



Environmental Appraisal Report

Woolfords Wind Farm - Tip Height Increase

Annex 6-1-2: Habitat Management Plan

Woolfords Wind Energy Ltd

wind2

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1. Introduction

1.1 Terms of reference

This Outline Habitat Management Plan (OHMP), hereon referred to as the HMP, is provided in support of a planning application to construct and operate three wind turbines with a tip height of up to 200 m plus associated infrastructure at a site approximately 4 km northeast of Forth in South Lanarkshire. Production of the HMP has been informed by the results of baseline ecology and ornithological studies.

In May 2025 the scheme was consented (P/22/0031) based on a 180 m turbine height and that planning application was accompanied by an Outline HMP (Atmos Consulting (2021). The planning consent was subject to a range of planning conditions, of which the following are relevant to this document:

Condition 23

A Habitat Management Plan (HMP) should be submitted to, and approved by, the Planning Authority, in consultation relevant stakeholders, prior to development commencing. The HMP must detail where, how and when an appropriate amount of peatland restoration/enhancement (in excess of that impacted by the development) will be delivered. The delivery of the approved HMP should subsequently be overseen by a Habitat Management Group (HMG). The approved plan must be implemented in full unless, in light of the results of monitoring, it is amended by the HMG, in which case the amended HMP must be implemented in full. The HMP must operate until the decommissioning and restoration of the site, subject to any changes approved by the Planning Authority in consultation with the HMG.

Reason: In the interests of good land management and the protection of habitats.

Condition 24

A Habitat Management Group (HMG) shall be established to oversee the preparation and delivery of the HMP and to review and assess the results from ongoing monitoring. The HMG shall include a representative of South Lanarkshire Council and shall have powers to propose reasonable changes to the HMP necessary to deliver its agreed aims, and notwithstanding the above,

- (a) Site clearance activities and where possible, construction, will take place outwith the bird breeding season (March to July inclusive). If site clearance activities commence during this period ECoW supervision is required.*
- (b) The HMP will operate for the full lifespan of the wind farm, including decommissioning*
- (c) The agreed proposals identified in the HMP will be fully implemented*
- (d) Surveillance and monitoring results of species and habitat will be carried out in accordance with the approved plan and be submitted to the HMG in accordance with the timescales set out.*

Reason: To safeguard environmental impacts, ecology, species and habitats and maintain effective planning control.

In addition the following condition was stipulated:

Condition 8

No development shall commence unless and until the terms of appointment of an independent Environmental Clerk of Works ("ECoW") by the Company have been submitted to and approved

in writing by the Planning Authority in consultation. The terms of appointment shall:

- (a) impose a duty to monitor compliance with the ecological and hydrological commitments and mitigations measures provided in the Planning Statement, Environmental Appraisal and other information lodged in support of the application as well as that required the Construction and Environmental Management Plan, as approved;*
- (b) require the ECoW to report to the nominated construction project manager any incidences of non-compliance with the ECoW works at the earliest practical opportunity;*
- (c) require the ECoW to submit a monthly report to the Planning Authority summarising works undertaken on site;*
- (d) require the ECoW to report to the Planning Authority any incidences of non-compliance with the ECoW works at the earliest practical opportunity;*
- (e) Advising the Company on adequate protection of nature conservation interests on the site; and*
- (f) Directing the micro-siting and placement of the turbines and infrastructure.*

The ECoW shall be appointed on the approved terms throughout the period from Commencement of Development to completion of post construction restoration works.

Reason: To secure effective monitoring of and compliance with the environmental mitigation and management measures associated with the development during the construction and restoration phase.

This HMP is updated in light of these comments and in the context of a slight increase of habitat loss as a result of larger hard-stand areas to accommodate larger turbines and revisions to track layout required to align with the new hard-stands. A structure for an HMG is also incorporated into the new HMP.

This HMP will be finalised following the completion of the planning process in collaboration with The South Lanarkshire Council (SLC). A detailed version of this HMP will be produced post consent.

The developer is referred to as 'the Applicant'.

The infrastructure footprint is referred to as the 'Proposed Development' and the Survey Area comprises the Proposed Development plus 250 m.

This version of the HMP supersedes the version in 2021 from the Consented Development.

NVC quadrats from the 2024 survey are provided in Appendix A, and full workbook assessing peat landslide risk in relation to NatureScot guidance (2026a) are provided in Appendix B.

1.2 Site Details and Project Description

The Proposed Development is located on agricultural land dominated by grassland, blanket bog and rush pasture. The site is located approximately at National Grid Reference (NGR) 298935,657572, approximately 4 km northeast of the village of Forth, and covers an area of c.290 hectares.

There are a number of operational and consented (but not yet built) wind farm schemes in the vicinity of the site, including Pates Hill, Heathland, Tormywheel, Longhill Burn, Pearie Law and Harburnhead.

The Proposed Development comprises the erection of three wind turbines to a maximum blade tip height of 200 m with associated infrastructure as follows:

- Access tracks;
- Turbine foundations;

- Crane hard standings;
- Combined substation and control building;
- Temporary construction compound; and
- Borrow pit search area.

1.3 Aims and Objectives

The primary objective of the HMP is minimise effects on the extent of bog habitat by aiding the recovery, enhancement and compensation of areas affected by the Proposed Development. As such, restoration work is proposed in the north of the Site where the blanket bog is identified as being in poor condition. Much of this area is outwith the infrastructure footprint and 5 m buffer (which in tandem comprise the total loss).

Whereas within the 2021 plan the intention was to enhance this blanket bog area whilst working directly with the Pates Hill Wind Farm, - located to the north of the Proposed Development -, the area of compensation/enhancement was not quantified in the original Outline HMP, this has changed in the present document with compensation/enhancement quantified

In other respects, such as in terms of the provision of ECoW, protection and enhancement of ground water dependant terrestrial ecosystems (GWDTEs) and improving habitats for wader species known to be present, the plan remains much as per the consented OHMP.

An HMG structure is included in this update.

1.4 Scope of the Habitat Management Plan

The HMP considers the management of the habitats and species over the expected operational lifespan of the Proposed Development. Issues relating to the construction phase of the Proposed Development and the immediate re-instatement post-construction are covered within the Construction Environmental Management Plan (CEMP). A more detailed document will be provided post consent and that document will then be subject to further changes.

This HMP considers the specific features of the Proposed Development and the local area in making recommendations based on best information currently available. If aspects relating to the Proposed Development are altered, or new ecological information emerges, then the HMP will be required to be adapted accordingly. In this way the HMP, through monitoring, will take account of the successes and failures of the management measures; modifications to the management regime can then be proposed as necessary.

This is a framework plan intended to be a live document, modified and refined throughout the monitoring period of the HMP and reported through the Applicant's ECoW to SLC and stakeholders via the HMG. The proposed methodologies will therefore be refined considering emerging monitoring results.

2. Existing Survey Information

The background information presented in this section of the HMP has been sourced from the technical studies carried out as part of the Proposed Development application process for both the Consented Scheme and the Proposed Development.

A National Vegetation Classification (NVC) was undertaken on habitats within the Red line boundary in both 2021 (Consented Development) and 2024 (Proposed Development).

Protected Species surveys were conducted during the NVC surveys up to 200 m in appropriate habitat. Details on the extents for each protected species is provided in the Ecology EA: Technical Appendix 6-1.

The application of the 250 m survey buffer was applied, which allows for the identification of any potential Groundwater Dependent Terrestrial Ecosystems (GWDTEs) within 250 m of excavations anticipated to be deeper than 1 m, in line with regulator guidance (SEPA, 2024¹). This distance is considered the maximum zone of influence in relation to impact pathways upon groundwater-dependent habitats.

A hydrologist undertook a hydrogeological risk assessment for the Consented Development of potential GWDTE communities identified in the NVC survey to confirm their GWDTE status, based on both hydrogeological setting and floristics.

Bat static activity surveys were repeated in 2024 using detectors at each of the three turbine locations in the summer and autumn seasons.

The following Ornithological Surveys were carried out between September 2020 and August 2021 and therefore remain in date at the time of writing:

- Twelve months of vantage point surveys from a single vantage point location;
- Breeding wader survey within the site boundary; and
- Breeding raptor survey up to 1 km from the site boundary, dependent on public access.

The EA Technical Appendix 6-1: Ecology and Ornithology Assessment should be viewed for baseline NVC information and Annex 6-1-1 for bat data. The latter compares the two years of bat survey (2021 and 2024).

2.1 Habitats

The Survey Area was dominated by M17 *Scirpus cespitosus* – *Eriophorum vaginatum* blanket mire, which was found on the flatter higher ground to the north and west. This was surrounded by M25 *Molinia caerulea* – *Potentilla erecta* mire with the sloping ground to the south dominated by other mire (M23) and grassland (U4, MG6, MG10) communities as well as localised areas of M15 *Scirpus cespitosus* – *Erica tetralix* wet heath. The NVC communities present within the Survey Area, lost from the Proposed Development and associated nature conservation designations are summarised in Table 1 below.

Annex I habitats are natural habitat types identified by the EU Habitats Directive (Council Directive 92/43/EEC) as being of *community interest* and in need of conservation across Europe (which includes the UK) (European Environment Agency (EEA) (2026)).

A Scottish Biodiversity List (SBL) habitat is a habitat formally identified by Scottish Ministers as being of “principal importance for biodiversity conservation” in Scotland. This requirement is set out under the Nature Conservation (Scotland) Act 2004, which places a legal Biodiversity Duty on all public bodies to further the conservation of biodiversity (Scottish Government (2025)).

Table 1: NVC communities within the Survey Area (Proposed Development + 250 m) and Loss, (infrastructure + 5 m), their associated conservation designations, and GWDTE status

NVC code	NVC community / sub-community	Annex 1 habitat	SBL habitat	GWDTE status	Extent within Proposed Development + 250 m (ha.)	Total Loss (infrastructure + 5 m) (ha.)	Total Loss % of extent within Proposed Development + 250 m (ha.)
M6c M6d	<i>Carex echinata</i> – <i>Sphagnum recurvum</i> mire	None	None	Yes (Low)	2.15	0	0
M15d	<i>Scirpus cespitosus</i> – <i>Erica tetralix</i> wet heath	H4010 Northern Atlantic wet heaths with <i>Erica tetralix</i> H7130 Blanket bog, where peat depth is > 0.5 m	Raised and blanket bogs if peat depth >0.5 m	Yes (Low)	4.28	0	0
M17a	<i>Scirpus cespitosus</i> – <i>Eriophorum vaginatum</i> blanket mire	H7130 Blanket bog	Raised and blanket bogs	No	69.45	3.28	5
M23a	<i>Juncus effusus/acutiflorus</i> – <i>Galium palustre</i> rush-pasture – <i>Juncus effusus</i> sub-community	None	None	Yes (Low – Moderate)	5.44	0.31	6
M23b	<i>Juncus effusus/acutiflorus</i> – <i>Galium palustre</i> rush-pasture – <i>Juncus acutifloris</i> sub-community	None	None	Yes (Low – Moderate)	29.4	5.49	19
M25a	<i>Molinia caerulea</i> – <i>Potentilla erecta</i> mire	H7130 Blanket bog, where peat depth is > 0.5 m	Raised and blanket bogs if peat depth >0.5 m	No	37.52	1.13	2

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NVC code	NVC community / sub-community	Annex 1 habitat	SBL habitat	GWDTE status	Extent Proposed Development + 250 m (ha.)	within Total Loss (infrastructure + 5 m) (ha.)	Total Loss % of extent within Proposed Development + 250 m (ha.)
M25a	<i>Molinia caerulea</i> – <i>Potentilla erecta</i> mire	None (where peat depth is < 0.5 m)	None (where peat depth is < 0.5 m)	No	14.08	2.74	12
MG6a	<i>Lolium perenne</i> – <i>Cynosurus cristatus</i> grassland	None	None	No	8.9	0.3	3
MG10a	<i>Holcus lanatus</i> – <i>Juncus effusus</i> unimproved neutral grassland	None	None	No	17.4	3.52	20
S9a	<i>Carex rostrata</i> swamp	None	Naturally low-nutrient lochs, ponds and pools	No (not with SEPA 2024)	0.4	0	0
U5a	<i>Nardus stricta</i> – <i>Galium saxatile</i> grassland, species-poor sub-community	None	None	No	1.2	0.43	

The Survey Area was dominated by areas of blanket bog (M17a) which were found on the flatter higher ground to the north and west. Large areas are covered by an extensive network of parallel drains which may have been an historic attempt to improve the suitability for livestock (or avoid livestock being lost within deep peat). This blanket bog was surrounded by M25a *Molinia* mire, some of which is located on deep peat, with the sloping ground to the south dominated by grasslands (U5a, MG6a, MG10a) and other mire (M23a, M23b and M25a) communities. Some of the deeper M25a can be considered blanket bog in poor condition (see Figure 6-2). Much of the blanket bog is in poor condition and consecutive parallel drains crossing the area (see Figure 6-4).

The survey data demonstrates a strong relationship between topographical position and gradient with M25 on flat and gentle slopes and M17 on the largest and flattest areas, including depressions. Both M25 and M17 are fused with M6 flushes and M23 acid flushes/rush-pasture.

Grazing pressure was noted by the presence of nibbled *Molinia* which is typically an unpalatable species. The presence of U5 *Nardus stricta* grasslands on knolls, as opposed to more palatable U4 *Agrostis capillaris*/*Festuca ovina* type, was noted.

Quadrats were undertaken in several locations (see Appendix A of this report).

2.2 Fauna

2.2.1 Mammals

No evidence of mammals was seen during Protected Species surveys. Small drainage ditches are present, mainly at the edges of the survey area, and these did not reveal any protected species interest, such as otter *Lutra lutra* or water vole *Arvicola amphibius*.

No potential bat roost features were observed on any tree within the copses. The mature trees were primarily Scots pine, and no obvious fissures/cracks were visible from the ground. All broadleaved trees were either semi-mature or species with small growth forms (due to the proximity of the mature Scots pine and wind exposure) and lacked obvious bat roost potential.

2.2.2 Birds

Numerous bird species were observed during the ornithology surveys carried out between September 2020 and August 2021. High numbers of potentially breeding curlew, lapwing and snipe were noted as were large counts of non-breeding (passage) golden plover. Only curlew and non-breeding plover were taken through to impact assessment within the 2021 Environmental Appraisal, however, as all but one breeding territory was beyond the zone of influence of the proposed infrastructure footprint. This single record relates to a probable curlew territory.

Golden plover was taken forward to the impact assessment due to the high numbers of flights observed. As a result of the nationally declining status of many wader species, measures to enhance existing habitat for nesting and foraging are included in this plan.

3. Habitat Management Recommendations

The design has gone through various iterations to avoid the deepest areas of peat. Notwithstanding, given the ubiquity of blanket bog on site, 4.41 ha is lost based on direct loss and indirect loss to within 5 m. As shown in Table 1, this is comprised of 3.28 ha of M17a blanket mire and 1.13 ha of M25a mire (the latter is considered blanket bog where peat depth is > 0.5 m).

The primary requirements for mitigation/compensation/enhancement are considered to be as follows.

- To compensate/enhance for lost blanket bog with an appropriate amount of peatland restoration/enhancement (in excess of that impacted by the development);

- To ensure bog habitat temporarily disturbed during construction is reinstated;
- To protect and enhance GWDTE wherever possible; and
- To monitor the effect of the Wind Farm on wader species and habitats.

The HMP will apply throughout the lifetime of the wind farm and will involve the key stakeholders from the HMG such as the Applicant, landowner, NS, SEPA and SLC (as applicable). All costs associated with the implementation and maintenance of the HMP will be met by the Applicant.

Mitigation measures in respect of GWDTE are regarded as 'Embedded Mitigation' and detailed in the CEMP.

3.1 Habitat Management Areas (HMAs)

The Habitat Management Area (HMA) for bog restoration is shown on Figure 6-2 with prescriptions below broadly based on the NatureScot Peatland Action Technical compendium (NatureScot, 2026b).

Grassland wetting for waders is not shown here as selection of these areas will be chosen by the ECoW prior to works commencing (at which point they will be fenced to be removed from the works area).

3.2 Outline Prescriptions

The following includes, in part, measures set out in the Woolfords Environmental Appraisal, Technical Appendix 10-1; Hydrology and Hydrogeology Appraisal (part of the Consented Development).

Bog Habitats

Avoidance/Mitigation

Areas for permanent and temporary removal will be clearly demarcated on Site and communicated to the design team/contractors.

The ECoW will liaise with the design team to understand where micro-siting can help avoid areas of deepest peat.

Tracking across deep peat should be avoided and floating roads used wherever possible. Where peat < 1m deep the tracks will be of conventional 'cut' road design. Where the track crosses peat > 1m deep the method of track construction will be floating road. Floating roads have fewer impacts on peat and release less carbon than excavating peat soils. SNH (2010) Guidance will be followed for the design of track sections identified as requiring floating roads.

Movement of floating tracks over peat could lead to changes in peat hydrology. Regular maintenance of access tracks will be required in order to assess the stability of the peat.

Restoration proposals will be developed for the beneficial reuse of excavated Peat to be used alongside floating tracks for reinstatement and landscaping of verges and for remediation should settlement and ponding occur on infrastructure restoration.

Any residual peat will be used in the borrow pit areas and emplaced to raise peat wetness and groundwater levels within the peat body returning it to a more natural state.

The measures will be supervised by the ECoW and mandated in a Construction Environment Management Plan.

Compensation/Enhancement

A restoration programme of existing degraded blanket bog in the north of the Proposed Development to an area amounting to up to 14.6ha will be implemented to compensate for losses, and enhance the Site as per National Planning Framework 4 requirements (NPF4) (which sets out new requirements for development to deliver positive effects, primarily under Policy 3, and contribute to the enhancement of biodiversity, including

where relevant restoring degraded habitats (<https://www.gov.scot/publications/national-planning-framework-4/>) - see Figure 6-4). This figure also shows the extent of drains traversing the area prior to restoration.

It is useful to understand a given location's suitability as a restoration site in terms of the impacts a landslide event could have on receptors in the vicinity. Therefore, an exercise in assessing risk was carried out using NatureScot's *Blanket Bog Protocol for Assessing the Potential Impacts of Restoration on Peat landslide Risk (2026)*. OWC (formerly East Point Geo Ltd, v.1.4.1, 20/02/2026) tool. Based on the conditions at site prior to restoration and based on the proposed restoration techniques, the risk calculated is Low of an instability event (e.g. bog burst, landslide). Whilst this tool is designed for use on Peatland Action projects, it provides a qualitative judgement as to the suitability of the HMA. The pre and post restoration pages from this tool are included in Appendix B. It should be noted that this evaluation does not replace a quantitative (e.g. geomechanical) peat landslide risk assessment, should it be deemed necessary.

Restoration will be achieved through methods including ditch blocking using peat and artificial dams, backfilling and with peat waves.

Whilst some vegetated acrotelmic peat will be available, it is possible there will not be enough to create all dams. In this situation plastic or wooden dams will be used where natural material is not available. Notwithstanding, natural materials will be used preferentially.

Erosion channels will be used as a starting point for enhancement. The number and type of dams installed and intervals between them will be dependent upon the ditch gradient, width, depth, flow, best practice guidance, but as an approximate guide:

- 10-20 m intervals along furrows and drains (flat ground or shallow slopes <1 degree).
- 7.5 m intervals (2 degrees).
- 4 m intervals (4 degrees).
- 3 m intervals (5 degrees).

The restoration site is around 2 degrees slope though local increases and decreases should be considered by the ECoW.

As noted in NatureScot (2025b) hand-built peat dams can only be made in ditches no larger than 70 cm wide and 60 cm deep. Machine built dams can be in ditches no larger than 150 cm wide and 120 cm deep, depending on the peat composition.

Dams should be built to plough ridge height (or approximately 20 cm about the round surface if ridges are absent e.g. following reprofiling or stump and root plate mulching) and staggered between adjacent furrows to encourage rewetting over a wider area. Wherever possible, dams will be installed where drains are at their narrowest.

Spacing will be left at the very top and sides of dams to allow a minimal flow, not entirely blocking flow.

It should be noted that understanding of best practice peatland restoration techniques continues to evolve and as such best practice guidance at the time of work being carried out will be taken into account.

Ditch blocking

The blocking of drainage ditches will slow the seepage of water and encourage rewetting, and to encourage restoration of areas of areas which would have been peatland prior to commercial forestry. The blocking must start from the highest point of the peatland and work successively downwards. Distance between blocks should be kept minimal to allow more effective retention of water and to decrease the flow at each block or dam.

- For drain blocking, each restoration location will be assessed individually on the ground by the ECoW and designated Peat Specialist.
- The difference in water levels downstream and upstream should be limited to less than 30 cm to reduce pressure and keep the water table sufficiently high.

The need for surface protection such as biodegradable geotextile materials or the spreading of heather rich brash will be reviewed.

Backfilling

Backfilling is an alternative to the dam / blocking process described above. Backfilling involves entirely filling in a ditch or watercourse instead of blocking or creating dams at certain points. It is the most effective method for rewetting peatland but should only be done in areas of significant drying.

The best methodology to complete an entire ditch backfill is to use a large quantity of peat and lay turves on top, though it is noted that this option may not be a major method used given the lack of available turves. It is also best suited to gully blocking, and there are few large erosion features of this type present.

Throughout the process, hydrological management techniques will be assessed for their effectiveness through water table monitoring and, if required, strategies may be redesigned to increase rate and / or coverage of water table recovery.

Peat Waves

Where drains have eroded to the mineral layer 'peat waves' or elevated ridges will be installed. Ideally this would be undertaken by a 14 tonne, 1.9 m track machine to avoid compaction but also provide the space between tracks to sit across drains. Should it not be possible to use this machine (e.g. due to access difficulties) a low-pressure ground excavator should be used.

This relatively new method of grip blocking avoids the need for expensive piling panels and the labour-intensive work involved during installation. This method is not suitable for large ditches (1.5 m or more) or where there is a fast flow of water. In these situations, piling panels will be required.

For grips of this size typically a series of waves about three buckets wide are created with gaps at the edge to allow minimal water movement through the succession of waves. Hollows behind dams should not be so deep that wildlife could become stuck within these.

Monitoring will be required to ensure the ongoing stability of 'wave-dammed' areas as they may leak over time as dams settle over time. During construction this will be undertaken by the ECoW. Dams will be checked at once a month during the construction period and every two months during year 1 of the operational period. After this time, depending on the success of establishment, the monitoring period will be reviewed by the ECoW.

Habitat Surveys should be undertaken at 3-year intervals with monitoring locations identified to ensure long term condition and ensure consistency. Criteria for success should include increase in *Sphagnum* species.

Waders

Areas of agriculturally improved grassland which currently hold little interest to waders will be identified and enhanced by the ECoW. For lapwing, fields will be cut/seeded to encourage patchy clumps of taller vegetation (10-15 cm) over 20% of the field, and no more than 10% rush cover². Curlew prefers a taller and greater density of tussock to grassland ratio. These measures will benefit snipe too.

Agrochemical inputs should be limited in these areas and scrapes, waterlogged fields and splash pools should be used. Predator control should be introduced in consultation with local farmers if appropriate and safe to do so.

3.3 Habitat Management Group

The purpose of the HMG will be to provide an oversight mechanism and peer review opportunities to discuss the need for corrective actions (e.g. changes to current measures), how and when to implement them.

The HMG would be responsible for reviewing the findings of the habitat management programme and for refining the implementation of the plan if required.

The ECoW would oversee all operations and initially facilitate the creation of which it is proposed would include representatives from SLC, the Applicant, and any landholders with vested interests.

² <https://naturalengland.blog.gov.uk/2018/07/11/looking-after-our-breeding-waders-on-upland-farms/> (accessed 14 October 2021)

In accordance with good land management practice, a register of management works undertaken onsite would be maintained to monitor that such works are consistent with the agreed objectives of the HMP. A technical report would be produced at the end of each year in which habitat management and monitoring prescriptions have been undertaken. This would be submitted to the HMG for review.

The HMG would be established by the Applicant's ECoW prior to construction commencing and would ensure that prescriptions are enacted in a timely manner and the results communicated back to stakeholders. The HMG would be responsible for reviewing the findings of all prescribed monitoring as part of the habitat management programme and for refining the implementation of the plan if required. *Ad hoc* communication with the HMG including the distribution of any interim or monthly reports would be undertaken by email.

The HMG would meet annually for the first five years to ensure that the aims are progressing and to assess if any other factors have had an adverse or positive effect on the Site that were not considered. The minutes of these meetings would be communicated back to stakeholders. After the initial five-year period, results from monitoring carried out in years 10 and 15 would be communicated to the HMG.

3.4 Monitoring the Effect of the Restoration Measures

In the event that any targets relating to habitats and their conditions have not been met, these survey results would inform a review of whether any remedial action is considered necessary. The purpose of monitoring is therefore to ensure that the basis for consent is discharged and that an enhancement and significant biodiversity net gain is achieved. The prescriptions below may be revised subject to agreement with the HMG.

Blanket bog

In order to assess the effectiveness of the habitat restoration post construction, with the aim being to monitor the long-term condition of the Proposed Development, a programme of fixed-point photography and quadrat monitoring in Years 1, 3 and 5 would be in place.

The monitoring would be used to assess the effectiveness of the HMP, which can be updated to reflect this survey data. Following Year 5 it would be agreed with the HMG (see prescription 6) the frequency of surveys, which would be dependent on factors including how successful establishment has been and other land-use pressures, such as grazing densities.

Habitat monitoring would apply to 'drains' (i.e. bog) and bog restoration/creation areas, as shown on Figure 6-4: Peatland Restoration of the EA Report, considering the following criteria, as derived from McDonald *et al.* (1998), collecting a number of quantitative measures based upon that methodology namely:

- Common heather *Calluna vulgaris* cover;
- Heath cover *Erica* spp. cover;
- Bilberry *Vaccinium myrtillus* cover;
- *Sphagnum*/bryophyte cover;
- Intensity of common heather & bilberry browsing (recorded using classification categories of Low/Med/High);
- Stem breakage;
- Bryophyte depth;
- Trampled bare ground;
- Dung presence (from large herbivores);
- Dung pellets per 100 m²;
- Average height of dwarf shrubs;
- Common heather age class;
- NVC community; and
- Evidence of herbivores, such as burrows, warrens, runs, prints, etc.

Monitoring of the actual peatland restoration features would also be undertaken to check the integrity of the features and record any issues of further work requirements. If features are not performing correctly, remedial measures may be required, e.g. increasing dam frequency.

Waders

Post-construction monitoring of areas of improvement should be undertaken in years 1, 2, 3 and 5 following operations commencing with a review being undertaken as to the need for any further monitoring following year 5.

4. References

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Appendices



Appendix A. NVC Quadrats

National Vegetation Classification Survey Form

Location: Woolfords tip height increase		Altitude:
Date: 9-11 th September 2024 in dry, overcast conditions.	Surveyors: SM	Slope: lower agricultural field to south with land rising to blanket bog plateau in north (approx. elevation between 20-60 m)
Site vegetation and description: 'Site in two halves'. Lowland wet agricultural grasslands and with Molinia rush pasture on slopes to blanket bog plateau in north		Domin. Scale used (1-10)
Grid references are approximate and there may be slight differences between GRS and Figure 6-2.		

Quadrat No.	Q1	Q2	Q3	Q4	Q5
Grid reference: NS	99640 56579	99294 56814	99247 57219	99520 57401	99641 57486
NVC - M23					
Species					
<i>Deschampsia cespitosa</i>	7	6		5	5
<i>Juncus effusus</i>	7	8	7	9	9
<i>Urtica dioica</i>	4				
<i>Ranunculus repens</i>	4	2			
<i>Agrostis capillaris</i>	5	4	2	4	
<i>Rhytidiadelphus squarrosus</i>	4		5		
<i>Cirsium palustre</i>	4	2		2	1
<i>Holcus lanatus</i>		2			
<i>Trifolium sp.</i>		1			
<i>Galium saxatile</i>			5		5
<i>Juncus acutifloris</i>			7		
<i>Dryopteris dilatata</i>			4	2	1
<i>Pseudscleropodium purum</i>				4	
<i>Molinia caerulea</i>			4	1	
<i>Epilobium palustre</i>				2	
<i>Rumex acetosa</i>				2	4
<i>Viola palustris</i>				1	
<i>Potentilla erecta</i>					4
<i>Festuca rubra</i>					4

Quadrat No.	Q1	Q2	Q3	Q4	Q5
Grid reference: NS	99433 56516	98746 57641	99273 56427	99184 57202	NT 00175 57883
NVC M25					
Species					
<i>Molinia caerulea</i>	10	10	10	8	7
<i>Potentilla erecta</i>	1	4	4	1	4
<i>Rhytidiadelphus squarrosus</i>	4	4		4	3
<i>Galium palustre</i>	1				
<i>Pleurozium schreberi</i>	4		4	6	6
<i>Hylocomium splendens</i>		5	5		
<i>Polytrichum strictum</i>		4	4	4	4

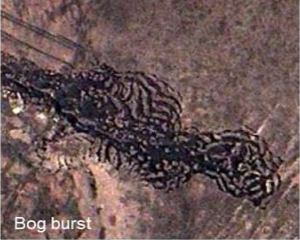
<i>Hypnum jutlandicum</i>			4		
<i>Sphagnum tenellum</i>		1			
<i>Deschampsia flexuosa</i>		1		5	6
<i>Polytrichum commune</i>		4			
<i>Carex binervis</i>					1
<i>Agrostis capillaris</i>					2
<i>Galium saxatile</i>					4
<i>Juncus squarosus</i>		2		2	4
<i>Juncus effusus</i>				1	

Quadrat No.	Q1	Q2	Q3	Q4	Q5
Grid reference: NS	98879 56342	98718 56445	99101 56914	99918 57548	99927 57498
NVC M17a					
Species					
<i>Molinia caerulea</i>	6	7	7	4	5
<i>Erica tetralix</i>	6	5			5
<i>Eriophorum vaginatum</i>	7	6	6	6	8
<i>Empetrum nigrum</i>	4				1
<i>Potentilla erecta</i>	2	4	4		4
<i>Trichophorum cespitosum</i>	6	1			
<i>Brachythecium rutabulum</i>	1				
<i>Calluna vulgaris</i>	4				
<i>Sphagnum papillosum</i>	5	5	4	4	
<i>Sphagnum medium</i>	4		4	5	
<i>Polytrichum strictum</i>	4	4	5		
<i>Pseudoscleropodium purum</i>	1				
<i>Hylocomium splendens</i>	2	4			
<i>Pleurozium schreberi</i>	4				
<i>Hypnum jutlandicum</i>		4			
<i>Sphagnum palustre</i>			5		5
<i>Sphagnum subnitens</i>			5	5	4
<i>Sphagnum capillifolium</i>			5	5	5
<i>Vaccinium oxycoccus</i>				1	
<i>Aulacomium palustre</i>				1	

Quadrat No.	Q1	Q2	Q3	Q4	Q5
Grid reference: NS	99409 57341	99696 57571	NT 00165 57866		
NVC M6					
Species					
<i>Juncus effusus</i>	10	10	9		
<i>Galium saxatile</i>	4	4	4		
<i>Sphagnum subnitens</i>	4	4	2		
<i>Sphagnum fallax</i>	4		4		
<i>Molinia caerulea</i>		4	5		
<i>Polytrichum commune</i>	4				
<i>Pseudoscleropodium purum</i>	2				
<i>Festuca rubra</i>	4				
<i>Potentilla erecta</i>	4	2			
<i>Cirsium palustre</i>		1			
<i>Rumex acetosa</i>		2			
<i>Agrostis capillaris</i>			4		
<i>Holcus lanatus</i>			2		
<i>Sphagnum palustre</i>		5			
<i>Pleurozium schreberi</i>	5				

Appendix B. Assessment of the Potential Impacts of Restoration on Peat Landslide Risk

STEP 1. Calculate the baseline, or "pre-restoration" likelihood of a peat landslide (i.e. the chance of a natural peat slide occurrence in the current site condition)

Please answer ALL the questions below (note that the assessment is not valid unless all entries are completed).	Answers Required	How to answer the question	Further Information
i) Are there any pre-existing peat landslide scars within the area to be restored or nearby? Is there any evidence of a pre-existing peat slide or bog burst within the area to be restored, on the adjacent hillsides, on the other side of the hill or on the opposing valley side. See "How to answer" for examples.	NO	If either 'peat slides' or 'bog bursts' are present, enter YES as the answer to question i).  Peat slide Slab failures with large areas of exposed mineral substrate (typically grey)  Bog burst 'Ribbon' failures with strong patterning and exposed peat (typically black)  Peaty-debris slide (not assessed) Failures in soil, typically small, steep and with mineral substrate and shadowing	Report Section 2.2.1
ii) What is the average peat depth (in m) based on the probes collected from site? How deep is the peat on average across the area to be developed, if restoration works are to be focused in an area that is not representative of the average peat depth (e.g. in a locally deep area), select a value that corresponds to this area instead. See "How to answer" for further guidance.	3.0 - 3.5	EITHER total the peat depths across all samples and divide by the number of samples (see right) 14 locations totalling 46m = mean of 3.3m  OR, select a representative peat depth using data from the area to be restored (see right) Central location of 3.8m 	Report Section 4.2.1.1
iii) What is the average slope angle for the hillside based on elevation data for the site? Enter data for only <u>one</u> of the following: Enter slope angle: Enter the slope angle as a 'gradient' (in %), e.g. if using Google Earth's elevation profile tool: Enter the 'rise' (elevation change in m) and 'run' (distance in m over which elevation changes): See how to answer for further guidance. Useful links: https://www.google.co.uk/earth/download/gep/agree.html https://magic.defra.gov.uk/MagicMap.aspx Google Earth Pro download MagicMap online viewer Angle: Gradient (%): Rise: Run:	4.4 - 8.7	EITHER draw a path in Google Earth and use the "Elevation Profile" tool to read off the "Avg. Slope" value and select the corresponding range in the Gradient (%) box Google Earth  OR use contours on MagicMap to determine 'rise and run' and enter values in Rise and Run boxes OR enter value from DTM of site MagicMap 	Report Section 4.2.1.2
iv) What is the substrate? What is the material immediately underlying the peat (i.e. within a few centimetres) primarily made up of? See "How to answer" for further guidance. Useful links: http://mapapps.bgs.ac.uk/geologyofbritain/home.html? BGS Geology of Britain online viewer Note that NatureScot internal staff may have access to the NS Geology layer containing equivalent information	Unknown	EITHER use observations from site (e.g. at the base of the peat profile, as observed in gullies, drains, cuttings, stream margins)  OR refer to BGS "superficial" geology layer in the Open Geology of Britain Viewer. Where 'None recorded', enter 'Unknown' in substrate box 	Report Section 4.2.1.4
v) Which of the following best describes the geomorphology of the peat on site? What is the natural geomorphological condition of the area to be restored. This is best determined from either site walkover or review of up-to-date satellite imagery - see "How to answer" for a visual glossary of geomorphological features.	Planar (no other features)	EITHER use site observations or refer to the visual glossary of peatland geomorphology to the right:  Planar with pipes  Planar (no other features)  Planar (with pools)  Slightly eroded (isolated gullies)  Heavily eroded (extensive haggings)  Undulating peat among rock outcrops	Report Section 2.1
vi) Are any of the following land uses present over the area to be restored? What is the primary land use of the area to be restored. This is best determined from site walkover but can also be determined from satellite imagery for some categories of land use.	Machine cutting	EITHER use site observations or refer to the visual glossary of land uses to the right:  Machine cutting  Hand cutting	Report Section 4.2.1.8

		Burning Forestry													
vii) Which of the following best describes the status and condition of forestry on site? If the site is afforested over most of the proposed restoration area, please refer to the "How to answer" guidance in order to classify the alignmentof trees (rows) and present (pre-restoration) status of the forest (e.g. felled or afforested). If the site is part-forested, consider splitting the site into separate protocol workbooks.	Not afforested	Refer to the visual glossary or forest status and condition to the right: Afforested, rows aligned Afforested, rows oblique Unforested, rows aligned Unforested, rows oblique	Report Section 4.2.1.7												
viii) Which of the following best describes the slope profile of the area to be restored? What is the slope profile (shape as if 'side on') of the hillslope over which restoration is to be carried out. This can be inferred from changes in contour spacing or using Google Earth's elevation profile tool - see "How to answer" guidance.	Rectilinear	EITHER draw a path in Google Earth and use the "Elevation Profile" tool to view the profile shape in the main part of the site to be restored OR Use contour spacing on MagicMap to identify the slope profile Google Earth MagicMap Convex Rectilinear Concave	Report Section 4.2.1.3 For a walk through guide to both Google Earth and MagicMap, click here: GE / MM Guide												
ix) Which of the following best describes artificial drainage in the area to be restored How are the artificial drains on site arranged in the area to be restored? If the site is afforested, drains will be visible as narrow linear breaks in the treeline, often cross-cutting rows of trees. See "How to answer" guidance to help determine drain orientation.	Aligned to contour	Refer to the visual glossary of drain orientation (right) and use MagicMaps to determine slope direction (from contours). Use the 'majority' of drains to inform the answer. Aligned to contour Oblique to contour Aligned to slope	Report Section 4.2.1.6												
x) What type of peat is found at the base of the area to be restored The physical composition of the peat at the base of the peat profile (within a few centimetres of its contact with the substrate) provides an indication of its shear strength. Using the simplified descriptions in the "How to answer" guidance, enter the description that best suits the peat observed at site. If no information is entered, the Factor of Safety approach will not be used for comparison.	Amorphous	Refer to the table to the right to determine the type of peat (requires site observations or field logs of peat character, e.g. using von Post) <table><tr><th>Type of Peat</th><th>von Post</th><th>Description</th></tr><tr><td>Fibrous</td><td>H3 - H5</td><td>Plant remains clearly recognisable and retain some tensile strength. Water and no solids on squeezing.</td></tr><tr><td>Pseudo-fibrous</td><td>H6 - H8</td><td>Mixture of fibres and amorphous paste. Turbid water and <50% solids on squeezing.</td></tr><tr><td>Amorphous</td><td>H9 - H10</td><td>No recognisable plant remains, mushy consistency. Paste and >50% solids on squeezing.</td></tr></table>	Type of Peat	von Post	Description	Fibrous	H3 - H5	Plant remains clearly recognisable and retain some tensile strength. Water and no solids on squeezing.	Pseudo-fibrous	H6 - H8	Mixture of fibres and amorphous paste. Turbid water and <50% solids on squeezing.	Amorphous	H9 - H10	No recognisable plant remains, mushy consistency. Paste and >50% solids on squeezing.	Report Section 4.3.3.1
Type of Peat	von Post	Description													
Fibrous	H3 - H5	Plant remains clearly recognisable and retain some tensile strength. Water and no solids on squeezing.													
Pseudo-fibrous	H6 - H8	Mixture of fibres and amorphous paste. Turbid water and <50% solids on squeezing.													
Amorphous	H9 - H10	No recognisable plant remains, mushy consistency. Paste and >50% solids on squeezing.													

Based on the landslide susceptibility (contributory factor) approach:

The baseline (pre-restoration) likelihood of a peat landslide is:

MODERATE

This means that a landslide at the site is:

possible, given baseline conditions and the occurrence of a triggering event (e.g. intense rainfall, pipe collapse, adverse loading) somewhere within the restoration area

The most likely form of instability is:

BOG BURST

Based on the Factor of Safety approach:

The baseline factor of safety for average site conditions in a fully saturated slope (i.e. ground surface water table) is:

1.0

STEP 2. Calculate the post-restoration likelihood of a peat landslide, i.e. the effects of restoration groundworks on the natural likelihood

1. Which restoration measures are being adopted?

Select 'YES' or 'NO' for all measures being adopted from the list of restoration techniques below.

For non-afforested bogs only		Net effect on stability
Ditch-blocking (peat dams)	YES	Slight reduction in stability
Ditch-blocking (plastic piling dams)		n/a
Ditch-blocking (wooden or composite dams)		n/a
Ditch-blocking (drain reprofiling)		n/a
Ditch-blocking (wave dams)	YES	Slight reduction in stability
Ditch-blocking (zipping)		n/a
Deep bunding (trench / backfill) (<20m from bog margin)		n/a
Cell / surface / fish-scale / scallop / finger bunding		n/a
Gully reprofiling		n/a
Gully damming / bunding (stone / surface bunds)		n/a
Bare peat textile application		n/a
Bare peat whole turving		n/a
Bare peat transplanting, seeding or mulching		n/a
Scrub removal		n/a
For afforested bogs only:		
Forest to bog: tree harvesting		n/a
Forest to bog: ridge and ditch/furrow blocking		n/a
Forest to bog: ground smoothing / stump flipping		
Stump flipping only		n/a
Stump flipping and brash incorporation		n/a
Stump flipping, brash and stem incorporation		n/a
Ditch-blocking (peat dams)		n/a
Ditch-blocking (plastic piling dams)		n/a
Ditch-blocking (wooden or composite dams)		n/a
Ditch-blocking (drain reprofiling)		n/a
Ditch-blocking (wave dams and/or zipping)		n/a

Based on the landslide susceptibility (contributory factor) approach:

The post-restoration (modified) likelihood of a peat landslide is:

MODERATE

This means that a landslide at the site is:

possible, given the proposed restoration techniques, A CONSEQUENCE ASSESSMENT IS REQUIRED

Based on the factor of safety (limit equilibrium) approach:

The modified factor of safety post-restoration* is:

1.0

* the following techniques are covered in this calculation (note that the 'net effect on stability' comments do not apply to this output):

- gully reprofiling / damming / bunding (by application of buttressing)
- tree harvesting (by change of water table, tree loading and peat density) and ditch/furrow blocking (by application of buttressing)

3. Calculate the consequences should a landslide occur

1. Do "blueline" watercourses occur within 500m of the area to be restored (either on the slope or at its foot)?

If yes, go to next question and if no, go to question 3

2. Which of the following statuses applies to the watercourse(s)? (up to and including 5km downstream)

There is a Private Water Supply in continuous or intermittent use

There is a Public Water Supply (reservoir)

There is a designated (SAC, SSSI, SPA, Ramsar) watercourse or connecting watercourse

The qualifying interests of the designation(s) are likely to be affected by smothering with peat or a short term acid pulse

3. Which of the following applies to the terrestrial habitats on site?

Groundwater dependent terrestrial ecosystems (GWDTEs) are present

There are designated habitats (Natura, SSSI) within or downslope of the proposed restoration area

The qualifying interests of the designation(s) are likely to be affected by smothering with peat or a direct loss of peat (with overlying habitat)

4. Which of the following species are observed on or near to site?

European Protected Species (EPS) have been confirmed in restoration area (or within 1km)

Are the EPS likely to be nesting / resident during restoration works?

Will the EPS be likely to leave the site permanently if its habitat is disturbed?

Other vulnerable species have been confirmed in restoration area (or within 1km)

Vulnerable birds

Freshwater Pearl Mussels present in watercourse within 5km

5. Is there a credible runout pathway to any of the following publicly accessible areas within or adjacent to the site?

Footpaths / cycle trails / access track

Is the footpath / cycle trail / access track used regularly (daily)?

Temporarily occupied facility (e.g. hide, building, picnic area, unoccupied farm barn)

Permanently occupied facility (e.g. house, office, other amenity)

6. Is there a credible runout pathway to any of the following infrastructure / land uses within or adjacent to the site?

Public road

Railway line

Power generation facility (towers, turbines, buried cables, substations, etc)

Other infrastructure (water supply facility, telecomms facility)

Grazing / stock (sheep, deer, cattle)

Arable (standing crops, productive land)

7. Is there a credible pathway to any of the following historic and/or cultural sites/monuments/buildings within or downslope of site?

Scheduled monument

Other Nationally Important historic site/building

Based on the conditions at site prior to restoration and on the proposed restoration techniques, the risk calculated is:

Given that risk has been calculated to be LOW, restoration may continue as planned.

		Adverse Consequence				
		Very High	High	Moderate	Low	Very Low
Peat landslide likelihood	Very High	High	High	Medium	Low	Low
	High	High	Medium	Medium	Low	Negligible
	Moderate	Medium	Medium	Low	Low	Negligible
	Low	Low	Low	Low	Negligible	Negligible
	Very Low	Low	Negligible	Negligible	Negligible	Negligible

Risk Level	Can Restoration Proceed?
High	Avoid restoration at these locations or utilise minimally intrusive restoration techniques
Medium	Baseline conditions in combination with restoration proposals represent a significant risk. Alternative restoration proposals may represent a lower risk
Low	Restoration may proceed as proposed, assuming good practice techniques and monitoring during groundworks
Negligible	Restoration may proceed as proposed, assuming good practice techniques and monitoring during groundworks