

MWP

Response to RFI Item Number 4.1
Coole Wind Farm

Coole Wind Farm Ltd.

September 2022

Contents

1. Introduction	3
2. Review of Ground Investigation.....	3
3. Slope at T12 location	5
4. Summary and Conclusion	5

Figures

Figure 2-4 Plan of ground investigation at T12 with peat depths shown	4
---	---

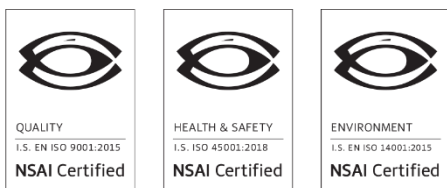
Appendices

Appendix A – Summary of Factual Ground Investigation Information at T12

Appendix B - Drawing of Existing Ground Levels at T12 from LiDAR data

Project No.	Doc. No.	Rev.	Date	Prepared By	Checked By	Approved By	Status
23249	6001	A	15/08/2022	P Curran	D Cagney	P Curran	DRAFT
23249	6001	B	19/08/2022	P Curran	D Cagney	P Curran	DRAFT
23249	6001	C	08/09/2022	P Curran	D Cagney	P Curran	DRAFT

MWP, Engineering and Environmental Consultants
Address: Park House, Bessboro Road, Blackrock, Cork, T12 X251
www.mwp.ie



1. Introduction

Malachy Walsh and Partners Limited (MWP) was appointed by Coole Wind Farm Limited to provide a response to item 4.1 of a Request for Further Information (RFI) from An Bord Pleanála on Case Number ABP-309770-21 dated 21 April 2022. This item is reproduced below for clarity:

“4.1 In section 8.3.2.1 of the EIAR it is stated that the recorded peat depth at T12 is given as 12.5m - from the 2020 rotary core boreholes while the peat depth within 50m is 4.5m based on table 8-4. You are requested to justify the location of the turbine in very deep peat and at a location where the slope angle is 3 degrees and to consider whether there is a more suitable alternative.”

The following was undertaken to inform the response to the above RFI:

- A review of the ground investigation at T12
- A site visit and peat probing at T12 to supplement the available ground investigation information at T12
- A review of the slope angles and peat stability assessment at T12

2. Review of Ground Investigation

A review of ground conditions at T12 was carried out based on the following information:

- Rotary Core Borehole T12 from Ground Investigations Ireland Ltd. Report Number 9373-01-20, November 2020 Peat Probe and window sample information from Appendix 8-1 of the EIAR by MKO titled “Geotechnical and Peat Stability Report”
- Peat Probes complete by MWP on 28th July 2022

The relevant information from the above-listed investigations is provided in Appendix A of this document

The following is noted regarding the peat depths identified in the various investigations listed above.

- The rotary core borehole at T12 identified a peat depth of 12.5m
- The peat probes identified a peat depth of 8.7m at the closest probe to the centre of the turbine foundation and a maximum of 9.0m in the vicinity of the turbine and hardstand.

A variety of peat depths have been provided from various techniques. The peat depth affects peat stability calculations which are used as part of the justification of turbine positions. Therefore, selection of an appropriate and representative peat depth is important. From experience, the peat probes provide the most reliable representation of the peat depth at T12 for the reasons detailed below.

- The peat probe used has a small auger at the end of the probe which was used to extract samples of the material at the base of the peat. This allowed for visual confirmation that the interface between the peat and the underlying stratum had been reached, hence verifying the depth of the peat.
- The rotary core drilling technique used at T12 was focused on identifying the depth to a competent stratum (such as limestone at Coole). This technique flushes water through the borehole as drilling progresses. At Coole, the peat is underlain by soft clays. The flushing of water makes the determination of the interface between the peat and soft clay difficult to identify as the two materials become mixed. The peat gets washed down into the clay underneath as the borehole casing advances. Rotary core

drilling was a technique used to identify the depth to a solid stratum (Limestone) at Coole and was not used to determine the interface between two soft materials such as peat and clay.

Following a review of the available ground investigation information and peat probes, the following can be noted:

- The Rotary Core Borehole at T12 overestimates the depth of peat (the borehole log suggests a peat depth of 12.5m).
- The peat probes completed to inform this RFI response suggest the peat depth to be 8.7m at the centre of T12 and a maximum peat depth of 9m in the vicinity of the turbine and hardstand.
- The rotary coring technique used at T12 is not suitable for accurately determining the interface between two soft materials such as peat and clay and was used to identify the depth to a solid stratum (Limestone) at Coole.
- The depths provided by the peat probes are considered to provide the most accurate peat depths and should be used for assessment purposes.

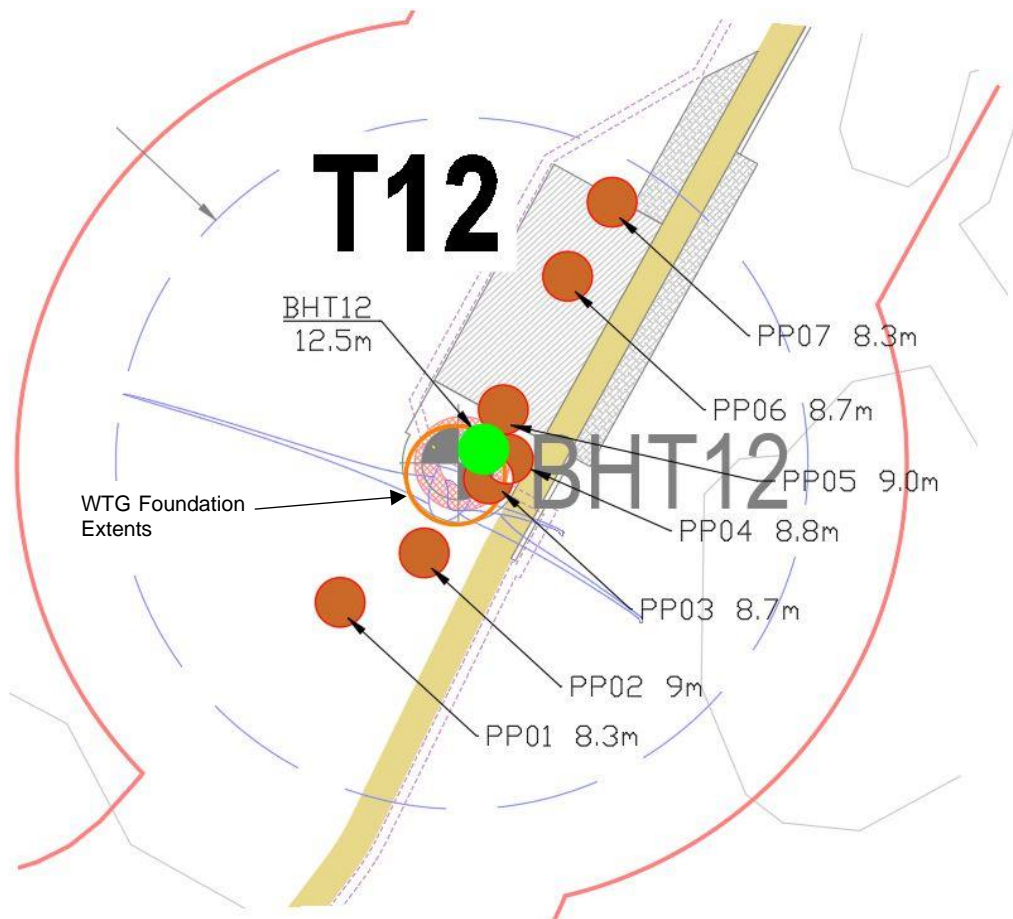


Figure 2-1 Plan of ground investigation at T12 with recorded peat depths shown

3. Slope at T12 location

The slope of 3 degrees at T12 presented in EIAR was obtained using a combination of readings taken during the site reconnaissance by FT using handheld equipment, such as the Silva Clino Master and from contour survey plans for the site.

Further investigation of the slope at T12 was carried out to inform the response to this RFI. This included a review of LiDAR which was procured specifically to provide a response to this RFI.

The LiDAR is considered more accurate than the methodologies used which originally yielded a slope angle of 3 degrees. The steepest slope angle derived from the LiDAR is 1.51 degrees. The average angle is 0.24 degrees. A drawing showing two cross sections and profiles of the existing ground at T12 is provided in Appendix B.

The maximum angle of 1.51 degrees and average angle of 0.24 degrees from the LiDAR data aligns with what was noted onsite, ie that the site is close to flat.

The peat stability assessment has been revised with the updated peat depth (maximum of 9m) and maximum slope angle from LiDAR at T12 (1.51°). The updated factors of safety against slope instability are summarised in Table 3-1.

A Factor of Safety (FOS) of 1.3 is the minimum required by “BS 6031:2009 Code of practice for earthworks”. All of the calculated FOS values in Table 3-1 are greater than 1.3.

Table 3-1 Summary of Factors of Safety at T12

	Condition 1 (No surcharge)	Condition 2 (10kPa surcharge)
Undrained Case	2.53	2.28
Drained Case	1.68	3.28

4. Summary and Conclusion

The following has been undertaken in order to provide a response to item 4.1 of the RFI related to Coole Wind Farm (An Bord Pleanála reference Case Number ABP-309770-21 dated 21 April 2022)

- A detailed review of the ground conditions at T12.
- Further ground investigation in the form of peat probing.
- Reinterpretation of the available site investigation data in conjunction with the additional peat probing.
- A detailed review of topography at T12.
- Procurement of further topographical data in the form of LiDAR.
- Update of the peat stability assessment based on the above.

It is concluded that the location of T12 is justified as the peat stability assessment provides an adequate factor of safety.

Appendix A

Ground Investigation Information for T12

Peat Probes from T12 at Coole WF (28-07-2022)

Peat Probe Number	ITM		Peat Depth (m)	Shear (Kpa)
	E	N		
PP01	640238	774744	8.3	
PP02	640255	774754	9	15
PP03	640268	774769	8.7	12
PP04	640272	774773	8.8	
PP05	640271	774783	9	14
PP06	640284	774810	8.7	
PP07	640293	774825	8.3	



Machine : Beretta T44		Casing Diameter 102mm to 24.50m		Ground Level (mOD) 68.58		Client Statkraft		Job Number 9373-01-20	
Flush : Water		Location 240320 E 274754 N		Dates 16/07/2020- 17/07/2020		Project Contractor GII		Sheet 1/3	
Core Dia: 63.5 mm									
Method : Rotary Cored									

Depth (m)	TCR	SCR	RQD	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
0.00								Poor Recovery. Driller notes: Black PEAT. Recovery consists of dark brown fibrous PEAT. (Very soft.)			
2.00 2.00-2.45	20				0,0/1,1,1,2 SPT(C) N=5						
3.50 3.50-3.95	37				1,0/0,2,0,0 SPT(C) N=2						
5.00 5.00-5.45	67				2,2/1,1,0,1 SPT(C) N=3						
6.50 6.50-6.95	67				0,2/1,0,1,0 SPT(C) N=2		(12.50)				
8.00 8.00-8.45	20				0,2/0,0,1,0 SPT(C) N=1						
9.50 9.50-9.95					0,0/0,0,0,1 SPT(C) N=1						

Remarks Standpipe installed, slotted from 15.00m to 1.00m BGL with a pea gravel surround, sealed from 1.00m to GL with plain pipe and a bentonite surround, finished with a rasied cover.	Scale (approx) 1:50	Logged By Tmcl
	Figure No. 9373-01-20.BH12	



Machine : Beretta T44 Flush : Water Core Dia: 63.5 mm Method : Rotary Cored	Casing Diameter 102mm to 24.50m	Ground Level (mOD) 68.58	Client Statkraft	Job Number 9373-01-20
	Location 240320 E 274754 N	Dates 16/07/2020- 17/07/2020	Project Contractor GII	Sheet 2/3

Depth (m)	TCR	SCR	RQD	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
11.00 11.00-11.45	20				0,0/0,0,0,0 SPT(C) N=0						
12.50 12.50-12.95	47				6,5/6,5,4,4 SPT(C) N=19	56.08	12.50 (1.50)	Poor Recovery. Driller notes: Grey Silt. Recovery consists of grey silty CLAY.(Stiff)			
14.00	43					54.58	14.00 (0.85)	Poor Recovery. Driller notes: GRAVEL and Cobbles. Recovery consists of grey sub-angular to sub-rounded coarse GRAVEL with occasional cobbles. (Dense)			
14.85	67	43	43			53.73	14.85 (2.35)	Weak thickly bedded brown/grey fine grained LIMESTONE. Distinctly weathered. (14.85m - 17.00m) One fracture set. F1: 10-30 Degrees, close to medium spaced, stepped rough with some brown clay infill. (17.00m - 20.00m) Two fracture sets. F1: 0-15 Degrees, close to medium, planar rough with some clay infill. F2: 80-90 Degrees, stepped rough, clean.			
15.50	100	70	43	6							
17.00	100	70	33			51.38	17.20 (2.80)	Weak to medium strong thickly bedded dark grey fine grained argillaceous LIMESTONE. Partially weathered to unweathered. (20.00m - 24.50m) One fracture set. F1: 0-10 Degrees, close to wide, planar to undulating rough with some clay staining.			
18.50	100	77	53	15							
20.00											

Remarks

Scale (approx)
1:50

Logged By
Tmcl

Figure No.
9373-01-20.BH12



Machine : Beretta T44 Flush : Water Core Dia: 63.5 mm Method : Rotary Cored	Casing Diameter 102mm to 24.50m	Ground Level (mOD) 68.58	Client Statkraft	Job Number 9373-01-20
	Location 240320 E 274754 N	Dates 16/07/2020- 17/07/2020	Project Contractor GII	Sheet 3/3

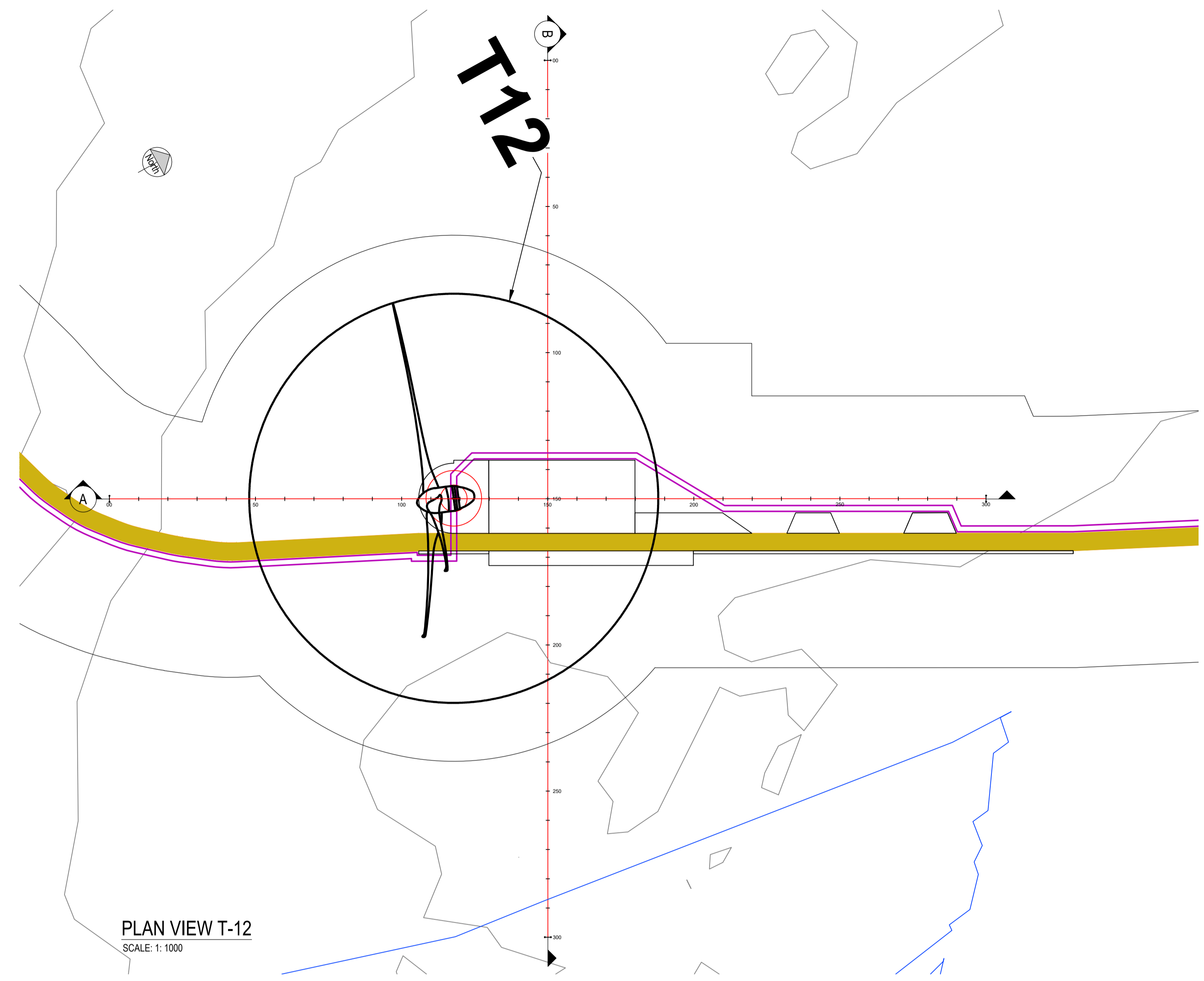
Depth (m)	TCR	SCR	RQD	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
21.50	93	90	77			48.58	20.00	Medium strong to strong thickly bedded dark grey fine grained LIMESTONE. Partially weathered to unweathered.			
	97	93	87	4			(4.50)				
	97	97	93								
24.50						44.08	24.50	Complete at 24.50m			

Remarks	Scale (approx)	Logged By
	1:50	Tmcl
Figure No. 9373-01-20.BH12		

Appendix B

Topographical Data from LiDAR

DO NOT SCALE FROM THIS DRAWING. USE FIGURED DIMENSIONS IN ALL CASES. VERIFY DIMENSIONS ON SITE AND REPORT ANY DISCREPANCIES TO THE DESIGNERS IMMEDIATELY. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE DESIGNERS SPECIFICATION. © THIS DRAWING IS COPYRIGHT AND MAY ONLY BE REPRODUCED WITH THE DESIGNERS PERMISSION.



PLAN VIEW T-12
SCALE: 1:1000

Chainage	0.000	10.000	20.000	30.000	40.000	50.000	60.000	70.000	80.000	90.000	100.000	110.000	120.000	130.000	140.000	150.000	160.000	170.000	180.000	190.000	200.000	210.000	220.000	230.000	240.000	250.000	260.000	270.000	280.000	290.000	300.000
Existing Levels	68.295	68.467	68.717	68.955	68.997	68.964	68.864	68.823	68.806	68.918	68.923	68.965	68.898	68.842	68.822	68.835	68.838	68.761	68.721	68.584	68.467	68.466	68.435	68.461	68.488	68.480	68.549	68.652	68.687	68.679	68.676

SECTION A-A
SCALE: H:1500, V:1500. DATUM 65.00

Chainage	0.000	10.000	20.000	30.000	40.000	50.000	60.000	70.000	80.000	90.000	100.000	110.000	120.000	130.000	140.000	150.000	160.000	170.000	180.000	190.000	200.000	210.000	220.000	230.000	240.000	250.000	260.000	270.000	280.000	290.000	300.000
Existing Levels	67.230	67.297	67.252	67.655	67.295	67.524	67.281	67.715	67.813	67.261	67.225	68.298	68.264	68.527	68.722	68.535	69.072	69.134	69.170	69.328	69.455	69.473	69.446	69.465	69.412	69.417	69.396	69.407	69.415	69.423	69.419

SECTION B-B
SCALE: H:1500, V:1500. DATUM 65.00

P01	19/08/22	ISSUED FOR INFORMATION	MG	PC
REV	DATE	DESCRIPTION	BY	APP

PROJECT: COOLE WIND FARM

TITLE: SECTIONS T-12

CLIENT: STATKRAFT



DRAWN: MG	CHECKED: PC	APPROVED: PC
-----------	-------------	--------------

PROJECT NUMBER: 22777	DATE: 19/08/22	SCALE @ A1: AS SHOWN
-----------------------	----------------	----------------------

STATUS DESCRIPTION: FOR INFORMATION	STATUS: S2
-------------------------------------	------------

DRAWING NUMBER: 23249 - MWP - 00 - 00 - SK - S - 0201	REV: P01
---	----------