CREAG DHUBH WIND FARM

SUPPLEMENTARY INFORMATION

MARCH 2020

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Preface

The following Supplementary Information (SI) is provided in response to requests from Argyll and Bute Council for additional information to address the potential environmental effects of the proposed development near Succothmore, Strachur, Argyll, PA27 8DW.

The SI has been prepared by Muirden Energy LLP to accompany a planning application (19/02544/PP) submitted by Creag Dhubh Renewables LLP under the Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations to Argyll and Bute Council (ABC). The planning application is for permission to construct and operate a nine turbine wind farm at Creag Dhubh near Strachur ('the proposed development').

Specialist EIA input has been provided by the following consultants:

Geology, Hydrology, Hydrogeology and Peat – Fluid Environmental Consulting

Additional copies of the SI can be purchased directly from Creag Dhubh Renewables LLP: printed copies or digital versions on CD-ROM are available for a cost of £10.

Due to the Coronavirus (COVID-19) pandemic, hard copies of the EIA Report cannot be viewed at public locations. However, the documents can be viewed using Argyll and Bute Council's online planning system and the wind farm's dedicated website: www.creagdhubhwindfarm.co.uk

To order an additional copy, please contact Creag Dhubh Renewables LLP at the following address or phone number:

Creag Dhubh Renewables LLP
Muirden Farm
Turriff
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Tel: 01888 569 310

Comments on the application for planning permission should be forwarded to the address below:

Argyll and Bute Council,
Kilmory
Lochgilphead
Argyll
PA31 8RT

Or, by searching for the planning application (19/02544/PP) using Argyll and Bute Council's online planning system, where registered users are able to "make a public comment".

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APPENDIX 11 – FIGURE 11E

HISTORICAL SATELLITE TAG FIX DATA FROM GOLDEN EAGLES 993 AND 815

This figure contains confidential information, so it is not available for public viewing.

APPENDIX 13.4

PEAT MANAGEMENT PLAN

Creag Dubh Wind Farm
Outline Peat Management Plan

for

Muirden Energy

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Creag Dubh Wind Farm

Outline Peat Management Plan

March 2020

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1 Introduction

This outline Peat Management Plan (PMP) document has been prepared for the construction of the Creag Dubh Wind Farm (the 'Proposed Development') near Strachur, Argyle and Bute, Scotland. It was requested as part of a consultation feedback response from the Scottish Environmental Protection Agency (SEPA), dated 12 March 2020, specifically:

> "*The plans suggest that most of the deep peat will also be avoided. However, there are some parts of the infrastructure which may require the excavation of deep peat, such as a large turning or laydown area and site compound. We have not seen a Peat Management Plan (PMP) which explains how the applicant proposes to manage the peat following its excavation. Consequently, we object due to a lack of information on peat management."*

The PMP addresses the management of peat during the construction period for the windfarm and the restoration of the site once construction has been completed. It should be read in conjunction with the Creag Dubh Wind Farm Peat Survey Report included as Appendix 13.2 of the Hydrology, Hydrogeology and Geology chapter of the EIA Report.

It should be noted that the peat discussed in this report is mostly in minor pockets, and is not the nationally-important Class 1 & 2 types of peat, as per the Scottish Natural Heritage (SNH) classification (Figure 13.3 of the EIA Report).

The PMP will be further developed and implemented subsequent to the Proposed Development receiving consent from the Scottish Government. Further details and specific plans will be determined during the detailed design process and once further site investigations have been undertaken. These details will then be included in a detailed PMP as a part of the Contractor's detailed Construction Environmental Management Plan (CEMP).

2 Objectives

The PMP has been developed to demonstrate that peat has been appropriately considered and protected during the design phase of proposed development and, should consent be granted, will be carefully managed and preserved throughout the construction and operation periods. The PMP aims to propose mitigation measures that will minimise any impacts, and the long-term habitat restoration and management plans for key areas of the site are designed to enhance the site.

The PMP outlines the overall approach of minimisation of peatland disruption that has been adopted. It aims to demonstrate that, where practical, all further opportunities to minimise peat disturbance and extraction will be taken.

The PMP seeks to identify that appropriate proposals to reuse surplus peat can be accommodated within the site layout, without significant environmental or health and safety implications, to minimise risk in terms of carbon release and human health. The document also demonstrates that there will be no long-term peat storage on site.

3 Structure

The structure of the PMP is as follows:

- Legislation, policy, and guidance;
- Classification of excavated material;
- Definition of peat, details of peatland characteristics and peat conditions on site;
- Avoidance and minimisation of peat disturbance;
- Peat balance between excavation and reuse on site of surplus peat;
- Peat excavation and handling methods / controls and temporary peat storage; and,
- Reuse in infrastructure construction restoration and in habitat enhancement.

Tables are included showing:

- Where surplus peat will be generated and the associated quantities;
- What quantity of this surplus peat will be catotelmic, what quantity will be acrotelmic and what, if any, quantity will be amorphous; and,
- The principles of where catotelmic, acrotelmic and amorphous peat, if any, will be re-used and approximately how much will be re-used and in which locations.

4 Legislation, Policy and Guidance for Peat Management

4.1 Legislation Policy and Guidance

When considered as part of a carbon landscape, peat has a capacity to act as a carbon sink. The management of peat therefore has implications for carbon emissions and climate change. There is a substantial body of legislation and guidance regarding climate change and carbon which is relevant to the management of peat including:

- The Kyoto Protocol (1997) and the Kyoto Protocol and National Accounting for Peatlands (2012);
- The UK Climate Change Act (2008);
- *The Carbon and Water Guidelines.* Carbon Landscapes and Drainage, 2012 www.clad.ac.uk; and
- *Forests and climate change: UK Forestry Standard Guidelines*. Forestry Commission, 2011.

Other key documents relied upon to inform this draft PMP include:

- *Peatland Survey: Guidance on Developments on Peatland*. Scottish Government, Scottish Natural Heritage, SEPA, 2017;
- *Good Practice During Windfarm Construction (4th Edition).* Scottish Renewables, SNH, SEPA, Forestry Commission Scotland, Historic Environment Scotland, Marine Scotland Science & AEECoW, 2019;

- *Scotland's National Peatland Plan Working for our future*. Scottish Natural Heritage, 2015;
- *Scottish Environment Protection Agency Guidance: Developments on Peatland – Site Surveys*. SEPA, 2013;
- *SEPA Regulatory Position Statement – Developments on Peat*. February 2010;
- *Guidance on the Assessment of Peat Volumes, Reuse of Excavated Peat and the Minimisation of Waste*. Scottish Renewables, 17 January 2012;
- *Floating Roads on Peat: A Report into Good Practice in Design, Construction and Use of Floating Roads in Peat with particular reference to Windfarm Developments in Scotland*. Forestry Civil Engineering and SNH, 2010.
- *Forests & Water Guidelines. 5th Edition*. HMSO Forestry Commission, 2012;
- *Peat Landslide Hazard and Risk Assessments: Best Practice Guide for Proposed Electricity Generation Developments*. Scottish Executive, 2006;
- *Peat Slide Hazards and Risk Assessments: Best Practice Guide for Proposed Electricity Generation Developments*. Scottish Executive, 2017;
- *Towards an assessment of the state of UK Peatlands.* JNCC, 2011; and
- *Draft Peatland and Energy Policy Statement*. SNH, July 2016.

4.2 Role of the Peat Management Plan

The PMP is intended to be a working document to be used throughout the key stages of the design, construction, operation, decommissioning and re-instatement phases of the Proposed Development as part of an overall Construction Environmental Management Plan (CEMP) as follows:

Stage 1: Environmental Impact Assessment (EIA)

It is necessary to show how, through site investigation and iterative design, the Proposed Development has been designed to minimise, so far as reasonably practicable, the quantity of peat which will be excavated; that volumes of peat anticipated to be excavated by the proposed development have been considered; and how excavated peat will be managed. The overall aim is to minimise the impacts associated with excavation of peat by using the following hierarchy of design principles: prevent excavation; reduce volumes of peat excavated; and reuse excavated peat in a manner to which it is suited. This hierarchical approach comprises:

1. Initial assessment of peat coverage on site based on broad 100m grid;
2. Design of layout based on various constraints including peat occurrence on site;
3. Further detailed site surveys undertaken to obtain peat depth across the proposed layout and micro-siting allowance and iteration as necessary;
4. Calculation of estimated volumes of excavated peat and potential reuse volume requirements based upon the proposed site design / layout;

5. Determine whether there is likely to be negative or positive overall peat balance, and whether the generation of excess material can be avoided, and, if not, where reductions in the volumes of excavated materials may be achieved;
6. Site layout is refined to avoid areas of deeper peat and hence reduce carbon impacts of the project construction activities;
7. Further surveys undertaken if required in new sections of infrastructure;
8. Record specific examples of how overriding principles of prevention and minimisation of peat disturbance are to be taken into account in the design of the site;
9. The assessment is to be consistent with and feed into the peat stability and carbon payback assessment; and
10. Identify limitations and make recommendations for further site investigation (post-consent) in order to steer detailed design and micro-siting such that opportunities for further reductions in excavated peat volumes can be implemented where possible.

Stage 2: Post Consent / Pre-Construction

As part of the EIA it will have been demonstrated that, on the basis of the investigation and data gathered, it is likely that the excavated materials for the Proposed Development can be managed in an appropriate manner. The peat mass balance calculations may be further developed and refined post planning consent, and prior to the relevant works commencing, as a consequence of any further or more detailed ground investigation or survey works required to inform detailed design, or that may be required under planning consent conditions.

Stage 3: Construction Stage

Actual peat volumes excavated during construction will be recorded against the overall predicted volumes provided in Table 3 of this PMP. Within micro-siting allowances, the alignment and design of tracks, hardstanding orientation and construction methods will be reviewed to avoid/minimise peat disturbance as much as possible in light of the more detailed information available once construction actually commences. A regular review and update of the peat mass balance table will be undertaken by the appointed Contractor and monitored by the Ecological Clerk of Works (ECoW) on site, and made available to regulators as required.

5 Peat Conditions

5.1 Definitions of Peat

Organic material less than 0.5m depth is not defined as peat. This is in accordance with guidance from:

- The Soil Survey of Scotland (1984) defines peat as *'the organic layer or layers exceeding 50 cm depth from the soil surface and with an organic matter content of greater than 60 %';*
- The Forestry Commission use 45 cm as the critical depth for peat to occur (*Understanding the GHG implications of Forestry on Peat Soils in Scotland,* 2010);

- The Macaulay Land Use Research Institute define shallow peat as having 'a prescribed depth of organic matter of 50 – 100 cm'; and
- *Developments on Peatland: Site Surveys,* SNH, SEPA, Scottish Government and The James Hutton Institute 2104.

Deep peat is classified within:

- Scottish Government Guidance. *Developments on Peatland: Site Surveys* 'Deep Peat: a peat soil with a surface organic layer greater than 1.0m deep'.

Shallow peat can therefore be classified as organic material between 0.5m and 1.0m in depth with deep peat over 1.0m depth.

Peat can be separated into three main layers: acrotelmic (the upper living layer), catotelmic (the middle to lower layer) and occasionally amorphous (lower layer) peat:

- Acrotelmic peat is the living layer of the peat including the peat turf or turve being a thin, floating vegetation mat layer. The acrotelm is generally found within the top layer of peat (often less than 0.5 m) depending on the degree of decomposition and fibrous nature of the peat (approximately H1 to H5 on the Von Post classification scale). The acrotelm is generally of high permeability, decreasing with depth. The water table fluctuates in this layer and conditions vary from aerobic to anaerobic. Material may be fibrous or pseudo-fibrous (plant remains recognisable), spongy, and when excavated strength is lost but retains integral structure and can stand unsupported when stockpiled >1 m.
- Catotelmic peat is the dead layer of peat found deeper than acrotelmic peat which has some remnant plant structures. Material has high water content and is permanently below the water table (saturated) therefore organic matter decomposes anaerobically. Some plant structures may be recognisable but are highly humified losing most of their characteristics (approximately H6 to H8 on the Von Post classification scale) and strength. Water flow through the catotelm is slow unless peat structures such as sink holes or peat pipes are present.
- Amorphous peat is highly decomposed organic material where all recognisable plant remains are absent (approximately H9 to H10 in the Von Post classification scale). These deposits are dark brown to black in colour, plastic, are low tensile strength and are unable to stand unsupported >1 m when stockpiled.

5.2 Peat Conditions on Site

Desk Based Review

The site was assessed for peat vegetation through desktop review of maps and plans, a number of site walkovers by ecologists and hydrologists, and intrusive site investigation in terms of extensive peat depth probing and coring across the wind farm site and infrastructure locations including the access track route.

The infrastructure layout has been compared to the SNH Carbon and Peatland 2016 Map, as shown in Figure 13.3 of the EIA Report. This indicates that the existing access track is on mineral soils in the southwest. Class 4 or 5 soils are found in the northeast below the majority of the site infrastructure, including Turbines 1 and 4-9, the substation, construction compound

and the borrow pit search areas. Class 4 is areas that are unlikely to be associated with peatland habitats or wet and acidic type. Class 5 is where soil information takes precedence over vegetation data and it is assumed not to be peatland habitat.

A small section of access track, and Turbines 2 and 3 are located on Class 3 peat. This is defined as having a dominant vegetation cover that is not priority peatland habitat but associated with wet and acidic types.

The track turning area at the far south west of the site beyond turbine 1 extends onto Class 2 peat, which is nationally important carbon-rich soils, deep peat and priority peatland habitat.

Peat probing, as discussed below, was undertaken to define the actual peat occurrence on site.

Peat Surveying Methodology

To obtain a detailed understanding of the spatial and depth distribution of peat and its properties, a series of tasks have been completed which include:

- Peatland habitat mapping;
- Depth penetration probing in a 100 m grid over the part of the site considered for development;
- Higher frequency of depth penetration probing at all infrastructure and track locations:
    - Track – every 50 m with 10 m offset to either side of track;
    - Turbine base and crane hardstanding – 10 m grid on the footprint of the turbine base and crane hardstanding and on a 20m grid in the surrounding 50m micro-siting area; and
    - 10 m grid for the footprint of all other infrastructure and a 20m grid in the surrounding 50m micro-siting area.
- Coring in two campaigns with a total of 97 cores obtained;
- Development of a depth of penetration map to indicate the maximum depth of probe penetration at all investigation points across the site;
- Development of an interpreted maximum depth of peat contour map to indicate the potential peat depth based on the depth penetration probing results and verified by coring;
- Examination of the variability of the depth of the acrotelm, the thickness of the catotelm and the thickness of any amorphous peat;
- Calculation of the maximum potential peat volumes that will be removed due to excavation for infrastructure based on the depth penetration probing results; and
- Examination of areas where peat will be reused to allow calculation of reuse volumes.

Peat Surveys

Peat surveys were undertaken in two phases in 2017 and 2018. For both these phases the following tasks were required to be completed:

- Record the depth of penetration at each probe location along with an estimate of the geology at the limit of penetration;
- Collect data from cores on total peat depth, Von Post measurements every metre, the thickness of the acrotelm, catotelm and amorphous peat, the underlying geology and comments on water table if possible;
- Take a photographic record of all cores;
- Present all data in tables with appropriate labelling of locations according to the specification document;
- Provide a peat depth contour plan across the area of probing and coring; and
- Provide a factual report detailing the work completed and the data collected.

The phases were as follows:

Phase 1

- Depth of penetration probing on a grid of 100m spacing across the part of the site that was considered for development along with part of the land ownership boundary, resulting in 536 probes.
- Complete coring in 44 probe locations.

Phase 2

- Complete depth of penetration probing across the proposed infrastructure layout at the following locations, totalling 1,146 probes:
    - along most sections of proposed access tracks at 50m intervals with 10m offset probes;
    - at all nine turbine bases and associated crane hardstanding (a circle of 7.2m diameter plus an area of 23m x 45m) on a 10m grid and on a 20m grid in the surrounding 50m micro-siting area;
    - at the construction compound (an irregular shape with an area of 4,473m^2) on a 10m grid and on a 20m grid in the surrounding 50m micro-siting area;
    - at the borrow pit search areas (irregular shapes with areas of 3,012 m^2 and 2,849 m^2) on a 10m grid and on a 20m grid in the surrounding 50m micro-siting area; and
- Complete coring in 53 probe locations.

A peat depth contour plan was constructed (Figure 2 of Appendix 13.2: Peat Survey Report of the EIA) to show all peat probe locations in relation to the infrastructure and was used to inform design changes including track amendments and proposed construction compound, substation and borrow pit locations.

The second phase of peat probing and coring was focused on the specifics of the infrastructure layout, which helped accurately estimate peat volumes that will be excavated for construction and enabled the layout to be refined to avoid peat wherever possible. The depth of penetration probing exercise was carried out on site where a probe has been used to ascertain the depth of penetration to 0.1 m accuracy. Cores were also undertaken to verify the probe penetration depths to assess whether they were representative of the peat depth.

The total number of locations monitored for both phases was 1,682 probes and 97 cores. The locations are presented in Figure 1 of Appendix 13.2: Peat Survey Report of the EIA.

Peat Survey Results

In general, the depth of penetration probing indicated an absence of peat (0 to 0.5m depth) across the majority of the 4.6km^2 site.

Of the 1,682 locations probed a total of 1,376 probes (81.8%) recorded depths of 0.5m or less, 193 probes (11.5%) recorded depths of penetration between >0.5m and 1.0m and 113 probes (6.7%) recorded depths of penetration >1.0m (Table 1).

Table 1 Depth of Penetration Distribution Across the Site

Depth Range (m)	Number of Probes	Percentage of Probes
0 to 0.5 (no peat)	1376	81.8%
>0. 5 – 1.0	193	11.5%
>1.0 – 1.5	38	2.3%
>1.5 – 2.0	43	2.6%
>2.0 – 2.5	8	0.5%
>2.5 – 3.0	13	0.8%
>3.0 – 3.5	6	0.4%
>3.5 – 4.0	3	0.2%
>4.0 – 4.5	1	0.1%
>4.5 – 5.0	0	0.0%
>5.0 – 5.5	0	0.0%
>5.5+	1	0.1%
Total	**1,682**	**100%**

Within the site, the total area of the proposed wind farm infrastructure footprint is 6.77ha. Across the vast majority, or 82.9% of the area of infrastructure, the peat depth is less than 0.5m in depth and therefore not considered to be located on peat deposits (Table 2). A total of 10.0% of the infrastructure is located on peat between 0.5m and 1.0m, classified as peat but not as deep peat. Deep peat, probe depths greater than 1.0m, was identified at 7.1% of the infrastructure locations. Areas of deeper peat are less frequent and tend to occur in pockets in flatter areas of the site, either in the valley bottom or near the crest of the ridge.

A total of 1.16ha of the infrastructure (17.1%) is therefore located on peat, of which 0.48ha (7.1%) is located on deep peat (Table 2).

Table 2 Peat Depth Distribution across Site Infrastructure

Depth Range (m)	Area of infrastructure footprint (m^2)	Area of infrastructure footprint (%)
0 to 0.5 (no peat)	56,108	82.90%
>0. 5 – 1.0	6,786	10.03%
>1.0 – 1.5	2,584	3.82%
>1.5 – 2.0	1,268	1.87%
>2.0 – 3.0	427	0.63%
>3.0 – 4.0	474	0.70%
>4.0+	31	0.05%
Total	**67,678**	**100.00%**

Note: These values are slightly different from the actual excavation footprint as the excavated width will allow for drainage and batter slopes.

The deepest penetration probes were located within areas of low topographical gradient on the flat crest of the ridge between Creag Chaonaig and Creag Dubh. Here peat to a depth of 5.6m was recorded, and there were several pockets of up to 2m deep. In general, the site infrastructure has successfully avoided these areas, especially where the northern extent of the turning area ceases just shy of an area where peat is up to 4m deep.

The main areas where peat will be encountered during construction are the construction compound, the substation and turbines 4, 7 and 8. For the turbines and substation this is generally shallow peat (<1m depth). However, the construction compound area has some peat up to 3m deep.

Habitat Conditions

Phase 1 Habitat survey results and more detailed mapping using the National Vegetation Classification (NVC) standard is detailed within Chapter 10 of the EIA Report, and shown on Figures 13.7a-b. All lower areas of the site are dominated by commercial forestry, and this includes much of the site infrastructure including most of the exiting and new access track, the borrow pit search areas, the substation and turbines 1, 2, 3, 5, 6, 7 and 8.

Exceptions include the eastern area of the existing track and the construction compound, which are within marshy grassland and acid flush. The upper stretches of new access track will pass through sections of a variety of habitats, including unimproved acid grassland, acid flush, wet modified bog, dry modified bog and mire. The proposed Turbine 4 and its hardstanding are located on dry modified bog, and Turbine 9 is on a mosaic of calcifugous grassland and montane communities.

Where peat was noted to be present in these assemblages, the peat survey (Appendix 13.2 of the EIA) identified the depths and distribution of the two main types of peat layer across the site, namely acrotelm and catotelm. Amorphous peat (H9) was identified in the catotelm in a single deep core at a depth of greater than 3m.

Of the 17 cores that are located on peat, an acrotelm layer (with fibrous material present) was encountered at the majority of locations. It varied in thickness between 0.03m and 0.13m with an average thickness of 0.09m where it was present. Catotelm made up the difference to the

total peat depth, with a range of 0.02 to 3.2m depth where it was present, and an average thickness of 0.47m.

These values have been used in calculations of volumes of peat across the site where the peat contour map indicates that peat is present (e.g. >0.5m probe depth).

Peat Characteristics

Samples of peat were observed in the field as part of the peat depth probing programmes and descriptions noted with respect to its characteristics, including fibre content, decomposition and moisture content.

The Von Post test was also carried out at core locations. Von Post scores for the acrotelm ranged between H1 and H4, with a median of H3. A score of H3 is defined by Ekono (1981) as "*Very slightly decomposed peat which, when squeezed, releases muddy brown water, but from which no peat passes between the fingers. Plant remains still identifiable, and no amorphous material present."* This effectively means that there is no amorphous peat in category H3. H scores of 5 or more begin to have amorphous material, with significant amorphous material occurring at scores of H9 and above.

For the catotelm, Von Post scores ranged between H5 and H9, with a median of H6. A score of H6 is defined as "*Moderately highly decomposed peat with a very indistinct plant structure. When squeezed, about one-third of the peat escapes between the fingers. The residue is very pasty but shows the plant structure more distinctly than before squeezing*." In terms of reuse, consideration has to be given to the increasingly amorphous and plastic nature of that catotelm with Von Post scores of H7 and above.

6 Avoidance and Minimisation of Peat Disturbance

6.1 Avoidance

The infrastructure layout has been designed to avoid and minimise the impact on peat habitat. In practice this has been undertaken by avoiding the deepest peat, which is normally where the best quality blanket bog habitats occur and are to some extent preserved. The three design elements aimed at minimising effects on blanket bog systems have been incorporated:

- Avoiding the deepest peat with tracks and turbines;
- Staying where possible to the outer edge of deeper peat areas; and
- Skirting around them rather than cutting across them where possible.

The final iteration of the infrastructure layout was undertaken subsequent to detailed peat probing across all infrastructure which reduced the presence of infrastructure located on deep peat (>1.0m depth) to 7.1% of its footprint.

6.2 Further Minimisation

The disturbance of peat by the construction of the tracks, crane hardstandings and turbine foundations and other infrastructure will be minimised as much as practicably possible, taking into account the other constraints to the development, in order to try and reduce any peat waste on site and reduce potential carbon losses from the peat excavation process.

Throughout the construction process, the appointed Contractor will look to minimise the volumes of excavated peat. As far as possible, appropriate handling and storage of excavated materials will be undertaken such that their integrity and subsequent reuse is not jeopardised.

Further measures to minimise peat disturbance will be incorporated in the development and construction process. The principles of the waste hierarchy (outlined above) will be adhered to in order to:

- Avoid and/or minimise production of excavated peat;
- Reuse, where possible, excavated peat on site in landscaping and re-profiling works, to minimise visual impacts and to facilitate habitat, ecological and hydrogeological restoration, improvement and enhancement; and
- Avoid waste peat being sent for disposal, recovery and/or reuse off site.

It is anticipated that an Ecological Clerk of Works (ECoW) will be appointed for the scheme that will:

- Identify areas of sensitive habitat;
- Clearly mark sensitive habitats near to construction areas and make the Contractor aware of the sensitivity of peat habitats and inform all sub-contractors;
- Walk the areas affected by the proposed development with engineers before construction commences;
- Authorise minor movement of infrastructure within the micro-siting available where impact can be reduced; and
- Monitor that any micro-siting does not result in movements into more sensitive habitats and deep peats unless unavoidable.

All contractors will be made aware of the sensitivity of peat and wetland habitats and the ECoW will clearly mark sensitive habitats near to construction areas. Contractors will be required to work within the narrowest practical construction corridor when working in or near areas of peat.

All plans and method statements will be accompanied by justification of the final design and/or construction methods identified by the Contractor, including reasons for discounting alternative methods. This is required in order to demonstrate that all avenues for avoiding hydrological disruption and reducing the disturbance and excavation of peat have been considered.

7 Excavation and Reuse Volume Estimates and Reuse Requirements

7.1 Peat Excavation Assumptions

The Proposed Development infrastructure and dimensions used in the peat balance calculations are summarised in Table 3 and Table 4. Table 3 contains the basic infrastructure dimensions as provided, and Table 4 summarises additions based on assumptions about the excavations in peat required around each item of infrastructure.

Table 3 – Infrastructure Dimension Final Layout

Infrastructure	Dimensions	Area (m^2)
Turbine 1 Foundation	Circle, diameter 17.2 m	232
Turbine 2 Foundation	Circle, diameter 17.2 m	232
Turbine 3 Foundation	Circle, diameter 17.2 m	232
Turbine 4 Foundation	Circle, diameter 17.2 m	233
Turbine 5 Foundation	Circle, diameter 17.2 m	232
Turbine 6 Foundation	Circle, diameter 17.2 m	232
Turbine 7 Foundation	Circle, diameter 17.2 m	232
Turbine 8 Foundation	Circle, diameter 17.2 m	232
Turbine 9 Foundation	Circle, diameter 17.2 m	232
Turbine 1 Hardstanding	Irregular, average 23 m x 45 m	922
Turbine 2 Hardstanding	Irregular, average 23 m x 45 m	917
Turbine 3 Hardstanding	Irregular, average 23 m x 45 m	911
Turbine 4 Hardstanding	Irregular, average 23 m x 45 m	923
Turbine 5 Hardstanding	Irregular, average 23 m x 45 m	917
Turbine 6 Hardstanding	Irregular, average 23 m x 45 m	921
Turbine 7 Hardstanding	Irregular, average 23 m x 45 m	909
Turbine 8 Hardstanding	Irregular, average 23 m x 45 m	914
Turbine 9 Hardstanding	Irregular, average 23 m x 45 m	913
Construction Compound	Irregular shape	4,473
Substation	Rectangle: 20 m x 50 m	1,000
Borrow Pit 1 (west)	Irregular shape	3,012
Borrow Pit 2 (east)	Irregular shape	2,849
New Track	Width 4m, Length 5,622 m	22,550
Existing Track	Width 4m, Length 5,872 m	23,500
Total		**67,712**

The following are infrastructure assumptions, which have been used in the peat calculations:

Excavated Tracks

- Tracks are 4m wide;
- 0.5m deep V drains with a 2 to 1 batter will be installed alongside the upslope side of excavated tracks; and
- slope batters will be installed along the downward slope on a 2 in 1 gradient.

Construction Compound & Substation

- V drains will be installed on all sides of the excavated construction compound and substation at 0.5m depth, with a 2 to 1 batter for each V.
- The construction compound will be reinstated following construction.

Turbine Foundations

- Turbine foundations will be backfilled with concrete. The areas outside of this footprint will have sloped sides for construction. Where these adjoin the crane hardstanding they will be filled with hardcore. Where these adjoin the surrounding habitat, they will be backfilled with the material removed.
- V drains will be installed on the side of the turbine foundations not connected to the crane hardstandings 0.5m depth, with a 2 to 1 batter for each V.

Crane Hardstandings

- The excavated crane hardstanding areas will have slope batters installed along the perimeter on a 2 in 1 gradient to ground level where the base is raised above the surrounding ground.
- V drains will be installed on all sides of the crane hardstandings at 0.5m length of each V.

Borrow Pit Search Areas

- The borrow pit search areas will be excavated with a perimeter diversion V ditch on all sides of the borrow pit at 0.5m length of each V.

Additional dimensions from the assumptions above used in the peat balance calculations are summarised in Table 4. These relate to the actual excavated dimensions.

Table 4 – Infrastructure Additional Dimensions in Peat

Infrastructure	Dimensions	Area (m^2)
Turbine 1 Foundation	No additional areas in peat	0
Turbine 2 Foundation	No additional areas in peat	0
Turbine 3 Foundation	No additional areas in peat	0

Infrastructure	Dimensions	Area (m^2)
Turbine 4 Foundation	2 in 1 excavation around free perimeter of 27m on peat, plus 0.5m V drains	95
Turbine 5 Foundation	No additional areas in peat	0
Turbine 6 Foundation	No additional areas in peat	0
Turbine 7 Foundation	2 in 1 excavation around free perimeter of 25m on peat, plus 0.5m V drains	52
Turbine 8 Foundation	2 in 1 excavation around free perimeter of 22m on peat, plus 0.5m V drains	50
Turbine 9 Foundation	No additional areas in peat	0
Turbine 1 Hardstanding	No additional areas in peat	0
Turbine 2 Hardstanding	No additional areas in peat	0
Turbine 3 Hardstanding	No additional areas in peat	0
Turbine 4 Hardstanding	2 in 1 excavation around free perimeter of 19m on peat, plus 0.5m V drains	19
Turbine 5 Hardstanding	No additional areas in peat	0
Turbine 6 Hardstanding	No additional areas in peat	0
Turbine 7 Hardstanding	2 in 1 excavation around free perimeter of 22m on peat, plus 0.5m V drains	176
Turbine 8 Hardstanding	2 in 1 excavation around free perimeter of 22m on peat, plus 0.5m V drains	138
Turbine 9 Hardstanding	No additional areas in peat	0
Construction Compound	2 in 1 excavation around free perimeter of 37m on peat, plus 0.5m V drains	131
Substation	2 in 1 excavation around free perimeter of 37m on peat, plus 0.5m V drains	95
Borrow Pit 1 (west)	No additional areas in peat	0
Borrow Pit 2 (east)	No additional areas in peat	0
New Track	1m wider than footprint on each side of track for drainage and 2 in 1 slope back to ground level along free perimeter of 631m	1,430
Existing Track	No additional areas in peat	0
Total		**2,231**

It is assumed that any peat excavated for cable trenches is stored adjacent to the trench while the track is laid and then replaced, therefore this volume is not applicable to the excavated volume.

7.2 Excavated Peat Volumes

Peat excavation volumes associated with the project have been calculated using the GIS package ArcGIS based on the following data and assumptions:

- A contour map of assumed peat depth based on interpolation of values from probing across the site;
- Dimensions of the proposed areas for excavation for site infrastructure based on the layout shape files provided;
- An estimated acrotelm depth of 0.09m across infrastructure area where peat (>0.5 m organic soil) is present based on the peat core data;
- An estimated catotelm thickness of the average depth of the peat minus the acrotelm (0.09m) across infrastructure areas where peat is present, and based on the peat core data;
- Minimal occurrence of amorphous peat; and,
- An assumption that the probe depth is representative of the actual depth of the peat (validated by a spatial coverage or cores and detailed in Appendix 13.2 Peat Survey Report of the EIA).

The contoured surface of the peat created has been used to determine the average depth of peat under the excavation footprint of all proposed infrastructure and therefore the total volume of peat to be excavated as well as the volume of acrotelmic and catotelmic peat. This data is presented in Table 5.

The peat volume estimates have been calculated to take into account the wind farm layout and additional extraction volumes as per Table 4.

The total calculated excavation volume estimates are:

- Total volume of peat which will be excavated = 11,338m^3;
- Total volume of acrotelm which will be excavated = 1,092m^3; and
- Total volume of catotelm which will be excavated = 10,296m^3.

These values are estimates based on the available data and the above assumptions.

In order to further determine accurate peat volumes, further peat probing and / or other ground investigation techniques will be employed as necessary prior to and during the works in order to inform micro-siting requirements.

Final implementation of peat reuse and classification will be subject to geotechnical on-site tests e.g. shear vane testing, to determine peat stability and type and use potential.

Table 5 – Excavated Peat Volumes Based on Actual Footprint

Infrastructure	Infrastructure area (m^2)	Average peat depth over infrastructure area (m)	Percentage of infrastructure with >0.5m depth of peat	Area of infrastructure with >0.5m depth of peat (m^2)	Average peat depth over area of infrastructure with >0.5m depth of peat (m)	Volume of peat excavated (m^3)	Volume of acrotelm peat excavated (m^3)	Volume of catotelm peat excavated (m^3)
Turbine 1 Foundation	231	0.26	0.0	0	0.00	0	0	0
Turbine 2 Foundation	231	0.09	0.0	0	0.00	0	0	0
Turbine 3 Foundation	231	0.14	0.0	0	0.00	0	0	0
Turbine 4 Foundation	326	1.40	100	231	1.40	381	30	351
Turbine 5 Foundation	231	0.28	0.0	0	0.00	0	0	0
Turbine 6 Foundation	231	0.29	0.0	0	0.00	0	0	0
Turbine 7 Foundation	283	0.68	100	231	0.68	173	26	147
Turbine 8 Foundation	281	0.76	95.7	221	0.77	187	25	162
Turbine 9 Foundation	231	0.14	0.9	2	0.58	1	0	1
Turbine 1 Hardstanding	922	0.12	0.0	0	0.00	0	0	0
Turbine 2 Hardstanding	917	0.09	0.0	0	0.00	0	0	0
Turbine 3 Hardstanding	911	0.11	0.0	0	0.00	0	0	0

Infrastructure	Infrastructure area (m^2)	Average peat depth over infrastructure area (m)	Percentage of infrastructure with >0.5m depth of peat	Area of infrastructure with >0.5m depth of peat (m^2)	Average peat depth over area of infrastructure with >0.5m depth of peat (m)	Volume of peat excavated (m^3)	Volume of acrotelm peat excavated (m^3)	Volume of catotelm peat excavated (m^3)
Turbine 4 Hardstanding	987	0.83	53.1	490	1.33	687	50	637
Turbine 5 Hardstanding	917	0.17	0.0	0	0.00	0	0	0
Turbine 6 Hardstanding	921	0.28	6.5	60	0.53	32	5	26
Turbine 7 Hardstanding	1,085	0.86	98.0	890	0.87	838	97	741
Turbine 8 Hardstanding	1052	0.71	75.2	688	0.82	608	75	533
Turbine 9 Hardstanding	913	0.09	0.0	0	0.00	0	0	0
Construction Compound	4,604	1.30	89.9	4,023	1.41	5751	374	5,377
Substation	1,095	0.51	55.1	551	0.68	403	59	344
Borrow Pit 1 (west)	3012	0.15	0.0	0	0.00	0	0	0
Borrow Pit 2 (east)	2,849	0.04	0.0	0	0.00	0	0	0
New Track	23,980	0.26	10.6	2,399	0.78	2,328	352	1,976
Existing Track	23,500	0.21	7.6	1,789	1.21	0	0	0
Total	**69,943**	**-**	**-**	**-**	**-**	**11,388**	**1,092**	**10,296**

7.3 Peat Reuse Areas and Volumes

From Table 5 above, the volume of peat that will be removed by excavation of the infrastructure is 1,092m^3 of acrotelm and 10,296m^3 of catotelm. This volume of peat will be reused around the site in the following areas, as detailed in Table 6 and on Figures 2a and 2b:

- Around the foundations and hardstanding areas of turbines 4, 7 and 8, which have adjacent peat deposits. This includes backfill around the turbine, plus backfill of the V drains and a 0.3m thickness of peat placed on the 2 in 1 excavated slopes. This should essentially be the reinstatement of excavated peat turves and tie in with the adjacent peat.
- In appropriate locations along the new and existing track verges, where peat is currently present next to a 2 in 1 excavated slope or V drain in 0.3m thickness.
- Reinstatement of the small section of turning head at the far south west end of the wind farm site that extends on to peat. This is 1m deep peat and will be reinstated as currently exists following the construction period (Area A).
- Restoration of eroded peat above the Allt Mor watercourse on the top of the ridge. This is an area of peat that has been subject to erosion and will degrade further without intervention. It is considered that peat can be placed over at least half of the 8,133m^2 area identified in a 0.5m thickness. This would need to be installed with appropriate dams and retainment structures (Area B). This is likely to be a conservative approach and it is likely that more peat could be used to restore this area.
- Placement of peat in a forestry turning area that has been cleared. It is assumed that a 0.5m thickness of peat can be placed here over the 1,783m^2 area (Area C).
- For the reinstatement of the construction compound area, where the average peat depth is currently 1.4m. It is proposed to reinstate it to this depth along with the surrounding disturbed area (Area D).
- There are a number of areas to the west of the construction compound where areas have been cleared by not restored. These total 3,210m^2 and it is assumed that 0.5m of peat can be placed in these areas (Areas E to H).
- The eastern borrow pit is located close to some areas of peat. It is considered that the cleared margin along the existing track can be used to place peat along with some peat in the borrow pit to extend these areas of peat by 772m^2 in a 0.5m thickness (Area I).
- There are some drains that are located in the area between turbine 6 and 7 that are linked to peat areas and are likely to be having a detrimental effect on the peat habitat. These total about 950m in length and it is assumed they have dimensions of about 0.5m wide by 0.5m deep and could be backfilled with peat (Areas J to M).

Table 6 Estimated Potential Reuse Volumes

Reuse Area	Reuse Summary	Acrotelm volume (m^3)	Catotelm volume (m^3)	Total Volume (m^3)
Turbine 4 Foundation (yellow highlight on Figure 1b)	Backfill around turbine plus backfill drain of 0.5x0.5 on V, where peat is already present	8	48	56
Turbine 7 Foundation (yellow highlight on Figure 1b)	Backfill around turbine plus backfill drain of 0.5x0.5 on V, where peat is already present	5	10	15
Turbine 8 Foundation (yellow highlight on Figure 1b)	Backfill around turbine plus backfill drain of 0.5x0.5 on V, where peat is already present	5	11	16
Turbine 4 Hardstanding (yellow highlight on Figure 1b)	0.3m of peat on 2 in 1 excavated slope where peat is already present	5	12	17
Turbine 7 Hardstanding (yellow highlight on Figure 1b)	0.3m of peat on 2 in 1 excavated slope where peat is already present	13	29	42
Turbine 8 Hardstanding (yellow highlight on Figure 1b)	0.3m of peat on 2 in 1 excavated slope where peat is already present	9	23	32
New Track Excavated (yellow highlight on Figures 1a and 1b)	Where peat is present next to 2 in 1 excavated slope on upgradient side of track only	49	115	165
Existing track (yellow highlight on Figures 1a and 1b)	Where peat is present next to 2 in 1 excavated slope on upgradient side of track only	59	137	195
Reinstatement of turning head (Area A)	1m depth replacement over $48m^2$	4	44	48
Restoration of eroded peat area (Area B)	0.5m placement in eroded peat area. Half of the $8,133m^2$ area	366	1,667	2,033
Reinstatement of forestry turning area (Area C)	0.5m reinstatement on area of $1,783m^2$	160	731	892
Construction Compound (Area D Figure 1b)	Reinstate to 1.41m thickness over compound plus wider disturbed area	482	7,010	7,491
Areas E to H	0.5m reinstatement on area of $3,210m^2$	289	1,316	1,605
Area I	0.5m reinstatement of peat over $772m^2$ area	69	317	386
Area j to M	0.5m restoration of drains at 0.5m wide and 0.5m deep over 950m in length	43	195	238
Total		**1,566**	**11,665**	**13,231**

The re-use of the excavated peat has taken a conservative approach in that a realistic value for acrotelm reinstatement has been used.

7.4 Net Peat Balance

The excavated peat volumes and volumes of peat to be re-used are summarised in Table 7 below. The total volume of peat predicted to be excavated does not exceed the potential reuse volume so there will not need to be disposal of excess peat off-site.

Table 7 Net Peat Balance

	Acrotelm volume (m^3)	Catotelm / Amorphous volume (m^3)	Total Volume (m^3)
Excavated Peat	**1,092**	**10,296**	**11,388**
Peat Reuse	**1,566**	**11,665**	**13,231**
Total Balance	**474**	**1,369**	**1,843**

Over the life time of the windfarm it is expected that there will be a potential for more peat to be reused on the site than the volume excavated. This will allow the optimum peat restoration programme to be undertaken selecting the best areas for reinstatement.

In this form the peat will be managed in a carbon sequestration friendly manner through appropriate blocking of drainage and re-profiling of cells to re-create the bog habitats and retain carbon.

8 Handling Excavated Materials

8.1 Excavation

The following methodologies for excavation of peat are recommended:

- Areas of peat within the footprint of any excavation will have the top layer of vegetation stripped off as turf prior to construction by an experienced specialist contractor. When excavating areas of peat, excavated turves should be as intact as possible. Often it is easiest to achieve this by removing large turves up to 500 mm in order to keep the peat intact.
- These turves should be stored adjacent to the construction area such that they remain moist and viable (see temporary storage below). Excavated turves should be as intact as possible so as to minimise carbon losses.
- Peat will then be removed, stored separately and kept damp (Carbon and Water Guidelines, 2012). The moisture content of stored/stockpiled peat will be monitored and if it falls below 25% of that in surrounding, intact peat then it will be watered.

- Excavated soils and turves will be handled so as to avoid cross contamination between distinct horizons and allow reuse potential to be maximised.
- Prior to any excavations, the Contractor will produce a detailed Method Statement identifying where and how excavated peat will be used in reinstatement or landscaping works. Specific requirements for the excavation, handling, storage and reinstatement of peat will be outlined in this Method Statement. The Contractor will consider potential impacts on downstream hydrological receptors and also the potential for instability issues with the excavated material.
- Care will be taken when stripping and removing topsoil and peat turves and appropriate storage methods used on site, i.e. excavated material will be stored in separate horizons and vegetation rich top layers will be stored vegetation side up.
- Classification of excavated materials will depend on their identified re-use in reinstatement works. At this site it is anticipated that the material to be excavated will comprise peat (which may be sub-divided into turf, acrotelm and catotelm/amorphous), peaty soils and mineral soils (subsoil and topsoil).

8.2 Temporary Storage

Following excavation, peat will be required to be temporarily stored before reuse or disposal. Excavated peat will be stored in stockpiles to minimise carbon losses while being stored. Excavated turves will be stored adjacent to the construction area such that they remain moist and viable.

Areas of temporary storage required for peat will be identified in the Contractor's Method Statement taking into account constraints and mitigation requirements identified in the consolidated supplementary environmental information. This will describe any intended drainage, pollution prevention and material stability mitigation measures that may be required. The following general guidelines will apply:

- The appropriate temporary storage areas for excavated peat will be as close to the excavation as practicable and will not be located on deep peat (peat >1.0m).
- The design and location of stockpiles, including incorporated drainage elements, will be agreed with the ECoW and Geotechnical Consultant / Geotechnical Clerk of Works prior to excavation works commencing.
- Temporary peat storage areas should be located ideally on flat areas so that erosion and run off is limited, leachate from the material is controlled, and stability of the existing peatland in the vicinity is not affected.
- Excavated material is to be stockpiled at least 50 m away from watercourses. This will prevent the runoff of any wetting required on stored peat and discharge into adjacent watercourses.
- The temporary storage areas should not be located close to any sensitive habitats.
- Any edges of cut peat that may remain exposed, or areas of peat excavation on steep slopes, will be covered with geotextile or similar approved. This will allow re-turfing and re-vegetation and reduce erosion risks.

- Suitable storage areas are more appropriately sited in areas with lower ecological value and low slopes. Cleared areas of forestry are preferred to areas of higher ecological value or areas close to watercourses.
- Temporary peat storage should be in locations where the water table can be kept artificially high.
- An up-gradient cut off ditch should be installed around the edge of the storage bund in order to collect up-gradient surface water runoff and divert water runoff from eroding the toe of the bund.
- It is desirable to keep haul distances of excavated peat as short as possible and as close to intended re-use destinations to minimise plant movements in relation to any earthworks activity, including peat management, in order to minimise the potential impact on the peat structure. It is important that temporary storage is safe and keeps the material suitable for its planned reuse.
- The handling and storage of peat will look to avoid that excavated peat does not lose either its structure or moisture content. Peat turves require careful storage and wetting to be maintained and to prevent drying out and subsequent oxidisation such that they remain fit for re-use.
- Stockpiling of peat should be in large volumes, taking due regard to potential loading effects. Piles should be bladed off at the side to minimise the available drying surface area.
- Higher piles are more likely to become dewatered, while smaller piles expose a greater area to evaporation. Reducing mound size may also increase likelihood of erosional losses as particulate organic carbon (POC). Overall volumes of stockpiling should be minimised and height and surface areas kept to a minimum.
- Stockpiles should be battered so as to limit instability and erosion and should be bunded using impermeable material. The bunds should extend to a level above the toe of the stockpiled material to provide restraint to surface runoff.
- When planning the temporary storage areas any additional disturbance areas should be minimised.
- Transport of peat to temporary storage areas, restoration areas or designated spoil areas will be by low ground pressure vehicles to avoid excessive compaction of the peat.

The areas considered appropriate for temporary peat storage are presented on Figures 1and 1b.

9 Reuse of Peat in Infrastructure Restoration

9.1 Bare Peat

There are a number of important methodologies regarding the exposure of bare peat including:

- The amount of time any bare peat will be exposed will be minimised to preserve its integrity.
- The phasing of work should be carried out to minimise the total amount of exposed ground at any one time. By stripping turf and replacing as soon as possible after peat has been re-distributed there will be minimal areas of bare peat.
- Any peat areas on steep ground, or that remains partially bare, will be covered using geotextile or a similar method to stop erosion.
- Any areas of bare peat, where vegetation is not re-growing, will be seeded with a seed mixture obtained from the existing habitat.

This approach has been shown to be effective on other peat sites and the turves re-grow quickly both establishing vegetation and consolidating the peat. The re-vegetated areas will be monitored. Any areas of bare peat, where vegetation is not re-growing, will be seeded with a seed mixture obtained from the existing habitats on site. Stock exclusion in these areas will continue until vegetation is properly established.

9.2 Infrastructure Re-use

Peat reuse around and within infrastructure areas is an important aspect of the Proposed Development as it allows an opportunity to maintain the integrity of the excavated peat, enhance habitats and create new habitats. This is planned to be undertaken along infrastructure margins and in the restoration of infrastructure areas at locations A, D and I on Figures 2a and 2b.

This will be undertaken through:

- The Contractor will be required to provide appropriate plant for undertaking all reinstatement works such that no unnecessary disturbance of the ground surface occurs. In order to minimise disturbance and damage to the ground surface, any mobile plant required for reinstatement and landscaping works will be positioned on constructed access tracks, hardstanding areas or existing disturbed areas wherever possible. The use of a long reach excavator for excavations and reinstatement works is preferable as it enables sufficient room to allow initial side casting and subsequent pulling back of turves over reinstated peat or soil.
- Excavated catotelm or amorphous peat will only be used in restoration works where the topography allows straight-forward deposition with no pre-treatment or containment measures and without risk to the environment. Suitable scenarios may be present in those disturbed areas where natural topography profile allows such use. A fibrous layer of acrotelm and turf will be placed above any catotelm or amorphous peat reinstated.
- Reinstatement of vegetation will be focused on natural regeneration utilising peat vegetated turves. To encourage stabilisation and early establishment of vegetation cover, where available, peat turves (acrotelmic material) or other topsoil and vegetation turves in keeping with the surrounding vegetation type will be used to provide a dressing for the final surface.

- Consideration should also be given to the impacts of poor drainage control in any areas where peat is used in reinstatement, for instance track verges, reinstatement of the construction compound, etc.
- Any reinstatement and re-profiling proposals will consider, and mitigate against, identified significant risks to environmental receptors. In particular, in areas of replaced peat, water management will be considered in the Contractor's Construction Method Statements to allow an appropriate hydrological regime to be re-established within areas of disturbance. Particular attention will be paid to maintaining hydrological continuity and preventing the creation of preferential subsurface flow paths (for instance within backfilled cable trenches).
- Peat turves should be replaced on all disturbed areas, including constructed roadside drainage channel embankments where possible.
- When constructing tracks rapid restoration will be undertaken as track construction progresses.
- Immediately following construction some turves will be replaced along the road edges to allow quicker re-vegetation and to soften the road edges.
- Any landscaping or road batters should be limited to the areas of ground already disturbed.
- Track edges, passing places and the crane hardstanding areas on the opposite sides of the access tracks from the turbine bases that are no longer required would be reinstated post construction through the removal of capping material and the reuse of peat turves. Where peat turves are used to reinstate track edges this will be done in a manner to allow works to tie in with the surrounding topography, landscape and ground conditions.
- The design and construction of tracks on peat shall be done in such a way so as to reduce impacts on the existing peat hydrology at the site. The built track should allow for the transmittance of water, so natural drainage can be maintained as far as possible.
- The revegetation of temporary hardstanding areas will depend on the identified reinstatement use and associated vegetation character bounding the areas of restoration, with the aim being to match turves and topsoil to similar ground conditions. Where appropriate, excess peat turves, if acrotelm in nature and considered suitable by the ECoW, could be used for screening bunds, landscaping or as part of an HMP in conjunction with reseeding. The seed mix used on site would be agreed with the ECoW and SNH and would use local native species akin to the local ecological baseline.

9.3 Peatland Restoration

The restoration program will include restoration of eroded peat areas and placement of peat in areas that have been stripped of soils as well as restoration of some drainage ditches.

Proposed Restoration Areas

There are different types of peatland restoration areas proposed:

- Proposed restoration area A is where the excavated track will just extend on to an area of Class 2 peat. Once the construction period has been completed this area will be reinstated as it currently exists. Peat will be stored adjacent to the track area for reinstatement and then replaced as soon as is practical.
- Proposed restoration area B is an area of eroded peat that extends along the gentle sloping ridge. It connects to the Allt Mor watercourse. The peat would be reinstated in an average 0.5m thickness, however this will vary depending on the depth of erosion, and the peat would be held in place with dams. The hydrology in this area will help maintain a saturated habitat that will promote reestablishment of the peat habitat. These areas would benefit from restoration in order to reduce peat erosion and surface water run off rates, improve local water quality, carbon sequestration and ecosystem benefits.
- Areas C, E, F, G and H are areas where clearing has been undertaken and in placed some hardcore has been placed to enable vehicle movements. These areas will be stripped back to the natural soils and peat will be placed to allow reestablishment of the peat habitat and connection to the surrounding peatland.
- The side of the existing track within Area I is another area where the soils have been removed and in conjunction with a section of the borrow pit, once developed, will have peat placed to allow the small areas of peat identified here to expand.
- The backfilling of some drains that are located in the area between turbine 6 and 7 are likely to be increasing erosion, dewatering adjacent peat habitats and transporting water more rapidly off the hillside. These will be backfilled with peat and stabilised with dams at appropriate spacing according to gradient in order to improve the peatland habitat.

10 Conclusions

Based on the peat depth, characteristics and distribution investigations undertaken across the development area and the windfarm infrastructure layout the site is characterised by a general absence of peat, except for a number of small pockets, along with some more extensive areas on flatter areas on the ridge crest and also to the north of the substation and around the area of the construction compound.

A surplus of peat is not expected to be generated by the Proposed Development as all estimated excavated peat is planned for reuse for restoration work during the construction, post-construction, and decommissioning phases of the windfarm.

Further investigation will be undertaken prior to works commencing to confirm peat depth, distribution and characterisation. The additional survey data will be used to inform any micro-siting, if required.

The Contractor, monitored by the ECoW, will maintain a record of actual peat volumes excavated and the subsequent peat reuse to compare the predicted and actual peat volumes. This record during the construction, operation, decommissioning and restoration phases of the wind farm will be made available for review by regulators as and when required.

211000 212000 213000

703000

702000

1 2 3

Allt nan Cruach Odhar

Creag an t-Suidheachain

Allt Mòr

Waterfalls

Waterfall

River Cur

Upper Succoth

Upper Caoinaig

Creag Chaonaig

Lower Caoinaig

Ford

Succothmore

Fords

Weir

Allt an Creadha

Socach Mòr

N

Key:

Infrastructure

- Turbine Locations
- Site Boundary
- Land Ownership Boundary
- Infrastructure Layout

Water Features

- 1:50 K Mapped Watercourses
- 1:25 K or Other Mapped Watercourses
- Standing Water

Temporary Storage Areas

- Temporary Storage Areas

Peat Contour Plan (m)

- 0 - 0.50 m
- 0.51 - 1.00 m
- 1.01 - 1.50 m
- 1.51 - 2.00 m
- 2.01 - 3.00 m
- 3.01 - 4.00 m
- 4.01 - 5.00 m
- > 5.00 m

0 100 200 300 400 500 m

PROJECT

CREAG DUBH WIND FARM

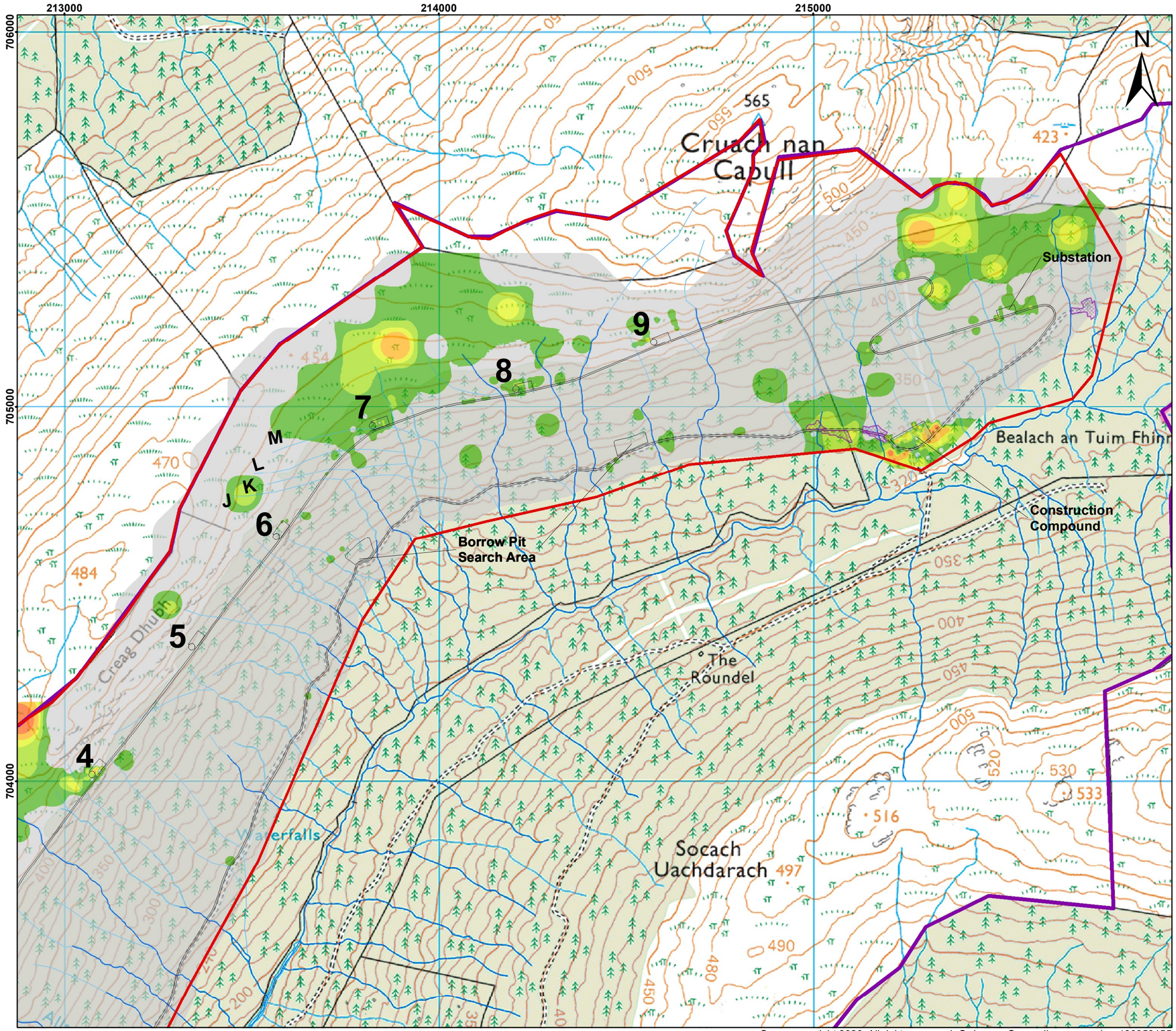
SCALE

1:10,000 @ A3

FIGURE 1a

Temporary Storage Areas (Southwest)

FLUID ENVIRONMENTAL CONSULTING



Key:

Infrastructure

- Turbine Locations
- Site Boundary
- Land Ownership Boundary
- Infrastructure Layout

Water Features

- 1:50 K Mapped Watercourses
- 1:25 K or Other Mapped Watercourses
- Standing Water

Temporary Storage Areas

- Temporary Storage Areas

Peat Contour Plan (m)

- 0 - 0.50 m
- 0.51 - 1.00 m
- 1.01 - 1.50 m
- 1.51 - 2.00 m
- 2.01 - 3.00 m
- 3.01 - 4.00 m
- 4.01 - 5.00 m
- > 5.00 m

0 100 200 300 400 500 m

PROJECT

CREAG DUBH WIND FARM

SCALE

1:10,000 @ A3

FIGURE 1b

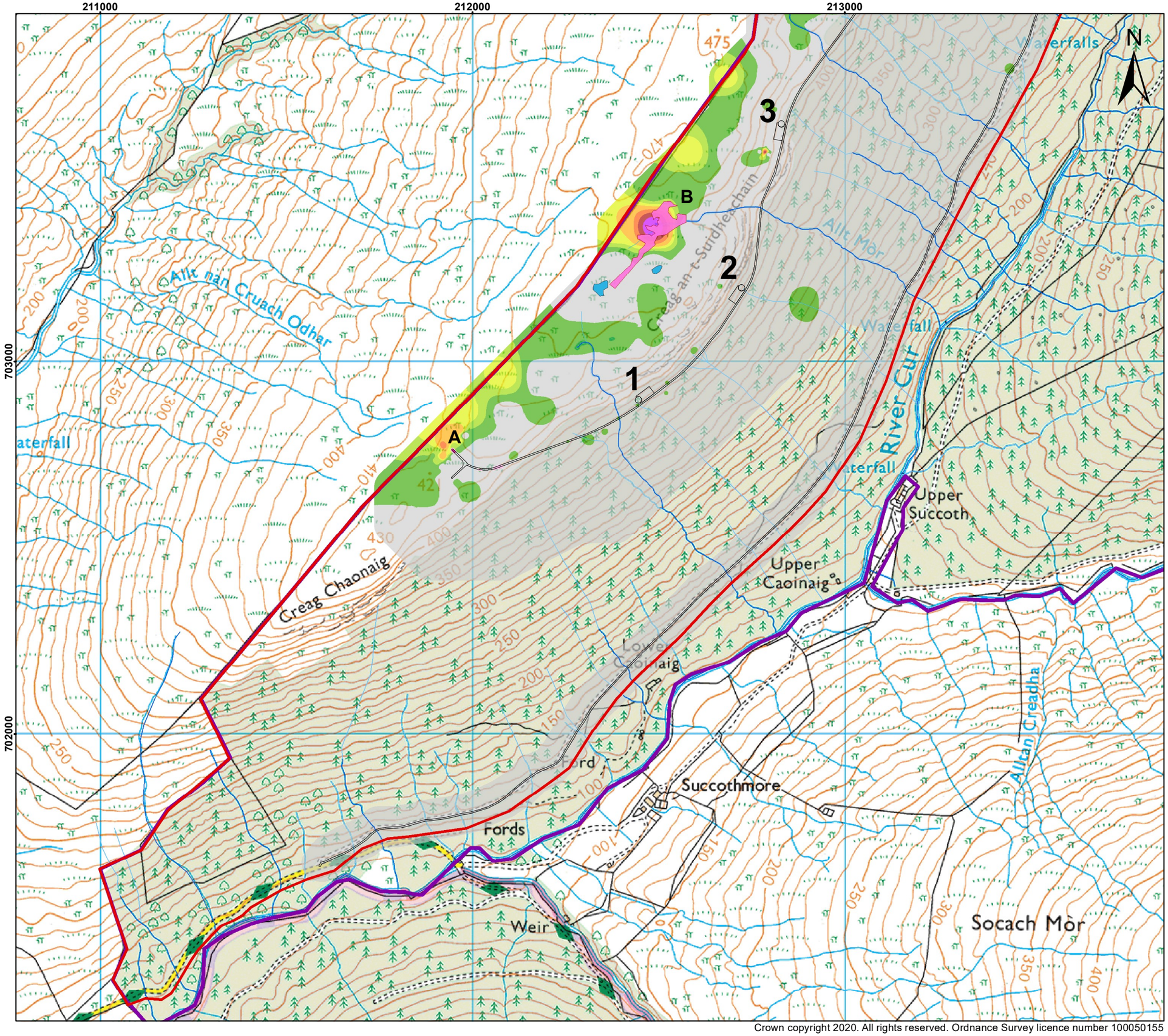
Temporary Storage Areas (Norheast)

FLUID ENVIRONMENTAL CONSULTING

211000 212000 213000

703000

702000



Key:

Infrastructure

- Turbine Locations
- Site Boundary
- Land Ownership Boundary
- Infrastructure Layout

Water Features

- 1:50 K Mapped Watercourses
- 1:25 K or Other Mapped Watercourses
- Standing Water

Peat Restoration Thickness

- 0.3 m
- 0.5 m
- 1.0 m
- 1.4 m

Peat Contour Plan (m)

- 0 - 0.50 m
- 0.51 - 1.00 m
- 1.01 - 1.50 m
- 1.51 - 2.00 m
- 2.01 - 3.00 m
- 3.01 - 4.00 m
- 4.01 - 5.00 m
- > 5.00 m

0 100 200 300 400 500 m

PROJECT

CREAG DUBH WIND FARM

SCALE

1:10,000 @ A3

FIGURE 2a

Peat Restoration Areas (Southwest)

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213000 214000 215000

706000 705000 704000

N

Cruach nan Capull

Substation

Construction Compound

Borrow Pit Search Area

The Roundel

Socach Uachdarach

Creag Dhubh

Waterfalls

Bealach an Tuim Fhinn

1 2 3 4 5 6 7 8 9

A B C D E F G H I J K L M

Key:

Infrastructure

- Turbine Locations
- Site Boundary
- Land Ownership Boundary
- Infrastructure Layout

Water Features

- 1:50 K Mapped Watercourses
- 1:25 K or Other Mapped Watercourses
- Standing Water

Peat Restoration Thickness

- 0.3 m
- 0.5 m
- 1.0 m
- 1.4 m

Peat Contour Plan (m)

- 0 - 0.50 m
- 0.51 - 1.00 m
- 1.01 - 1.50 m
- 1.51 - 2.00 m
- 2.01 - 3.00 m
- 3.01 - 4.00 m
- 4.01 - 5.00 m
- > 5.00 m

0 100 200 300 400 500 m

PROJECT

CREAG DUBH WIND FARM

SCALE

1:10,000 @ A3

FIGURE 2b

Peat Restoration Areas (Northeast)

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