

OUTLINE CONSTRUCTION ENVIRONMENT MANAGEMENT PLAN (OCEMP)

Appendix 2 – Outline Peat Management Plan

HyNet Carbon Dioxide Pipeline

Planning Act 2008

The Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009 – Regulations 5(2)(a)

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1. INTRODUCTION

- 1.1.1. This Outline Peat Management Plan (PMP) supports the assessment contained in **Chapter 11 – Land and Soil (Volume II)** and is an appendix to the **Outline Construction Environmental Management Plan (Document reference: D.6.5.4)**.
- 1.1.2. The Applicant intends to build and operate a new underground carbon dioxide (CO₂) pipeline from Cheshire, England to Flintshire, Wales with necessary Above Ground Installations (AGIs) and Block Valve Stations (BVSs) hereafter referred to as the ‘DCO Proposed Development’. Further details of each element of the DCO Proposed Development are set out in **Chapter 3 – Description of the DCO Proposed Development (Volume II)**.
- 1.1.3. The DCO Proposed Development will form part of HyNet North West (‘the Project’), which is a hydrogen supply and Carbon Capture and Storage (‘CCS’) project. The goal of the Project is to reduce CO₂ emissions from industry, homes and transport and support economic growth in the North West of England and North Wales. The wider Project is based on the production of low carbon hydrogen from natural gas. It includes the development of a new hydrogen production plant, hydrogen distribution pipelines, hydrogen storage and the creation of CCS infrastructure. CCS prevents CO₂ entering the atmosphere by capturing it, compressing it and transporting it for safe, permanent storage.

1.2. PEAT SENSITIVITY

- 1.2.1. Following ground investigations undertaken between October 2021 and April 2022, it was established that peat was present within the Newbuild Infrastructure Boundary, at two distinct locations (**Figures 11.6.1 and 11.6.2 (see Annex A)**).
- 1.2.2. The Institute of Environmental Management & Assessment (IEMA) Guide for Land and Soils (**Ref.6**) provides best practice guidance for peat management. It stipulates that “*where peat disturbance by construction activities cannot be avoided, special measures are required for their handling*”. The IEMA guidance also directs developments to consider Scottish Environmental Protection Agency (SEPA) guidelines that state “*SEPA expect developers to seek to avoid ‘waste’ peat altogether, or at least minimised as far as is reasonably practicable and managed in the most sustainable and environmentally robust manner*” (**Ref.11**).

1.3. SCOPE OF WORK

- 1.3.1. This Outline PMP will provide an outline report estimating the potential volume of peat to be excavated during the construction process and present options to minimise/re-use excavated peat.
- 1.3.2. This Outline PMP ensures that appropriate plans for excavation, storage, re-use, and (if necessary) disposal of peat have been considered in advance of the construction phase. The findings of this Outline PMP will be used by the

appointed Construction Contractor(s) as a basis for preparing the detailed construction PMP, as part of a Construction Environmental Management Plan (CEMP) prior to construction.

1.3.3. The scope has followed various criteria laid out in the following guidance documents:

- Guide to Understanding and Addressing the Impact of New Developments on Peat Soil **(Ref. 1)**.
- A New perspective on Land and Soil in Environmental Impact Assessment **(Ref. 6)**;
- Regulatory Position Statement – Developments on Peat **(Ref. 8)**;
- Developments on Peatland Guidance – Waste **(Ref. 9)**; and
- Developments on Peat and Off-Site Uses of Waste Peat **(Ref. 10)**;

2. METHODOLOGY

- 2.1.1. Ground Investigation (GI) data collected between October 2021 and April 2022 formed the basis of the peat depth and volume estimates. This data included borehole and Cone Penetration Tests (CPT) (**Ref. 5** and contained within Appendix 11.6 of ES Volume III, **Application document reference D.6.3.11.6**). Borehole data has been used where available, including records of Von Post humification values (H1-H10), with increasing values representing increased levels of peat decomposition (**Ref. 2**).

2.2. LIMITATIONS

- 2.2.1. A limited survey of peat depth probing and Russian coring were used to supplement and refine the GI datasets during July 2022, as is typical for Outline PMPs. This survey aimed to collect data every 50m within the Newbuild Infrastructure Boundary of the two distinct peat areas identified, however, there were limitations as noted below.
- 2.2.2. There were difficulties inserting the depth probes and Russian corer into the topsoil due to high soil compaction preventing the equipment reaching the underlying peat layer. It was also difficult to ascertain the extent to which the material penetrated by the depth probes was peat or clay, as the Russian corer did not recover sufficient material to determine the full profile at the area probed.
- 2.2.3. However, it is considered that the GI data along with limited verification from additional peat probing and coring provides sufficient information for the purposes of this report. This is sufficient because the GI data provides several data points at the two Peat Areas identified. Furthermore, the peat identified was described during the GI works. Additional GI data will be gathered during the Detailed Design and pre-construction stages of the DCO Proposed Development to refine peat information further.
- The design features within this Outline PMP are informed by the Preliminary Design. Where design information is not available, a reasonable worst-case scenario is assumed to ensure that suitably robust estimations of peat and associated requirements for peat management have been considered.

3. RESULTS

- 3.1.1. At two discrete locations peat was identified as a layer beneath the topsoil by ground investigations undertaken between October 2021 and April 2022. These locations are:
- Peat Area 1: South of CF Fertilisers (in Section 1); and
 - Peat Area 2: North of Gowry Landfill (in Section 2).
- 3.1.2. Peat Area 1 and 2, and the peat data, are shown on **Figures 11.6.1** and **11.6.2** in **Annex A**, including borehole, CPT, peat probing and Russian corer locations.
- 3.1.3. Borehole records of peat presence were discontinuous (**Ref. 5**), therefore, peat recorded within the column was aggregated to determine a total depth of each peat deposit (**Table 3.1** and **Table 3.2**).
- 3.1.4. Where borehole data was not available, CPT results are used to provide an estimated peat depth. The CPT indicated the presence of 'sensitive, fine grained' and 'organic soils – clay' (**Ref. 7**) that are likely to indicate peat where these layers correlate with peat recorded from nearby boreholes.
- 3.1.5. The Agricultural Land Classification Survey (see **Appendix 11-4, Volume III**) categorises the topsoil in the Newbuild Infrastructure Boundary to depths of 1.2m. Topsoil within the peat areas is classified as a peaty loam (**Ref. 12**), shown in Photograph 1 in **Annex B**.

3.2. ESTIMATED PEAT DEPTHS: PEAT AREA 1

- 3.2.1. There was no available peat data south of the railway in Peat Area 1 so estimates for peat depths here are based on the GI data north of the railway (**Figure 11.6.1** in **Annex A**).
- 3.2.2. The peat depth results for Peat Area 1 are summarised in **Table 3.1**. Borehole data indicated that peat layers were present between the depths of 0.5m-12m, but predominantly below 1.2m, with shallower peat (0.5m-1.2m) only present at one location (Borehole LB_21_203) (**Figure 11.6.1** in **Annex A**). The average total depth of peat from aggregating various data was 4.3m.
- 3.2.3. Construction plans indicate trench depths of between 2.5m and 6.0m, and this report assumes a typical depth of 3m. Peat values are provided for each of these scenarios in **Table 3.1**.
- 3.2.4. The peat classification ranged from H5 (moderately decomposed) to H9 (almost completely decomposed) when categorised for humification on the Von Post Scale, indicating amorphous catotelmic peat.

Table 3.1 - Peat Depths for Peat Area 1. Data summarised from GI investigations (Ref. 5). Rounded to one decimal place

	Identifier	Peat Depth within 2.5 m of Surface, discontinuous (m)	Peat Depth within 3m of Surface, discontinuous (m)	Peat Depth within 6m of Surface, discontinuous (m)	Total Peat Depth in Column, discontinuous (m)
Borehole	LB_21_202	0.7	0.7	2.6	4.7
Borehole	LB_21_203	1.8	2.3	2.3	2.9
Borehole	LB_21_212	1.1	1.6	2	4.1
Borehole	LB_21_213	1.4	1.9	3.4	4.3
CPT	LB_21_214	1.3	1.8	4.8	5.3
Average		1.3	3.0	1.7	4.3

3.3. ESTIMATED PEAT DEPTHS: PEAT AREA 2

- 3.3.1. The peat depth results for Peat Area 2 are summarised in **Table 3.2**. Borehole data indicated that peat layers were present between the depths of 0.4m - 5.8m, but predominantly below 1.2m, with shallower peat (0.4m-1.2m) only present at one location (Borehole LB_21_12) (**Figure 11.6.2 in Annex A**). The average total depth of peat was 3.5m when aggregated.
- 3.3.2. Peat depth values are provided for depths shallower than 2.5m, 3.0m and 6.0m in **Table 3.2** to inform likely peat excavation volumes, as with Peat Area 1.
- 3.3.3. Classed as H8 (very strongly decomposed) on the Von Post Scale, peat in this area is considered as amorphous catotelmic peat. This is synonymous with the detection of the water table at 1.15m below ground level by the Russian core taken at RGP2 (**Figure 11.6.2 in Annex A**).

Table 3.2 - Peat Depths for Peat Area 2. Data summarised from GI investigations (Ref.5). Rounded to one decimal place

	Identifier	Peat Depth within 2.5 m of Surface, discontinuous (m)	Peat Depth within 3m of Surface, discontinuous (m)	Peat Depth within 6m of Surface, discontinuous (m)	Total Peat Depth in Column, discontinuous (m)
Borehole	LB_21_11	0.8	1.0	3.8	3.8
Borehole	LB_21_12	1.68	2.1	2.3	2.3
CPT	LB_21_118	1.3	1.8	3.9	3.9
CPT	LB_21_119	1.3	1.8	3.9	3.9
CPT	LB_21_10	1.3	1.8	3.8	3.8
Average		1.3	3.5	1.7	3.5

3.4. DESIGN FEATURES

- 3.4.1. For each peat area the Newbuild Carbon Dioxide Pipeline construction features were identified. The likely dimensions of these features were informed by

Chapter 3 – Description of the DCO Proposed Development (Volume II) in the Environmental Statement or under reasonable worst-case scenario assumptions. This ensures that a suitably robust estimation of peat and associated requirements for peat management have been considered.

3.4.2. The design construction features for each peat area are shown in **Figures 11.6.1 and 11.6.2 in Annex A**.

3.4.3. Dimensions and/or assumptions for the different construction features are as follows:

- Ince AGI (Peat Area 1):
 - Majority of facility will be installed above-ground with imported materials.
 - Piled foundations will be installed, with peat disturbance minimal.
- Open trench Newbuild Carbon Dioxide Pipeline construction and open trench crossings (Ince AGI to Stanlow AGI Pipeline) (Peat Area 1):
 - Footprint area of 2,268m²; 756m × 3m (3m typical trench width assumed for this report).
 - The depth of the trench will be variable but anticipated within the range of 2.5m – 6.0m, with an assumed typical depth of 3m (**Chapter 3 – Description of the DCO Proposed Development (Volume II)**).
- Open trench Newbuild Carbon Dioxide Pipeline construction and open trench crossings (Stanlow AGI to Flint AGI Pipeline) (Peat Area 2):
 - Footprint area of 2,814m²; 938m x 3m (3m typical trench width assumed for this report).
 - The depth of the trench will be variable but anticipated within the range of 2.5m – 6.0m, with an assumed typical depth of 3m (**Chapter 3 – Description of the DCO Proposed Development (Volume II)**).
- Trenchless crossing pits (Peat Areas 1 and 2):
 - Assumed reasonable worst-case scenario of the most intrusive trenchless construction method example, Auger Boring. That has an entrance pit footprint area of 32m² (8m × 4m) and an exit pit footprint area of 16m² (4m × 4m) (**Chapter 3 – Description of the DCO Proposed Development (Volume II)**).
 - Assumed that all peat encountered to full depth of pit will be extracted from these areas and that the depth of pit could be beyond the peat depth extent.

3.5. ESTIMATED PEAT EXCAVATION VOLUMES

3.5.1. The Ince AGI will be constructed in Peat Area 1 using piled foundations, by applying this best practice approach negligible peat excavation is anticipated.

- 3.5.2. In both peat areas pipeline will be laid via open trench methods with excavation depth ranging from 2.5m – 6.0m (typically 3.0m), with an indicative footprint of 2,268m² in Peat Area 1 and 2,814m² in Peat Area 2.
- 3.5.3. To calculate peat excavation volume estimates for open trench construction, the footprint was multiplied against the average peat depth shallower than 2.5m and 6.0m to determine a likely range for excavation volume arisings. In addition to the typical assumed depth of 3.0m. **Table 3.3** estimates a range between 2,900m³- 6,800m³ of peat excavation at Peat Area 1 and 3,700m³ - 9,800m³ in Peat Area 2 (rounded to the nearest 100m³) from open trench construction. At the typical depth of 3.0m, approximately 3,900m³ and 4,800m³ of peat extraction is estimated from open trench construction.
- 3.5.4. All peat excavated for open trench construction will be returned to the trenches as backfill.

Table 3.3 – Open Trench Peat Excavation Volume Estimates

Feature	Footprint Area (m ²)	Average Peat Depth within 2.5m of Surface (m)	Average Peat Depth within 3m of Surface (m)	Average Peat Depth within 6m of Surface (m)	Estimated Peat Excavation Volume to 2.5m of surface (m ³)	Estimated Peat Excavation Volume to 3m of surface (m ³)	Estimated Peat Excavation Volume to 6m of surface (m ³)
Peat Area 1: 20" pipeline (open trench and open trench crossings)	2,268	1.3	1.7	3	2,948	3,855	6,804
Peat Area 2: 36" pipeline (open trench and open trench crossings)	2,814	1.3	1.7	3.5	3,658	4,783	9,849

- 3.5.5. It has also been identified that peat excavation will be necessary for 3 trenchless crossing pits at Peat Area 1 (trenchless crossing TRS-01), with a further 2 trenchless crossing pits at Peat Area 2 (trenchless crossing TRS-09) (see **Appendix 3.1, Volume III**). It is assumed that the full peat depth will be excavated at these locations. The assumed dimensions of these pits are 32m² (entrance pit) and 16m² (exit pit). To calculate the estimated peat excavation volume the average of the total peat depth for each peat area was used, with

Table 3.4 estimating that trenchless pit excavation will result in approximately 300m³ of peat excavation at Peat Area 1 and 200m³ in Peat Area 2. Material excavated for trenchless crossing pit construction will also be used to backfill each of these pits.

Table 3.4 – Trenchless Crossing Pits Peat Excavation Volume Estimates

Feature	Number of Features	Footprint Area (m ²)	Average Total Peat Depth (m)	Estimated Peat Excavation Volume (m ³)
Peat Area 1: Trenchless crossing entrance pit	2	32	4.3	275
Peat Area 1: Trenchless crossing exit pit	1	16	4.3	69
			Total	344
Peat Area 2: Trenchless crossing entrance pit	1	32	3.5	112
Peat Area 2: Trenchless crossing exit pit	1	16	3.5	56
			Total	168

4. PEAT MANAGEMENT

- 4.1.1. It is expected that prior to construction commencing the Construction Contractor(s) will provide the final Peat Management Plan that details locations for temporary storage; an outline programme indicating the duration and quantity of stored peat (including how it will be stored and measures to mitigate and/or capture sediment runoff from stored material); and a plan for the reinstatement and re-use of permanent material.
- 4.1.2. Good practice includes extracting the peat in the different layers identified according to the Von Post classification system (**Ref.5**) and stockpiling these layers separately. The Construction Contractor(s) will follow standard good practice with regards to soil/peat storage (**Ref. 3**) as stated in the CEMP. For temporary storage plans any mitigation requirements and constraints in the ES should be considered. A description of pollution prevention; intended drainage plans; and peat stockpile stability mitigation measures should be included (**Ref.11**). This will include temporary storage of materials at a minimum distance of 10m from any watercourses and 50m from any watercourse identified on Ordnance Survey 50,000 scale mapping, with soil mounds no higher than 2m and with stable banking.
- 4.1.3. Timescales between excavation and backfilling should be kept as short as possible (with a 6-week reinstatement objective). Temporary peat stockpiles will need to be kept wet, to reduce potential for desiccation/oxidation and to not act as a carbon dioxide source (**Ref.1**). Measures for how this will be achieved should be identified in the final Peat Management Plan. This could include storing the peat in depressions within the Newbuild Infrastructure Boundary and covering with tarpaulin (**Ref. 1**).
- 4.1.4. Soil and peat excavated for Newbuild Carbon Dioxide Pipeline construction will be backfilled into the trench. These materials should be replaced sequentially for applicable types of soil and peat material aiming to re-establish baseline conditions. Where there will be upward displacement the construction should prioritise backfilling the trenches with excavated peat, over topsoil, as surplus topsoil is easier to manage (**Ref.10**), presenting more opportunities for re-use and is less sensitive to material handling/transfer activities.
- 4.1.5. Any peat mounded above surface level as a permanent solution is liable to dry-out and emit carbon dioxide. Any such locations should be carefully selected at areas where wet ground conditions can be maintained, and peat should be mounded at heights of less than 0.5m.
- 4.1.6. Elements of the management and re-use of excavated material may require approval from statutory stakeholders, taking account of reducing erosion/compaction, protecting the soils from pollution and retaining/enhancing

soil functionality as a resource. Should material be taken off-site, appropriate environmental permits and biosecurity measures shall be adopted **(Ref. 1)**.

5. SUMMARY AND CONCLUSIONS

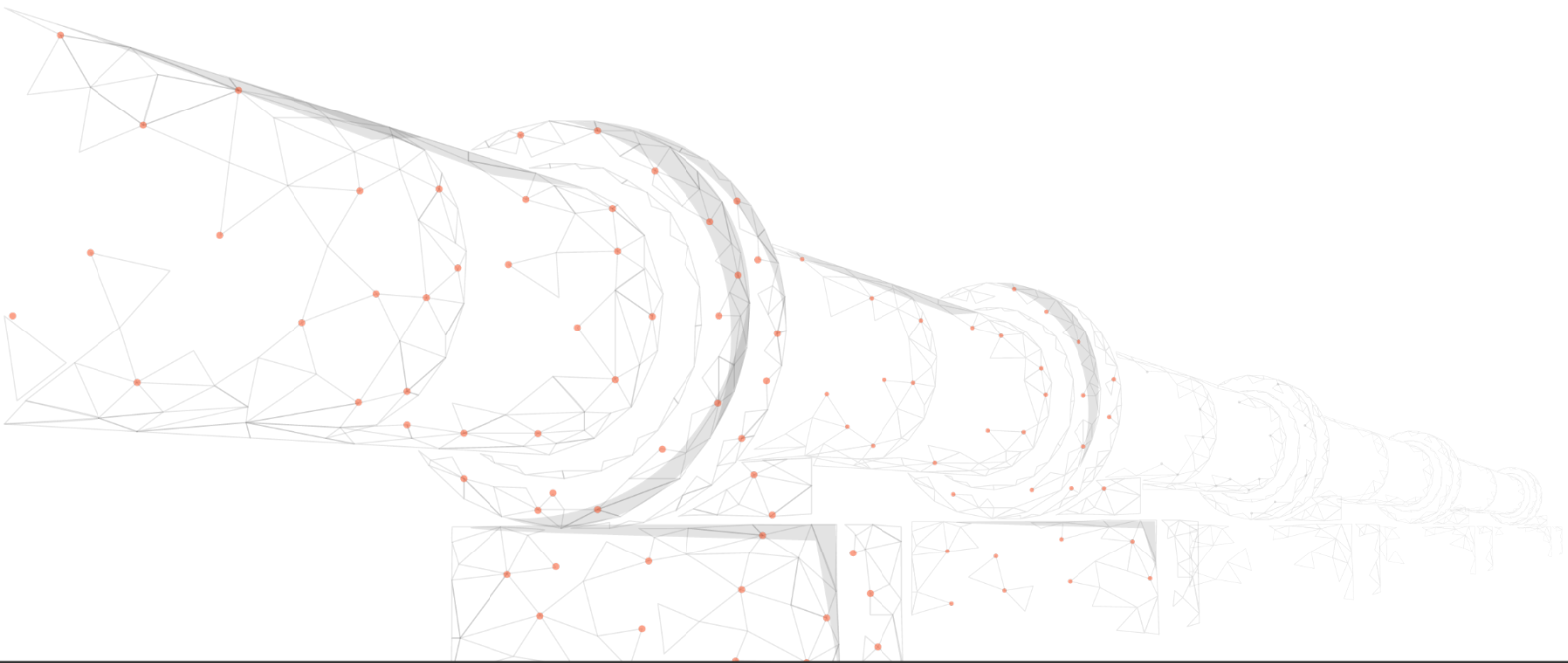
- 5.1.1. Applying the reasonable assumptions discussed above, it is expected that there will be sufficient re-use opportunities to balance peat excavation volumes.
- 5.1.2. Opportunities to reduce the volume of peat excavation include:
- Seeking to minimise open trench depth towards the lower end of the range, where feasible, with a 10,000m³ differential in excavation volume (aggregating Peat Areas 1 and 2) estimated when comparing trench excavations at depths of 2.5m versus 6.0m across the length of the scheme. Generally, the trench depth will be kept to a minimum, except where it needs to be deeper to avoid an obstacle (such as approaching assets/utilities).
 - Obtain more GI data to refine peat depths for Detailed Design and enhance the accuracy of plans for storage and reinstatement.
- 5.1.3. These opportunities should be applied where feasible so that all reasonable measures are taken to avoid unnecessary peat excavation and subsequent peat management.
- 5.1.4. In the event that there is an excess of excavated material, application of additional options at the Detailed Design and Construction Stages would be required. If no site use is available, off-site re-use options should be explored, with appropriate disposal as waste considered only as the final option, in line with the management hierarchy set out by SEPA (**Ref.10**).

6. REFERENCE LIST

- **Ref. 1** - Broads Authority (2021). Guide to understanding and addressing the impact of new developments on peat soil. [online] Available at: https://www.broads-authority.gov.uk/__data/assets/pdf_file/0024/381426/Peat-Guide-Adopted-March-2021.pdf [Accessed June 2022].
- **Ref.2** - Blackland Centre (2022). Von Post Humification Scale. [online] available at: [REDACTED] [Accessed July 2022].
- **Ref. 3** - CIRIA (2006). Control of water pollution from linear construction projects: technical guidance. Publication C648; Construction Industry Research and Information Association, London.
- **Ref. 4** - Eni Progetti S.P.A (2021). New Onshore Pipelines Constructability Report.
- **Ref. 5** - Fugro Geoservices Limited (2022). LBA CCS Transport and Storage Project Ground Investigations. Geo Environmental Report, Liverpool, UK (F190089 01).
- **Ref. 6** - Institute of Environmental Management & Assessment (IEMA) (2022). Guide: A New perspective on Land and Soil in Environmental Impact Assessment. February 2022.
- **Ref. 7** - Robertson, P.K., (2010). Soil Behaviour Type from the CPT: an update. [online] Available at: [REDACTED] [Accessed July 2022].
- **Ref. 8** - Scottish Environment Protection Agency (2010a). Regulatory Position Statement – Developments on Peat. [online] Available at: [REDACTED] [Accessed June 2022].
- **Ref. 9** - Scottish Environment Protection Agency (2010b). Development on Peatland Guidance – Waste. [online] Available at: [REDACTED] or via [REDACTED] [Accessed June 2022].
- **Ref. 10** - Scottish Environment Protection Agency (2017). Developments on Peat and Off-Site Uses of Waste Peat. [online] Available at: [REDACTED] [Accessed July 2022].
- **Ref. 11** - Scottish Renewables and Scottish Environmental Protection Agency (2012). Developments on Peatland: Guidance on the Assessment of Peat Volumes, Reuse of Excavated Peat and the Minimisation of Waste. [online] Available at: [REDACTED] [Accessed July 2022].

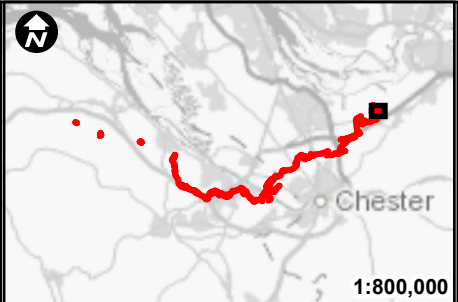
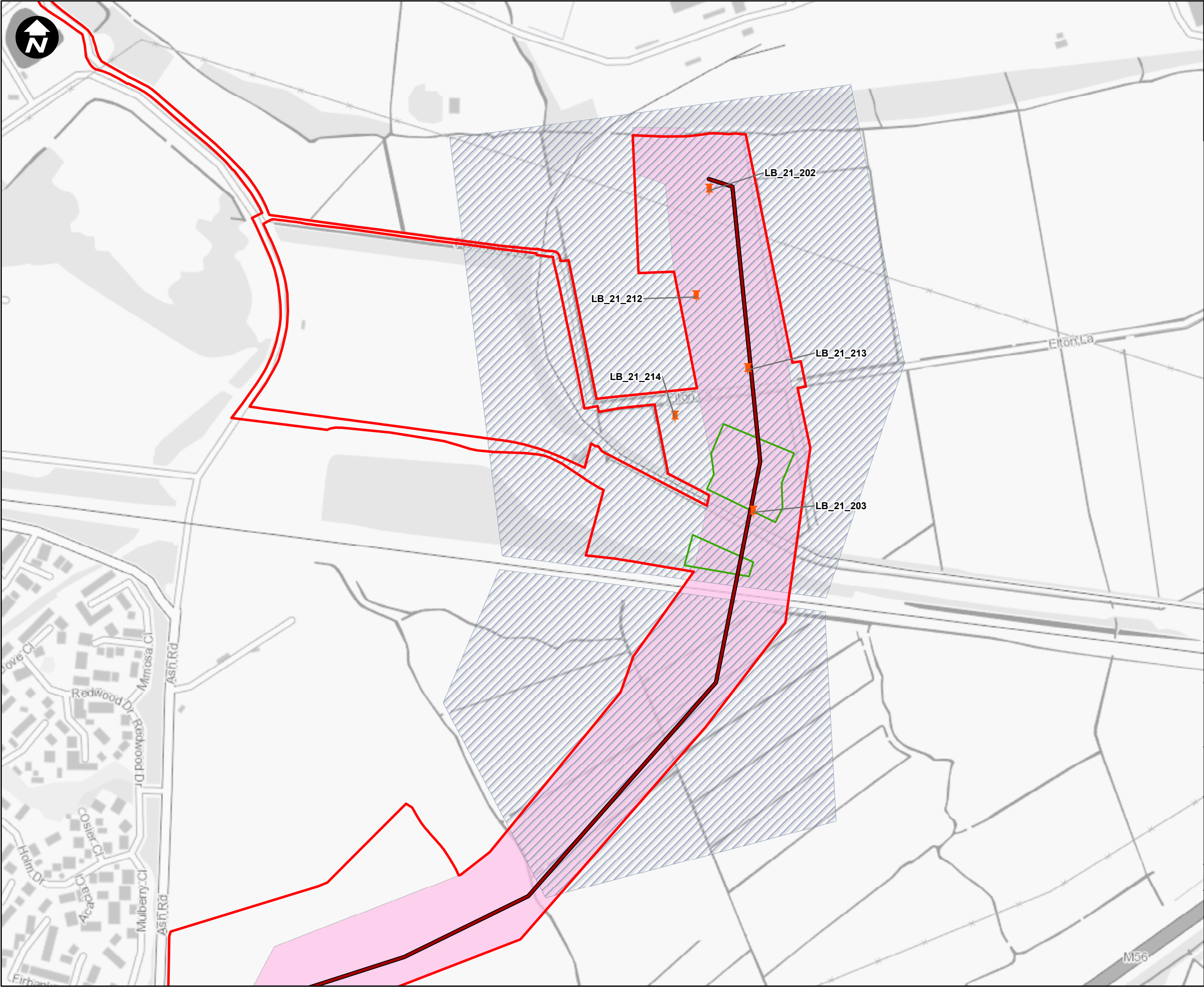
- **Ref.12** - Reading Agricultural Consultants (RAC) (2022). HyNet Pipeline Agricultural Land Classification and Soil Resources.

Annexures



Annex A

PEAT AREAS FIGURES



- Key:
- Peat Data Points
 - Indicative alignment of Ince AGI to Stanlow AGI Pipeline
 - Peat Area 1
 - Newbuild Infrastructure Boundary
 - Trenchless Crossing Compound
 - Permanent Acquisition of Land



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HyNet North West

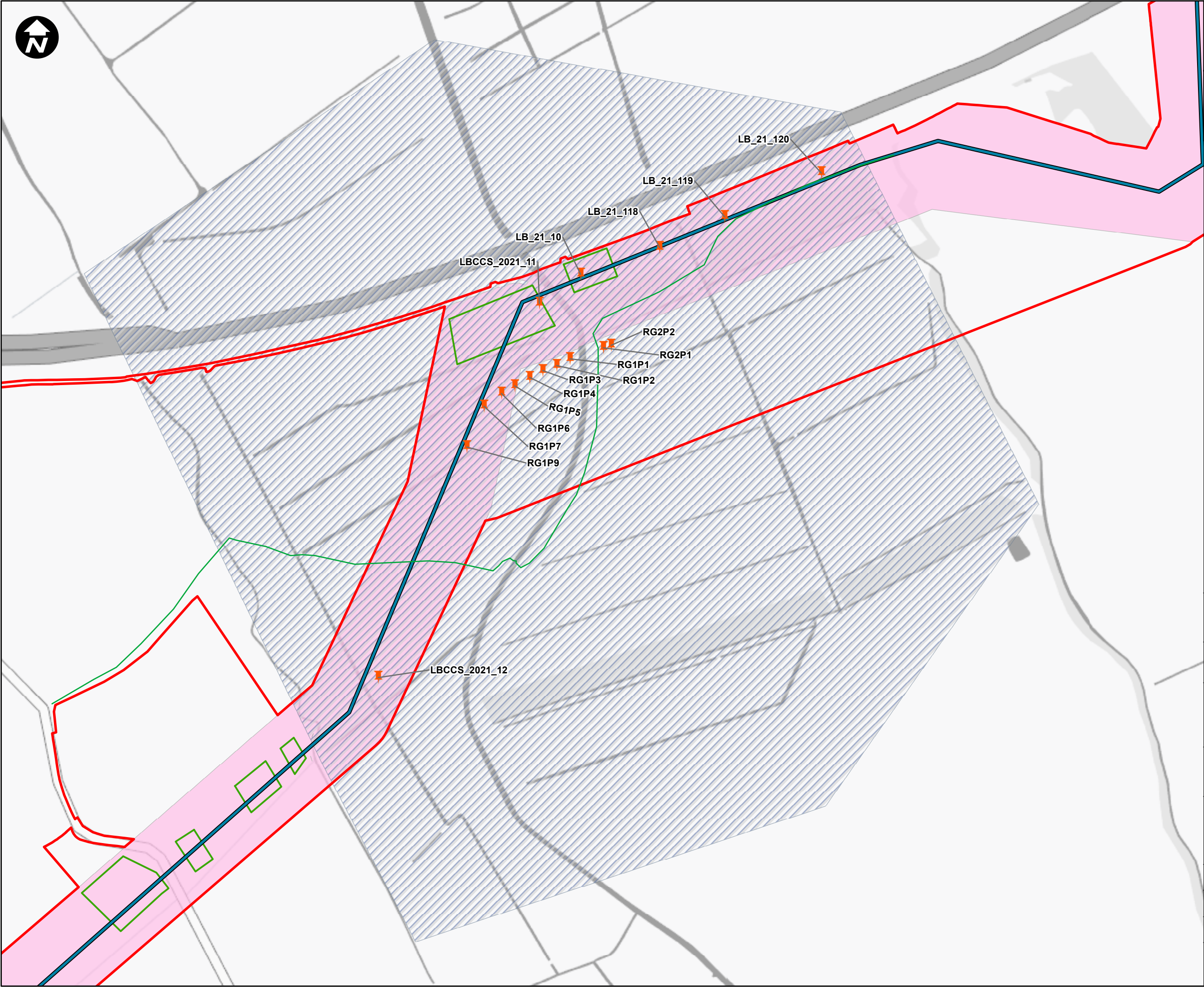
PROJECT TITLE
HyNet Carbon Dioxide Pipeline DCO

DRAWING TITLE
Figure 11.6.1-
Peat Area 1

DRAWING STATUS
FOR DCO SUBMISSION

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SCALE @ A3 SIZE 1:4,000	DATE 9/27/2022	REVISION A	

DRAWING NUMBER
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- Key:**
- Peat Data Point
 - Transects
 - Indicative alignment of Stanlow AGI to Flint
 - AGI Pipeline
 - Peat Area 2
 - Newbuild Infrastructure Boundary
 - Trenchless Crossing Compound
 - Permanent Acquisition of Land

SCALE: 1:4,000
0 25 50 100 150 Metres

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HyNet North West

PROJECT TITLE
HyNet Carbon Dioxide Pipeline DCO

DRAWING TITLE
**Figure 11.6.2-
Peat Area 2**

DRAWING STATUS
FOR DCO SUBMISSION

DRAWN	CHECKED	APPROVED	AUTHORISED
PM	JH	VB	VB
SCALE @ A3 SIZE		DATE	REVISION
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Annex B

PEAT AREAS PHOTOGRAPHS



Photograph 1 - Peaty Loam topsoil at RG1P2 (Peat Area 1) (present to 0.65m). More decomposed peaty loam topsoil present between 0.65m-0.75m



Photograph 2 - Russian Core taken at RG1P2 (Peat Area 2). Depth 0.75m-1.15m. Showing more decomposed peaty loam topsoil (0.75m-0.9m and clay (0.9m-1.15m). Water table detected beneath this at 1.15m