Loch Toftingall BESS

Appendix 10.2 – Outline Peat Management Plan

August 2023

Project No: 0669684

The business of sustainability

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1. INTRODUCTION

1.1 Background

This outline Peat Management Plan (oPMP) for Loch Toftingall Battery Energy Storage System (BESS) (the Proposed Development) has been prepared initially to inform Highland Council and statutory consultees of the estimated peat excavation & re-use potential and proposed peat & soils management methodologies to be employed during construction.

This oPMP has been prepared to be a technical appendix to an Environmental Report (ER) for the Proposed Development. This oPMP will support the Proposed Development to be a construction project that complies with good practice in accordance with Scottish Renewables (SR) and Scottish Environment Protection Agency (SEPA) guidance.

The purpose of the oPMP is to:

- Define the materials that will be excavated as a result of the Proposed Development, focusing specifically on the excavation of peat;
- Report on detailed investigations into peat depths within the Proposed Development;
- Detail proposals for the management of excavated peat and other soils;
- Consider the potential effect of the Proposed Development on Ground Water Dependant Terrestrial Ecosystems (GWDTEs);
- Determine volumes of excavated peat at the Site and proposals for re-use or reinstatement using excavated materials; and
- Provide details of required general and site-specific mitigation measures.

This oPMP has been produced in accordance with SR and SEPA guidance on peat excavations and management[1]. It is also intended to be a document that will evolve during the different phases of the project and will therefore be subject to continued review to address:

- Requirements to discharge future planning conditions;
- Detailed ground investigations and design development;
- Unforeseen conditions encountered during construction; and
- Changes resulting from the construction methods used by the contractor(s).

Whilst this oPMP provides a base standard for good practice, where avoidance or further minimisation of risks to the environment can be demonstrated through use of alternative methods or improvements to current practices, the contractor will implement these wherever possible and will correspond with SEPA and Highland Council.

This oPMP is accompanied by the following appendices:

- Appendix A – Figures; and
- Appendix B – Excavation and Re-use Volumes and Calculations.

[1] SR and SEPA (2012) Guidance on the Assessment of Peat volumes, Re-use of Excavated Peat and the Minimisation of Waste [Online] Available at: https://www.gov.scot/binaries/content/documents/govscot/publications/advice-and-guidance/2014/07/assessment-of-peat-volumes-reuse-of-excavated-peat-and-minimisation-of-waste-guidance/documents/guidance-on-the-assessment-of-peat-volumes-reuse-of-excavated-peat-and-the-minimisation-of-waste/guidance-on-the-assessment-of-peat-volumes-reuse-of-excavated-peat-and-the-minimisation-of-waste/govscot%3Adocument/Guidance%2Bon%2Bthe%2Bassessment%2Bof%2Bpeat%2Bvolumes%252C%2Breuse%2Bof%2Bexcavated%2Bpeat%252C%2Band%2Bthe%2Bminimisation%2Bof%2Bwaste.pdf (Accessed 24/04/2023)

1.2 The Site

The Site is located in the Scottish Highlands, approximately 2 km southeast of Spittal, Caithness. The Site falls within the administrative area of Highland Council, covering an area of approximately 40.3 hectares (ha). The Site is centred at NGR 318201, 951950 on gently sloping land ranging between approximately 100m Above Ordnance Datum (AOD) near the Site entrance and 75m AOD at the Easternmost point of the Site.

The land within the Site boundary consists predominantly of forestry plantations with an area of deforested land where access tracks have been proposed between the existing Halsary Wind Farm and the large, forested area in the north of the Site. The Site will be accessed via Halsary Wind Farm, which is adjacent to the A9. The Loch of Toftingall is approximately 400m east of the Site.

1.3 The Proposed Development

The Proposed Development will involve the construction and operation of a BESS facility, including a 100m x 65m compound, 52 battery units and a 50m x 50m potential future Augmentation Area.

The 'Site Layout Plan' is shown in Figure 10.2.1 in Appendix A.

1.4 Consultation

Peat management within the Site, both excavation/disturbance and the reinstatement/restoration, was considered throughout the assessment of the Proposed Development and the outcomes of studies are reported in the ER. The ER forms part of the planning application and is made available to all consultees, including SEPA.

Correspondence with SEPA in May 2019 highlighted that the Site layout should aim to avoid areas of deep peat. Avoiding peat disturbance as much as possible will minimise the release of CO_2 into the atmosphere and will also reduce the likelihood of the drying out or oxidisation of peat. Mitigation measures relating to the excavation, handling, storage and re-use of peat are outlined in Section 4 of this oPMP.

2. OBJECTIVES

2.1 Introduction

The use of Desk studies, detailed field survey work and completion of technical assessments, such as the PSRA for the ER, allows for a consistent approach to the management of peat.

The preparation of this oPMP is a response to the scoping responses received May-June 2019 and the intent to deliver a construction project that complies with good practice in accordance with SR and SEPA guidance.

The overall objective of the civil engineering design of the Proposed Development has been to minimise the excavation of peat where possible and achieve an overall material balance at the Site, as far as is reasonably practicable. This is exemplified through the design evolution, in which the scale of the Proposed Development has reduced significantly and; in turn, significantly reducing the impact on the deepest peat at the Site. The re-use of existing access tracks, constructed for Halsary Wind Farm, as the entrance to the Site is another example of reducing impact on peat through design. This approach is considered to present the best opportunity for peat reinstatement or restoration in accordance with good practice and the methods set out in **Appendix 7.2: Outline Habitat Management Plan (oHMP)**, while removing the need for waste management controls.

The objectives of the oPMP are achieved by:

- Ensuring the characteristics of the Site are understood through targeted peat probing and assessing the Site topography;
- Understanding the extent of the Site layout and how excavations will take place;
- Modelling the peat depth profile based on probing and a digital terrain modelling in 3D;
- Considering the best practice advice for peat reinstatement; and
- Developing practical peat restoration opportunities for improvement of habitats and peatlands.

This oPMP has been compiled in accordance with the following best practice guidance:

- Guidance on Developments on Peatland: Peatland Survey[2];
- Guidance on Developments on Peatland: Guidance on the Assessment of Peat Volumes, Re-use of Excavated Peat and Minimisation of Waste[3]
- Floating Roads on Peat Guidance[4]; and
- SEPA Regulatory Position Statement – Developments on Peat[5].

2.2 Approach to Minimising Peat Excavation

The following steps have been taken during the outline design stage of the Proposed Development to minimise the effect on peat:

[2]SNH (2017) Guidance on Developments on Peatland: Peatland Survey (2017) [Online] Available at: https://www.gov.scot/binaries/content/documents/govscot/publications/advice-and-guidance/2018/12/peatland-survey-guidance/documents/peatland-survey-guidance-2017/peatland-survey-guidance-2017/govscot%3Adocument/Guidance%2Bon%2Bdevelopments%2Bon%2Bpeatland%2B-%2Bpeatland%2Bsurvey%2B-%2B2017.pdf (Accessed 24/04/2023)

[3] Scottish Government (2014) Assessment of Peat Volumes, Reuse of Excavated Peat and Minimisation of Waste [Online] Available at: https://www.gov.scot/publications/assessment-of-peat-volumes-reuse-of-excavated-peat-and-minimisation-of-waste-guidance/ (Accessed 24/04/2023)

[4] SNH (2010) Floating Roads on Peat [Online] Available at: http://www.roadex.org/wp-content/uploads/2014/01/FCE-SNH-Floating-Roads-on-Peat-report.pdf (Accessed 24/04/2023)

[5] SEPA (2010) SEPA Regulatory Position Statement – Developments on Peat [Online] Available at: https://www.sepa.org.uk/media/143822/peat_position_statement.pdf (Accessed 24/04/2023)

- The development of an access track design which avoids deeper peat where reasonably practicable;
- The development of an access track design which uses existing tracks where possible;
- The development of an access track design where tracks can be floated through areas of deep peat, where gradients permit; and
- The design and orientation of infrastructure considers local topography, deep peat and other environmental constraints.

At detailed design and construction stage these steps will be supplemented by taking the following measures to minimise disturbance:

- Maximisation of batter angles in cuttings where practical.
- Consideration of floating tracks.
- The use of appropriate construction plant to avoid unnecessary disturbance of the ground surface.

The fundamental principal upon which this oPMP is based is that achieving a successful materials strategy is contingent on gaining a thorough understanding of the Site through investigation and developing a design that achieves the materials management objectives. For the Proposed Development, this principle is achieved by undertaking peat investigation works prior to preparing this oPMP and taking account of consultee comments & environmental constraints in a dynamic design approach.

2.3 Aims and Objectives

2.3.1 Need for a Peat Management Plan

The significance of peatlands is most evident in their protection by various legislation, policy and local, national or international initiatives including but not limited to:

- United Kingdom Biodiversity Action Plan (UKBAP)[6].
- Scotland's National Peatland Plan (SNH, 2015)[7].
- European Council Habitats Directive 92/43/EEC (Council of the European Communities, 1992)[8].
- Scottish Biodiversity List (SBL) (Scottish Government, 2020)[9];
- Scottish Government discussion paper on the Management of Carbon-Rich Soils (Scottish Government, 2011)[10].
- Scottish Soil Framework (Scottish Government, 2009)[11]; and

[6] UK Government, 1994: UK Biodiversity Action Plan [online] available at: UK BAP | JNCC - Adviser to Government on Nature Conservation (accessed 24/04/2023)

[7] NatureScot, 2015: Scotland's National Peatland Plan: Working for our future [online] available at : Scotland's National Peatland Plan: Working for our future | NatureScot (Accessed 24/04/2023)

[8] European Union, 1992: Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora [online] available at: Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora (legislation.gov.uk) (Accessed 24/04/2023)

[9] Scottish Government, 2020: Scottish Biodiversity List [online] available at: Scottish Biodiversity List | NatureScot (Accessed 24/04/2023)

[10] Scottish Government, 2011: Low Carbon Scotland – meeting the emissions reduction targets 2010 – 2022: report [online] available at: https://www.gov.scot/publications/low-carbon-scotland-meeting-emissions-reduction-targets-2010-2022-report/pages/10/ (Accessed 24/04/2023)

[11] Scottish Government, 2009: The Scottish Soil Framework [online] available at: The Scottish Soil Framework - gov.scot (www.gov.scot) (Accessed 24/04/2023)

- Climate Change Plan (2017-2032) (Scottish Government et al., 2017)[12].

SEPA has a statutory and legislative duty to ensure that where peat soil is generated during construction, it is stored, re-used, treated or disposed of correctly, which may require authorisation or permits.

SEPA's policy on the management of peat is set out within SEPA Regulatory Position Statement – Developments on Peat. This highlights that the best management option for peat spoil is the prevention of its production, by seeking to minimise peat excavation and disturbance. Where this is unavoidable, developers should attempt to re-use as much of the peat produced on-site as is possible, in justifiable and environmentally beneficial ways.

This oPMP is prepared to demonstrate to the local authority, SEPA and other consultees that the construction of the Proposed Development will progress in an orderly manner, is in accordance with good practice and achieves the aim of being environmentally sustainable.

The oPMP is therefore prepared in accordance with the SR and SEPA guidance. It details how:

- The Proposed Development has been structured and designed so far as is reasonably practicable to reduce the volumes of peat excavated;
- Volumes of peat excavated during the course of the works have been considered in the design; and
- Excavated peat will be managed.

2.3.2 Objectives of the oPMP

The primary objective of the oPMP is to outline how any peat proposed to be excavated will be managed and re-used during the construction of the Proposed Development.

This is achieved through responding to the following objectives:

- Providing a description of the extent and depths of peat at the Proposed Development and how this was determined;
- Estimation of peat volumes to be excavated and used in reinstatement;
- Classification of excavated materials;
- Consideration of the use of appropriate peat(s);
- Describing how excavated peat will be handled to ensure suitability for re-use;
- Determining if temporary storage of peat will be required during construction and how this will be done to ensure suitability for re-use; and
- How any surplus peat will be utilised in peat restoration through Habitat Management Plan.

The response to these objectives is provided in the following sections of this oPMP.

[12] Scottish Government, 2017: Draft climate change plan: draft third report on policies and proposals 2017 – 2032 [online] available at: Draft climate change plan: draft third report on policies and proposals 2017-2032 - gov.scot (www.gov.scot) (Accessed 24/04/2023)

3. PEAT INVESTIGATIONS, EXCAVATION, RE-USE AND MANAGEMENT

3.1 Peat Classification and Published Geology

3.1.1 General Peat Classification

Peat is a sedimentary material, which is dark brown or black in colour, and comprises partially decomposed remains of plants and organic materials preserved in anaerobic conditions, essentially within a waterlogged environment. There are two principal types of peat.

Acrotelmic peat is the upper layer of peat consisting of living and partially decomposed material with a higher hydraulic conductivity and a variable water table. These deposits are generally found to exist in the upper 0.5m of peat deposits and is typically suitable for re-instatement because it contains viable plant life to assist in the regeneration of peatland vegetation and carbon sequestration.

Catotelmic peat is variable in characteristics, with decomposition of fibres generally increasing with depth. Water content can be highly variable and affects the structural strength of the material. Suitability for re-use generally depends on fibre and water content. The upper catotelm is commonly deemed as being appropriate for re-use in restoration due to its relatively high fibre content.

Generally, excavated semi-fibrous catotelmic peat from the Site will have sufficient structural strength to be able to be used in the lower layers of verge restoration as it will not be 'fluid'.

The catotelmic peat would be capped with a surface layer of acrotelm to re-establish the peat vegetation. If any fluid like wet catotelmic peat is encountered then it would be placed in more appropriate locations such as low-lying concave deposition areas, where practical.

The following assumptions have been made in classifying peat excavated during the construction work:

- Where the total peat depth was found to be less than 0.5m, this peat material is assumed to be 100% acrotelmic;
- Where the total peat depth is between 0.5m and 1.0m, the upper acrotelmic peat is at least 0.5m deep; and
- Where the total peat depth is found to be greater than 1.0m, acrotelmic peat is assumed to account for at least 30% of the total depth but generally applying minimum of 0.5m thick.

Existing topography and permitted track gradients drive the design of the infrastructure with due consideration given to potential construction risk and effects on environmentally sensitive receptors including deep peat, watercourse buffers and any GWDTEs. Further micro-siting post-consent would take place in such a way as to avoid where possible the excavation of deep peat.

3.1.2 Published Geology

Published data from British Geological Survey (BGS)[13] indicates that the entirety of the Site is underlain by peat. The superficial soils are displayed in Figure 10.2.2, contained within Appendix A

Published bedrock geology mapping indicates that the Site is underlain by a sedimentary Spital Flagstone Formation, consisting of Sandstone, Mudstone and Siltstone. The bedrock units underlying the Site are displayed in Figure 10.2.3 in Appendix A.

[13] British Geological Survey (2019): Geology Viewer [online] available at: BGS Geology Viewer (BETA) (Accessed 24/04/2023):

3.1.3 Investigations

The existing peat depths across the Site have been determined through a phased survey approach. The survey was initiated to inform the assessment and design of the Proposed Development while supporting the PSRA and oPMP.

Preliminary peat probing was undertaken as part of the initial site optioneering, which was superseded by phases of detailed peat probing focussing on the Proposed Development. The survey comprised a total of 195 probes.

Phase one probing was carried out by Arcus (part of the ERM Group) in 2019 as part of preliminary assessment works for a previous wind farm application. This phase of probing consisted of probes being sunk in a 100m grid across the whole Site, where possible. The Proposed Development was revised to a two-turbine layout in 2020, covering a much smaller area than the previous iteration. The initial survey gathered sufficient data to inform an indicative site layout. In 2023, both turbines were dropped from the design and the Proposed Development was revised from a wind farm to a BESS site.

Phase two probing was carried out in June 2022 by Arcus. The survey was conducted largely in accordance with the Scottish Government guidance, with some deviation from the standards due to dense forestry plantations rendering parts of the Site inaccessible. This stage of probing was carried out with the aim of targeting formally proposed infrastructure, much of which has now been dropped from the Proposed Development. As a result, the stage two data gathered throughout the Site is more extensive than the current infrastructure footprint. Data was gathered at the Site according to the following methodology:

- Probes were sunk at 50m centres along the proposed access track, with points perpendicular to the track at 25m offsets; and
- Probes were sunk in a 25m x 25m grid across the proposed substation and BESS compound.

Additional probing was carried out in July 2022 as a result of revisions to the infrastructure layout. The revised access track and substation and BESS compound were surveyed using the same methodology as was used in previous phase two probing.

Further design changes were made in March 2023 and it was determined that sufficient data was gathered across all phases of probing to inform the current infrastructure layout.

The peat depths are illustrated in Figure 10.2.4: Recorded Peat Depths within Appendix A of this oPMP.

3.1.4 Summary of Peat Depths

Peat depths ranged from 0m to 5.0m thickness across the Site, with over 81% of the probes confirming peat depths in excess of 1.0m. The average depth of peat across the whole Site was found to be 2.68m.

As deep peat is not confined to a specific area within the Site, some of the proposed infrastructure will be underlain by deeper peat. In order to limit the peat disturbance on site, it is recommended that micro-siting be used, where possible, for infrastructure currently sited in areas of deeper peat.

Figure 10.2.5: ‘Interpolated Peat Depths’ included in Appendix A illustrates the peat depths recorded across the Site, the distribution of peat deposits along the proposed access tracks and infrastructure.

3.2 Excavation and Re-use Calculation

Excavated peat volumes have been calculated using the 3D design model of the Proposed Development. This model is compared to the 3D peat surface model, which is based on the extensive peat probe surveying undertaken as well as topographical surveys carried out on the Site.

In addition, a contingency bulking factor has been applied which is equal to 10% of the total volume of excavated material.

Through analysis of these 3D models, it is possible to calculate the volume of excavated material and estimate what this material is comprised of; be this non peat superficial soils, peat or other materials. Table 1 displays the various construction activities that will generate excavated peat as well as displaying the expected volume produced from each activity based on the 3D modelling analysis. This calculation does not take micrositing into account, this measure can however be employed by the contractor to reduce the volume of excavated peat.

Table 1: Peat Excavation Volumes Based on Construction Activity

Infrastructure Component	Estimated Volume of Excavated Peat (m^3)	Estimated Volume of Acrotelmic Peat (m^3)	Estimated Volume of Catotelmic Peat (m^3)
Construction of New Tracks	3,619	1,925	1,694
Potential Augmentation Area	3,798	1,266	2,532
BESS compound	11,375	3,250	8,125
SUB-TOTAL	**18,792**	**6,441**	**12,351**
+ 10% contingency Bulking Factor	**1,879**	**644**	**1,235**
TOTAL	**20,671**	**7,085**	**13,586**

A detailed assessment of excavated volumes by location within the Site is provided in Appendix B of this report.

3.2.1 Estimation of Peat Re-use Requirements

The principles of peat reinstatement should be adhered to for all elements of the infrastructure, comprising of the following:

- In the event that quality deep peat is subject to excavation, full reinstatement of the peat is required to prevent loss of the resource;
- Shallow Peat and peaty soils will be reinstated on access track and infrastructure verges with turves places on the upper horizons, encouraging revegetation;
- All peat, soil and turves excavated from beneath infrastructure will be reinstated in the vicinity of its original location; and
- Any wet catotelmic peat will be placed at the bottom of any restoration profile, followed by semi fibrous catotelmic peat and then acrotelmic peat should be placed on top with turves capping the material at surface.

3.2.2 Peatland Restoration Potential

The outline objectives in proposing the restoration of peat resources present on the Site is to:

- Ensure residual volumes of excavated peat from the Proposed Development are re-used in areas where ecological benefits and carbon sequestration can be maintained or increased;
- Promote the re-use of excavated peat materials and avoid their disposal to landfill;
- Promote use of best practice and guidance to ensure that benefit is made from reusing peat and peaty soils for ecological enhancement; and

Restoration activities will be overseen by the Ecological Clerk of Works (ECoW) to ensure that methods are properly adhered to.

The areas proposed for peatland restoration at the Site are deforested areas, with furrow filling, ditch blocking and peat dams likely to be the most suitable restoration techniques, these are discussed in greater detail in section 3.2.3 of the oPMP.

Table 2 shows the opportunities for re-use of peat within the Site, including the demand for acrotelmic and catotelmic peat. Table 3 summarises the total peat balance estimated during construction of the Proposed Development. Detailed excavation calculations are included in Appendix B.

Table 2: Peat Re-use Volumes Based on Construction Activity

Development Area	Total Demand Estimate (m^3)	Acrotelm Demand (m^3)	Catotelm Demand (m^3)	Reinstatement Thickness (max) (m)	Assumptions
Construction of new access tracks	4,620	2,310	2,310	1.0	Either side of the access tracks will be reinstated by up to 1.0m of peat out to a width of 3.0m. The top 0.5m of reinstated peat is assumed to be acrotelmic.
Potential Augmentation Area	675	225	450	1.0	The perimeter of the potential Augmentation Area will be reinstated by up to 1.0m out to a width of 3.0m. The top 0.5m is assumed to be acrotelmic.
BESS Compound	840	420	420	1.0	The perimeter of the BESS compound will be reinstated by up to 1.0m out to a width of 3.0m. The top 0.5m is assumed to be acrotelmic.
SUB-TOTAL	**6,135**	**2,955**	**3,180**		
Habitat management and peat restoration	14,536	4,130	10,406		Methods used will be ditch blocking, peat dams and furrow filling.
TOTAL	**20,671**	**7,085**	**13,586**		

Table 2 summarises the assessment of peat restoration volumes. A detailed assessment is provided in Appendix B.

The following assumptions have been made in assessing peat re-use:

- New sections of access tracks are assumed to have verges and earthworks on both sides of the track with widths of approximately 3.0m based on the topography of the Site. As the access tracks will have graded slopes, peat depths will vary across the profile to tie into the existing ground level, but it is assumed that peat depths will not exceed 1.0 m;
- No peat will be placed on access track verges where the local topography is steep and/or a watercourse is in close proximity;

- Peat will only be laid to a thickness that maintains hydrological conditions to avoid it drying out. It will not be used as a thin layer or on steeper non-peat slopes. Low verges and landscaping will be formed to permit surface water to drain off of the access tracks; and
- Reinstatement at the BESS compound and potential Augmentation Area assumes a maximum peat depth thickness of 1.0m, including the re-use of acrotelmic peat and turves.

Excavated peat will be temporarily placed adjacent to where it is excavated. However, where this is not possible, temporary peat storage areas have been identified. These are areas of previous disturbance where peat was less than 1.0m, areas out with 50m buffer of watercourses and where topography permits.

Table 3: Peat Balance Calculations

Peat Description	Total Peat Demand Estimate for Reinstatement (m^3)	Total Peat Supply from Excavation (m^3)	Surplus (+) or Deficit (-) (m^3)
Acrotelm	7,085	7,085	0
Catotelm	13,586	13,586	0
Total	**20,671**	**20,671**	**0**

Table 3 demonstrates that all peat excavated at the Site during construction will be reinstated, leaving no surplus or deficit.

3.2.3 Peatland Restoration

For deforested areas and areas proposed for deforestation, furrow filling, ditch blocking and peat dams are most likely to be the most suitable restoration techniques.

3.2.3.1 Ditch Blocking and Peat Dams

In order to achieve the objective of restoring peatlands to an active, healthy state via raising water table levels across the restoration areas and obtaining a relatively flat topography, drains will be blocked to reduce water loss and backfilled to create a flat surface upon which the blanket bog vegetation can re-establish. Peat dams will be installed in forestry furrows within the Peatland Restoration Areas (PRA) in accordance with recognised guidance (such as SNH). Methods outlined below are based on the following assumptions:

- Forestry furrows are no greater than 1.0m wide and 0.65m deep;
- The PRA are situated on a relatively gradual slope;
- Peat dams will be installed in furrows at a density of one every 12m, where possible;
- The peat dams will be constructed in accordance with guidance which states that each peat dam will be anchored into the forestry furrow to a width of approximately 0.5m on each side, and 0.2m deeper than the base of the furrow; and
- Wet, structured catotelmic peat will be used to create the peat dam which will be approximately 1.2m long and approximately 0.5m higher than the surrounding ground level. The use of this peat will aid the formation of a watertight dam; unlikely to be successful achieved by the use of cracked peat. Acrotelmic peat (comprising vegetation and/or a natural seedbank) will be placed on top of each dam to prevent the peat drying out and to aid regeneration of the peat dam. The peat dam will be constructed higher than the surrounding ground level to allow for any potential peat shrinkage.

3.2.3.2 Furrow Filling

Plough furrows are designed to collect and transport small volumes of water from the body of the forestry site to the larger drains. Furrows form extensive networks of micro-drainage across the Site.

The distance between furrows is generally around 4m, which results in approximately 2.5 km/ha of linear reinstatement opportunity. The locations and distance between bunds will be dependant on the topography of the Site, and will be determined following topographic surveys and furrow and ditch surveys. Re-profiling of the furrow edges to a gradient of approximately 35^{O} will be undertaken for approximately 1.0m upstream of each peat dam. This is to prevent the build-up of water behind the peat dam posing a health and safety risk to wildlife or other. Where areas within the PRA are not considered suitable for peat dams (such as steep slopes or wide ditches), alternative methods may be required. Alternative methods may include re-profiling of the ditch or the use of plastic/wooden grip blocks. Advice should be sought from a suitably qualified specialist in these circumstances.

Further details on peatland restoration techniques are outlined in **Appendix 7.2: Outline Habitat Management Plan (oHMP)**.

3.2.4 Handling and Storage of Peat

It will be necessary for the contractor to prescribe the methods and timing involved in excavating, handling and storing peat for use in reinstatement. The contractor will be responsible for appointing a chartered geotechnical engineer who will monitor any potential stability risks. Construction methods will be based on the following principles:

- The surface layer of peat (acrotelm) and vegetation will be stripped separately from the catotelmic peat. This will typically be an excavation depth of up to 0.5m.
- Acrotelmic material will be stored separately from catotelmic material.
- Careful handling is essential to retain any existing structure and integrity of the excavated materials and thereby maximise the potential for excavated material to be re-used.
- Less humified catotelmic peat which maintains its structure upon excavation should be kept separate from any highly humified amorphous or wet catotelmic peat.
- Acrotelmic material will be replaced as intact as possible once construction progresses/as it is complete.
- To minimise handling and transportation of peat; acrotelmic and catotelmic will be replaced, as far as is reasonably practicable, in the locality from which it was removed. Acrotelmic material is to be placed on the surface of reinstatement areas.
- Temporary storage of peat will be minimised, with restoration occurring in parallel with other construction works.
- Temporary peat storage areas should be sited in locations with lower ecological value, low stability risk and at a suitable distance from watercourses.
- Peat should be stored in stockpiles no greater than 2m in height.
- Reinstatement will always be undertaken at the earliest opportunity to minimise storage of peat, turves and other materials.
- Managing the construction work as much as possible to avoid periods when peat materials are likely to be wetter, e.g. high rainfall events.
- Transport of peat on Site from excavation to temporary storage area and restoration Site should be minimised.

3.2.5 Waste Management Plan Requirements

Based on the calculations carried out, the total peat volumes excavated will be fully incorporated into the re-instatement works, therefore is unlikely to require a waste management licence.

4. MITIGATION

4.1 General Mitigation

General mitigation measures will be implemented in accordance with the peat excavation, handling & storage and reinstatement methods discussed in Section 3 of this oPMP and in accordance with best practice guidance included in **Technical Appendix 13.1: Outline Water Construction Environmental Management Plan (oWCEMP)**. The oWCEMP outlines best practice in relation to implementation of drainage and pollution prevention.

4.2 Specific Mitigation

Alongside general mitigation and key principles outlined in Section 3 of this oPMP, additional mitigation measures will be implemented in specific areas on the Site based on the conditions at those locations. Table 4 details the Site-specific mitigation measures.

Table 4: Site-Specific Mitigation

Location	Details of Peat	Proposed Mitigation
Access track	Much of the access track footprint is underlain by shallow peat < 1.0m deep although there is an area at the north of the access track adjacent to the BESS compound where the track is underlain by deep peat, with depths up to 2.0m deep.	Floated access tracks will be utilised on Site in areas of deep peat, where possible. Pre-construction drainage measures such as diversion ditches, temporary interception bunds, swales and retention ponds will be implemented in line with **Technical Appendix 13.1: oWCEMP**. Walls of excavation with corrective action taken where necessary. Cut embankments excavated during construction will be reinstated with local stored turves at the earliest possible opportunity to allow reestablishment of vegetation and reduce the exposure of bare peat and any potential de-watering. Pre-construction drainage will be carefully designed in excavated areas and around temporary storage of peat. Details of the drainage are included in **Technical Appendix 13.1: oWCEMP** Regular visual inspections of peat to be undertaken by the appointed Environmental (or Ecological) Clerk of Works (EcoW) to assess for draining, exposed bare peat surfaces, ponding and erosion of excavated materials in temporary stockpiles.
Potential Augmentation Area	Average peat depth in this area is approximately 1.5m. Depths are fairly consisted throughout the area. Peat depths up to 3.6m are recorded in the area immediately north of the potential Augmentation Area.	Detailed ground investigation, such as trial pits and boreholes, to be carried out within the proposed infrastructure area to fully assess the nature of the peat and hydrological regime. Pre-construction drainage measures such as diversion ditches, temporary interception bunds, swales and retention ponds will be implemented in line with the **Technical Appendix 13.1: oWCEMP**. Hydrological monitoring in the area north of the proposed infrastructure periodically prior to and during construction as

Location	Details of Peat	Proposed Mitigation
		included in **Technical Appendix A7.4: oHMP**. Regular visual inspections of peat to be carried out by the ECoW to assess for draining, exposed bare peat surfaces, ponding and erosion of excavated materials in temporary stockpiles. Post-construction, the entirety of the temporary works area will be reinstated to its original condition. Peat removed from the area will be reused in the locality from which it was removed, where possible.
BESS compound	The average depth of peat in this area is approximately 1.75m. Peat is generally significantly deeper in the east of this area than the west. The deepest peat recorded in the vicinity of the compound is 2.5m to the north east of the proposed infrastructure.	Detailed ground investigations, such as trial pits and boreholes, to be carried out within the proposed infrastructure area to fully assess the nature of the peat and hydrological regime. Pre-construction drainage measures such as diversion ditches, temporary interception bunds, swales and retention ponds will be implemented in line with the **Technical Appendix 13.1: oWCEMP**. Hydrological monitoring to be undertaken in the area northeast of the proposed infrastructure periodically prior to and throughout the construction phase as included in **Technical Appendix A7.4: oHMP**. Cut embankments excavated during construction will be reinstated with locally stored turves at the earliest possible opportunity to allow reestablishment of vegetation and reduce the exposure of bare peat and any potential dewatering. Pre-construction drainage will be carefully designed in excavated areas and around temporary storage of peat. Details of the drainage are included in the **Technical Appendix 13.1: oWCEMP**. Regular visual inspections of peat to be carried out by the ECoW to assess for draining, exposed bare peat surfaces, ponding and erosion of excavated materials in temporary stockpiles.

5. CONCLUSION

The following conclusions are drawn regarding the management of peat and excavated materials within the Site:

- As a result of the peat excavation and re-use estimates, all peat excavated during construction will be fully incorporated into reinstatement and restoration works;
- Excavated peat will be used for the reinstatement of access track verges, cut and fil embankment slopes, BESS compound area, potential Augmentation Area and restoration in habitat management;
- The estimates of excavated peat in this oPMP are likely to be higher than actual peat excavation volumes as micro-siting during construction will allow for the avoidance of localised pockets of deeper peat;
- Sufficient methods have been defined to ensure that peat can be sensitively handled and stored on Site to allow for effective re-use; and
- No waste licence is required for the construction work.

APPENDIX A - FIGURES

Figure 10.2.1: Site Layout Plan Figure

Figure 10.2.2: Superficial Soils

Figure 10.2.3: Bedrock Geology

Figure 10.2.4: Recorded Peat Depths

Figure 10.2.5: Interpolated Peat Depths

Figure 10.2.6: Temporary Peat Storage Areas

APPENDIX B – EXCAVATION AND RE-USE VOLUMES AND CALCULATIONS

4887 - Loch Toftingall BESS - Peat Excavation and Re-Use Calculations

Infrastructure	Total Area	Average Peat Depth	Peat Cut Volume	Total Acrotelm Excavation Est.	Total Catotelm Excavation Est.	Areas of Reinstament	Total Peat Re-use Est.	Total Acrotelm Re-use Est.	Total Catotelm Re-use Est.
Permananent Tracks									
Halsary WF to BESS Compound	3850	0.9	3619.0	1925.0	1694	4620	4620	2310	2310
SUB-TOTAL	**3850**		**3619.0**	**1925.0**	**1694**	**4620**	**4620**	**2310**	**2310**
BESS Compound	6500	1.75	11375.0	3250.0	8125.00	840	840	420	420
SUB-TOTAL	**6500**		**11375.0**	**3250.0**	**8125.00**	**840**	**840**	**420**	**420**
Potential Augmentation Area	2532	1.5	3798.0	1266.0	2532.00	450	675	225	450
SUB-TOTAL	**2532**		**3798.0**	**1266.0**	**2532.00**	**450**	**675**	**225**	**450**
TOTAL Excavation Volume	**10350**		**18792.0**	**6441.0**	**12351.0**	**5460.0**	**6135.0**	**2955.0**	**3180.0**
. +10% contingency for Bullking			**1879.2**	**644.1**	**1235**				
TOTAL			**20671.2**	**7085.1**	**13586.10**				
Peat Re-use in Habitat Management Plan							14536	4130	10406
SUB-TOTAL							14536	4130	10406
TOTAL PEAT EXCAVATION and REUSE			**20671**	**7085**	**13586**		**20671**	**7085**	**13586**

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