throated divers it should measure at least 20 m x 15 m and have a depth of at least 0.5 m. That therefore defines the minimum conditions aimed for in the management, but larger waterbodies / potential waterbodies (up to 1 ha) will often be more suitable to divers and will therefore be prioritised in the management.

Measures for restoring degraded lochans for divers will include the following:

- Strengthening or repairing degraded or poached lochan margins; and
- Damming lochan outflows to raise water levels. This may include use of plastic or timber dams.

Enhancement of existing lochans

Measures for enhancement of lochans for divers may include one or more of the following:

- Creating floating nesting rafts – This will be done sheltered lochans. Rafts will measure approximately 2 m x 2 m and will require at least three anchors;
- Creating peat islands where water levels are suitable to do so; and
- Expanding lochans by combining them with adjacent lochans. This will involve moving the separating degrading or poor-condition peat banks, where this can be done safely and efficiently. Peat banks will be used to strengthen lochan banks elsewhere.

Monitoring Methodology

The objective of the monitoring will be to determine the effectiveness of the management and assess the need to alter management prescriptions, e.g. to repair failing dams. All management measurements will be subject to reactive monitoring during the first five years of operation. Monitoring will:

- Record the use of the management parcels by red-throated diver through targeted survey work;
- Record the condition of lochans, including water levels, bank erosion, and dam integrity using simple, qualitative assessments;
- Assess the recovery/condition of surrounding blanket bog habitat through recording of *Sphagnum* cover and presence of other indicator species;
- Assess the integrity of installed dams; and
- Inspect the integrity of any stock fencing used.

Targeted red-throated diver surveys will be carried out prior to any restoration or enhancement works being implemented and in each of the first five years of operation. Methods will be agreed with the HMP Stakeholder Group prior to commencement of any works and will follow industry standard best-practice guidance (SNH, 2009).

Monitoring reports will include desk-study information, e.g. data from National bird census surveys, Shetland Bird Club, and SOTEAG reports, to enable comparison of survey data with population trends throughout Shetland as a whole. The outcome of on-site monitoring will be assessed in each annual management review, and will inform changes to the breadth of management for subsequent years. This will allow for a dynamic management plan to ensure that failing management regimes are addressed, and that the set objectives are being met. After year five of operation of the Proposed Development, the need for continued monitoring will be evaluated in consultation with the HMP Stakeholder Group.

Section 5: Waders

Aims

The broad aims for waders, including curlew, whimbrel, golden plover and dunlin, are as follows:

1. To create conditions suitable for feeding and nesting birds.

Target Areas

On site

There are a range of locations within the site where wader management can be carried out: They are low-lying areas with low gradients that are >1 km from the nearest Proposed Development infrastructure. Such areas occur along stream valleys in the northwest of the site, e.g. around South Burn of Vigon.

Off site

Areas B, C and D listed in Table 2 (Section 3: Blanket Mire) have potentially suitable locations for wader management.

Objectives

A number of indicators have been used to formulate objectives which reflect different aspects of red-throated diver habitat over time. These will be compared against suitable reference areas, where possible, to allow the quality of the restored blanket mire to be assessed in context. The objectives are stated in Table 5.

Table 5 – Objectives for red-throated diver management

<i>Feature</i>	<i>Objective</i>	<i>Definition</i>
Waders	5.1	Grazing pressure / poaching is reduced to an acceptable level
	5.2	Development of habitat mosaic with closed (little bare ground) short sward comprising a mixture of sparse heather, cottongrass and deergrass, together with <i>Racomitrium</i> moss, <i>Cladonia</i> lichens, and, in blanket bog situations, <i>Sphagnum</i> mosses
	5.3	There is uptake of and then continued use of scrapes by waders
	5.4	Monitoring records stable or increasing population (in comparison to pre-intervention baseline) within on and off-site management areas

Management Methodology

Background

Whimbrel management is part of the Viking Wind Farm project on Central Mainland, Shetland, as described in the HMP for the scheme (Viking Energy Partnership, 2010). It states that extensive areas of relatively short moorland vegetation, but ideally with some wetland areas (pools and wet hollows), appear to be the preferred breeding habitat. Good whimbrel moorland typically has a closed short sward comprising a mixture of sparse heather, cottongrass and deergrass, together with *Racomitrium* moss, *Cladonia* lichens, and, in blanket bog situations, *Sphagnum* mosses, and such communities can develop in a range of situations, including intact deep peat blanket bog. The HMP further states that whimbrel in Shetland also make some use of the very extensive areas of blanket bog moorland with a medium sward length, but that this by itself appears not to be attractive. The vegetation of such areas consists of the same species but heather or cottongrass typically dominate (or co-dominate) and *Racomitrium* moss and *Cladonia* lichens are uncommon. In reality there exists a

continuum from short to medium height sward moorland vegetation (and longer) and at any one location there is usually a degree of heterogeneity of sward lengths. The HMP also states that many whimbrel pairs show a tendency to nest in association with other breeding species, including other waders, probably because the mobbing behaviour of these species affords them some protection from aerial predators such as crows and large gull species. Overall, the Viking HMP includes a range of management measures for whimbrel, including grazing management, wetting up small areas (e.g. barriers across erosion and drainage features), crow (predator) control and creation of large shallow pools and marshy edges for waders in general, which creates the 'many eyes' and 'protective umbrella' conditions that result from multi-species vigilance and anti-predator mobbing behaviours. The Viking HMP adds that habitat suitability for whimbrel is currently being systematically investigated and assessed as part of HMP base-line monitoring.

This Draft HMP will be updated as and when new information on effective and appropriate techniques become available, notably from Viking or other Shetland schemes.

Proposed techniques

A detailed specification for the works, tailored to the specific conditions within individual management areas within the site and in the off-site Areas B, C and D, will be informed by baseline survey work, which will aim to establish:

- The baseline use of the management parcels by waders through targeted survey work.
- The cover of heather and condition of blanket bog habitats (through recording of *Sphagnum* cover and presence of other indicator species).

In addition, Information obtained from desk study and observation will be used to assess the baseline disturbance effects of nearby roads and infrastructure, and the occurrence of deleterious farming practices (such as over-grazing and muirburn).

Management methods will be developed post consent, in agreement with the HMP Stakeholder Group. However, broad principles for the restoration management are provided below.

Creation of scrapes

Scrapes will be constructed by excavating a series of shallow depressions into the surface of the bare or degraded peat. The deepest sections of the scrapes will not exceed 500 mm below the adjacent ground level. The finished base profile will have local undulations to create differing depths of water and the outer edges will taper out gently to meet the adjacent ground level, so as to create wet margins, which will have differing levels of exposure depending on seasonal water level fluctuations. Scrape edges will also be scalloped so as to provide local habitat variations. Scrapes are to be designed so as to hold water during the period from March to the end of July each year. They will each have a minimum surface area of 25 m². These will be placed in one or more clusters, but not linked to each other. The completed base profile will not be covered with topsoil but allowed to colonise naturally. These design parameters are consistent with the guidance set out in the Royal Society for the Protection of Birds 'Farming for Wildlife' leaflet: 'Scrape Creation for Wildlife' (RSPB, no date).

Existing minor pools will be maintained and where possible enhanced by minor drain blocking to improve feeding areas.

Grazing control

Grazing control measures are presented in Section 3. These measures are predicted to result in a diverse and varied vegetation and are therefore likely to benefit waders.

Monitoring Methodology

The objective of the monitoring will be to determine the effectiveness of the management and assess the need to alter management prescriptions, e.g. to vary grazing regimes. All management measurements will be subject to reactive monitoring during the first five years of operation. Monitoring will:

- Record the use of the management parcels by waders through targeted survey work;
- Record the condition of scrapes using simple, qualitative assessments;
- Assess the recovery/condition of surrounding blanket bog habitat through recording of *Sphagnum* cover and presence of other indicator species; and
- Inspect the integrity of any stock fencing used.

Targeted wader surveys will be carried out prior to any restoration or enhancement works being implemented and in each of the first five years of operation. Methods will be agreed with the HMP Stakeholder Group prior to commencement of any works and will follow industry standard best-practice guidance (SNH, 2009).

Monitoring reports will include desk-study information, e.g. data from National bird census surveys, Shetland Bird Club, and SOTEAG reports, to enable comparison of survey data with population trends throughout Shetland as a whole. The outcome of on-site monitoring will be assessed in each annual management review, and will inform changes to the breadth of management for subsequent years. This will allow for a dynamic management plan to ensure that failing management regimes are addressed, and that the set objectives are being met. After year five of operation of the Proposed Development, the need for continued monitoring will be evaluated in consultation with the HMP Stakeholder Group.

Section 6: Merlin

Aims

The broad aims for merlin are as follows:

1. To create conditions suitable for feeding and nesting birds.

Target Areas

On site

As reported in the 2019 EIA report Chapter 6: Ornithology, two merlin territories were recorded within the Proposed Development site boundary in 2016; both were near the Burn of Firth in the northern part of the site. The management at these locations will continue, in order to maintain suitable breeding habitat for merlin.

Other locations where merlin management can be carried out include areas which are at least 500 m away from any proposed turbine location and which lack high-quality deep heather vegetation, but where heather is extensively present. Such areas occur in the northwest of the site between Hill of Bakkanelee and Hill of Markamouth.

Off site

Areas B, C and D listed in Table 2 (Section 3: Blanket Mire) all have potentially suitable locations for merlin management.

Objectives

A number of indicators have been used to formulate objectives which reflect different aspects of red-throated diver habitat over time. These will be compared against suitable reference areas, where possible, to allow the quality of the restored blanket mire to be assessed in context. The objectives are stated in Table 6.

Table 6 – Objectives for red-throated diver management

<i>Feature</i>	<i>Objective</i>	<i>Definition</i>
Merlin	6.1	Grazing pressure is controlled within management areas. No grazing will occur between April and July
	6.2	There will be an increase and then constant provision of dense heather within management areas, particularly within stream valleys
	6.3	Previously un-occupied areas become occupied
	6.4	Monitoring records stable or increasing population (in comparison to pre-intervention baseline) within on and off-site management areas

Management Methodology

Background

Merlin management is part of the Viking Wind Farm project on Central Mainland, Shetland, as described in the HMP for the scheme (Viking Energy Partnership, 2010). The HMP states that the loss of breeding merlins from several historical sites in Shetland has coincided with significant habitat degradation; notably that patches of deep heather required for nesting have been lost through reseeding for agricultural purposes, over-grazing by sheep and defoliation by insect larvae. Merlins typically nest on the ground in heather moorland, often in deep heather on a slope of a hill or on the side of a valley. Importantly, merlins show high site fidelity returning in

successive years to nest in the same suitable area. Therefore, specific management measures in the HMP focus on stock exclusion fencing to allow heather regeneration to occur over sufficiently large areas to be attractive to nesting merlin, with vegetation that is neither too tall and dense but not too short either.

The Outline HMP for Beaw Field Wind Farm (Peel Wind Farms (Yell) Limited, 2016) also includes measures for merlin. Similar to Viking, the focus of the Beaw Field HMP is on stock exclusion.

This Draft HMP will be updated as and when new information on effective and appropriate techniques become available, notably from Viking or other Shetland schemes.

Proposed techniques

A detailed specification for the works, tailored to the specific conditions within individual management areas within the site and in the off-site Areas B, C and D, will be informed by baseline survey work, which will aim to establish:

- The baseline use of management areas by merlins through targeted survey work.
- The cover and structure of heather in management areas.

Management methods will be developed post consent, in agreement with the HMP Stakeholder Group. However, broad principles for the restoration management are provided below.

Grazing control

Stock will be excluded from large (>3 ha) management areas. If necessary this will involve stock fencing. However, whilst tall dense heather is ideal for nesting merlins, they cannot use a thick sward without any gaps in it. Therefore targeted grazing management of small numbers of sheep to break up the sward may be allowed if it is determined through monitoring that the vegetation has become too dense or tall and is being deselected by merlins.

Monitoring Methodology

The objective of the monitoring will be to determine the effectiveness of the management and assess the need to alter management prescriptions, e.g. to vary grazing regimes. All management measurements will be subject to reactive monitoring during the first five years of operation. Monitoring will:

- Record the use of the management parcels by merlins through targeted survey work;
- Assess the development of heather vegetation through recording percentage cover and average canopy height; and
- Inspect the integrity of any stock fencing used.

Targeted merlin surveys will be carried out prior to any restoration or enhancement works being implemented and in each of the first five years of operation. Methods will be agreed with the HMP Stakeholder Group prior to commencement of any works and will follow industry standard best-practice guidance (SNH, 2009).

Monitoring reports will include desk-study information, e.g. data from National bird census surveys, Shetland Bird Club, and SOTEAG reports, to enable comparison of survey data with population trends throughout Shetland as a whole. The outcome of on-site monitoring will be assessed in each annual management review, and will inform changes to the breadth of management for subsequent years. This will allow for a dynamic management plan to ensure that failing management regimes are addressed, and that the set objectives are being met. After year five of operation of the Proposed Development, the need for continued monitoring will be evaluated in consultation with the HMP Stakeholder Group.

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