

Dean Moor Solar Farm

Environmental Statement Appendix 10.3 – Peat Survey Report

on behalf of FVS Dean Moor Limited

March 2025 Prepared by: Stantec UK Ltd PINS Ref: EN010155 Document Ref: 6.3 Revision: 1







DEAN MOOR SOLAR FARM ENVIRONMENTAL STATEMENT APPENDIX 10.3 – PEAT SURVEY REPORT PLANNING INSPECTORATE REFERENCE EN010155 PREPARED ON BEHALF OF FVS DEAN MOOR LIMITED

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

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1 Peat Survey Methodology and Results

1.1 Introduction

- 1.1.1 This Peat Survey has been produced for the Applicant to support the DCO application for the Dean Moor Solar Farm (the 'Proposed Development') on approximately 276.5ha of land located between the villages of Gilgarran and Branthwaite in West Cumbria (the 'Site'), which is situated within the administrative area of Cumberland Council (the 'Council').
- 1.1.2 The Site Location Plan of the Proposed Development is shown on Figure1.1 [REF: 6.2].
- 1.1.3 It should be noted that the Site Location Plan shown below differs from the Draft Order Limits that were assessed during PEIR. Therefore, the results of this survey represent a fixed point in time in relation to the previous iteration of the Draft Order Limits. The survey undertaken in 2023/24 is a reasonable representation of the Site Location Plan (ES Figure 1.1) and can be used as basis for this peat survey. The minor amendments to the Order Limits from PEIR have no impact on the results being reported.





Figure 1.1: Site Location Plan (Extract of ES Figure 1.1)

1.2 Purpose of Appendix

- 1.2.1 This appendix is specifically concerned with the results of the peat survey and associated impact of the location of peat with the proposed infrastructure at the Site.
- 1.2.2 The objectives are:
 - To provide a summary of the peat survey and methodology undertaken;
 - To provide a summary of the peat probing and sampling results; and
 - To summarise the findings and provide recommendations for the Site.



1.3 Peat Survey Fieldwork

Peat Background

- 1.3.1 The definition of peat provided in Guidance on Developments on Peatlands (SEPA, 2017)¹ is as follows 'peat soil is an organic soil which contains more than 60 percent of organic matter and exceeds 50 centimetres in thickness.'
- 1.3.2 Peat is a type of soil which forms under waterlogged conditions from dead plant material and accumulates where rainfall is high, and evapotranspiration losses are low.
- 1.3.3 The soil profile of peat is composed of two main zones: the acrotelm and catotelm:
 - The acrotelm is the upper more fibrous layer above the level of the permanently saturated peat, comprising a matrix of living plants and recently deposited dead material.
 - The catotelm is the lower permanently waterlogged peat that exists in an anaerobic environment (Marsden and Ebmeier, 2012)² and is generally unable to withstand any excavation and handling without complete disintegration.
- 1.3.4 Peat can hold large quantities of carbon that is poorly protected, which means that excavation of peat can lead to carbon losses/emissions. Maintaining peatlands in good condition can reduce net Greenhouse Gas (GHG) emissions as peatlands are able to sequester further carbon dioxide. However, degraded peatlands release stored GHGs as the exposed peat decomposes.
- 1.3.5 The area survey, as described in paragraphs 1.3.7-1.3.8 and Figure 1.2 below, is predominantly modified moorland with a known history utilised as agricultural grassland production and grazing by sheep and cattle.

¹ Scottish Government, Scottish Natural Heritage, SEPA (2017) Peatland Survey. Guidance on Developments on Peatland, online version only. Accessed May 2024

² Marsden K and Ebmeier S (2012) 'Peatlands and Climate Change' SPICe Briefing 20 April 2012



Peat Survey

- 1.3.6 The peat survey was carried out in line with Guidance on Developments on Peatland comprising:
 - Initial assessment peat probing on a 100m grid across the area with a potential for peat in the proposed development area and on a 25m grid across the area under consideration for structures.
 - Detail assessment a targeted probing on a 10m grid and sampling regime tailored to potential development area for structures within the proposal boundary where peat is identified in the initial assessment, focussing on areas of greatest potential impact.
- 1.3.7 The initial survey was carried out first during November 2023. The detailed peat survey was carried out during February 2024 following assessment of the initial survey results. The initial survey comprised probing on a 100m grid across the proposed solar development area in the area of the Site to the south of Gilgarran Road (Area C) (as shown on ES Figure 3.1) [REF:
 6.2]. The areas to the north of Gilgarran Road (Areas A and B) were excluded due to the recent surface coal mining activity discounting the presence of peat deposits.
- 1.3.8 In addition, probing on a 25m grid was carried out across the area proposed for the substation. Although this area was not identified as in an area containing peat, this more detailed survey grid was carried out to confirm that this area of potential structures is outside of the area in which peat is present.
- 1.3.9 The peat probe consists of a 25mm diameter solid metal cone attached to solid extension rods and handle. The probe is pushed into the ground by hand until stopped by resistance at the tip on bedrock, gravel, sand, or firm clay. No sample is taken by the probe and so it is not possible to determine by probing alone the difference between peat and soft clay in the probe interval. Confirmation is given by peat sampling, see section 1.4.
- 1.3.10 The locations of the peat probing are shown on Figure 1.2.



Figure 1.2: Peat Probing Grid



- 1.3.11 As per the Scottish Environmental Protection Agency (SEPA) guidance the detailed survey focussed on a 10m grid of probing across the area where peat was identified by the initial assessment and where indicated by BGS³ information. The aim of the detailed survey was to delineate the peat spatial extent and depth. A hand dug trial pit was undertaken at nine representative locations where peat was indicated in the initial assessment to allow confirmation of the presence of peat, and classification if encountered.
- 1.3.12 The outputs from the surveys comprised a soft soil/peat depth for each of the probe locations, and logs of hand dug trial pits with description of the

³ British Geological Survey, 2024. GeoIndex Onshore. Available at: <u>https://mapapps2.bgs.ac.uk/geoindex/home.html</u>. Accessed May 2024

soft soil or peat encountered, see Appendix A. The data was used to provide a colour coded plan showing the extent and depth of soft soil/peat across the site, see Figure 1.3.

1.4 Review of Results

1.4.1 During the peat survey a total of 808 locations were probed across the proposed solar development area to determine the thickness of soft soil/peat. The extent and depth across the Site are shown in Figure 1.3.



Figure 1.3: Soft Soil/Peat Depth

1.4.2 Table 1.1 summarises the number of locations and the corresponding percentage of the total results for each depth category.



Surveyed soft soil/peat depth, m	Number of probe points	Percentage of total probe points
<0.5	331	41.0%
0.5 – 1.0	418	51.7%
1.0 – 1.5	41	5.1%
1.5 – 2.0	12	1.5%
2.0 – 2.4	6	0.7%

- 1.4.3 In general, over 92% of the survey area was indicated by the probing to be covered with soft soil/peat with a depth less than 1.0m. Deeper areas of soft soil/peat are located in localised pockets within the areas identified as peat in the BGS mapping generally associated with topographical lows in proximity to watercourses. Soft soil/peat was indicated in these areas from 1.0m below ground level (bgl) up to a maximum depth of 2.40m bgl at only 7.3% of the site probe locations.
- 1.4.4 Nine hand pit locations were chosen to correspond to the isolated pockets indicated as deeper soft soil/peat indicated by the probing as well as to confirm the absence of peat at the shallower soft soil/peat locations indicated across the Site. The logs of the hand dug trial pits are included in Appendix A. The summary results of the hand pits are given in Table 1.2.

Location	Thickness of peat encountered (m)	Summary description
100M-123	None encountered	0.0-0.25m: Topsoil/rough grass. 0.25-1.2m: Very soft to soft brown and grey sandy gravelly CLAY.
100M-124	None encountered	0.0-0.25m: Topsoil/rough grass. 0.25-1.2m: Very soft to soft brown and grey sandy gravelly CLAY.
100M-38	None encountered	0.0-0.23m: Topsoil/rough grass. 0.23-1.3m: Very soft to soft brown and grey sandy gravelly CLAY.
100M-66	None encountered	0.0-0.26m: Topsoil/rough grass.

 Table 1.2: Hand dug trial pit summary



Location	Thickness of peat encountered (m)	Summary description
		0.26-1.2m: Very soft to soft brown and grey sandy gravelly CLAY with occasional cobbles.
10M-12	None encountered	 0.0-0.25m: Topsoil/rough grass. 0.25-0.55m: Loose brown and grey SAND with gravel sized fragments of mudstone. 0.55-1.2m: Very soft to soft brown and grey sandy gravelly CLAY with occasional cobbles.
10M-134	None encountered	0.0-0.25m: Topsoil/rough grass. 0.25-1.2m: Very soft to soft brown and grey sandy gravelly CLAY with occasional cobbles.
10M-214	0.46	0.0-0.14m: Peaty topsoil/rough grass.0.14-0.46m: Soft and very soft brown and dark brown slightly fibrous PEAT.0.46-0.80m: Very soft to soft brown and grey sandy gravelly CLAY.
10M-340	>1.45 (2.1 by probing)	0.0-0.30m: Peaty topsoil/rough grass. 0.30-1.45m: Soft and very soft brown and dark brown slightly fibrous PEAT.
25M-129	None encountered	0.0-0.3: Topsoil/rough grass 0.3-0.92: Soft to firm brown and grey sandy gravelly CLAY

1.4.5 The results of the hand pit sampling indicated that peat was sampled and recorded in only two of the trial pits undertaken during the detailed peat probing exercise, see Figure 1.4. Peat was not encountered outside of the area indicated as peat by the BGS. These results indicate that the majority of the Site area investigated by the survey comprised organic topsoil overlying soft to very soft clay soil with no peat present.



Figure 1.4: Confirmed Peat Locations



1.4.6 Where encountered in the two locations, the peat deposits were recorded as brown to dark brown fibrous Peat. A von Post classification of the two localised areas of peat encountered showed it to be H9 indicating that the peat is practically fully decomposed.

1.5 Recommendations

1.5.1 Peat with thicknesses of 0.46m bgl to 2.1m bgl was confirmed very locally in two distinct locations which are both within the area indicated as peat on BGS mapping. In order to minimise the impact on peat at the Site, Work Nos. 1, 2, 4, and 5 [**REF: 2.3**] have been avoided from development within the operational design of the Proposed Development, as is shown on ES Figure 3.5 Exclusion Area [**REF: 6.2**] and through the Work Plans within the DCO [**REF: 2.3**].



1.5.2 Should any construction activity related to Work No. 3 and 6 [**REF: 2.3**] need to take place within identified areas of peat during the construction phase of the Proposed Development, then mitigation measures outlined in the OCEMP (ES Appendix 5.1) [**REF: 6.3**] will be implemented and secured by a DCO Requirement.



Appendix A Hand Dug Trial Pit Logs



TRIAL PIT NO. 100M-123

Contract: DEAN MOOR, CUMBRIA

Contract No: 7499

Status: FINAL

Client: STANTEC UK LTD

Pit Dimensions: 0.50 X 0.30

Co-ordinates E 304775.41

Date: 14/02/2024

Equipment: HAND DUG

N 523508.84

Description of Strat	a L	.egend	Depth	Level	Sampling	SPT Blows U Blows Hand Vane	Pipe
Ground Surface			0.00	111.44			
MADE GROUND: Topsoil / rough grass.			0.25	111.19	В 0.20		
Very soft and soft light brown and light grey r very sandy slightly gravelly CLAY. Gravel fin to sub rounded.	nottled orange and grey e to coarse and angular		1.20	110.24	DB 1.00		
Water Strikes Details					SYMBOLS	KEY	
Strike: Dry Flow: Stability: Stable Shoring: None Backfilling: Backfilled on completion Notes: Logged by: RA	Flow: Casing: Final Depth: 1.20			B - BUL U - UNI D - SM/ J - JAF V - VIA W - WA	LK NR - DISTURBED * - ALL DISTURBED L TER ALL DIMENSIONS /	NO RECOVERY ESTIMATED DEN ARE IN METRES	SITY



TRIAL PIT NO. 100M-124

Contract: DEAN MOOR, CUMBRIA

Contract No: 7499

Status: FINAL

Client: STANTEC UK LTD

Pit Dimensions: 0.50 X 0.30

Co-ordinates E 304874.14

Date: 14/02/2024

Equipment: HAND DUG

N 523503.91

Description of Stra	ta L	.egend	Depth	Level	Sampling	SPT Blows U Blows Hand Vane	Pipe
Ground Surface			0.00	112.18			
MADE GROUND: Topsoil / rough grass. Soft at top becoming very soft light brown, o grey mottled orange and grey very sandy slig pockets of very loose brown and orange bro coarse sand. Gravel fine to coarse and angu	range brown and light ghtly gravelly CLAY with wn slightly gravelly fine to lar to sub rounded.		0.25	111.93	B 0.20 DB 1.00		
			1.20	110.98			
Water Strikes Details Strike: Dry Flow: Casing: Final Depth: 1.20 Stability: Stable Shoring: None Backfilling: Backfilled on completion Notes: Notes: Notes:				B - BUL U - UNI D - SM/ J - JAR V - VIAI W - WA	SYMBOLS K NR - DISTURBED * - ALL DISTURBED L TER	KEY NO RECOVERY ESTIMATED DEN:	SITY
Logged by: RA Checked by: SKF ALL DIMENSIONS ARE IN METRES					ARE IN METRES		



TRIAL PIT NO. 100M-38

Contract: DEAN MOOR, CUMBRIA

Contract No: 7499

Status: FINAL

Client: STANTEC UK LTD

Pit Dimensions: 0.50 X 0.30

Co-ordinates E 304871.70

Date: 14/02/2024

Equipment: HAND DUG

N 522808.49

Description of Strat	a Li	.egend	Depth	Level	Sampling	SPT Blows U Blows Hand Vane	Pipe
Ground Surface			0.00	144.92			
MADE GROUND: Topsoil / rough grass. Soft at top becoming very soft light brown an orange and grey very sandy slightly gravelly coarse and angular to sub rounded.	d light grey mottled CLAY. Gravel fine to		0.23	144.69	В 0.20		
			1.30	143.62	DB 1.00		
Water Strikes	Details				SYMBOLS	KEY	
Stability: Stable Shoring: None Backfilling: Backfilled on completion Notes:	n completion			B - BUL U - UNI D - SM/ J - JAR V - VIA W - WA	LK NR - DISTURBED * - ALL DISTURBED S L TER	NO RECOVERY ESTIMATED DEN	SITY
Logged by: RA	Checked by: SKF				ALL DIMENSIONS A	ARE IN METRES	



TRIAL PIT NO. 100M-66

Contract: DEAN MOOR, CUMBRIA

Contract No: 7499

Status: FINAL

Client: STANTEC UK LTD

Pit Dimensions: 0.50 X 0.30

Co-ordinates E 304566.31

Description of Strata	Legend	Depth	Level	Sampling	SPT Blows U Blows Hand Vane	Pipe
Ground Surface		0.00	139.95			
MADE GROUND: Topsoil / rough grass.		0.26	130.60	В 0.20		
Soft at top becoming very soft light brown and light grey mottled orange and grey very sandy slightly gravelly CLAY. Gravel fine to coarse and angular to sub rounded. Occasional cobbles.		1.20	138.75	DB 1.00		

Water Strikes	Deta	ails	SYMBOLS KEY
Strike: Dry Flow: Stability: Stable Shoring: None Backfilling: Backfilled on completion	Casing:	Final Depth: 1.20	B - BULK NR - NO RECOVERY U - UNDISTURBED * - ESTIMATED DENSITY D - SMALL DISTURBED J - JAR V - VIAL
Notes:			W - WATER
Logged by: RA	Checked by: SKF		ALL DIMENSIONS ARE IN METRES



TRIAL PIT NO. 10M-12

Contract: DEAN MOOR, CUMBRIA

Contract No: 7499

Status: FINAL

Client: STANTEC UK LTD

Pit Dimensions: 0.50 X 0.30 Equipment: HAND DUG Co-ordinates E 304421.00

Date: 14/02/2024

N 523011.03

					SPT Blows	
Description of Strata	Legend	Depth	Level	Sampling	U Blows Hand Vane	Pipe
Ground Surface		0.00	133.71			
MADE GROUND: Topsoil / rough grass.		0.25	133.46	В 0.20		
POSSIBLE MADE GROUND: Loose* dark brown, grey and dark grey clayey gravelly fine to coarse sand intermixed with many fragments of mudstone. Gravel fine to coarse and angular to sub rounded.		0 55	133 16	B 0.50		
POSSIBLE MADE GROUND: Soft and very soft light brown, grey and dark grey mottled orange and grey very sandy slightly gravelly clay. Gravel fine to coarse and angular to sub rounded. Occasional cobbles. Soft to firm at depth.		1.20	132.51	DB 1.00		

Water Strikes	Deta	ails	SYMBOLS KEY		
Strike: Dry Flow:	Casing:	Final Depth: 1.20			
Stability: Stable			U - UNDISTURBED * - ESTIMATED DENSITY		
Shoring: None			D - SMALL DISTURBED		
Backfilling: Backfilled on completion	า		V - VIAL		
Notes:			W - WATER		
Logged by: RA	Checked by: SKF		ALL DIMENSIONS ARE IN METRES		



TRIAL PIT NO. 10M-134

Contract: DEAN MOOR, CUMBRIA

Contract No: 7499

Status: FINAL

Client: STANTEC UK LTD

Pit Dimensions: 0.50 X 0.30

Co-ordinates E 304061.02

Date: 14/02/2024

Equipment: HAND DUG

N 523301.02

Description of Strata	a Le	egend	Depth	Level	Sampling	SPT Blows U Blows Hand Vane	Pipe
Ground Surface			0.00	116.79			
MADE GROUND: Topsoil / rough grass.	d light grey mottled CLAY. Gravel fine to hal cobbles.		0.25	116.54	B 0.20 DB 1.00		
	· 전 2013 -		1.10	115.69	00 1.00		
Water StrikesDetailsStrike: DryFlow:Casing:Final Depth: 1.10Stability: StableShoring: NoneBackfilling: Backfilled on completion			10	SYMBOLS KEY B - BULK NR - NO RECOVERY U - UNDISTURBED * - ESTIMATED DENSITY D - SMALL DISTURBED J - JAR V - VIAL W WATED			
Notes: Logged by: RA Checked by: SKF					ALL DIMENSIONS A	ARE IN METRES	



TRIAL PIT NO. 10M-214

Contract: DEAN MOOR, CUMBRIA

Contract No: 7499

Status: FINAL

Client: STANTEC UK LTD

Pit Dimensions: 0.50 X 0.30

Co-ordinates E 304151.04

Date: 14/02/2024

Equipment: HAND DUG

N 523331.02

Description of Strat	a	Legend	Depth	Level	Sampling	SPT Blows U Blows Hand Vane	Pipe
Ground Surface			0.00	117.05			
MADE GROUND: Peaty topsoil / rough grass	5.		0.14	116.91			
Soft and very soft brown and dark brown slig [F1,R1,W1,H9]. Very soft light brown and light grey mottled o sandy slightly gravelly CLAY. Gravel fine to o sub rounded. Slightly peaty at top.	htly fibrous PEAT range and grey very coarse and angular to		0.46	116.59	U66 0.14-0.46		
Water Strikes	Water Strikes Details			SYMBOLS KEY			
Strike: 0.00 Flow: SEEPAGE Casing: Final Depth: 0.80 Stability: Stable Shoring: None Backfilling: Backfilled on completion Notes: Stability: Stable Stability: Stable			80	B - BULK NR - NO RECOVERY U - UNDISTURBED * - ESTIMATED DENSITY D - SMALL DISTURBED J - JAR V - VIAL W - WATER			
Logged by: RA Checked by: SKF				ALL DIMENSIONS ARE IN METRES			



TRIAL PIT NO. 10M-340

Contract: DEAN MOOR, CUMBRIA

Contract No: 7499

Status: FINAL

Client: STANTEC UK LTD

Pit Dimensions: 0.50 X 0.30

Co-ordinates E 304431.04

Date: 14/02/2024

Equipment: HAND DUG

N 523360.99

SPT Blows **Description of Strata** Legend Depth Level Sampling U Blows Pipe Hand Vane Ground Surface MADE GROUND: Peaty topsoil / sparse grass. 0.30 Soft and very soft brown and dark brown slightly fibrous PEAT [F1,R1,W0,H9]. U66 0.50-1.00 1.45 Water Strikes Details SYMBOLS KEY Strike: 0.30 Flow: MODERATE Final Depth: 1.45 Casing: NR - NO RECOVERY * - ESTIMATED DENSITY - BULK - UNDISTURBED - SMALL DISTURBED в Stability: Stable U D Shoring: None J V W - JAR - VIAL - WATER Backfilling: Backfilled on completion Notes: ALL DIMENSIONS ARE IN METRES Logged by: RA Checked by: SKF



TRIAL PIT NO. 25M-129

Contract: DEAN MOOR, CUMBRIA

Contract No: 7499

Status: FINAL

Client: STANTEC UK LTD

Pit Dimensions: 0.50 X 0.30

Co-ordinates E 304427.99

Date: 14/02/2024

Equipment: HAND DUG

N 523457.02

Description of Strat	ta	Legend	Depth	Level	Sampling	SPT Blows U Blows Hand Vane	Pipe
Ground Surface			0.00	123.96			
MADE GROUND: Topsoil / rough grass.	and light grey mottled		0.30	123.66	В 0.20		
orange and grey very sandy slightly gravelly coarse and angular to sub rounded. Occasio sandstone obstruction, presumed boulder.	CLAY. Gravel fine to nal cobbles. At 0.92 hard		0.02	123.04	DB 0 90		
Water Strikes	Details			SYMBOLS KEY			
Strike: Dry Flow: Stability: Stable Shoring: None Backfilling: Backfilled on completion Notes: Logged by: BA	Casing: Final Depth: 0.92			B - BULK NR - NO RECOVERY U - UNDISTURBED * - ESTIMATED DENSITY D - SMALL DISTURBED J - JAR V - VIAL W - WATER ALL DIMENSIONS ARE IN METRES			