Appendix 7.3: Outline Peat Management Plan

Consulting Report

Appendix 7.3 – Outline Peat Management Plan
An Càrr Dubh Wind Farm

Argyll & Bute
Car Duibh Wind Farm Ltd

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CONTENTS

1. INTRODUCTION

1.1. Background

Car Duibh Wind Farm Ltd (the Applicant) are seeking consent under Section 36 of the Electricity Act 1989 for construction of the An Càrr Dubh Wind Farm, Argyll & Bute (hereafter the 'Proposed Development').

The Site for the Proposed Development lies approximately 1 km to the west of Inveraray and 2.5 km east of Dalavich and is approximately 16 km^2 (c. 1,600ha) in area (Plate 1.1). The site is bordered to the north and south by open peatlands and to the west and east by commercial forestry plantations.

The Proposed Development is described in full in **Chapter 4: Project Description.**

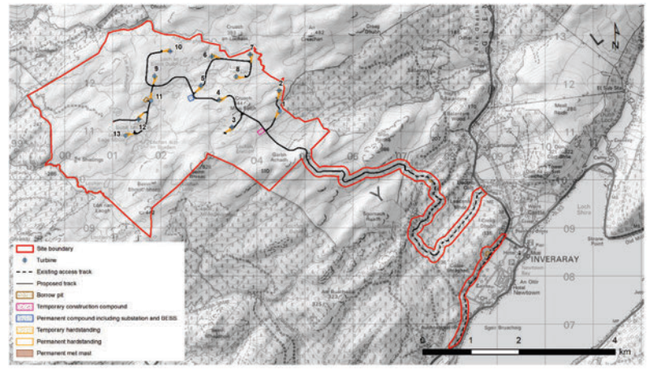

Plate 1.1 Proposed location of the An Càrr Dubh wind farm

This Peat Management Plan (PMP) follows guidance (Scottish Renewables & SEPA, 2012) on the assessment of peat excavation and reuse for wind farms in Scotland. The PMP was prepared in parallel with a Peat Landslide Hazard and Risk Assessment (PLHRA, Appendix 7.4) and is informed by peat depth probing undertaken by Kaya Consulting and documented in Appendix 7.2.

1.2. Scope of Work

The scope of the PMP is as follows:

- Summarise the design 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 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.
- Identify good practice measures to ensure excavated peat is stored safely and with minimal loss of function prior to its reinstatement.

The PMP follows general recommendations made by SEPA for schemes set within peatlands when consultation has been possible. However, at the time of scoping for this Proposed Development, SEPA had recently been subject to a cyber attack (SEPA, 28/06/21) and no specific advice was issued. Subsequent consultation was, however, undertaken with SEPA, including in the response to the Gate Check report (email from SEPA 17th November 2022). Further details of the consultation undertaken are provided in Chapter 7 of the EIA Report.

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.
- Section 5 describes the approach to reuse of excavated peat soils in reinstating proposed infrastructure.
- Section 6 describes reuse of peat in satisfying restoration objectives.
- Section 7 provides general good practice measures and measures specific to the conditions at the proposed site.

Where relevant information is available elsewhere in the EIA Report, this is referenced in the text rather than repeated in this report.

2. CONTEXT TO PEAT MANAGEMENT

2.1. 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]).

2.2. Good Practice Guidance

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

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

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:

- 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).

In general terms, the guidance considers appropriate activities to be undertaken at the planning (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 planning (EIA):

i. 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.

ii. Calculate the volumes of peat likely to be excavated during construction.

iii. Demonstrate how excavated peat will be managed and reused (ii and iii together comprising an assessment of the "peat and soil balance").

These activities are normally considered within a PMP, delivered as part of the EIA at the planning stage.

Given consent, during the pre-construction period:

i. 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).

ii. 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.

iii. 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.

[1] an Outline Restoration and Enhancement Plan is provided as Appendix 8.5 to the EIA Report

- Monitor, adjust and implement the PMP to accommodate deviations in expected peat volumes and adapt reuse measures to actual site volumes.
- 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.

2.3. Approach at An Càrr Dubh

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, and given other site and design constraints that may influence turbine locations and associated infrastructure (such as tracks).
- **Reuse** peat on site in construction, reinstatement or in restoration (restoring off-site will require environmental authorisation).
- **Recycle** as a soil substitute or for use in other works (where on-site or off-site use in restoration is not possible).
- **Dispose**, only if all other options have been explored and discounted.

2.3.1. 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 visual impacts, hydrology, terrestrial ecology) and the practical requirements of wind farm construction (e.g. minimum turbine spacings, acceptable gradients for tracks / hardstandings).

At An Càrr Dubh, approximately 60% of the site is covered in peat (Table 1, Appendix 7.2), and opportunities to avoid peat altogether are relatively limited. Nevertheless, a process of iterative design in which peatland constraints were balanced with other environmental and practical constraints was used to minimise overlap of infrastructure with the deeper peat deposits at the Site. This is documented in the Chapter 3 ('Site Selection and Design Strategy') of the EIA Report.

In order to provide greater flexibility to infrastructure placement, the standard 10 m grid was expanded to a 20 m grid over a larger footprint. This enabled greater scope for micro-siting during layout workshops. In addition to this approach, the design process to minimise peat impacts included:

- **Between Scoping and Layout 2 ('Second Public Exhibition Event'):** a relocation of turbines to avoid priority peatland habitats and the presence of known areas of deep peat, where possible, informed by the Phase 1 peat probing data undertaken at 100m grid across the site.
- **Between Layout 2 and the Interim Layout:** minor iterative changes to balance peat depth and watercourse constraints after taking into account the main landscape visual drivers for layout revisions.
- **Between the Interim Layout and Optimised Interim Layout:** further layout modifications to reflect updated peat survey data, amongst other constraints.
- Between **the Optimised Interim Layout and Final Layout:** further changes, including minor adjustments (e.g. flipping hardstandings) to accommodate the revised peat survey data.

By siting foundations and hardstandings in areas of relatively shallow peat, flipping or orienting hardstanding footprints to further minimise excavation volumes, and adopting a lower threshold for floating track, peat excavation volumes have been minimised as far as practicable for a 13 turbine scheme on this site.

2.3.2. Reuse

Excavated peat will be reused at the point of excavation or in tying infrastructure into the landscape (e.g. by dressing track and hardstanding margins). Reinstatement approaches are derived from the Good Practice guidance detailed in Section 2.1 and are considered in further detail in Section 5.

2.3.3. Restore

At An Càrr Dubh, early observations of relatively widespread peatland erosion have underpinned a reuse strategy incorporating extensive peatland restoration and enhancement using excavated peat. Further detail is provided in Section 6.

2.3.4. Disposal

No disposal of peat is anticipated as part of the Proposed Development.

3. DESK STUDY

3.1. Site Overview

The Proposed Development straddles the hills to the north of Beinn Bhreac (526 m) and surrounds Cruach Mhic Eoich (444 m), the access track falling to the southeast into commercial forestry above Inveraray. Much of the main turbine area lies over strongly northeast-southwest aligned ridges with intervening troughs (Figure 7.3.1). This topography has a strong influence on the position of major water bodies and deeper peat deposits (see Plate 3.1 below and section 3.3).

In the troughs and on the ridge spurs, slope angles are relatively low (typically <5°) but these rapidly increase over the steeper sideslopes of the ridges, in particular as the proposed access track approaches the forest margin, with slopes frequently exceeding 15° (see Figure 7.3.2). Again, slope acts as a constraint on the continuity of deep peat development, with the deepest deposits in areas of gentle gradient, though more usually in inter-ridge troughs rather than on the ridge crests.

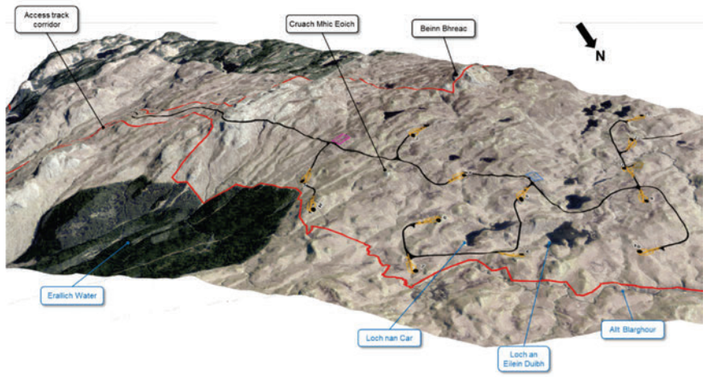

Plate 3.1 Perspective view of Proposed Development (note 2x vertical exaggeration)

3.2. Peat Depth and Distribution

Peat depth probing was undertaken in 2 phases in accordance with Scottish Government (2017) guidance:

- A total of 5,363 probes were collected across Phase 1 (100 m grid, between March and August 2021) and Phase 2 (detailed infrastructure-specific probing, between January and March 2022, and with some additional probing in October 2022). Phase 2 probing was collected on a 20 m grid in order to provide greater flexibility in infrastructure placement during design workshops.
- 39% of probes recorded depths <50 cm and therefore recorded organic soils (rather than peat), although organic soils may still support priority peatland habitats.
- Peat exceeded 4.9 m in depth at a number of locations across the site, however these areas have been entirely avoided.
- 18 cores were taken across the site (locations detailed on Figure 7.2 of the EIA Report) with substrate corresponding to bedrock in around 50% of locations.

A peat survey report (Appendix 7.2) provides more detail on the peat surveys.

Figure 7.4.3 provides a peat depth map of the Proposed Development interpolated from the Phase 1 and Phase 2 peat depth surveys, with probing locations superimposed. 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).

Figure 7.4.3 indicates that:

- Peat is widespread across the Proposed Development, peaking in depth along a northeast-southwest axis in a number of large pockets of very deep peat between the area north of the proposed met mast and east of Turbine 10.
- Depths decline with reducing elevation towards the southeast along the route of the proposed access track.
- Many of the larger lochans, despite being in low lying areas, are surrounded by shallower organic soils, rather than deeper peat.

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. Typically, this process involved minimising the overlap of permanent excavation footprints with deeper deposits, mirroring hardstandings to further reduce overlap, and adjusting track alignments away from pockets of deep peat. Further details on the iterative site design adopted for An Càrr Dubh (which took account of all constraints, not just peat) are provided in the Chapter 3 of the EIA Report.

Coring undertaken at turbine locations (and documented in EIA Report Appendix 7.2) indicates occasional area of clay and gravelly clay substrate, which may lead to localised overestimates of peat depth in some parts of the site. In some areas, core retrieval was limited with basal peat too wet to recover from the core base. Appendix 7.2 indicates that some of the basal material may comprise amorphous (H_{10} on the von Post scale) peat and the handleability of such material requires consideration as part of reuse proposals (see Sections 5 and 6).

3.3. Peat Geomorphology and Condition

A detailed account of peat geomorphology is provided within the PLHRA (Appendix 7.5) based on geomorphological mapping of the site from satellite imagery and subsequent field walkover and verification. Detailed geomorphological mapping has facilitated identification of degraded parts of the site, visible primarily as hagged areas.

Hagged areas are present in variable condition, with bare floors, vegetated floors but bare hagg sides and as largely recovered areas with little exposed peat. The more bare peat present within a hagged area, the more degraded the area and the longer the trajectory towards natural recovery. Figure 7.4.4 shows hagged areas classified as vegetated or bare / part bare based on interpretation of satellite imagery and the 25 cm aerial photograph purchased to support mapping. Examples of hagged peat on the ground and visible on aerial imagery are shown on Plate 3.1.

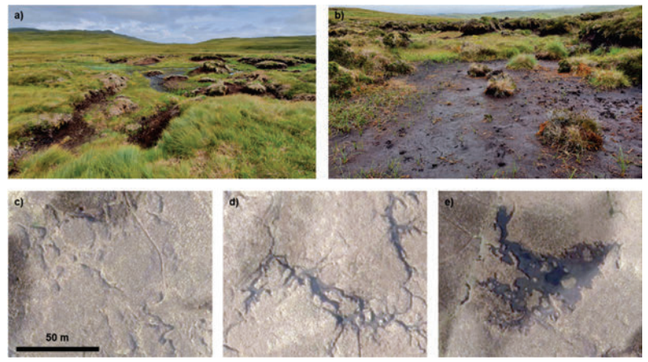

Plate 3.1 a) part bare / partially recovered hagged area, b) bare peat in hagged area, c) recovered hagged area on aerial imagery, d) part bare area, e) bare peat area

In addition to natural degradation by erosion, much of the site has been subject to artificial drainage in the form of moorland drains. Figure 7.3.4 shows drains mapped within the Proposed Development area. Over 800 drain segments have been mapped totalling over 65 km in length, and while many are partially vegetated, they are likely to be active and affecting the surrounding peatlands. Examples are shown on **Plate 3.2**. NatureScot guidance on the assessment of peatland condition (Scottish Natural Heritage, 2017) indicates potential effects up to 30 from drains, and if this is the case, an indicative area of c. 350 ha is potentially affected by these artificial drains at An Càrr Dubh.

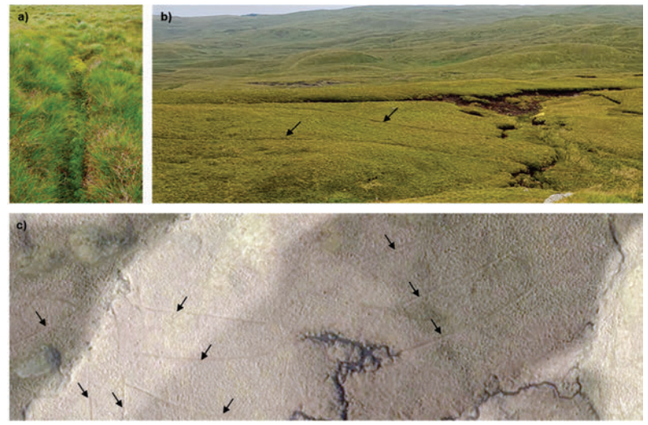

Plate 3.2 a) part vegetated drain, b) drains cut oblique to slope, c) drains visible on aerial imagery (approximately 20 m spacing)

The Carbon and Peatland 2016 Map (shown as an inset on Figure 7.4.3) predicts the entirety of the open hill area to comprise Class 2 carbon-rich soils, deep peat and priority peatland habitats. Class 2 corresponds to nationally important carbon-rich soils, deep peat, and priority peatland habitat (i.e., land covered by peat-forming vegetation or vegetation associated with peat formation). Areas of Class 2 are noted on the map legend for the map to be "areas of potentially high conservation value and restoration potential". Given the presence of drains and areas of eroded peatland, there is restoration potential at the Site and this is the primary reason for the selection of peatland restoration as an opportunity for peat reuse at An Càrr Dubh.

Ecological assessment of the Site (see Chapter 8 'Ecology' of the EIA Report) indicates the principal habitat components to be blanket bog, wet and dry dwarf shrub heath and acid grassland. Dry heath tends to dominate the drier, steeper slopes and wet heath occurs in mosaics with blanket bog in the lower wetter areas. Bog habitats represent c. 45% of the Ecology Survey Area (ESA). Table 2.10 of Chapter 8 interprets blanket bog habitats (NVC communities M2, M3, M17, M19 and M20) to be of County level importance. Modification of some areas by grazing is noted, although other areas are considered to be moderately species-rich and semi-natural.

There are no peat cuttings on the site and no major quarries within which excavated peat might be placed for restoration purposes. The site does not seem to have been subject to muirburn.

4. PEAT AND SOIL EXCAVATION

4.1. 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 (see Chapter 4 'Project Description' of the EIA Report). However, some infrastructure is not required post-construction (parts of the foundation hardstandings, the temporary construction compound and borrow pits) and the peat excavated from these areas will be directly reinstated. In this section, the following terms are used to describe groundworks associated with peat / soil and wind farm infrastructure:

- **Permanently excavated:** peat will be permanently removed from the infrastructure footprint, stored locally and reused elsewhere.
- **Temporarily excavated:** peat will be temporarily removed from the infrastructure footprint, stored locally and fully reinstated at the point of excavation post-construction.
- **Landscaping:** the process of using peat to 'dress' or tie-in the boundaries of infrastructure.
- **Restoration:** the use of excavated materials to improve the quality of land areas that are considered degraded through mechanisms other than associated with wind farm construction (e.g. through cutting or erosion); the term is not used to describe reinstatement activities at 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 below). Additional 'take' has been specified to accommodate a 2:1 slope around each type of infrastructure which is considered to be conservative (and therefore lead to a likely overestimate in excavated peat and soil volumes).

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. While Appendix 7.2 notes that the acrotelm may be thicker in many locations across the site, a 0.3 m provides a reasonable basis for estimating turf (acrotelm) and underlying peat matrix (catotelm).

Soils less than 0.5m in depth are assumed to be organic (or other) soils other than peat and are classed as 'soil' for the purposes of this assessment. While the soil balance is considered in the PMP proposals, it is not the primary focus of this assessment and is not considered part of the peat mass balance calculated.

4.1.1. Turbines, hardstandings, secondary crane pads and blade lay downs

Each turbine location will comprise a circular turbine foundation of c. 17.5m radius and a main hardstanding (c. 72 m x 30 m), with temporary hardstandings for blade laydowns (84 m x 25 m), ancillary cranes and runover areas. All footprints will be fully excavated to substrate and replaced with coarse aggregate for the duration of construction (see Chapter 4 of the EIA Report). The main hardstandings must remain in place for routine maintenance and decommissioning. Plate 4.1 shows the layout for these infrastructure components.

The permanently excavated volumes for turbines and hardstandings are based on the product of each component area and the average peat depth for that component, with each component considered separately (e.g. main hardstanding + turbine, crane pads, blade laydown). Average peat depths are based on the peat depth model interpreted from detailed Phase 2 probing (Figure 7.3.3).

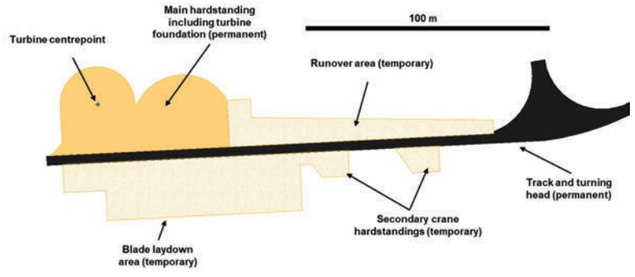

Plate 4.1 Indicative layout for turbines, hardstandings and track

Volumes are separated into permanent and temporary excavations and into acrotelmic and catotelmic peat, where the former is equivalent to the component footprint x 0.3 m and the latter is the remainder.

Table 4.1 shows excavation volumes for the turbines, hardstandings, secondary crane pads and blade lay downs. Figure 7.3.5 shows these infrastructure components colour-coded by temporary and permanent excavation, superimposed on the peat depth model (which is shown without filled symbology on Figure 7.3.3).

4.1.2. Access tracks

Access tracks will comprise a 6 m wide running surface and will be constructed as floating track on peat depths in excess of 0.5 m wherever gradients allow and where the floating section exceeds 100 m in length. Shorter floating sections are not used since transition sections between floating and cut and fill tracks would occupy much of the 100 m extent.

Because floating tracks involve no excavation of peat, no peat volumes are generated from this type of site infrastructure.

Where cut tracks are specified, primarily on non-peat soils (<0.5m), excavation volumes are calculated as the product of track footprints and the average peat depth under the track section, with an addition 2:1 side cut on each side of the track. A further 1 m width of excavation is included on one side for a drainage ditch.

Table 4.1 shows the excavation volumes for cut tracks (which includes any turning heads in areas specified as of cut and full construction). Figure 7.3.5 shows track sections colour-coded according to floating and cut and fill construction.

4.1.3. 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.

4.1.4. Construction compound

The construction compound (located at the top of the main access track) will provide storage for site plant and materials and will be reinstated post-construction. Therefore it will be temporarily excavated, with all excavated peat stored locally and reinstated. The location of the construction compound is shown on Figure 7.3.5 and the excavation volume is shown in Table 4.1.

4.1.5. Substation and BESS compound

The substation will be permanently excavated to substrate over a footprint of 106 m x 106 m. The excavated peat volume based on detailed probing is shown in Table 4.1, including a 2:1 sideslope around the compound margin. The location of the substation and BESS compound is shown on Figure 7.3.5 and the excavation volume is shown in Table 4.1.

4.1.6. Met mast

The met mast hardstanding c. 20 m x 20 m) is location in the west of the Site (see Figure 7.3.5) and will require permanent excavation of underlying peat soils (although the track to it is largely floated). The met mast location is shown on Figure 7.3.5 and the excavation volume is shown in Table 4.1.

4.1.7. Borrow pits

There are three proposed borrow pit search areas, two of which are located at roadsides within the commercial forestry to the southeast of the Proposed Development. Both are existing and neither of these are in peat. The third is located adjacent to proposed Turbine 11 with an average soil depth of c. 0.48 m and although this corresponds to organic soil, the excavation volume is treated as peat for the purposes of impact assessment. Borrow pit locations and excavation volumes are shown on Figure 7.3.5 and Table 4.1 respectively.

4.2. Summary of peat and soil excavation volumes

Table 4.1 below summarises peat excavation volumes based on the approach to calculation described above. Figures are quoted to 1 m^3 to avoid rounding errors leading to inaccurate totals in later tables rather than to imply accuracy of calculations to 1m^3.

Infrastructure	Type of Excavation	Excavation Volume (m^3)		
		Acrotelm	Catotelm	Soil
Turbine foundations and main hardstandings (incl. perimeter cut slopes)	Permanently excavated	6,631	12,912	3,445
Tracks (cut and fill) (incl. marginal cut slopes)	Permanently excavated	16,989	31,561	7,586
Substation and BESS compound	Permanently excavated	3,155	4,469	0
Blade laydowns, runovers and secondary crane hardstandings (incl. perimeter cut slopes)	Temporarily excavated	14,264	34,190	3,871
Met Mast	Permanently excavated	120	560	0
Construction compound	Temporarily excavated	3,312	3,477	0
Borrow pits	Temporarily excavated	1,669	1,002	0
	Totals	**46,140**	**88,171**	**14,902**

Table 4.1 Peat excavation volumes for all infrastructure

Section 5 considers peat reuse volumes in tying proposed infrastructure into the landscape and Section 6 considers how to use the remaining peat in restoration of degraded areas across the Site.

5. PEAT AND SOIL REUSE

5.1. Reuse calculations for temporary excavations

All peat and soil excavated for the following types of infrastructure will be stored locally and reinstated directly at its point of origin once construction of the wind farm is completed:

- Blade laydown areas and runover areas.
- Secondary crane hardstandings.
- Temporary construction compound.

Table 5.1 shows direct reinstatement volumes.

Infrastructure Type of Excavation	Excavation Volume (m^3)		
	Acrotelm	Catotelm	Soil
Blade laydowns, runovers and secondary crane hardstandings (incl. perimeter cut slopes)	14,264	34,190	3,871
Construction compound	3,312	3,477	0
Totals	**17,576**	**37,668**	**3,871**

Table 5.1 Peat direct reinstatement volumes for temporarily excavated infrastructure

5.2. Reuse for landscaping infrastructure

At An Càrr Dubh, there are opportunities to utilise excavated peat in restoration of degraded areas across the site. Therefore, use of peat in landscaping infrastructure has been minimised where possible and the majority of 'dressing' will be undertaken using organic soil.

Landscaping will be undertaken as follows:

- Cut slopes around the perimeters of foundations and permanent hardstandings will be landscaped using the acrotelm excavated from these areas, with the underlying catotelm utilised elsewhere – this minimises transport of this material is considered to be least disruptive of the overlying habitats.
- The borrow pit in the main infrastructure area will be reinstated using acrotelmic and catotelmic peat excavated from the pit and stored locally.
- The margins of cut and fill tracks will be dressed using the acrotelmic material derived from their cut sideslopes – material excavated from underneath the track footprint will require reuse elsewhere and is considered in Section 6.
- The margins of floating track (where no peat is excavated locally) will be dressed using organic soils rather than peat.

Table 5.2 shows the volumes of peat and soil used to be used in landscaping.

Infrastructure Type of Excavation	Excavation Volume (m^3)		
	Acrotelm	Catotelm	Soil
Perimeter cut slopes around turbines and main hardstandings	622	0	79
Borrow pit (main site only)	1,669	1,002	0
Marginal cut slopes along cut and fill tracks	7,904	0	1,184
Margins of floating track	0	0	9,800
Totals	**10,195**	**1,002**	**11,063**

Table 5.2 Peat and soil volumes for use in landscaping

6. PEATLAND RESTORATION

6.1. Reuse calculations for restoration

Given the relatively widespread occurrence of erosion across the peatlands at An Càrr Dubh, peatland restoration of these eroded areas has been considered a key element of the habitat management proposals from the outset of the project design. Peatland restoration will be delivered through a combination of the following approaches:

i. Reinstatement of peat in areas naturally denuded of peat soils through emplacement of peat excavated during construction.

ii. Reprofiling of hagged areas that do not merit peat emplacement (because they have vegetated floors or because their slopes are too steep to safely accommodate relocated peat).

iii. Rewetting of peat through drain blocking and through the reinstatement in i. above (which will benefit adjacent areas by sealing extensive areas of free draining peat haggs)

iv. Encouraging recovery of peatland habitats by grazing control.

Approach i. relies on the availability of peat generated during wind farm construction to implement, and is considered in the first part of this section. The second part of this section considers approaches ii - iv. which are also presented as part of Appendix 8.5 of the EIA Report ('Outline Habitat Management Plan').

6.2. Identification of restoration areas for use of excavated peat

Geomorphological mapping of the full infrastructure area and main access track corridor undertaken in support of the PLHRA were used to identify c. 240 hagged areas across the Site. Subsequently, the following attributes were determined for each individual hagg polygon:

- Severity of erosion (recovered, partially bare, bare; see Plate 3.1 c to e), including an estimate of areal loss of peat cover (25% loss, 50% loss, 75% loss, 100% loss).
- Indicative peat depth (and therefore erosive loss) using the peat depth model interpolated from Phase 1 and Phase 2 probing.
- Mean slope angle (using the OS Terrain 5 digital terrain model).
- Proximity to proposed infrastructure (less than 100 m from proposed infrastructure).
- Natural stability (using outputs from the PLHRA).

Partially bare or bare hagged areas with mean slopes <5° with >1.0 m of erosive loss over >50% of their footprint, within 100 m of proposed infrastructure and with natural stability of 'Moderate' or Factor of Safety >1.4 were identified as candidates for restoration. A 100 m distance threshold from proposed infrastructure was specified to minimise tracking of restoration plant (typically low ground pressure excavators) over intact habitats.

Hagged areas greater than 100 m from proposed infrastructure or on steeper slopes are recommended for reprofiling works (approach ii above). Hagged areas that are vegetated / recovered are not recommended for any restoration works as they are considered to be sufficiently stable to avoid risking any disturbance.

Each candidate hagged area was then assigned a target restoration depth based on the prevailing peat depth at that location, with target depths typically 50-75% of the prevailing depth. A maximum restoration depth of 1.5 m was set for mean slopes up to 2.5°, 1.0 m for mean slopes up to 4° and 0.75 m for any slopes > 4°. This approach to target depths was taken to allow for:

- Any inherent overestimates within the peat depth model.
- Accommodation space (in volumetric terms) for internal retaining structures that might be required to aid local stability of emplaced materials.
- Ensuring the reinstated peat sits lower than the surrounding peat and is therefore able to receive surface water, aiding rewetting and recovery.
- Ensuring that emplaced peat thickness reduces with increasing gradient in order to maximise stability.

Based on this conservative approach to infill volumes, there is a reasonable level of confidence that the reuse volumes detailed in section 6.3 (below) are credible and achievable.

It is anticipated that some retaining structures may be appropriate within hagged areas, in particular where:

- Eroded floors are wide and open (with few residual peat islands to act as natural berms).
- Gradients are greater (>3°).
- Significant inflows of water occur from discrete point sources (e.g. large gullies).
- Catotelmic peat is of very poor consistency (see section 3.2).

Retaining structure would be best constructed from site-won materials (such as larger grades of won rock) or from composite dams such as those used in large gully restoration projects (Yorkshire Peat Partnership, 2014a, b). It is unlikely that retaining structures / dams would need to be constructed to the full depth of the peat deposit, but rather they would need to be of sufficient height to prevent the more humified basal catotelmic peat from creeping down-gradient. It is considered beyond the scope of this pre-consent EIA to produce detailed hagg-specific designs, however, in the event that consent is granted, a detailed hagg restoration plan should be prepared informed by site-specific UAV survey and restoration best practice at that time. Section 7.4 makes additional recommendations specific to hagg restoration.

6.3. Restoration calculations

Restoration volumes are based on the footprint of each hagged area, reduced by the 'area loss of peat cover' percentage described above, multiplied by the target depth. In all, 23 hagged areas were identified, with an average footprint of 5,000 m^2, an average prevailing peat depth of 2.0 m and an average available space of 60% per footprint. Haggs are shown on Figure 7.3.4.

Table 6.1 shows the proposed restoration volumes based on the approach described above. Figure 7.3.6 shows all hagged areas proposed for peat emplacement.

While the total volume of peat required to restore to the target depths balances (to within c. 200 m^3 or 0.4%) of the peat available from excavation, more acrotelm is required than available and less catotelm is required than available. In practice, this means that not all catotelmic peat placed into hagged areas will have continuous acrotelm cover, and a 'checkerboarding' approach to turfing each area may be required. Alternatively, if emplacement of catotelmic peat without acrotelmic cover is not preferred, there is additional accommodation space in the borrow pit, contiguous with areas of deeper peat (up to 1.0 m deep in the area surrounding the pit), and additional catotelmic peat could be placed ahead of the reinstatement of locally stored peat. Based on the c. 5,500 m^2 footprint, an additional 0.5 - 0.75 m^3 of peat across the borrow pit area would enable an additional 2,750 m^3 to 4,125 m^3 of catotelm to be reused in this area, tying into the deeper peat surrounding it.

			Restoration Volume (m^3)	
Hagged Area ID	**Available Area (m^2)***	**Target Depth (m)**	**Acrotelm**	**Catotelm**
HR_26	897	1.50	269	1,076
HR_25	2,710	1.50	813	3,251
HR_33	2,298	1.50	689	2,757
HR_1	2,933	1.50	880	3,519
HR_142	3,939	1.00	1,182	2,757
HR_51	1,294	1.00	388	906
HR_34	1,338	1.00	401	937
HR_23	1,808	1.00	542	1,266
HR_5	3,174	1.00	952	2,222
HR_240	1,629	1.00	489	1,140
HR_116	2,162	1.00	649	1,513
HR_223	2,108	1.00	632	1,475
HR_9	4,702	1.00	1,410	3,291
HR_31	13,246	1.00	3,974	9,272
HR_55	5,304	0.75	1,591	2,387
HR_3	1,053	0.75	316	474
HR_32	8,018	0.75	2,405	3,608
HR_30	371	0.75	111	167
HR_0	2,424	0.75	727	1,091
HR_88	2,328	0.50	698	466
HR_22	3,103	0.50	931	621
HR_6	2,580	0.75	774	1,161
HR_4	1,906	0.75	572	857
		Totals	**21,396**	**46,214**

Table 6.1 Restoration volumes (* note that this area is not the full mapped hagg area, but a subarea based on an interpretation of accommodation space available around residual peat)

At this pre-consent stage, the overall balance is judged to be a reasonable indication that a balance is achievable, with 'actual' target depths and volumes to be determined post-consent using more detailed elevation data, with preparation of individual hagg area restoration plans.

6.4. Peat and soil mass balance

Based on the excavation calculations in section 4, landscaping calculations in section 5 and restoration calculations in this section, the peat mass balance for An Càrr Dubh is as follows:

	Peat Balance (m^3)		
Activity	**Acrotelm**	**Catotelm**	**Total**
Excavation			
Total excavation during construction	46,140	88,171	134,311
Reuse and restoration			
Total used in direct reinstatement	17,576	37,667	55,243
Total used in landscaping	10,195	1,002	11,197
Total used in restoration	21,396	46,214	67,610
Peat Mass Balance (Excavation – (Reuse + Restoration))	**-3,027**	**3,288**	**261**

Table 6.2 Peat mass balance

The table indicates that there is sufficient peat to fully reinstate temporary infrastructure, provide dressing of permanent infrastructure and enable restoration of extensive areas of eroded peat across the central part of the Site.

6.5. Additional peatland restoration activities

6.5.1. Hagg reprofiling

While the most severely degraded deep peatland within practical trafficking distance of the proposed infrastructure has been specified for restoration with excavated peat, there are numerous additional areas of hagged peat that are further from infrastructure or in which partial recovery has taken place. These areas are recommended for hagg reprofiling using conventional reprofiling techniques, which typically involve turf roll back from hagg crests, reprofiling of steep hagg faces, and relaying of turves back over the now reduced gradient peat face. This is a well established restoration technique, widely used in Peatland ACTION projects across Scotland, and delivered by numerous restoration contractors in a variety of settings. Figure 7.3.6 shows all areas proposed for hagg reprofiling.

6.5.2. Drain blocking

As noted in section 3.3, much of the site has been subject to drainage in an attempt to reduce water tables. Over 65,000 m of drains have been mapped across the site, each of which has the potential to cause a water table drawdown effect on the surrounding peat soils, with associated impacts on habitat (a shift to species characteristic of drier conditions).

In order to complement the peatland restoration measures described in section 6.2, drain blocking is recommended for all drains shown on Figure 7.3.4 (and additional drains if these are identified locally during groundworks).

The method of drain blocking will depend upon:

- State of activity of drain (active, partially vegetated, recovered).
- Position of drain base (within peat, to substrate, into substrate).
- Gradient of drain (not the prevailing slope).

Determining this information for all drains on site is outwith the scope of a PMP, but should be determined prior to determining the drain blocking technique(s). Further, dependent on the time elapsed since issue of this PMP and the duration of construction, an up-to-date evidence base should be used to determine the most appropriate technique, required dam spacing and requirement for imported materials (if any).

6.5.3. Grazing management

While grazing pressure is variable across the Site (see Chapter 8 of the EIA Report), recovering peatland vegetation may be particularly susceptible to grazing pressure, particularly where new growth is occurring in bare peat. While acrotelm has been specified over the majority of hagged areas being restored, there are still likely to be bare peat areas, and 'knitting' together of the surface acrotelmic turves would benefit from grazing management in the first few years after restoration.

While it is not practical to fence all restored areas, it is recommended that the main areas of hagg restoration are fenced for a minimum of 2 to 3 years (or growing seasons, dependent on construction timing) to allow some recovery to take place.

6.5.4. Total restoration area

While the primary purpose of the PMP is to ensure a peat mass balance is achievable within the constraints and opportunities afforded by a site, this PMP also looks to achieve a biodiversity net gain by enhancing a greater area of peatland than directly and indirectly affected by wind farm construction activities.

In order to provide a preliminary quantification of potential net gain, the areas that may be enhanced by the restoration activities have been calculated. Table 6.3 shows the number of hectares per proposed restoration activity. The total restoration area has been calculated as the sum of the following:

- The footprints of all hagged areas to be restored using placed peat + a 30 m buffer surrounding each hagged area.
- The footprints of all hagged areas to be restored using reprofiling + a 30 m buffer surrounding each hagged area.
- The footprint of the 30 m buffer zone assigned to all drains.

Two summary totals are provided, one indicating the total of all activities independent of one another, and the second with areas of overlap removed (since many areas benefitting from drain blocking may also benefit from adjacent effects associated with hagg restoration, etc). The most beneficial effect is assumed to be associated with hagg restoration, and hence hagg restoration areas have been 'clipped out' of the drain blocking buffer. Figure 7.3.6 shows all areas potentially benefitting from all the restoration measures outlined above.

Area affected by restoration	Area (ha) when activity considered in isolation	Area (ha) when overlap removed
Hagged areas restored using emplaced peat	11.78	11.78
Hagged areas restored by reprofiling	21.56	21.56
Areas within 30 m of hagged areas restored using emplaced peat	45.73	32.64
Areas within 30 m of hagged areas restored by reprofiling	93.60	66.77

Areas within 30 m of drains restored by damming	347.20	310.07
Totals	**n/a**	**442.82**

Table 6.3 Areas affected by restoration activities

Based on the Table 6.3, the total area potentially benefitting from restoration activities is c. 440 ha (see Figure 7.3.6). This can be compared with the conservative land-take figure on the open range (see Chapter 8) identified as part of the ecological impact assessment of c. 28 ha, with the difference representing potential biodiversity net gain associated with the scheme.

It should be noted that much of the proposed restoration activity would not be likely without being secured as part of the wind farm consent, since no 'donor' peat would be available to restore hagged areas and there would be no land management benefit to the landowner of undertaking restoration.

6.5.5. Scheduling of restoration activities

Given the interdependency of construction and restoration activities, and the benefits of minimising storage and handling of peat between arisings (at excavations) and destinations (hagg restoration areas), it is recommended that restoration contractors (RC) and the balance of plant (BoP) contractors work in tandem during the construction period.

Ideally, materials should be transported directly from excavation locations to their target location with minimal double handling. The selection of restoration areas in close proximity to infrastructure (typically adjoining of close to proposed tracks and hardstandings) means that this should approach should be feasible over much of the site.

In order to minimise contractor 'downtime' between excavation and construction of individual scheme elements and associated generation of peat for use in restoration activities, the RC may be deployed on drain blocking and non-placement hagg restoration activities.

7. GOOD PRACTICE

7.1. 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.

7.2. Pre-construction refinement of the PMP

For a site in which peatland restoration forms a critical part of proposals, it is important that this Outline Peat Management Plan is refined post-consent. Suggested refinements are outlined below for each restoration activity.

7.2.1. Hagg restoration using placed peat

The approach outlined in section 6.2 should be refined as follows:

i. A site-wide UAV survey should be undertaken to capture up-to-date habitat information and digital terrain data.

ii. Boundaries of each hagg restoration area should be refined using the outputs of i. and terrain data used to determine variations in target depth and requirements for retaining structures.

iii. Volume requirements (or imported material) requirements for retaining structures should be identified and the position and construction methodology for each structure should be determined (informed by i. above).

iv. Restoration sequence should be fully refined (downslope to upslope) for each hagg restoration area.

v. Source excavations should be defined for each hagg restoration area to ensure that RC and BoP contractor working is coordinated during construction.

7.2.2. Hagg reprofiling

The approach outlined in section 6.5.1 should be refined as follows:

vi. Proposed areas for reprofiling should be inspected on the data derived from i. to determine whether there are any additional areas that may benefit from emplaced peat (rather than reprofiling).

vii. Access routes and reprofiling methodology should be determined and documented for each hagg restoration area requiring reprofiling.

7.2.3. Drain blocking

The approach outlined in section 6.5.2 should be refined as follows:

viii. A pre-restoration drain survey should be undertaken to determine the level of activity, condition and depth of cut of each drain.

ix. Drain gradients should be calculated for each drain.

x. Drain restoration technique should be allocated based on viii and ix above.

7.2.4. Grazing management

Once areas for hagg restoration using emplaced peat are finalised, fencing requirements should also be finalised and consultation should take place with the landowner to ensure that stock movements remain possible throughout the site.

Prior to erection of fences (which will be temporary), monitoring of enclosed and adjacent ground should be initiated to inform the timing of fence removal (see 7.6 'Monitoring' below).

7.3. Excavation and handling

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

- A minimum thickness of 0.3 m of acrotelmic peat or turved organic soil should be excavated where sufficient soil is present; where less than 0.3 m is present, the full depth of soil and surface vegetation should be excavated.
- 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 – for low ground pressure excavators used by the RC, this requirement is less critical.
- If working is required away from constructed roads / tracks, the use of long reach excavators should be encouraged in order to minimise cross-tracking, unless low-ground pressure plant are being utilised.
- Wherever possible, double handling of peat should be minimised (in particular for catotelmic peat and / or where of poor consistency) by direct transport of materials to their point of storage.

7.4. Storage

The following good practice measures are proposed for temporary storage (where required between excavation and direct reinstatement or between excavation and reuse for restoration):

- If storage cannot be avoided, minimise storage time by taking an holistic approach to excavation and restoration such that catotelmic peat (in particular) is used as soon as possible after excavation.

- Store excavated acrotelmic and catotelmic peat separately during excavation works, which will 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 should take place 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).
- Storage locations should be checked against the PLHRA likelihood results (Figures 7.4.6 and 7.4.8 of Appendix 7.4) with storage avoided in areas of Moderate (or higher) likelihood or Factor of Safety <1.4. Storage should also be >50 m away from watercourses (where possible) and away from the edges of excavations. The Ecological Clerk of Works (ECoW) should work with an appointed Geotechnical Engineer (GE) to review the placement and condition of stored peat.
- 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).
- If required (e.g. due to gradient), peat and soil stores should be appropriately bunded to prevent risks from material instability and prevent runoff of sediment and water from the stockpiles.
- 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.
- A Sustainable Drainage System (SuDS) should be implemented to control water and sediment loss during storage (this also applies to reinstated areas, see below).

7.5. Reinstatement and Restoration

The following good practice measures are proposed for reinstatement and restoration:

- For excavations undergoing direct reinstatement, turves and underlying catotelmic peat should be reinstated at the locations from which they were removed.
- 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 fully cover reinstated soils, a checkerboard pattern of turf blocks should be used, with turf squares no less than 1 m^2 to act as seed points interspersed amongst the bare areas.
- Where possible, reinstated ground levels should tie in with the surroundings, and any bulking up should be avoided by tamping down soils and turves. For hagg restoration areas using emplaced peat, reprofiling of the hagged area margins may be required to achieve this tie in.

7.6. Monitoring

During construction and restoration, monitoring should be undertaken in any areas where peat is stored or placed, 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 moisture 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.
- Acceleration of re-use for vulnerable stores if so identified.

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

- Review of % vegetation cover and vegetation composition in restored hagg areas, with particular attention paid to any residual areas of bare peat 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.
- Review of potential poaching effects alongside erected fencing.
- 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).
- Construction of additional retaining structures if any creep of peat soils is evident at any restored location.

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

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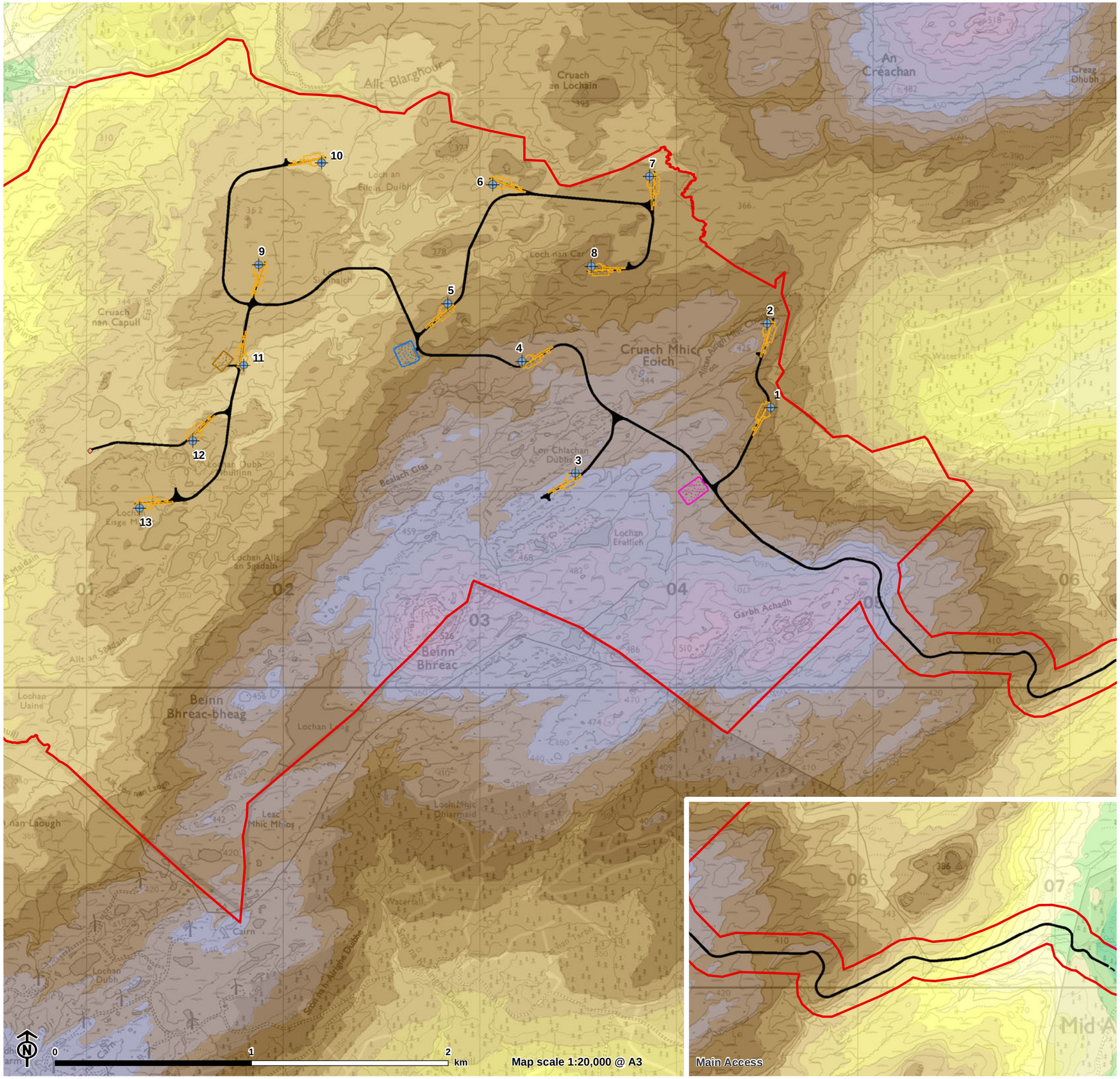
Figure 7.3.1: Elevation



- Site boundary
- Turbine
- Existing access track
- Proposed track
- Borrow pit
- Temporary construction compound
- Permanent compound including substation and BESS
- Temporary hardstanding
- Permanent hardstanding
- Permanent met mast

Elevation (m)

- 140 - 160
- 160 - 180
- 180 - 200
- 200 - 220
- 220 - 240
- 240 - 260
- 260 - 280
- 280 - 300
- 300 - 320
- 320 - 340
- 340 - 360
- 360 - 380
- 380 - 400
- 400 - 420
- 420 - 440
- 440 - 460
- 460 - 480
- 480 - 500
- 500 - 520

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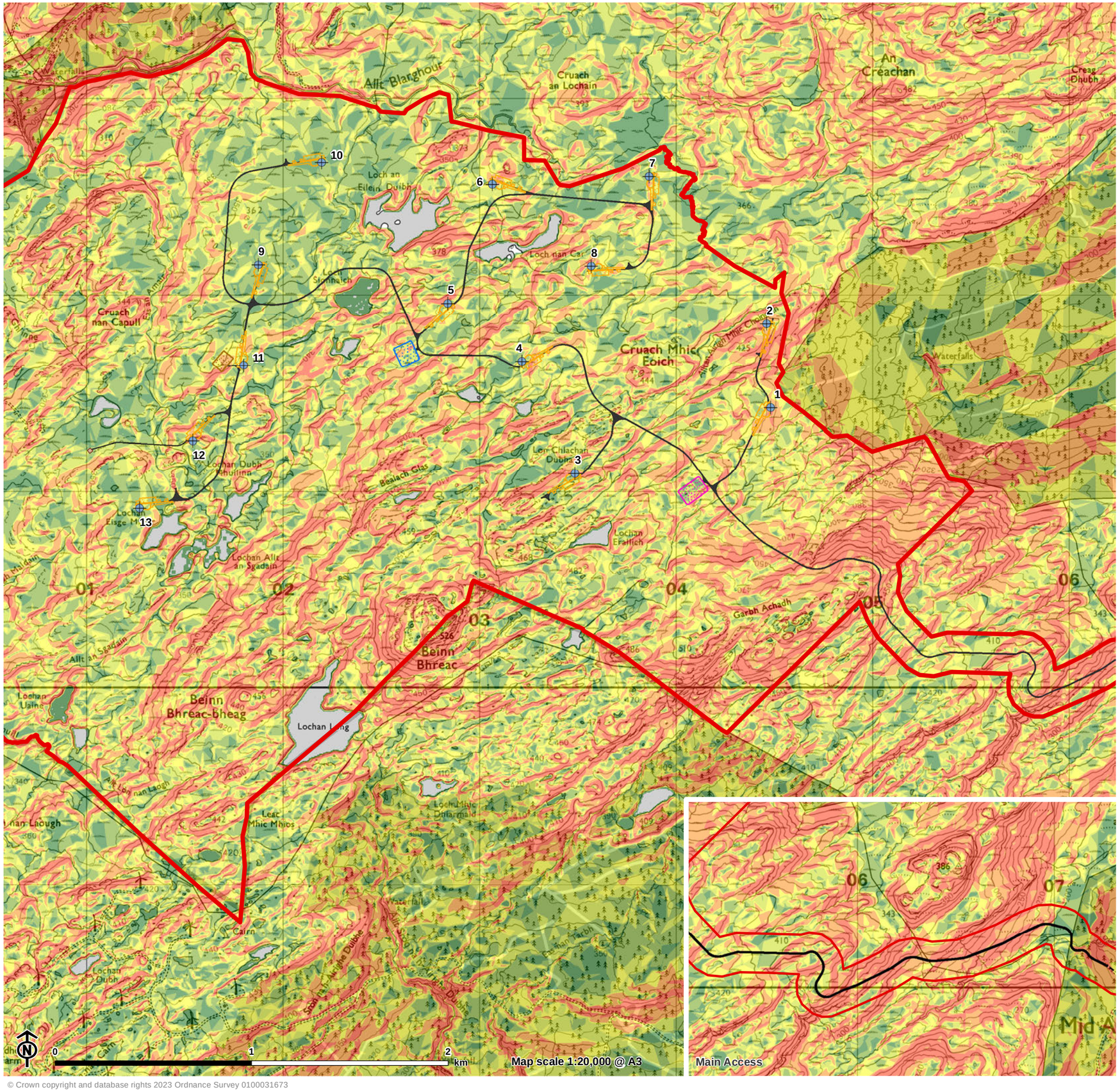
Figure 7.3.2: Slope Angle



- Site boundary
- Turbine
- Existing access track
- Proposed track
- Borrow pit
- Temporary construction compound
- Permanent compound including substation and BESS
- Temporary hardstanding
- Permanent hardstanding
- Permanent met mast

Slope (in degrees)

Slope angle (degrees)

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

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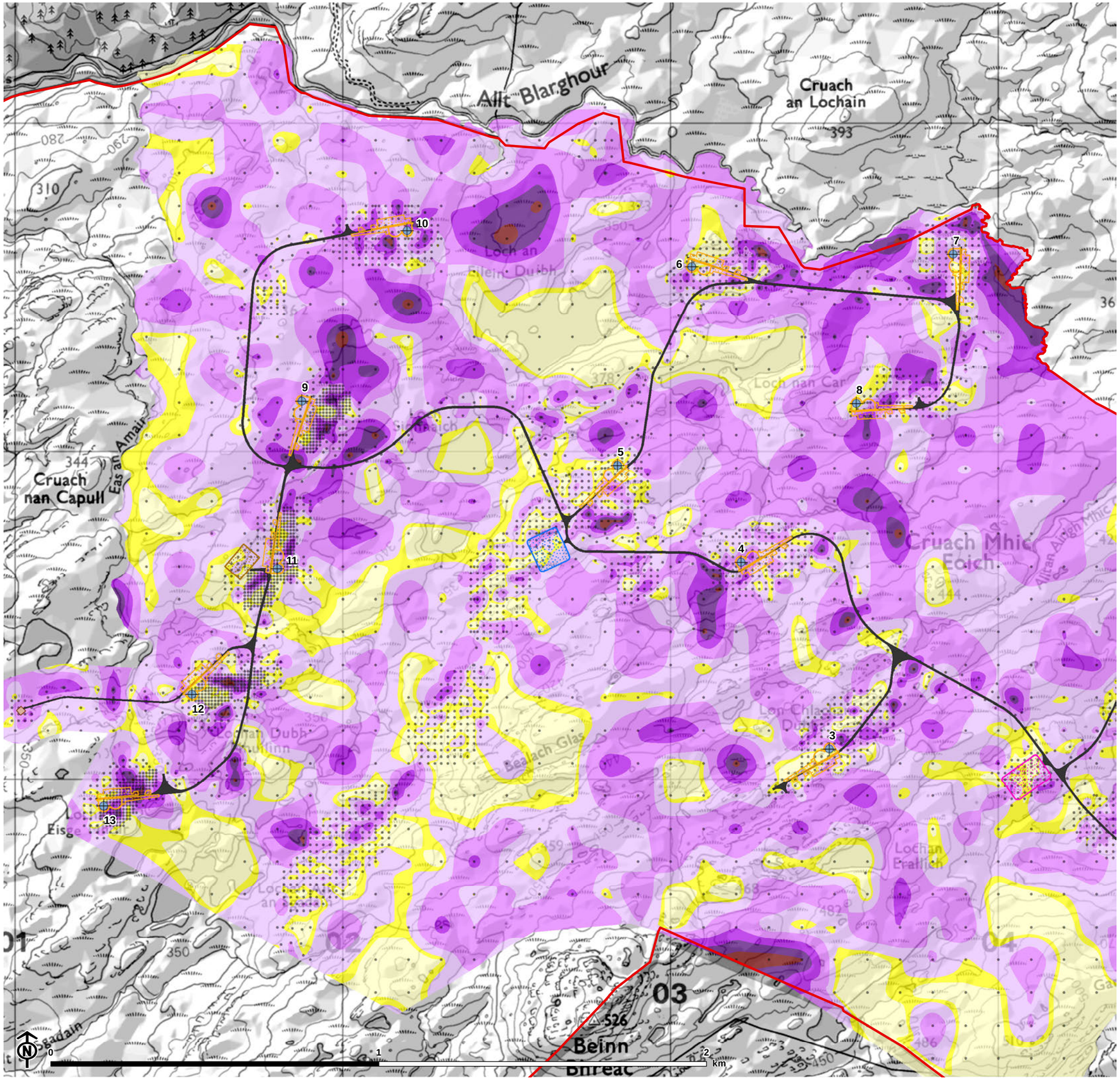
Figure 7.3.3: Peat Depths (Sheet A)



Site boundary
Turbine
Existing access track
Proposed track
Borrow pit
Temporary construction compound
Permanent compound including substation and BESS
Temporary hardstanding
Permanent hardstanding
Permanent met mast

Peat depth (cm)

<= 0.35
>0.35 - 0.50
>0.50 - 1.00
>1.00 - 2.00
>2.00 - 3.00
>3.00 - 4.00
>4.00 - 5.00
Probe location

Carbon and Peatland (2016) Map

Class 2
Class 5

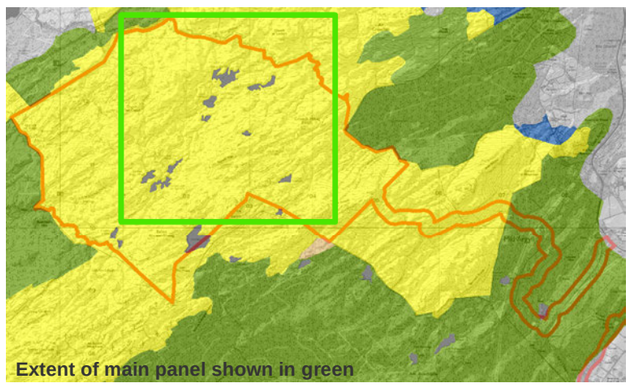


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Figure 7.3.3: Peat Depths (Sheet B)

- Site boundary
- Turbine
- Existing access track
- Proposed track
- Borrow pit
- Temporary construction compound
- Permanent compound including substation and BESS
- Temporary hardstanding
- Permanent hardstanding
- Permanent met mast

Peat depth (cm)

- <= 0.35
- >0.35 - 0.50
- >0.50 - 1.00
- >1.00 - 2.00
- >2.00 - 3.00
- >3.00 - 4.00
- >4.00 - 5.00
- Probe location

Carbon and Peatland (2016) Map

- Class 2
- Class 5

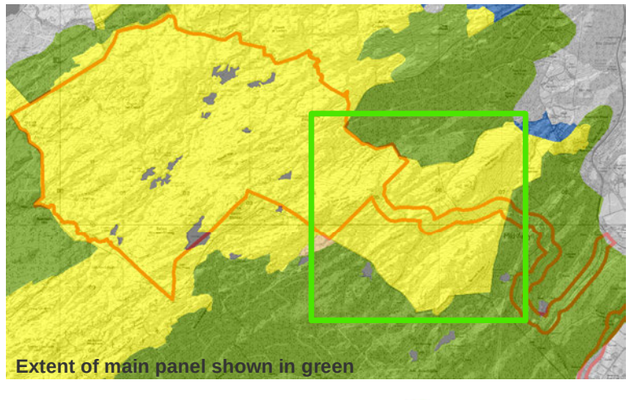

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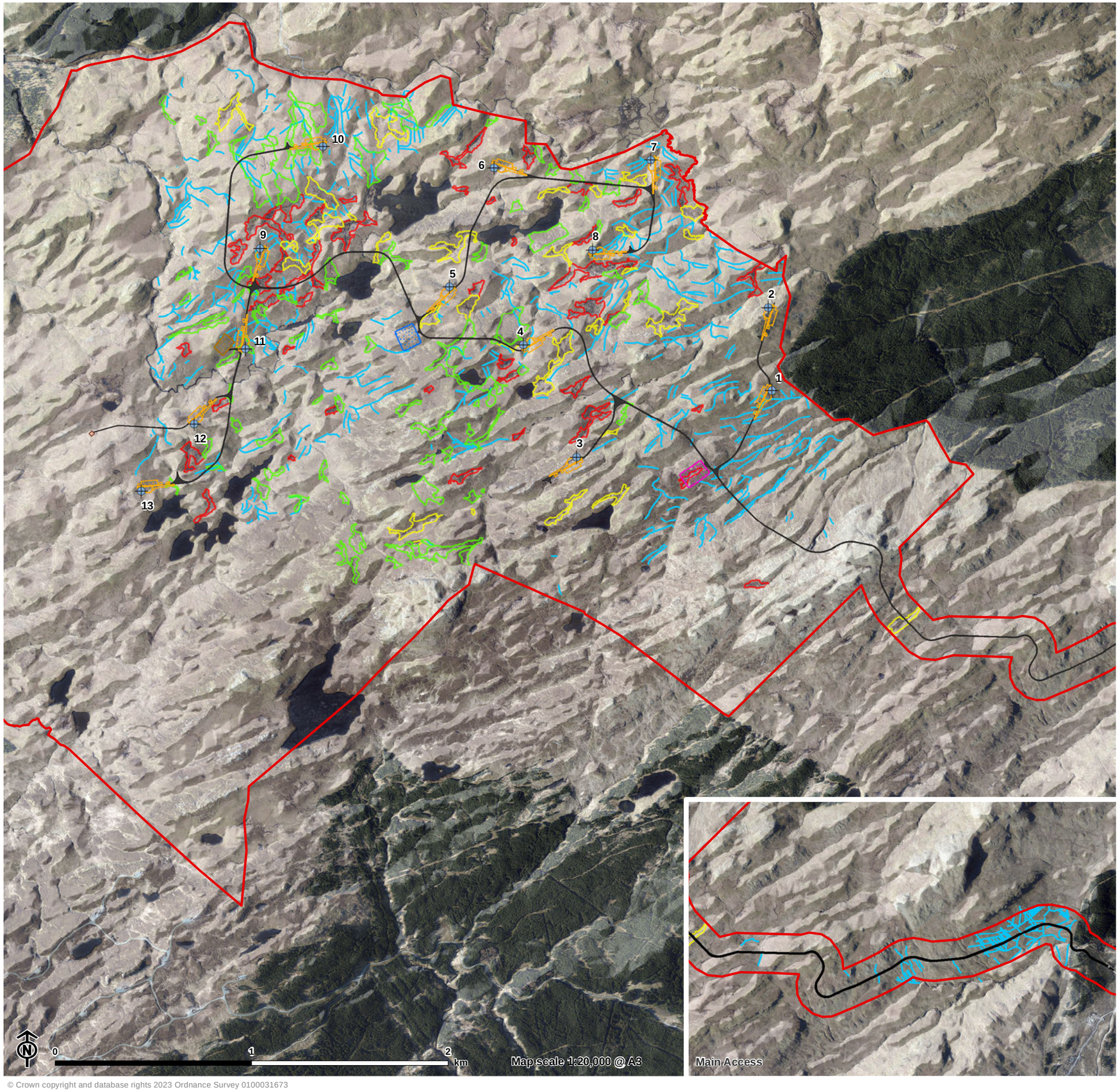
Figure 7.3.4: Hagged areas and drains



- Site boundary
- Turbine
- Existing access track
- Proposed track
- Borrow pit
- Temporary construction compound
- Permanent compound including substation and BESS
- Temporary hardstanding
- Permanent hardstanding
- Permanent met mast

Geomorphology

- Predominantly bare hagged area
- Partially bare hagged area
- Predominantly recovered hagged area
- Moor drains

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An Càrr Dubh Wind Farm EIA
for Car Duibh Wind Farm Ltd

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Figure 7.3.5: Infrastructure construction types

Site boundary
Termporary excavation
Permanent
Floating track

Map scale 1:20,000 @ A3

Main Access

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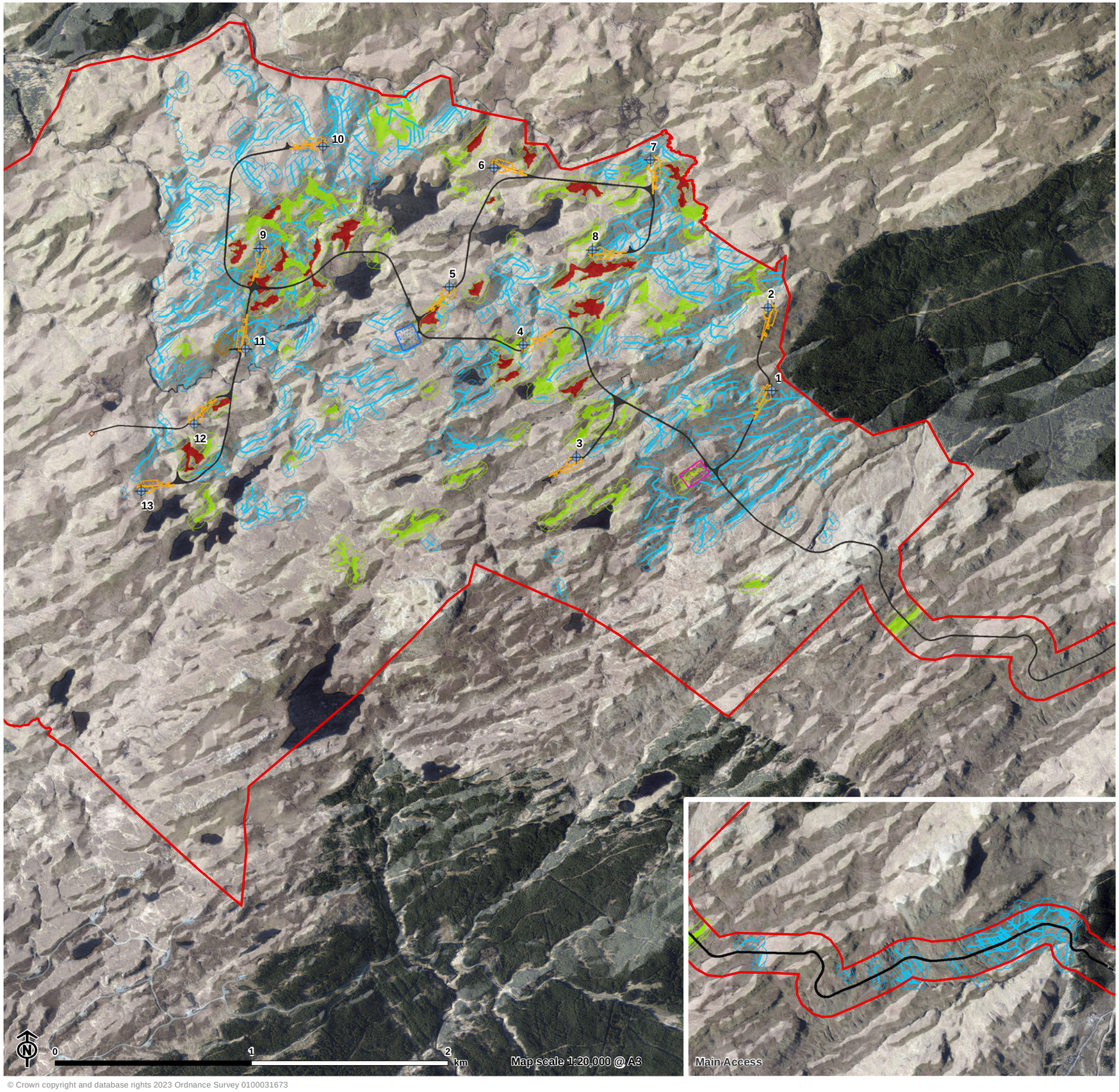
Figure 7.3.6: Restoration activities and areas



- Site boundary
- Turbine
- Existing access track
- Proposed track
- Borrow pit
- Temporary construction compound
- Permanent compound including substation and BESS
- Temporary hardstanding
- Permanent hardstanding
- Permanent met mast

Restoration activity / area

- Hagged peat - infill
- Hagged peat - reprofile
- Hagged peat - infill buffers
- Hagged peat - reprofile buffers
- Drain buffers
- Moor drains

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