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Ground Investigations Ireland

Lissinagroagh Wind Farm

Tobin Consulting Engineers

Ground Investigation Report

February 2022

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DOCUMENT CONTROL SHEET

Project Title	Lissinagroagh Wind Farm
Engineer	Tobin Consulting Engineers
Client	Coillte
Project No	10040-10-20
Document Title	Ground Investigation Report

Rev.	Status	Author(s)	Reviewed By	Approved By	Office of Origin	Issue Date
A	Final	M Sheehan	D MagLochlainn	C Finnerty	Dublin	07 February 2022

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APPENDICES

1.0 Preamble

On the instructions of Tobin Consulting Engineer, a site investigation was carried out by Ground Investigations Ireland Ltd., between October 2021 to February 2022 at the site of the proposed Wind Farm in Manorhamiliton Co. Leitrim.

2.0 Overview

2.1. Background

It is proposed to construct a Wind Farm with associated services and access roads at the proposed site. The site is currently greenfield and is situated on Coillte Forestry and Farmland in the hills around Dough Mountain to the North of Manorhamilton Town, Co. Leitrim. The proposed construction is envisaged to consist of pile foundations and pavement make up with some local excavations for services and plant.

2.2. Purpose and Scope

The purpose of the site investigation was to investigate subsurface conditions utilising a variety of investigative methods in accordance with the project specification. The scope of the work undertaken for this project included the following:

- Visit project site to observe existing conditions
- Carry out 36 No. Trial Pits to a maximum depth of 4.1m BGL
- Carry out 16 No. Russian Samples to a maximum depth of 2.50m BGL.
- Carry out 2 No. Rotary Core Boreholes to a maximum depth of 15m BGL
- Installation of 2 No. Groundwater monitoring wells
- Geotechnical & Environmental Laboratory testing
- Report with recommendations

3.0 Subsurface Exploration

3.1. General

During the ground investigation a programme of intrusive investigation specified by the Consulting Engineer was undertaken to determine the sub surface conditions at the proposed site. Regular sampling and in-situ testing was undertaken in the exploratory holes to facilitate the geotechnical descriptions and to enable laboratory testing to be carried out on the soil samples recovered during excavation and drilling.
The procedures used in this site investigation are in accordance with Eurocode 7 Part 2: Ground Investigation and testing (ISEN 1997 – 2:2007) and B.S. 5930:2015.

3.2. Trial Pits

The trial pits were excavated using a 13T Bog Master excavator at the locations shown in the exploratory hole location plan in Appendix 1. The locations were checked using a CAT scan to minimise the potential for encountering services during the excavation. The trial pits were sampled, logged and photographed by a Engineering Geologist prior to backfilling with arisings. Notes were made of any services, inclusions, pit stability, groundwater encountered and the characteristics of the strata encountered and are presented on the trial pit logs which are provided in Appendix 2 of this Report.

3.3. Russian Sampling

The Russian Peat Sampler is a side filling chambered-type sampler. This discrete point sampler is inserted in the closed (empty) position. Once the target depth is reached, the “T” handle is turned clockwise to initiate the sampling while the pivotal cover plate supports the cutting action of the bore. As the sampler is turned 180 degrees, the sharpened edge of the bore longitudinally cuts a semi-cylindrical shaped sample until the opposite side of the cover plate is contacted. The contained sample can now be recovered without risk of contamination by overlying sediments. The sample is extruded from the bore by a counter clockwise rotation where sample rests on cover plate ready for sectioning. The Russian sample records are provided in Appendix 3 of this Report.

3.4. Rotary Boreholes

The rotary coring was carried out by a track mounted T44 Beretta rig at the locations shown on the location plan in Appendix 1. The rotary boreholes were completed from the ground surface or alternatively, where noted on the individual borehole log, from the base of the cable percussion borehole where a temporary liner was installed to facilitate follow-on rotary coring.

The T44 Beretta is equipped with rubber tracks which allow for short travel on pavement surfaces avoiding any damage to the surface. The T44 Beretta utilises a triple tube core barrel system operated using a wireline drilling process. The outer barrel is rotated by the drill rods and at its lower end, carries the coring bit. The inner barrel is mounted on a swivel so that it does not rotate during the process. The third barrel or liner is placed within the second one to retain the core intact and to preserve as much as possible the fabric of the drilling stratum. The core is cut by the coring bit and passes to the inner liner. The core is brought up to the surface within the inner barrel on a small diameter wire rope or line attached to the “overshoot” recovery tool which is then placed into a core box in order of recovery. A drilling fluid, typically air mist or water flush is passed from the surface through hollow drill rods to the drill bit, and is used to cool the drill bit. Temporary casing is used in some situations to support unstable ground or to seal off fissures or voids. It should be noted that the rotary coring can only achieve limited recovery in overburden, particularly granular or weakly cemented strata due to the flushing medium washing away the cohesive fraction during coring. The recovery achieved, where required is noted on the borehole logs and core photographs are provided to allow assessment of the core recovered. The rotary borehole logs are provided in Appendix 4 of this Report.

3.5. Surveying

The exploratory hole locations have been recorded using a KQ GEO Technologies KQ-M8 System which records the coordinates and elevation of the locations to ITM as required by the project specification. The coordinates and elevations are provided on the exploratory hole logs in the appendices of this Report.

3.6. Groundwater Monitoring Installations

Groundwater Monitoring Installation were installed upon the completion of the boreholes to enable sampling and the determination of the equilibrium groundwater level. The typical groundwater monitoring installation consists of a 50mm uPVC/HDPE slotted pipe with a pea gravel response zone and bentonite seal installed to the Engineers specification. Where required the standpipe is sealed with a gas tap and finished with a durable steel cover fixed in place with a concrete surround. The installation details are provided on the exploratory hole logs in the appendices of this Report.

3.7. Laboratory Testing

Samples were selected from the exploratory holes for a range of geotechnical and environmental testing to assist in the classification of soils and to provide information for the proposed design.
Environmental & Chemical testing as required by the specification, including pH and organic matter content was carried out by Element Materials Technology Laboratory in the UK.
Geotechnical testing consisting of moisture content, Atterberg limits, Particle Size Distribution (PSD), hydrometer, and 2.5kg Vibrating Rammer Compaction tests were carried out in NMTL's Geotechnical Laboratory in Carlow and PROSOILS laboratory in the UK.
The results of the laboratory testing are included in Appendix 5 of this Report.

4.0 Ground Conditions

4.1. General

The ground conditions encountered during the investigation are summarised below with reference to insitu and laboratory test results. The full details of the strata encountered during the ground investigation are provided in the exploratory hole logs included in the appendices of this report.

The sequence of strata encountered were variable across the site and generally comprised;

- Topsoil
- Made Ground
- Peat Deposits
- Granular Deposits
- Cohesive Deposits
- Bedrock

TOPSOIL: Topsoil was encountered in the majority of exploratory holes and was present to a maximum depth of 0.3m BGL.

MADE GROUND: Made Ground deposits were encountered beneath the Topsoil in TP05 and was present to a depth of 0.44m BGL. These deposits were described generally as *Light brown slightly clayey sandy angular to subangular fine to coarse Gravel.*

PEAT DEPOSITS: Peat deposits were encountered in the majority of trial pit locations. These deposits were typically described as *dark brown slightly sandy slightly gravelly pseudo fibrous PEAT* and were generally present to depths ranging between 0.30m and 1.30m BGL. At location TP38 and TP35 peat deposits was encountered to depths of 2.30m BGL and 3.50m BGL respectively.

COHESIVE DEPOSITS: Cohesive deposits were encountered beneath the Peat and were described typically as *brown*, *grey brown* or *blue grey* slightly *sandy slightly gravelly CLAY with occasional cobbles and boulders*. The secondary sand and gravel constituents varied across the site and with depth, with granular lenses occasionally present in the cohesive till matrix. The strength of the cohesive deposits typically increased with depth and was firm becoming firm to stiff or stiff in the majority of the exploratory holes. These deposits had some, occasional or frequent cobble and boulder content where noted on the exploratory hole logs.

GRANULAR DEPOSITS: Granular deposits were also encountered beneath the PEAT deposits and were typically described as G*rey brown slightly clayey slightly sandy angular to subangular fine to coarse GRAVEL with occasional cobbles and rare boulders.* The secondary sand/gravel and silt/clay constituents

varied across the site and with depth while occasional or frequent cobble and boulder content also present where noted on the exploratory hole logs.

BEDROCK: The rotary core borehole BH01 recovered *Medium strong to strong grey mottled orange fine to medium grained SANDSTONE with some clay smearing and banding interbedded with strong thinly to thickly laminated grey fine grain SILTSTONE with some clay smearing and banding*. At borehole location BH02 rotary core recovered *Strong thinly laminated to thickly bedded grey fine grain fossiliferous LIMESTONE with many clay ands and some cavities*.
The depth to rock varies from 2.70m BGL in BH01 to a maximum of 4.00m BGL in BH02. The total core recovery is good, typically 100% with some of the uppermost runs dropping to 80 or 90%. The SCR and RQD both are relatively poor in the upper weathered zone, often recovered as non-intact, however both indices show an increase with depth in each of the boreholes.

4.2. Groundwater

Groundwater strikes are noted on the exploratory hole logs where they occurred and where possible drilling or excavations were suspended for twenty minutes to allow the subsequent rise in groundwater to be recorded. We would point out that these exploratory holes did not remain open for sufficiently long periods of time to establish the hydrogeological regime and groundwater levels would be expected to vary with the tide, time of year, rainfall, nearby construction and other factors. For this reason, standpipes were installed in BH01 and BH02 to allow the equilibrium groundwater level to be determined.

4.3. Laboratory Testing

4.3.1. Geotechnical Laboratory Testing

The geotechnical testing carried out on soil samples recovered generally confirm the descriptions on the logs with the primary constituent of the cohesive deposits found to be a CLAY of low to intermediate plasticity. The Particle Size Distribution tests confirm that generally the cohesive deposits are well-graded with percentages of sands and gravels ranging between 2% and 39% generally with fines contents of 35% to 88%.
The Particle Size Distribution tests confirm that generally the granular deposits are gap graded with percentages of silt/clay typically 21% with a gravel/sand content of typically 45%.

4.3.2. Chemical Laboratory Testing

The pH testing carried out indicate that the pH results are acidic. Organic matter content ranged from 1.80% to 82.40%

The results from the completed laboratory testing is included in Appendix 5 of this report.

5.0 Recommendations & Conclusions

5.1. General

The recommendations given and opinions expressed in this report are based on the findings as detailed in the exploratory hole records. Where an opinion is expressed on the material between exploratory hole locations, this is for guidance only and no liability can be accepted for its accuracy. No responsibility can be accepted for conditions which have not been revealed by the exploratory holes. Limited information has been provided at the ground investigation stage and any designs based on the recommendations or conclusions should be completed in accordance with the current design codes, taking into account the variation and the specific details contained within the exploratory hole logs.

5.2. Foundations

Generally foundations on stiff cohesive deposits are feasible, however the density and nature of the underlying deposits should be assessed prior to the details design.

Wind Turbine Locations

Where wind turbine foundations are proposed, it is recommended to carry our dynamic probes to establish the allowable bearing capacity of the overburden deposits. Boreholes to establish the underlying strata details are also recommended

5.3. Excavations

Short term temporary excavations in the cohesive deposits will remain stable for a limited time only and will require to be appropriately battered or the sides supported if the excavation is below 1.25m BGL or is required to permit man entry.

Excavations in the Made Ground, Peat or soft Cohesive Deposits will require to be appropriately battered or the sides supported due to the low strength of these deposits.

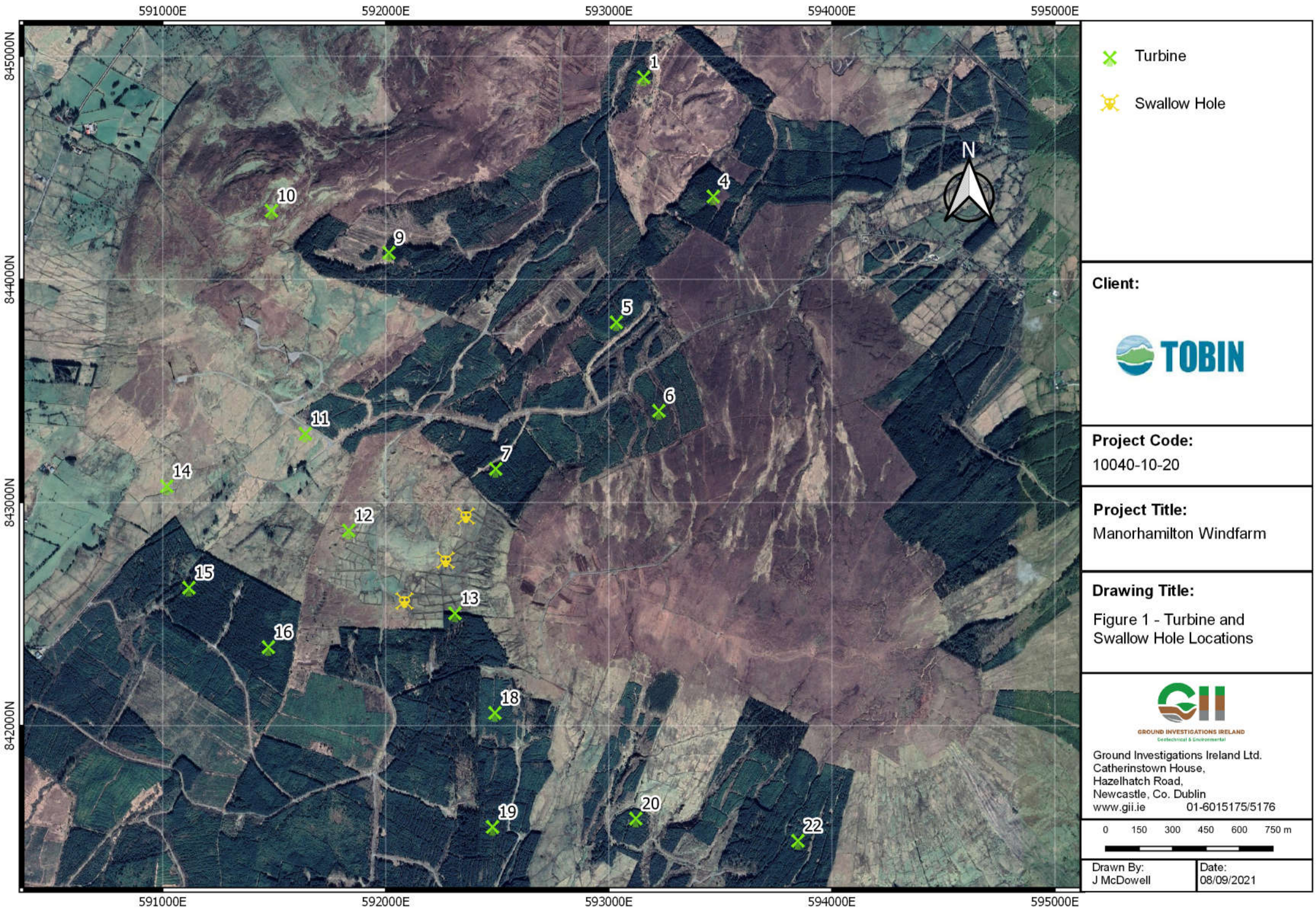
Any excavations which penetrate the granular deposits will require to be appropriately battered or the sides supported and are likely to require dewatering due to the groundwater seepages noted in the exploratory hole logs in the Appendices of this Report.

The groundwater and stability noted on the trial pit logs should be consulted when determining the most appropriate construction methods for excavations.

Any waste material to be removed off site should be disposed of to a suitably licenced landfill.

The recommendations provided in this report should be verified in the design of the proposed buildings, using the full details of the loading conditions and taking into consideration the allowable tolerable settlements/movements that the building can accommodate. The founding strata should be inspected and verified by a suitably qualified engineer prior to construction of the building foundations.

APPENDIX 1 - Site Location Plan



Client:

TOBIN

Project Code:
10040-10-20

Project Title:
Manorhamilton Windfarm

Drawing Title:
Figure 1 - Turbine and Swallow Hole Locations

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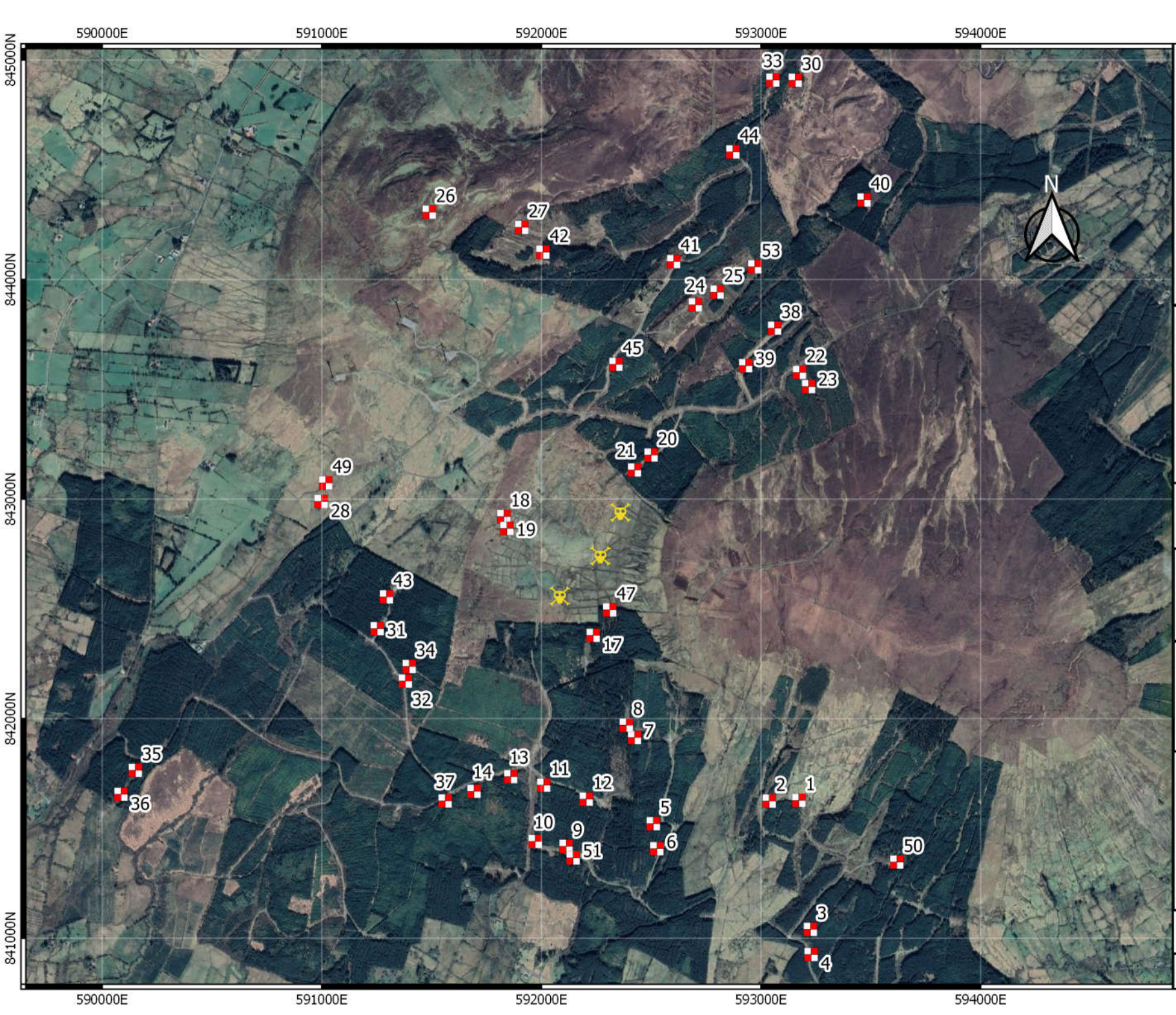
0 150 300 450 600 750 m

Drawn By:	Date:
J McDowell	08/09/2021



Client:

TOBIN

Project Code:
10040-10-20

Project Title:
Manorhamilton Windfarm

Drawing Title:
Figure 1 - Turbine and Swallow Hole Locations

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0 150 300 450 600 750 m

Drawn By:	Date:
J McDowell	08/09/2021

Gouge

Swallow Hole

Client:

TOBIN

Project Code:
10040-10-20

Project Title:
Manorhamilton Windfarm

Drawing Title:
Figure 1 - Turbine and Swallow Hole Locations

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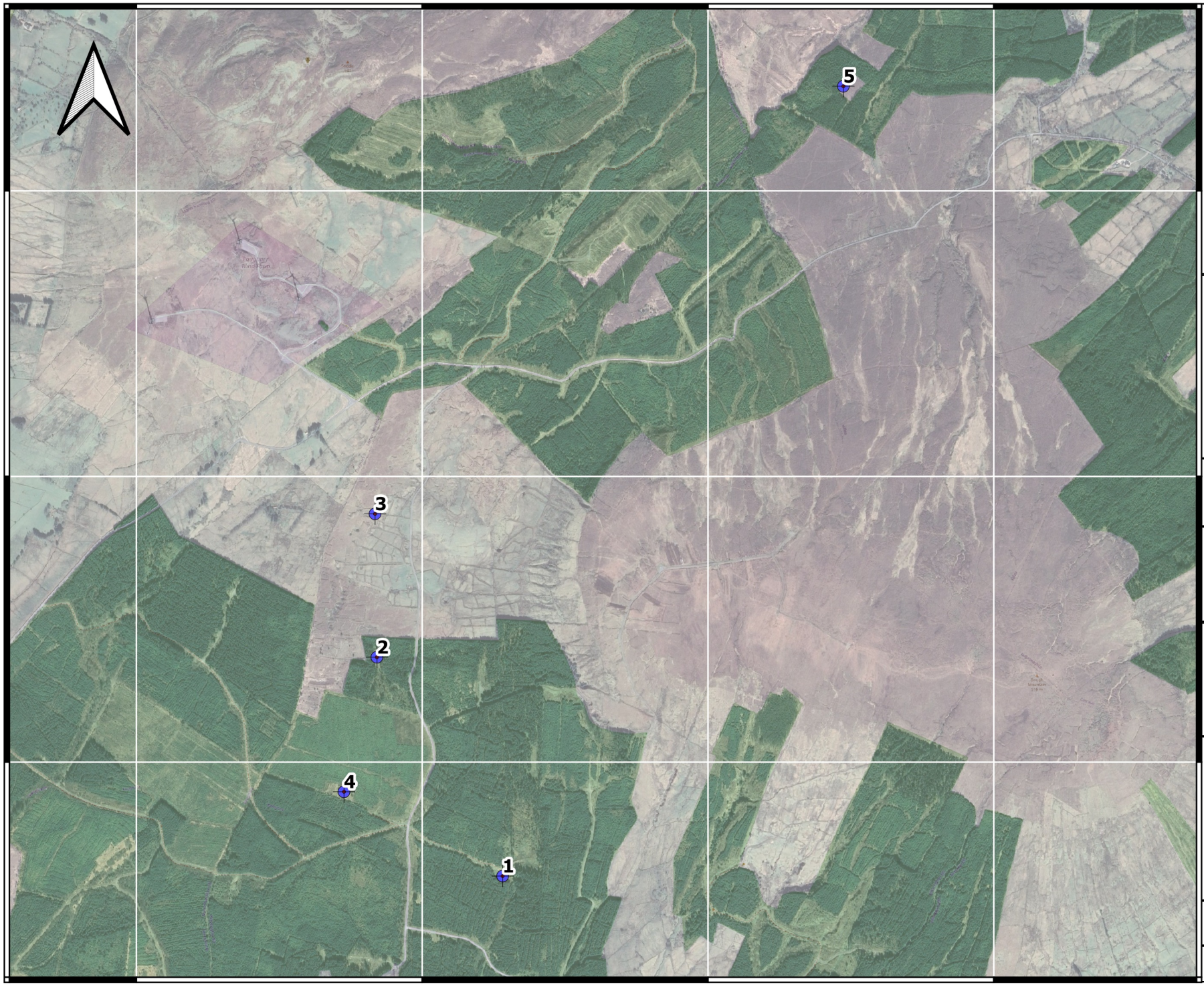
0 150 300 450 600 750 m

Drawn By:	Date:
J McDowell	08/09/2021



Boreholes

Client:

TOBIN

Project Code:
10040-10-20

Project Title:
Manorhamilton Windfarm

Drawing Title:
Figure 1 Borehole Locations

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0 250 500 750 m

Drawn By:	Date:
JS	30/09/21

APPENDIX 2 – Trial Pit Records

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Site Manorhamilton Windfarm			**Trial Pit Number** TP02
Machine : 13 Tonne Tracked Excavator **Method :** Trial Pit	**Dimensions** 2.50m x 1.00m x 3.70m (L x W x D)	**Ground Level (mOD)**	**Client** Tobin	**Job Number** 10040-10-20
	Location	**Dates** 06/10/2021	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
			medium seepage(1) at 0.00m.		(0.30)	Soft dark brown slightly sandy slightly gravelly Peat TOPSOIL with grass and rootlets		▽1
					0.30			
0.50	I 40.00kPa		40,41,39/Av. 40.00			Soft to firm dark brown slightly sandy slightly gravelly pseudo fibrous PEAT with occasional tree stumps		
0.50	T							
0.50	R 34.00kPa		35,35,32/Av. 34.00		(0.70)			
					1.00			
1.00	I 52.67kPa		55,50,53/Av. 52.67			Firm dark brown slightly sandy slightly gravelly pseudo fibrous PEAT with occasional tree stumps		
1.00	T							
1.00	R 44.33kPa		45,42,46/Av. 44.33		(0.30)			
					1.30			
			medium seepage(2) at 1.50m.			Greyish black slightly clayey slightly sandy angular to subangular fine to coarse GRAVEL with occasional angular to subangular cobbles and boulders		▽2
2.00	B							
					(2.40)			
3.00	B							
						OBSTRUCTION at 3.70m BGL		
					3.70	Complete at 3.70m		

Plan

Remarks

Surface water encountered (medium seepage). Groundwater encountered at 1.50m (medium seepage)
Side walls stable
Shear vane attempted at 0.50m and 1.00m
Trial pit terminated at 3.70m due to presumed bedrock or boulder
Trial pit backfilled on completion

Scale (approx)	Logged By	Figure No.
1:25	M.Sheehan	10040-10-20.TP02

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Site Manorhamilton Windfarm			**Trial Pit Number** TP04
Machine : 13 Tonne Tracked Excavator **Method :** Trial Pit	**Dimensions** 2.40m x 1.00m x 2.50m (L x W x D)	**Ground Level (mOD)**	**Client** Tobin	**Job Number** 10040-10-20
	Location	**Dates** 06/10/2021	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.10) 0.10	Soft dark brown slightly sandy slightly gravelly Peat TOPSOIL with grass and rootlets		
					(0.50)	Soft to firm dark brown slightly sandy slightly gravelly pseudo fibrous PEAT		
0.50	I 31.33kPa		32,32,30/Av. 31.33		0.60			
0.50	T					Firm brownish grey slightly sandy slightly gravelly silty CLAY with occasional angular to subangular cobbles		
0.50	R 28.33kPa		28,30,27/Av. 28.33		(0.30)			
					0.90			
1.00	B					Stiff bluish grey slightly sandy slightly gravelly silty CLAY with occasional angular to subrounded cobbles and boulders		
					(1.60)			
2.00	B					OBSTRUCTION at 2.50m BGL		
					2.50	Complete at 2.50m		

Plan

Remarks

No groundwater encountered
Side walls stable
Shear vane attempted at 0.50m and 1.00m (too stiff at 1.00m)
Trial pit terminated at 2.50m due to presumed bedrock or boulder
Trial pit backfilled on completion

Scale (approx)	Logged By	Figure No.
1:25	M.Sheehan	10040-10-20.TP04

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Site Manorhamilton Windfarm			**Trial Pit Number** TP05
Machine : 13 Tonne Tracked Excavator **Method :** Trial Pit	**Dimensions** 2.90m x 1.00m x 3.70m (L x W x D)	**Ground Level (mOD)**	**Client** Tobin	**Job Number** 10040-10-20
	Location	**Dates** 04/10/2021	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					0.05	Soft dark brown slightly sandy slightly gravelly Peat TOPSOIL with grass and rootlets		
					(0.39)	MADE GROUND: Light brown slightly clayey sandy angular to subangular fine to coarse Gravel		
					0.44			
0.50	T				(0.16)	Firm brown slightly sandy slightly gravelly clayey pseudo fibrous PEAT with tree stumps		
					0.60			
1.00	B				(1.10)	Firm bluish grey slightly sandy slightly gravelly silty CLAY with occasional angular to subrounded cobbles		
					1.70			
2.00	B				(2.00)	Stiff bluish grey slightly sandy slightly gravelly silty CLAY with occasional angular to subangular cobbles and some angular to subangular boulders		
3.00	B					OBSTRUCTION at 3.70m BGL		
					3.70	Complete at 3.70m		

Plan

Remarks

No groundwater encountered
Side walls stable
Shear vane attempted at 0.50m and 1.00m (too granular and tree stumps)
Trial pit terminated at 3.70m due to presumed bedrock or boulder
Trial pit backfilled on completion

Scale (approx)	Logged By	Figure No.
1:25	M.Sheehan	10040-10-20.TP05

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Site Manorhamilton Windfarm			**Trial Pit Number** TP06
Machine : 13 Tonne Tracked Excavator **Method :** Trial Pit	**Dimensions** 3.00m x 1.00m x 4.10m (Lx W x D)	**Ground Level (mOD)**	**Client** Tobin	**Job Number** 10040-10-20
	Location	**Dates** 04/10/2021	**Engineer**	**Sheet** 1/2

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
			slow seepage(1) at 0.00m.		(0.30)	Soft dark brown slightly sandy slightly gravelly Peat TOPSOIL with grass and rootlets		▽1
					0.30			
0.50	B				(0.50)	Firm greyish brown slightly sandy slightly gravelly silty CLAY with occasional angular to subangular cobbles		
					0.80			
1.00	B				(1.10)	Stiff grey slightly sandy slightly gravelly silty CLAY with occasional angular to subangular cobbles (large water content)		
					1.90			
2.00	B				(1.90)	Stiff grey slightly sandy slightly gravelly silty CLAY with occasional angular to subangular cobbles and boulders		
3.00	B				3.80			
4.00	B				(0.30)	Light brown slightly sandy clayey angular to subangular fine to coarse GRAVEL with occasional angular to subangular cobbles and boulders (weathered rock)		

Plan

Remarks

Surface water encountered (slow seepage)
Side walls stable
Shear vane attempted at 0.50m and 1.00m (too granular)
Trial pit terminated at 4.10m due to presumed bedrock or boulder
Trial pit backfilled on completion

Scale (approx)	Logged By	Figure No.
1:25	M.Sheehan	10040-10-20.TP06

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Site Manorhamilton Windfarm			**Trial Pit Number** TP06
Machine : 13 Tonne Tracked Excavator **Method :** Trial Pit	**Dimensions** 3.00m x 1.00m x 4.10m (Lx W x D)	**Ground Level (mOD)**	**Client** Tobin	**Job Number** 10040-10-20
	Location	**Dates** 04/10/2021	**Engineer**	**Sheet** 2/2

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					4.10	OBSTRUCTION at 4.10m BGL Complete at 4.10m		

Plan

Remarks

Scale (approx)	Logged By	Figure No.
1:25	M.Sheehan	10040-10-20.TP06

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Site Manorhamilton Windfarm			**Trial Pit Number** TP09
Machine : 13 Tonne Tracked Excavator **Method :** Trial Pit	**Dimensions** 2.80m x 1.00m x 3.40m (L x W x D)	**Ground Level (mOD)**	**Client** Tobin	**Job Number** 10040-10-20
	Location	**Dates** 04/10/2021	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.10) 0.10	Soft dark brown slightly sandy slightly gravelly Peat TOPSOIL with grass and rootlets		
						Soft dark brown slightly sandy slightly gravelly fibrous PEAT with tree stumps		
0.50	T				(0.70)			
					0.80	Soft to firm light brown sandy slightly gravelly slightly silty CLAY with occasional angular to subangular cobbles		
1.00	I 35.33kPa		35,36,35/Av. 35.33		(0.40)			
1.00	B							
1.00	R 30.67kPa		31,31,30/Av. 30.67		1.20	Firm bluish grey slightly sandy slightly gravelly slightly silty slightly peaty CLAY with occasional angular to subangular cobbles		
					(0.30)			
					1.50	Stiff bluish grey slightly sandy slightly gravelly slightly silty CLAY with occasional angular to subangular cobbles and boulders		
2.00	B							
					(1.90)			
3.00	B							
						OBSTRUCTION at 3.40m BGL		
					3.40	Complete at 3.40m		

Plan

Remarks

No groundwater encountered
Side walls stable
Shear vane attempted at 0.50m and 1.00m (too many tree stumps at 0.50m)
Trial pit terminated at 3.40m due to presumed bedrock or boulder
Trial pit backfilled on completion

Scale (approx)	Logged By	Figure No.
1:25	M.Sheehan	10040-10-20.TP09

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Site Manorhamilton Windfarm			**Trial Pit Number** TP10
Machine : 13 Tonne Tracked Excavator **Method :** Trial Pit	**Dimensions** 2.40m x 1.00m x 3.00m (L x W x D)	**Ground Level (mOD)**	**Client** Tobin	**Job Number** 10040-10-20
	Location	**Dates** 04/10/2021	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.60)	Soft to firm brown slightly sandy slightly gravelly fibrous PEAT with tree stumps and an organic odour		
0.50 0.50 0.50	I 37.33kPa T R 31.33kPa		38,38,36/Av. 37.33 32,30,32/Av. 31.33		0.60			
1.00	B				(1.20)	Firm bluish grey slightly sandy gravelly silty CLAY with occasional angular to subrounded cobbles		
2.00	B				1.80	Stiff bluish grey slightly sandy gravelly silty CLAY with occasional angular to subrounded cobbles and boulders		
					(1.20)	OBSTRUCTION at 3.00m BGL		
3.00	B		slow seepage(1) at 3.00m.		3.00	Complete at 3.00m		▽1

Plan

Remarks

Groundwater encountered at 3.00m (slow seepage)
Side walls stable
Shear vane attempted at 0.50m and 1.00m (too stiff at 1.00m)
Trial pit terminated at 3.00m due to presumed bedrock or boulder
Trial pit backfilled on completion

Scale (approx)	Logged By	Figure No.
1:25	M.Sheehan	10040-10-20.TP10

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Site Manorhamilton Windfarm			**Trial Pit Number** TP11
Machine : 13 Tonne Tracked Excavator **Method :** Trial Pit	**Dimensions** 2.70m x 1.00m x 2.40m (L x W x D)	**Ground Level (mOD)**	**Client** Tobin	**Job Number** 10040-10-20
	Location	**Dates** 04/10/2021	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.30)	Soft dark brown slightly sandy slightly gravelly Peat TOPSOIL with grass and rootlets		
					0.30			
					(0.20)	Soft greyish brown slightly sandy gravelly silty CLAY with occasional angular to subangular cobbles and boulders		
0.50	B				0.50			
						Firm bluish grey slightly sandy slightly gravelly silty CLAY with occasional angular to subangular cobbles		
1.00	B				(1.00)			
					1.50			
						Stiff bluish grey slightly sandy slightly gravelly silty CLAY with occasional angular to subangular cobbles and boulders		
2.00	B				(0.90)			
						OBSTRUCTION at 2.40m BGL		
					2.40	Complete at 2.40m		

Plan

Remarks

No groundwater encountered
Side walls stable
Shear vane attempted at 0.50m and 1.00m (too stiff and granular)
Trial pit terminated at 2.40m due to presumed bedrock or boulder
Trial pit backfilled on completion

Scale (approx)	Logged By	Figure No.
1:25	M.Sheehan	10040-10-20.TP11

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Site Manorhamilton Windfarm			**Trial Pit Number** TP12
Machine : 13 Tonne Tracked Excavator **Method :** Trial Pit	**Dimensions** 2.00m x 1.00m 1.10m (L x W x D)	**Ground Level (mOD)**	**Client** Tobin	**Job Number** 10040-10-20
	Location	**Dates** 04/10/2021	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.30)	Soft dark brown slightly sandy slightly gravelly Peat TOPSOIL with grass and rootlets		
					0.30			
0.50	T				(0.70)	Dark brown/black slightly sandy slightly gravelly slightly clayey pseudo fibrous PEAT with occasional angular to subangular boulders and tree stumps		
1.00	B				1.00 (0.10) 1.10	Soft orangey brown slightly sandy gravelly CLAY with occasional angular to subangular cobbles and boulders OBSTRUCTION at 1.10m BGL		
						Complete at 1.10m		

Plan

Remarks

No groundwater encountered
Side walls stable
Shear vane attempted at 0.50m and 1.00m (too granular and tree stumps)
Trial pit terminated at 1.10m due to presumed bedrock or boulder
Trial pit backfilled on completion

Scale (approx)	Logged By	Figure No.
1:25	M.Sheehan	10040-10-20.TP12

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Site Manorhamilton Windfarm			**Trial Pit Number** TP13
Machine : 13 Tonne Tracked Excavator **Method :** Trial Pit	**Dimensions** 2.40m x 1.00m x 2.50m (L x W x D)	**Ground Level (mOD)**	**Client** Tobin	**Job Number** 10040-10-20
	Location	**Dates** 05/10/2021	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
			slow seepage(1) at 0.00m.		(0.20)	Soft dark brown slightly sandy slightly gravelly Peat TOPSOIL with grass and rootlets		▽1
					0.20			
					(0.40)	Soft to firm dark brown slightly sandy slightly gravelly pseudo fibrous PEAT		
0.50	I 32.33kPa		35,30,32/Av. 32.33					
0.50	T				0.60			
0.50	R 15.67kPa		16,17,14/Av. 15.67			Firm brownish grey slightly sandy gravelly slightly silty CLAY with occasional angular to subangular cobbles		
					(0.70)			
1.00	B							
					1.30			
						Firm grey mottled light brown slightly sandy gravelly silty CLAY with occasional angular to subangular cobbles and boulders		
					(1.20)			
2.00	B							
					2.50	OBSTRUCTION at 2.50m BGL		
						Complete at 2.50m		

Plan

Remarks

Surface water encountered (slow seepage)
Side walls stable
Shear vane attempted at 0.50m and 1.00m (too granular at 1.00m)
Trial pit terminated at 2.50m due to presumed bedrock or boulder
Trial pit backfilled on completion

Scale (approx)	Logged By	Figure No.
1:25	M.Sheehan	10040-10-20.TP13

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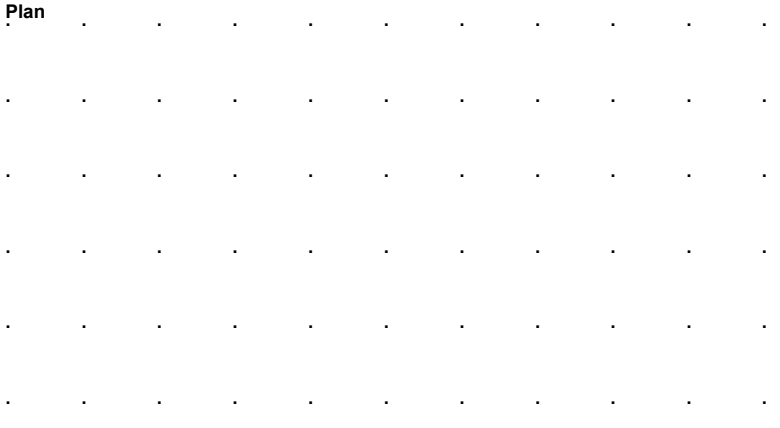
Site Manorhamilton Windfarm			**Trial Pit Number** TP14
Machine : 13 Tonne Tracked Excavator **Method :** Trial Pit	**Dimensions** 3.00m x 1.00m x 3.30m (L x W x D)	**Ground Level (mOD)**	**Client** Tobin	**Job Number** 10040-10-20
	Location	**Dates** 05/10/2021	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.30)	Soft dark brown slightly sandy slightly gravelly Peat TOPSOIL with grass and rootlets		
					0.30	Firm dark brown slightly sandy slightly gravelly fibrous PEAT		
0.50	I 42.00kPa		45,40,41/Av. 42.00					
0.50	T							
0.50	R 24.00kPa		25,25,22/Av. 24.00		(0.80)			
1.00	I 29.33kPa		35,25,28/Av. 29.33					
1.00	T				1.10			
1.00	R 15.33kPa		15,14,17/Av. 15.33			Firm greyish lightly orangey brown slightly sandy gravelly slightly silty CLAY with occasional angular to subangular cobbles and boulders		
					(1.00)			
2.00	B				2.10	Stiff greyish light orangey brown slightly sandy gravelly silty CLAY with occasional angular to subangular cobbles and boulders		
					(1.20)			
3.00	B					OBSTRUCTION at 3.30m BGL		
					3.30	Complete at 3.30m		

Plan



Remarks

No groundwater encountered
Side walls stable
Shear vane attempted at 0.50m and 1.00m
Trial pit terminated at 3.30m due to presumed bedrock or boulder
Trial pit backfilled on completion

Scale (approx)	Logged By	Figure No.
1:25	M.Sheehan	10040-10-20.TP14

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Site Manorhamilton Windfarm			**Trial Pit Number** TP17
Machine : 13 Tonne Tracked Excavator **Method :** Trial Pit	**Dimensions** 2.70m x 1.00m x 3.50m (L x W x D)	**Ground Level (mOD)**	**Client** Tobin	**Job Number** 10040-10-20
	Location	**Dates** 06/10/2021	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.30)	Soft dark brown slightly sandy slightly gravelly Peat TOPSOIL with grass and rootlets		
					0.30			
0.50	I 27.33kPa		28,26,28/Av. 27.33		(0.40)	Soft dark brown slightly sandy slightly gravelly pseudo fibrous PEAT		
0.50	T							
0.50	R 24.00kPa		25,23,24/Av. 24.00		0.70			
1.00	B				(0.90)	Firm bluish grey slightly sandy gravelly silty CLAY with occasional angular to subangular cobbles		
					1.60			
2.00	B				(1.90)	Stiff bluish grey slightly sandy gravelly silty CLAY with occasional angular to subangular cobbles and boulders		
3.00	B					OBSTRUCTION at 3.50m BGL		
					3.50	Complete at 3.50m		

Plan

Remarks

No groundwater encountered
Side walls stable
Shear vane attempted at 0.50m and 1.00m (too stiff at 1.00m)
Trial pit terminated at 3.50m due to bedrock or boulder
Trial pit backfilled on completion

Scale (approx)	Logged By	Figure No.
1:25	M.Sheehan	10040-10-20.TP17

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Site Manorhamilton Windfarm			**Trial Pit Number** TP20
Machine : 13 Tonne Tracked Excavator **Method :** Trial Pit	**Dimensions** 2.80m x 1.00m x 3.90m (L x W x D)	**Ground Level (mOD)**	**Client** Tobin	**Job Number** 10040-10-20
	Location	**Dates** 06/10/2021	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
			medium seepage(1) at 0.00m.		(0.20)	Soft dark brown slightly sandy slightly gravelly Peat TOPSOIL with grass and rootlets		▽1
					0.20			
					(0.40)	Soft dark brown slightly sandy slightly gravelly slightly clayey fibrous PEAT		
0.50	I 20.67kPa		22,20,20/Av. 20.67					
0.50	T				0.60			
0.50	R 11.67kPa		12,11,12/Av. 11.67			Soft brownish grey slightly sandy slightly gravelly silty CLAY with occasional angular to subangular cobbles		
					(0.70)			
1.00	I 32.00kPa		33,30,33/Av. 32.00					
1.00	B							
1.00	R 22.67kPa		22,22,24/Av. 22.67					
					1.30	Firm bluish grey slightly sandy gravelly silty CLAY with occasional angular to subangular cobbles and boulders		
					(0.40)			
					1.70	Stiff bluish grey slightly sandy gravelly silty CLAY with occasional angular to subangular cobbles and boulders		
2.00	B							
					(2.20)			
3.00	B							
						OBSTRUCTION at 3.90m BGL		
					3.90	Complete at 3.90m		

Plan

Remarks

Surface water encountered (medium seepage)
Side walls stable
Shear vane attempted at 0.50m and 1.00m
Trial pit terminated at 3.90m BGL
Trial pit backfilled on completion

Scale (approx)	Logged By	Figure No.
1:25	M.Sheehan	10040-10-20.TP20

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Site Manorhamilton Windfarm			**Trial Pit Number** TP21
Machine : 13 Tonne Tracked Excavator **Method :** Trial Pit	**Dimensions** 2.50m x 1.00m x 2.40m (L x W x D)	**Ground Level (mOD)**	**Client** Tobin	**Job Number** 10040-10-20
	Location	**Dates** 06/10/2021	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
			fast seepage(1) at 0.00m.		(0.30)	Soft dark brown slightly sandy slightly gravelly Peat TOPSOIL with grass and rootlets		▽1
					0.30			
0.50	B					Soft dark brown slightly sandy gravelly clayey pseudo fibrous PEAT		
					(1.00)			
1.00	B							
					1.30			
						Dark brown slightly sandy gravelly peaty CLAY with occasional angular to subangular cobbles and boulders		
					(1.10)			
2.00	B							
						OBSTRUCTION at 2.40m BGL		
					2.40	Complete at 2.40m		

Plan

Remarks

Surface water encountered (fast seepage)
Side walls stable
Shear vane attempted at 0.50m and 1.00m (too granular)
Trial pit terminated at 2.40m due to presumed bedrock or boulder
Trial pit backfilled on completion

Scale (approx)	Logged By	Figure No.
1:25	M.Sheehan	10040-10-20.TP21

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Site Manorhamilton Windfarm			**Trial Pit Number** TP22
Machine : 13 Tonne Tracked Excavator **Method :** Trial Pit	**Dimensions** 2.70m x 1.00m x 2.80m (L x W x D)	**Ground Level (mOD)**	**Client** Tobin	**Job Number** 10040-10-20
	Location	**Dates** 07/10/2021	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.10) 0.10	Soft dark brown slightly sandy slightly gravelly Peat TOPSOIL with grass and rootlets		
					(0.40)	Soft dark brown slightly sandy slightly gravelly fibrous PEAT with occasional tree stumps		
0.50	I 27.33kPa		28,28,26/Av. 27.33		0.50			
0.50	T					Soft brown sandy gravelly slightly silty CLAY with occasional angular to subangular cobbles		
0.50	R 21.00kPa		22,20,21/Av. 21.00		(0.30)			
					0.80			
1.00	B					Stiff bluish grey slightly sandy gravelly silty CLAY with occasional angular to subangular cobbles and boulders		
					(2.00)			
2.00	B					OBSTRUCTION at 2.80m BGL		
					2.80	Complete at 2.80m		

Plan

Remarks

No groundwater encountered
Side walls stable
Shear vane attempted at 0.50m and 1.00m (too stiff)
Trial pit terminated at 2.80m due to presumed bedrock or boulder
Trial pit backfilled on completion

Scale (approx)	Logged By	Figure No.
1:25	M.Sheehan	10040-10-20.TP22

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Site Manorhamilton Windfarm			**Trial Pit Number** TP24
Machine : 13 Tonne Tracked Excavator **Method :** Trial Pit	**Dimensions** 2.10m x 1.00m x 1.30m (L x W x D)	**Ground Level (mOD)**	**Client** Tobin	**Job Number** 10040-10-20
	Location	**Dates** 07/10/2021	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
			medium seepage(1) at 0.00m.		(0.20) 0.20	Soft dark brown slightly sandy slightly gravelly Peat TOPSOIL with grass and rootlets		▽1
						Soft dark brown slightly sandy slightly gravelly fibrous PEAT with tree stumps		
0.50 0.50 0.50	I 25.67kPa T R 22.33kPa		26,25,26/Av. 25.67 23,23,21/Av. 22.33		(1.00)			
1.00 1.00 1.00	I 30.67kPa T R 23.67kPa		31,30,31/Av. 30.67 24,21,26/Av. 23.67		1.20 (0.10) 1.30	Grey slightly sandy angular to subangular fine to coarse GRAVEL of Slate OBSTRUCTION at 1.30m BGL		
						Complete at 1.30m		

Plan

Remarks

Surface water encountered (medium seepage)
Side walls stable
Shear vane attempted at 0.50m and 1.00m
Trial pit terminated at 1.30m due to presumed bedrock or boulder
Trial pit backfilled on completion

Scale (approx)	Logged By	Figure No.
1:25	M.Sheehan	10040-10-20.TP24

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Site Manorhamilton Windfarm			**Trial Pit Number** TP25
Machine : 13 Tonne Tracked Excavator **Method :** Trial Pit	**Dimensions** 2.40m x 1.00m x 1.50m (L x W x D)	**Ground Level (mOD)**	**Client** Tobin	**Job Number** 10040-10-20
	Location	**Dates** 07/10/2021	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.10) 0.10	Soft dark brown slightly sandy slightly gravelly Peat TOPSOIL with grass and rootlets		
						Soft dark brown slightly sandy slightly gravelly fibrous PEAT with tree stumps		
0.50	I 28.67kPa		30,28,28/Av. 28.67					
0.50	T							
0.50	R 30.33kPa		31,31,29/Av. 30.33		(1.30)			
1.00	I 39.33kPa		40,41,37/Av. 39.33					
1.00	T							
1.00	R 30.33kPa		31,31,29/Av. 30.33					
					1.40 (0.10) 1.50	Grey slightly sandy angular to subangular fine to coarse GRAVEL with occasional angular to subangular cobbles and boulders		
						Complete at 1.50m		

Plan

Remarks

No groundwater encountered
Side walls stable
Shear vane attempted at 0.50m and 1.00m
Trial pit terminated at 1.50m due to presumed bedrock of boulder
Trial pit backfilled on completion

Scale (approx)	Logged By	Figure No.
1:25	M.Sheehan	10040-10-20.TP25

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Site Manorhamilton Windfarm			**Trial Pit Number** TP27
Machine : 13 Tonne Tracked Excvator **Method :** Trial Pit	**Dimensions** 2.60m x 1.00m x 2.10m (L x W x D)	**Ground Level (mOD)**	**Client** Tobin	**Job Number** 10040-10-20
	Location	**Dates** 08/10/2021	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.20)	Soft dark brown slightly sandy slightly gravelly Peat TOPSOIL with grass and rootlets		
					0.20			
						Firm dark brown slightly sandy slightly gravelly pseudo fibrous PEAT with some tree stumps		
0.50	I 35.00kPa		36,34,35/Av. 35.00					
0.50	T							
0.50	R 20.67kPa		20,22,20/Av. 20.67					
					(1.10)			
1.00	I 28.33kPa		30,27,28/Av. 28.33					
1.00	T							
1.00	R 12.33kPa		14,10,13/Av. 12.33					
			medium seepage(1) at 1.30m.		1.30			▽1
						Brownish grey sandy slightly clayey slightly silty angular to subangular fine to coarse GRAVEL with occasional angular to subangular cobbles and boulders		
					(0.80)			
2.00	B					OBSTRUCTION at 2.10m BGL		
					2.10	Complete at 2.10m		

Plan

Remarks

Groundwater encountered at 1.30m (medium seepage)
Side walls stable
Shear vane attempted at 0.50m and 1.00m
Trial pit terminated at 2.10m due to presumed bedrock or boulder
Trial pit backfilled at completion

Scale (approx)	Logged By	Figure No.
1:25	M.Sheehan	10040-10-20.TP27

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Site Manorhamilton Windfarm			**Trial Pit Number** TP28
Machine : 13 Tonne Tracked Excavator **Method :** Trial Pit	**Dimensions** 2.5m x 1.00m x 2.30m (L x W x D)	**Ground Level (mOD)**	**Client** Tobin	**Job Number** 10040-10-20
	Location	**Dates** 11/10/2021	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.20)	Soft dark brown slightly sandy slightly gravelly Peat TOPSOIL with grass and rootlets		
					0.20	Firm orangey brown mottled grey slightly sandy slightly gravelly silty CLAY with occasional angular to subangular cobbles and boulders		
0.50	I 53.33kPa		52,55,53/Av. 53.33					
0.50	B							
0.50	R 44.67kPa		45,46,43/Av. 44.67					
					(1.30)			
1.00	I 59.00kPa		60,59,58/Av. 59.00					
1.00	B							
1.00	R 44.00kPa		42,45,45/Av. 44.00					
					1.50	Stiff bluish grey slightly sandy gravelly slightly silty CLAY with occasional angular to subangular cobbles and boulders		
					(0.80)			
2.00	B					OBSTRUCTION at 2.30m BGL		
					2.30	Complete at 2.30m		

Plan

Remarks

No groundwater encountered
Side walls stable
Shear vane attempted at 0.50m and 1.00m
Trial pit terminated at 2.30m due to presumed bedrock or boulder
Trial pit backfilled on completion

Scale (approx)	Logged By	Figure No.
1:25	M.Sheehan	10040-10-20.TP28

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Site Manorhamilton Windfarm			**Trial Pit Number** TP31
Machine : 13 Tonne Tracked Excavator **Method :** Trial Pit	**Dimensions** 2.70m x 1.00m x 2.10m (L x W x D)	**Ground Level (mOD)**	**Client** Tobin	**Job Number** 10040-10-20
	Location	**Dates** 05/10/2021	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
			medium seepage(1) at 0.00m.		(0.20) 0.20	Soft dark brown slightly sandy slightly gravelly Peat TOPSOIL with grass and rootlets		▽1
0.50 0.50 0.50	I 24.67kPa T R 19.33kPa		25,24,25/Av. 24.67 20,20,18/Av. 19.33		(0.60)	Soft dark brown slightly sandy slightly gravelly pseudo fibrous PEAT with occasional tree stumps		
1.00	B				0.80 (1.00)	Firm bluish grey slightly sandy gravelly silty CLAY with occasional angular to subangular cobbles and boulders		
2.00	B				1.80 (0.30) 2.10	Stiff bluish grey sandy gravelly silty CLAY with occasional angular to subangular cobbles and boulders OBSTRUCTION at 2.10m BGL		
						Complete at 2.10m		

Plan

Remarks

Surface water encountered (medium seepage)
Side walls stable
Shear vane attempted at 0.50m and 1.00m (too stiff at 1.00m)
Trial pit terminated at 2.10m due to presumed boulder or bedrock
Trial pit backfilled on completion

Scale (approx)	Logged By	Figure No.
1:25	M.Sheehan	10040-10-20.TP31

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Site Manorhamilton Windfarm			**Trial Pit Number** TP32
Machine : 13 Tonne Tracked Excavator **Method :** Trial Pit	**Dimensions** 2.60m x 1.00m x 2.30m (L x W x D)	**Ground Level (mOD)**	**Client** Tobin	**Job Number** 10040-10-20
	Location	**Dates** 05/10/2021	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
			fast seepage(1) at 0.00m.		(0.20)	Soft dark brown slightly sandy slightly gravelly Peat TOPSOIL with grass and rootlets		▽1
					0.20	Very soft dark brown slightly sandy slightly gravelly fibrous PEAT with occasional tree stumps		
0.50 0.50 0.50	I 19.00kPa T R 14.67kPa		20,19,18/Av. 19.00 15,15,14/Av. 14.67		(0.70)			
					0.90	Firm bluish grey slightly sandy gravelly silty CLAY with occasional angular to subangular cobbles and boulders		
1.00 1.00 1.00	I 28.67kPa B R 26.67kPa		33,25,28/Av. 28.67 34,21,25/Av. 26.67					
			medium seepage(2) at 1.50m.		(1.40)			▽2
2.00	B					OBSTRUCTION at 2.30m BGL		
					2.30	Complete at 2.30m		

Plan

Remarks

Surface water encountered (fast seepage). Groundwater encountered at 1.50m (medium seepage)
Side walls stable
Shear vane attempted at 0.50m and 1.00m
Trial pit terminated at 2.30m due to presumed bedrock or boulder
Trial pit backfilled on completion

Scale (approx)	Logged By	Figure No.
1:25	M.Sheehan	10040-10-20.TP32

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Site Manorhamilton Windfarm			**Trial Pit Number** TP33
Machine : 13 Tonne Tracked Excavator **Method :** Trial Pit	**Dimensions** 2.30m x 1.00m x 2.20m (L x W x D)	**Ground Level (mOD)**	**Client** Tobin	**Job Number** 10040-10-20
	Location	**Dates** 07/10/2021	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
			medium seepage(1) at 0.00m.		(0.10) 0.10	Soft dark brown slightly sandy slightly gravelly Peat TOPSOIL with grass and rootlets		▽1
0.50	B				(1.30)	Firm brownish grey slightly sandy gravelly slightly silty CLAY with occasional angular to subangular cobbles and boulders		
1.00	B					OBSTRUCTION at 2.20m BGL		
2.00	B				1.40	Complete at 2.20m		

Plan

Remarks

Surface water encountered (medium seepage)
Side walls stable
Shear vane attempted at 0.50m and 1.00m (too granular)
Trial pit terminated at 2.20m due to presumed bedrock or boulder
Trial pit backfilled on completion

Scale (approx)	Logged By	Figure No.
1:25	M.Sheehan	10040-10-20.TP33

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Site Manorhamilton Windfarm			**Trial Pit Number** TP35
Machine : 13 Tonne Tracked Excavator **Method :** Trial Pit	**Dimensions** 2.30m x 1.00m x 1.80m (L x W x D)	**Ground Level (mOD)**	**Client** Tobin	**Job Number** 10040-10-20
	Location	**Dates** 05/10/2021	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
			slow seepage(1) at 0.00m.		0.05	Soft dark brown slightly sandy slightly gravelly Peat TOPSOIL with grass and rootlets		▽1
0.50	B				(0.95)	Firm to stiff bluish grey slightly sandy slightly gravelly silty CLAY with occasional angular to subangular cobbles and boulders		
1.00	B				1.00	Stiff bluish grey slightly sandy slightly gravelly silty CLAY with occasional angular to subangular cobbles and boulders		
					(0.80)	OBSTRUCTION at 1.80m BGL		
					1.80	Complete at 1.80m		

Plan

Remarks

Surface water encountered (slow seepage)
Side walls stable
Shear vane attempted at 0.50m and 1.00m (too stiff)
Trial pit terminated at 1.80m due to presumed bedrock or boulder
Trial pit backfilled on completion

Scale (approx)	Logged By	Figure No.
1:25	M.Sheehan	10040-10-20.TP35

Ground Investigations Ireland Ltd
www.gii.ie

Site Manorhamilton Windfarm			**Trial Pit Number** TP36
Machine : 13 Tonne Tracked Excavator **Method :** Trial Pit	**Dimensions** 2.10m x 1.00m x 1.60m (L x W x D)	**Ground Level (mOD)**	**Client** Tobin	**Job Number** 10040-10-20
	Location	**Dates** 05/10/2021	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.10) 0.10	Soft dark brown slightly sandy slightly gravelly Peat TOPSOIL with grass and rootlets		
0.50	B					Stiff blueish grey slightly sandy slightly gravelly silty CLAY with occasional angular to subangular cobbles and boulders		
1.00	B				(1.50)			
					1.60	OBSTRUCTION at 1.60m BGL Complete at 1.60m		

Plan

Remarks

No groundwater encountered
Side walls stable
Shear vane attempted at 0.50m and 1.00m (too stiff)
Trial pit terminated at 1.60m due to presumed bedrock or boulder
Trial pit backfilled on completion

Scale (approx)	Logged By	Figure No.
1:25	M.Sheehan	10040-10-20.TP36

Ground Investigations Ireland Ltd
www.gii.ie

Site Manorhamilton Windfarm			**Trial Pit Number** TP37
Machine : 13 Tonne Tracked Excavator **Method :** Trial Pit	**Dimensions** 2.60m x 1.00m x2.60m (L x W x D)	**Ground Level (mOD)**	**Client** Tobin	**Job Number** 10040-10-20
	Location	**Dates** 05/10/2021	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
			fast seepage(1) at 0.00m.		(0.10) 0.10	Soft dark brown slightly sandy slightly gravelly Peat TOPSOIL with grass and rootlets		▽1
						Very soft dark brown/black slightly sandy slightly gravelly pseudo fibrous PEAT		
0.50 0.50 0.50	I 19.67kPa T R 17.67kPa		18,22,19/Av. 19.67 16,19,18/Av. 17.67		(0.90)			
1.00 1.00 1.00	I 14.33kPa T R 10.00kPa		15,13,15/Av. 14.33 10,9,11/Av. 10.00		1.00	Firm bluish grey slightly sandy gravelly silty CLAY with occasional angular to subangular cobbles and boulders		
			medium seepage(2) at 1.50m.		(1.10)			▽2
2.00	B				2.10	Stiff bluish grey slightly sandy gravelly silty CLAY with occasional angular to subangular cobbles and boulders		
					(0.50)			
2.50	B					OBSTRUCTION at 2.60m BGL		
					2.60	Complete at 2.60m		

Plan

Remarks

No groundwater encountered
Side walls stable
Shear vane attempted at 0.50m and 1.00m
Trial pit terminated at 2.60m due to presumed bedrock or boulder
Trial pit backfilled on completion

Scale (approx)	Logged By	Figure No.
1:25	M.Sheehan	10040-10-20.TP37

Ground Investigations Ireland Ltd
www.gii.ie

Site Manorhamilton Windfarm			**Trial Pit Number** TP38
Machine : 13 Tonne Tracked Excavator **Method :** Trial Pit	**Dimensions** 2.70m x 1.00m x 3.70m (L x W x D)	**Ground Level (mOD)**	**Client** Tobin	**Job Number** 10040-10-20
	Location	**Dates** 06/10/2021	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
			slow seepage(1) at 0.00m.		(0.30)	Soft dark brown slightly sandy slightly gravelly Peat TOPSOIL with grass and rootlets		▽1
					0.30	Very soft dark brown slightly sandy slightly gravelly pseudo fibrous PEAT		
0.50 0.50 0.50	I 9.33kPa T R 3.25kPa		10,8,10/Av. 9.33 5,4,4,/Av. 3.25					
1.00 1.00 1.00	I 4.75kPa T R 3.67kPa		5,7,7,/Av. 4.75 2,4,5/Av. 3.67		(1.50)			
					1.80	Soft brownish grey slightly sandy gravelly peaty slightly silty CLAY		
2.00	B				(0.50)			
					2.30	Stiff bluish grey slightly sandy gravelly silty CLAY with occasional angular to subangular cobbles and boulders		
3.00	B				(1.40)	OBSTRUCTION at 3.70m BGL		
					3.70	Complete at 3.70m		

Plan

Remarks

Surface water encountered (slow seepage)
Side walls collapsing
Shear vane attempted at 0.50m and 1.00m
Trial pit terminated at 3.70m due to presumed bedrock or boulder
Trial pit backfilled on completion

Scale (approx)	Logged By	Figure No.
1:25	M.Sheehan	10040-10-20.TP38

Ground Investigations Ireland Ltd
www.gii.ie

Site Manorhamilton Windfarm			**Trial Pit Number** TP39
Machine : 13 Tonne Tracked Excavator **Method :** Trial Pit	**Dimensions** 2.60m x 1.00m x 3.80m (L x W x D)	**Ground Level (mOD)**	**Client** Tobin	**Job Number** 10040-10-20
	Location	**Dates** 06/10/2021	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
			slow seepage(1) at 0.00m.		(0.30)	Soft dark brown slightly sandy slightly gravelly Peat TOPSOIL with grass and rootlets		▽1
					0.30			
0.50	I 25.67kPa		26,25,26/Av. 25.67			Soft dark brown slightly sandy slightly gravelly fibrous PEAT with tree stumps		
0.50	T							
0.50	R 20.33kPa		20,21,20/Av. 20.33		(0.80)			
1.00	I 28.00kPa		28,29,27/Av. 28.00					
1.00	T							
1.00	R 23.33kPa		24,24,22/Av. 23.33		1.10			
						Firm bluish grey slightly sandy gravelly silty CLAY with occasional angular to subangular cobbles and boulders		
					(1.10)			
2.00	B							
					2.20			
						Stiff bluish grey slightly sandy gravelly silty CLAY with occasional angular to subangular cobbles and boulders		
					(1.60)			
3.00	B							
						OBSTRUCTION at 3.80m BGL		
					3.80			
						Complete at 3.80m		

Plan

Remarks

Surface water encountered (slow seepage)
Side walls stable
Shear vane attempted at 0.50m and 1.00m
Trial pit terminated at 3.80m due to presumed bedrock or boulder
Trial pit backfilled on completion

Scale (approx)	Logged By	Figure No.
1:25	M.Sheehan	10040-10-20.TP39

Ground Investigations Ireland Ltd
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Site Manorhamilton Windfarm			**Trial Pit Number** TP41
Machine : 13 Tonne Tracked Excavator **Method :** Trial Pit	**Dimensions** 2.50m x 1.00m x 2.50m (L x W x D)	**Ground Level (mOD)**	**Client** Tobin	**Job Number** 10040-10-20
	Location	**Dates** 07/10/2021	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.20) 0.20	Soft dark brown slightly sandy slightly gravelly Peat TOPSOIL with grass and rootlets		
					(0.40) 0.60	Soft dark brown slightly sandy slightly gravelly pseudo fibrous PEAT with tree stumps		
0.50	I 19.33kPa		17,18,23/Av. 19.33			Firm oragngey brown sandy gravelly slightly silty CLAY with occasional angular to subangular cobbles and boulders		
0.50	T							
0.50	R 10.00kPa		11,11,8/Av. 10.00					
1.00	B				(0.90) 1.50			
						Stiff oragngey brown sandy gravelly slightly silty CLAY with occasional angular to subangular cobbles and boulders		
2.00	B				(1.00) 2.50	OBSTRUCTION at 2.50m BGL		
						Complete at 2.50m		

Plan

Remarks

No groundwater encountered
Side walls stable
Shear vane attempted at 0.50m and 1.00m (too granular at 1.00m)
Trial pit terminated at 2.50m due to presumed bedrock or boulder
Trial pit backfilled on completion

Scale (approx)	Logged By	Figure No.
1:25	M.Sheehan	10040-10-20.TP41

Ground Investigations Ireland Ltd
www.gii.ie

Site Manorhamilton Windfarm			**Trial Pit Number** TP42
Machine : 13 Tonne Tracked Excavator **Method :** Trial Pit	**Dimensions** 2.60m x 1.00m x 2.20m (L x W x D)	**Ground Level (mOD)**	**Client** Tobin	**Job Number** 10040-10-20
	Location	**Dates** 08/10/2021	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.40)	Soft dark brown slightly sandy slightly gravelly Peat TOPSOIL with grass and rootlets		
0.50	I 17.33kPa		16,17,19/Av. 17.33		0.40	Very soft dark brown slightly sandy slightly gravelly pseudo fibrous PEAT with tree stumps		
0.50	T							
0.50	R 13.33kPa		14,14,12/Av. 13.33					
1.00	I 17.00kPa		16,19,16/Av. 17.00					
1.00	T							
1.00	R 14.00kPa		15,12,15/Av. 14.00		(1.80)			
2.00	I 23.33kPa		22,24,24/Av. 23.33			OBSTRUCTION at 2.20m BGL		
2.00	T							
2.00	R 13.67kPa		13,15,13/Av. 13.67		2.20	Complete at 2.20m		

Plan

Remarks

No groundwater encountered
Side walls stable
Shear vane attempted at 0.50m, 1.00m and 2.00m
Trial pit terminated at 2.20m due to presumed bedrock or boulder
Trial pit backfilled on completion

Scale (approx)	Logged By	Figure No.
1:25	M.Sheehan	10040-10-20.TP26

Ground Investigations Ireland Ltd
www.gii.ie

Site Manorhamilton Windfarm			**Trial Pit Number** TP43
Machine : 13 Tonne Tracked Excavator **Method :** Trial Pit	**Dimensions** 2.70m x 1.00m x 2.10m (L x W x D)	**Ground Level (mOD)**	**Client** Tobin	**Job Number** 10040-10-20
	Location	**Dates** 05/10/2021	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.10) 0.10	Soft dark brown slightly sandy slightly gravelly Peat TOPSOIL with grass and rootlets		
0.50	B					Stiff bluish grey slightly sandy slightly gravelly silty CLAY with occasional angular to subangular cobbles and boulders		
1.00	B				(2.00)			
2.00	B					OBSTRUCTION at 2.10m BGL		
					2.10	Complete at 2.10m		

Plan

Remarks

No groundwater encountered
Side walls stable
Shear vane attempted at 0.50m and 1.00m (too stiff)
Trial pit terminated at 2.10m due to presumed bedrock or boulder
Trial pit backfilled on completion

Scale (approx)	Logged By	Figure No.
1:25	M.Sheehan	10040-10-20.TP43

Ground Investigations Ireland Ltd
www.gii.ie

Site Manorhamilton Windfarm			**Trial Pit Number** TP44
Machine : 13 Tonne Tracked Excavator **Method :** Trial Pit	**Dimensions** 2.60m x 1.00m x 2.70m (L x W x D)	**Ground Level (mOD)**	**Client** Tobin	**Job Number** 10040-10-20
	Location	**Dates** 07/10/2021	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.50)	Soft dark brown slightly sandy slightly gravelly pseudo fibrous PEAT with occasional tree stumps		
0.50	I 23.00kPa		22,24,23/Av. 23.00		0.50			
0.50	T					Firm brown mottled grey sandy gravelly slightly silty CLAY with occasional angular to subangular cobbles and boulders		
0.50	R 18.67kPa		18,18,20/Av. 18.67					
					(0.90)			
1.00	I 42.67kPa		42,45,41/Av. 42.67					
1.00	B							
1.00	R 21.67kPa		20,25,20/Av. 21.67					
					1.40	Stiff brown mottled grey sandy gravelly slightly silty CLAY with occasional angular to subnagular cobbles and boulders		
2.00	B				(1.30)			
						OBSTRUCTION at 2.70m BGL		
					2.70	Complete at 2.70m		

Plan

Remarks

No groundwater encountered
Side walls stable
Shear vane attempted at 0.50m and 1.00m
Trial pit terminated at 2.70m due to presumed bedrock or boulder
Trial pit backfilled on completion

Scale (approx)	Logged By	Figure No.
1:25	M.Sheehan	10040-10-20.TP44

Ground Investigations Ireland Ltd
www.gii.ie

Site Manorhamilton Windfarm			**Trial Pit Number** TP45
Machine : 13 Tonne Tracked Excavator **Method :** Trial Pit	**Dimensions** 2.30m x 1.00m x 0.50m (L x W x D)	**Ground Level (mOD)**	**Client** Tobin	**Job Number** 10040-10-20
	Location	**Dates** 07/10/2021	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					0.05	Soft dark brown slightly sandy slightly gravelly Peat TOPSOIL with grass and rootlets		
					(0.45)	Soft brown sandy gravelly slightly silty CLAY with occasional angular to subangular cobbles and boulders OBSTRUCTION at 0.50m BGL		
0.50	B				0.50	Complete at 0.50m		

Plan

Remarks

No groundwater encountered
Side walls stable
No shear vane attempted(too granular)
Trial pit terminated at 0.50m BGL to to presumed bedrock
Trial pit backfilled on completion

Scale (approx)	Logged By	Figure No.
1:25	M.Sheehan	10040-10-20.TP45

Ground Investigations Ireland Ltd
www.gii.ie

Site Manorhamilton Windfarm			**Trial Pit Number** TP49
Machine : 13 Tonne Tracked Excavator **Method :** Trial Pit	**Dimensions** 2.80m x 1.00m x 2.70m (L x W x D)	**Ground Level (mOD)**	**Client** Tobin	**Job Number** 10040-10-20
	Location	**Dates** 11/10/2021	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
			slow seepage(1) at 0.00m.		(0.20)	Soft dark brown slightly sandy slightly gravelly Peat TOPSOIL with grass and rootlets		▽1
					0.20	Firm grey mottled orangey brown slightly sandy slightly gravelly silty CLAY with some angular to subangular cobbles and boulders		
0.50	I 47.33kPa		46,48,48/Av. 47.33					
0.50	B							
0.50	R 38.00kPa		39,37,38/Av. 38.00					
1.00	B				(1.60)			
					1.80	Stiff bluish grey slightly sandy gravelly silty CLAY with occasional angular to subangular cobbles and boulders		
2.00	B				(0.90)			
						OBSTRUCTION at 2.70m BGL		
					2.70	Complete at 2.70m		

Plan

Remarks

Surface water encountered (slow seepage)
Side walls stable
Shear vane attempted at 0.50m and 1.00m (too stiff at 1.00m)
Trial pit terminated at 2.70m due to presumed bedrock or boulders
Trial pit backfilled on completion

Scale (approx)	Logged By	Figure No.
1:25	M.Sheehan	10040-10-20.TP49

Ground Investigations Ireland Ltd
www.gii.ie

Site Manorhamilton Windfarm			**Trial Pit Number** TP50
Machine : 13 Tonne Tracked Excavator **Method :** Trial Pit	**Dimensions** 2.30m x 1.00m x 1.80m (Lx W x D)	**Ground Level (mOD)**	**Client** Tobin	**Job Number** 10040-10-20
	Location	**Dates** 06/10/2021	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.30)	Soft dark brown slightly sandy slightly gravelly Peat TOPSOIL with grass and rootlets		
					0.30			
0.50	B				(0.50)	Firm bluish grey slightly sandy gravelly silty CLAY with occasional angular to subangular cobbles		
					0.80			
1.00	B				(1.00)	Stiff orangey brown sandy gravelly slightly silty CLAY with sand lenses and occasional angular to subangular cobbles and boulders OBSTRUCTION at 1.80m BGL		
					1.80	Complete at 1.80m		

Plan

Remarks

Groundwater encountered at 0.90m (medium seepage)
Side walls stable
Shear vane attempted at 0.50m and 1.00m (too stiff)
Trial pit terminated at 1.80m due to presumed bedrock
Trial pit backfilled on completion

Scale (approx)	Logged By	Figure No.
1:25	M.Sheehan	10040-10-20.TP50

Ground Investigations Ireland Ltd
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Site Manorhamilton Windfarm			**Trial Pit Number** TP51
Machine : 13 Tonne Tracked Excavator **Method :** Trial Pit	**Dimensions** 2.50m x 1.00m x 1.80m (L x W x D)	**Ground Level (mOD)**	**Client** Tobin	**Job Number** 10040-10-20
	Location	**Dates** 04/10/2021	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.30)	Dark brown/black slightly sandy slightly gravelly fibrous PEAT		
0.30	T				0.30	Soft light brown sandy gravelly slightly silty CLAY with occasional angular to subangular cobbles and boulders		
0.50	I 27.33kPa		29,25,28/Av. 27.33		(0.60)			
0.50	B							
0.50	R 20.67kPa		21,20,21/Av. 20.67					
					0.90	Stiff bluish grey slightly sandy slightly gravelly silty CLAY with occasional angular to subangular cobbles and boulders		
1.00	B				(0.90)			
						OBSTRUCTION at 1.80m BGL		
					1.80	Complete at 1.80m		

Plan

Remarks

No groundwater encountered
Side walls stable
Shear vane attempted at 0.50m and 1.00m (too stiff at 1.00m)
Trial pit terminated at 1.80m due to presumed bedrock or boulder
Trial pit backfilled on completion

Scale (approx)	Logged By	Figure No.
1:25	M.Sheehan	10040-10-20.TP51

Ground Investigations Ireland Ltd
www.gii.ie

Site Manorhamilton Windfarm			**Trial Pit Number** TP53
Machine : 13 Tonne Tracked Excavator **Method :** Trial Pit	**Dimensions** 2.70m x 1.00m x 3.80m (L x W x D)	**Ground Level (mOD)**	**Client** Tobin	**Job Number** 10040-10-20
	Location	**Dates** 07/10/2021	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.30)	bluish grey slightly sandy gravelly silty CLAY with occasional angular to subangular cobbles and boulders		
					0.30	Soft dark brown slightly sandy slightly gravelly fibrous PEAT with tree stumps		
0.50	T							
1.00	T							
					(3.20)			
2.00	T							
3.50	B				3.50	Firm bluish grey slightly sandy slightly gravelly silty CLAY with occasional angular to subangular cobbles		
					(0.30)			
					3.80	Complete at 3.80m		

Plan

Remarks

No groundwater encountered
Side wall collapse
Shear vane not attempted (too unstable)
Trial pit terminated at 3.80m due to side walls collapse
Trial pit backfilled on completion

Scale (approx)	Logged By	Figure No.
1:25	M.Sheehan	10040-10-20.TP53

Manorhamilton Trial Pit Photographs.

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APPENDIX 3 –Russian Sample Records

Ground Investigations Ireland Ltd
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Site Manorhamilton Windfarm			**Number** RS01
Machine : Russian Sampler **Method :** Drive-in Windowless Sampler	**Dimensions**	**Ground Level (mOD)**	**Client** Tobin	**Job Number** 10040-10-20
	Location	**Dates** 16/11/2021	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.00-0.50	T				(0.50) 0.50	Soft brown slightly sandy slightly gravelly fibrous PEAT Refusal at 0.50m BGL Complete at 0.50m		

Remarks
Peat probe refused at 0.65m BGL
Russian Sampler refused at 0.50m BGL

Scale (approx)	Logged By
1:25	M.S & J.S

Figure No. 10040-10-20.RS01

Ground Investigations Ireland Ltd
www.gii.ie

Site Manorhamilton Windfarm			**Number** RS02
Machine : Russian Sampler **Method :** Drive-in Windowless Sampler	**Dimensions**	**Ground Level (mOD)**	**Client** Tobin	**Job Number** 10040-10-20
	Location	**Dates** 16/11/2021	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.00-0.20	T				(0.20)	Soft brown slightly sandy slightly gravelly pseudo-fibrous PEAT		
0.20-0.40	T				0.20 (0.20)	Soft grey slightly clayey slightly sandy slightly gravelly slightly peaty SILT		
					0.40	Refusal at 0.40m BGL Complete at 0.40m		

Remarks
Peat probe refused at 0.40m BGL
Russian Sampler refused at 0.40m BGL

Scale (approx)	Logged By
1:25	M.S & J.S

Figure No. 10040-10-20.RS02

Ground Investigations Ireland Ltd
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Site Manorhamilton Windfarm			**Number** RS03
Machine : Russian Sampler **Method :** Drive-in Windowless Sampler	**Dimensions**	**Ground Level (mOD)**	**Client** Tobin	**Job Number** 10040-10-20
	Location	**Dates** 17/11/2021	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.00-0.30	T				(0.30) 0.30	Soft dark brown slightly sandy slightly gravelly fibrous PEAT		
						Complete at 0.30m		

Remarks
Peat probe to 0.40m BGL
Russian Sampler to 0.30m BGL

Scale (approx)	Logged By
1:25	M.S & D.M

Figure No. 10040-10-20.RS03

Ground Investigations Ireland Ltd
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Site Manorhamilton Windfarm			**Number** RS04
Machine : Russian Sampler **Method :** Drive-in Windowless Sampler	**Dimensions**	**Ground Level (mOD)**	**Client** Tobin	**Job Number** 10040-10-20
	Location	**Dates** 16/11/2021	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.00-0.10	T				(0.10) 0.10	Soft brown slightly sandy slightly gravelly pseudo-fibrous PEAT Refusal at 0.10m BGL Complete at 0.10m		

Remarks
Peat probe refused at 0.10m BGL
Russian Sampler refused at 0.10m BGL

Scale (approx)	Logged By
1:25	M.S & J.S

Figure No. 10040-10-20.RS04

Ground Investigations Ireland Ltd
www.gii.ie

Site Manorhamilton Windfarm			**Number** RS05
Machine : Russian Sampler **Method :** Drive-in Windowless Sampler	**Dimensions**	**Ground Level (mOD)**	**Client** Tobin	**Job Number** 10040-10-20
	Location	**Dates** 16/11/2021	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.00-0.40	T				(0.40) 0.40	Soft brown slightly silty slightly sandy slightly gravelly pseudo-fibrous PEAT Refusal at 0.40m BGL Complete at 0.40m		

Remarks
Peat probe refused at 0.40m BGL
Russian Sampler refused at 0.40m BGL

Scale (approx)	Logged By
1:25	M.S & J.S

Figure No. 10040-10-20.RS05

Ground Investigations Ireland Ltd
www.gii.ie

Site Manorhamilton Windfarm			**Number** RS07
Machine : Russian Sampler **Method :** Drive-in Windowless Sampler	**Dimensions**	**Ground Level (mOD)**	**Client** Tobin	**Job Number** 10040-10-20
	Location	**Dates** 15/11/2021	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.00-0.35	T				(0.35) 0.35	Soft dark brown slightly sandy slightly gravelly pseudo fibrous PEAT with an organic odour Refusal at 0.35m BGL		
						Complete at 0.35m		

Remarks
Peat probe refused at 0.80m BGL
Russian Sampler 0.35m BGL

Scale (approx)	Logged By
1:25	M.S & J.S

Figure No. 10040-10-20.RS07

Ground Investigations Ireland Ltd
www.gii.ie

Site Manorhamilton Windfarm			**Number** RS08
Machine : Russian Sampler **Method :** Drive-in Windowless Sampler	**Dimensions**	**Ground Level (mOD)**	**Client** Tobin	**Job Number** 10040-10-20
	Location	**Dates** 15/11/2021	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.00-0.20	T				(0.20)	Soft dark brown slightly sandy slightly gravelly pseudo fibrous PEAT		
0.20-0.50	T				0.20	Soft greyish brown slightly sandy slightly gravelly silty CLAY		
					(0.30)			
					0.50	Refusal at 0.50m BGL		
						Complete at 0.50m		

Remarks
Peat probe refused at 0.60m BGL
Russian sampler refused at 0.50m BGL

Scale (approx)	Logged By
1:25	M.S & J.S

Figure No. 10040-10-20.RS08

Ground Investigations Ireland Ltd
www.gii.ie

Site Manorhamilton Windfarm			**Number** RS09
Machine : Russian Sampler **Method :** Drive-in Windowless Sampler	**Dimensions**	**Ground Level (mOD)**	**Client** Tobin	**Job Number** 10040-10-20
	Location	**Dates** 15/11/2021	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.00-0.25	T				(0.25) 0.25	Soft brown slightly sandy slightly gravelly fibrous PEAT		
0.25-1.00	T				(0.75) 1.00	Soft dark greyish brown silty clayey fibrous PEAT Refusal at 1.00m BGL		
						Complete at 1.00m		

Remarks
Peat probe refused at 1.10m BGL
Russian Sampler refused at 1.00m BGL

Scale (approx)	Logged By
1:25	M.S & J.S

Figure No. 10040-10-20.RS09

Ground Investigations Ireland Ltd
www.gii.ie

Site Manorhamilton Windfarm			**Number** RS10
Machine : Russian Sampler **Method :** Drive-in Windowless Sampler	**Dimensions**	**Ground Level (mOD)**	**Client** Tobin	**Job Number** 10040-10-20
	Location	**Dates** 15/11/2021	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.00-0.28	T				(0.28)	Soft dark brown slightly sandy slightly gravelly fibrous PEAT with an organic odour		
0.28-0.80	T				0.28 (0.52)	Soft brownish grey sandy slightly clayey slightly peaty SILT		
0.80-1.00	T				0.80 (0.20)	Firm bluish grey slightly sandy slightly gravelly silty CLAY Refusal at 1.00m BGL		
					1.00	Complete at 1.00m		

Remarks
Peat probe refused at 0.80m BGL
Russian sampler refused at 1.00m BGL

Scale (approx)	Logged By
1:25	M.S & J.S

Figure No. 10040-10-20.RS10

Ground Investigations Ireland Ltd
www.gii.ie

Site Manorhamilton Windfarm			**Number** RS11
Machine : Russian Sampler **Method :** Drive-in Windowless Sampler	**Dimensions**	**Ground Level (mOD)**	**Client** Tobin	**Job Number** 10040-10-20
	Location	**Dates** 15/11/2021	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.20) 0.20	Soft dark brown slightly sandy slightly gravelly pseudo fibrous PEAT Refusal at 0.20m BGL Complete at 0.20m		

Remarks
Peat probe refused at 0.30m BGL
Russian sampler refused at 0.20m BGL

Scale (approx)	Logged By
1:25	

Figure No. 10040-10-20.RS11

Ground Investigations Ireland Ltd
www.gii.ie

Site Manorhamilton Windfarm			**Number** RS12
Machine : Russian Sampler **Method :** Drive-in Windowless Sampler	**Dimensions**	**Ground Level (mOD)**	**Client** Tobin	**Job Number** 10040-10-20
	Location	**Dates** 16/11/2021	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.00-0.50	T				(0.50)	Soft dark brown slightly clayey slightly sandy slightly gravelly pseudo-fibrous PEAT Refusal at 0.50m BGL		
					0.50	Complete at 0.50m		

Remarks
Peat probe refused at 0.50m BGL
Russian Sampler refused at 0.50m BGL

Scale (approx)	Logged By
1:25	M.S & J.S

Figure No. 10040-10-20.RS12

Ground Investigations Ireland Ltd
www.gii.ie

Site Manorhamilton Windfarm			**Number** RS14
Machine : Russian Sampler **Method :** Drive-in Windowless Sampler	**Dimensions**	**Ground Level (mOD)**	**Client** Tobin	**Job Number** 10040-10-20
	Location	**Dates** 17/11/2021	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.00-0.50	T				(2.50)	Soft brown slightly sandy slightly gravelly fibrous PEAT		
1.00-1.50	T							
2.00-2.50	T				2.50	Complete at 2.50m		

Remarks
Peat probe to 2.70m BGL
Russian Sampler to 2.50m BGL

Scale (approx)	Logged By
1:25	M.S & D.M

Figure No. 10040-10-20.RS14

Ground Investigations Ireland Ltd
www.gii.ie

Site Manorhamilton Windfarm			**Number** RS15
Machine : Russian Sampler **Method :** Drive-in Windowless Sampler	**Dimensions**	**Ground Level (mOD)**	**Client** Tobin	**Job Number** 10040-10-20
	Location	**Dates** 16/11/2021	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.00-0.45	T				(0.45)	Soft brown slightly silty slightly sandy slightly gravelly pseudo-fibrous PEAT		
					0.45	Refusal at 0.40m BGL		
0.45-0.50	T				0.50	Soft grey slightly clayey slighlty sandy SILT		
						Complete at 0.50m		

Remarks
Peat probe refused at 1.20m BGL
Russian Sampler refused at 0.50m BGL

Scale (approx)	Logged By
1:25	M.S & J.S

Figure No. 10040-10-20.RS15

Ground Investigations Ireland Ltd
www.gii.ie

Site Manorhamilton Windfarm			**Number** RS16
Machine : Russian Sampler **Method :** Drive-in Windowless Sampler	**Dimensions**	**Ground Level (mOD)**	**Client** Tobin	**Job Number** 10040-10-20
	Location	**Dates** 16/11/2021	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.00-0.50	T				(0.50)	Soft dark brown slightly sandy slightly gravelly fibrous PEAT Refusal at 0.50m BGL		
					0.50	Complete at 0.50m		

Remarks
Peat probe refused at 0.60m BGL
Russian Sampler refused at 0.50m BGL

Scale (approx)	Logged By
1:25	M.S & J.S

Figure No. 10040-10-20.RS16

Ground Investigations Ireland Ltd
www.gii.ie

Site Manorhamilton Windfarm			**Number** RS18
Machine : Russian Sampler **Method :** Drive-in Windowless Sampler	**Dimensions**	**Ground Level (mOD)**	**Client** Tobin **Job Number** 10040-10-20
	Location (Handheld GPS) 591835 E 842879 N	**Dates** 14/12/2021	**Engineer** **Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.00-0.50	T				(0.50) 0.50	Soft brown slightly sandy slightly silty fibrous PEAT Refusal at 0.50m BGL Complete at 0.50m		

Remarks
Peat probe refused at 1.90m BGL
Russian Sampler refused at 0.50m BGL

Scale (approx)	Logged By
1:25	DML

Figure No. 10040-10-20.RS18

Ground Investigations Ireland Ltd
www.gii.ie

Site Manorhamilton Windfarm			**Number** RS19
Machine : Russian Sampler **Method :** Drive-in Windowless Sampler	**Dimensions**	**Ground Level (mOD)**	**Client** Tobin	**Job Number** 10040-10-20
	Location (Handheld GPS) 591824 E 842843 N	**Dates** 14/12/2021	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.00-0.50	T				(0.50) 0.50	Soft light brown slightly sandy fibrous PEAT Refusal at 0.50m BGL Complete at 0.50m		

Remarks
Peat probe refused at 1.90m BGL
Russian Sampler refused at 0.50m BGL

Scale (approx)	Logged By
1:25	DML

Figure No. 10040-10-20.RS19

Manorhamilton Russian Sampler Photographs

RS01 - 0.00-0.50m BGL

RS02 – 0.0-0.40m BGL

RS03 – 0.00 -0.30m BGL

RS04 – 0.00-0.10m BGL

RS05 – 0.00-0.40m BGL

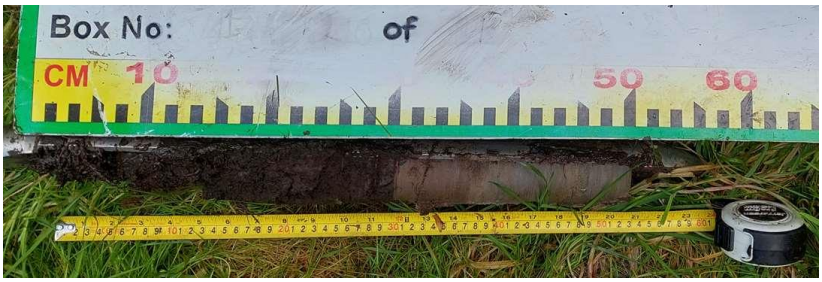
RS07 – 0.00-0.35m BGL

RS08 – 0.00-0.50m BGL

RS09 - 0.00-0.50m BGL

RS09 – 0.50-1.00m BGL

RS10 – 0.00-0.50m BGL



RS10 – 0.50-1.00m BGL

RS11 – 0.00-0.20m BGL

RS12 – 0.00-0.50m BGL

RS14 – 0.00-0.50m BGL

RS14 – 1.00-1.50m BGL

RS14 – 2.00-2.50m BGL

RS15 – 0.00-0.50m BGL

RS16 – 0.00-0.50m BGL

RS18 – 0.00-0.50m BGL

RS19 – 0.00-0.50m BGL

APPENDIX 4 - Rotary Borehole Records

Ground Investigations Ireland Ltd
www.gii.ie

Site Manorhamilton Windfarm			**Borehole Number** BH-1
Machine : Beretta T41 **Flush :** water **Core Dia :** 102 mm **Method :** Rotary Cored	**Casing Diameter** 104mm cased to 9.70m	**Ground Level (mOD)**	**Client** Tobin	**Job Number** 10040-10-20
	Location	**Dates** 15/11/2021	**Engineer**	**Sheet** 1/1

Depth (m)	TCR (%)	SCR (%)	RQD (%)	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
0.00	30	14					(2.50)	Driller notes road fill. Recovery consists of Fill: Light brown angular to subrounded medium to coarse Gravel with cobbles and boulders of Sandstone.			
2.50	90	51	33	NI			2.50 (0.90)	Strong thickly laminated to thinly bedded grey mottled orange fine to medium grained SANDSTONE with some clay banding. Distinctly weathered to residual. . 2.50m - 3.40m BGL: Non-Intact Zone with Clay bands			
3.40	100	93	80	16			3.40 (2.10)	Strong to very strong thickly laminated to thinly bedded brown mottled grey medium to coarse-grained SANDSTONE with some orange surface staining and slight clay banding. Unweathered to partially weathered. 3.40m - 4.80m BGL: 2 Fracture sets - F1: Fractures are dipping 0 - 20 degrees, closely to widely spaced, smooth planar to rough undulating, with some clay infilling. F2: Fractures are dipping 30 - 50 degrees, closely to widely spaced, smooth planar to smooth undulating, with some clay infilling. 3.50m - 3.55m BGL: Clay band. 3.65m - 3.68m BGL: Clay band.			
4.00 5.50							5.50				
5.85	100	89	71	10			(1.80)	Medium strong to very strong thickly laminated to thinly bedded brown mottled grey fine to coarse-grained SANDSTONE with some clay smearing and banding interbedded with strong thinly to thickly laminated dark brown to black fine-grained SILTSTONE with some black clay banding. Unweathered to partially weathered. 4.80m - 7.30m BGL: 2 Fracture sets - F1: Fractures are dipping 0 - 30 degrees, closely to medium spaced, rough planar to rough undulating, with some clay infilling. F2: Fractures are dipping 70 - 85 degrees, medium to widely spaced, rough planar, with some clay infilling. 5.85m - 6.05m BGL: Clay band. 6.35m - 6.43m BGL: Clay band.			
7.00 7.30	100	78	56	18			7.30 (2.40)	Strong thinly to thickly laminated grey black fine-grained SILTSTONE with some clay smearing and banding. Unweathered to partially weathered. 7.35m - 7.39m BGL: Clay band. 7.30m - 9.70m BGL: 2 Fracture sets - F1: Fractures are dipping 0 - 30 degrees, very closely to closely spaced, smooth planar to rough planar, with some clay infilling. F2: Fractures are dipping 60 - 85 degrees, medium to widely spaced, rough planar to rough undulating, with some clay infilling. 8.95m - 8.97m BGL: Clay band			
8.50	100	77	33	20			9.70				
9.70								Complete at 9.70m			

Remarks
Borehole complete at 9.70m BGL.
Standpipe installed in borehole upon completion. Slotted standpipe installed from 9.70m - 3.0m BGL with a pea gravel surround. Plain standpipe installed from 3.0m BGL to GL with a bentonite seal and a flush cover.

Scale (approx)	Logged By
1:50	CE

Figure No. 10040-10-20.BH-1

Ground Investigations Ireland Ltd
www.gii.ie

Site Manorhamilton Windfarm			**Borehole Number** BH-2
Machine : Beretta T41 **Flush :** water **Core Dia:** 102 mm **Method :** Rotary Cored	**Casing Diameter** 104mm cased to 15.00m	**Ground Level (mOD)**	**Client** Tobin	**Job Number** 10040-10-20
	Location	**Dates** 16/11/2021-17/11/2021	**Engineer**	**Sheet** 1/2

Depth (m)	TCR (%)	SCR (%)	RQD (%)	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
0.00											
	40						(1.50)	Driller notes road infill. Recovery consists of MADE GROUND: Light grey angular to subrounded medium to coarse Gravel with occasional cobbles and wood fragments. (Fill)			
1.50							1.50				
1.50-1.95	40				6,4/8,8,12,22 SPT(C) N=50		(1.00)	Driller notes cobbles. Recovery consists of POSSIBLE MADE GROUND: Light grey angular to subrounded medium to coarse Gravel with frequent cobbles of Limestone and occasional wood fragments.			
2.40-2.70					10,10/15,35 SPT(C) 50/150		2.50				
2.50	33						(1.50)	Driller notes cobbles. Recovery consists of Light grey slightly clayey angular to subrounded medium to coarse GRAVEL with frequent cobbles of Limestone. (Weathered rock)			
4.00					25,25/25,25 SPT(C) 50/150		4.00				
4.00-4.30	100	79	43	16			(1.30)	Strong to very strong thinly laminated to thinly bedded light grey fine-grained fossiliferous LIMESTONE with clay smearing and banding. Partially to distinctly weathered. 4.0m - 5.30m BGL: 2 Fracture sets - F1: Fractures are dipping 0 - 20 degrees, very closely to medium spaced, smooth planar to rough undulating, with some clay infilling. F2: Fractures are dipping 70 - 85 degrees, closely to medium spaced, rough planar to rough undulating, with some clay infilling.			
5.30							5.30				
5.50	100	35	7	NI			(1.80)	Strong thinly laminated to thinly bedded light grey fine-grained fossiliferous LIMESTONE with clay smearing and banding, and weathered out Limestone gravel. Distinctly weathered to residual. 5.30m - 7.10m BGL: Non-Intact Zone with clay bands			
7.00											
7.10	83	48	31	CAVITY			7.10 (0.95)	CAVITY infilled with light brown slightly sandy slightly gravelly Clay and cobbles and boulders of fossiliferous Limestone. 7.10m - 8.05m BGL: Infilled CAVITY.			
8.05							8.05				
8.50	100	50	20	NI			(1.45)	Strong thinly laminated to thinly bedded grey fine-grained fossiliferous LIMESTONE with clay banding. Distinctly weathered to residual 8.05m - 9.50m BGL: Non-Intact Zone with clay bands			
9.00											
9.50	100	50	50				9.50				
10.00								Strong thinly laminated to thinly bedded grey fine-grained fossiliferous LIMESTONE with lots of clay banding and some Limestone gravel lenses. Distinctly weathered to residual. 9.50m - 10.50m BGL: 1 Fracture set - F1:			

Remarks
Borehole complete at 15.0m BGL.
Standpipe installed in borehole upon completion. Slotted standpipe installed from 15.0m to 3.0m BGL with a geo sock and a pea gravel surround, Plain standpipe installed from 3.0m BGL to GL with a bentonite seal and a flush cover.

Scale (approx)	Logged By
1:50	CE

Figure No. 10040-10-20.BH-2

Ground Investigations Ireland Ltd
www.gii.ie

Site Manorhamilton Windfarm			**Borehole Number** BH-2
Machine : Beretta T41 **Flush :** water **Core Dia :** 102 mm **Method :** Rotary Cored	**Casing Diameter** 104mm cased to 15.00m	**Ground Level (mOD)**	**Client** Tobin	**Job Number** 10040-10-20
	Location	**Dates** 16/11/2021-17/11/2021	**Engineer**	**Sheet** 2/2

Depth (m)	TCR (%)	SCR (%)	RQD (%)	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
				7				Fractures are dipping 0 - 30 degrees, closely to medium spaced, smooth planar to rough planar, with some clay infilling. 10.35m - 10.45m BGL: Clay band.			
10.50	83	47	28	NI			(2.40)	10.50m - 11.50m BGL: Non-Intact Zone with clay bands			
11.50				CAVITY				11.50m - 11.90m BGL: Infilled CAVITY.			
11.90	100	59	47	16			11.90	Strong to very strong thinly laminated to thinly bedded grey fine-grained fossiliferous LIMESTONE with many clay bands and some Limestone gravel lenses. Distinctly weathered to residual. 11.90m - 14.10m BGL: 2 Fracture sets - F1: Fractures are dipping 0 - 30 degrees, closely to medium spaced, rough planar to rough undulating, with some clay infilling. F2: Fractures are dipping 60 - 85 degrees, closely to widely spaced, smooth planar to rough undulating, with some clay infilling. 12.20m - 12.40m BGL: Clay band. 12.50m - 12.60m BGL: Clay band. 13.25m - 13.29m BGL: Clay band. 13.45m - 13.60m BGL: Clay band. 13.70m - 13.90m BGL: Clay band.			
13.00	92	82	48				(3.10)				
14.10								14.10m - 14.70m BGL: Infilled CAVITY.			
14.30				CAVITY							
14.70	71	46	46	1				14.70m - 15.0m BGL: 1 Fracture set - F1: Fractures are dipping 40 - 60 degrees, closely spaced, smooth planar, with some clay infilling.			
15.00							15.00	Complete at 15.00m			

Remarks

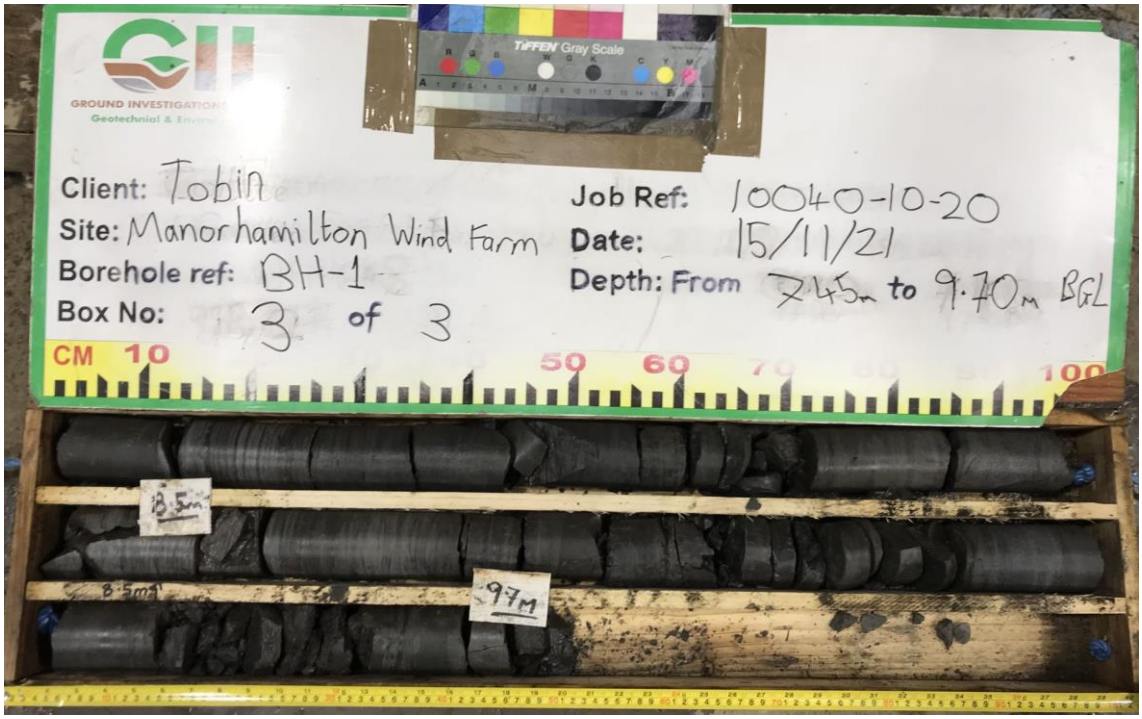
Scale (approx)	Logged By
1:50	CE

Figure No. 10040-10-20.BH-2

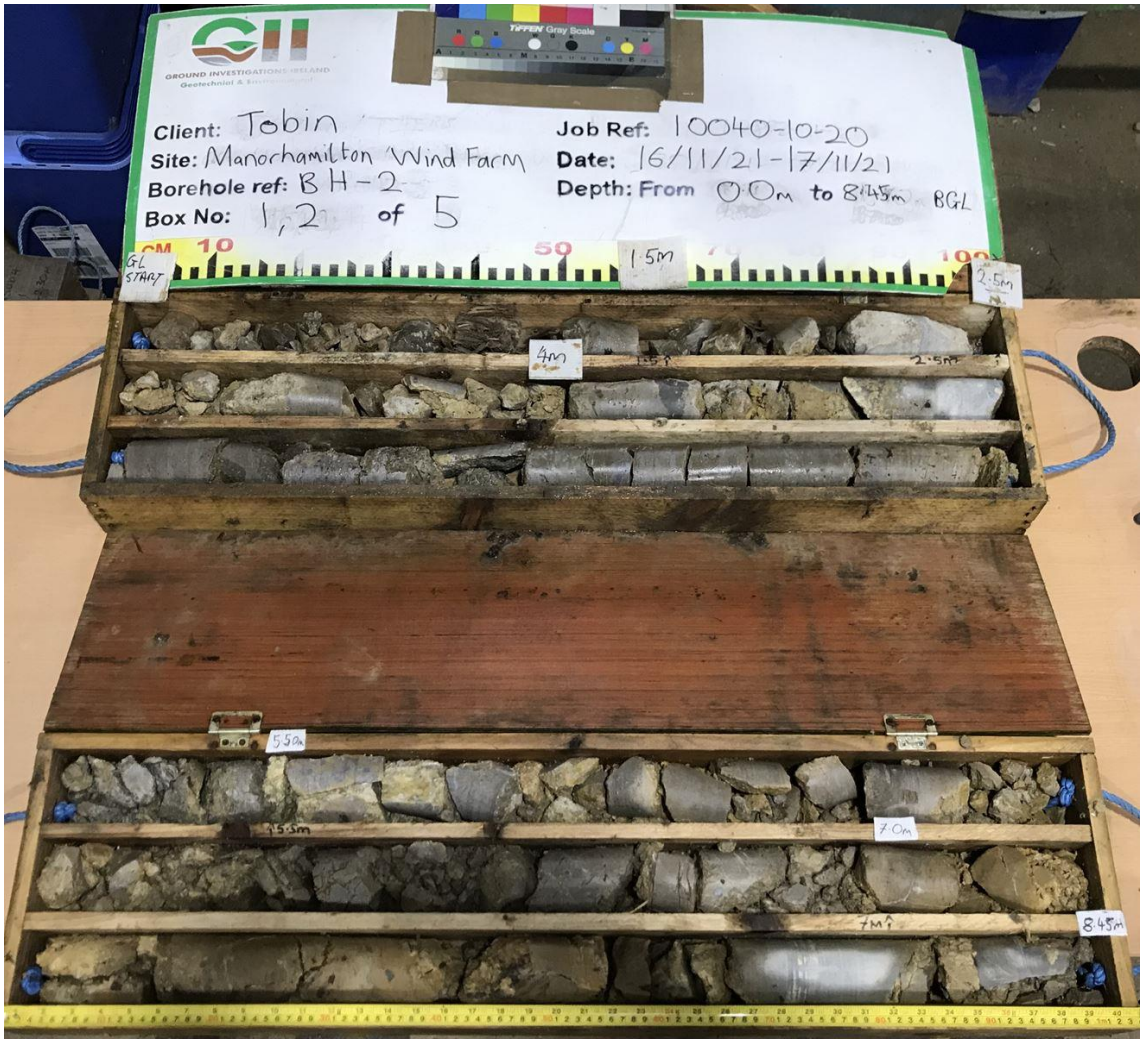
Manorhamilton Windfarm

Rotary Core Photographs

BH-1 (1, 2 of 3)


GROUND INVESTIGATIONS
Geotechnical & Environmental
Client: Tobin
Site: Manorhamilton Wind Farm
Borehole ref: BH-1
Box No: 3 of 3
Job Ref: 10040-10-20
Date: 15/11/21
Depth: From 2.45m to 9.70m BGL
CM 10
50
60
100
8.5m
9.7m

BH-1 (3 of 3)


GROUND INVESTIGATIONS IRELAND
Client: Tobin
Site: Manorhamilton Wind Farm
Borehole ref: BH-2
Box No: 1, 2 of 5
Job Ref: 10040-10-20
Date: 16/11/21-17/11/21
Depth: From 0.0m to 8.45m BGL
1.5m
2.5m
4m
5.5m
7.0m
8.45m

BH-2 (1, 2 of 5)


Client: Tobin
Site: Manorhamilton Wind Farm
Borehole ref: BH-2
Box No: 3,4,5 of 5
Job Ref: 10040-10-20
Date: 16/11/21-17/11/21
Depth: From 8.45m to 15.0m BGL
10m
11.5m
13m
14.3m
15.0m

BH-2 (3, 4, 5 of 5)

APPENDIX 5 – Laboratory Testing

National Materials Testing Laboratory Ltd.

SUMMARY OF TEST RESULTS

			Particle			Index Properties		Bulk	Cell	Undrained Triaxial Tests		Shear Strength	
BH/TP	Depth	Moisture	Density	<425um	LL	PL	PI	Density	Presssure	Compressive	Strain at	Cu	Mode of
No	m	%	Mg/m3	%	%	%	%	Mg/m3	kPa	Stress kPa	Failure %	kPa	Failure
RS01	0.0-0.5	384.3											
RS02	0.20-0.40	72.3											
RS03	0.00-0.30	222.5											
RS04	0.00-0.10	303.5											
RS05	0.00-0.40	219.0											
RS08	0.20-02.50	41.3											
RS09	0.25-1.00	106.8											
RS10	0.80-1.00	35.2											
RS12	0.0-0.50	174.9											
RS14	0.00-0.50	714.8											
RS14	1.00-1.50	977.3											
RS14	2.00-2.50	913.7											
RS15	0.00-0.45	329.1											
RS15	0.45-0.50	77.4											
RS16	0.0-0.50	397.0											
RS18	0.00-0.50	459.2											
RS19	0.00-0.50	605.0											
NMTL	Notes :									Job ref No.	NMTL 3493-GIIProject ID:10010-10-20		
	1. All BS tests carried out using preferred (definitive) method unless otherwise stated.									Location	Manorhamilton		

LABORATORY REPORT

4043

Contract Number: PSL21/8440

Report Date: 24 November 2021

Client's Reference: 10040-10-20

Client Name: Ground Investigations Ireland Ltd
Catherinestown House
Hazelhatch Road
Newcastle
Co Dublin
D22 YD52

For the attention of: Jim Stokes

Contract Title: Manorhamilton

Date Received: 25/10/2021
Date Commenced: 25/10/2021
Date Completed: 24/11/2021

Notes: Opinions and Interpretations are outside the UKAS Accreditation

Checked and Approved Signatories:

A Watkins (Director)	R Berriman (Quality Manager)	S Royle (Laboratory Manager)
L Knight (Assistant Laboratory Manager)	S Eyre (Senior Technician)	T Watkins (Senior Technician)

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awatkins@prosoils.co.uk

SUMMARY OF LABORATORY SOIL DESCRIPTIONS

Hole Number	Sample Number	Sample Type	Top Depth m	Base Depth m	Description of Sample
TP11		B	0.50		Grey & dark brown sandy organic CLAY.
TP12		T	0.50		Dark brown very clayey PEAT.
TP02		T	1.00		Dark brown very clayey PEAT.
TP02		B	2.00		Dark brown slightly sandy gravelly organic CLAY.
TP04		T	0.50		Brown mottled grey slightly sandy slightly gravelly organic CLAY.
TP17		T	0.50		Dark brown peaty CLAY.
TP38		T	1.00		Dark brown clayey PEAT.
TP39		T	0.50		Dark brown peaty CLAY.
TP39		T	1.00		Dark brown peaty CLAY.
TP27		B	1.00		Dark brown slightly sandy slightly gravelly CLAY.
TP28		B	2.00		Brown slightly sandy slightly gravelly CLAY.
TP49		B	2.00		Brown sandy very clayey GRAVEL of cobbles.
TP22		T	0.50		Dark brown clayey PEAT.
TP24		T	1.00		Dark brown clayey PEAT.

SUMMARY OF SOIL CLASSIFICATION TESTS

(BS1377 : PART 2 : 1990)

Hole Number	Sample Number	Sample Type	Top Depth m	Base Depth m	Moisture Content % Clause 3.2	Linear Shrinkage % Clause 6.5	Particle Density Mg/m^3 Clause 8.2	Liquid Limit % Clause 4.3/4	Plastic Limit % Clause 5.3	Plasticity Index % Clause 5.4	Passing .425mm %	Remarks
TP11		B	0.50		50							
TP12		T	0.50		269							
TP02		T	1.00		216							
TP02		B	2.00		52							
TP04		T	0.50		82			107	43	64	85	Extremely High Plasticity CE
TP17		T	0.50		277							
TP38		T	1.00		459							
TP39		T	0.50		148							
TP39		T	1.00		232							
TP27		B	1.00		22							
TP28		B	2.00				2.62					
TP49		B	2.00		14			29	16	13	25	Low Plasticity CL
TP22		T	0.50		375							
TP24		T	1.00		411							

SYMBOLS : **NP : Non Plastic** *** : Liquid Limit and Plastic Limit Wet Sieved.**

UKAS TESTING 4043

PSL Professional Soils Laboratory

Manorhamilton

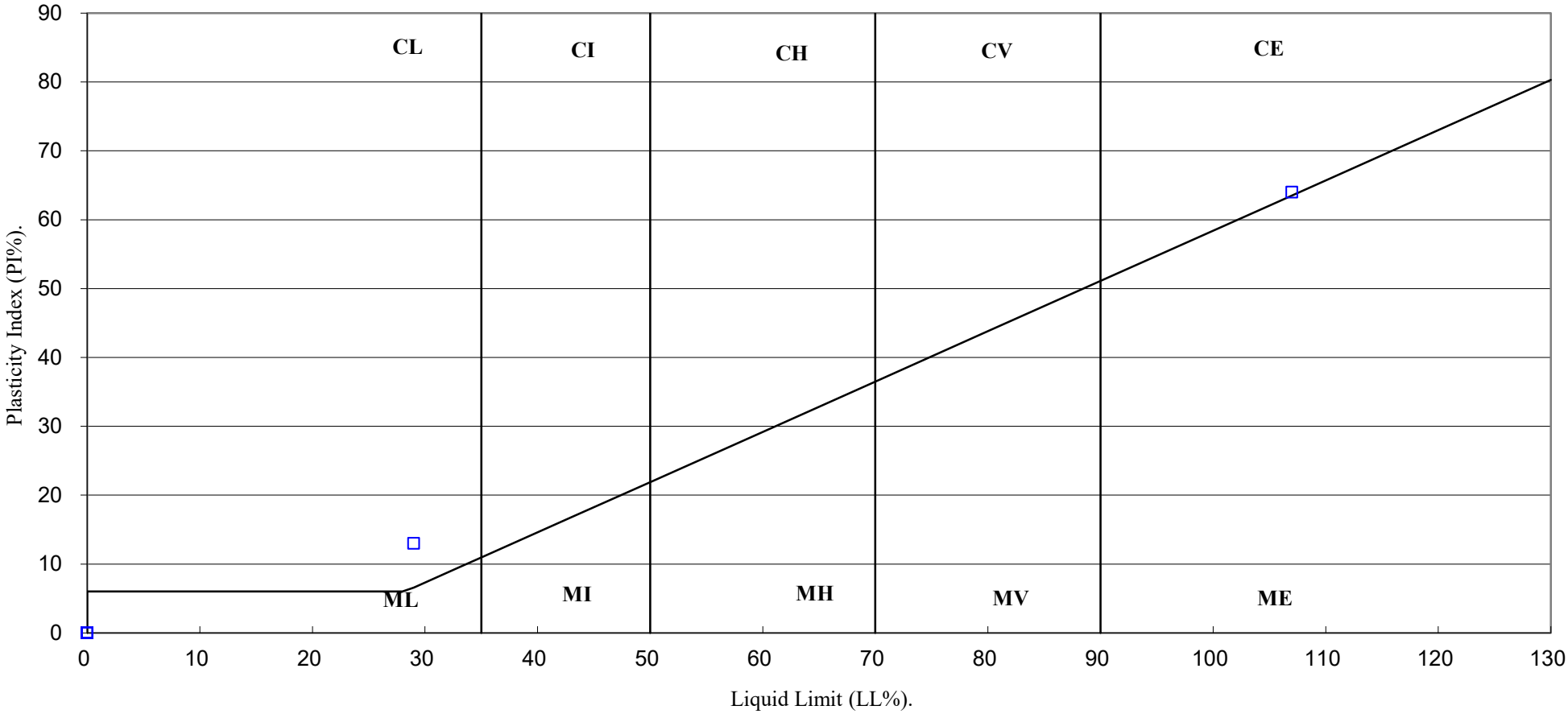
Contract No:

PSL21/8440

Client Ref:

10040-10-20

PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION.



UKAS TESTING 4043	PSL Professional Soils Laboratory	Manorhamilton	Contract No: PSL21/8440 Client Ref: 10040-10-20

PARTICLE SIZE DISTRIBUTION TEST

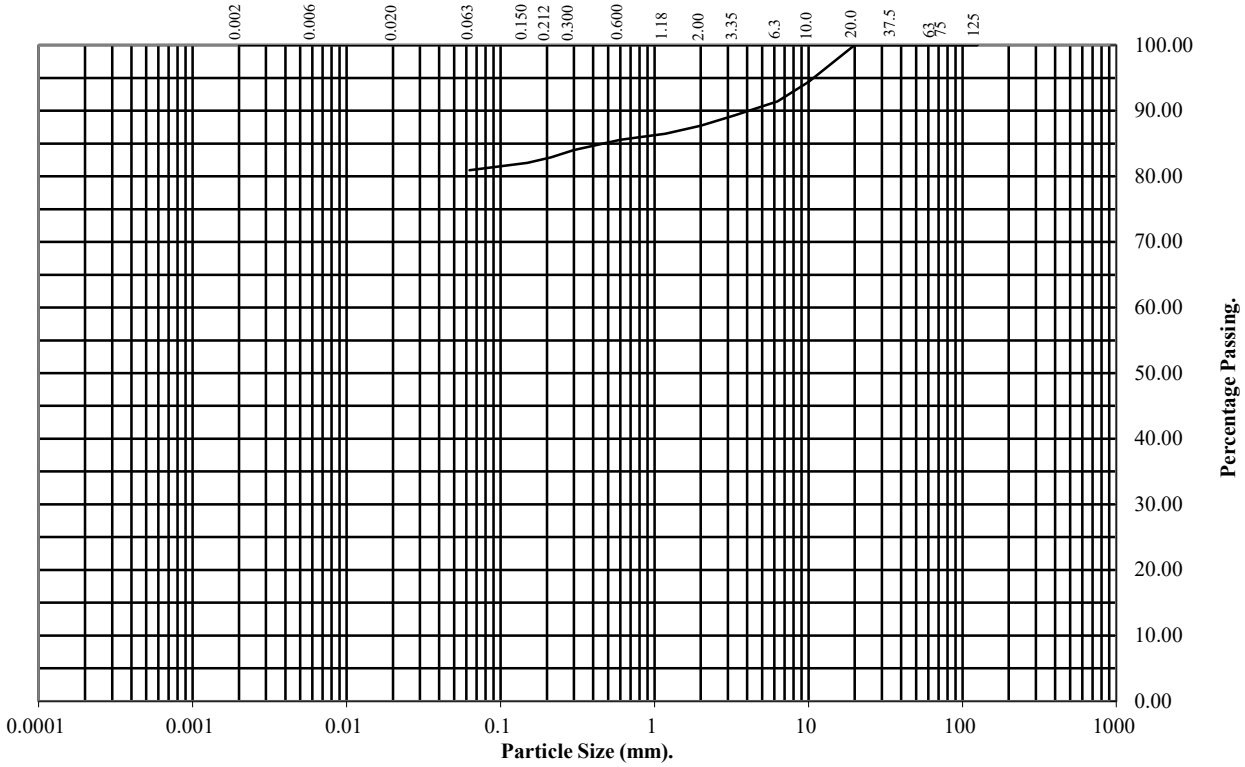
BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number: TP04 **Top Depth (m):** 0.50

Sample Number: **Base Depth(m):**

Sample Type: T



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	100
10	94
6.3	91
3.35	89
2	88
1.18	86
0.6	86
0.3	84
0.212	83
0.15	82
0.063	81

Soil Fraction	Total Percentage
Cobbles	0
Gravel	12
Sand	7
Silt/Clay	81

Remarks:

See Summary of Soil Descriptions

PARTICLE SIZE DISTRIBUTION TEST

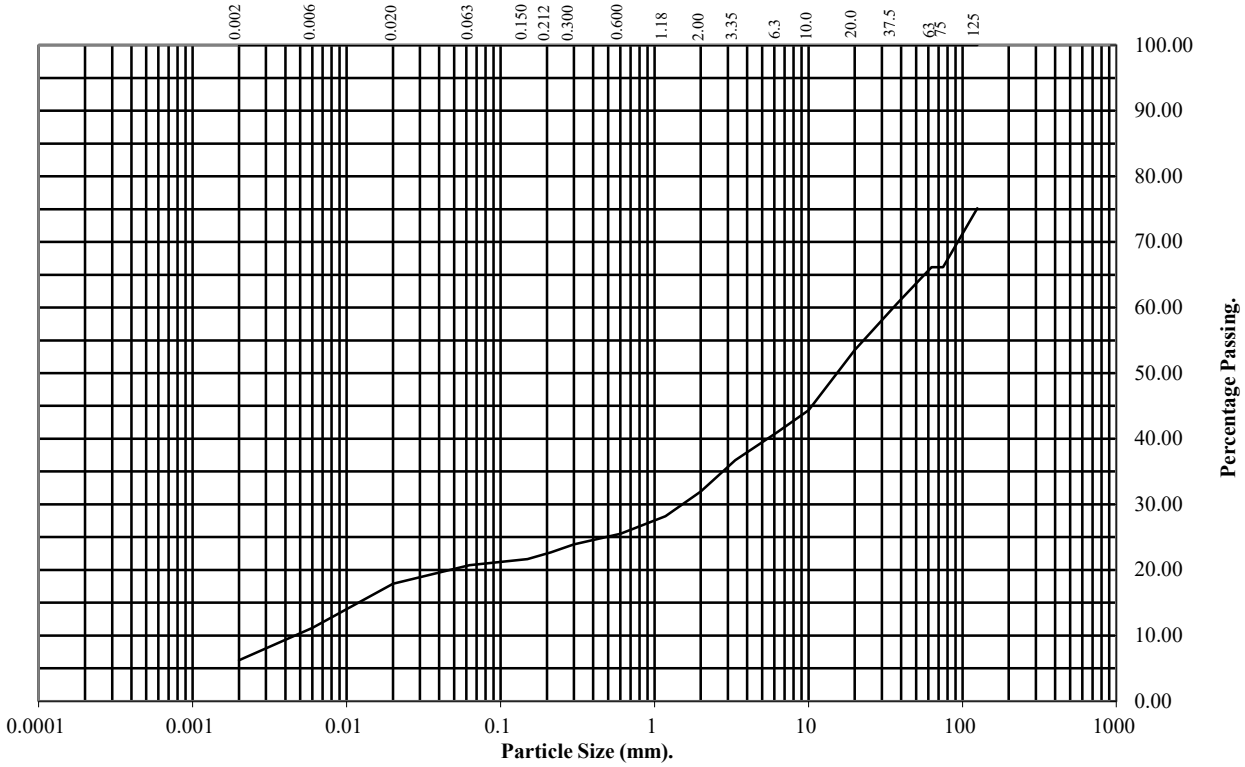
BS1377 : Part 2 : 1990

Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4

Hole Number: TP49 **Top Depth (m):** 2.00

Sample Number: **Base Depth(m):**

Sample Type: B



BS Test Sieve (mm)	Percentage Passing
125	75
75	66
63	66
37.5	61
20	53
10	44
6.3	41
3.35	37
2	32
1.18	28
0.6	26
0.3	24
0.212	23
0.15	22
0.063	21

Particle Diameter	Percentage Passing
0.02	18
0.006	11
0.002	6

Soil Fraction	Total Percentage
Cobbles	34
Gravel	34
Sand	11
Silt	15
Clay	6

Remarks:
See Summary of Soil Descriptions

LABORATORY REPORT

4043

Contract Number: PSL21/8836

Report Date: 07 December 2021

Client's Reference: 10040-10-20

Client Name: Ground Investigations Ireland Ltd
Catherinestown House
Hazelhatch Road
Newcastle
Co Dublin
D22 YD52

For the attention of: Jim Stokes

Contract Title: Manorhamilton

Date Received: 10/11/2021
Date Commenced: 10/11/2021
Date Completed: 7/12/2021

Notes: Opinions and Interpretations are outside the UKAS Accreditation

A copy of the Laboratory Schedule of accredited tests as issued by UKAS is attached to this report. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced other than in full, without the prior written approval of the laboratory.

Checked and Approved Signatories:

A Watkins (Director)

R Berriman (Quality Manager)

S Royle (Laboratory Manager)

L Knight (Assistant Laboratory Manager)

S Eyre (Senior Technician)

M Fennell (Senior Technician)

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e-mail: rberriman@prosoils.co.uk
awatkins@prosoils.co.uk

SUMMARY OF LABORATORY SOIL DESCRIPTIONS

Hole Number	Sample Number	Sample Type	Top Depth m	Base Depth m	Description of Sample
TP33		B	1.00		Brown silty slightly sandy slightly gravelly CLAY.
TP41		T	0.50		Dark brown PEAT.
TP53		T	0.50		Dark brown PEAT.
TP53		T	2.00		Dark brown PEAT.
TP42		T	1.00		Dark brown CLAY.
TP32		B	1.00		Brown slightly sandy gravelly CLAY.
TP20		B	2.00		Brown slightly sandy slightly gravelly CLAY.
TP21		B	2.00		Brown slightly sandy slightly gravelly clayey PEAT.
TP37		T	1.00		Brown clayey PEAT.
TP43		B	1.00		Brown silty slightly sandy slightly gravelly CLAY.
TP43		B	2.00		Brown slightly sandy slightly gravelly CLAY.
TP05		T	0.50		Dark brown clayey PEAT.
TP05		B	2.00		Dark brown slightly gravelly CLAY.
TP05		B	3.00		Grey slightly sandy slightly gravelly CLAY.
TP06		B	1.00		Dark brown mottled grey slightly gravelly slightly sandy CLAY.
TP09		T	0.50		Dark brown clayey PEAT.
TP10		T	0.50		Dark brown clayey PEAT.
TP51		T	0.30		Dark brown clayey PEAT.

SUMMARY OF SOIL CLASSIFICATION TESTS

(BS1377 : PART 2 : 1990)

Hole Number	Sample Number	Sample Type	Top Depth m	Base Depth m	Moisture Content % Clause 3.2	Linear Shrinkage % Clause 6.5	Particle Density Mg/m^3 Clause 8.2	Liquid Limit % Clause 4.3/4	Plastic Limit % Clause 5.3	Plasticity Index % Clause 5.4	Passing .425mm %	Remarks
TP33		B	1.00		21			34	17	17	45	Low Plasticity CL
TP41		T	0.50		190							
TP53		T	0.50		831							
TP53		T	2.00		875							
TP42		T	1.00		1052							
TP32		B	1.00		20			43	23	20	52	Intermediate Plasticity CI
TP20		B	2.00		28			34	18	16	68	Low Plasticity CL
TP21		B	2.00		468			707	200	507	89	Extremely High Plasticity CE
TP37		T	1.00		663							
TP43		B	1.00		20			35	19	16	45	Intermediate Plasticity CI
TP05		T	0.50		200							
TP05		B	2.00		17			34	17	17	80	Low Plasticity CL
TP06		B	1.00				2.55					
TP09		T	0.50		230							
TP10		T	0.50		461							
TP51		T	0.30		202							

SYMBOLS : **NP : Non Plastic** *** : Liquid Limit and Plastic Limit Wet Sieved.**

UKAS TESTING 4043

PSL Professional Soils Laboratory

Manorhamilton

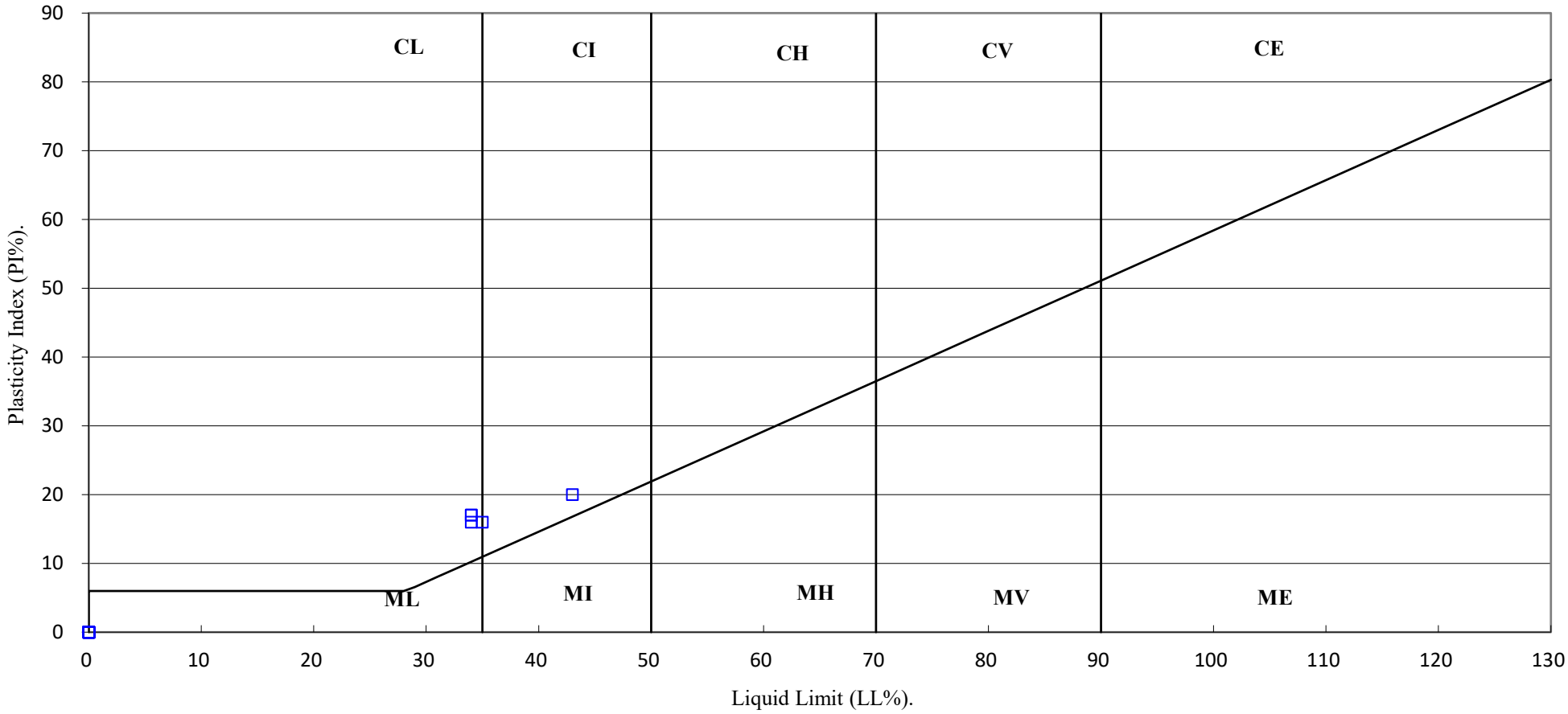
Contract No:

PSL21/8836

Client Ref:

10040-10-20

PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION.



UKAS TESTING 4043	PSL Professional Soils Laboratory	Manorhamilton	Contract No: PSL21/8836 Client Ref: 10040-10-20

PARTICLE SIZE DISTRIBUTION TEST

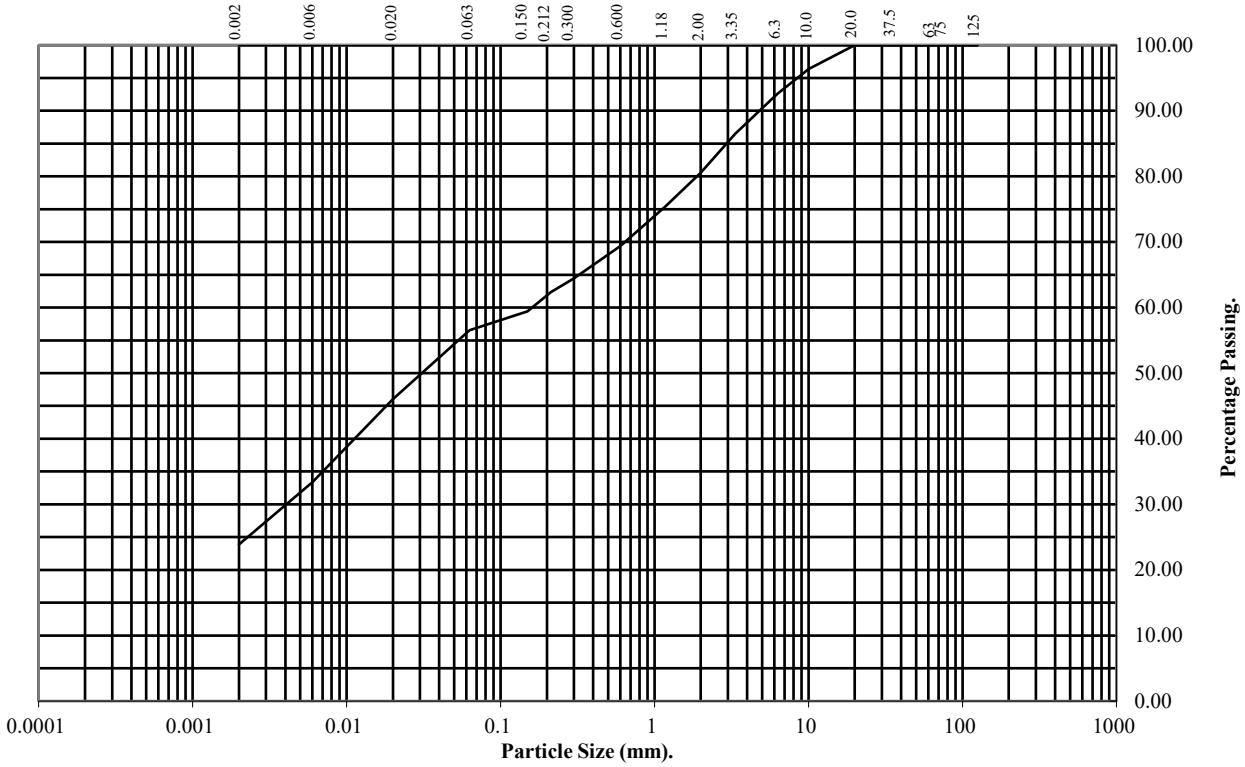
BS1377 : Part 2 : 1990

Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4

Hole Number: **TP05** **Top Depth (m):** **3.00**

Sample Number: **Base Depth(m):**

Sample Type: **B**



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	100
10	96
6.3	93
3.35	87
2	81
1.18	75
0.6	69
0.3	64
0.212	62
0.15	59
0.063	57

Particle Diameter	Percentage Passing
0.02	46
0.006	33
0.002	24

Soil Fraction	Total Percentage
Cobbles	0
Gravel	19
Sand	24
Silt	33
Clay	24

Remarks:
See Summary of Soil Descriptions

PARTICLE SIZE DISTRIBUTION TEST

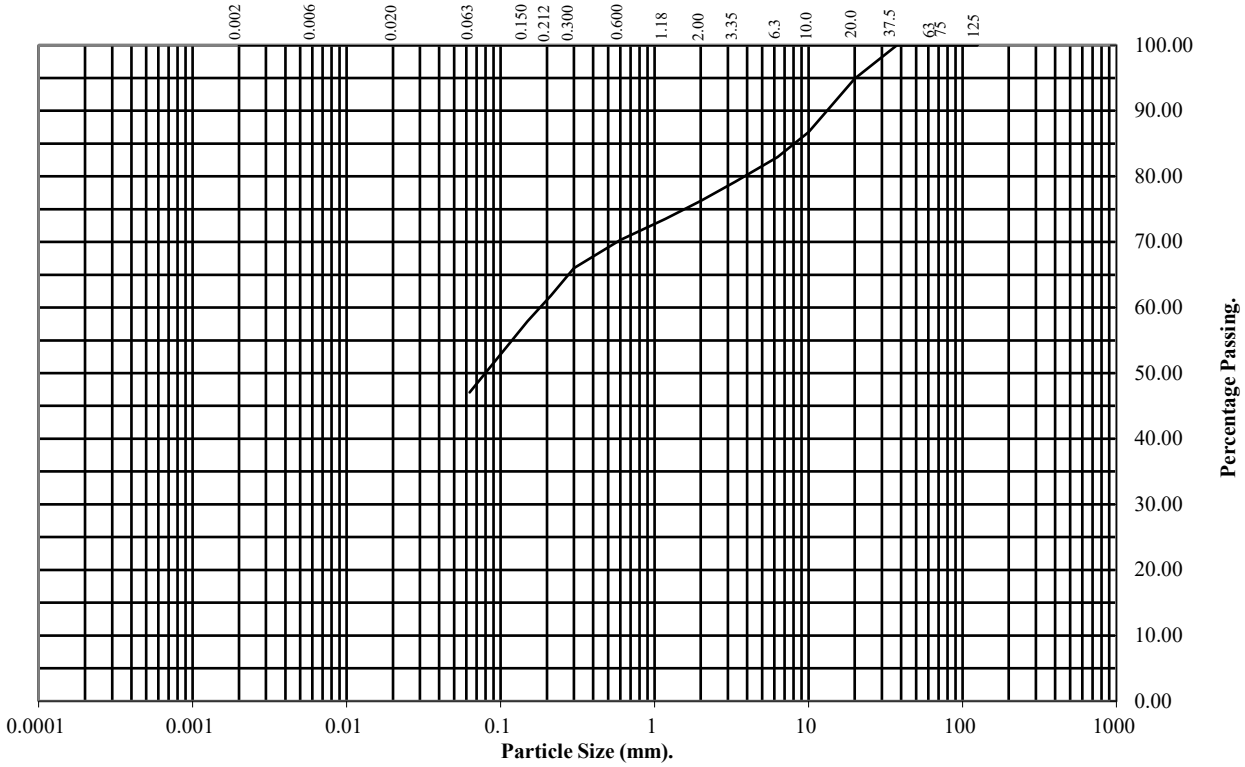
BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number: TP20 **Top Depth (m):** 2.00

Sample Number: **Base Depth(m):**

Sample Type: B



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	95
10	87
6.3	83
3.35	79
2	76
1.18	74
0.6	70
0.3	66
0.212	62
0.15	58
0.063	47

Soil Fraction	Total Percentage
Cobbles	0
Gravel	24
Sand	29
Silt/Clay	47

Remarks:

See Summary of Soil Descriptions

PARTICLE SIZE DISTRIBUTION TEST

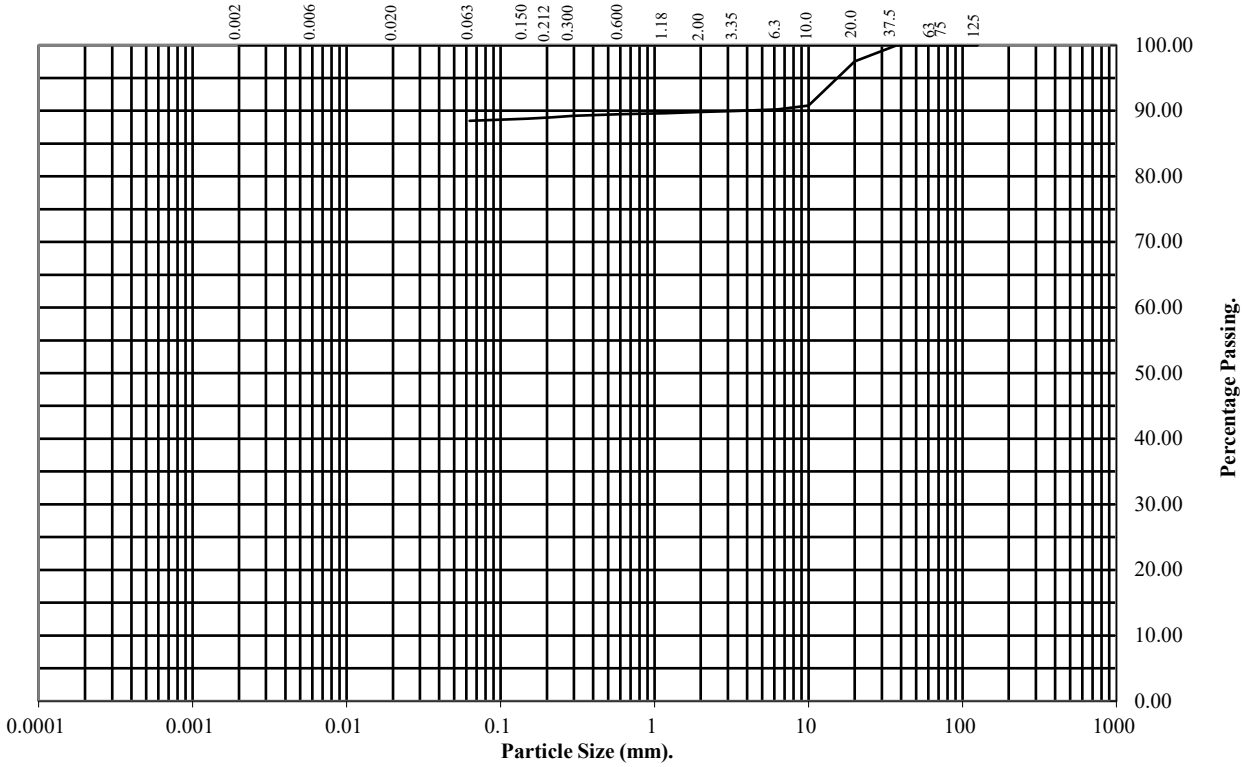
BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number: TP21 **Top Depth (m):** 2.00

Sample Number: **Base Depth(m):**

Sample Type: B



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	98
10	91
6.3	90
3.35	90
2	90
1.18	90
0.6	89
0.3	89
0.212	89
0.15	89
0.063	88

Soil Fraction	Total Percentage
Cobbles	0
Gravel	10
Sand	2
Silt/Clay	88

Remarks:

See Summary of Soil Descriptions

PARTICLE SIZE DISTRIBUTION TEST

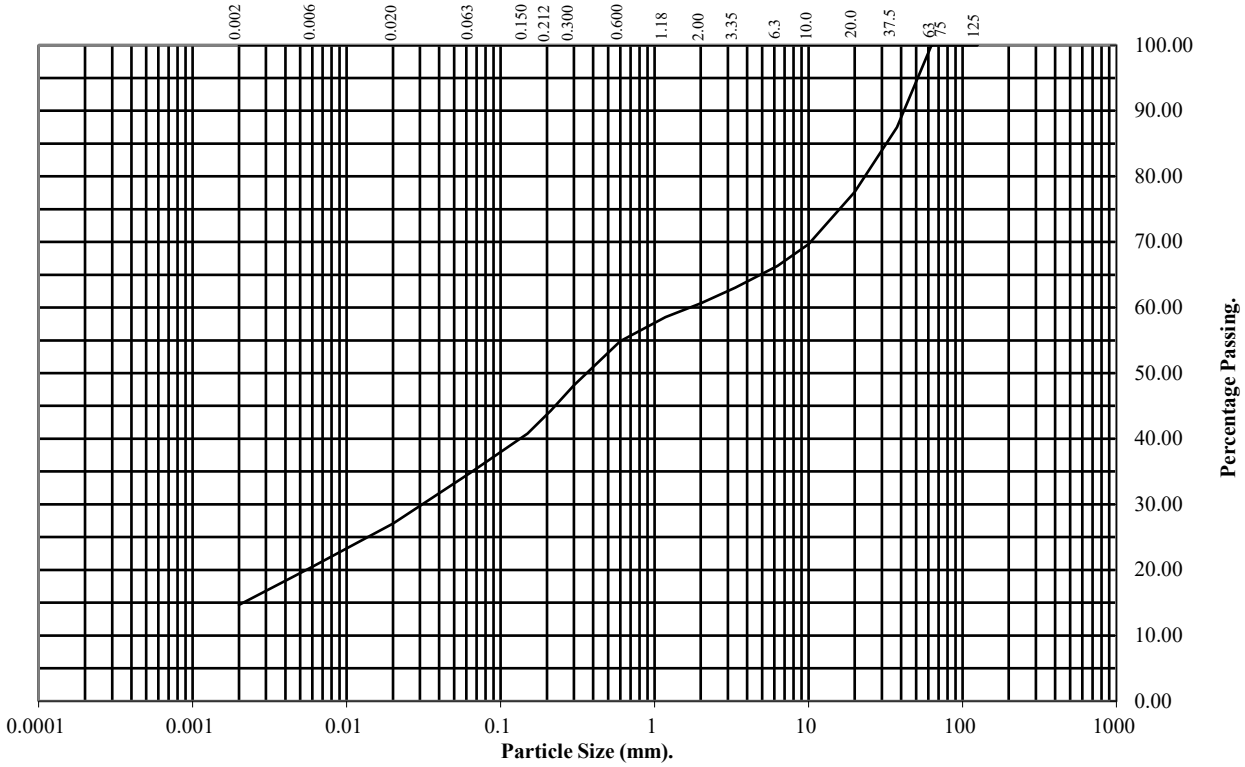
BS1377 : Part 2 : 1990

Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4

Hole Number: TP32 **Top Depth (m):** 1.00

Sample Number: **Base Depth(m):**

Sample Type: B



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	87
20	78
10	70
6.3	66
3.35	63
2	61
1.18	59
0.6	55
0.3	48
0.212	44
0.15	41
0.063	35

Particle Diameter	Percentage Passing
0.02	27
0.006	20
0.002	15

Soil Fraction	Total Percentage
Cobbles	0
Gravel	39
Sand	26
Silt	20
Clay	15

Remarks:

See Summary of Soil Descriptions

UKAS TESTING 4043

PSL Professional Soils Laboratory

Manorhamilton

Contract No:
PSL21/8836
Client Ref:
10040-10-20

PARTICLE SIZE DISTRIBUTION TEST

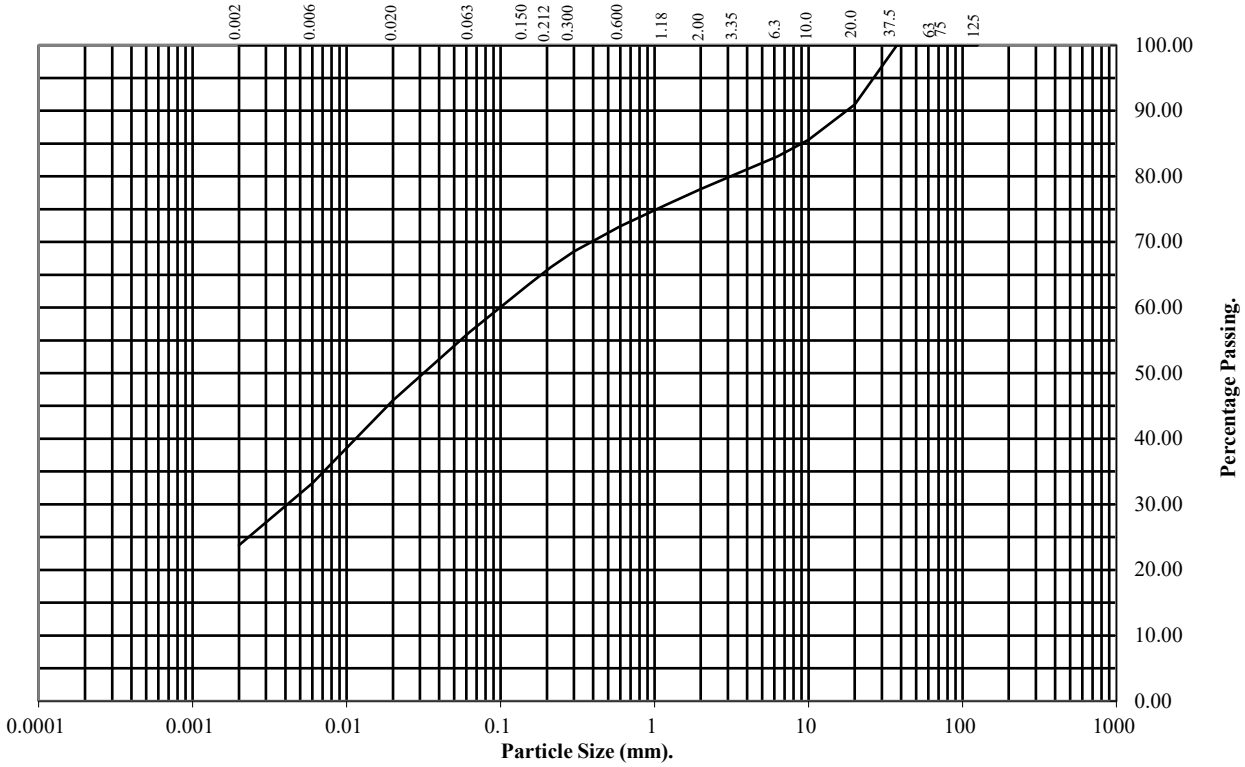
BS1377 : Part 2 : 1990

Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4

Hole Number: TP43 **Top Depth (m):** 2.00

Sample Number: **Base Depth(m):**

Sample Type: B



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	91
10	86
6.3	83
3.35	80
2	78
1.18	76
0.6	72
0.3	69
0.212	66
0.15	63
0.063	56

Particle Diameter	Percentage Passing
0.02	46
0.006	33
0.002	24

Soil Fraction	Total Percentage
Cobbles	0
Gravel	22
Sand	22
Silt	32
Clay	24

Remarks:
See Summary of Soil Descriptions

Element Materials Technology
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Ground Investigations Ireland
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Newcastle
Co. Dublin
Ireland

Attention :	Diarmaid MagLochlainn
Date :	22nd November, 2021
Your reference :	10040-10-20
Our reference :	Test Report 21/18037 Batch 1
Location :	Manorhamilton Windfarm
Date samples received :	15th November, 2021
Status :	Final Report
Issue :	1

One sample was received for analysis on 15th November, 2021 and was scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.
All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

Authorised By:

Hayley Prowse
Project Manager

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Ground Investigations Ireland
Catherinestown House
Hazelhatch Road
Newcastle
Co. Dublin
Ireland

Attention :	Diarmaid MagLochlainn
Date :	3rd November, 2021
Your reference :	10040-10-20
Our reference :	Test Report 21/16876 Batch 1
Location :	Manorhamilton Windfarm
Date samples received :	26th October, 2021
Status :	Final Report
Issue :	1

Two samples were received for analysis on 26th October, 2021 of which two were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.
All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

Authorised By:

Bruce Leslie
Project Manager

Element Materials Technology Environmental UK Limited
Registered in England and Wales
Registered Office: 10 Lower Grosvenor Place, London, SW1W 0EN
Company Registration No: 11371415

Element Materials Technology

Client Name: Ground Investigations Ireland
Reference: 10040-10-20
Location: Manorhamilton Windfarm
Contact: Diarmaid MagLochlainn
EMT Job No: 21/16876

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

EMT Sample No.	1	2											
Sample ID	TP02	TP11											
Depth	1.00	0.50											
COC No / misc													
Containers	T	T											
Sample Date	06/10/2021	04/10/2021											
Sample Type	Soil	Soil											
Batch Number	1	1											
Date of Receipt	26/10/2021	26/10/2021											

Please see attached notes for all abbreviations and acronyms

											LOD/LOR	Units	Method No.
Organic Matter	24.5	1.8									<0.2	%	TM21/PM24
pH #	-	5.84									<0.01	pH units	TM73/PM11

Please include all sections of this report if it is reproduced
All solid results are expressed on a dry weight basis unless stated otherwise.

Client Name: Ground Investigations Ireland
Reference: 10040-10-20
Location: Manorhamilton Windfarm
Contact: Diarmaid MagLochlainn

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Analysis	Reason
No deviating sample report results for job 21/16876						

Please note that only samples that are deviating are mentioned in this report. If no samples are listed it is because none were deviating.
Only analyses which are accredited are recorded as deviating if set criteria are not met.

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

EMT Job No.: 21/16876

SOILS

Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation.

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation has been performed on clay, sand and loam, only samples that are predominantly these matrices, or combinations of them will be within our MCERTS scope. If samples are not one of a combination of the above matrices they will not be marked as MCERTS accredited.

It is assumed that you have taken representative samples on site and require analysis on a representative subsample. Stones will generally be included unless we are requested to remove them.

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary.

If you have not already done so, please send us a purchase order if this is required by your company.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

All analysis is reported on a dry weight basis unless stated otherwise. Limits of detection for analyses carried out on as received samples are not moisture content corrected. Results are not surrogate corrected. Samples are dried at 35°C ±5°C unless otherwise stated. Moisture content for CEN Leachate tests are dried at 105°C ±5°C.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

Where a CEN 10:1 ZERO Headspace VOC test has been carried out, a 10:1 ratio of water to wet (as received) soil has been used.

% Asbestos in Asbestos Containing Materials (ACMs) is determined by reference to HSG 264 The Survey Guide - Appendix 2 : ACMs in buildings listed in order of ease of fibre release.

Sufficient amount of sample must be received to carry out the testing specified. Where an insufficient amount of sample has been received the testing may not meet the requirements of our accredited methods, as such accreditation may be removed.

Negative Neutralization Potential (NP) values are obtained when the volume of NaOH (0.1N) titrated (pH 8.3) is greater than the volume of HCl (1N) to reduce the pH of the sample to 2.0 - 2.5. Any negative NP values are corrected to 0.

The calculation of Pyrite content assumes that all oxidisable sulphides present in the sample are pyrite. This may not be the case. The calculation may be an overesitimate when other sulphides such as Barite (Barium Sulphate) are present.

WATERS

Please note we are not a UK Drinking Water Inspectorate (DWI) Approved Laboratory .

ISO17025 accreditation applies to surface water and groundwater and usually one other matrix which is analysis specific, any other liquids are outside our scope of accreditation.

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

DEVIATING SAMPLES

All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. The temperature of sample receipt is recorded on the confirmation schedules in order that the client can make an informed decision as to whether testing should still be undertaken.

SURROGATES

Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery in soils is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130% and for VOCs are 50 - 150%. When surrogate recoveries are outside the performance criteria but the associated AQC passes this is assumed to be due to matrix effect. Results are not surrogate corrected.

DILUTIONS

A dilution suffix indicates a dilution has been performed and the reported result takes this into account. No further calculation is required.

BLANKS

Where analytes have been found in the blank, the sample will be treated in accordance with our laboratory procedure for dealing with contaminated blanks.

NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a UKAS requirement for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.
Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.

REPORTS FROM THE SOUTH AFRICA LABORATORY

Any method number not prefixed with SA has been undertaken in our UK laboratory unless reported as subcontracted.

Measurement Uncertainty

Measurement uncertainty defines the range of values that could reasonably be attributed to the measured quantity. This range of values has not been included within the reported results. Uncertainty expressed as a percentage can be provided upon request.

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS Ref No. 4225) accredited - UK.
SA	ISO17025 (SANAS Ref No.T0729) accredited - South Africa
B	Indicates analyte found in associated method blank.
DR	Dilution required.
M	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
>>	Results above calibration range, the result should be considered the minimum value. The actual result could be significantly higher.
*	Analysis subcontracted to an Element Materials Technology approved laboratory.
AD	Samples are dried at 35°C ±5°C
CO	Suspected carry over
LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
ME	Matrix Effect
NFD	No Fibres Detected
BS	AQC Sample
LB	Blank Sample
N	Client Sample
TB	Trip Blank Sample
OC	Outside Calibration Range

HWOL ACRONYMS AND OPERATORS USED

HS	Headspace Analysis.
EH	Extractable Hydrocarbons - i.e. everything extracted by the solvent.
CU	Clean-up - e.g. by florisil, silica gel.
1D	GC - Single coil gas chromatography.
Total	Aliphatics & Aromatics.
AL	Aliphatics only.
AR	Aromatics only.
2D	GC-GC - Double coil gas chromatography.
#1	EH_Total but with humics mathematically subtracted
#2	EU_Total but with fatty acids mathematically subtracted
_	Operator - underscore to separate acronyms (exception for +).
+	Operator to indicate cumulative e.g. EH+HS_Total or EH_CU+HS_Total
MS	Mass Spectrometry.

EMT Job No: 21/16876

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM21	Modified BS 7755-3:1995, ISO10694:1995 Determination of Total Organic Carbon or Total Carbon by combustion in an Eltra TOC furnace/analyser in the presence of oxygen. The CO2 generated is quantified using infra-red detection. Organic Matter (SOM) calculated as per EA MCERTS Chemical Testing of Soil, March 2012 v4.	PM24	Dried and ground solid samples are washed with hydrochloric acid, then rinsed with deionised water to remove the mineral carbon before TOC analysis.			AD	Yes
TM73	Modified US EPA methods 150.1 (1982) and 9045D Rev. 4 - 2004) and BS1377-3:1990. Determination of pH by Metrohm automated probe analyser.	PM11	Extraction of as received solid samples using one part solid to 2.5 parts deionised water.	Yes		AR	No

Element Materials Technology

Client Name: Ground Investigations Ireland
Reference: 10040-10-20
Location: Manorhamilton Windfarm
Contact: Diarmaid MagLochlainn
EMT Job No: 21/18037

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

EMT Sample No.	1										Please see attached notes for all abbreviations and acronyms		
Sample ID	TP53												
Depth	1.00												
COC No / misc													
Containers	T												
Sample Date	07/10/2021												
Sample Type	Soil												
Batch Number	1										LOD/LOR	Units	Method No.
Date of Receipt	15/11/2021												
Organic Matter	82.4										<0.2	%	TM21/PM24
pH #	3.88										<0.01	pH units	TM73/PM11

Please include all sections of this report if it is reproduced
All solid results are expressed on a dry weight basis unless stated otherwise.

Client Name: Ground Investigations Ireland

Reference: 10040-10-20

Location: Manorhamilton Windfarm

Contact: Diarmaid MagLochlainn

Matrix : Solid

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Analysis	Reason
21/18037	1	TP53	1.00	1	pH	Sample holding time exceeded prior to receipt

Please note that only samples that are deviating are mentioned in this report. If no samples are listed it is because none were deviating.

Only analyses which are accredited are recorded as deviating if set criteria are not met.

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

EMT Job No.: 21/18037

SOILS

Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation.

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation has been performed on clay, sand and loam, only samples that are predominantly these matrices, or combinations of them will be within our MCERTS scope. If samples are not one of a combination of the above matrices they will not be marked as MCERTS accredited.

It is assumed that you have taken representative samples on site and require analysis on a representative subsample. Stones will generally be included unless we are requested to remove them.

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary.

If you have not already done so, please send us a purchase order if this is required by your company.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

All analysis is reported on a dry weight basis unless stated otherwise. Limits of detection for analyses carried out on as received samples are not moisture content corrected. Results are not surrogate corrected. Samples are dried at 35°C ±5°C unless otherwise stated. Moisture content for CEN Leachate tests are dried at 105°C ±5°C.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

Where a CEN 10:1 ZERO Headspace VOC test has been carried out, a 10:1 ratio of water to wet (as received) soil has been used.

% Asbestos in Asbestos Containing Materials (ACMs) is determined by reference to HSG 264 The Survey Guide - Appendix 2 : ACMs in buildings listed in order of ease of fibre release.

Sufficient amount of sample must be received to carry out the testing specified. Where an insufficient amount of sample has been received the testing may not meet the requirements of our accredited methods, as such accreditation may be removed.

Negative Neutralization Potential (NP) values are obtained when the volume of NaOH (0.1N) titrated (pH 8.3) is greater than the volume of HCl (1N) to reduce the pH of the sample to 2.0 - 2.5. Any negative NP values are corrected to 0.

The calculation of Pyrite content assumes that all oxidisable sulphides present in the sample are pyrite. This may not be the case. The calculation may be an overesitimate when other sulphides such as Barite (Barium Sulphate) are present.

WATERS

Please note we are not a UK Drinking Water Inspectorate (DWI) Approved Laboratory .

ISO17025 accreditation applies to surface water and groundwater and usually one other matrix which is analysis specific, any other liquids are outside our scope of accreditation.

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

DEVIATING SAMPLES

All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. The temperature of sample receipt is recorded on the confirmation schedules in order that the client can make an informed decision as to whether testing should still be undertaken.

SURROGATES

Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery in soils is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130% and for VOCs are 50 - 150%. When surrogate recoveries are outside the performance criteria but the associated AQC passes this is assumed to be due to matrix effect. Results are not surrogate corrected.

DILUTIONS

A dilution suffix indicates a dilution has been performed and the reported result takes this into account. No further calculation is required.

BLANKS

Where analytes have been found in the blank, the sample will be treated in accordance with our laboratory procedure for dealing with contaminated blanks.

NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a UKAS requirement for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.
Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.

REPORTS FROM THE SOUTH AFRICA LABORATORY

Any method number not prefixed with SA has been undertaken in our UK laboratory unless reported as subcontracted.

Measurement Uncertainty

Measurement uncertainty defines the range of values that could reasonably be attributed to the measured quantity. This range of values has not been included within the reported results. Uncertainty expressed as a percentage can be provided upon request.

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS Ref No. 4225) accredited - UK.
SA	ISO17025 (SANAS Ref No.T0729) accredited - South Africa
B	Indicates analyte found in associated method blank.
DR	Dilution required.
M	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
>>	Results above calibration range, the result should be considered the minimum value. The actual result could be significantly higher.
*	Analysis subcontracted to an Element Materials Technology approved laboratory.
AD	Samples are dried at 35°C ±5°C
CO	Suspected carry over
LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
ME	Matrix Effect
NFD	No Fibres Detected
BS	AQC Sample
LB	Blank Sample
N	Client Sample
TB	Trip Blank Sample
OC	Outside Calibration Range

HWOL ACRONYMS AND OPERATORS USED

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