Breezy Hill Energy Project

Phase 1 and 2 Peat Probing and Coring Survey Report

Technical Appendix 8.1

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CONTENTS

LIST OF TABLES

LIST OF FIGURES

1 INTRODUCTION

MacArthur Green was commissioned by Brockwell (the Applicant) to carry out peat depth and coring surveys to aid the design process and to inform an assessment of the nature and condition of the peatland at the proposed Breezy Hill Energy Project (the Proposed Development).

This report has been produced by MacArthur Green in accordance with Scottish Environment Protection Agency (SEPA) and NatureScot guidelines (2017). Those contributing to the preparation of the technical appendix have undergraduate and/or postgraduate degrees in relevant subjects, have professional experience, and hold professional memberships relating to their field of expertise (e.g., Chartered Institute of Ecology and Environmental Management (CIEEM)).

2 AIMS AND OBJECTIVES

The surveys were split into two phases, with the following aims and objectives:

2.1 Phase 1

- **Aim 1 Gather high resolution peat depth data on a 100 m² systematic grid for the Site[1].**
    - Objective 1.1 Inform the layout of the Proposed Development's infrastructure to help reduce effects associated with peatland habitats; and
    - Objective 1.2 Provide peat depth data to: 1) inform the effect of the Proposed Development on carbon losses arising from disturbance to peatland habitats; and 2) inform a draft Peat Management Plan (DPMP) for the Site (**Technical Appendix 8.2**, EIAR, Volume 3).

2.2 Phase 2

- **Aim 1 Gather additional high-resolution peat depth data around proposed wind turbine and infrastructure locations.**
    - Objective 1.1 Further inform the layout of the Proposed Development's infrastructure to help reduce effects associated with peatland habitats; and
    - Objective 1.2 Provide peat depth data to inform the effects of the Proposed Development on carbon losses arising from disturbance to peatland habitats.
- **Aim 2 Present data on the nature of peat deposits at key infrastructure locations.**
    - Objective 2.1 Provide data to inform a DPMP; and
    - Objective 2.2 Assess the accuracy of peat depth probe samples.

These surveys detail the depth and character of the peatland across the Site. A full and detailed description of the vegetation present on the Site, which may also contribute to the

[1] The peat survey area for the Proposed Development comprised the area as detailed in **Figure 8.5 (EIAR, Volume 2a)**.

characterisation of the peatland condition, can be found in **Technical Appendix 6.1** (EIAR Volume 3).

3 THE SITE AND STUDY AREA

The Site is located approximately 8.5 km south-west of Cumnock and north of Dalmellington and lies wholly within the East Ayrshire Council administrative area. Land cover within the Site primarily consists of commercial conifer plantation and clearfell. There are several minor watercourses on and around the Site. The Proposed Development is fully described within Chapter 2: Proposed Development.

A full description of the site is provided in **Chapter 2** (EIAR, Volume 1). The peat survey area for the Proposed Development comprised the area as detailed in **Figure 8.5** (EIAR, Volume 2a), which is generally on commercial planted coniferous plantation (**Figure 6.3**, EIAR, Volume 2a). The site was surveyed between 2013 and 2014 (north west corner formerly known as Polquhairn), 2022, 2024 and 2025 (remainder of Site).

The Carbon and Peatland Map 2016 was consulted to determine likely peatland classes present at the Site. The map is a predictive tool that provides an indication of the likely presence of peat at a coarse scale. The Carbon and Peatland Map has been developed as a high-level planning tool and identifies areas of nationally important carbon-rich soils, deep peat and priority peatland habitat[2] as Class 1 and Class 2 peatlands. **Figure 6.2** (EIAR, Volume 2a) indicates that, according to this predictive tool and map, the Site contains a very small amount of Class 1 peatland in the far south and no Class 2 peatland. The Site is predominantly made up of Class 0 (mineral)[3], Class 3[4] and Class 4[5] soils.

As the Carbon and Peatland Map is a high-level tool, peat depth and coring surveys were carried out across the site to inform siting, design and mitigation and the detailed assessment on peatland and associated habitats. The results of the peat surveys are discussed here, and the results of the habitat surveys are presented and discussed in **Chapter 6** (EIAR, Volume 1) and **Technical Appendix 6.1** (EIAR, Volume 3).

4 METHODOLOGY

Field surveys followed best practice guidance published at the time of survey with regards surveying for developments on peatland (Scottish Government, Scottish Natural Heritage, SEPA (2017), Scottish Renewables and SEPA (2012).

[2] Priority peatland habitat is land covered by peat-forming vegetation or vegetation associated with peat formation.
[3] Mineral soil - Peatland habitats are not typically found on such soils (Class 0). Indicative vegetation - no peatland vegetation.
[4] Class 3 - Dominant vegetation cover is not priority peatland habitat but is associated with wet and acidic type. Occasional peatland habitats can be found. Most soils are carbon-rich soils, with some areas of deep peat.
[5] Class 4 - Area unlikely to be associated with peatland habitats or wet and acidic type. Area unlikely to include carbon-rich soils. Indicative vegetation - heath with some peatland.

The below methodology describes the methods employed for the Phase 1 and Phase 2 peat surveys carried out for the Proposed Development in 2013, 2014, 2020, 2021, 2024 and 2025.

4.1 Phase 1 Peat Probing

4.1.1 Peat Depth Analysis

The adopted sampling frequency took due consideration of good practice and published guidance referred to above. Phase 1 peat data was collected by MacArthur Green in July 2020 and May/June 2021 to inform the initial design of the Proposed Development. Additional Phase 1 peat probing was carried out by MacArthur Green in September 2025 where there were gaps in the 2020/2021 coverage relevant to the Proposed Development. Phase 1 peat data for the Polquairn area of the Site (north west area of the Site) was collected in October 2013 and June 2014, and was provided by the Applicant in November 2024. The Phase 2 peat depth probing locations sampled are also shown in **Figure 8.5** (EIAR, Volume 2a).

The following methods were employed by MacArthur Green on behalf of the Applicant during the peat surveys conducted in 2020, 2021 and 2024:

1. The Site was sampled using a 100 m^2 systematic grid which was established around a random point selected within the Site. The grid was orientated north to south for ease of navigation.
2. Geographical Information System (GIS) was used to generate the systematic grid and related sampling locations.
3. 1,066 samples were generated in total.
4. Sampling locations were downloaded on to handheld Global Positional System (GPS) units, which were used to locate sampling locations in the field.
5. A custom made collapsible solid steel peat depth probe was used at each sample point to establish substratum depth. Full depth recordings were taken to the nearest centimetre (cm). (N.B. As this is a peat assessment, only peat or organo-mineral soil (i.e., peaty soils – peaty podzols or peaty gleys) depths were recorded; where the sample point fell on mineral soil/bare rock the probe depth was recorded as zero).
6. The underlying substrate was defined if determinable.
7. Peat depth data were modelled using 'Inverse Distance Weighted' (IDW) interpolation in ArcMAP 10.6©. This interpolation method is best suited to situations where the density of samples is great enough to capture the local surface variation needed for the analysis (Childs, 2004).
8. A depth model was generated using the following categories of peat depth: 0; 1-25 cm, 26-50 cm, 51-100 cm and 50 cm intervals thereafter.

4.2 Phase 2 Peat Probing and Coring

4.2.1 Peat Depth Analysis

The first phase of peat depth probing and analysis (Phase 1 peat survey) was carried out on a 100 m² systematic grid. This peat depth data and other constraints were used to inform the layout of the Development, including the wind turbine locations, substation, access track alignments, compounds etc.

The second phase of intensive peat probing (Phase 2 peat survey) supplements the original data and gathers further high-resolution data for the Site on and adjacent to the footprint of proposed infrastructure.

The following methods were employed by MacArthur Green on behalf of the Applicant in December 2024 and January 2025:

1. Where infrastructure likely requires the excavation of peat, e.g., at wind turbines, substation, compounds etc., peat depth samples were taken at regular intervals. Samples were taken at 10 m intervals along crosshairs from the central point of proposed turbines, and across a 25 m grid at the proposed locations of borrow pits, construction compounds, batching plants and substations (**Figure 8.5**, EIAR Volume 2a)).
2. The alignment of proposed new, and existing, access tracks was sampled at 50 m intervals, with measurements taken on the access track centreline and points 10 m perpendicular to the centreline on either side of the proposed track.
3. GIS was used to generate the sampling locations.
4. 1,484 Phase 2 sample locations were sampled in total. The Phase 2 peat depth probing locations sampled are also shown in **Figure 8.5** (EIAR, Volume 2a).
5. Sampling locations were downloaded on to hand-held GPS units, which were used to locate sample points in the field.
6. A custom made collapsible solid steel peat depth probe was used at each sample point to establish peat depth. Full depth recordings were taken. (N.B. As this is a peat assessment, only peat or organo-mineral soil depths were recorded; where the sample point fell on mineral soil/rock the probe depth was recorded as zero).
7. The underlying substrate was defined if determinable.
8. Peat depth data were combined with the Phase 1 probing data and modelled using IDW interpolation in ArcMap 10.6©, as per the Phase 1 probing data.
9. An updated peat depth model was generated using the following categories of peat depth: 0; 1-25 cm, 26-50 cm, 51-100 cm and 50 cm intervals thereafter.

4.2.2 Peat Coring

Peat coring was undertaken by MacArthur Green in January 2025. Peat coring analysis methods follow those detailed within Hobbs (1986: see Hobbs Appendix A p.78-79) and Hodgson (1974).

1. Peat cores were initially taken at four locations. Locations were determined after a review of the proposed infrastructure layout at the time of surveys, and analysis of peat depths

from the Phase 1 peat survey. An additional two locations (C005, C006) were added when it was found that three of the four initial samples were on shallow peat (<0.5 m) where only one core could be obtained. A peat depth probe was taken adjacent to each core sample. Coring locations are detailed in Table 4-1.

2. A 'Russian Corer' (volume 0.5 litres (l)) was used to take peat cores.
3. At each core sample location, the full peat depth profile was sampled, which involved taking 50 cm length cores from the surface layer through to the basal layer (where peat meets the underlying substrata).
4. For each sample core, the following information was collected in the field:
   a. A photograph of each 50 cm core;
   b. Depth of the acrotelm;
   c. Degree of humification (as per Hodgson, 1974)[10]:
      - Amorphous Peats - peats with fibre < 1/3rd volume when not rubbed - reduces to < 1/10 by rubbing, (optional - yields soluble dark humidified matter).
      - Fibrous Peats - peats with fibre > 2/3rds volume when not rubbed - reduces to no less than > 4/10 by rubbing, (optional - yields little soluble dark humidified matter).
      - 'Intermediate' if assessment falls between amorphous and fibrous.
   d. Degree of humification using the Von Post Scale;
   e. Fine Fibre Content: F0 (none), F1, F2, F3 (very high);
   f. Coarse Fibre Content: R0 (none), R1, R2, R3 (very high);
   g. Water Content: B1 (dry) to B5 (very wet); and
   h. Type of substrate underlying the peat (where this could be determined).

Table 4-1 Peat core sample numbers, locations and corresponding infrastructure

Sample Core ID	Number of 50 cm cores sampled	Easting	Northing	Infrastructure
C001	1	247244	613858	T3
C002	1	248064	612929	T11
C003	3	247756	612079	T15
C004	1	246732	611639	T17
C005	4	246780	611654	T17
C006	3	248105	613004	T11

5 SURVEY DETAILS & LIMITATIONS

The Phase 1, Phase 2 and coring peat surveys were carried out by MacArthur Green on the following dates:

- October 2013, June 2014, July 2020, May and June 2021, and September 2024 (Phase 1 probing);
- December 2024 and January 2025 (Phase 2 probing); and
- January 2025 (Phase 2 coring).

Limitations with regard to peat probing, relate to the survey method and analysis as follows:

- Obtaining a false depth measurement because of the probe meeting obstructions within the peat (e.g., hitting roots, stones etc). This was mitigated against as far as possible by taking an additional probe at each sample where it was suspected that the probe was hitting a barrier.
- In some cases, peat depth may be over-estimated if the substratum underlying the peat is soft. This is discussed in more detail in Section 6.2.
- Difficulty with inserting the probes into drier more humified peat, which was mitigated against as far as possible by using a custom-made solid steel probe with detachable steel handles to allow probes to be forced into the peat.
- The Phase 2 probing and coring sample locations were selected based on the infrastructure layout at the time of survey.

The above limitations associated with the method used to assess peat depth are not considered a significant factor and the peat and coring data presented are deemed to provide an accurate representation of the typical peat conditions within the Site; these data can be relied upon to inform the objectives of the peat survey.

6 RESULTS

The results are presented as follows:

- Section 6.1 presents the results of the peat depth probing;
- Section 6.2 provides a comparison of probed and cored (true) peat depths; and
- Section 6.3 presents the results of the coring survey.

6.1 Phase 1 & Phase 2 Probing

During the peat depth probing surveys in 2013, 2014, 2020, 2021, 2024 and 2025 a total of 1,066 peat depth probes were taken during Phase 1 and 1,484 probes during Phase 2. Therefore, there is a combined peat depth dataset of 2,550 probes within the Site, as shown in **Figure 8.5** (EIAR, Volume 2a). An additional 596 probes were taken during the 2020/2021 Phase 1 surveys but are not located within the finalised red line boundary and so have not been included in the calculations.

Figures 8.2.3 and 8.2.4 (EIAR, Volume 3) show the results of the peat depth surveys. **Figure 8.2.4** (EIAR, Volume 3) shows the specific depth class at each sample location, and **Figure 8.2.3** (EIAR, Volume 3) shows the results of the IDW peat depth modelling based on all available sample depths collected. **Figure 8.2.3** (EIAR, Volume 3) is based on IDW data interpolation and consequently the peat depth contours and boundaries are to a degree indicative; therefore, they cannot be taken as definite boundaries, as actual peat depths 'in the field' may vary to a degree around these boundaries.

Charts 6.1.1 and 6.1.2 present the percentage and frequency of samples falling within the peat depth categories recorded in the Site.

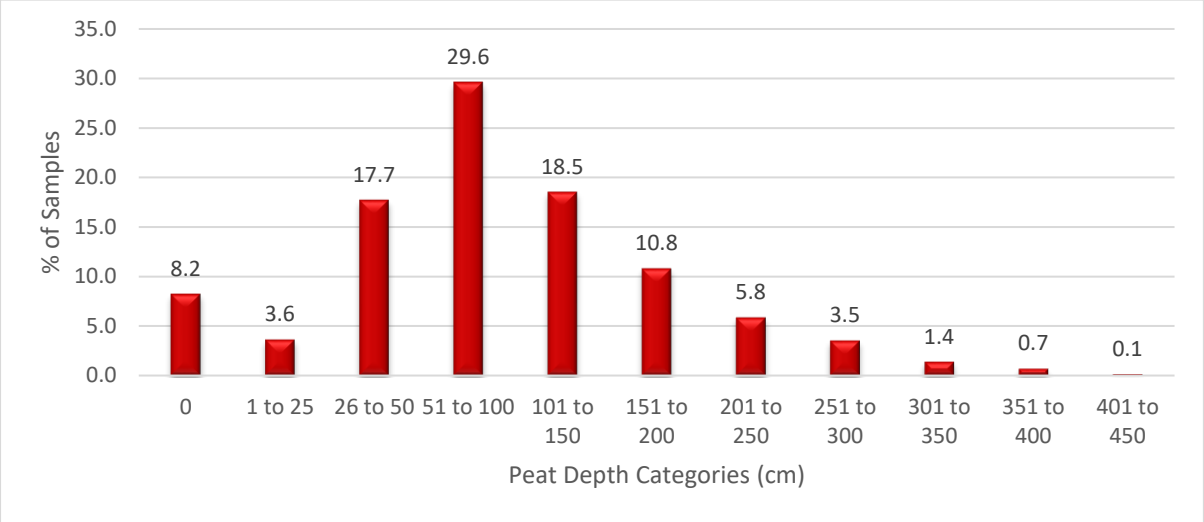

Chart 6.1.1, % Peat Depth Categories

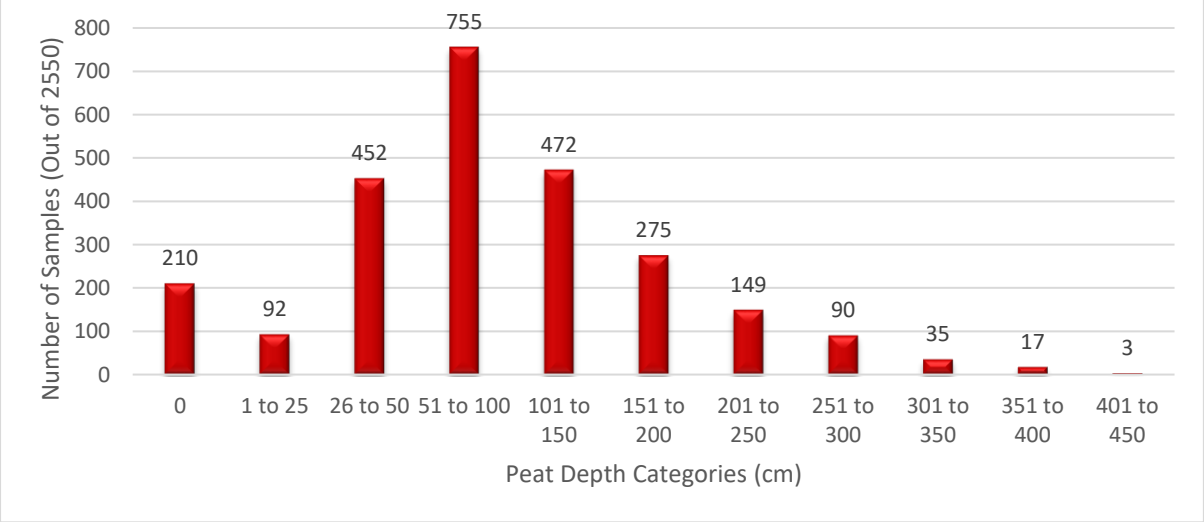

Chart 6.1.2, Peat Depth Frequency Distribution

As shown in **Figure 8.2.3** (EIAR, Volume 3), and further highlighted by Charts 6.1.1 and 6.1.2, the most common peat depth category recorded was 51 to 100 cm (mean 102 cm; median 86 cm). However there are several deeper peat pockets within the site (maximum depth 440 cm). Overall, 21.3% of samples fell within the 1 cm to 50 cm depth range; furthermore, the areas of 1 cm to 50 cm

depth are more appropriately considered to be, and referred to as, organo-mineral soils, or peaty soils (the peat depth surveys generally recorded these areas as being peaty podzols with occasional patches of peaty gleys). Additionally, 8.2% of the probes had no peat or peaty soils present. Overall, 59.1% of peat probes were less than 1 m in depth.

The following considerations are evident from the data:

- 92 samples (3.6%) fell on land with less than or equal to 25 cm depth of peat or organo-mineral/peaty soils.
- 452 samples (17.7%) fell on land with between 26 cm and 50 cm of peat or organo-mineral/peaty soils.
- 755 samples (29.6%) fell on land with between 51 cm and 100 cm of peat.
- 472 samples (18.5%) fell on land with between 101 cm and 150 cm of peat.
- 275 samples (10.8%) fell on land with between 151 cm and 200 cm of peat.
- 149 samples (5.8%) fell on land with between 201 cm and 250 cm of peat.
- 90 samples (3.5%) fell on land with between 251 cm and 300 cm of peat.
- 35 samples (1.4%) fell on land with between 301 cm and 350 cm of peat.
- 17 samples (0.7%) fell on land with between 351 cm and 400 cm of peat.
- Only 3 samples (0.1%) fell on land with more than 400 cm depth of peat.
- 210 samples (8.2%) fell on land with no peat.

Only sampling points on non-peat or non-organo-mineral habitats (e.g., bare rock or brown mineral soil were recorded as 0 cm of peat. Peat or organo-mineral soil was recorded at all other points.

Land where peat depth is greater than 50 cm is classified as 'blanket bog' by NatureScot (MacDonald *et al.*, 1998) and JNCC (JNCC, 2010); however, some areas with a peat depth of less than 50 cm can still form part of the wider hydrologically connected mire, or macrotope. The blanket bog at the Site is generally in a degraded condition having been planted over with commercial forestry across the majority of the Site. However, there are some unplanted patches and larger forestry rides which support bog that is active and better-quality, with frequent to abundant *Sphagna* in the basal layer; see **Technical Appendix 6.1** (EIAR, Volume 3) for further details of the Site's habitat condition.

6.2 Accuracy of Peat Depth Probes

At each core sample location, a peat depth probe was taken adjacent to the core sample to compare the probed depth against the true depth determined by measuring the depth of material retained in the core sample. To ensure the full depth of peat is sampled, a core is extracted that confirms the peat/substratum boundary has been reached. This approach allows a relative assessment of the accuracy of the peat depth probing. Peat was present at all six sample locations. The results are presented in Table 6-1.

Table 6-1 Difference between probed and true (cored) depth

Sample Core ID	Probed Depth (cm)	Cored Depth (cm)	Difference (Probed - Cored) (cm)	Infrastructure
C001	78	30	48	T3
C002	83	44	39	T11
C003	155	155	0	T15
C004	72	32	40	T17
C005	207	177	30	T17
C006	176	147	29	T11

As can be seen within Table 6-1, there was a tendency for the peat probes to overestimate the true peat depths determined via coring within the Site (mean overestimation of 31 cm).

The overestimation of peat depth from certain probes is due to the peat layer being underlain by other soft non-peat substrates into which the probe could still easily be inserted. As the physical dimensions of the peat probe are narrower than the Russian corer, penetrating beyond the peat layer into soft substrates is easier for the probe. Soft clays were found to underlay the peat at all but one of the coring points. When probing, this clay offered a similarly low resistance as peat, and the boundary between the two would thus be almost indiscernible in the absence of taking a core sample.

6.3 Core Sample Results

Sections 6.3.1 to 6.3.10 below present the information of the key variables recorded on the nature of peat deposits within the Site from the coring survey. Annex A presents the results for each of the variables from all the core samples, Annex B details the Von Post Classification methodology, and Annex C presents the photographs of each core subsample taken. The cores from all six core sample locations were sent to a laboratory for further analysis.

6.3.1 Depth of Acrotelm

The catotelm and acrotelm represent two distinct layers within undisturbed peat that control the hydrological regime. The catotelm is the bottom layer of peat that is mostly below the water table. The acrotelm overlies the catotelm and is the 'living' layer in which most water table fluctuations occur. The thickness of the acrotelm usually varies up to around 50 cm in undisturbed mires, but it largely depends upon the habitat type (and can reduce/disappear over time under long established forestry). Anaerobic and aerobic conditions alternate periodically with the fluctuation of the water table, favouring more rapid microbial activity than in the catotelm. The acrotelm consists of the living parts of mosses and dead and poorly decomposed plant material. It has a very loose structure that can contain and release large quantities of water in a manner that limits variations of the water table in peat bogs (Quinty and Rochefort, 2003).

Acrotelm was recorded at five sample locations (see Chart 6.3.1), however the mean depth was 2.83 cm, which is considered very shallow. The remaining sample location indicated no discernible acrotelm. Four sample locations were within a planted habitat and two in an unplanted habitat.

In the context of any development, it is recommended that for the purposes of construction and subsequent reinstatement, that where a sufficient peat depth exists, the top 50 cm of material should be treated as acrotelm. This approach will allow excavation of intact turves for reinstatement purposes where they are present, which will in turn facilitate quicker regeneration of disturbed areas. Even if little vegetation is present within this top layer, it should still be treated as acrotelmic material as it may contain a seedbank, particularly in open habitats, which will aid re-vegetation of reinstatement areas.

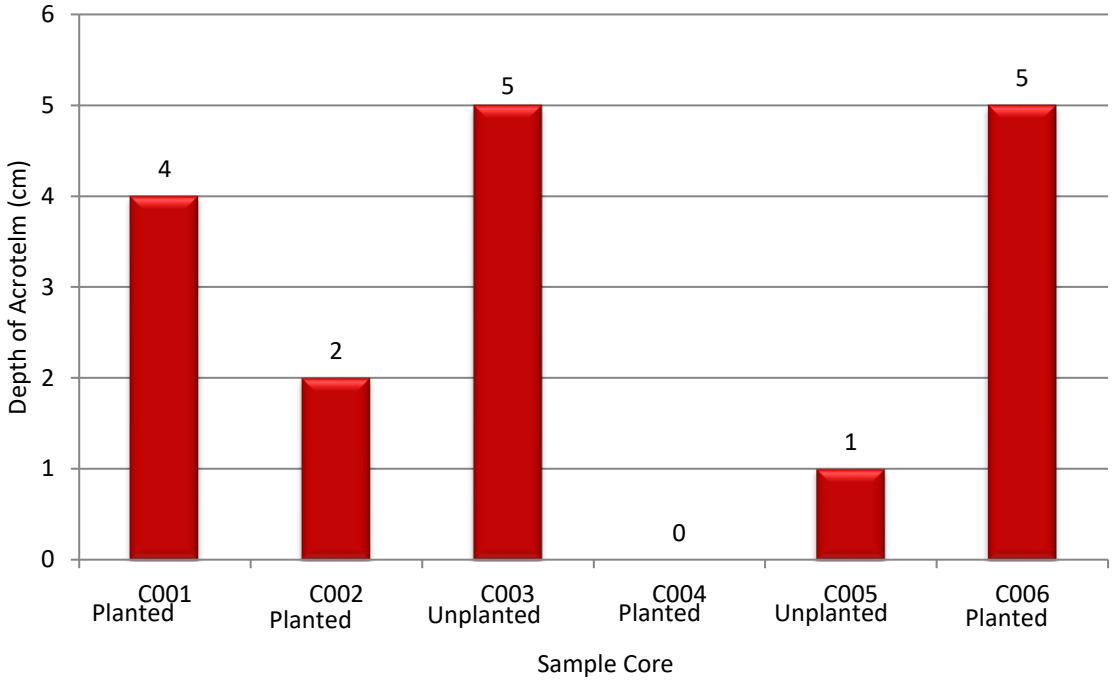

Chart 6.3.1 Depth of Acrotelm

6.3.2 Degree of Humification

The degree of humification was recorded in the field, in accordance with the methods discussed in Section 4.2.2 above; with each 0.5 m subsample being categorised as either fibrous, intermediate or amorphous peat.

From the six sample cores taken, there were a total of thirteen separate 0.5 l subsamples extracted and analysed. The results are summarised below.

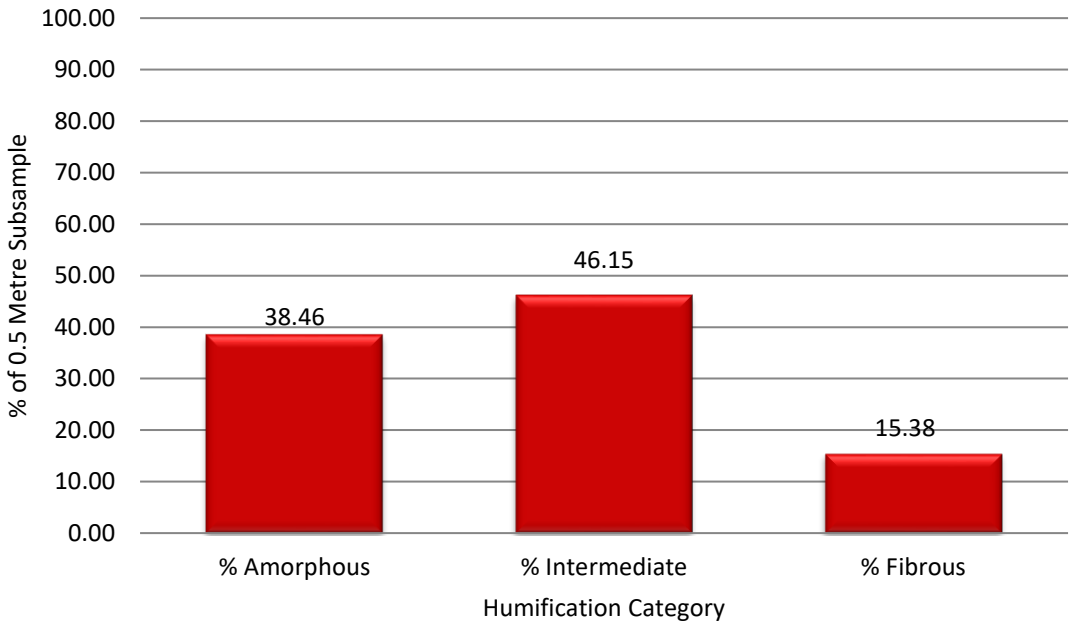

Chart 6.3.2 Degree of humification: % of 0.5 metre subsamples

Chart 6.3.2 above shows the degree of humification, in percentage of 0.5 m subsamples, for six sample locations. The following considerations are highlighted:

- 38.46% of the peat from the 0.5 m subsamples (n = 5) was amorphous in nature.
- 46.15% of the peat from the 0.5 m subsamples (n = 6)was intermediate in nature.
- 15.38% of the peat from the 0.5 m subsamples (n = 2) was fibrous in nature.

Interpretation of the data suggests that the peat across the Site is varied in nature and is weakly to strongly humified dependant on the location. In general, the upper peat horizons tend to be intermediate to fibrous, whereas the underlying peat tends to be amorphous to intermediate (see Annex A).

6.3.3 Fibrous Content

The proportions of coarse and fine fibres within the peat samples were ascertained in the field according to the Hobbs scale (see Section 4.2.2). For the purpose of analysis, mean, fine and course fibre contents were estimated for cores that had more than one 0.5 m subsample. The results are presented below.

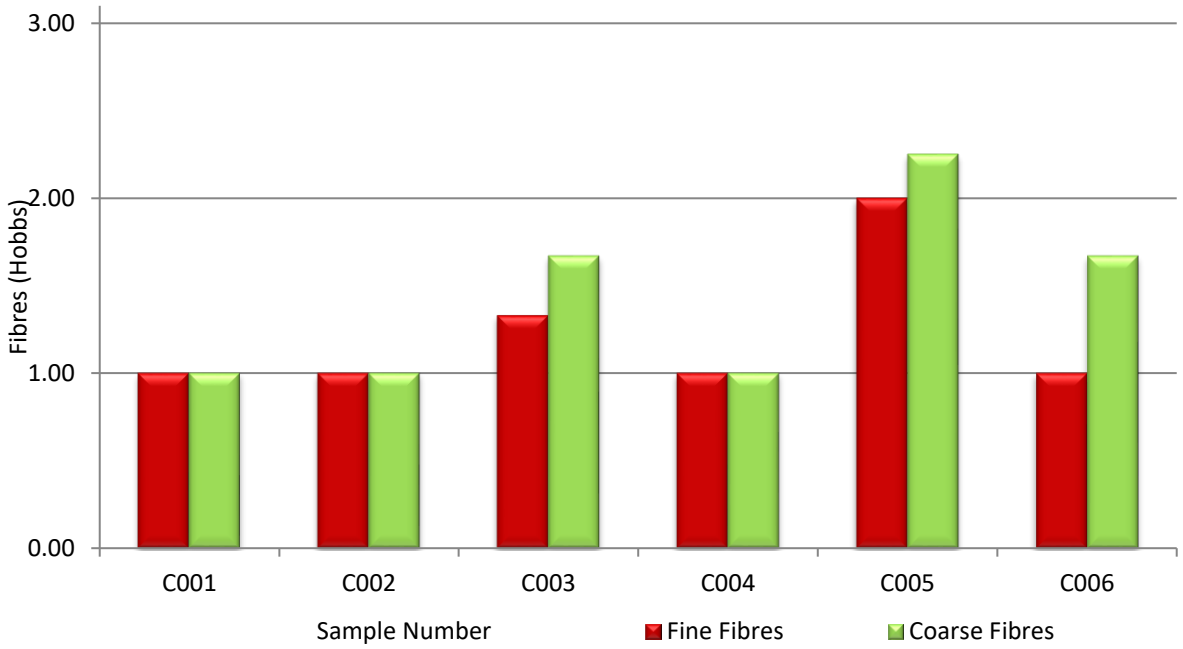

Chart 6.3.3 Levels of Coarse & Fine Fibres: % 0.5 metre subsamples

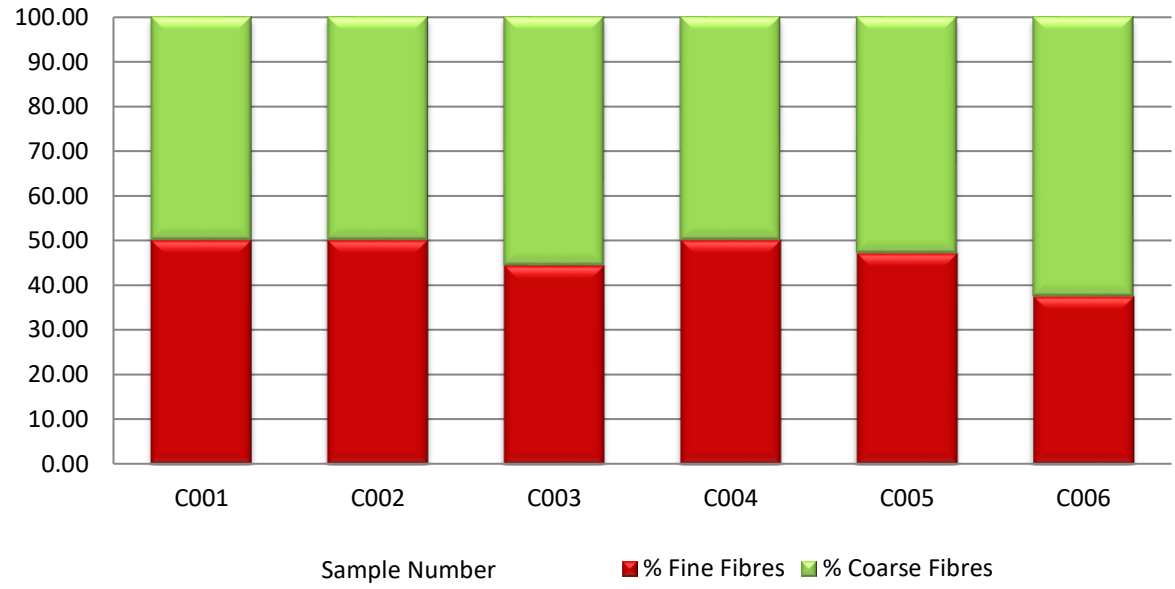

Chart 6.3.4 Fibrous Content: % 0.5 metre subsamples

Chart 6.3.3 above shows the level of coarse and fine fibres (using the Hobbs scale) present in six core locations and Chart 6.3.4 shows the percentage of fibrous content for fine and coarse fibres that were present in each of the six sample locations. The following considerations are highlighted:

- Sample locations C001, C002, C004 and C006 were scored as having a low fine fibre content (F1) according to the Hobbs scale. Sample location C005 was assessed as having a moderate fine fibre content (F2) according to the Hobbs scale. Sample location C003 was scored as

having an average fine fibre content between low and moderate according to the Hobbs scale;

- Sample locations C001, C002 and C004 were assessed as having a low course fibre content (R1) according to the Hobbs scale. Sample locations C003 and C006 were scored as having an average course fibre content between low and moderate (R2) according to the Hobbs scale. Sample location C005 was assessed as having an average course fibre content between moderate and high (R3) according to the Hobbs scale.; and
- Overall, the majority of the 0.5 m subsamples had a relatively even split of fine and coarse fibres. Only sample location C006 had noticeably more course fibres than fine fibres.

6.3.4 Water Content

The water content of subsamples was determined in the field using the Hobbs scale (B1 Dry – B5 Very Wet). The results below provide a summary mean for each core location.

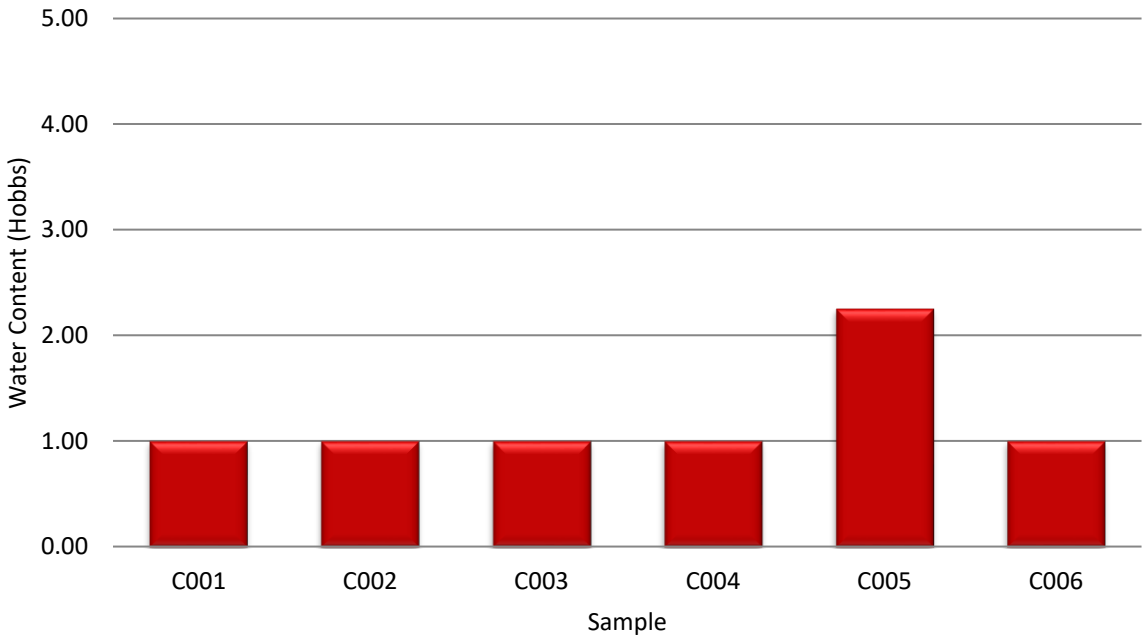

Chart 6.3.5 Mean Water Content: Core Location Summary

- The vertical axis in Chart 6.3.5 above, refers to the water content of sampled peat; 1 = dry to 5 = very wet.
- For the purpose of this analysis, a mean water content was estimated for cores that had more than one 0.5 m subsample.
- Sample locations, C001, C002, C003, C004 and C006 were recorded as B1 on the Hobbs scale, i.e., dry peats.
- Sample location C005 was recorded as having a mean water content of between B2 and B3 on the Hobbs scale, i.e., semi-dry peats with some moisture.
- No sample locations were recorded as having a value of B3 or higher.

6.3.5 Von Post (Degree of humification)

An estimate of the degree of humification according to the Von Post scale (see Annex B) was carried out on samples at all core locations, see Chart 6.3.6 below.

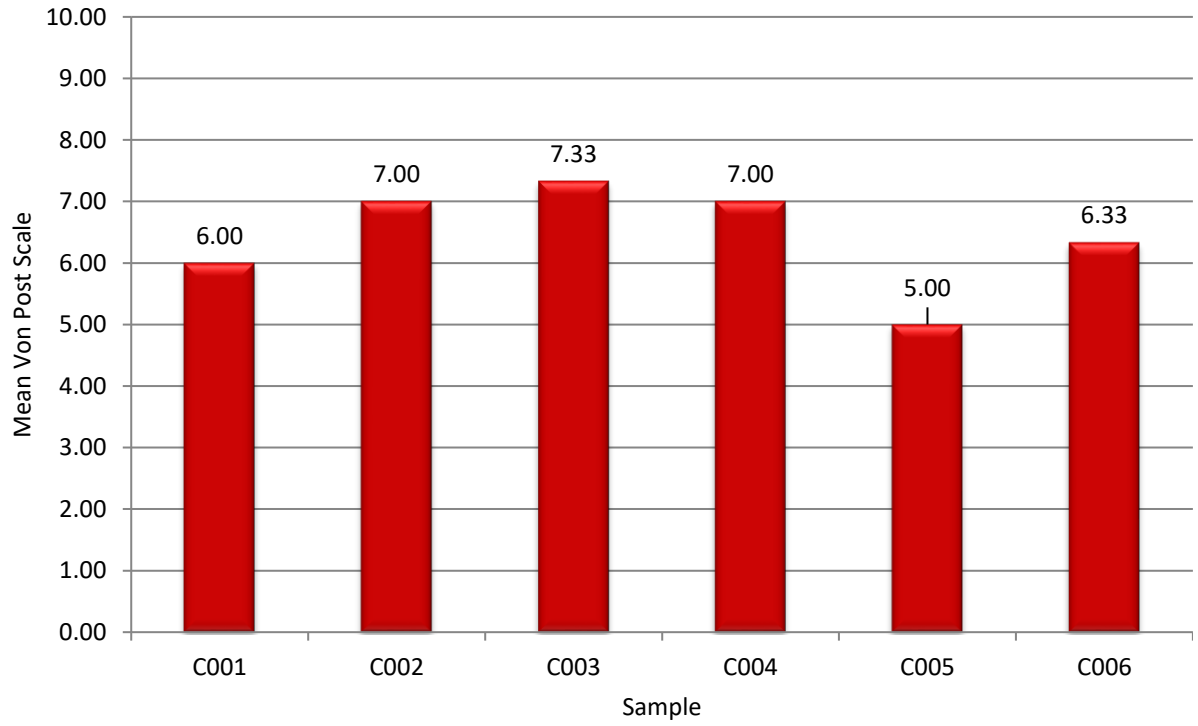

Chart 6.3.6 Mean Von Post

- The vertical axis in Chart 6.3.6, above refers to the Von Post Scale of Peat Decomposition (H1 to H10, see Annex B for details).
- For the purpose of this analysis, a mean degree of humification was estimated for cores that had more than one 0.5 m subsample.
- One sample was scored H5 on the Von Post scale, indicating moderate decomposition.
- Four samples were scored between H6 and H7 on the Von Post scale, indicating well- to strongly-decomposed peats.
- One sample was scored between H7 and H8 on the Von Post scale, indicating very strongly-decomposed peats.

6.3.6 pH of Peat Samples

Thirteen 0.5 l peat subsamples from 6 sample core locations were sent to the laboratory for analysis. The pH values determined are provided below.

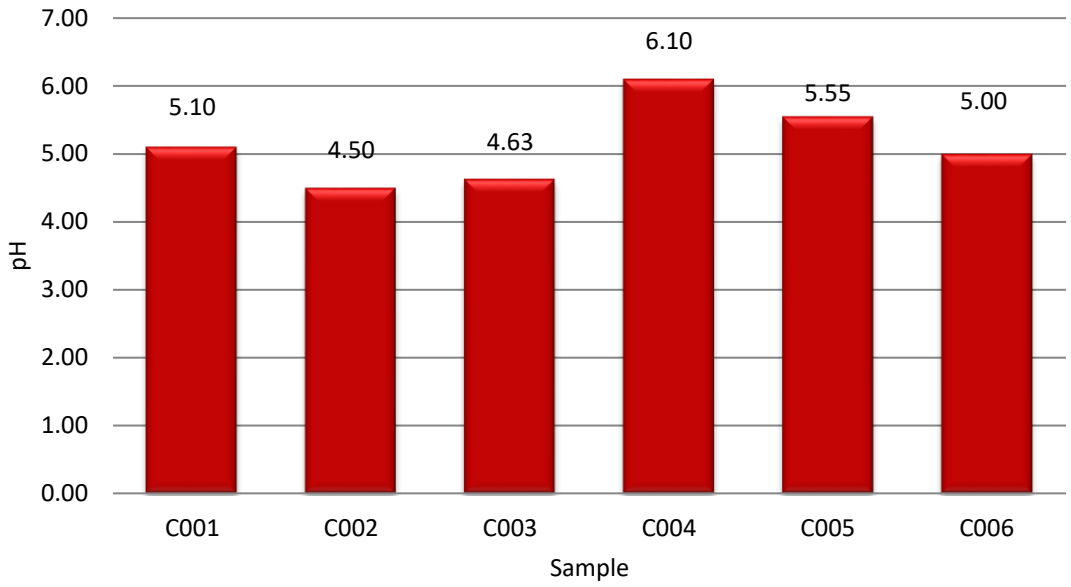

Chart 6.3.7 Mean pH

- The mean pH value of the thirteen subsamples was 5.14, with a range from 4.5 to 6.1 (see Annex A); and
- Chart 6.3.7 provides the mean pH for each core location and indicates that all subsamples were acidic in nature, as would be expected from the environment present within the Site.

6.3.7 Dry Matter (%)

Oven dry matter (%) was calculated for the thirteen subsamples sent to the laboratory. The mean dry matter for each core location is illustrated in Charts 6.3.8 and 6.3.9.

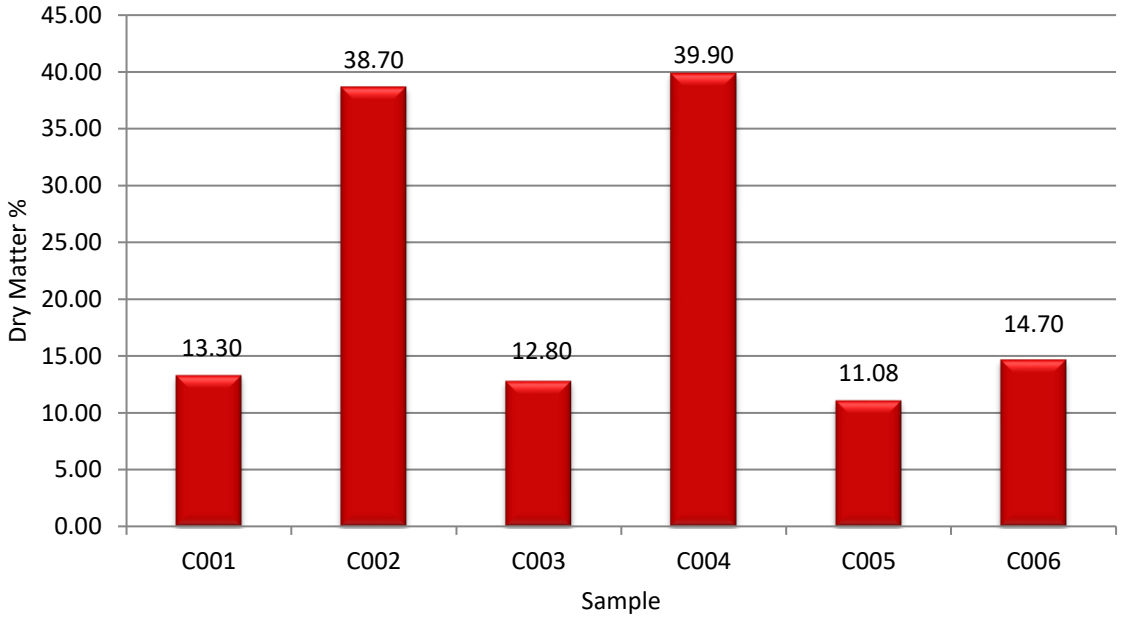

Chart 6.3.8 Core Mean Dry Matter (%)

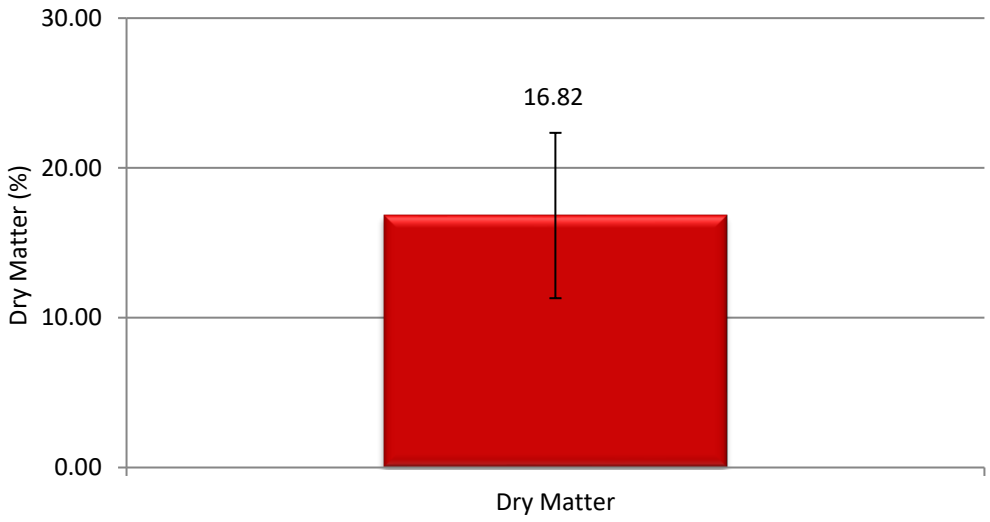

Chart 6.3.9 Subsample Mean Dry Matter (%)

Table 6-3-1, Descriptive Statistics

Mean	Standard Error	95% Confidence Interval	95% CL Lower	95% CL Upper	Precision
16.82	2.81	5.52	11.31	22.34	32.79

Charts 6.3.8 and 6.3.9, and Table 6.3.1 show the dry matter mean and summary statistics for the thirteen subsamples analysed. The following considerations are highlighted:

- For the purpose of the analysis in Chart 6.3.8, a mean dry matter content was estimated for cores that had more than one 0.5 m subsample.
- The mean dry matter percentage from the cores is 16.82 %; with maximum and minimum values of 39.9 % and 9.7 % respectively (see Annex A).

6.3.8 Dry Bulk Density (g/cm³)

Dry Bulk Density (g/cm³) was calculated for thirteen subsamples sent to the laboratory. The mean dry bulk density for each core location is illustrated in Charts 6.3.12 and 6.3.13.

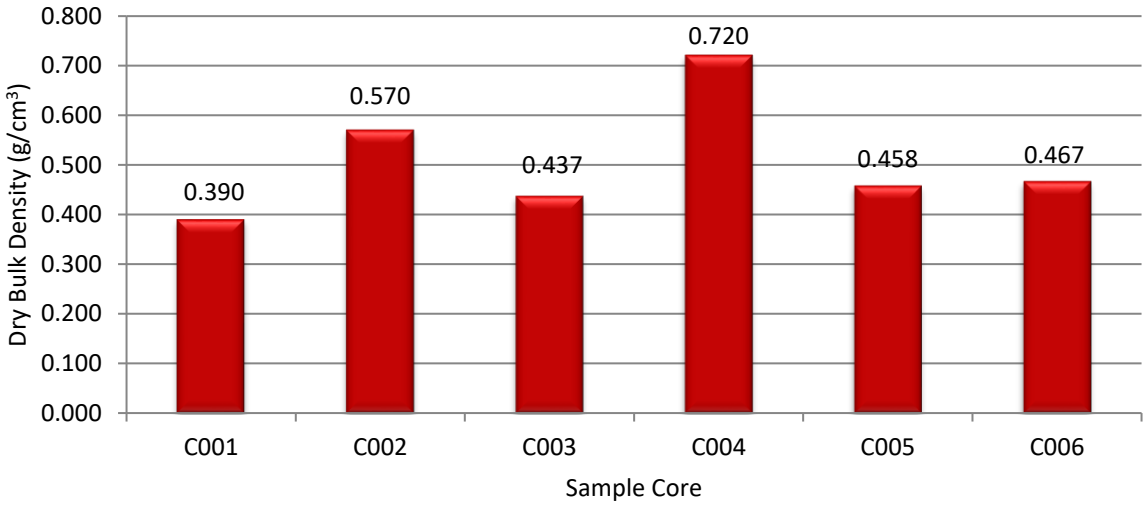

Chart 6.3.12 Core Mean Dry Bulk Density (g/cm³)

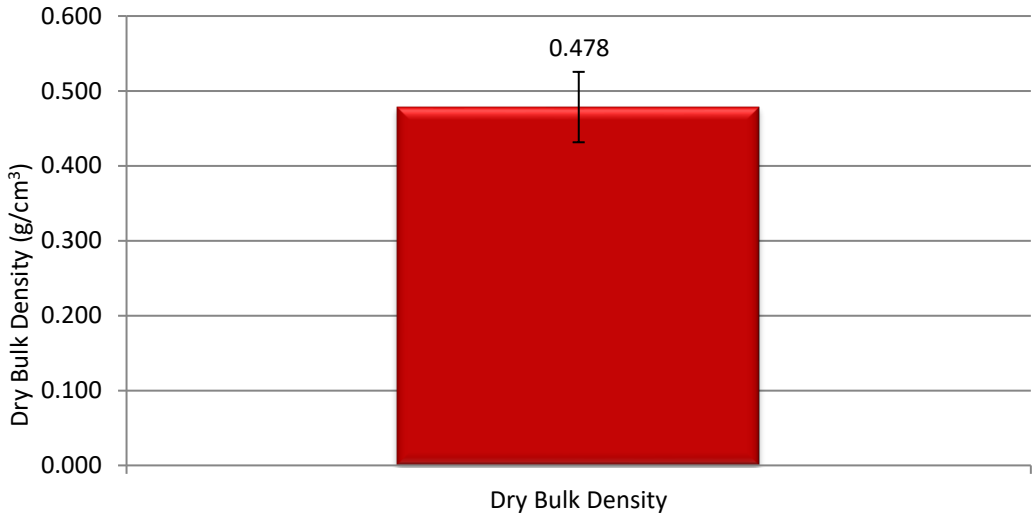

Chart 6.3.13 Subsample Mean Dry Bulk Density (g/cm3)

Table 6-3-2 Descriptive Statistics

Mean	Standard Error	95% Confidence Interval	95% CL Lower	95% CL Upper	Precision
0.478	0.024	0.047	0.431	0.526	9.89

Charts 6.3.12 and 6.3.13, and Table 6.3.3 show the dry bulk density mean and summary statistics for the thirteen subsamples analysed. The following considerations are highlighted:

- For the purpose of the analysis in Chart 6.3.13, a mean dry bulk density was estimated for cores that had more than one 0.5 m subsample; and
- The mean dry bulk density from the cores is 0.478 g/cm³; with maximum and minimum values of 0.72 g/cm³ and 0.39 g/cm³ respectively (see Annex A).

6.3.9 Total Carbon (%)

Total Carbon content (% dry weight) was calculated for thirteen subsamples sent to the laboratory. The mean total carbon density for each core location is illustrated in Charts 6.3.14 and 6.3.15.

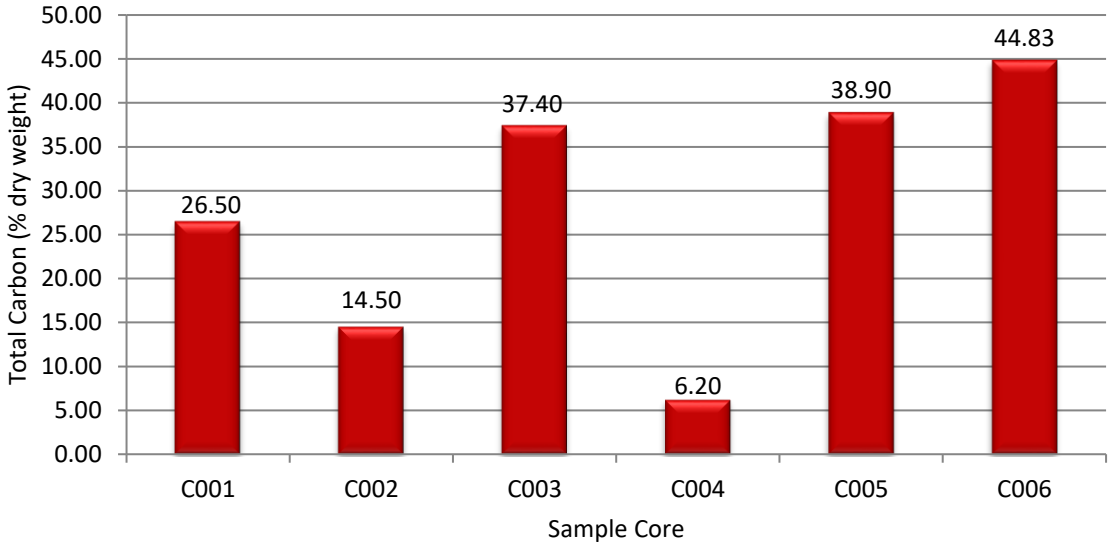

Chart 6.3.14, Core Mean Total Carbon (% weight)

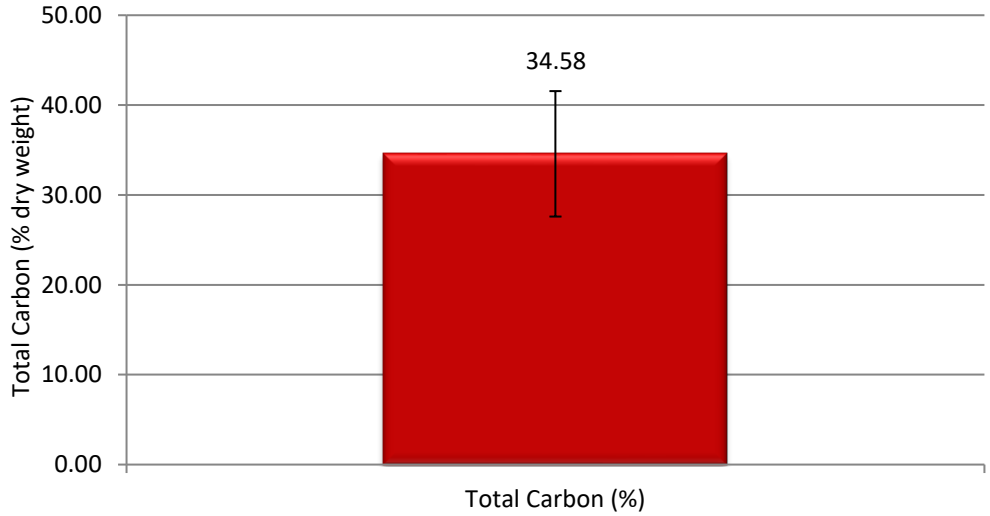

Chart 6.3.15, Subsample Mean Total Carbon (% weight)

Table 6-3-3 Descriptive Statistics

Mean	Standard Error	95% Confidence Interval	95% CL Lower	95% CL Upper	Precision
34.58	3.56	6.98	27.60	41.55	20.18

Charts 6.3.14 and 6.3.15, and Table 6.3.4 show the total carbon mean and summary statistics for the thirteen subsamples analysed. The following considerations are highlighted:

- For the purpose of the analysis in Chart 6.3.15, a mean was estimated for cores that had more than one 0.5 m subsample.
- The mean total carbon (%) from the cores is 34.58 %; with maximum and minimum values of 49.80 % and 14.50 % respectively (see Annex A).

6.3.10 Underlying Substrates

At each coring sample location, where possible, a characterisation was made of the underlying substrate below the peat horizon. The raw data is provided in Annex A of this report, with sample locations C001, C002, C004, C005 and C006 indicating a clay horizon below the peat layer and sample C003 indicating bedrock below the peat layer. The results of the Phase 2 peat probing survey indicated that, where it could be determined, the underlying substrate varied across the Site, with some areas of bedrock, gravel/granular, clay and mineral soil.

7 SUMMARY

7.1 Peat Depth Analysis

Combining the results from the Phase 1 and Phase 2 depth surveys highlights the main peat depth category recorded at the Site is between 51 cm and 100 cm. Just over 20% of sample locations recorded depths of less than 50 cm, which is more appropriately considered, or referred to as, organo-mineral soils or peaty soils. Several deeper pockets of peat were recorded within the Site; the maximum depth recorded as 440 cm (**Figure 8.2.4** (EIAR, Volume 3).

The data revealed the following key results:

- 92 samples (3.6%) fell on land with less than or equal to 25 cm depth of peat or organo-mineral/peaty soils.
- 452 samples (17.7%) fell on land with between 26 cm and 50 cm of peat or organo-mineral/peaty soils.
- 755 samples (29.6%) fell on land with between 51 cm and 100 cm of peat.
- 472 samples (18.5%) fell on land with between 101 cm and 150 cm of peat.
- 275 samples (10.8%) fell on land with between 151 cm and 200 cm of peat.
- 149 samples (5.8%) fell on land with between 201 cm and 250 cm of peat.
- 90 samples (3.5%) fell on land with between 251 cm and 300 cm of peat.
- 35 samples (1.4%) fell on land with between 301 cm and 350 cm of peat.
- 17 samples (0.7%) fell on land with between 351 cm and 400 cm of peat.
- Only 3 samples (0.1%) fell on land with more than 400 cm depth of peat.
- 210 samples (8.2%) fell on land with no peat.

Only sampling points on non-peat or non-organo-mineral habitats (e.g., clay, bare rock or brown mineral soil) were recorded as 0 cm of peat. Peat or organo-mineral/peaty soil was recorded at all other points.

7.2 Peat Coring

The peat core sample results presented in Section 6.3, highlight the physical and chemical properties of the peat onsite. The most notable results from the core analysis are detailed below:

- Peat probes undertaken at the Site tend to overestimate the true depth of peat present due to underlying soft substrates, such as clay, below the peat horizon in some areas.
- The depth of acrotelm is variable, between 1 cm – 5 cm. However, the acrotelm is typically shallow in depth (mean = 2.83 cm) with one location devoid of acrotelm.
- The peat onsite is mostly amorphous to intermediate in nature, with only one sample exhibiting fibrous peat. The peat generally contains a range of low to moderate levels of coarse and fine fibres.
- The mean water content of the peat at the sample locations appears to be consistent with dry peats and semi dry peats that contain some moisture.
- Samples analysed in the field to the Von Post scale were scored between H5 and H8 (indicating moderately decomposed to strongly decomposed peats).
- The samples were acidic, pH ranging from 4.5 – 6.1.
- Dry matter, wet bulk density, dry bulk density and total carbon content statistics were calculated from thirteen subsamples sent to the laboratory from six core sample locations.

Overall, the peats and organo-mineral soils sampled across the Site were between 51 cm to 100 cm, dry to semi-dry, amorphous to intermediate in nature, and exhibited moderate to strong levels of decomposition.

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ANNEX A. PEAT CORING DATA

Sample No.	Infrastructure	X	Y	Planted / Unplanted	Sub-sample	Probed depth (cm)	Cored Depth (cm)	Depth of Acrotelm (cm)	Photo	Colour	Depth of Sub Sample	Amorphous	Intermediate	Fibrous	Fine Fibres+	Coarse Fibres+	Water Content +	Von Post Scale #	Dry Bulk Density g/l	Dry Bulk Density g/cm³	Dry Matter %	Moisture %	pH	Total Carbon % dry weight	Substrate
C001	Turbine 3	247244	613858	Planted	C001a	78	30	4	Yes	Mid-dark brown	0-0.3	1	0	0	1	1	1	6	390	0.39	13.3	86.7	5.1	26.5	Clay
C002	Turbine 11	248064	612929	Planted	C002a	83	44	2	Yes	Light brown	0-0.44	1	0	0	1	1	1	7	570	0.57	38.7	61.3	4.5	14.5	Clay
C003	Turbine 15	247756	612079	Unplanted	C003a	155	155	5	Yes	Mid brown	0-0.5	0	1	0	2	2	1	7	440	0.44	10.5	89.5	4.8	32.9	Rock
C003	Turbine 15	247756	612079	Unplanted	C003b	155	155	0	Yes	Mid brown	0.5-1	0	1	0	1	2	1	7	420	0.42	13.7	86.3	4.5	29.5	Rock
C003	Turbine 15	247756	612079	Unplanted	C003c	155	155	0	Yes	Mid-dark brown	1-1.45	1	0	0	1	1	1	8	450	0.45	14.2	85.8	4.6	49.8	Rock
C004	Turbine 17	246732	611639	Planted	C004a	72	32	0	Yes	Light brown	0-0.32	1	0	0	1	1	1	7	720	0.72	39.9	60.1	6.1	6.2	Clay
C005	Turbine 17	246780	611654	Unplanted	C005a	207	177	1	Yes	Mid brown	0-0.5	0	0	1	3	3	3	4	490	0.49	9.7	90.3	5.1	42.0	Clay
C005	Turbine 17	246780	611654	Unplanted	C005b	207	177	0	Yes	Mid brown	0.5-1	0	0	1	2	3	3	4	510	0.51	11.3	88.7	5.5	38.3	Clay
C005	Turbine 17	246780	611654	Unplanted	C005c	207	177	0	Yes	Mid brown	1-1.5	0	1	0	2	2	2	5	410	0.41	11.9	88.1	5.9	36.1	Clay
C005	Turbine 17	246780	611654	Unplanted	C005d	207	177	0	Yes	Dark brown	1-1.77	0	1	0	1	1	1	7	420	0.42	11.4	88.6	5.7	39.2	Clay
C006	Turbine 11	248105	613004	Planted	C006a	176	147	5	Yes	Mid brown	0-0.5	0	1	0	1	2	1	6	480	0.48	16.9	83.1	5.5	40.6	Clay
C006	Turbine 11	248105	613004	Planted	C006b	176	147	0	Yes	Mid-dark brown	0.5-1	0	1	0	1	2	1	6	440	0.44	13.5	86.5	4.7	45.0	Clay
C006	Turbine 11	248105	613004	Planted	C006c	176	147	0	Yes	Mid-dark brown	1-1.47	1	0	0	1	1	1	7	480	0.48	13.7	86.3	4.8	48.9	Clay

+ see Section 4.2.2 methodology for description; # see Annex B for description.

ANNEX B. VON POST SCALE OF HUMIFICATION

Degree of Decomposition	Nature of Squeezed Liquid	Proportion of Peat Extruded	Nature of Plant Residues	Description
H1	Clear, Colourless	None	Plant structure unaltered. Fibrous, elastic	Undecomposed
H2	Almost clear, yellow-brown	None	Plant structure distinct, almost unaltered.	Almost undecomposed
H3	Slightly turbid, brown	None	Plant structures distinct, most remains easily identifiable	Very weakly decomposed
H4	Strongly turbid, brown	None	Plant structure distinct, most remains identifiable	Weakly decomposed
H5	Strongly turbid, contains a little peat in suspension	Very little	Plant structure clear but indistinct and difficult to identify	Moderately decomposed
H6	Muddy, much peat in suspension	One third	Plant structure indistinct but clearer in residue, most remains undefinable	Well decomposed
H7	Strongly muddy	One half	Plant structure indistinct	Strongly decomposed
H8	Thick mud, little free water	Two thirds	Plant structure very indistinct – only resistant material such as roots	Very strongly decomposed
H9	No free water	Nearly all	Plant structure almost unrecognisable	Almost completely decomposed
H10	No free water	All	Plant structure not recognisable, amorphous	Completely decomposed

ANNEX C. PHOTOGRAPHS OF CORE SAMPLES

Photo 1. Core Sample C001a

Photo 2. Core Sample C002a

Photo 3. Core Sample C003a

Photo 4. Core Sample C003b

Photo 5. Core Sample C003c

Photo 6. Core Sample C004a

Photo 7. Core Sample C005a

Photo 8. Core Sample C005b

Photo 9. Core Sample C005c

Photo 10. Core Sample C005d

Photo 11. Core Sample C006a

Photo 12. Core Sample C006b

Photo 13. Core Sample C006c