Technical Note 1

CLIENT:	**Convatec Limited**
PROJECT:	**PEP Wind and Solar Development**
SUBJECT:	**Peat and Soil Technical Note**
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PREPARED BY:	Gruffydd Jones
REVIEWED & APPROVED BY:	

1 INTRODUCTION

1.1.1 This technical note presents the results of a peat and soil survey conducted on a c. 26 ha proposed development site in Rhymney, Caerphilly. The proposed development includes the installation of three wind turbines and a solar array.

1.1.2 The predictive Agricultural Land Classification (ALC) map of Wales[1] indicates the Site lies in an area of ALC Grade 5 land. As such, the site does not require a detailed ALC assessment under current Welsh Government guidance.

1.1.3 However, mineral, organic-mineral and peat soils provide other ecosystem services in addition to agricultural production, which are protected in Welsh Government policies. The Natural Resources Policy (NRP)[2] requires sustainable management of soil resource maintain the soil functions and ecosystem services provided. Additionally, Chapter 6 of Planning Policy Wales (PPW)[3] requires development proposals to safeguard peatlands from development impacts.

1.1.4 The scoping response from the Welsh Government's Soil, Peatland and Agricultural Land Use Planning Unit identified three issues that are "likely to be significantly affected by the development":

- the protection of peat resource;

[1] Welsh Government (2019) Predictive Agricultural Land Classification (ALC) Map 2. Available online: https://datamap.gov.wales/layers/inspire-wg:wg_predictive_alc2 [Accessed 22 January 2024]
[2] Welsh Government (2018) Natural Resources Policy (13 February 2018). Available online: https://www.gov.wales/natural-resources-policy [Accessed : 22 January 2024]
[3] Welsh Government (2024) Planning Policy Wales (12 February 2024). Available online: https://www.gov.wales/planning-policy-wales [Accessed: 13 February 2024]

- maintaining soil services and functions; and
- beneficial restoration and after use of the site.

1.1.5 An assessment of the soil and peat resources on-site is therefore required to ensure that these resources are not lost or damaged during development, and that the site's restoration and after use is not compromised.

1.1.6 This report has two main objectives. Firstly, to identify and outline the presence of any areas of peat within the site. Secondly, to provide information on properties which influence the soil resource's susceptibility to structural damage or loss during construction. Soil texture is the main consideration in this regard; sandy soils are prone to loss through erosion and but are more resilient to structural damage from handling and storage, whereas clayey soils are the converse.

1.1.7 The findings of this report will inform the baseline of a Soils and Peat Environmental Statement (ES) chapter and an Outline Soil Management Plan (OSMP).

2 DESK STUDY

2.1.1 The Site lies in an area of ALC Grade 5 land in the Predictive ALC map for Wales.[4]

2.1.2 Soil Survey for England and Wales mapping[5] shows that the site contains areas of disturbed soils (opencast coal workings, soil association reference 92c). Soils of the Wilcocks 1 (721c) association are found within the wider area surrounding the site.

2.1.3 Wilcocks 1 (721c) soils are characterised by a peaty gley surface horizon overlying fine loamy or fine loamy over clayey upland soils. These soils are severely waterlogged near the surface (Wetness Class V and VI) due to high rainfall combined with a slowly permeable subsoil and gentle relief.

2.1.4 The Peatlands of Wales Map[6] shows that there is evidence of peat on land approximately 1 km south-west of the site, however, peat has not previously been recorded within the proposed development area. This does not exclude the possible presence of peat on the site and a field survey is required to confirm absence.

[4] Welsh Government (2019) Predictive Agricultural Land Classification (ALC) Map 2. Available online: https://datamap.gov.wales/layers/inspire-wg:wg_predictive_alc2 [Accessed 22 January 2024]
[5] Soil Survey of England and Wales (1984) Soils and their Use in Wales, with accompanying 1: 250,000 map (Sheet 2). Not available online.
[6] Welsh Government (2022) Peatlands of Wales map. Available online: https://datamap.gov.wales/maps/peatlands-of-wales-maps/ [Accessed 22 January 2024].

3 SITE SURVEY

3.1 Site Description

3.1.1 A site survey was conducted on the 17th of January 2024. The weather conditions were clear skies with low temperatures (2-4°C) throughout the day.

3.1.2 The highest elevation (390 m AOD) was in the westernmost part of the site. From this ridge, the land sloped down toward the south-east (310 m AOD) and to the north (362 m AOD).

3.2 Peat Survey Methodology

3.2.1 The Soil Survey of England and Wales defines peat as having:

- "more than 40 cm of (O horizon) material within the upper 80cm, excluding fresh litter (L) and living moss; or
- more than 30 cm of organic (O horizon) material resting directly on the bedrock (R or Cr) or extremely stony material; and,
- no overlying non-humose material mineral horizon that has a colour value of 4 or more and extends below 30 cm depth".

3.2.2 The site was surveyed for peat using the above definition at predefined locations on a 100 m x 100 m grid within the site boundary (Figure 1). Whilst the survey points were predefined, signs of possible peat presence such as changes in the vegetation, water regime and ground conditions were noted during the walkover, to ensure that smaller areas of peat were not missed during the survey.

3.2.3 At each survey point, peat depth was measured by probing using a collapsible aluminium avalanche pole 15 mm in diameter. Depth was recorded in 5 cm increments from the ground level (excluding live vegetation) to a maximum depth of 2.8 m.

3.2.4 If peat was detected during the initial peat probing, these areas were to be revisited for a more detailed assessment of a range of peat-specific properties. This included an assessment of the degree of organic matter decomposition (Von Post humification scale), peat texture, the content of fine, coarse and woody fibres, wetness, and surface firmness. Where present, peat samples will be collected from a depth of >40 cm for laboratory analysis.

3.2.5 The detailed peat survey also included a description of the vegetation present at each point. This consisted of a simplified NVC survey where species and communities indicative of peatland health were recorded. The collected vegetation data can

subsequently be used if required to assess the sensitivity of the receptor in the ES chapter.

Figure 1: Peat probing locations (Basemap © Google Satellite) (mapping to provide updated map once boundary is finalised).

3.3 Soil Survey Methodology

3.3.1 The site was split into six sub-areas based on the topography, vegetation type, and land use (Figure 2). The soil was surveyed using a "free survey" design rather than using predetermined survey locations in order to ensure a representative distribution across the site whilst retaining the ability to provide more detail in areas of sensitive or variable soils and detect abrupt changes in soil type in the field.

Figure 2: The six soil sampling areas within the site and the specific points where subsampling was conducted (Basemap © Google Satellite) (mapping to provide updated map once boundary is finalised).

3.3.2 Each area was walked over in a "W" formation to ensure an even coverage of the survey area. Using an Edelman auger, the soil profile was examined at specific points within each area. For each auger boring, topsoil depth and texture was recorded. The underlying subsoil was also briefly described at each point.

3.3.3 Composite topsoil samples were collected from each of the six areas. Topsoil from each auger point were thoroughly mixed in a bucket to ensure the composite samples were fully homogenised and representative of the entire area. These were sent for particle size distribution analysis in a UKAS ISO/IEC17025 accredited laboratory (NRM Laboratories) to support assessments of texture made in the field. Also measured were soil organic matter content, pH, and the concentrations of available phosphorus, potassium, and magnesium.

4 RESULTS

4.1 Peat survey

4.1.1 No peat was found at any of the probing points shown in Figure 2. The topsoil was a shallow organic-mineral[7] soil throughout the site, as discussed below.

4.1.2 The vegetation throughout the site is consistent with the use of land for rough grazing. The higher slopes were dominated by grass species including *Festuca ovina* and *Molinia caerulea*. The lower lying and more gently sloping parts of the site had species indicative of wetter conditions such as *Juncus* species. None of the high sensitivity peatland indicator *Sphagnum* moss species were encountered.

4.2 Soil survey

4.2.1 A dark grey (10YR 4/1) to dark greyish brown (10YR 4/2) and very dark greyish brown (10YR 3/1) topsoil was found within the site.

4.2.2 The topsoil across the site ranged from 10 to 20 cm (Photographs 1a, 1b and 1c). The deepest topsoils (up to 20 cm) were found on the parts of the site with lower lying land or shallower gradients (northern parts of Areas 1 and 2 in particular), whilst the topsoil was shallower on the ridgeline in Area 1 and the slopes of Areas 3, 4, 5 and 6 (10-15 cm).

a – Area 1 point 5 b – Area 6 point 1 c – Area 6 point 6

Photograph 1: Variation in topsoil depth throughout the site. Photograph 1c displays the on the clayey subsoil horizon only found in this part of the site.

4.2.3 The topsoil across the site is an organic-mineral soil as defined by Hodgson (2022), and there is slight variation between different areas of the site. The topsoil of Areas 1, 2,

[7] Hodgson (2022) *Soil Survey Field Handbook (4th Edition)*. Soil Survey Technical Monograph No. 5, Cranfield.

and 3 were of a silty clay texture, whereas Areas 4, 5, and 6 were classed as heavy textured clay loam.

4.2.4 Laboratory analysis for particle size distribution of composite samples for six areas within the site were taken to support the hand-texture assessment made in the field. These results are provided below in Table 1.

Table 1: Laboratory analysis results

Area	Particle Size Distribution (%)			Organic matter (%)
	Sand	Silt	Clay	
1	11	50	39	8.3
2	16	47	37	12.0
3	17	46	37	13.0
4	25	47	28	12.0
5	27	45	28	12.4
6	21	45	34	17.2

4.2.5 The topsoil overlies a layer of a dark, coarse substrate (Photograph 2) which is a legacy of the historic surface coal mining conducted in the area. An assessment of this horizon was beyond the scope of this report, however, it was found consistently throughout the site apart from one point (Area 6, point 6) where a clay subsoil was recorded (Photograph 1c).

Photograph 2: Exposed soil profile due to localised erosion in Area 6. A thin topsoil layer (<10 cm) overlies a layer of opencast spoil.

5 DISCUSSION

5.1.1 The site walkover data showed no peat deposits to be present on Site, which is consistent with the Peatlands of Wales Map[8] and the Soil Survey of England and Wales[9] mapping which.

5.1.2 Topsoil depth was variable and underlain by a dark, coarse substrate which was classed as opencast coal mining spoil.

5.1.3 The topsoils identified onsite are prone to compaction and have a limited window during which they are suitable for handling (heavy textured clay loam to silty clay). Mixing of the identified topsoil layers with the underlying spoil will impact upon the

[8] Welsh Government (2022) Peatlands of Wales map. Available online: https://datamap.gov.wales/maps/peatlands-of-wales-maps/ [Accessed 22 January 2024].
[9] Soil Survey of England and Wales (1984) Soils and their Use in Wales, with accompanying 1: 250,000 map (Sheet 2). Not available online.

topsoil's ability to provide a range of soil functions post-development due to loss of fertility. Furthermore, the local steep topography and high annual precipitation exacerbates the risk of soil erosion during the construction phase.

5.1.4 To mitigate the above risks to the soil resource, a Soil Management Plan (SMP) should be prepared for the site and make reference to the Defra (2009)[10] guidance on the use of soils in construction. The SMP should detail the different areas, depths, and types of soils to be stripped, appropriate methods and machinery for stripping, storing, and replacing soils, and the conditions during which soil handling should be stopped and when work can recommence.

5.1.5 Given that heavy textured topsoils were found across the site, guidance relating to preventing soil structural damage and compaction is particularly important. Stripping and stockpiling should only be conducted when the soil is below its plastic limit, that is, the moisture content above which a soil displays plastic behaviour and becomes more prone to structural damage. Soil stripping and stockpiling work should be suspended during sustained heavy rainfall (>10 mm in 24 hours) and not restarted until the soil is below its plastic limit.

5.1.6 To avoid loss of topsoil quality through mixing with the underlying subsoil or spoil, both topsoil and subsoil should be stripped and stored separately in clearly defined stockpiles. This should be informed by the SMP which will detail the depths to which different areas of soil are to be stripped.

6 CONCLUSIONS AND RECOMMEDATIONS

6.1.1 No peat was found on site.

6.1.2 The site comprised disturbed soil profiles, with topsoils consisting of heavy textured clay loams to silty clay overlying coal mining spoil.

6.1.3 A SMP will be required which details appropriate construction methods and mitigation strategies. This must consider the steep gradients, high annually rainfall levels, and clay soils that occur across the site.

[10] Defra (2009) Construction Code of Practice for the Sustainable Use of Soils on Construction Sites. Available online: https://www.gov.uk/government/publications/code-of-practice-for-the-sustainable-use-of-soils-on-construction-sites [Accessed: 22 January 2024].