Technical Appendix

Lairdmannoch Energy Park

Technical Appendix 8-2: Outline Peat Management Plan

Lairdmannoch Energy Park

May 2025

Contents

Contents

Tables

Figures

Glossary of Terms

Term	Definition
The Applicant	Lairdmannoch Energy Park Limited
The Agent	Atmos Consulting Limited
Environmental Advisors and Planning Consultants	Atmos Consulting Limited
Environmental Impact Assessment	Environmental Impact Assessment (EIA) is a means of carrying out, in a systematic way, an assessment of the likely significant environmental effects from a development.
Environmental Impact Assessment Regulations	Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017
Environmental Impact Assessment Report	A document reporting the findings of the EIA and produced in accordance with the EIA Regulations
The Proposed Development	Lairdmannoch Energy Park
The Proposed Development Site	The full application boundary as per Figure 1-1

List of Abbreviations

Abbreviation	Description
AOD	Above Ordnance Datum
BGS	British Geological Society
BPG	Best Practice Guidance
CEMP	Construction Environmental Management Plan
DWPA	Drinking Water Protected Area
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
ECU	Energy Consents Unit
FoS	Factor of Safety
GIS	Geographical Information System
Ha	hectare
HMP	Habitat Management Plan
kV	Kilovolt
LIDAR	Light Detection And Ranging
NGR	National Grid Reference
NVC	National Vegetation Classification
OHL	Overhead Line
OPMP	Outline Peat Management Plan
PLHRA	Peat Landslide Hazard Risk Assessment
SEPA	Scottish Environmental Protection Agency

1 Introduction

1.1 Background

Lairdmannoch Energy Park Limited (the Applicant) is seeking consent under Section 36 of the Electricity Act (Scotland) 1989 (as amended) to develop a wind farm consisting of 9 wind turbines at up to 180 m to tip height, ground mounted solar panels, battery energy storage systems (BESS) and associated infrastructure including electrical transformers, hardstandings, access roads, cabling, borrow pit and electrical substation (the 'Proposed Development').

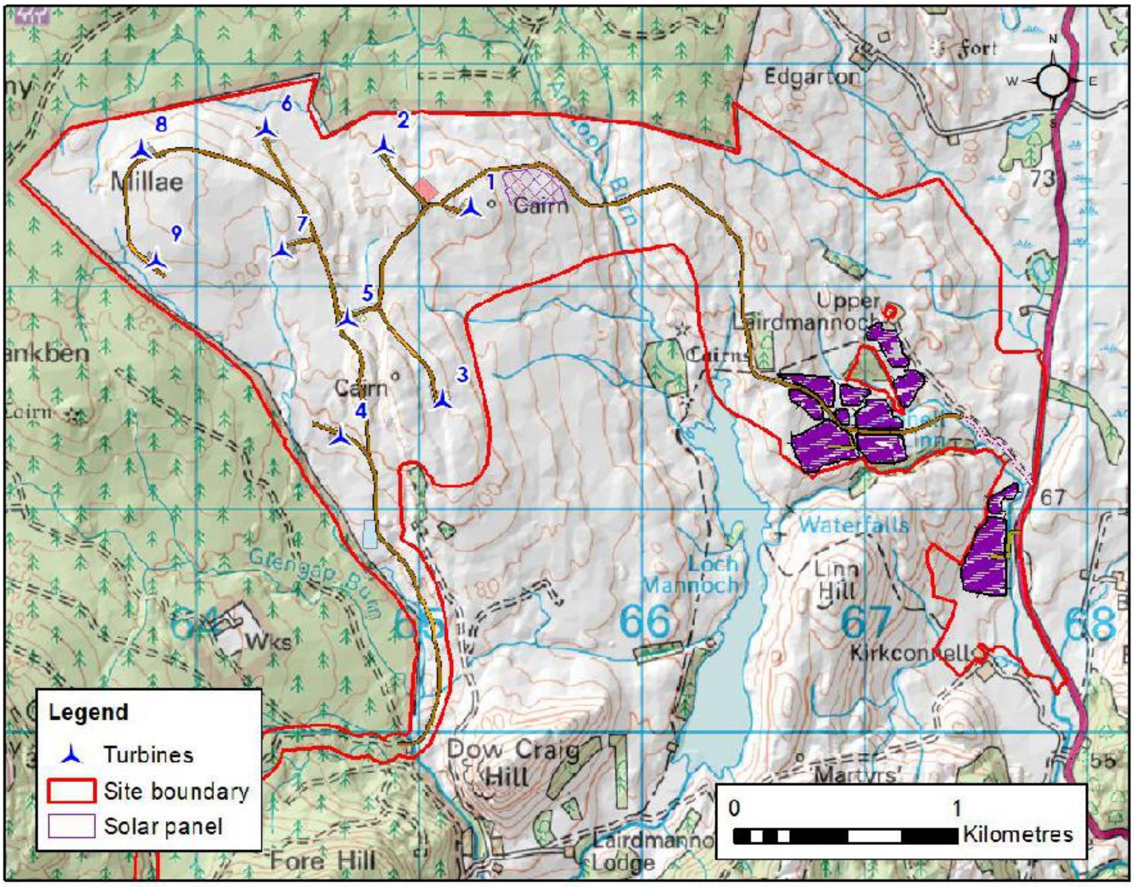
The Proposed Development is located on land northeast of Gatehouse of Fleet and approximately 10km west of Castle Douglas. The Proposed Development Site lies entirely within the Dumfries and Galloway Council (DGC) planning authority area.

The Site is centred on National Grid Reference (NGR) (approximate) NX 66233 62404 with all infrastructure located approximately 7km from the town of Gatehouse of Fleet.

The Proposed Development Site covers an area of approximately 612.2 ha. The western portion of the site features the Wind Development with the eastern section featuring the Solar Development. An overview of the site location is shown on

.

Plate 1 Overview map of Proposed Development



The Proposed Development would consist of nine wind turbines each with a tip height of 180m above ground level (agl), ground mounted solar panels, a battery energy storage system (BESS) and associated infrastructure including:

- Access tracks;
- Turbine foundations and crane hardstandings;
- Substation;
- One borrow pit;
- Underground cabling;
- Temporary construction compound;
- Solar infrastructure including a power station and switching and breaking station; and
- Up to eight watercourse crossings.

This Outline Peat Management Plan (OPMP) follows guidance (Scottish Renewables & SEPA, 2012) on the assessment of peat excavation and reuse for wind farms in Scotland. The OPMP was prepared in parallel with a Peat Landslide Hazard and Risk Assessment (PLHRA, Technical Appendix 8-1) and is informed by peat depth probing undertaken by Atmos Consulting.

1.2 Scope of Work

The scope of the OPMP is as follows:

- Summarise the principles adopted for design of the wind farm with respect to peat soils, including the approach to peat characterisation and the identification of opportunities taken to minimise impacts on peatlands within the Proposed Development Site;
- Calculate the potential volumes of peat that may be excavated in association with wind farm construction, both acrotelmic and catotelmic peat;
- Identify and justify reuse of acrotelmic and catotelmic peat where it cannot be reinstated at source; and
- Identify good practice measures to ensure excavated peat is stored safely and with minimal loss of function prior to its reinstatement.

The OPMP follows the advice issued in SEPA's Scoping Opinion response of 18/09/2023 (SEPA Ref 10265).

1.3 Report Structure

This report is structured as follows:

- Section 2 provides an outline of relevant guidance relating to the excavation, storage and reuse of peat;
- Section 3 provides an overview of the Site and proposed wind farm infrastructure based on the scheme described in the main EIA chapters and on desk study review of site information;
- Section 4 describes the approach to and results of peat excavation calculations and summarises opportunities for reuse of excavated peat soils within the Proposed Development Site; and

- Section 5 provides general good practice measures and measures specific to the conditions at the Proposed Development.

Where relevant information is available elsewhere in the Environmental Impact Assessment Report (EIA), this is referenced in the text rather than repeated in this report.

1.4 Peat as a Carbon Store

Priority peatland habitats comprise blanket bog, lowland raised bog, lowland fens, and part of the upland flushes, fens and swamps, as listed in the UK Biodiversity Action Plan (UK BAP). Blanket bog is the most widespread of these habitat types in Scotland, and therefore it is blanket bog that is usually of relevance for proposed developments/wind farms in upland areas.

Blanket bogs in the UK started forming in the early Holocene, with most UK bogs initiating prior to 6,000 years ago under cooler and wetter conditions than at present. Where bogs remain waterlogged and peat forming plant species persist, blanket bog is still considered to be actively forming and accumulating organic matter, and therefore can be considered a carbon sink.

A bog that is not losing carbon/peat but is no longer accumulating organic matter can be considered a carbon store, and a degrading bog can be considered a carbon source (Mills et al, 2021).

A peatland may change state between sink, store and source through natural processes or as a result of human activity. The purpose of the peat management plan is to avoid impacts on the peat carbon stores at wind farm sites by avoiding peat, where possible, or by minimising impacts where peat cannot be avoided.

Where there are opportunities to improve peat condition, e.g. through restoration, and in so doing, help convert carbon sources into stores or sinks, this may also be facilitated by the peat management plan (usually in conjunction with the Habitat Management Plan).

1.5 Good Practice Guidance

Where peat is to be excavated in association with built infrastructure, it may be considered a waste product under the following legislation:

- Environmental Protection Act 1990 (as amended);
- Landfill (Scotland) Regulations 2003 (as amended); and
- The Waste Management Licensing (Scotland) Regulations 2011.

In order to address this legislation, a number of guidance documents have been issued to assist applicants in responsibly planning, installing and operating infrastructure in peatland settings. This PMP has been informed by this collective good practice, which includes the following documents:

- Advising on peatland, carbon-rich soils and priority peatland habitats in development management (NatureScot, 2023);
- Good Practice during Wind Farm Construction, Version 4 (Scottish Renewables, Scottish Natural Heritage, Scottish Environmental Protection Agency, Forestry Commission Scotland, 2019);
- Developments on Peat and Off-Site Uses of Waste Peat, WST-G-052 (SEPA, 2017);

- Peatland Survey. Guidance on Developments on Peatland (Scottish Government, Scottish Natural Heritage and SEPA, 2017a);
- Peat Landslide Hazard and Risk Assessments, Best Practice Guide for Proposed Electricity Generation Developments (Second Edition) (Scottish Government, 2017);
- Carbon and Peatland 2016 Map (GIS) (Scottish Natural Heritage, 2016a);
- Carbon-rich Soils, Deep Peat and Priority Peatland Habitat Mapping, Consultation Analysis Report (Scottish Natural Heritage, 2016b);
- Scotland's National Peatland Plan - Working for our future (Scottish Natural Heritage, 2015a);
- Constructed Tracks in the Scottish Uplands, 2nd Edition (Scottish Natural Heritage, 2015b);
- Developments on Peatland: Guidance on the assessment of peat volumes, reuse of excavated peat and the minimisation of waste (Scottish Renewables and SEPA, 2012);
- Floating Roads on Peat - A Report into Good Practice in Design, Construction and Use of Floating Roads on Peat with particular reference to Wind Farm Developments in Scotland (Scottish Natural Heritage and Forestry Commission Scotland, 2010); and
- Annex 1: Precautions to protect drinking water and Scottish Water assets in peatland areas (Scottish Water, 2020).

In general terms, the guidance considers appropriate activities to be undertaken at the pre-planning application (Environmental Impact Assessment (EIA)), post-consent/pre-construction and construction stages. The overarching principles are generally the same across the different guidance documents and are set out below.

During pre-planning (EIA):

1. Determine at a sufficient level of detail the distribution of peat within a site in order to assess the likely level of impact of proposed works;
2. Calculate the volumes of peat likely to be excavated during construction; and
3. Demonstrate how excavated peat will be managed (2 and 3 together comprising an assessment of the "peat and soil balance").

These activities are normally considered within an OPMP, delivered as part of the Environmental Impact Assessment at the planning stage.

Given consent, during the pre-construction period:

- A refined peat and soil mass balance should be calculated through further site investigation works (including intrusive works such as detailed probing across final infrastructure footprints and/or trial pits to verify the nature of probed materials);
- Further detailed topographic survey and design level excavation, storage and reuse plans should be drafted to enable contractors to bid for and implement the works; and
- Key good practice measures should be identified within the PMP that integrate with other related plans or control documents for construction, including, where applicable, the Construction and Decommissioning Environmental Management Plan, Site Waste Management Plan, Habitat Management Plan (where relevant) and Geotechnical Risk Register.

During the construction stage:

- Utilise micro-siting to optimise infrastructure locations relative to final pre-construction information gathered on site;
- Monitor, adjust and implement the PMP to accommodate deviations in expected peat volumes and adapt reuse measures to actual site volumes; and
- Set-up monitoring programmes to identify the new post-construction baseline and provide a basis for monitoring the success of the PMP and identify appropriate mitigation where necessary.

Through the different stages of the project, the strategy should be to prevent disturbance to and losses of peat through appropriate reuse, wherever possible.

1.6 Approach at the Proposed Development

The strategy for peat management for the Proposed Development follows SEPA's guidance for developments on peat and uses of waste peat (SEPA, 2017). The hierarchy is as follows:

- **Prevent** the creation of waste peat by minimising overlap of infrastructure with peat where it is possible to do so, and given other site and design constraints that may influence turbine locations and associated infrastructure (such as tracks), where avoidance is not possible, minimise excavation (e.g. through the use of floating tracks);
- **Reuse** peat on site in construction, or by **reinstatement** in temporary excavations;
- **Restore**, using peat to improve eroded or damaged areas outwith the area of direct and indirect construction impact (restoring off-site will require environmental authorisation); and
- **Recycle** as a soil substitute or for use in other works (where on-site or off-site use in restoration is not possible).

Disposal of peat (i.e. export from the Proposed Development Site as waste) is no longer considered an acceptable outcome for materials generated during construction.

At the Proposed Development, a combination of prevention and reuse has formed the peat management strategy.

Peatland within the site is subject to restoration, however, it is not anticipated that excavated peat will be required to undertake restoration work, which is detailed in Technical Appendix 6-6 (Outline Habitat Management Plan). Outline details of the peat management strategy are provided below, and full detail of excavation and reuse proposals are provided in Section 4.

1.6.1 Prevent

Prevention involves minimising the amount of peat excavated during construction by informed layout planning.

The extent to which this is possible is not just a function of the amount of peat on site, but also of the presence of other constraints (e.g. landscape and visual impacts, telecommunications, aviation, hydrology, terrestrial ecology) and the practical requirements of wind farm construction (e.g. minimum turbine spacings, feasible gradients for tracks / hardstandings, buffer distances from watercourses, etc).

The presence of peat on the Proposed Development Site is relatively localised in the main infrastructure are although due to the combination of other non-peatland constraints, some overlap with peat has been inevitable.

Comparison of the peat depth model with the layout indicates that significant efforts have been made during layout design to site infrastructure out of the deepest peat areas and to route access tracks onto shallower peat:

- In the northwest, turbines generally avoid peat, with only Turbine 9 having an appreciable overlap, however, the footprint has been optimised to minimise overlap with peat >1.0 m. The track in this area has been routed around the deepest peat rather than directly across it;
- In the centre of the Site, the access tracks have been routed along bedrock areas with a small crossing of the peat trough axis by the hardstanding footprint of T5. Turbines 4, 5 and 6 largely avoid peat;.
- The eastern turbine string (Turbines 1, 2 and 3) avoid peat, even though there are several large pockets in this area; and
- Floating track has been specified wherever gradients allow in order to minimise excavation.

As a result, the proposed layout minimises peat excavation insofar as possible given other constraints.

1.6.2 Reuse

The primary reuse strategy for peat management is to reuse peat to reinstate the main borrow pit in the north of the Site.

1.6.3 Restore

There are no suitable restoration targets for use of excavated peat due to an absence of eroded gullies, peat pans, artificial drainage or cuttings on the Proposed Development Site.

1.6.4 Disposal

No disposal of peat or soil is required as part of the Proposed Development.

2 Desk Study

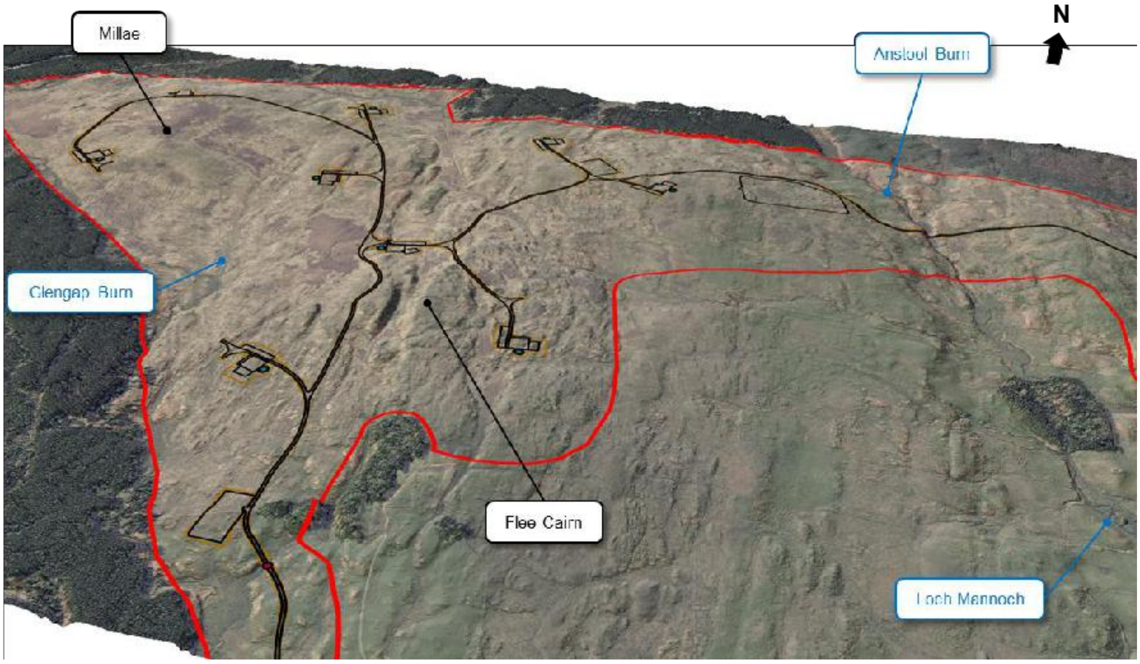
2.1 Site Overview

The Proposed Development lies on gentle, undulating hills that fall from west to east towards the Anstool Burn in the centre of the site and the Tarff Water, which drains from Loch Mannoch, to the east.

There are no pronounced summits, though Millae (245 m AOD) and Flee Cairn (c. 225 m AOD) represent the highest elevations (Figure 8.2.1). LiDAR data shows a strong north-to-south geological structure which governs the relief within the wind farm area, this transitioning to a less organised undulating / hummocky terrain in the east of the Site where the solar arrays are located.

Plate 2 shows a 3D perspective view of the Site with satellite imagery superimposed and key geographical features highlighted.

Plate 2 3D perspective view of the Site (strong north-south bedrock structure visible) (bing imagery © 2024 Microsoft Corporation © Maxar CNES (2024) Distribution Airbus DS)



The topography of the central part of the Proposed Development Site results in compartmentalisation of the peat deposits, which are typically deep between linear bedrock ridges that are at or close to the ground surface. The ridges generally have moderate to steeply sloping sidewalls, while the ridge floors are flat. In the northwest of the Proposed Development Site, gradients are very gentle over a wider area, and bedrock control on relief is much less (see Figure 8-2-1).

2.2 Peat Depth

Peat depth probing was undertaken in several phases:

- 429 probes were collected between October 2020 and December 2020 to provide a Phase 1 100 m grid;
- A further 103 probes were collected on a 100 m grid in October 2023 along the main access track corridor and in the area proposed for solar infrastructure; and
- 1,109 probes were collected along the track centreline with 10 m offsets and on a 20 m grid across all wind farm infrastructure footprints.
- Probing was uplifted from a 20 m grid to a 10 m grid across all wind farm infrastructure in January and February 2025 taking the total number of probes collected to 2,727 probes.

Records of substrate identified using the refusal method indicated bedrock or granular substrate over the vast majority of the Proposed Development Site.

Interpolation of peat depths was undertaken in the ArcMap GIS environment using a natural neighbour approach. This approach was selected because it preserves recorded depths at each probe location, unlike some other approaches (e.g. kriging), is computationally simple, and minimises 'bullseye' effects. The approach was selected after comparison of outputs with three other methods (inverse distance weighted, kriging and TIN; ESRI, 2025).

The peat depth model is shown on **Figure 8-2-3** with probing locations superimposed.

Much of the Proposed Development Site lacks peat, with probed depths <0.5 m. The most extensive peat deposits lie in the northwest of the Proposed Development Site where slope gradients are very gentle and in linear north-to-south aligned troughs that sit between bedrock outcrops in the centre of the Proposed Development Site. Here, peat depths reach close to 4.0 m in depth.

Comparison of the peat depth model with the layout shows that significant efforts have been made during layout design to Proposed Development Site infrastructure out of the deepest peat areas and to route access tracks onto shallower peat:

- In the northwest, turbines generally avoid peat, with only Turbine 9 having an appreciable overlap, however, the footprint has been optimised to minimise overlap with peat >1.0 m. The track in this area has been routed around the deepest peat rather than directly across it;
- In the centre of the Proposed Development Site, the access tracks have been routed along bedrock areas with a small crossing of the peat trough axis by the hardstanding footprint of T5. Turbines 4, 5 and 6 largely avoid peat; and
- The eastern turbine string (Turbines 1, 2 and 3) avoid peat, even though there are several large pockets in this area.

The inset panel on Figure 8.2.3 shows the Carbon and Peatland (2016) Map for the Proposed Development Site and indicates a generally good correlation between the north-south aligned peat within troughs (shown to be Class 1) and in the northwest (also Class 1) with Class 2 shown over much of the remaining area.

Given the absence of peat over much of the Class 2 area, this classification does not provide a good fit to peat conditions on the ground.

2.3 Peat Geomorphology

While peat is present over much of the Proposed Development Site, typical peatland geomorphological features such as gullies, haggs, bog pools and patterning are largely absent, with the ground surface concealed under dense grasses or heather where peat is present.

The west of the Proposed Development Site comprises gentle planar peatland with widespread *Molinia* and numerous drains under this grassy layer. Review of LiDAR data shows few geomorphological features under the grassland.

Two large peat basins sit alongside the Proposed Development Site boundary in the west. Bedrock is close to surface in many locations and shows a strong north-south orientation. Where it is more subdued, peat is thin over the undulating terrain. Occasional flushes are present in the north of the Proposed Development Site adjacent to shallow linear (natural) drainage patterns that are confluent with the upper reaches of the Anstool Burn.

2.4 Drainage

The Proposed Development Site has been heavily modified by artificial drainage cut into the peatlands to improve soil conditions. This has affected surface vegetation resulting in the extensive sward of *Molinia* that conceals many of the drains below knee to waist height grassy sward. LiDAR data shows the true extent of drainage, which has a total drain length within the wind farm area of c. 82.5 km.

While the drains will likely be functional to varying degrees, they are not sufficiently large to accommodate peat excavated from infrastructure locations and therefore this does not form part of the reuse proposals for peat for the Proposed Development.

2.5 Land Use

Land use is limited to grazing over most of the Proposed Development Site. There are one or two areas where the peat surface appears to be lower than the prevailing peatland, possibly due to historical cutting, but otherwise, land management of the peatland has largely been in the form of drainage.

3 Peat Excavation and Storage

3.1 Excavation Calculations

The majority of infrastructure comprising the Proposed Development will require full excavation of the peat or soils underlying the infrastructure footprints during construction. However, some infrastructure is not required post-construction and the peat or soil excavated from these areas will be directly reinstated within the excavation footprints.

In this section, the following terms are used to describe groundworks associated with peat / soil and wind farm infrastructure:

- **Permanently excavated:** peat / soil will be permanently removed from the infrastructure footprint, stored locally and reused elsewhere;
- **Temporarily excavated:** peat / soil will be temporarily removed from the infrastructure footprint, stored locally and fully reinstated at the point of excavation post-construction; and
- **Landscaping:** the process of using soil to 'dress' the boundaries of infrastructure.

Excavation volumes have been calculated as the product of the average peat depth under each footprint (derived from the peat model) and the indicative footprint area (detailed for each infrastructure type and its associated earthworks, below).

For this site, for each infrastructure item, the upper 0.3 m of the peat profile is assumed to be acrotelm and any remaining depth is assumed to be catotelm. A 0.3 m thickness of turf and underlying peat is a sufficiently thick continuous layer to avoid damaging the roots of the excavated vegetation and provide a coherent 'turf' to relay.

Soils less than 0.5 m in depth are assumed to be organic (or other) soils other than peat and are classed as 'soil' for the purposes of this assessment.

3.1.1 Turbines, Hardstandings, Ancillary Crane Pads and Blade Laydowns

Each turbine location will comprise a circular turbine foundation (26 m diameter), a primary hardstanding for the main crane (40 m x 38 m) and auxiliary crane (38 m x 6 m), a tower storage area (33 m x 20 m), and a secondary hardstanding for the blade storage area (83.5 m x 15 m). These figures are indicative at the pre-consent stage and are considered to be worst-case footprints.

Cut and fill earthworks will be required to level these working areas and hardstandings, with the footprints in the cut and fill areas also requiring full peat and soil excavation. Figure 3-5 in the EIAR shows an indicative turbine hardstanding (less earthworks) and is reproduced as

3 below.

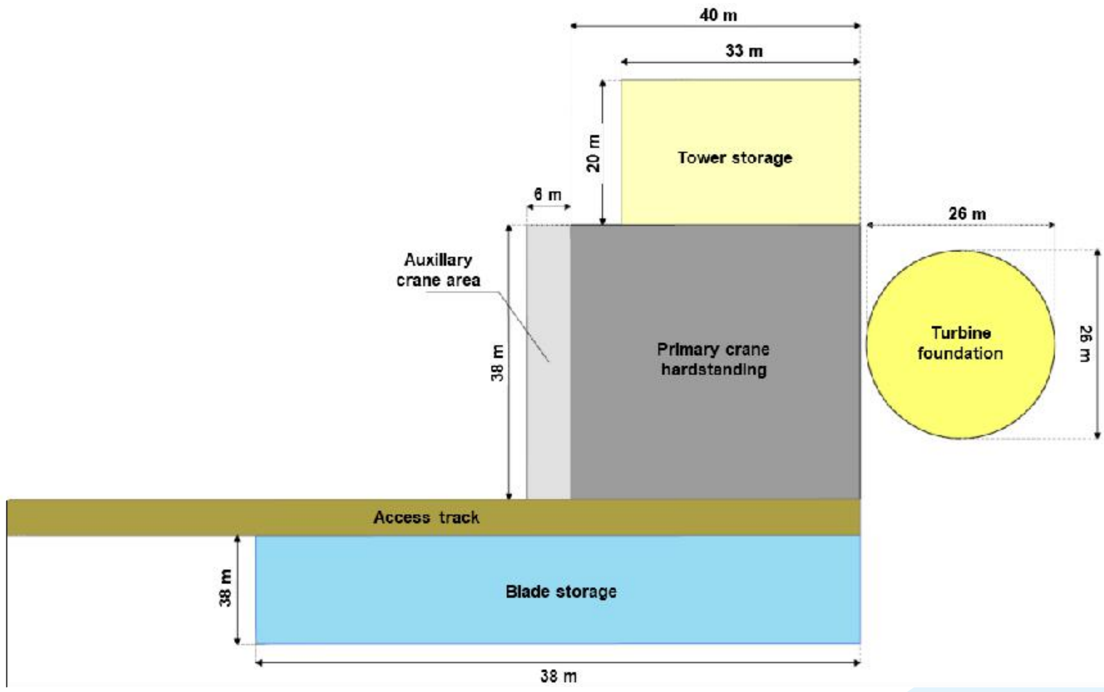
The turbine foundation (and earthworks), primary hardstanding (and earthworks),tracks and turning heads for each turbine will be permanently excavated to substrate, and peat and soil replaced with construction fill materials. Other infrastructure will be temporarily excavated, and any peat or soils will be stored locally and directly reinstated once the turbine has been installed.

The temporary and permanently excavated volumes for turbines, hardstandings and associated earthworks are calculated as follows:

- Each footprint was subdivided into depth classes (e.g. 0.0-0.5 m (soil), 0.5-1.0 m (peat), 1.0-1.5 m (peat)) and the average peat depth calculated within each area – this enabled separation of peat and soil volumes;
- The area of each subdivided footprint was multiplied by the average depth to determine the total volume; and
- For all peat, the top 0.3 m was classified as acrotelmic volume, and any depth below that as catotelm (e.g. a 0.7 m average depth in a footprint of 100 m^2 would be calculated as 100 m^2 x 0.3 m (acrotelm volume of 30 m^3) and 100 m^2 x 0.4 m (catotelm volume of 40 m^3).

To reflect the need for earthworks over the operational life of the wind farm, a new earthwork footprint has been generated alongside the permanent infrastructure that is due to remain in place. Any peat or soil excavated from under these footprints is assumed to require permanent reuse elsewhere.

Plate 3 Reproduction of EIAR Figure 3-5 showing turbine infrastructure layout



Error! Reference source not found. shows the calculated excavation volumes for all infrastructure and earthworks, both temporary and permanent, subdivided into acrotelm, catotelm and organic soils.

Figures are quoted to the nearest m³ to avoid rounding errors leading to inaccurate totals in later tables rather than to imply accuracy of calculations to 1 m³. Earthwork excavation requirements are not divided by infrastructure type since many of the earthworks serve a multitude of infrastructure components.

There is virtually no overlap between turbine foundations, their earthworks and peat, with peat being absent or of minimal extent in the wider footprints of Turbines 1, 2, 3, 4, 6, 7 and 8.

Table 8-2-1: Peat excavation volumes for all infrastructure

Infrastructure	Type of Excavation	Excavation Volume (m^3)*			
		Acrotelm	Catotelm	Peat Total	Soil
Turbine foundation	Permanent	97	98	195	777
Primary crane hardstanding	Permanent	637	921	1559	3573
Auxiliary crane hardstanding	Permanent	67	107	174	63
Tower storage area	Permanent	52	87	139	90
Blade storage area	Permanent	125	289	414	607
Substation and BESS	Permanent	205	232	438	1950
Access track (cut and fill)	Permanent	2697	5510	8207	12835
Earthworks – cut	Permanent	359	778	1137	3379
Earthworks – fill	Permanent	1331	2594	3925	3293
Subtotal (Permanent)		**5,548**	**5570**	**10617**	**16187**
Auxiliary crane hardstanding	Temporary	120	244	365	297
Tower storage area	Temporary	344	973	1317	1538
Blade storage area	Temporary	696	2552	3248	2227
Borrow pit	Temporary	0	0	0	10104
Construction compound	Temporary	1897	2107	4004	367
Earthworks – cut	Temporary	675	1251	1925	1798
Earthworks – fill	Temporary	959	3266	4225	2755
Subtotal (Temporary)		**3,826**	**4691**	**10392**	**15083**
Total		**9,374**	**10261**	**21009**	**31270**

*Note that minor rounding errors of +/- 1m³ are present in subtotals and total

3.1.2 Access Tracks

Access tracks comprise a minimum of 5.0 m wide running surface. Two types of track construction are proposed - floating and cut and fill.

Floating tracks have been specified where peat depths exceed 0.5 m, where gradients allow and where short lengths and cut and fill requirements would not preclude their construction. Floating tracks involve no excavation, and therefore no peat is generated from this element of site infrastructure, nor from the earthwork fill to either side (which is also of floating construction).

Cut tracks have generally been specified elsewhere, typically on depths <0.5 m but also on peat where gradients do not allow for floating construction.

A small number of localised areas of cut track are required in peat, but these are typically on the approaches to hardstandings or over short distances of peat where transition pieces between cut and fill and floating track would limit the length of floating track to the point of it offering little excavation saving.

Table 8-2-1 shows the excavation volumes associated with new cut and fill tracks. These volumes will be permanently excavated.

Approximately 3,120 m^3 of peat excavation has been avoided through the use of floating track.

3.1.3 Cable Trenches

Cable trenches are to be excavated alongside access tracks and all peat excavated prior to cable placement will be directly reinstated after installation. Reinstatement is likely to be undertaken immediately after installation with very short-term sidecasting of materials, and therefore peat disturbed in this activity is not considered in the overall peat mass balance calculations.

3.1.4 Construction Compound

The construction compound (125m x 60 m) will provide storage for site plant and materials and will be reinstated post-construction. Therefore it is temporarily excavated, with all excavated materials stored locally and reinstated. Only the southern corner of the construction compound overlaps with peat.

3.1.5 Substation and BESS

The compound housing the substation and associated battery energy storage system (BESS) will be permanently excavated to substrate over a footprint of 100 m x 75 m. Only the eastern corner of this compound is within peat. Table 8-2-1 shows the volumes of soil associated with permanent excavation of the compound.

3.1.6 Total volumes

Based on the above, the total temporary and permanent excavation volumes for acrotelm, catotelm and soil are as shown on Table 8-2-2 below.

Table 8-2-2: Total Excavation Volume for all infrastructure

Type	Excavation Volume (m^3)			
	Acrotelm	Catotelm	Total Peat	Soil
Permanent	5,570	10,617	16,187	26,566
Temporary	4,691	10,392	15,083	19,086
Totals	**10,261**	**21,009**	**31,270**	**45,652**

In total, c. 16,187 m^3 of peat are to be permanently excavated and will require reuse elsewhere on Proposed Development Site. Approximately 15,083 m^3 of peat will be temporarily excavated, stored locally and directly reinstated post-construction.

3.2 Reuse

Excavated peat and soil will be re-used as follows:

1. Reinstatement of temporary excavations for infrastructure (peat and soil);
2. Landscaping of permanent infrastructure to minimise visual impacts of infrastructure (soil only);
3. Reuse in borrow pits (peat only); and
4. Reinstatement of an historical cutting (peat only).

There are no other opportunities for reuse or reinstatement within the Proposed Development Site boundary.

3.2.1 Reinstatement

In total, 15,083 m^3 of peat will be temporarily excavated from proposed infrastructure locations. This material will be set to one side during construction, kept under suitable moisture-controlled conditions for the duration of storage and then reinstated at the point of excavation. This leaves 16,187 m^3 of peat requiring reuse elsewhere on Proposed Development Site.

3.2.2 Reuse in borrow pits

One borrow pit search area has been identified to support the extraction of aggregate for construction. This is located east of the substation / BESS compound on a gentle east facing slope, with prevailing surface drainage into the west of the pit.

The borrow pit will be excavated below ground level over most of its footprint and will therefore naturally collect moisture, increasing its viability as a permanent peat store for materials excavated from infrastructure locations. Careful borrow pit design will ensure peat stays wet (see below).

Available accommodation space for peat has been calculated based on c. 55% of the footprint of the borrow pit.

All permanently excavated acrotelmic peat (c. 5,570 m^3) will be used within the borrow pit over an area of c. 18,550 m^2 to a depth of 0.3 m. This acrotelmic peat will be placed over catotelmic peat, the latter laid to a depth of 0.35 m over an impermeable liner sourced from on-site cohesive materials or imported. Approximately 6,500 m^3 of catotelmic peat will be used within the borrow pit.

The anticipated peat reinstatement footprint is shown superimposed on the borrow pit search area on **Plate 4**. Contours are shown at 2 m intervals, indicating the likely direction of water into the borrow pit area, which will help keep peat deposits placed within the borrow pit wet.

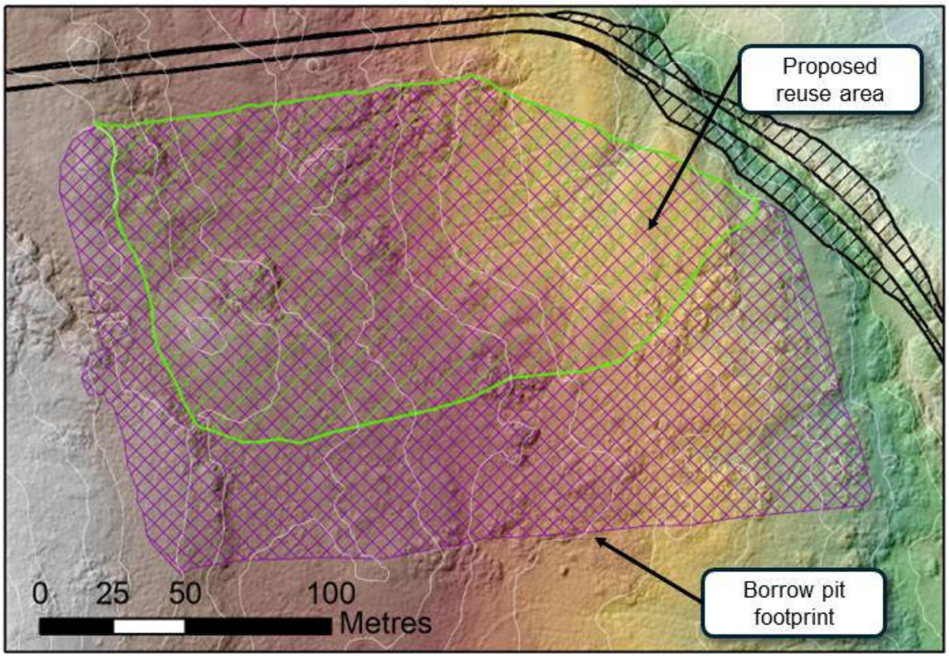


Plate 4 Indicative borrow pit restoration footprint

The creation of a new peat deposit in this location is considered in keeping with the distribution of peat across the wider Proposed Development Site, which occurs in pockets between bedrock outcrop, other than in the far west of the Proposed Development Site where slopes are much gentle, and peat is more closely aligned to blanket bog in its distribution.

The following design principles will be adopted for the borrow pit:

- Following return of non-peat overburden to the floor of the borrow pit, the borrow pit base will be levelled with a minor reverse incline towards the pit headwall to ensure moisture retention;
- The unfinished base will then be lined with impermeable fill (clay or equivalent) to preclude free draining / dewatering from the base of the peat fill;
- Depending on the borrow pit footprint and the degree of remoulding of catotelmic peat excavated during construction, mineral berms will be constructed to create retention cells, within which peat will be placed – berm crests will be set to the top level of anticipated catotelmic fill;
- Catotelmic fill will be placed within each cell, directly over the impermeable liner and between mineral berms; and
- Acrotelmic turves will then be placed over the catotelmic fill and berms to produce a continuous vegetated top surface.

In order to ensure the reinstated borrow pits function as intended, a monitoring programme will be established to track vegetative recovery of the finished borrow pit surfaces, effectiveness of constructed berms in holding peat in place, and moisture content of the peat deposits. Table 8-2-3 shows reuse volumes for the borrow pit.

3.2.3 Reuse in probable peat cutting

A cutting has been identified west of the T junction adjacent to the proposed Turbine 5 location. This is shown on Plate 5. There is an elevation change of c. 1.0 m between the floor of the feature and the prevailing peat surface to the north and south, indicating loss of c. 1.0 m of peat in this area.

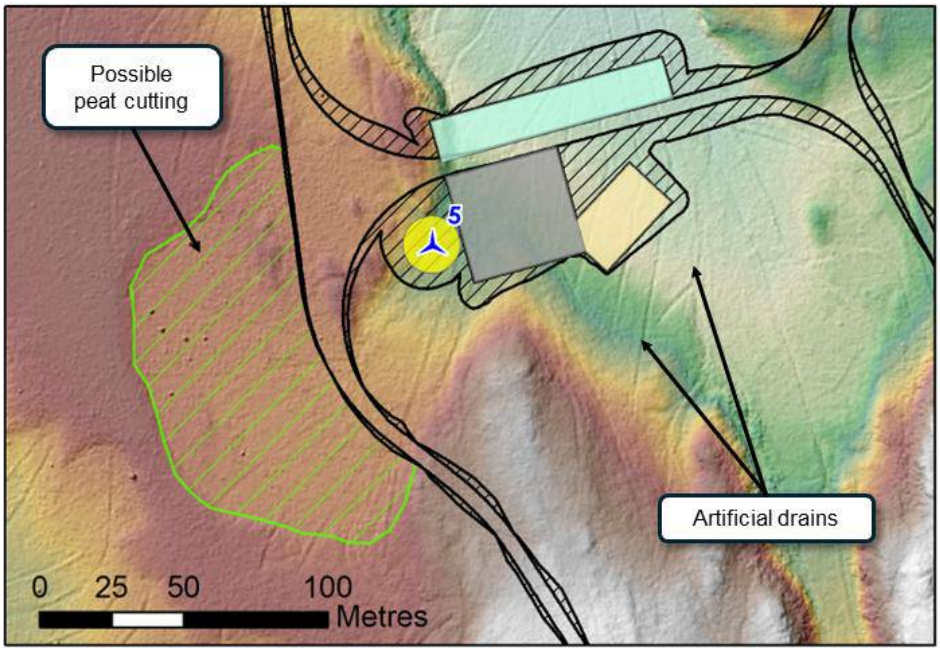


Plate 5 Probable cutting to be used for peat reinstatement near Turbine 5

Proposed infrastructure will comprise a track of filled construction across the 'neck' of the feature in the southeast, and this track will therefore provide a retaining structure for peat placed to the west. It is proposed that existing surface vegetation / acrotelm will be stripped and stored adjacent to the location, with c. 0.55 m of catotelmic peat placed into the cutting area, before surface vegetation / acrotelm is laid on top.

The use of 0.55 m of catotelmic peat over the cutting area of c. 7,442 m^2 will require c. 4,093 m^3 of peat (see Table 8-2-3).

3.2.4 Landscaping of Infrastructure

No peat will be used in landscaping infrastructure. Instead, the top surfaces of cut and fill earthworks and the area not reinstated with peat within the borrow pit, in both cases having low gradients, will be top-dressed with organic soils excavated from infrastructure and earthworks footprints.

Approximately 26,566 m^3 of surplus soil will be generated during construction.

There are c. 31,840 m^2 of earthworks surfaces requiring top dressing with soil and c. 17,370 m^2 of borrow pit remaining after reuse of peat (see section 4.2.2). Reinstating soil to a depth of 0.8 m in the borrow pit will utilise c. 13,901 m^3 of soil, and landscaping infrastructure (i.e. earthworks) with c. 0.4 m will utilise the remaining soil (c. 12,665 m^3).

If required, a locally appropriate seed mix will be used to encourage revegetation and stabilisation of the landscaped margins. Table 8-2-3 summarises reuse volumes for soil.

Table 8-2-3: Peat and soil reuse

Location	Areas and Volumes					
	Area (m^2)	Target Acrotelm Depth (m)	Acrotelm Volume (m^3)	Target Catotelm Depth (m)	Catotelm Volume (m^3)	Total Peat Reuse (m^3)
Borrow Pit	18,494	0.3	5,548	0.35	6,498	12,069
Cutting	7,442	0	0	0.55	4,093	4,093
Totals			**5,548**		**10,490**	**16,162**
	Area (m^2)	**Target soil depth (m)**	**Soil volume (m^3)**			**Total Soil Reuse (m^3)**
Borrow Pit	17,376	0.8	13,901	-	-	13,901
Earthworks	31,841	0.4	12,665	-	-	12,665
Totals	-	-	**25,566**	-	-	**26,566**

3.3 Peat and Soil Balance

The peat and soil balance for the Proposed Development is shown in Table 8-2-4 below. The upper part of the table shows excavation volumes, subdivided into permanent and temporary, and is drawn from Tables 8-2-1 and 8-2-2. The lower part of the table considers reuse volumes, and is drawn from Table 8-2-3.

There is a negligible volumetric difference between excavation and reuse and therefore a peat and soil balance at the pre-consent stage.

Given that the target depth of peat reinstatement in the borrow pit is relatively shallow (0.65 m) and only 52% of the footprint has been specified for reuse, it is likely that there would be additional accommodation space within the borrow pit if post-consent ground investigations were to indicate an increase in excavation volumes.

Breakdown of the peat volumes into acrotelmic and catotelmic peat also shows the two different types of peat to be largely balanced.

Table 8-2-4: Peat and soil balance

Heading Left	Volume (m^3)		
	Acrotelm	Catotelm	Soil
Excavation			
Total Permanent	5,570	10,617	26,566
Total Temporary	4,691	10,392	19,086
Totals	**10,261**	**21,009**	**45,652**
Reuse			
Directly Reinstated	4,691	10,392	19,086
Borrow Pit	5,548	6,498	13,901
Cutting	0	4,093	0
Landscaping Earthworks	0	0	12,665
Totals	**10,239**	**20,984**	**45,652**
Balance	**22**	**25**	**0**
	Minimal surplus	**Minimal surplus**	**Balance**

The next section summarises good practice for excavation, handling, storage, re-use and monitoring associated with peat excavations at the Proposed Development.

4 Good Practice

4.1 Background

Good practice measures in relation to peat excavation and reuse are now generally well defined following a number of years of practice (at wind farm sites) across the UK and Ireland. In Scotland in particular, there is an increasing body of experience relating to peat restoration, facilitated by Peatland Action (Scottish Natural Heritage, 2017).

As a result, there are a number of specialist contractors who have experience in the planning, design and implementation of peat restoration works in the Scottish uplands. A key step in delivering the restoration proposals described above is identification of appropriate contractors to implement the restoration plans at each location.

The sections below outline good practice measures related to excavation and handling, storage, and reinstatement and restoration of peat in association with wind farm construction.

4.2 Excavation and Handling

The following good practice measures are proposed for excavation and handling:

- A minimum thickness of 300 mm of acrotelmic peat or turved organic soil should be excavated where sufficient soil is present; where less than 300 mm is present, the full depth of soil and surface vegetation should be excavated;
- Large bucket excavators should be utilised to maximise turf sizes and reduce the number of open edges on reinstatement;
- Excavation and transport of peat/soil shall be undertaken to avoid cross-contamination between soil horizons (e.g. organic soil and underlying mineral soil / substrate);
- Where possible, cross-tracking of plant over undisturbed vegetation should be minimised, and excavated materials transported to their storage locations along constructed track;
- If working is required away from constructed roads / tracks, the use of low ground pressure long reach excavators should be encouraged in order to minimise cross-tracking;
- If landscaping of road / track margins is required for temporary works, it is preferable for vegetated organic soils to be used for this purpose rather than acrotelmic peat (which should be stored); and
- Wherever possible, double handling of peat should be minimised (in particular for catotelmic peat) by direct transport of materials to their point of storage.

4.3 Storage

The following good practice measures are proposed for storage:

- Eliminate storage where possibly by single handling from the point of excavation to a location of reuse;

- If storage cannot be avoided, minimise storage time by taking an holistic approach to excavation and reinstatement such that catotelmic peat (in particular) is used as soon as possible after excavation;
- Store excavated acrotelmic and catotelmic peat separately during excavation works, ideally to be undertaken by an experienced contractor specialising in peat groundworks and restoration;
- Acrotelmic peat and turved soil blocks should be stored turf side up to prevent damage to vegetation;
- Storing in areas of minimal gradient where 'runoff' or drainage away from the point of storage is minimised (these areas will also satisfy to avoid areas of lower stability);
- Fewer, larger stores will be preferable to a greater number of small stores, since the total potential area of drying surface will be less;
- Where storage is required in the medium term, preparing the peat to minimise the surface exposed to drying (e.g. through blading off of catotelmic peat and use of appropriate cover to minimise moisture loss);
- The Ecological Clerk of Works (ECoW) should work with an appointed Geotechnical Engineer (GE) to review the placement and condition of stored peat;
- Storage areas should be outside any area identified in the PLHRA (Technical Appendix 8-3) as of 'Moderate' likelihood or greater or Factor of Safety <2.0 and should be more than 50m away from watercourses, away from sensitive habitats and away from the edge of excavations;
- Peat and soil stores should be appropriately bunded to prevent risks from material instability and prevent runoff of sediment and water from the stockpiles; and
- The condition of the excavated peat, in particular its moisture content, should be regularly monitored and local water utilised to periodically 'refresh' stored peat and prevent desiccation.

4.4 Reinstatement and Restoration

The following good practice measures are proposed for reinstatement:

- Any bare peat exposed at the surface of a reinstated area should be seeded with a seed mix or translocated vegetation appropriate to the locality;
- Where insufficient turves are available to full cover reinstated soils, a checkerboard pattern of turf blocks should be used, with turf squares no less than 1m^2 to act as seed points interspersed amongst the bare areas;
- Reinstated ground levels should tie in with the surrounds, and any bulking up should be avoided by tamping down soils and turves; and
- If appropriate, temporary fencing may be required to enable vegetation to establish following reinstatement works and prevent damage by livestock, deer or rabbits.

4.5 Monitoring

During construction, monitoring should be undertaken in any areas where peat is stored, as follows:

- Regular visual inspection of the outer peat surface of any stored peat to identify any evidence for drying or cracking;

- Regular coring of stored peat to log the moisture content of stored peat (using the von Post scale to monitor changes in moisture content for peat on the outside and within the peat mound);
- Clear specification of an action plan in response to these observations, including modifications to coverings, implementation of watering, or construction of temporary berms to retain water in the storage footprint; and
- Acceleration of reuse for vulnerable stores if so identified.

Key to the success of the strategy for peat management will be careful monitoring of the post-construction works and any reinstatement activities. A monitoring programme should be initiated once peat reinstatement works have been completed, and should include:

- Review of % vegetation cover and vegetation composition in areas of bare peat that have been reinstated or in any areas that have been seeded (due to a lack of available turved material);
- Review of stability of deposits in their new locations; and
- Fixed point photography in order to aid review over a series of monitoring intervals.

If required, mitigation recommendations should follow from the monitoring and include:

- Specification of seeding appropriate to the target vegetation or stabilisation with geotextile if revegetation is not occurring naturally (which will assist re-wetting and retention of moisture contents); and
- Construction of wood or mineral dams (or equivalent) if any creep of peat soils is evident at any reinstated location.

Monitoring should be carried out for a minimum of five years after construction and reinstatement works have concluded.

5 References

ESRI (2025) Comparing interpolation methods. Accessed 28/04/2025. Available at: https://pro.arcgis.com/en/pro-app/latest/tool-reference/spatial-analyst/comparing-interpolation-methods.htm

Lantschner L, McMullen A and MacDougall K (2011) Restoration Techniques Using Peat Spoil from Construction Works. EnviroCentre, 41p

Mills AJ, Massey K and Trinick M (2021) Carbon-rich soils, deep peat and priority peatland habitat – A guide to project level assessment. Natural Power, 39p

Scottish Government (2017) Peat Landslide Hazard and Risk Assessments, Best Practice Guide for Proposed Electricity Generation Developments (Second Edition). Scottish Government, 84p

Scottish Government, Scottish Natural Heritage, SEPA (2017) Peatland Survey. Guidance on Developments on Peatland, on-line version only, 18p

Scottish Natural Heritage (2015a) Scotland's National Peatland Plan – Working for our future. Scottish Natural Heritage, 52p

Scottish Natural Heritage (2015b) Constructed Tracks in the Scottish Uplands, 2nd Edition. Land Use Consultants, 147p

Scottish Natural Heritage (2016a) Carbon and Peatland 2016 Map.

Scottish Natural Heritage (2016b) Carbon-rich Soils, Deep Peat and Priority Peatland Habitat Mapping, Consultation Analysis Report. Scottish Natural Heritage, 20p

Scottish Natural Heritage and Forestry Commission Scotland (2010) Floating Roads on Peat - A Report into Good Practice in Design, Construction and Use of Floating Roads on Peat with particular reference to Wind Farm Developments in Scotland, 82p

Scottish Renewables and Scottish Environmental Protection Agency (2012) Developments on Peatland: Guidance on the assessment of peat volumes, reuse of excavated peat and the minimisation of waste. Version 1, January 2012. SR and SEPA Joint Publication, 23p

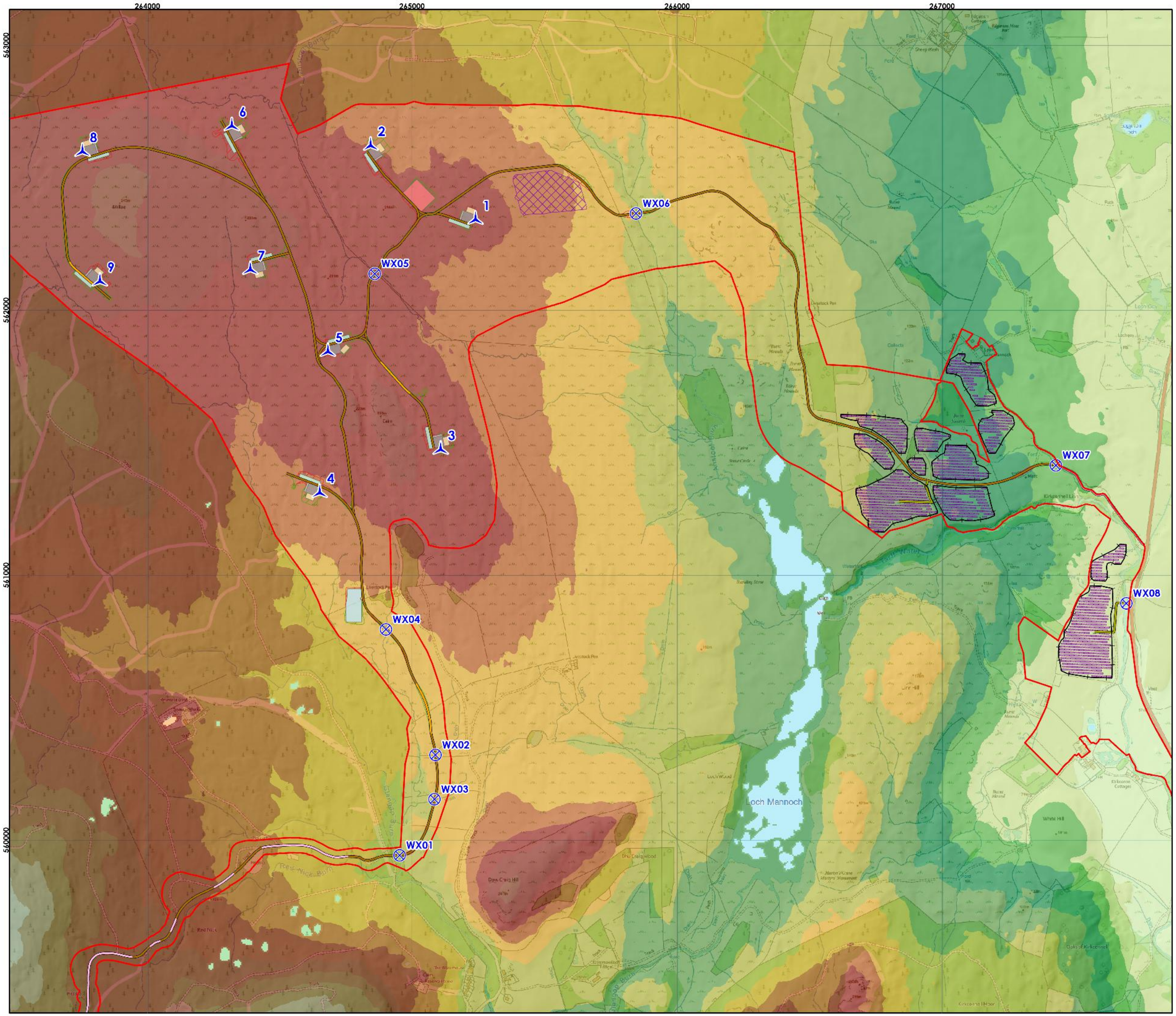
Scottish Renewables, Scottish Natural Heritage, Scottish Environmental Protection Agency and Forestry Commission Scotland (2019) Good Practice during Wind Farm Construction, Version 4

Scottish Water (2020) Annex 1: Precautions to protect drinking water and Scottish Water assets in peatland areas.

SEPA (2010a) SEPA Regulatory Position Statement – Developments on Peat. National Waste Policy Unit, SEPA, 4p

SEPA (2010b) Developments on Peatland Guidance - Waste. SEPA, 7p

SEPA (2017) SEPA Guidance – Developments on Peat and Off-Site Uses of Waste Peat – WST-G-052. SEPA, 5p



Lairdmannoch Energy Park

wind2

Figure 8.2.1 Elevation

Key

Site Boundary	
Watercourse Crossings	
Turbines	
Security fence	
Access track - cut	
Access track - floating	
Access track - upgraded / widened	
Access track - solar	
Turbine foundation	
Crane hardstanding	
Auxiliary crane area	
Tower storage	
Blade storage	
Substation and BESS	
Construction compound	
Borrow Pit	
Solar panel	
Power Station	
Switching and Breaking Station	
Earthworks - fill	
Earthworks - cut	

Elevation (m)

- 41 - 60
- 61 - 80
- 81 - 100
- 101 - 120
- 121 - 140
- 141 - 160
- 161 - 180
- 181 - 200
- 201 - 220
- 221 - 240
- 241 - 260
- 261 - 280
- 281 - 300
- 301 - 320

OWC
An ABL Group Company

atmos
CONSULTING

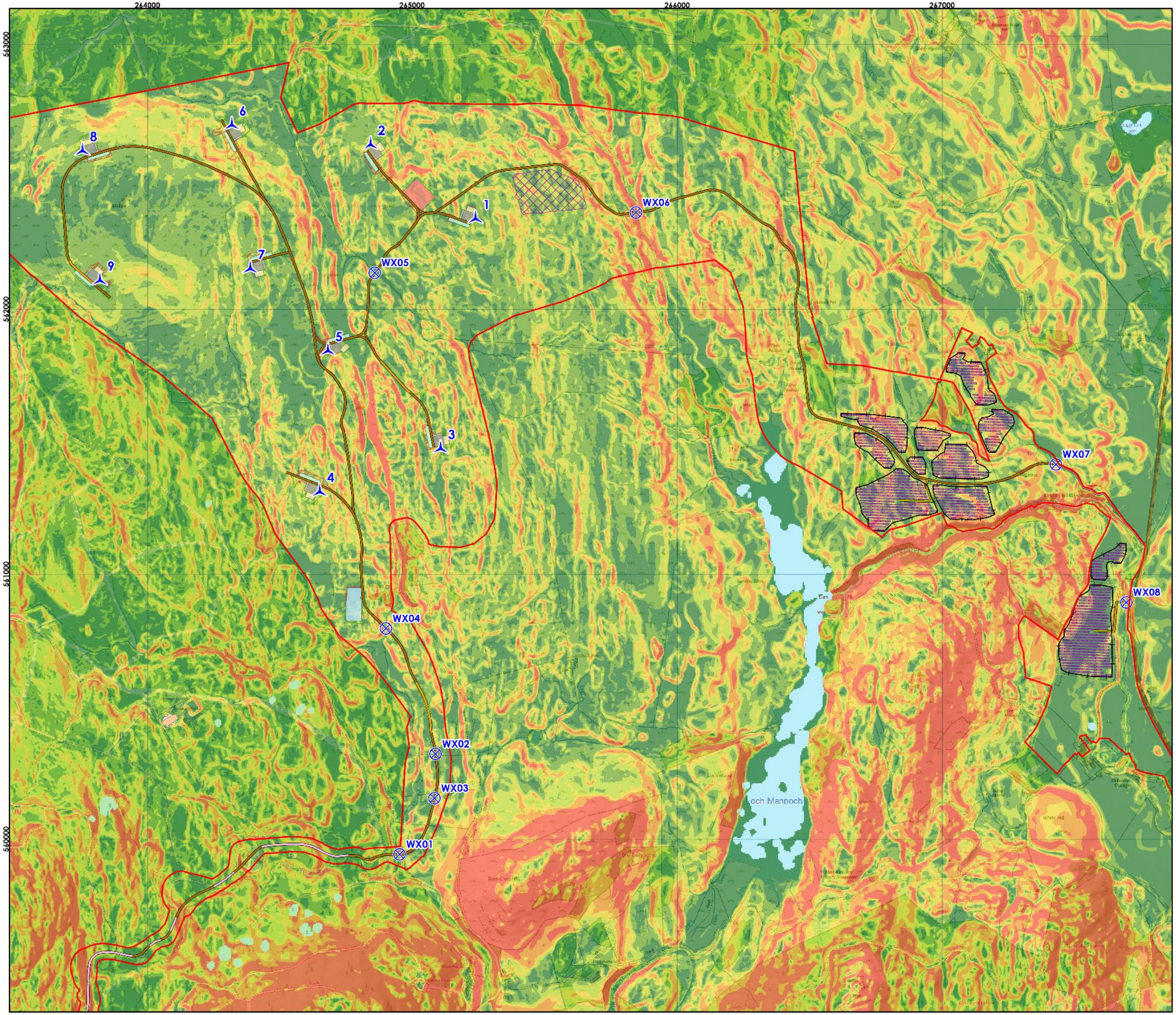
0 500 1,000 2,000

Metres

N

Scale @ A3:
1:13,500

Date of edit:	Turbine layout:	Drawing number:
02/04/2025	Rev10	01
Drawn by: RH	Checked by: AM	Approved by:



Lairdmannoch Energy Park

wind2

Figure 8.2.2 Slope

Key

- Site Boundary
- Turbines
- Watercourse Crossings
- Security fence
- Access track - cut
- Access track - floating
- Access track - upgraded / widened
- Access track - solar
- Turbine foundation
- Crane hardstanding
- Auxillary crane area
- Tower storage
- Blade storage
- Substation and BESS
- Construction compound
- Borrow Pit
- Solar panel
- Power Station
- Switching and Breaking Station
- Earthworks - fill
- Earthworks - cut

Slope (°)

- 0.0 - 2.5
- 2.5 - 5.0
- 5.0- 7.5
- 7.5 - 10.0
- 10.0- 15.0
- > 15.0

OWC An ABL Group Company

atmos CONSULTING

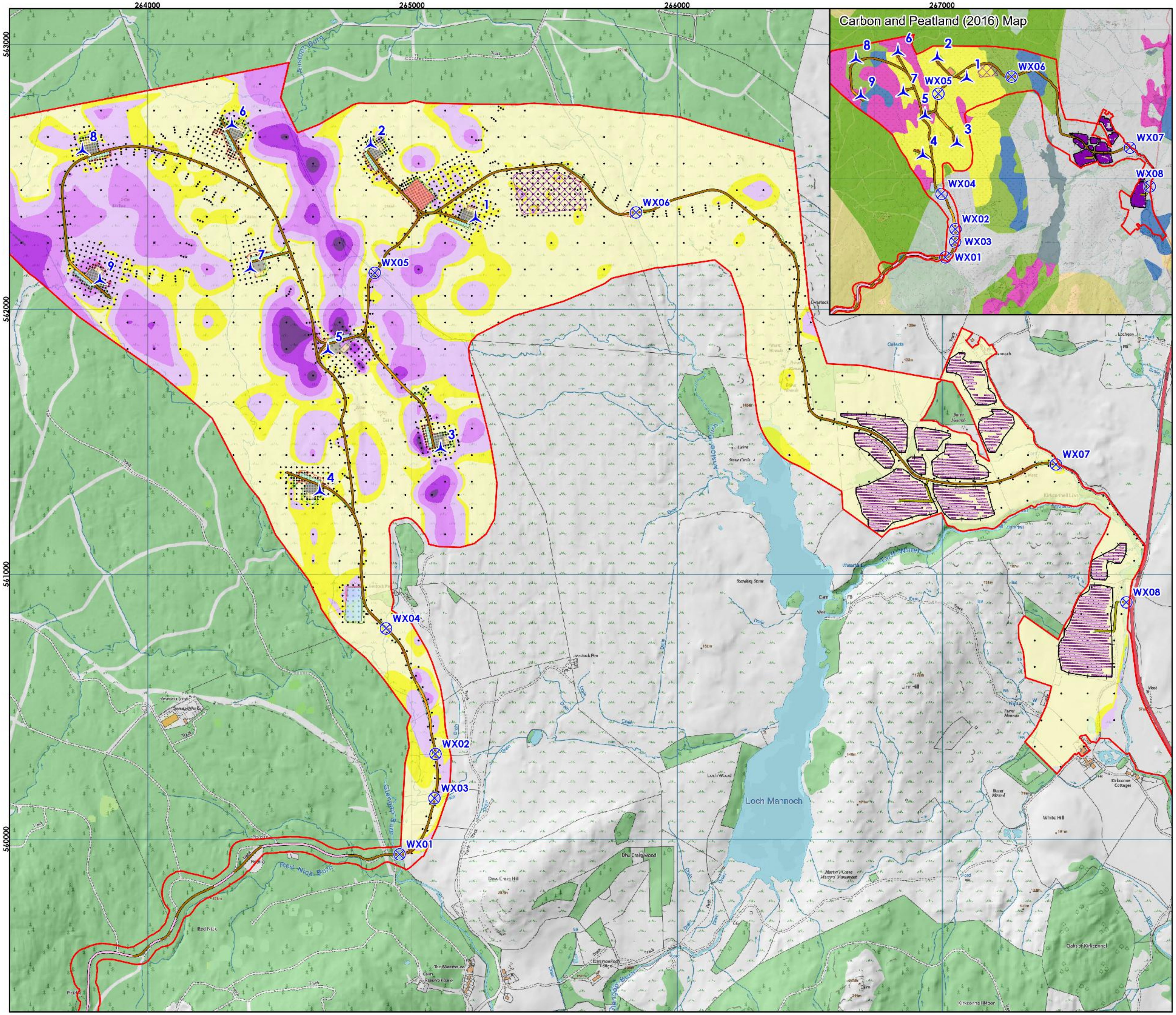
0 500 1,000 2,000

Metres

N

Scale @ A3: 1:13,500

Date of edit: 02/04/2025	Turbine layout: Rev10	Drawing number: 01
Drawn by: RH	Checked by: AM	Approved by:



Lairdmannoch Energy Park

wind2

Figure 8.2.3 Peat Depth

Key

- Site Boundary
- Turbines
- Watercourse Crossings
- Security fence
- Access track - cut
- Access track - floating
- Access track - upgraded / widened
- Access track - solar
- Turbine foundation
- Crane hardstanding
- Auxillary crane area
- Tower storage
- Blade storage
- Substation and BESS
- Construction compound
- Borrow Pit
- Solar panel
- Power Station
- Switching and Breaking Station
- Earthworks - fill
- Earthworks - cut

Peat Depth (m)

- <= 0.35
- >0.35 - 0.50
- >0.50 - 1.00
- >1.00 - 2.00
- >2.00 - 3.00
- >3.00 - 4.00
- Probe Locations

Carbon and Peatland (2016) Map (Inset)

- Class 1
- Class 2
- Class 3
- Class 4
- Class 5
- Mineral Soil
- Unknown Soil
- Non Soil

OWC
An ABL Group Company

atmos
CONSULTING

0 500 1,000 2,000
Metres

N

Scale @ A3:
1:13,500

Date of edit:	Turbine layout:	Drawing number:
28/04/2025	Rev10	01
Drawn by: RH	Checked by: AM	Approved by: