Appendix 8A

GROUND INVESTIGATION REPORT

Ground Investigation Report
Brittas Windfarm, Thurles, Co. Tipperary

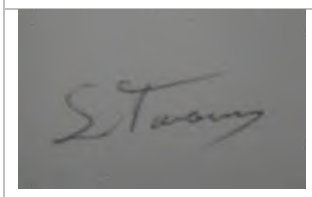
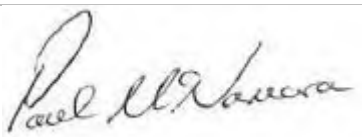
Client:	Orsted
Client's Representative:	MWP
Report No.:	23-1008
Date:	26th Feb 2024
Status:	Final For Issue

Northwest Geotech
Unit 9
Northwest Business Complex
Derry
BT48 8SE
www.northwestgeo.com
info@northwestgeo.com

CONTENTS

APPENDICES

Document Control Sheet

Report No.:		23-1008			
Project Title:		Brittas Windfarm, Thurles, Co. Tipperary			
Client:		Orsted			
Client's Representative:		MWP (Malchy Walsh & Partners)			
Revision:	A01	**Status:**	Final for Issue	**Issue Date:**	26th Feb 2024
Prepared by:		**Reviewed by:**		**Approved by:**	
					
Sean Toomey BSc		Paul McNamara BEng MICE MIEI		Paul McNamara BEng MICE MIEI	

The works were conducted in accordance with:

UK Specification for Ground Investigation 2nd Edition, published by ICE Publishing (2012)

British Standards Institute (2015) BS 5930:2015+A1:2020, Code of practice for site investigations.

BS EN 1997-2: 2007: Eurocode 7 - Geotechnical design - Part 2 Ground investigation and testing.

Geotechnical Society of Ireland (2016), Specification & Related Documents for Ground Investigation in Ireland

Laboratory testing was conducted in accordance with:

British Standards Institute BS 1377:1990 parts 2, 4, 5, 7 and 9

METHODS OF DESCRIBING SOILS AND ROCKS

Soil and rock descriptions are based on the guidance in BS5930:2015, The Code of Practice for Site Investigation.

Abbreviations used on exploratory hole logs	
U	Nominal 100mm diameter undisturbed open tube sample (thick walled sampler).
UT	Nominal 100mm diameter undisturbed open tube sample (thin walled sampler).
P	Nominal 100mm diameter undisturbed piston sample.
B	Bulk disturbed sample.
LB	Large bulk disturbed sample.
D	Small disturbed sample.
C	Core sub-sample (displayed in the Field Records column on the logs).
L	Liner sample from dynamic sampled borehole.
W	Water sample.
ES / EW	Soil sample for environmental testing / Water sample for environmental testing.
SPT (s)	Standard penetration test using a split spoon sampler (small disturbed sample obtained).
SPT (c)	Standard penetration test using 60 degree solid cone.
(x,x/x,x,x,x)	Blows per increment during the standard penetration test. The initial two values relate to the seating drive (150mm) and the remaining four to the 75mm increments of the test length.
(Y for Z/ Y for Z)	Incomplete standard penetration test where the full test length was not achieved. The blows 'X' represent the total blows for the given seating or test length 'Z' (mm).
N=X	SPT blow count 'N' given by the summation of the blows 'X' required to drive the full test length (300mm).
HVP / HVR	In situ hand vane test result (HVP) and vane test residual result (HVR). Results presented in kPa.
V VR	Shear vane test (borehole). Shear strength stated in kPa. V: undisturbed vane shear strength VR: remoulded vane shear strength
Soil consistency description	In cohesive soils, where samples are disturbed and there are no suitable laboratory tests, N values may be used to indicate consistency on borehole logs – a median relationship of Nx5=Cu is used (as set out in Stroud & Butler 1975).
dd-mm-yyyy	Date at the end and start of shifts, shown at the relevant borehole depth. Corresponding casing and water depths shown in the adjacent columns.
▽	Water strike: initial depth of strike.
▼	Water strike: depth water rose to.
Abbreviations relating to rock core – reference Clause 36.4.4 of BS 5930: 2015	
TCR (%)	Total Core Recovery: Ratio of rock/soil core recovered (both solid and non-intact) to the total length of core run.
SCR (%)	Solid Core Recovery: Ratio of solid core to the total length of core run. Solid core has a full diameter, uninterrupted by natural discontinuities, but not necessarily a full circumference and is measured along the core axis between natural fractures.
RQD (%)	Rock Quality Designation: Ratio of total length of solid core pieces greater than 100mm to the total length of core run.
FI	Fracture Index: Number of natural discontinuities per metre over an indicated length of core of similar intensity of fracturing.
NI	Non Intact: Used where the rock material was recovered fragmented, for example as fine to coarse gravel size particles.
AZCL	Assessed zone of core loss: The estimated depth range where core was not recovered.
DIF	Drilling induced fracture: A fracture of non-geological origin brought about by the rock coring.
(xxx/xxx/xxx)	Spacing between discontinuities (minimum/average/maximum) measured in millimetres.

Brittas Windfarm

1 EXECUTIVE SUMMARY

On the instructions of MWP Consulting Engineers, ("the Client's Representative"), acting on the behalf of Orsted ("the Client"), a ground investigation was undertaken at the above location to provide geotechnical information for input to the design and construction of a proposed windfarm.

This report details the work carried out both on site. It contains a description of the site and the works undertaken and the exploratory hole logs.

All information given in this report is based upon the ground conditions encountered during the site investigation works, and on the results of the laboratory and field tests performed. However, there may be conditions at the site that have not been taken into account, such as unpredictable soil strata, contaminant concentrations, and water conditions between or below exploratory holes. It should be noted that groundwater levels usually vary due to seasonal and/or other effects and may at times differ to those recorded during the investigation. No responsibility can be taken for conditions not encountered through the scope of work commissioned, for example between exploratory hole points, or beneath the termination depths achieved.

This report was prepared by Northwest Geotech Ltd for the use of the Client and the Client's Representative in response to a particular set of instructions. Any other parties using the information contained in this report do so at their own risk and any duty of care to those parties is excluded.

2 SCOPE

The extent of the investigation, as instructed by the Client's Representative, included trial pits, soil sampling and the preparation of a factual report on the findings.

3 DESCRIPTION OF SITE

As shown on the site location plan in Appendix A, the works were conducted on existing agricultural green fields around Thurles in Co. Tipperary. The lands for the proposed windfarm are located to the North of Thurles town and to the East of the N62 carriageway. The fields are sloping in various directions.

4 SITE OPERATIONS

4.1 Summary of site works

Site operations, which were conducted on 16th December 2023 comprised:

- twelve machine dug trial pits

The exploratory holes were located as instructed by the Client's Representative, as shown on the exploratory hole location plan in Appendix A.

4.2 Trial Pits

12 trial pits (TPBP01, TPBP02, TPBP03, TPSD01, TPSS01, TPSS02, TPT03, TPT04, TPT05, TPT07, TPT09 and TPT10) were excavated using a 12t tracked excavator fitted with a 600mm wide bucket, to depths of up to 4.00m.

Disturbed (small jar and bulk bag) samples were taken at standard depth intervals and at change of strata.

Any water strikes encountered during excavation were recorded along with any changes in their levels as the excavation proceeded. The stability of the trial pit walls was noted on completion.

Appendix B presents the trial pit logs with photographs of the pits and arising provided in Appendix C.

4.3 Surveying

The as-built exploratory hole positions were surveyed following completion of site operations by a Site Engineer from Northwest Geotech. Surveying was carried out using a Trimble R6 GPS system employing VRS and real time kinetic (RTK) techniques.

The plan coordinates (Irish National Grid / Irish Transverse Mercator / UK National Grid) and ground elevation (mOD Malin (Irl) / Newlyn (GB)) at each location are recorded on the individual exploratory hole logs.

5 GROUND CONDITIONS

5.1 General geology of the area

Published geological mapping indicate the superficial deposits underlying the site comprise area of Alluvium and areas of Glacial Till, areas of Peat are also shown within the vicinity. These deposits are underlain by Carboniferous Limestone.

5.2 Ground types encountered during investigation of the site

A summary of the ground types encountered in the exploratory holes is listed below, in approximate stratigraphic order:

- **Topsoil:** encountered typically in 300mm thickness across the site. Topsoil was noted as 'peaty' in several locations.
- **Recent deposits (peat):** Very soft organic silt was encountered underneath the topsoil layers in some locations.
- **Fluvioglacial deposits:** typically medium dense sands and gravels interspersed with layers of sandy gravelly clay
- **Glacial Till:** sandy gravelly clay, frequently with low cobble content, typically firm or stiff in upper horizons, becoming very stiff with increasing depth.

5.3 Groundwater

Groundwater was encountered during excavation of several trial pits. The trial pit ID and water strike depth are shown in the table below. See Table 1

Details of the individual groundwater strikes, along with any relative changes in levels as works proceeded, are presented on the exploratory hole logs for each location.

Table 1: Groundwater monitoring

TPID	Water Strike Depth (m)
TPSD01	3.20
TPSS01	2.20
TPSS02	3.00
TPT03	3.80
TPT04	2.30
TPT05	3.50

Seasonal variation in groundwater levels should also be factored into design considerations.

6 REFERENCES

Geotechnical Society of Ireland (2016), Specification & Related Documents for Ground Investigation in Ireland

IS EN 1997-2: 2007: Eurocode 7 - Geotechnical design - Part 2 Ground investigation and testing. National Standards Authority of Ireland.

BS EN 1997-2: 2007: Eurocode 7 - Geotechnical design - Part 2 Ground investigation and testing. British Standards Institution.

BS 5930: 2015+A1:2020: Code of practice for ground investigations. British Standards Institution.

BS EN ISO 14688-1:2018: Geotechnical investigation and testing. Identification and classification of soil. Part 1 Identification and description.

BS EN ISO 14688-2:2018: Geotechnical investigation and testing. Identification and classification of soil. Part 2 Principles for a classification.

BS 1377: 1990: Methods of test for soils for civil engineering purposes. British Standards Institution.

BS EN ISO 14689-1:2018: Geotechnical investigation and testing. Identification and classification of rock. Identification and description.

APPENDIX A

Site and Exploratory Hole Location Plans

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 TO BE READ IN CONJUNCTION WITH THE DESIGNERS SPECIFICATION.
© THIS DRAWING IS COPYRIGHT AND MAY ONLY BE REPRODUCED WITH THE DESIGNERS PERMISSION.

NOTES:

1. ALL DRAWINGS ARE TO BE READ IN CONJUNCTION WITH ALL RELEVANT SPECIFICATIONS, BILLS OF QUANTITIES, ARCHITECTURAL, SERVICES AND ENGINEERING DRAWINGS.
2. ALL LEVELS ARE IN METRES RELATED TO ORDNANCE DATUM MALIN HEAD.
3. ANY DISCREPANCIES BETWEEN THESE DOCUMENTS SHALL BE BROUGHT TO THE ATTENTION OF THE ENGINEER.
4. DRAWINGS ARE NOT TO BE SCALED.
5. ALL DIMENSIONS ARE IN MILLIMETRES, UNLESS NOTED OTHERWISE.

LEGEND:

- Folio Boundary
- Turbine Hardstand
- Access Track
- Spoil Deposition Area
- GC GC — 110kV Grid Connection Route
- C1 — Internal Wind Farm Cable Route
- Felling Buffer (105m)
- Trial Pit Location

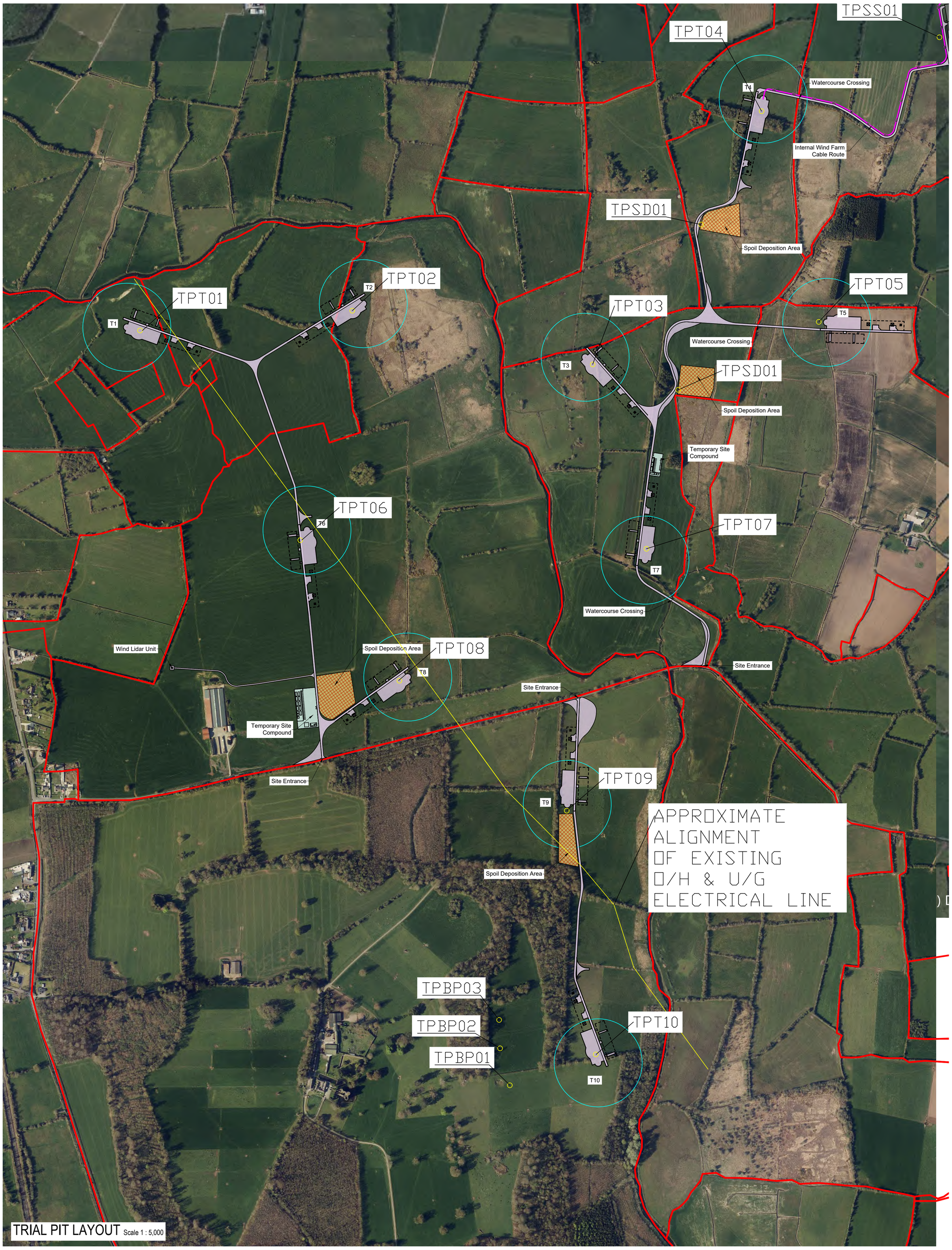
Contractor to check for underground and overhead utilities/services at each trial pit location prior to commencement of excavations

All locations to be checked with CAT & Genny

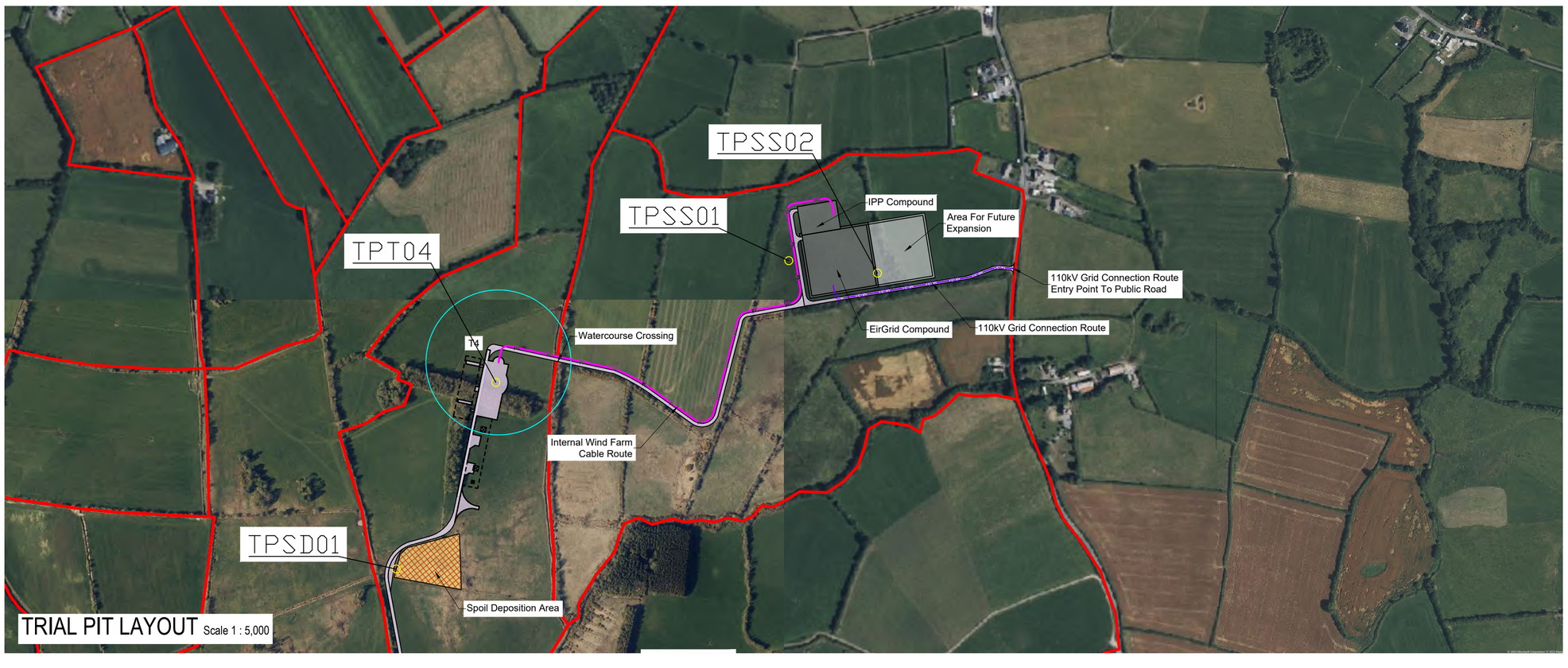
Trial pits can be moved up to 25m away from the proposed locations without confirmation from the Engineer. Engineer to be consulted where moves greater than 25m are required.

ITM Coordinates for Trial Pits

	X	Y
TP T01	612073	663326
TP T02	612580	663374
TP T03	613154	663245
TP T04	613557	663850
TP T05	613694	663347
TP T06	612455	662826
TP T07	613282	662805
TP T08	612692	662490
TP T09	613092	662180
TP T10	613161	661598
TP SS01	613982	664026
TP SS02	614111	664008
TP BP01	612956	661524
TP BP02	612933	661613
TP BP03	612930	661680
TPSD01	613413	663579



TRIAL PIT LAYOUT Scale 1 : 5,000



TRIAL PIT LAYOUT Scale 1 : 5,000

REV	DATE	DESCRIPTION	BY	APP
P01	12.12.23	Issued For Information	JK	PC

PROJECT: Brittas Wind Farm

TITLE: Trial Pit Layout

CLIENT: Ørsted

MWP
ENGINEERING AND ENVIRONMENTAL CONSULTANTS
CORK | TRALEE | LONDON | LIMERICK
mwp.ie

DRAWN:	CHECKED:	APPROVED:
JK	PC	PC
PROJECT NUMBER:	DATE:	SCALE @ A1:
23318	December 2023	1 : 5,000
STATUS DESCRIPTION: FOR INFORMATION		STATUS: S2

DRAWING NUMBER: 23318 - MWP - 00 - 00 - SK - C - 1003 REV: P01

APPENDIX B
Trial Pit Logs

Northwest Geotech

Site Brittas Wind Farm			**Trial Pit Number** TPBP01
Machine : 12 T Tracked Excavator **Method :** TP	**Dimensions** 3.5mX1mX1.4m	**Ground Level (mOD)** 106.02	**Client** Orsted	**Job Number** 23-1008
	Location 612956 E 661524 N	**Dates** 16/12/2023-16/01/2024	**Project Contractor** NWG	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
				105.82	(0.20) 0.20	TOPSOIL		
					(1.20)	Soft to firm brown slightly sandy slightly gravely CLAY with low to medium cobble and boulder content. Sand is fine to coarse. Gravel is sub angular fine to coarse of mixed lithologies predominantly limestone. Cobbles and boulders are sub angular up to 300mm of limestone.		
				104.62	1.40	Complete at 1.40m		

Plan

Remarks

Refusal on possible bedrock
Backfilled with arisings
Trial pit dry
Moderate stability

Scale (approx)	Logged By	Figure No.
1:50	AO	23-1008.TPBP01

Produced by the GEOtechnical DAtabase SYstem (GEODASY) © all rights reserved

Northwest Geotech

Site Brittas Wind Farm			**Trial Pit Number** TPBP02
Machine : 12 T Tracked Excavator **Method :** Trial Pit	**Dimensions** 3.6mX1mX1.8m	**Ground Level (mOD)** 108.00	**Client** Orsted	**Job Number** 23-1008
	Location 612934 E 661615 N	**Dates** 16/12/2023-16/01/2024	**Project Contractor** NWG	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
				107.80	(0.20) 0.20	TOPSOIL		
						Soft to firm brown slightly sandy slightly gravely CLAY with low cobble and boulder content. Sand is fine to coarse. Gravel is sub angular fine to coarse of mixed lithologies predominantly limestone. Cobbles and boulders are up to 300mm of limestone.		
					(1.60)			
				106.20	1.80	Complete at 1.80m		

Plan

Remarks

Refusal on possible bedrock
Backfilled with arisings
Trial pit dry
Moderate stability

Scale (approx)	Logged By	Figure No.
1:50	AO	23-1008.TPBP02

Produced by the GEOtechnical DAtabase SYstem (GEODASY) © all rights reserved

Northwest Geotech

Site Brittas Wind Farm			**Trial Pit Number** TPBP03
Machine : 12 T Tracked Excavator **Method :** TP	**Dimensions** 3.6mX1mX1.8m	**Ground Level (mOD)** 108.13	**Client** Orsted	**Job Number** 23-1008
	Location 612929 E 661687 N	**Dates** 16/12/2023-16/01/2024	**Project Contractor** NWG	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
				107.88	(0.25) 0.25	TOPSOIL		
					(0.55)	Firm brown slightly sandy slightly gravely CLAY with medium cobble content. Sand is fine to coarse. Gravel is sub angular fine to coarse of mixed lithologies predominantly limestone. Cobbles are of limestone.		
				107.33	0.80			
					(1.00)	Light brown silty gravely fine to coarse SAND with high cobble and boulder content. Gravel is sub angular fine to coarse of mixed lithologies predominantly limestone. Cobbles and boulders are up to 400mm of limestone.		
				106.33	1.80	Complete at 1.80m		

Plan

Remarks

Refusal on possible bedrock
Backfilled with arisings
Trial pit dry
Moderate stability

Scale (approx)	Logged By	Figure No.
1:50	AO	23-1008.TPBP03

Produced by the GEOtechnical DAtabase SYstem (GEODASY) © all rights reserved

Northwest Geotech

Site Brittas Wind Farm			**Trial Pit Number** TPSD01
Machine : 12 T Tracked Excavator **Method :** TP	**Dimensions** 3.8mX1.2mX4m	**Ground Level (mOD)**	**Client** Orsted	**Job Number** 23-1008
	Location	**Dates** 17/12/2023	**Project Contractor** NWG	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.35) 0.35	TOPSOIL		
					(0.35) 0.70	Soft light brown organic SILT.		
					(1.00) 1.70	Soft dark grey organic slightly sandy SILT. Sand is fine to coarse.		
					(1.20) 2.90	Soft to firm brown slightly sandy slightly gravely SILT. Sand is fine to coarse. Gravel is sub angular fine to coarse of mixed lithologies predominantly limestone.		
					(0.30) 3.20	`Firm brown slightly sandy slightly gravely CLAY. Sand is fine to coarse. Gravel is sub angular fine to coarse of mixed lithologies predominantly limestone.		
					(0.20) 3.40	Dense brown slightly sandy subangular fine to coarse GRAVEL of mixed lithologies predominently limestone with high cobble content. Sand is fine to coarse. Cobbles are up to 200mm of limestone.		
						Complete at 3.40m		

Plan

Remarks

Terminated due to collapse
Backfilled with arisings
Groundwater: 3.2 steady flow
Moderate to poor stability

Scale (approx)	Logged By	Figure No.
1:50	AO	23-1008.TPSD01

Produced by the GEOtechnical DAtabase SYstem (GEODASY) © all rights reserved

Northwest Geotech

Site Brittas Wind Farm			**Trial Pit Number** TPSS01
Machine : 12 T Tracked Excavator **Method :** TP	**Dimensions** 1.2mX3.7mX3.2m	**Ground Level (mOD)** 106.00	**Client** Orsted	**Job Number** 23-1008
	Location 613983.5 E 664024.5 N	**Dates** 17/12/2023	**Project Contractor** NWG	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.50)	TOPSOIL (peaty)		
				105.50	0.50	Soft dark grey organic slightly sandy SILT. Sand is fine to coarse.		
					(0.60)			
				104.90	1.10	Soft light brown SILT		
					(1.10)			
				103.80	2.20	Brown silty slightly gravely fine to coarse SAND with low cobble content. Gravel is sub angular fine to coarse of mixed lithologies predominantly limestone. Cobbles are up to 200mm of limestone.		
					(1.00)			
				102.80	3.20	Complete at 3.20m		

Plan

Remarks

Terminated due to collapse and water
Backfilled with arisings
Surface water entering pit groundwater strike 2.2m steady flow
Poor stability

Scale (approx)	Logged By	Figure No.
1:50	AO	23-1008.TPSS01

Produced by the GEOtechnical DAtabase SYstem (GEODASY) © all rights reserved

Northwest Geotech

Site Brittas Wind Farm			**Trial Pit Number** TPSS02
Machine : 12 T Tracked Excavator **Method :** TP	**Dimensions** 1.2mX3.6mX3m	**Ground Level (mOD)** 106.76	**Client** Orsted	**Job Number** 23-1008
	Location 614111 E 664007.9 N	**Dates** 17/12/2023	**Project Contractor** NWG	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.40)	TOPSOIL (peaty)		
				106.36	0.40			
					(0.50)	Stiff greyish brown organic slightly sandy SILT. Sand is fine to coarse.		
				105.86	0.90			
					(1.00)	Firm to stiff grey slightly sandy slightly gravely SILT with low cobble content. Sand is fine to coarse. Gravel is sub angular fine to coarse of mixed lithologies predominantly limestone. Cobbles are of limestone.		
				104.86	1.90			
					(1.10)	Dense grey silty sandy subangular fine to coarse GRAVEL of mixed lithologies predominently limestone with medium cobble content. Sand is fine to coarse. Gravel is sub angular fine to coarse of mixed lithologies predominantly limestone. Cobbles are of limestone.		
				103.76	3.00			
						Complete at 3.00m		

Plan

Remarks

Terminated due to collapse
Backfilled with arisings
Groundwater seepage at 3m
Poor stability

Scale (approx)	Logged By	Figure No.
1:50	AO	23-1008.TPSS02

Produced by the GEOtechnical DAtabase SYstem (GEODASY) © all rights reserved

Northwest Geotech

Site Brittas Wind Farm			**Trial Pit Number** TPT03
Machine : 12 T Tracked Excavator **Method :** TP	**Dimensions** 3.5mX1mX3.8m	**Ground Level (mOD)** 97.40	**Client** Orsted	**Job Number** 23-1008
	Location 613282 E 662804.5 N	**Dates** 16/12/2023	**Project Contractor** NWG	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
				97.20	(0.20) 0.20	TOPSOIL		
				96.90	(0.30) 0.50	Soft plastic fiberous PEAT.		
					(1.30)	Soft grey slightly sandy slightly gravelly SILT with low cobble content. Sand is fine to coarse. Gravel is sub angular fine to coarse of mixed lithologies predominantly limestone. Cobbles are up to 200mm of limestone.		
				95.60	1.80			
					(1.50)	Firm grey with brown mottling slightly sandy slightly gravely CLAY with low cobble and boulder content. Sand is fine to coarse. Gravel is sub angular fine to coarse of mixed lithologies predominantly limestone. Cobbles and boulders are up to 300mm of limestone.		
				94.10	3.30			
					(0.70)	Stiff brown slightly sandy slightly gravely CLAY with low cobble and boulder content. Sand is fine to coarse. Gravel is sub angular fine to coarse of mixed lithologies predominantly limestone. Cobbles and boulders are up to 300mm of limestone.		
				93.40	4.00	Complete at 4.00m		

Plan

Remarks

Schedule depth reached
Backfilled with arisings
Seepage at 3.8m
Moderate stability

Scale (approx)	Logged By	Figure No.
1:50	AO	23-1008.TPT03

Produced by the GEOtechnical DAtabase SYstem (GEODASY) © all rights reserved

Northwest Geotech

Site Brittas Wind Farm			**Trial Pit Number** TPT04
Machine : 12 T Tracked Excavator **Method :** TP	**Dimensions** 1.2mX3.6mX3m	**Ground Level (mOD)**	**Client** Orsted	**Job Number** 23-1008
	Location	**Dates** 16/12/2023	**Project Contractor** NWG	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.30) 0.30	TOPSOIL		
					(0.80) 1.10	Soft greyish brown sandy slightly gravely SILT. Sand is fine to coarse. Gravel is sub angular fine to coarse of mixed lithologies predominantly limestone		
					(0.65) 1.75	Medium dense brown silty fine to coarse SAND.		
					(1.25) 3.00	Dense grey slightly silty slightly sandy subangular fine to coarse GRAVEL with high cobble content. Sand is fine to coarse. Cobbles are of limestone.		
						Complete at 3.00m		

Plan

Remarks

Terminated due to collapse
Backfilled with arisings
Groundwater:1.7m Seepage, 2.3m steady flow
Poor stability

Scale (approx)	Logged By	Figure No.
1:50	AO	23-1008.TPT04

Produced by the GEOtechnical DAtabase SYstem (GEODASY) © all rights reserved

Northwest Geotech

Site Brittas Wind Farm			**Trial Pit Number** TPT05
Machine : 12 T Tracked Excavator **Method :** TP	**Dimensions** 3.6mX1.2mX4m	**Ground Level (mOD)** 100.22	**Client** Orsted	**Job Number** 23-1008
	Location 613693.9 E 663347.2 N	**Dates** 17/12/2023	**Project Contractor** NWG	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
				99.97	(0.25) 0.25	TOPSOIL		
						Soft to firm brown slightly sandy slightly gravely CLAY with low to medium cobble content. Sand is fine to coarse. Gravel is sub angular fine to coarse of mixed lithologies predominantly limestone. Cobbles are sub angular up to 200mm of limestone.		
				98.72	(1.25) 1.50	Soft to firm brown slightly sandy gravely CLAY with medium cobble and boulder content. Sand is fine to coarse. Gravel is sub angular fine to coarse of mixed lithologies predominantly limestone. Cobbles are sub angular up to 200mm of limestone.		
				96.22	(2.50) 4.00	Complete at 4.00m		

Plan

Remarks

Schedule depth achieved
Backfilled with arisings
Groundwater seepage at 3.5m
Moderate stability

Scale (approx)	Logged By	Figure No.
1:50	AO	23-1008.TPT05

Produced by the GEOtechnical DAtabase SYstem (GEODASY) © all rights reserved

Northwest Geotech

Site Brittas Wind Farm			**Trial Pit Number** TPT07
Machine : 12 T Tracked Excavator **Method :** TP	**Dimensions** 3.6mX1.1mX3.8m	**Ground Level (mOD)** 97.19	**Client** Orsted	**Job Number** 23-1008
	Location 613282 E 662804.5 N	**Dates** 16/12/2023	**Project Contractor** NWG	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
				96.94	(0.25) 0.25	TOPSOIL		
						Firm light brown with grey mottling slightly sandy slightly gravely CLAY with medium to high cobble and boulder content. Sand is fine to coarse. Gravel is sub angular fine to coarse of mixed lithologies predominantly limestone. Cobbles and boulders are up to 400mm of limestone.		
				95.39	(1.55) 1.80			
						Firm brown slightly sandy slightly gravely CLAY with medium to high cobble and boulder content. Sand is fine to coarse. Gravel is sub angular fine to coarse of mixed lithologies predominantly limestone. Cobbles and boulders are up to 300mm of limestone.		
				93.39	(2.00) 3.80			
						Complete at 3.80m		

Plan

Remarks

Terminated due to collapse
Backfilled with arisings
Trial pit dry
Poor stability

Scale (approx)	Logged By	Figure No.
1:50	AO	23-1008.TPT07

Produced by the GEOtechnical DAtabase SYstem (GEODASY) © all rights reserved

Northwest Geotech

Site Brittas Wind Farm			**Trial Pit Number** TPT09
Machine : 12 T Tracked Excavator **Method :** TP	**Dimensions** 3.7mX1.1mX3.5m	**Ground Level (mOD)** 98.88	**Client** Orsted	**Job Number** 23-1008
	Location 613092.4 E 662179.7 N	**Dates** 16/12/2023	**Project Contractor** NWG	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.30)	TOPSOIL		
				98.58	0.30	Soft brownish grey slightly silty slightly sandy slightly gravely CLAY with medium cobble content. Sand is fine to coarse. Gravel is sub angular fine to coarse of mixed lithologies predominantly limestone. Cobbles are up to 200mm of limestone.		
					(1.50)			
				97.08	1.80	Soft brown slightly silty slightly sandy slightly gravely CLAY with medium cobble content. Sand is fine to coarse. Gravel is sub angular fine to coarse of mixed lithologies predominantly limestone. Cobbles are up to 200mm of limestone.		
					(1.00)			
				96.08	2.80	Very stiff dark brown slightly silty slightly sandy slightly gravely CLAY with high cobble content. Sand is fine to coarse. Gravel is sub angular fine to coarse of mixed lithologies predominantly limestone. Cobbles are up to 200mm of limestone.		
					(0.70)			
				95.38	3.50	Complete at 3.50m		

Plan

Remarks

Terminated due to collapse
Backfilled with arisings
Trial pit dry
Poor stability

Scale (approx)	Logged By	Figure No.
1:50	AO	23-1008.TPT09

Produced by the GEOtechnical DAtabase SYstem (GEODASY) © all rights reserved

Northwest Geotech

Site Brittas Wind Farm			**Trial Pit Number** TPT1
Machine : 13T Excavator **Method :** Trial Pit	**Dimensions** 1.2mX3.5mX2.2m	**Ground Level (mOD)** 98.57	**Client** Orsted	**Job Number** 23-1008
	Location 612074.452 E 663326.766 N	**Dates** 03/02/2024	**Project Contractor** NWG	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
				98.32	(0.25) 0.25	TOPSOIL		
					(1.15)	Soft to firm brown slightly sandy slightly gravely CLAY with low cobble and boulder content. Sand is fine to coarse. Gravel is sub angular fine to coarse of mixed lithologies predominantly limestone. Cobbles and boulders are up to 300mm of limestone.		
			Water strike(1) at 1.40m.	97.17	1.40			▽1
					(0.80)	Firm brown slightly sandy slightly gravely CLAY with medium cobble content. Sand is fine to coarse. Gravel is sub angular fine to coarse of mixed lithologies predominantly limestone. Cobbles are of limestone.		
			Water strike(2) at 2.20m.	96.37	2.20			▽2
						Complete at 2.20m		

Plan

Remarks

Backfilled with arisings
Groundwater strike 1.4m
Poor stability
Refusal on possible bedrock

Scale (approx)	Logged By	Figure No.
1:50	AO	23-1008.TPT1

Produced by the GEOtechnical DAtabase SYstem (GEODASY) © all rights reserved

Northwest Geotech

Site Brittas Wind Farm			**Trial Pit Number** TPT10
Machine : 12 T Tracked Excavator **Method :** TP	**Dimensions** 3.6X1.2X3.8	**Ground Level (mOD)** 97.77	**Client** Orsted	**Job Number** 23-1008
	Location 613161 E 661598 N	**Dates** 16/12/2023	**Project Contractor** NWG	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
				97.57	(0.20) 0.20	TOPSOIL		
					(0.80)	Firm brown sandy slightly gravely CLAY. Sand is fine to coarse. Gravel is sub angular fine to coarse of mixed lithologies predominantly limestone.		
				96.77	1.00	Soft brownish grey slightly sandy slightly gravely CLAY with low cobble and boulder content. Sand is fine to coarse. Gravel is sub angular fine to coarse of mixed lithologies predominantly limestone. Cobbles and boulders are up to 300mm of limestone.		
					(2.20)			
				94.57	3.20	Stiff to very stiff dark brown slightly sandy slightly gravely CLAY with low cobble content. Sand is fine to coarse. Gravel is sub angular fine to coarse of mixed lithologies predominantly limestone. Cobbles are of limestone.		
					(0.60)			
				93.97	3.80	Complete at 3.80m		

Plan

Remarks

Terminated due to stability
Backfilled with arisings
Trial pit dry
Poor stability

Scale (approx)	Logged By	Figure No.
1:50	AO	23-1008.TPT10

Produced by the GEOtechnical DAtabase SYstem (GEODASY) © all rights reserved

Northwest Geotech

Site Brittas Wind Farm			**Trial Pit Number** TPT2
Machine : 12 T Tracked Excavator **Method :** TP	**Dimensions** 1.2mX4.5mX3.6m	**Ground Level (mOD)** 97.60	**Client** Orsted	**Job Number** 23-1008
	Location 612579.723 E 663374.625 N	**Dates** 03/02/2024	**Project Contractor** NWG	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.40)	TOPSOIL		
				97.20	0.40	Soft to firm brown slightly sandy slightly gravely SILT. Sand is fine to coarse. Gravel is sub angular fine to coarse of mixed lithologies predominantly limestone.		
					(0.80)			
			Water strike(1) at 1.20m.	96.40	1.20	Soft to firm brown slightly sandy slightly gravely CLAY with low cobble and boulder content. Sand is fine to coarse. Gravel is sub angular fine to coarse of mixed lithologies predominantly limestone. Cobbles and boulders are up to 300mm of limestone.		▽1
					(1.60)			
			Water strike(2) at 2.80m.	94.80	2.80	Stiff brown slightly sandy slightly gravely CLAY with low cobble and boulder content. Sand is fine to coarse. Gravel is sub angular fine to coarse of mixed lithologies predominantly limestone. Cobbles and boulders are up to 300mm of limestone.		▽2
					(0.80)			
				94.00	3.60	Complete at 3.60m		

Plan

Remarks

Refusal due to collapse
Backfilled with arisings
Poor stability

Scale (approx)	Logged By	Figure No.
1:50	AO	23-1008.TPT2

Produced by the GEOtechnical DAtabase SYstem (GEODASY) © all rights reserved

Northwest Geotech

Site Brittas Wind Farm			**Trial Pit Number** TPT6
Machine : 13 T Tracked Excavator **Method :** TP	**Dimensions** 1.2mX4mX1.6m	**Ground Level (mOD)** 105.27	**Client** Orsted	**Job Number** 23-1008
	Location 612454.984 E 662826.06 N	**Dates** 03/02/2024	**Project Contractor** NWG	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
				105.02	(0.25) 0.25	TOPSOIL		
					(0.45)	Soft to firm brown slightly sandy slightly gravely SILT with low to medium cobble and boulder content. Sand is fine to coarse. Gravel is sub angular fine to coarse of mixed lithologies predominantly limestone. Cobbles and boulders are sub angular up to 300mm of limestone.		
				104.57	0.70			
					(0.90)	Soft to firm brown slightly sandy slightly gravely CLAY with low to medium cobble and boulder content. Sand is fine to coarse. Gravel is sub angular fine to coarse of mixed lithologies predominantly limestone. Cobbles and boulders are sub angular up to 300mm of limestone.		
				103.67	1.60	Complete at 1.60m		

Plan

Remarks

Backfilled with arisings
Trial pit dry
Moderate stability
Refusal on possible bedrock

Scale (approx)	Logged By	Figure No.
1:50	AO	23-1008.TPT6

Produced by the GEOtechnical DAtabase SYstem (GEODASY) © all rights reserved

Northwest Geotech

Site Brittas Wind Farm			**Trial Pit Number** TPT8
Machine : 13T Tracked Excavator **Method :** TP	**Dimensions** 1.2mX4.3mX2.3m	**Ground Level (mOD)** 97.88	**Client** Orsted	**Job Number** 23-1008
	Location 612689.905 E 662491.138 N	**Dates** 03/02/2024	**Project Contractor** NWG	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.40)	TOPSOIL/PEAT		
				97.48	0.40	Firm brown slightly sandy slightly gravely CLAY with medium cobble content. Sand is fine to coarse. Gravel is sub angular fine to coarse of mixed lithologies predominantly limestone. Cobbles are of limestone.		
					(0.60)			
				96.88	1.00	Soft to firm brown slightly sandy slightly gravely CLAY with low to medium cobble and boulder content. Sand is fine to coarse. Gravel is sub angular fine to coarse of mixed lithologies predominantly limestone. Cobbles and boulders are sub angular up to 300mm of limestone.		
					(1.30)			
				95.58	2.30	Complete at 2.30m		

Plan

Remarks

Refusal on possible bedrock
Backfilled with arisings
Trial pit dry
Moderate stability

Scale (approx)	Logged By	Figure No.
1:50	AO	23-1008.TPT8

Produced by the GEOtechnical DAtabase SYstem (GEODASY) © all rights reserved

APPENDIX C
Trial Pit Photos

TPBP01

Brittas Windfarm
Thurles Co. Tipperary
Report No: 23-1008
Jan 2024

TPBP01

Brittas Windfarm
Thurles Co. Tipperary
Report No: 23-1008
Jan 2024

TPBP02

Brittas Windfarm
Thurles Co. Tipperary
Report No: 23-1008
Jan 2024

TPBP02

Brittas Windfarm
Thurles Co. Tipperary
Report No: 23-1008
Jan 2024

TPBP03

Brittas Windfarm
Thurles Co. Tipperary
Report No: 23-1008
Jan 2024

TPBP03

Brittas Windfarm
Thurles Co. Tipperary
Report No: 23-1008
Jan 2024

TPSD01

Brittas Windfarm
Thurles Co. Tipperary
Report No: 23-1008
Jan 2024

TPSD01

Brittas Windfarm
Thurles Co. Tipperary
Report No: 23-1008
Jan 2024

TPSS01

Brittas Windfarm
Thurles Co. Tipperary
Report No: 23-1008
Jan 2024

TPSS01

Brittas Windfarm
Thurles Co. Tipperary
Report No: 23-1008
Jan 2024

TPSS02

Brittas Windfarm
Thurles Co. Tipperary
Report No: 23-1008
Jan 2024

TPSS02

Brittas Windfarm
Thurles Co. Tipperary
Report No: 23-1008
Jan 2024

TPT01

Brittas Windfarm
Thurles Co. Tipperary
Report No: 23-1008
Jan 2024

TPT01

Brittas Windfarm
Thurles Co. Tipperary
Report No: 23-1008
Jan 2024

TPT02

Brittas Windfarm
Thurles Co. Tipperary
Report No: 23-1008
Jan 2024

TPT02

Brittas Windfarm
Thurles Co. Tipperary
Report No: 23-1008
Jan 2024

TPT03

Brittas Windfarm
Thurles Co. Tipperary
Report No: 23-1008
Jan 2024

TPT03

Brittas Windfarm
Thurles Co. Tipperary
Report No: 23-1008
Jan 2024

TPT04

Brittas Windfarm
Thurles Co. Tipperary
Report No: 23-1008
Jan 2024

TPT04

Brittas Windfarm
Thurles Co. Tipperary
Report No: 23-1008
Jan 2024

TPT05

Brittas Windfarm
Thurles Co. Tipperary
Report No: 23-1008
Jan 2024

TPT05

Brittas Windfarm
Thurles Co. Tipperary
Report No: 23-1008
Jan 2024

TPT06

Brittas Windfarm
Thurles Co. Tipperary
Report No: 23-1008
Jan 2024

TPT06

Brittas Windfarm
Thurles Co. Tipperary
Report No: 23-1008
Jan 2024

TPT07

Brittas Windfarm
Thurles Co. Tipperary
Report No: 23-1008
Jan 2024

TPT07

Brittas Windfarm
Thurles Co. Tipperary
Report No: 23-1008
Jan 2024

TPT08

Brittas Windfarm
Thurles Co. Tipperary
Report No: 23-1008
Jan 2024

TPT08

Brittas Windfarm
Thurles Co. Tipperary
Report No: 23-1008
Jan 2024

TPT09

Brittas Windfarm
Thurles Co. Tipperary
Report No: 23-1008
Jan 2024

TPT09

Brittas Windfarm
Thurles Co. Tipperary
Report No: 23-1008
Jan 2024

TPT10

Brittas Windfarm
Thurles Co. Tipperary
Report No: 23-1008
Jan 2024

TPT10

Brittas Windfarm
Thurles Co. Tipperary
Report No: 23-1008
Jan 2024