

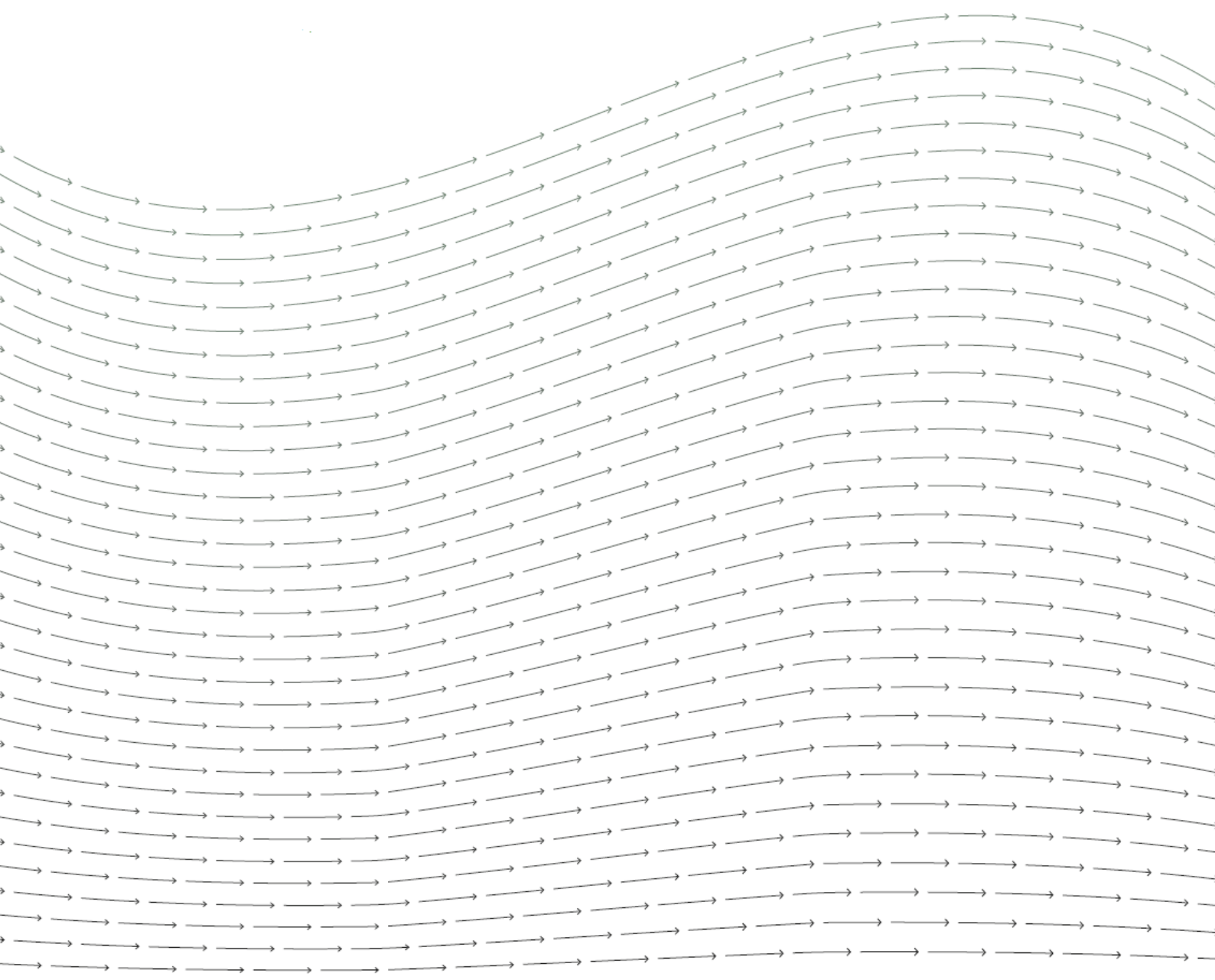


OVER HILL WIND FARM

Further Environmental Information

Energiekontor UK Ltd

August 2018



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1.0 Introduction

In March 29th 2018 Energiekontor (EK) submitted a Further Environmental Information (FEI) document to East Ayrshire Council (EAC) in support of a planning application made in May 2017 (17/0395/PP) by EK for Over Hill Wind Farm. The FEI was primarily to address issues raised by SNH in relation to peat. Following receipt of the consultee responses for that FEI EAC made a formal request for a further FEI on 31st July 2018 as follows:

'To follow up on previous discussions we've had regarding the consultation responses from RSPB and SNH and their continued objection to the Over Hill application in light of the first round of FEI not going far enough to overcome the outstanding impacts on the nationally important peatland and blanket bog habitats on the site. The Council has discussed this matter with you, including at a meeting on 27th July 2018 where we set out the Council's position that in order to address the issues raised by both RSPB and SNH, the Council would require Further Environmental Information in order to be able to assess whether the measures suggested by the consultees would be sufficient to meet the policy requirements of the applicable LDP policies.

Therefore, please consider this a formal request for the submission of further FEI comprising at the least, a revised Outline Habitat Management and Research Plan and revised Draft Peat Management Plan..."

EK responded by agreeing to submit the required FEI to include an updated draft Peat Management Plan (dPMP) and an updated Outline Habitat Management & Research plan (dOHMRP) to address the points raised by SNH and RSPB.

This FEI should be read in conjunction with the ES, and the previous FEI, and identifies those parts of the ES that have been updated, supplemented and amended. All other parts of the ES and previous FEI not discussed in this document remain current and relevant. All methodology and terminology used in this FEI reflect that used in the ES.

1.1 Scope of the FEI

Both the RSPB and SNH responses were effectively "conditioned objections" where the objection is withheld until certain specified conditions are agreed to by the applicant. SNH stated:

"In our view the proposal could be progressed with these additional measures. However, as it could adversely affect natural heritage interests of national importance, we object to the proposal unless it is made subject to a condition requiring submission of a revised Outline Habitat Management and Research Plan (OHMRP) which addresses the matters set out in paragraph 3.10 below."

"3.10 We therefore object to this proposal unless it is made subject to a condition which requires the submission of a revised OHMRP which:

- Incorporates the full extent of bog management and bog restoration discussed with the applicant in September/October 2017 into the current proposals (i.e.*

which extends the areas of bog restoration and bog management to the area within the application site west of turbines 2, 5 and 8, which is currently omitted from FEI Figure 6.11).

- *Includes appropriate commitments to a programme of active management measures for Management Unit A, such as blocking drains at the north end of site, blocking erosion gullies (even if vegetated) to raise the water table of adjacent peatland and the removal of regenerating trees.*
- *Makes provisions for the formation of a Habitat Management Group (HMG) to oversee and monitor the implementation of the agreed OHMRP. The HMG should include representatives from the Planning Authority, SNH and other relevant stakeholders and should have the power, where necessary, to alter prescriptions in the HMP in light of monitoring results to ensure progress towards the stated aims of the plan. The HMG should meet regularly throughout the lifetime of the development."*

The RSPB response acknowledged that *"the applicants have gone some way to addressing the issues we raised in our response (of 19th December 2017) to the original proposal. However, we continue to have concerns over the loss of blanket bog habitat and Martyrs Moss Provisional Wildlife Site and so maintain our objection to the proposed windfarm.*

However, with the inclusion of the revisions described in the FEI, we would now be minded to withdraw our objection should the following measure be undertaken:

- *The inclusion of the forestry within the red-line boundary to the west of turbines 2,5, 8 in the Outline Habitat Management Plan (OHMP) and its management under the prescriptions on Management Unit B of the OHMP. This would go some way to enable the restoration and management of the wider peatland unit and off-set some of the damaging impacts of the proposal".*

This FEI document therefore addresses the above mentioned elements from the SNH and RSPB consultation responses to the previous FEI submitted on March 29th 2018.

Information contained within this FEI supersedes that in the foregoing ES and FEI documentation so for the avoidance of doubt it is the information contained within this document that is the relevant.

1.2 Erratum of Updates to the Draft Outline Habitat Management & Research Plan

SNH Comment	Update Made	Page number / section/paragraph
<i>'we note the exclusion of the area to the west of turbines 2, 5 and 8 from the area covered by the OHMRP. In view of the peat depth and habitat mapping results for this area, we advise that this area should also be included within the OHMRP'</i>	This area has now been included in the OHMRP as detailed in the updated figure 6.11 a&b.	Figure 6.11 a&b
<i>'more active management proposals which we would wish to see for the area of existing open bog habitat (Management Unit A)'</i>	Prescription 1.3 added regarding regenerating conifers. Prescription 1.4 added regarding drain and gully blocking.	Page 5, Section 4.1, Prescriptions 1.3 and 1.4
<i>'We advise that "increasing abundance of peat forming Sphagna" is an objective of restoration, not a means of achieving it'</i>	Text updated to read <i>'the aim is to fell the conifers and restore the bog by increasing the water table and encouraging the growth of bog plants such as peat forming Sphagna'</i> .	Page 3, Section 3.2.
	Change of title to include <i>'& Peat Edge Woodland'</i>	Section 3.4 - title
<i>'In Prescription 1.1, the reference to 'Cummins et al 2011' is not given in full in the Reference list. We assume it is SNH Commissioned Report No 410. The Applicant should however note that Cummins et al were referring to red deer only'</i>	Sentence added, <i>'However, in general impacts can be site specific with densities generally accepted to be a poor indicator of damage. Long-term management should be based on assessment both of actual impacts and apparent density of deer (Putman et al., 2011)'</i> . Reference list updated also. Text added <i>'Recording of impacts from deer will also be included in the monitoring programme.'</i>	Page 4, Section 4.1, Prescription 1.1 Page 7, Section 5, Para 1.
	New section added <i>'3.5 Management Unit F– Upper Beoch Visual Screening'</i> . To cover off a requirement to maintain visual screening of the wind farm to Upper Beoch.	Page 4

SNH Comment	Update Made	Page number / section/paragraph
	New section added '4.5 Management Unit F – Upper Beoch Visual Screening'	Page 7
<i>'If the development includes piled foundations then SNH advises that studying the impacts of these, as well as those of floating roads and gravity foundations, would be worthwhile'</i>	Text added ', 'piled foundations'.	Page 1, last para. Page 8, Section 6, Para 5.
<i>'Makes provisions for the formation of a Habitat Management Group (HMG) to oversee and monitor the implementation of the agreed OHMRP. The HMG should include representatives from the Planning Authority, SNH and other relevant stakeholders and should have the power, where necessary, to alter prescriptions in the HMP in light of monitoring results to ensure progress towards the stated aims of the plan. The HMG should meet regularly throughout the lifetime of the development'</i>	Text added 'A Habitat Management Group (HMG) will oversee and monitor the implementation of the agreed OHMRP. The HMG should include representatives from East Ayrshire Council, SNH and RSPB and will meet on an annual basis (or timescales otherwise agreed by the HMG) during the operational period of the wind farm. An annual report will be submitted by the wind farm owner to the HMG detailing the tasks (management and monitoring) completed over the last year and those planned for the year ahead. Any monitoring reports will be issued to the HMG as they are produced. Management prescriptions in the HMP may be amended in light of monitoring results to ensure progress towards the stated aims of the plan'.	Page 2, paras 3-5

1.3 Erratum of Updates to the Draft Peat Management Plan

SNH Comment	Update Made for FEI August 2018 / Comment	Page number / section/paragraph
N/A	Figure A and B to DPMP – updated title.	
	Introduction to DPMP updated.	P1, Section 1, Paragraph 1
	Table 1, 2 updated. Changes comprise:	P3, Section 4.2, Table 1

SNH Comment	Update Made for FEI August 2018 / Comment	Page number / section/paragraph
	• 5 turbines piled and 5 excavated (rather than 6 piled and 4 excavated); • 9 crane pads piled and 1 (at Turbine 7) excavated. Similar to FEI PMP assumptions, 1m of excavation is assumed for any piling. Data for cut track peat loss added.	
	Text updated ' <i>an estimated 1,195.8m³ of intermediate and amorphous peat is likely to be excavated</i> '	Page 4, para 1.
<i>'Table 1 (and 2) of the DPMP identify that no peat will arise from cut tracks. Sub-paragraphs iii and iv of paragraph 3.5 of Chapter 3 of the FEI make it clear the 0.3km of new cut track is anticipated. From Figures 4.9a and 4.9b 'Interpolated Peat Depth Map' it seems most likely that these will be cut through areas of shallow peat, linking with floating track on deeper peat. Additional clarification from the applicant has indicated that up to approximately 1499m³ of peat will require to be excavated for cut tracks. We advise that the DPMP be amended to include this source of excavated peat'</i>	The DMP has been updated to include this. A total excavation figure of peat arising from the 0.3km of cut access track is 1328.76. This figure considers non-peat soils and has therefore reduced slightly from 1499.	Page 3, Table 1
	Text added ' <i>In general, the supply and demand for acrotelm and catotelm can be balanced on the site</i> '.	Page 4, last para.
	Table 3, 4 and 5 updated to take into account changes in Tables 1 and 2.	Page 6 and 7
<i>'It is clear from the accompanying text that top 1m of peat is being equated to the 'acrotelm', with peat</i>	Section 4.3 states that ' <i>Overall, the sample results suggest that the acrotelmic layer is variable in depth</i>	Section 4.3

SNH Comment	Update Made for FEI August 2018 / Comment	Page number / section/paragraph
<i>lying below a metre deep comprising the 'catotelm'. This is in part based on the coring reported in Appendix 4.5 Updated Peat Landslide and Hazard Risk Assessment (UPLHRA), Section 4.2. However, Table 4.1 'Depth of Acrotelm in Peat Core Samples' in the UPLHRA, indicates acrotelm depths ranging from 0.01m to 0.38m. Setting aside that several of these observations have been made from areas of conifer plantation where the acrotelm-catotelm distinction does not apply due to ground disturbance, this suggests that the amount of acrotelm peat available for re-use is considerably less than that suggested in Table 2 of the DPMP.</i>	<i>and it is recommended that the upper 0.5m should be reused as part of the reinstatement programme, where this depth of material is available'. The reason 0.5m is recommended is that it is more sensible to excavate the first 0.5m of acrotelm with an excavator rather than a thin layer. Excavation of 0.5m will help minimise damage to acrotelm and will ensure the proportion of the peat containing seed bank material is safely removed and separated from the underlying catotelmic material. Peatland that has been affected by commercial forestry will still have an active seed bank which is important to retain as part of the acrotelm layer.</i> Finally, the distinction of fibrous and non-fibrous peat (above and below 1m) is not linked to the acrotelm/catotelm. This is from the result of the peat coring and von post / Hobbs classifications.	
<i>'The Project Description chapter of the FEI indicates turbines on >2m of peat will be piled, while the DPMP indicates 1m of peat will be excavated at piled turbines. We advise that this be clarified.'</i>	This is correct, 1m of peat will still require excavation at piled turbines.	
<i>'Although the table notes that all verges are assumed to be available for reinstatement, the peat demand calculation for track verges appears to have only considered re-instatement of one trackside verge (i.e. assuming a track length of 8200m with 1m wide verges, we query why the area figure is 8200m² and not 16,400m²). We advise that this be clarified and the PMP updated as necessary'</i>	DPMP has been updated to include both verges.	Table 3 of DPMP

SNH Comment	Update Made for FEI August 2018 / Comment	Page number / section/paragraph
<i>'0.1m³ of acrotelmic peat has been calculated as being required to reinstate 10 turbine foundation verges. We query whether this figure is correct'</i>	The depth of acrotelmic peat has been increased to balance supply and demand.	
<i>'We note that the volume of available peat is 25,245m³ and that the volume of peat required is 25,246.4m³. In Technical Appendix 12.5 of the ES (Draft Peat Management Plan), the estimated volume of peat available was 15,127m³ and the volume required was 15,128m³. It is unclear how the ES and FEI versions of this calculation can be so different, yet both balance, nor what will be done if more, or indeed less, peat becomes available (e.g. although Table 3 includes a demand for peat for track verge reinstatement, section 4.2 of the DPMP indicates that track verges may not be required). We advise that this be clarified'</i>	The difference in calculations is largely due to removing the assumption of punched rock at crane pads and replacing it with piling which requires excavation of 1m depth of peat. The additional depth of material at the borrow pit has also increased the peat volumes. It is possible to balance the supply and demand for peat in both scenarios by varying the depth or width of the areas to be reinstated.	

1.4 Contract for Further Information

A hard copy of this FEI will be available for viewing during normal office hours at EAC's offices at Council Headquarters, London Road, Kilmarnock, East Ayrshire, KA3 7BU as well as at Cumnock Library, Rothesay House, 1 Greenholm Road, Cumnock KA18 1LH.

Electronic copies are available on request and requests for copies should be made to:

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**Over Hill Wind Farm
Draft Peat Management Plan**

Technical Appendix 4.5

Update for FEI August 2018

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1. INTRODUCTION

MacArthur Green was commissioned by EnergieKontor UK Ltd to complete a Draft Peat Management Plan (DPMP) for the Proposed Development Area at Over Hill Wind Farm (hereafter referred to as the 'Proposed Development'). For ease of reference, an erratum table indicating the changes to this document is included within this FEI submission in Section 1.

Peat depth surveys at the site were undertaken by Natural Power (Phase 1 peat survey) and MacArthur Green (Phase 2 peat survey) and the results of these surveys are presented within Appendix 12.4 of the Over Hill ES and an updated peat depth figure presented in Figure 4.9. Additional peat depths surveys were completed in 2017 and 2018 to ensure that the revised infrastructure was fully sampled. This report contains figures showing the peat probe locations and depths for the Phase 1 and Phase 2 surveys respectively Figures A & B.

The DPMP is completed in accordance with the guidance: 'Developments on Peatlands, Guidance on the Assessment of Peat Volumes, Reuse of Excavated Peat and the Minimisation of Waste' (Scottish Renewables (SR) & SEPA, January 2012) from herein referred to as SR & SEPA (2012). In accordance with this guidance (Page 10, SR & SEPA, 2012), a Final Peat Management Plan (PMP) will be prepared post-planning consent and in advance of construction when the infrastructure contractor is appointed. The Final PMP will be informed by further site investigation and detailed construction plans.

2. STRUCTURE OF THE PEAT MANAGEMENT PLAN

While there are no defined requirements for the layout or content of a PMP, SR & SEPA (2012) provides a guide to what should be considered when preparing such a plan. Annex 1 of this guidance contains a checklist of information that should be contained within a PMP. This structure is adopted within this DPMP as noted below:

Section 3 Aims and Objectives

Section 4 Details to inform the Peat Management Plan

- Section 4.1: Peat conditions at the site
- Section 4.2: Excavation and reuse volume estimates and reuse requirements for peat
- Section 4.3: Classification of excavated peat material
- Section 4.4: Use of peat in borrow pit restoration
- Section 4.5: Handling excavated peat
- Section 4.6: Temporary peat storage
- Section 4.7: Is there a requirement for a Waste Management Plan for the Site?

3. AIMS AND OBJECTIVES

As explained within SR & SEPA (2012), the key aim of any development on peat is to demonstrate, 'how, through site investigation and iterative design, the proposed development has been structured and designed to minimise, so far as reasonably practicable, the quantity of peat which will be excavated' (Page 6). The iterative design process that has been followed to achieve this aim is detailed within Chapters 2 and 3 of the Over Hill FEI from March 2018. The key elements of the design that reduce excavation of peat are the floating of all tracks and piling of six turbines and associated foundations – leaving 4 turbines and a borrow pit requiring excavation.

This DPMP deals with the peat that is expected to be excavated during the construction of the Proposed Development, which has been designed to minimise the excavation of peat.

The aim of this DPMP is to:

Establish how peat excavated during the construction of the Proposed Development will be managed to allow valid re-use of peat and to avoid, or minimise, the generation of waste peat.

This aim is achieved through the following objectives:

- Objective 1: Detail the peat conditions at the Proposed Development Area.
- Objective 2: Detail expected volumes of peat to be excavated and re-used.
- Objective 3: Consider the likely physical nature of the material and confirm it will be suitable for the re-uses proposed.
- Objective 4: Consider the validity of the use of peat in borrow pit restoration.
- Objective 5: Describe how excavated peat will be handled to ensure suitability for re-use.
- Objective 6: Describe if temporary storage of peat will be required during construction and how this will be done to ensure suitability for re-use.
- Objective 7: Consider whether any peat will not be suitable for re-use and whether there is a requirement for a Waste Management Plan for the development.

4. DETAILS TO INFORM THE PEAT MANAGEMENT PLAN

The following sections detail the information available to inform the DPMP.

4.1 Peat conditions at the Proposed Development Area (Objective 1)

Appendix 12.4 of the Over Hill ES describes the peat conditions at the Proposed Development Area:

- Appendix 12.4: Phase 2 and Coring Report
This report includes the data from 100m² peat probing throughout the study area and around infrastructure, carried out by Natural Power. The report also presents the results of the additional 10m and 50m probing along infrastructure and tracks, and the peat coring surveys for key infrastructure (11 turbines and a substation). Various attributes of the condition of peat are presented, which include: degree of humification, fibrous content, water content, pH etc.

A peat depth figure following intensive 10m and 50m probing of infrastructure locations and track, in combination with the Phase 1 depth probing data, is provided in Figure A to this report. All probes informing the peat depth interpolation were taken to full depth.

4.2 Excavation and re-use volume estimates and re-use requirements for peat (Objective 2)

Table 1 details the construction activities that will generate excavated peat and the expected volumes of peat arising from these activities. These estimates are based on the peat depth information gathered by Natural Power and MacArthur Green and the infrastructure layout as illustrated by Figure A to this DPMP.

Table 2 shows the volume of fibrous (<1m depth) as identified by the analysis of peat during coring surveys (Appendix 12.4, Volume 2 Over Hill ES). This analysis found that fibrous peat is generally found up to 1 metre depth and intermediate and amorphous peat greater than 1m depth. SEPA guidance (2010b) explains that the re-use of catotelmic peat is limited due to its physical characteristics (high water content and low tensile strength) causing it to breakdown to liquid peat upon excavation. However, SR et al (2012) explains that ‘unconsolidated’ catotelmic peat may be used in borrow pits provided that the conditions are correct and there is a justifiable use of this material in ecological restoration.

Table 1 Peat excavation by construction category – total peat generated

Infrastructure	Estimated Peat Volume to be Excavated (m3)
5 Turbines Bases (Piled) (Turbines 3, 5, 6, 9, 10)	2,189
5 Turbine Bases (Excavated) (Turbines 1, 2, 7, 8, 11)	3,264
9 Crane Pads and Service Areas (Piled) (At Turbines 1, 2, 3, 5, 6, 8, 9, 10, 11)	10,125
1 Crane Pads and Service Areas (Excavated) (At turbine 7)	949
1 Substation Excavated	214
Floating Track	0
Cut Tracks & Passing Places	1,329
Borrow Pit	7,803
Total	25,874
Contingency 5%	1,294
Total with contingency	27,167

Table 2 Peat excavation by construction category – Fibrous Peat (1m maximum depth)

Infrastructure	Estimated Peat Volume to be Excavated (m3)
5 Turbines Bases (Piled) (Turbines 3, 5, 6, 9, 10)	2,189
5 Turbine Bases (Excavated) (Turbines 1, 2, 7, 8, 11)	2,189
9 Crane Pads and Service Areas (Piled) (At Turbines 1, 2, 3, 5, 6, 8, 9, 10, 11)	10,125
1 Crane Pads and Service Areas (Excavated) (At turbine 7)	949

Infrastructure	Estimated Peat Volume to be Excavated (m3)
1 Substation Excavated	150
Floating Track	0
Cut Tracks & Passing Places	1,329
Borrow Pit	7,803
Total	24,735
Contingency 5%	1,237
Total with contingency	25,971

*A 5% contingency has been applied to the total excavated volume in order to take into account that the excavated sides will be battered back and not vertical.

Based on these excavation volumes, an estimated 1,195.8m³ of intermediate and amorphous peat is likely to be excavated. This peat will only be suitable for use in a borrow pit should the conditions of the borrow pit be suitable (Section 4.4).

Cabling will follow the line of access tracks; the cable trenches may require excavation specifically for this purpose. However, cable trenches will be incorporated, as much as possible, into the restored peat verges (if these are required) along the access tracks in order to reduce the requirement to excavate undisturbed ground. Any peat arising from cable trench excavation will be backfilled using the same peat and reinstated in the correct order. Backfilling will be on an 'as-you-go' basis in order to minimise time between excavation of the cable trench and peat reinstatement. In doing so, peat excavation and restoration effectively cancel each other out with no net surplus of peat; as a result, cabling is not considered further in this DPMP.

The formation of the temporary construction compound (TCC) will also generate excavated peat; however, this does not need to be reused elsewhere within the site area as the compound is temporary and will be restored at the end of the main construction phase. Peat excavated for the TCC will be stored nearby and in line with other principles outlined within this DPMP (see Section 4.6). The original material will subsequently be used in the restoration of the TCC area, meaning excavation and restoration cancel each other out. As a result, the peat volumes associated with the TCC are not included within the peat reuse calculation or Tables 1 and 2.

Table 3 below provides details on the reinstatement requirements of the Proposed Development and the anticipated demand for peat from the various reinstatement sources. Table 4 summarises the figures for total supply and demand for peat and Table 5 splits the supply and demand for peat into acrotelmic and catotelmic peat to establish whether the suitable type of peat is available for the restoration purpose required. In general, the supply and demand for acrotelm and catotelm can be balanced on the site.

With regards to peat reuse as detailed in Table 3, a number of guiding principles and assumptions are made including, in combination with other guidelines and principles described within this DPMP, the following:

- During the excavation and reuse of peat deposits the two-layered structure of the 'acrotelm' and underlying 'catotelm' shall be preserved as far as is practicable. This approach will aid in the successful re-vegetation and prevent drying and desiccation of the peat;
- Any glacial till material should also be stored separately (not mixed with acrotelm and catotelm material) and used as the bottom layer in restoration in borrow pits (to mimic the natural stratigraphy of a peatland);
- Peat will be stored suitably close and reused as close to its source location as far as practicable;
- Where feasible, reinstatement and restoration will be carried out concurrently with construction rather than at its conclusion.

Table 3 Reinstatement requirements and estimated peat volume requirement

Reinstatement Requirements	Total Demand Estimate (m3)	Demand for Acrotelm (m3)	Demand for Catotelm (m3)	Depth Acrotelm (m)	Depth subsoil/catotelm (m)	Total Length (m)	Width (m)	Area (m2)	Assumptions
Track verges (new floating track 8200m)	8610.0	4920.0	3690.0	0.3	0.3	8200.00	2.00	16400	Assumes that all road verges are available for reinstatement. 1 metre width assumed - 2m total including both sides.
Cut tracks and passing places	315.0	180.0	135.0	0.3	0.3	300.00	2.00	600	Assumes that all road verges are available for reinstatement. 1 metre width assumed - 2m total including both sides.
10 turbine foundations verges	392.3	224.2	168.1	0.3	0.3	747.32	1.00	747	Assume circumference is available for restoration at 1m width.
10 crane hardstanding verges	367.5	210.0	157.5	0.3	0.3	700.00	1.00	700	Assumed that one length and one width of each hardstanding is available for reinstatement. 1 metre width assumed.
Substation	21.0	12.0	9.0	0.3	0.3	40.00	1.00	40	Assume two lengths and one width are available for reinstatement. 1m width.
Borrow Pit	17469	4236	13234	0.22	0.92	120.00	160.00	19200	

Table 4 Total demand, supply and balance of peat

TOTAL PEAT DEMAND (m3) (From reinstatement)	27175
TOTAL PEAT SUPPLY (m3) (From excavation)	27167
SURPLUS (+) OR DEFICIT (-) (m3)[Supply - Demand] m3	-8

Table 5 Demand, supply and balance of acrotelmic and catotelmic peat

Demand for Acrotelm (m3)	9782
Supply of Acrotelm (m3)	9781
Surplus (+) or deficit (-) of Acrotelm	-1
Demand for Catotelm (m3)	17393
Supply of Catotelm (m3)	17387
Surplus (+) or deficit (-) of Catotelm (m3)	-6

4.3 Classification of excavated peat (Objective 3)

Peat was characterised for 32 peat core sub-samples from six sample locations (see Figure 12.8 and Figure 12.9, Volume 2). Appendix 12.4, Volume 2 details the physical properties recorded from the 32 peat core sub-samples taken at the site.

The key measures of peat condition, which are important to establishing the appropriate type of reuse, are noted in Table 6 below (see Appendix 12.4, Volume 2 for full details). Overall, the sample results suggest that the acrotelmic layer is variable in depth and it is recommended that the upper 0.5m should be reused as part of the reinstatement programme, where this depth of material is available. Significant catotelmic material exists within the Proposed Development Area and the results indicate that the peats present exhibit variable levels of humification; with fibrous peat found within 0.5-1m and amorphous peat between 1.5-3m peat depth.

Table 6 Peat condition

Acrotelm / Catotelm	Measure of Peat Condition	Consideration
Acrotelm	Depth	The depth of the acrotelm was measured at 12 sample point locations, which ranged from 1 to 38cm, with a mean depth of 15.8cm. ¹ Due to the difficulties of excavating the thinner range of acrotelm, without causing significant damage to it, it is recommended that 0.5m of surface peat is excavated (where possible) for reuse as acrotelmic material.
Acrotelm/Catotelm	Degree of Humification	41.38% (n=24 sub-samples) of 0.5m sub-samples were fibrous in nature. 31.03% (n=18) of 0.5, sub-samples were intermediate in nature. 27.59% (n=16) of sub-samples were amorphous in nature.
		In general, the core sub-samples at the upper 0.5 to 1m of the peat profile was fibrous in nature, with amorphous peat present 1.5 to 3m within the peat profile.
	Fibrous Content (fine and coarse fibres)	Due to the depths of peat experienced within the Proposed Development Area, there is a high degree of variability in fibre content for each sub-sample within individual cores. Full details can be found in Appendix 12.4, Section 5.3.3. Overall, fine and coarse fibre content decreased as peat depth increased, with fine fibres maintaining a higher proportion than coarse fibres.

¹ In response to a comment in SNH's consultation response, regarding thin acrotelm layers not being possible, this layer was recorded within the forestry plantation where the acrotelm degrades due to drying and lack of light.

Acrotelm / Catotelm	Measure of Peat Condition	Consideration
	Water Content	Due to the depths of peat experienced within the Proposed Development Area, there is a high degree of variability in water content for each sub-sample within individual cores. Full details can be found in Appendix 12.4, Section 5.3.3. Overall, water content was moderately wet in the Proposed Development Area, with significant variability between core and between sub-samples within cores. In general, water content reduced as peat depth increased, which is a characteristic of amorphous peat.
	Von Post	Due to the depths of peat experienced within the Proposed Development Area, there is a high degree of variability in Von Post score for each sub-sample within individual cores. Full details can be found in Appendix 12.4, Section 5.3.3. Overall, the degree of humification increased with peat depth. In general, the surface layer fibrous peats range from H3-H5, mid-layer intermediate peats range from H5-H7 and amorphous peats range from H7-H9. The range of decomposition ranged from low to high, depending on the depth of peat.

4.4 Use of peat in borrow pit restoration (Objective 4)

This borrow pit is located in an area covered by Sitka spruce plantation, however, the NVC survey and inspection of aerial imagery (Figure 1) suggests that the surrounding habitats are a mix of bog (M19) and acid grassland (MG 10).

Figure 1 Aerial imagery of borrow pit location showing peat depth probes



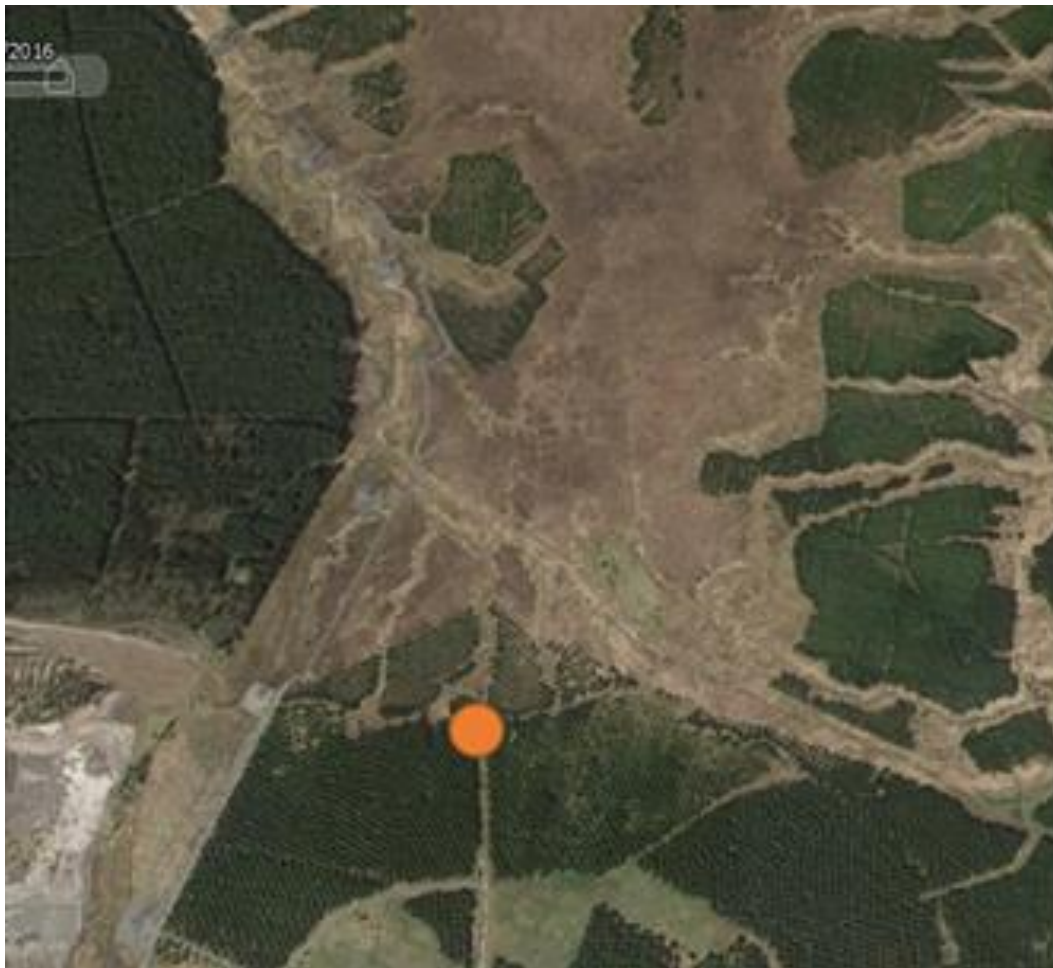
Source: ESRI, DigitalGlobe, GeoEye, I-Cubed, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS Community

The depth probe data for this area found depths vary between 5 to 84 cm – suggesting the presence of peat and/or organo-mineral soils. The coal risk assessment (FEI, March 2018, Chapter 9) indicates that this area has not been mined in the past, however, observations during peat depth surveys indicate that the underlying material is a mixture of peat and clays –suggesting that it has been modified during past restoration work and/or by the drying effects of commercial forestry. A distinctive habitat line is clear from the aerial imagery (northern point of the borrow pit cross hair

sample), which potentially indicates the boundary between made-ground and natural habitat. The borrow pit location is also at a similar altitude to the bog to the immediate north so there is no clear geographical/topographical reason for the habitat to change so abruptly. Therefore, the absence of bog habitat in the location is likely to be a result of past mining related activity and the impact of commercial forestry.

Historical aerial imagery from 2016 (Figure 2) and 1946 (imagery prepared from aerial photographs taken by the RAF in May 1946²) shows the area where the borrow pit is proposed appears to consist of mire/moorland habitat and the habitat line present in the recent aerial (Figure 1) is not apparent.

Figure 2 Aerial imagery for 2016 of Borrow Pit Location (orange dot)



Source: ESRI, DigitalGlobe, GeoEye, I-Cubed, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS Community

Given bog habitat exists immediately adjacent to this area (at similar altitude and topographical conditions) and that mire/moorland habitat existed in the past before habitat modification, it is considered that using the borrow pit to restore peat based habitat is justifiable. As mentioned earlier in the plan, the restoration of borrow pits require glacial till to be placed in the first instance followed by catotelm and then acrotelm. Due to its high clay content glacial till is non-permeable and will therefore help to maintain wet conditions.

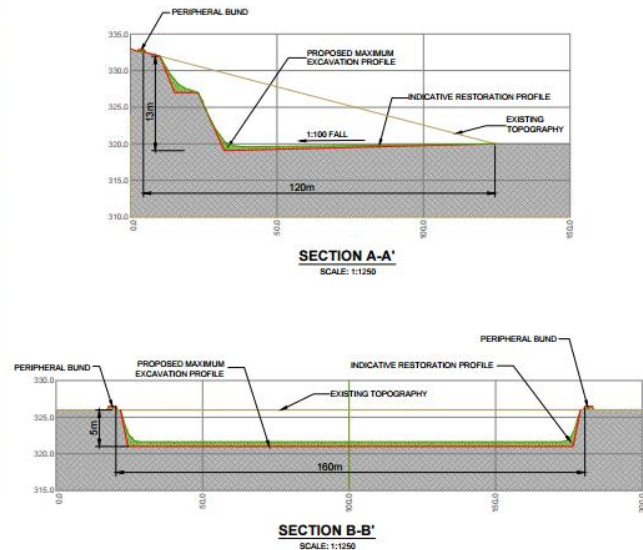
² Ordnance Survey Air Photo Mosaics NS 51 S.W (Ayrshire) which is part of the collection of Air Photo Mosaics of Scotland, 1944-1950 held online by the National Library of Scotland Leabharlann Nàiseanta na h-Alba. Aerial Image: NS 51 SW <http://maps.nls.uk/view/75221185>.

As shown in Figure 3, the borrow pit is anticipated to be a bowl type restoration profile which is preferred for the purposes of peatland restoration. The reinstatement principles as outlined within Scottish Renewables and SEPA (2012) should be followed in the restoration of the borrow pit.

Figure 3 Borrow Pit Outline Design



Source: ESRI, DigitalGlobe, GeoEye, I-Cubed, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS Community



Source: EnergieKontor UK Ltd

4.5 Handling excavated peat (Objective 5)

It will be necessary for the Final PMP to detail the precise methods and timing involved in handling peat, storing it and then using it for reinstatement. The final method statement for this should be based on the following principles:

- The surface layer of peat and vegetation (acrotelm) will be stripped separately from the catotelmic peat. Where possible this will involve an excavation depth of 0.5m and the creation of turves.
- The turves should be as large as practicably possible to minimise desiccation effects during storage.
- Contamination of excavated peat with other substrate materials (e.g. gravels, clays or silts) should be avoided and these materials stored separately where excavated.
- Acrotelmic material will be stored separately from catotelmic material.
- Careful handling is essential to retain any existing structure and integrity of the excavated materials and thereby maximise the potential for excavated material to be reused.
- Movement of excavated turves and peat should be kept to a minimum and it is preferable to transport peat intended for translocation to its final destination at the time of excavation.
- Less humified catotelmic peat (consolidated peat), which maintains its structure upon excavation, should be kept separate from highly humified amorphous peat.
- Consider the timing of excavation activities to avoid very wet weather periods in order to reduce the risk of peat becoming wet and unconsolidated, thereby reducing pollution or peat slide risk.

- Acrotelmic material will be replaced as intact as possible once construction is complete.
- To minimise handling and transportation of peat, acrotelmic and catotelmic will be replaced, as far as is reasonably practicable, in the location from which it was removed. Acrotelmic material must always be placed on the surface.

4.6 Temporary peat storage (Objective 6)

It will be necessary for the Final PMP to detail the precise methods and timing involved in temporary storage, should this be required at all (the preference being that peat is placed at its end use location directly from it being excavated). However, it is likely that a degree of temporary peat storage will be required during construction, for instance in association with stripping areas for the turbine foundations; this material will then be used in the subsequent restoration of this temporary construction area.

The final method statement for this should be based on the following guiding principles:

- Temporary storage of peat should be minimised. Where required it should be temporarily stored in stockpiles / bunds adjacent to and surrounding each infrastructure site.
- Acrotelm, catotelm and other substrate materials should all be stored separately and appropriately.
- Suitable storage areas should be sited in areas with lower ecological value (e.g. away from Groundwater Dependent Terrestrial Ecosystems (GWDTEs), low stability risk areas and at a suitable distance from watercourses.
- Peat turves should be stored in wet conditions where possible (e.g. within waterlogged former excavations) or irrigated in order to prevent desiccation.
- Larger stockpiles are more preferable than numerous small stockpiles. This helps minimise exposure to sun and wind, which can lead to desiccation. Stockpiles should not exceed 1.5m in height and be sited with due consideration for slope stability.
- Stores of non-turf, i.e. catotelm, should be bladed off to reduce surface area and desiccation of the stored peat.
- In dry weather periods, consideration should be given to watering stored turves and peat to prevent drying out, wastage and erosion.
- Pollution prevention measures should be installed around peat storage areas.
- Reinstatement will, in all instances, be undertaken at the earliest opportunity to minimise storage of turves and other materials.
- Timing the construction work, as much as possible, to avoid periods when peat materials are likely to be wetter.
- Temporary storage and replacement of peat excavated from the borrow pit should occur within the 'source' pit.
- Transport of peat on site from excavation to temporary storage and restoration site should be minimised.

4.7 Is there a requirement for a Waste Management Plan for the Site? (Objective 7)

There is no requirement for a Waste Management Plan.

5. LIMITATIONS OF THE DRAFT PEAT MANAGEMENT PLAN

The peat excavation and reuse volumes are intended as an initial indication. The total peat volumes are based on a series of design assumptions and estimates for the site layout and peat depth sample data averaged across discrete areas of the site. Such parameters can still vary over a small scale and therefore local topographic changes in the bedrock profile may impact the total accuracy of the volume calculation.

As explained earlier, this DPMP will be developed into a Final PMP post-planning consent and in advance of construction when the infrastructure contractor is appointed. The accuracy of the predictions within this DPMP may be improved through further detailed site investigation prior to and during construction. It is therefore important that the Final PMP remains a live document throughout the pre-construction and construction phases and is encapsulated within the wider Construction and Environmental Management Plan (CEMP). The PMP and volumetric assessments can be updated as more accurate information becomes available and the guiding principles within this DPMP incorporated into relevant construction method statements and plans.

6. REFERENCES

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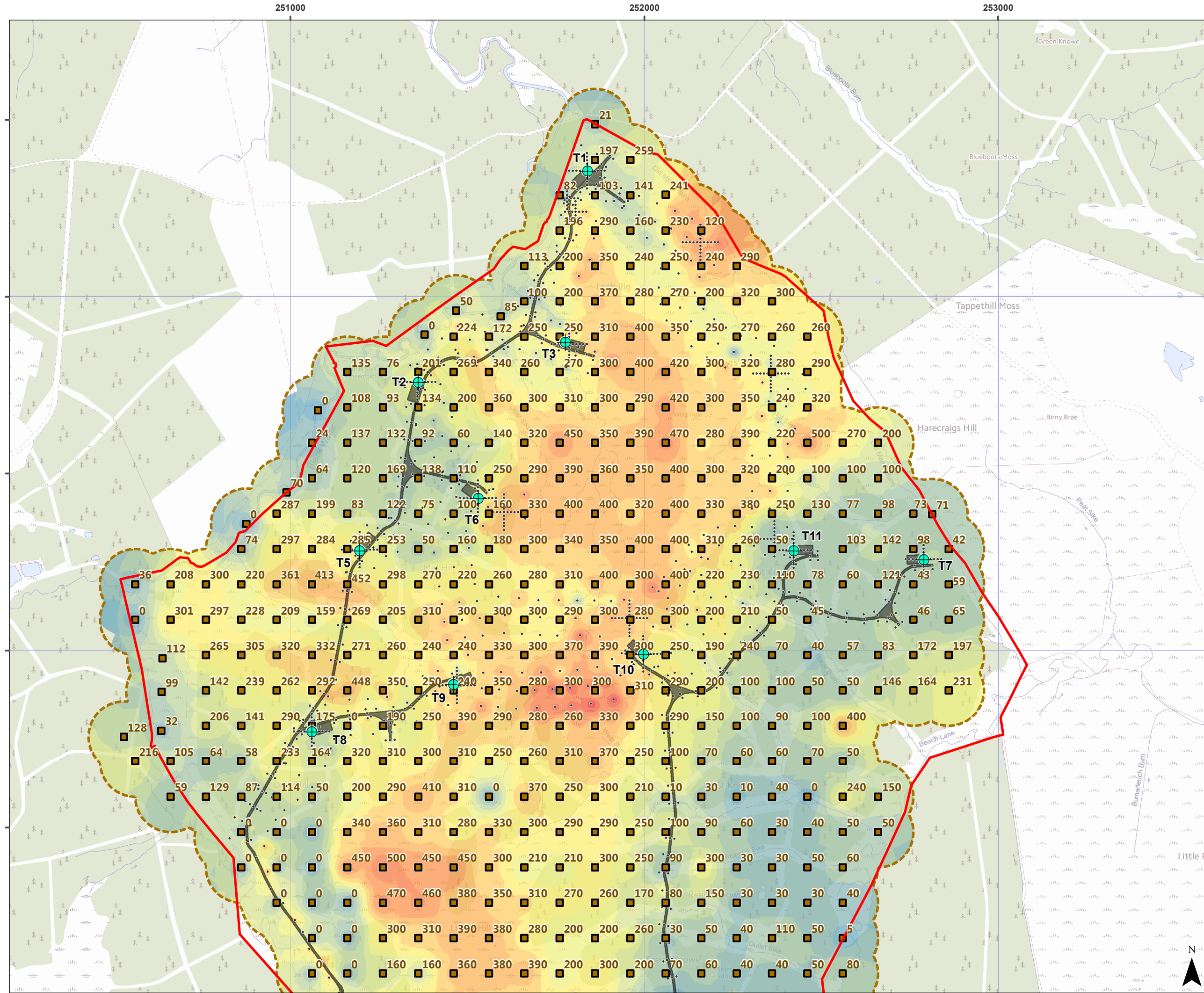
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Figure A PHASE 1 PEAT SAMPLE LOCATIONS / DEPTHS

Figure B PHASE 1 AND PHASE 2 PEAT SAMPLE LOCATIONS / DEPTHS



Legend:

- Turbine
- Planning Boundary
- Infrastructure
- Peat Study Area

Peat Depth Location (labels in cm)

- Phase 1 Grid (100m x 100m)
- Phase 2 Samples

Interpolated Peat Depth (cm)

	<1
	1 - 20
	21 - 50
	51 - 100
	101 - 150
	151 - 200
	201 - 250
	251 - 300
	301 - 350
	351 - 400
	401 - 450
	451 - 500
	501 - 550
	551 - 588

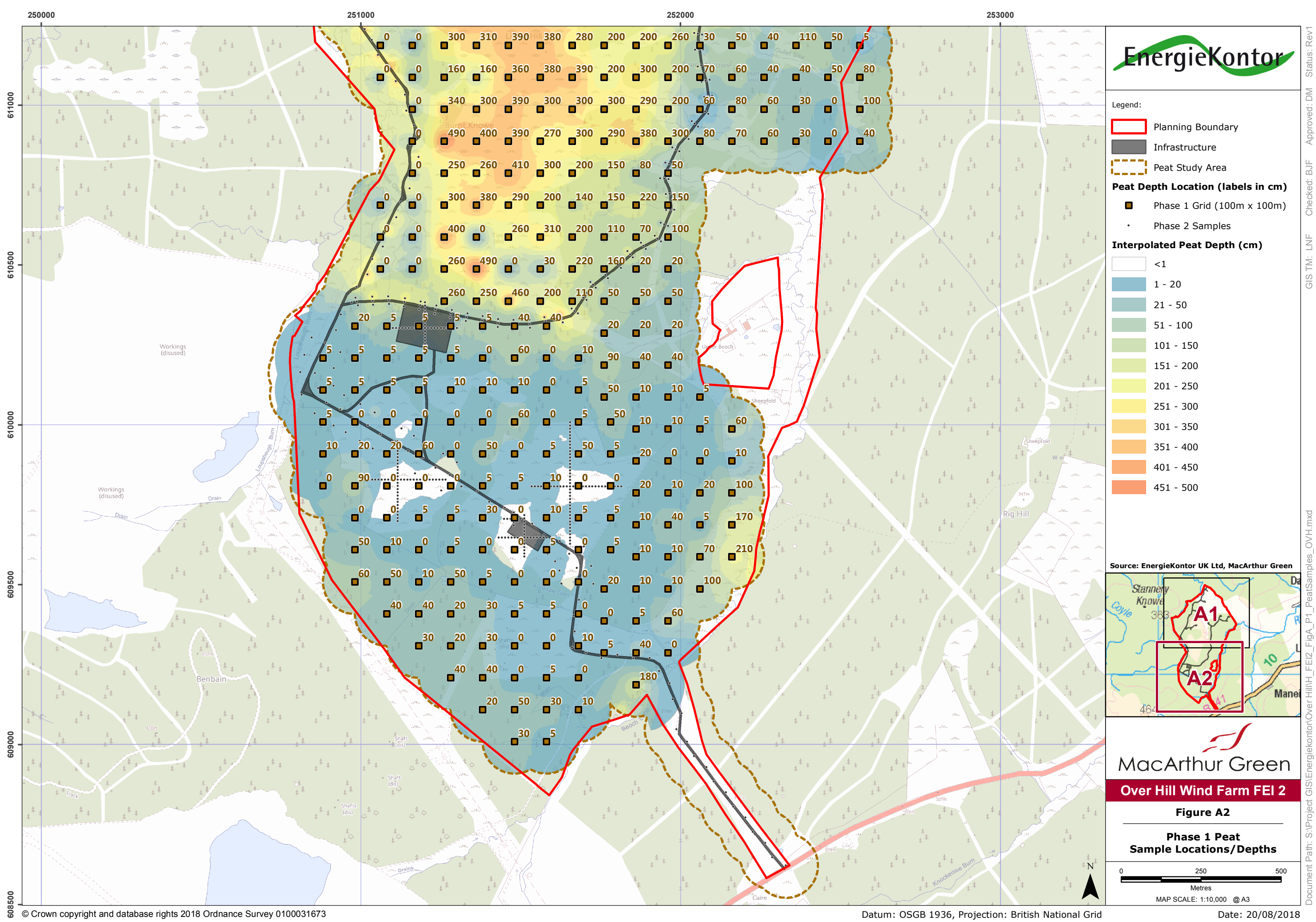
Source: EnergieKontor UK Ltd, MacArthur Green

Over Hill Wind Farm FEI 2

Figure A1

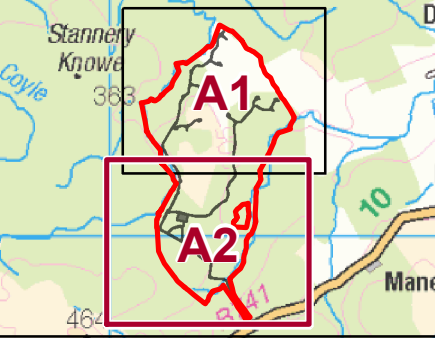
Phase 1 Peat Sample Locations/Depths

0 250 500
Metres
MAP SCALE: 1:10,000 @ A3



- Legend:
- Planning Boundary
 - Infrastructure
 - Peat Study Area
- Peat Depth Location (labels in cm)**
- Phase 1 Grid (100m x 100m)
 - Phase 2 Samples
- Interpolated Peat Depth (cm)**
- <1
 - 1 - 20
 - 21 - 50
 - 51 - 100
 - 101 - 150
 - 151 - 200
 - 201 - 250
 - 251 - 300
 - 301 - 350
 - 351 - 400
 - 401 - 450
 - 451 - 500

Source: EnergieKontor UK Ltd, MacArthur Green



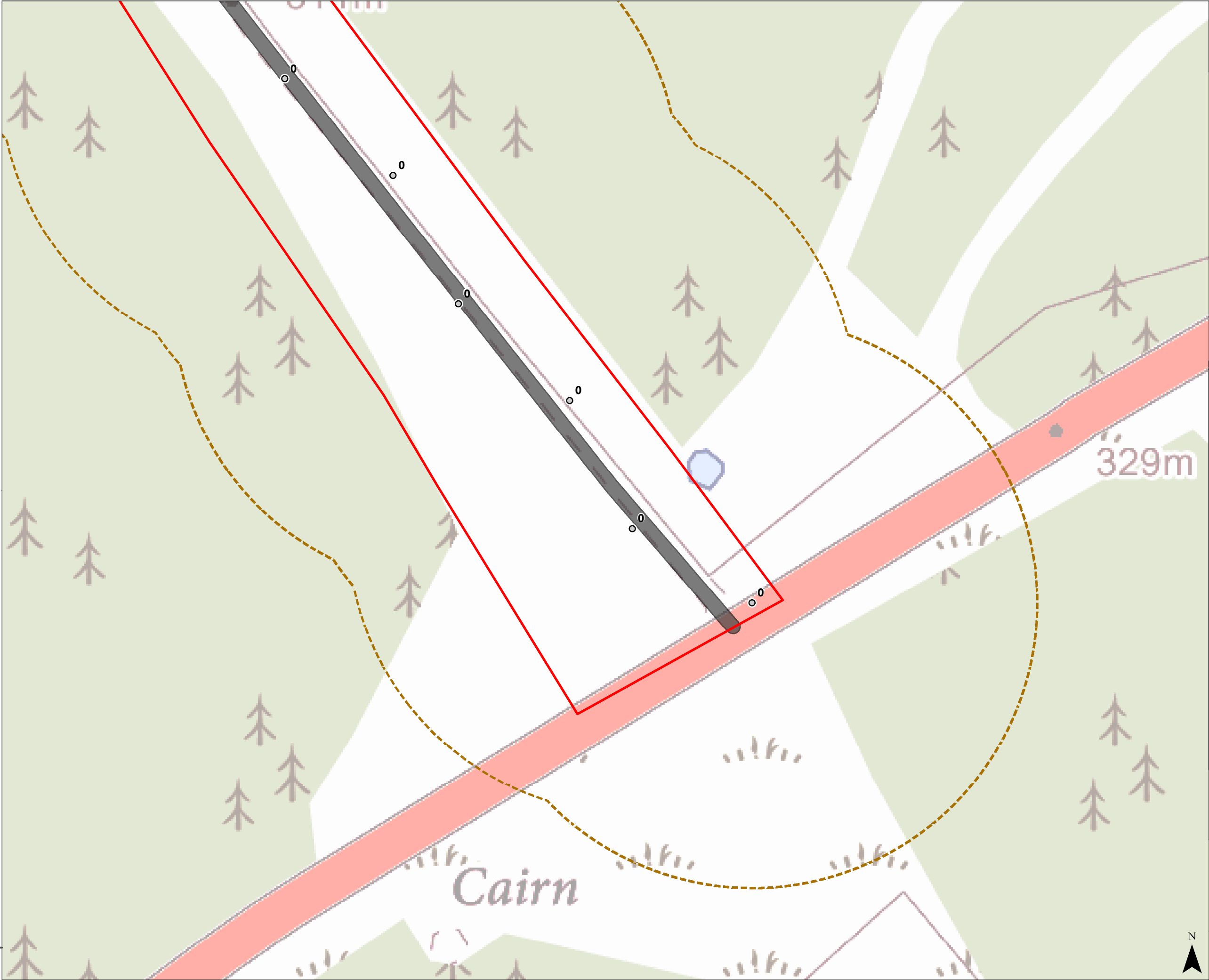
MacArthur Green

Over Hill Wind Farm FEI 2

Figure A2

Phase 1 Peat Sample Locations/Depths

0 250 500
Metres
MAP SCALE: 1:10,000 @ A3



Legend:

- Planning Boundary
- Infrastructure
- Peat Study Area

Peat Depth Location (labels in cm)

- Phase 2 Samples: Infrastructure

Source: EnergieKontor UK Ltd, MacArthur Green

Over Hill Wind Farm FEI 2

Figure B1

**Phase 1 and Phase 2
Peat Sample Locations/Depths**

0

25

50

Metres

MAP SCALE: 1:1,250 @ A3

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Datum: OSGB 1936, Projection: British National Grid

Date: 20/08/2018

