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Ground Investigations Ireland

Hackettstown, Skerries – Southern Greenfield site

DBFL

Ground Investigation Report

July 2020

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APPENDICES

1.0 Preamble

On the instructions of DBFL, a site investigation was carried out by Ground Investigations Ireland Ltd., between November 2019 and March 2020 at the site of the proposed new residential development in Hackettstown, Skerries, Co. Dublin.

2.0 Overview

2.1. Background

It is proposed to construct a residential development with associated services, access roads and car parking at the proposed site. The site is currently greenfield agricultural land and is situated on the outskirts of Skerries Village.
The proposed construction is envisaged to consist 2 to 3 story housing and 4 story apartment blocks with conventional or piled 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 13 No. Trial Pits to a maximum depth of 4.0m BGL
- Carry out 5 No. Soakaways to determine a soil infiltration value to BRE digest 365
- Carry out 25 No. Dynamic Probes to determine soil strength/density characteristics
- Carry out 8 No. Cable Percussion boreholes to a maximum depth of 7.10m BGL
- Carry out 5 No Rotary boreholes to a maximum depth of 17.20m BGL
- 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 8.5T tracked 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 Geotechnical Engineer/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. Soakaway Testing

The soakaway testing was carried out in selected trial pits at the locations shown in the exploratory hole location plan in Appendix 1. These pits were carefully excavated and filled with water to assess the infiltration characteristics of the proposed site. The pits were allowed to drain and the drop in water level was recorded over time as required by BRE Digest 365. The pits were logged prior to completing the soakaway test and were backfilled with arising's upon completion. The soakaway test results are provided in Appendix 3 of this Report.

3.4. Dynamic Probing

The dynamic probe tests (DPH) were carried out at the locations shown in the location plan in Appendix 1 in accordance with B.S. 1377: Part 9 1990. The test consists of mechanically driving a cone with a 50kg weight in 100mm intervals and monitoring the number of blows required. An equivalent Standard Penetration Test (SPT) 'N' value may be calculated by dividing the total number of blows over a 300mm drive length by 1.5. The dynamic probe logs are provided in Appendix 4 of this Report.

3.5. Cable Percussion Boreholes

The Cable Percussion Boreholes were drilled using a Dando 2000 drilling rig with regular in-situ testing and sampling undertaken to facilitate the production of geotechnical logs and laboratory testing.
The standard method of boring in soil for site investigation is known as the Cable Percussion method. It consists of using a Shell in non cohesive soils and a clay cutter in cohesive soils, both operated on a wire cable. Very hard soils, boulders and other hard obstructions are broken up by chiselling and the fragments removed with the Shell. Where ground conditions made it necessary, the borehole was lined with 200mm diameter steel casing. While the use of the Cable Percussion method of boring gives the maximum data on soil conditions, some mixing of laminated soil is inevitable. For this reason, thin lenses of granular material may not be noticed. Disturbed samples were taken from the boring tools at suitable depths, so that there is a representative sample at the top of each change in stratum and thereafter at regular intervals down the borehole until the next stratum was encountered. The disturbed samples were then sealed and sent to the laboratory where they were visually examined to confirm the description of the relevant strata.
Standard Penetration Tests were carried out in the boreholes. The results of these tests, together with the depths at which the tests were taken are shown on the accompanying borehole records. The test consists

of a thick wall sampler tube, 50mm external diameter, being driven into the soil by a monkey weighing 63.5kg and with a free drop of 760mm. For gravels and glacial till the driving shoe was replaced by a solid 60º cone. The Standard Penetration Test number referred to as the 'N' value is the number of blows required to drive the tube 300mm, after an initial penetration of 150mm. The number gives a guide to the consistency of the soil and can also be used to estimate the relative strength/density at the depth of the test and also to estimate the bearing capacity and compressibility of the soil. The cable percussion borehole logs are provided in Appendix 5 of this Report.

3.6. 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 5 of this Report.

3.7. 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 or Irish National Grid as required by the project specification. The coordinates and elevations are provided on the exploratory hole logs in the appendices of this Report.

3.8. 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 the Rilta Suite pH and sulphate testing was carried out by Element Materials Technology Laboratory in the UK. The Rilta suite testing includes both Solid Waste and Leachate Waste Acceptance Criteria.
Geotechnical testing consisting of moisture content, Atterberg limits, Particle Size Distribution (PSD), hydrometer, California Bearing Ratio (CBR), tests were carried out in NMTL's Geotechnical Laboratory in Carlow.
Rock strength testing including Point Load (Is_{50}) testing was carried out in NMTL's Geotechnical Laboratory in Carlow. The results of the laboratory testing are included in Appendix 6 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 but generally comprised;

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

TOPSOIL: Topsoil was encountered in all of the exploratory holes on the site and was present to a maximum depth of 0.5m BGL.

MADE GROUND: Made Ground deposits were not prominent in the southern greenfield part of the site. However it was encountered in TPI17 and TP10 to a maximum depth of 1m BGL that was described generally as *brown slightly sandy slightly gravelly Clay.* These deposits had occasional or some cobble content where noted on the exploratory hole logs. It should be noted that TP13 is located to the north of the site boundary and also encountered Made ground to a depth of 2.60m BGL that consisted of clayey gravelly Sand or sandy gravelly Clay.

COHESIVE DEPOSITS: Cohesive deposits were encountered beneath the topsoil and were described typically as *brown sandy gravelly CLAY / silty 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 glacial till matrix. These deposits had some, occasional or frequent cobble and boulder content where noted on the exploratory hole logs.

The strength of the cohesive deposits varied across the site but generally increased with depth and was typically soft to depths of between 1.7 and 3.4m BGL overlaying firm, firm to stiff or stiff in the majority of the exploratory holes.

GRANULAR DEPOSITS: The granular deposits were encountered within the cohesive deposits and were typically described as *grey or brown clayey sandy sub rounded to sub angular fine to coarse GRAVEL* or *gravelly fine to coarse SAND.* The secondary sand/gravel and silt/clay constituents varied across the site and with depth while occasional or frequent cobble and boulder content was also present where noted on the exploratory hole logs.
Based on the SPT N values the deposits are typically medium dense and become dense with depth although loose deposits were recorded in places. It should be noted that some of the trial pits where granular deposits or groundwater were encountered, experienced instability. This was described either as side wall spalling or as side wall collapse in the remarks section at the base of the trial pit logs. Groundwater strikes were noted in the majority of the boreholes generally on encountering or within the granular deposits.

BEDROCK: The rotary core boreholes recovered medium strong to strong grey fine grained LIMESTONE. Rare to some Calcite veins were noted during logging which are typically present within the Limestone.
The depth to medium strong to strong limestone rock varies from 9.8m BGL in BH02 to 13.2m BGL in BH09. Limestone was not encountered in RC10 before 17.2m BGL but hard pinkish grey gravelly CLAY which is described as possible weathered rock was encountered at a depth of 14.6m BGL. 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 good although some areas are recovered as non-intact.

4.2. Insitu Strength Testing

The correlated DPH blow counts indicate that the overburden deposits on the site are soft or soft to firm / loose to depths of 1.1m to 3.4m BGL and become firm or firm to stiff / medium dense with depth.
Some areas show deeper soft materials particularly the western side of the site where DP08, DP09, DP04, DP01, BH07 and BH03 are located. These locations coincide with a depression at the surface and indicate soft or soft to firm cohesive material or loose granular materials to depths of between 2.00m and 3.40m BGL.

4.3. Groundwater

Groundwater strikes are noted on the exploratory hole logs where they occurred and where possible drilling was 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 BH03, BH05A, BH07, and RC09 to allow the equilibrium groundwater level to be determined. The groundwater monitoring is included in Appendix 7 of this Report.

4.4. Laboratory Testing

4.4.1. 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 plasticity. The Particle Size Distribution tests confirm that generally the cohesive deposits are well-graded with percentages of sands and gravels ranging between 13% and 45% generally with fines contents of 30 to 50%.
The Particle Size Distribution tests confirm that generally the granular deposits are well-graded with percentages of sands/gravels and silt/clay typically between 25% and 35% with a gravel/sand content of typically 60% to 70%.
The CBR testing on remoulded samples from the site gave results ranging between 0.08% and 1.45% for the cohesive deposits.

4.4.1. Chemical Laboratory Testing

The pH and sulphate testing carried out indicate that pH results are near neutral and that the water soluble sulphate results is low when compared to the guideline values from BRE Special Digest 1:2005. The samples tested classify the soil as a Design Sulphate Level DS-1.

4.4.1. Environmental Laboratory Testing

A number of samples were analysed for a suite of parameters which allows for the assessment of the sampled material in terms of total pollutant content for classification of materials as *hazardous* or *non-hazardous*. The suite also allows for the assessment of the sampled material in terms of suitability for placement at licenced landfills (inert, stable non-reactive, hazardous etc.). The parameter list for the suite includes analysis of the solid samples for arsenic, barium, cadmium, chromium, copper, cyanide, lead, nickel, mercury, zinc, speciated aliphatic and aromatic petroleum hydrocarbons, pH, sulphate, sulphide, moisture content, soil organic matter and an asbestos screen.
The suite also includes those parameters specified in the EU Council Decision establishing criteria for the acceptance of waste at Landfills (Council Decision 2003/33/EC), which for the solid samples are total organic carbon (TOC), speciated aliphatic and aromatic petroleum hydrocarbons, BTEX, phenol, polychlorinated biphenyls (PCB) and PAH.
As part of the suite a leachate is generated from the solid sample which is analysed for antimony, arsenic, barium, cadmium, chromium, copper, lead, mercury, molybdenum, nickel, selenium, zinc, chloride, fluoride, soluble sulphate, sulphide, phenols, dissolved organic carbon (DOC) and total dissolved solids (TDS).
While the laboratory report provides a comparison with the waste acceptance criteria limits it does not provide a waste classification of the material sampled nor does it comment on any potentially hazardous properties of the materials tested. The possibility for contamination, not revealed by the testing undertaken should be borne in mind particularly where Made Ground deposits are present or the previous site use or location indicate a risk of environmental variation.

The waste classification report is included under the cover of a sperate report by Ground Investigations Ireland.

4.4.1.Rock Laboratory Testing

The point load testing carried out on samples recovered from the boreholes gave Is50 values ranging between 1.4 to 5.4 MPa. The Is_{50} results correlate to the UCS values using a factor of approximately 20, giving values of 28 MPa and 108 MPa. These results correlate to the strength descriptions ranging between of Medium Strong to Very Strong and confirming the variability of this stratum and the descriptions on the logs. The average of the correlated values from the point loading suggest the rock is typically Strong. The results from the completed laboratory testing is included in Appendix 6 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

The ground conditions on the southern greenfield part of the site are variable including soft compressible soils. Due to the variation in conditions, depths have been provided in table 1 at each of the investigation locations where an allowable bearing capacity of 100 kN/m2 and 200kN/m2 is achievable for conventional strip or pad foundations on the firm to stiff / stiff cohesive deposits or medium dense granular deposits.
The possibility for variation in the depth of the soft or loose deposits in the vicinity of these foundations should be considered and foundation inspections should be carried out. Any areas where suitable bearing strata is deep or soft spots encountered at the proposed foundation depths should be excavated and replaced with lean mix concrete.

Table 1 - Allowable Bearing Capacities at Investigation Locations on Green Field Site

	Allowable Bearing Capacities (ABC) kN/m2						
Probe / Borehole	**100 Kn /M2 ABC**	**200 Kn /M2 ABC**	**Comment**	**Probe / Borehole**	**100 Kn /M2 ABC**	**200 Kn /M2 ABC**	**Comment**
No.	**Depth mBGL**	**Depth m BGL**		**No.**	**Depth mBGL**	**Depth m BGL**	
DP01	2.7	3.7		**DP18**	1.8	2.3	
DP02	1.5	3.3		**DP19**	2.4	2.9	
DP03	1.1	2.2		**DP20**	1.7	2.4	
DP04	2.8	3.6		**DP21**	1.8	2.6	
DP05A	1.3	N/A	**Refusal at 1.4**	**DP22**	1.2	1.5	
DP06	1.7	2.4		**DP23**	1.7	1.9	
DP07	1.4	N/A		**DP24**	2.5	2.7	
DP08	3.6	4.4		**DP25**	1.6	2.0	
DP09	2.1	2.6		**BH01**	5.7	5.7	**Bridge culvert, See section 5.3**
DP10	1.8	3.2		**BH02**	1.7	3.8	
DP11	2.1	5.0		**BH03**	3.0	4.0	
DP12	1.2	1.7		**BH04**	2.0	2.0	
DP13	1.2	2.2		**BH05**	2.0	2.0	
DP14	1.7	2.2		**BH05A**	2.0	2.0	
DP15	2.5	2.9		**BH06**	2.1	2.1	
DP16	1.7	2.3		**BH07**	3.4	3.4	
DP17	2.0	2.0					
In areas with deeper soft / loose ground conditions and/or higher loadings, piling may be more economical, see below							

Where possible a ground bearing floor slab is recommended to be based on the firm or firm to stiff / cohesive deposits or medium dense granular deposits with an appropriate depth of compacted hardcore specified by the consulting engineer and in accordance with the limits and guidelines in SR21:2014+A1:2016 and/or NRA SRW CL808 Type E granular stone fill. Where the depth of Made Ground/Soft deposits exceeds 0.9m then suspended floor slabs should be considered.

Due to the variation in ground conditions we would recommend that all the foundations from individual buildings are founded in the same stratum to avoid differential settlement. This is particularly important to consider for longer sections of connected buildings that are more likely to cross areas of differing ground conditions i.e. apartment blocks, terraced housing.

Due to the presence of soft and compressible cohesive or loose granular deposits beneath the footprint of the proposed structures on some parts of the site conventional foundations may not be practical. In these areas piled foundations may be more economically advantageous for the proposed buildings particularly where higher loading is anticipated at the location of the proposed 3 or 4 story buildings. The deepest depths shown in the table are due to the increased depth of softer/loose materials and give an indication of the areas of the site where piling may be required. As mentioned in section 4.2 of this report the western part of the greenfield site is one area where the probes and boreholes indicate deeper soft/loose materials. The type, size and depth of the pile foundations should be confirmed by a specialist piling contractor based on the loading from the proposed building. The floor slab is recommended be suspended and also supported on the building piles. Negative skin friction from the very soft cohesive deposits should be considered in the pile design due to the possibility of loading from working platforms or the adjacent pavement make up. The slope leading to the stream should also be considered when determining foundation types as loading and excavation could cause instability meaning piled foundations may be more suitable if buildings with higher loadings are proposed in this area.
The recommended bearing capacity that can be achieved on the limestone rock would be in excess of 1000 kN/m2.

When the location and loading of buildings has been finalised for the proposed development it may be economically advantageous to undertake additional investigation to determine the extents of softer ground and the types of foundation that could be used for individual structures.

5.3. Foundations for Bridge Culvert

Due to the presence of variable made ground beneath the footprint of the northside of the proposed bridge in the location of BH01 and soft materials on the south site of the bridge at the location of BH02, piled foundations may be required, However when proposed bridge culvert loadings are finalised foundation type can be determined.
The type, size and depth of the pile foundations should be confirmed by a specialist piling contractor based on the loading from the proposed building.

Negative skin friction from the very soft cohesive deposits should be considered in the pile design due to the possibility of loading from working platforms or the adjacent pavement make up.

5.4. Groundwater

Bearing capacities provided within the report take into account the groundwater level. The design ground water level for the site are provided in the table below water levels were generally higher towards the northern part of the site nearer to the stream so levels in the eastern and western parts of the site are based on the highest reading recorded. Piezometers were not installed in all areas of the site so water levels provided are based on where water was encounter during excavation of trial pits and boreholes and may not represent standing water levels.

Area	Design Groundwater level	Investigation locations considered	Notes
Western part of site (Purple area*)	1.0m BGL	Piezo in BH03 and BH07	Based on piezometer readings
Eastern part of site (Green area*)	1.5m BGL	Piezo in BH05, RC09, BH06	Based on piezo readings in BH05 and BH09 and borehole records in BH06
*Water levels based on reading taken in summer months, levels would be expected to vary with the tide, time of year, rainfall, nearby construction and other factors. ** Figure 2 in appendix 1 shows DBFL designated areas on site.			

The groundwater monitoring is included in Appendix 7 of this Report.

5.5. Chemical Testing Results

The pH and sulphate testing completed on samples recovered from the exploratory holes across the northern green field and southern brown field parts of the site indicates the pH results are near neutral and the sulphate results are low, when compared to the guideline values from BRE Special Digest 1:2005. No special precautions are required for concrete foundations to prevent sulphate attack. The samples tested were below the limits of DS1 in the BRE Special Digest 1:2005.

5.6. External Pavements

The proposed pavements are recommended to be designed in accordance with the CBR test results included in the Appendixes of this Report. The low CBR test results from the southern part of the site indicate that a capping layer or a sufficient depth of crushed stone fill may be required. The CBR values gained from the northern part of the site were higher but should be used with caution due to the likely variation within the made ground. Plate bearing tests are recommended at the time of construction to verify the design assumptions for the proposed pavement make up and to verify adequate compaction has been achieved.

The use of a geogrid and separation membrane may improve the performance of the proposed pavement and enable a more economical pavement design to be achieved, a specialist supplier is recommended to advise of the required strength, depth and type of geotextile for the proposed design.

5.7. 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 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.

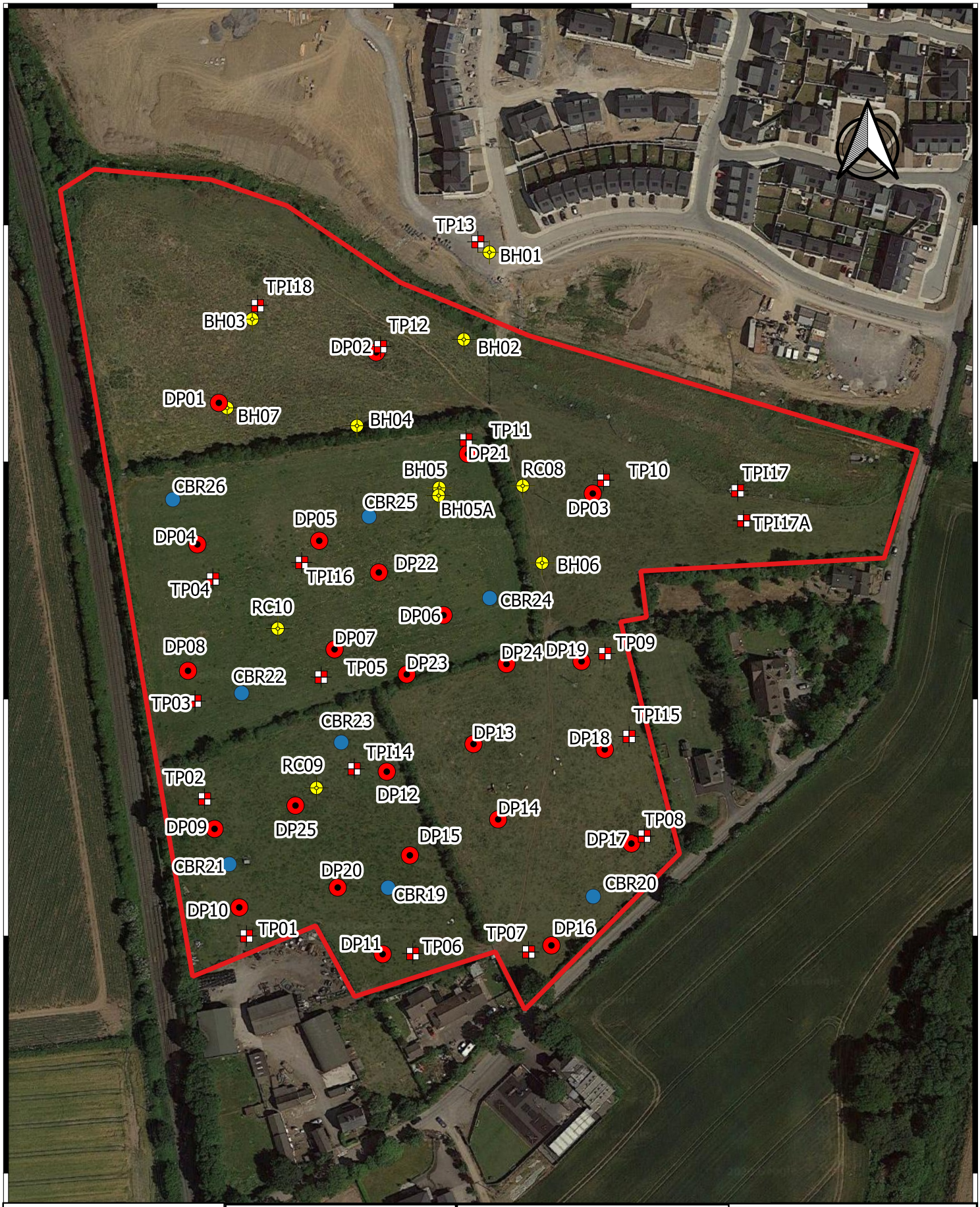
Excavations in the upper cohesive and granular deposits are expected to be excavatable with conventional excavation equipment. Due to the depth that rock was encountered excavations in rock are not anticipated to be required.

5.8. Soakaway Design

An infiltration rate of f=8.2 x 10^{-6} m/s were calculated for the soakaway location TPI16. At the locations of TPI14, TPI15, TPI17A, and TPI18 the water level dropped too slowly to allow calculation of ‘f’ the soil infiltration rate. These locations are therefore not recommended as suitable for soakaway design and construction.

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



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Client:

0 20 40 60 m

Project Title:
Hackettstown, Skerries

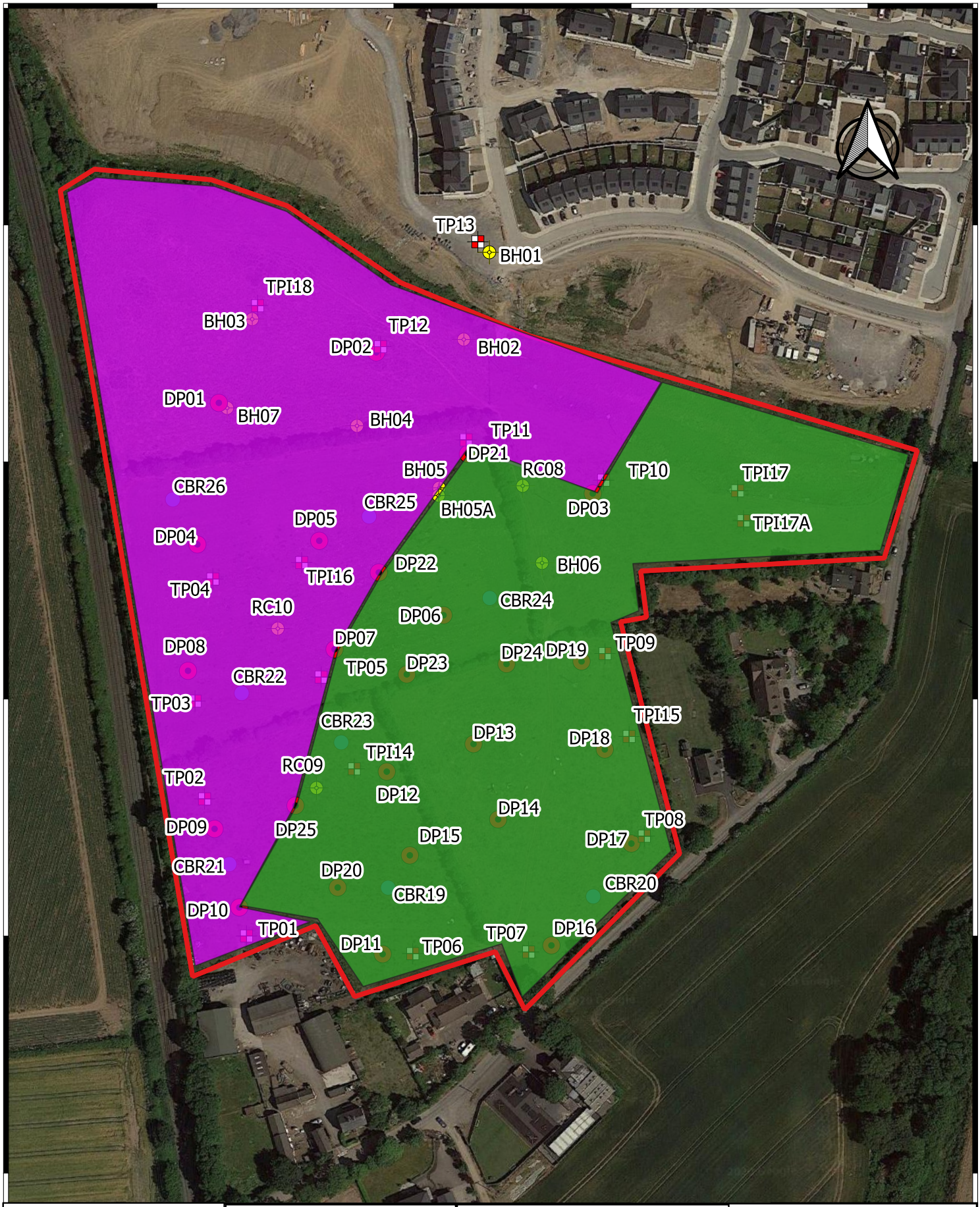
Drawing Title:
Figure 1 Investigation Location

GII Project Reference:
9225-11-19

Drawn By:
MS

Date:
03/07/2020

- Borehole
- Trial Pit
- Dynamic Probe
- CBR
- Indicative Site Boundary



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0 20 40 60 m

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Drawing Title:
Figure 2 Site zones

GII Project Reference:
9225-11-19

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MS

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03/07/2020

- Borehole
- Trial Pit
- Dynamic Probe
- CBR
- Indicative Site Boundary

APPENDIX 2 – Trial Pit Records

Ground Investigations Ireland Ltd
www.gii.ie

Site Hackettstown, Skerries			**Trial Pit Number** TP01
Machine : 8.5T Excavator **Method :** Trial Pit	**Dimensions** 1.0m x 2.5m x 3.40m	**Ground Level (mOD)** 24.45	**Client** DBFL	**Job Number** 9225-11-19
	Location (dGPS) 724937.8 E 758999.6 N	**Dates** 28/11/2019	**Project Contractor** Ground Investigations Ireland	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.20)	Brown slightly sandy slightly gravelly TOPSOIL.		
				24.25	0.20	Soft to firm orange brown slightly sandy slightly gravelly CLAY. Gravel is sub-angular to sub rounded fine to coarse. Sand is fine to coarse.		
0.70	B				(1.00)			
				23.25	1.20	Firm brown slightly sandy slightly gravelly CLAY with some cobbles and occasional boulders. (Band of clayey gravel at 1.5m-2.30m). Gravel is sub-angular to sub-rounded fine to coarse. Sand is fine to coarse.		
1.50	B		Water strike(1) at 1.50m.		(0.60)			▽1
				22.65	1.80	Firm to stiff brown slightly sandy slightly gravelly CLAY with some cobbles and occasional boulders. (Band of clayey gravel at 1.5m-2.30m). Gravel is sub-angular to sub-rounded fine to coarse. Sand is fine to coarse.		
					(0.50)			
				22.15	2.30	Firm to stiff reddish brown slightly sandy slightly gravelly silty CLAY with occasional cobbles and boulders. Gravel is sub-angular to sub-rounded fine to coarse. Sand is fine to coarse.		
2.70	B				(0.80)			
				21.35	3.10	Stiff reddish brown slightly sandy slightly gravelly CLAY with occasional cobbles and boulders. Gravel is sub-angular to sub-rounded fine to coarse. Sand is fine to coarse.		
					(0.30)			
				21.05	3.40	Complete at 3.40m		

Plan

Remarks

Trial pit side wall collapse from 0.5-3.0m
Trial pit complete at 3.40m due to collapse.
Trial pit backfilled on completion.
Groundwater seepage from 1.5-2.0m

Scale (approx)	Logged By	Figure No.
1:25	MS	9225-11-19.TP01

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Site Hackettstown, Skerries			**Trial Pit Number** TP02
Machine : 8.5T Excavator **Method :** Trial Pit	**Dimensions** 10m x 2.5m x 3.6m	**Ground Level (mOD)** 23.91	**Client** DBFL	**Job Number** 9225-11-19
	Location (dGPS) 724920.1 E 759057.4 N	**Dates** 28/11/2019	**Project Contractor** Ground Investigations Ireland	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.30)	Brown slightly gravelly slightly sandy TOPSOIL.		
				23.61	0.30			
0.50	B1				(0.70)	Soft to firm brown slightly sandy slightly gravelly CLAY with occasional sub-angular to sub-rounded cobbles. Gravel is sub-angular to sub-rounded, fine to coarse. Sand is fine to coarse.		
				22.91	1.00			
1.20	B2				(1.00)	Soft to frim brown slightly sandy slightly gravelly CLAY with occasional sub-angular to sub-rounded cobbles. Gravel is sub-angular to sub-rounded, fine to coarse. Sand is fine to coarse.		
				21.91	2.00			
					(0.50)	Firm reddish brown slightly sandy slightly gravelly CLAY with occasional sub-angular to sub-rounded cobbles. Gravel is sub-angular to sub-rounded, fine to coarse.		
				21.41	2.50			
2.80	B3				(1.10)	Stiff reddish brown slightly sandy slightly gravelly CLAY with occasional sub-angular to sub-rounded cobbles. Gravel is sub-angular to sub-rounded, fine to coarse.		
			Water strike(1) at 3.30m.					▽1
				20.31	3.60			
						Complete at 3.60m		

Plan

Remarks

Moderate water inflow from 3.30m.
Trial pit terminated due to collapse and water inflow.
Trial pit sidewall collapse from all sides.
Trial pit backfilled on completion.

Scale (approx)	Logged By	Figure No.
1:25	MS	9225-11-19.TP02

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Site Hackettstown, Skerries			**Trial Pit Number** TP03
Machine : 8.5T Excavator **Method :** Trial Pit	**Dimensions** 1m x 2.5m x 3.7m	**Ground Level (mOD)** 23.76	**Client** DBFL	**Job Number** 9225-11-19
	Location (dGPS) 724916.1 E 759098.7 N	**Dates** 28/11/2019	**Project Contractor** Ground Investigations Ireland	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.30)	Brown slightly sandy slightly gravelly TOPSOIL.		
				23.46	0.30			
0.50	B				(0.40)	Soft brown slightly sandy slightly gravelly silty CLAY. Gravel is sub-angular to sub-rounded fine to coarse. Sand is fine to coarse.		
				23.06	0.70			
1.00	B					Soft orangey brown slightly sandy slightly gravelly CLAY.Gravel is sub-angular to sub-rounded fine to coarse. Sand is fine to coarse.		
1.20	B				(1.30)			
2.00	B			21.76	2.00	Soft slightly gravelly sandy CLAY with occasional sub-angular to rounded cobbles. Gravel is sub-angular to rounded fine to coarse. Sand is fine to coarse.		
					(0.50)			
				21.26	2.50	Loose red brown very clayey gravelly fine to coarse SAND with occasional sub-angular to rounded cobbles. Gravel is sub-angular to rounded fine to coarse.		
3.00	B				(0.90)			
				20.36	3.40	Medium dense red brown very clayey gravelly fine to coarse SAND with occasional sub-angular to rounded cobbles. Gravel is sub-angular to rounded fine to coarse.		
					(0.30)			
				20.06	3.70	Complete at 3.70m		

Plan

Remarks

Trial pit side wall collapse.
Trial pit terminated due to collapse.
Trial pit backfilled on completion.
No groundwater encountered during excavation.

Scale (approx)	Logged By	Figure No.
1:25	MS	9225-11-19.TP03

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Site Hackettstown, Skerries			**Trial Pit Number** TP04
Machine : 8.5T Excavator **Method :** Trial Pit	**Dimensions** 1.0m x 2.5m x 3.30m	**Ground Level (mOD)** 23.11	**Client** DBFL	**Job Number** 9225-11-19
	Location (dGPS) 724923.6 E 759150.2 N	**Dates** 29/11/2019	**Project Contractor** Ground Investigations Ireland	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.20)	TOPSOIL.		
				22.91	0.20	Soft brown sandy gravelly silty CLAY with occasional sub-angular to sub-rounded cobbles and occasional sandy lenses. Gravel is sub-angular to sub-rounded, fine to coarse. Sand is fine to coarse.		
0.50	B				(0.90)			
			Water strike(1) at 0.90m.					▽1
				22.01	1.10	Soft to firm brown sandy gravelly silty CLAY with occasional sub-angular to sub-rounded cobbles and occasional sandy lenses. Gravel is sub-angular to sub-rounded, fine to coarse. Sand is fine to coarse.		
1.50	B							
					(1.70)			
2.50	B							
				20.31	2.80	Firm to stiff brown sandy gravelly silty CLAY with occasional sub-angular to sub-rounded cobbles and occasional sandy lenses. Gravel is sub-angular to sub-rounded, fine to coarse. Sand is fine to coarse.		
					(0.50)			
			Water strike(2) at 3.30m.	19.81	3.30	Complete at 3.30m		▽2

Plan

Remarks

Groundwater encountered at 0.9m. Steady trickle.
Groundwater encountered at 3.30m.
Trial pit side wall collapse.
Trial pit terminated due to unstability.
Trial pit backfilled on completion.

Scale (approx)	Logged By	Figure No.
1:25	MMC	9225-11-19.TP04

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Site Hackettstown, Skerries			**Trial Pit Number** TP05
Machine : 8.5T Excavator **Method :** Trial Pit	**Dimensions** 1.0m x 2.5m x 3.5m	**Ground Level (mOD)** 24.89	**Client** DBFL	**Job Number** 9225-11-19
	Location (dGPS) 724969.3 E 759108.8 N	**Dates** 28/11/2019	**Project Contractor** Ground Investigations Ireland	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.40)	Dark brown slightly sandy slightly gravelly TOPSOIL		
				24.49	0.40			
0.60	B				(0.90)	Loose reddish brown clayey gravelly fine to coarse SAND. Gravel is sub-angular to sub-rounded, fine to coarse.		
				23.59	1.30			
1.50	B				(0.90)	Firm to stiff brown slightly sandy slightly gravelly CLAY with occasional sub-angular to sub-rounded cobbles.Gravel is sub-angular to sub-rounded, fine to coarse. Sand is fine to coarse.		
				22.69	2.20			
2.50	B				(1.30)	Yellow brown clayey gravelly fine to coarse SAND with occasional sub-angular to sub-rounded cobbles. Gravel is sub-angular to sub-rounded fine to coarse. Sand is predominantly fine to medium.		
				21.39	3.50			
3.50	B					Complete at 3.50m		

Plan

Remarks

Trial pit terminated due to difficult excavation.
No groundwater encountered during excavation.
Trial pit stable.
Trial pit backfilled on completion.

Scale (approx)	Logged By	Figure No.
1:25	MS	9225-11-19.TP05

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Site Hackettstown, Skerries			**Trial Pit Number** TP06
Machine : 8.5T Excavator **Method :** Trial Pit	**Dimensions**	**Ground Level (mOD)** 24.90	**Client** DBFL	**Job Number** 9225-11-19
	Location (dGPS) 725007.9 E 758992.1 N	**Dates** 28/11/2019	**Project Contractor** Ground Investigations Ireland	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.20)	Brown slightly sandy slightly gravelly TOPSOIL.		
				24.70	0.20	Soft to firm brown slightly gravelly very sandy CLAY.Gravel is sub-angular to sub-rounded, fine to coarse. Sand is fine to coarse.		
0.50	B				(0.70)			
				24.00	0.90	Soft to firm slightly gravelly sandy CLAY with occasional sub-angular to sub-rounded cobbles and occasional lenses of yellow brown fine sand. Gravel is sub-angular to sub-rounded, fine to coarse.		▽1
			Water strike(1) at 1.00m.					
					(0.90)			
1.50	B		Water strike(2) at 1.50m.					▽2
				23.10	1.80	Firm slightly gravelly sandy CLAY with occasional sub-angular to sub-rounded cobbles and occasional lenses of yellow brown fine sand. Gravel is sub-angular to sub-rounded, fine to coarse.		
					(0.40)			
				22.70	2.20	Firm to Stiff slightly gravelly sandy CLAY with occasional sub-angular to sub-rounded cobbles and occasional lenses of yellow brown fine sand. Gravel is sub-angular to sub-rounded, fine to coarse.		
					(0.30)			
2.50	B			22.40	2.50	Complete at 2.50m		

Plan

Remarks

Moderate groundwater inflow from 1.0m and 1.5m.
Collapse from all sides of trial pit.
Trial pit terminated due to collapse.
Trial pit backfilled on completion.

Scale (approx)	Logged By	Figure No.
1:25	MS	9225-11-19.TP06

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Site Hackettstown, Skerries			**Trial Pit Number** TP07
Machine : 8.5T Excavator **Method :** Trial Pit	**Dimensions** 1.0m x 2.5m x 3.4m	**Ground Level (mOD)** 25.04	**Client** DBFL	**Job Number** 9225-11-19
	Location (dGPS) 725056.8 E 758992.8 N	**Dates** 28/11/2019	**Project Contractor** Ground Investigations Ireland	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.30)	Brown slightly sandy slightly gravelly TOPSOIL.		
				24.74	0.30			
0.50	B					Soft to firm orange brown slightly sandy slightly gravelly CLAY. Gravel is sub-angular to sub-rounded, fine to coarse. Sand is fine to coarse.		
					(1.20)			
1.20	B							
			Water strike(1) at 1.50m.	23.54	1.50			▽1
					(0.80)	Firm orange brown slightly sandy slightly gravelly CLAY. Gravel is sub-angular to sub-rounded, fine to coarse. Sand is fine to coarse.		
2.20	B							
				22.74	2.30			
					(0.70)	Stiff brown slightly sandy slightly gravelly CLAY with occasional sub-angular to sub-rounded cobbles and boulders. Gravel is sub-angular to sub-rounded, fine to coarse. Sand is fine to coarse.		
3.00	B			22.04	3.00			
					(0.40)	Very stiff brown slightly sandy slightly gravelly CLAY with occasional sub-angular to sub-rounded cobbles and boulders. Gravel is sub-angular to sub-rounded, fine to coarse.		
				21.64	3.40			
						Complete at 3.40m		

Plan

Remarks

Groundwater seepage from 1.5m to 2.6m from all faces.
Minor trial pit side wall collapse.
Trial pit terminated at 3.4m due to hard digging.

Scale (approx)	Logged By	Figure No.
1:25	MS	9225-11-19.TP07

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Site Hackettstown, Skerries			**Trial Pit Number** TP08
Machine : 8.5T Excavator **Method :** Trial Pit	**Dimensions** 1.0m x 2.5m x 4.0m	**Ground Level (mOD)** 23.42	**Client** DBFL	**Job Number** 9225-11-19
	Location (dGPS) 725105.6 E 759041.7 N	**Dates** 28/11/2019	**Project Contractor** Ground Investigations Ireland	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
				23.32	(0.10) 0.10	TOPSOIL.		
						Soft brown slightly sandy slightly gravelly silty CLAY. Gravel is sub-angular to sub-rounded, fine to coarse. Sand is fine to coarse.		
				22.97	(0.35) 0.45			
0.50	B1					Soft to firm orange brown slightly sandy slightly gravelly CLAY with occasional sub-angular to sub-rounded cobbles. Gravel is sub-angular to sub-rounded fine to coarse.		
1.00	B2				(1.05)			
				21.92	1.50	Firm orange brown slightly sandy slightly gravelly CLAY with occasional sub-angular to sub-rounded cobbles. Gravel is sub-angular to sub-rounded fine to coarse.		
2.00	B3				(1.00)			
			Water strike(1) at 2.50m.	20.92	2.50	Firm to stiff orange brown sandy slightly gravelly CLAY with occasional sub-angular to sub-rounded cobbles. Gravel is sub-angular to sub-rounded fine to coarse.		▽1
					(0.40)			
				20.52	2.90	Stiff orange brown slightly sandy slightly gravelly CLAY with occasional sub-angular to sub-rounded cobbles and boulders. Gravel is sub-angular to sub-rounded, fine to coarse. Sand is fine to coarse.		
3.50	B4				(1.10)			
				19.42	4.00			

Plan

Remarks

Trial pit backfilled on completion.
Minor groudnwater seepage from 2.5m to 3.5m.
Minor trial pit side wall collapse from 2.5m to 3.5m.

Scale (approx)	Logged By	Figure No.
1:25	MS	9225-11-19.TP08

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Site Hackettstown, Skerries			**Trial Pit Number** TP09
Machine : 8.5T Excavator **Method :** Trial Pit	**Dimensions** 1.0m x 2.5m x 2.7m	**Ground Level (mOD)** 21.94	**Client** DBFL	**Job Number** 9225-11-19
	Location (dGPS) 725089.1 E 759118.7 N	**Dates** 29/11/2019	**Project Contractor** Ground Investigations Ireland	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.20)	Brown slightly gravelly slightly sandy TOPSOIL.		
				21.74	0.20	Soft brown sandy gravelly silty CLAY with occasional sub-angular to sub-rounded cobbles. Gravels are sub-angular to sub-rounded, fine to coarse. Sand is fine to coarse.		
0.50	B							
					(2.30)			
1.50	B		Water strike(1) at 1.80m.					▽1
				19.44	2.50			
					(0.20)	Stiff brown sandy gravelly silty CLAY with occasional sub-angular to sub-rounded cobbles. Gravels are sub-angular to sub-rounded, fine to coarse. Sand is fine to coarse.		
				19.24	2.70	Complete at 2.70m		

Plan

Remarks

Groundwater encountered at 1.8m. High amount of water causing weakness and major sidewall collapse.
Trial pit terminated due to unstability.
Trial pit backfilled on completion.

Scale (approx)	Logged By	Figure No.
1:25	MMC	9225-11-19.TP09

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Site Hackettstown, Skerries			**Trial Pit Number** TP10
Machine : 8.5T Excavator **Method :** Trial Pit	**Dimensions**	**Ground Level (mOD)** 17.33	**Client** DBFL	**Job Number** 9225-11-19
	Location (dGPS) 725088.4 E 759191.9 N	**Dates** 29/11/2019	**Project Contractor** Ground Investigations Ireland	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
				17.13	(0.20) 0.20	TOPSOIL.		
0.50	B				(0.80)	MADE GROUND: Brown sandy gravelly CLAY with some angular to sub-rounded cobbles. Fragments of red bricks. Gravel is sub-angular to sub-rounded, fine to coarse. Sand is fine to coarse.		
				16.33	1.00			
1.50	B				(1.10)	Firm to stiff brown slightly sandy gravelly silty CLAY with some sub-rounded cobbles and occasional sub-rounded boulders. Gravel is sub-angular to sub-rounded, fine to coarse. Sand is fine to coarse.		
				15.23	2.10			
2.50	B		Water strike(1) at 3.00m.		(1.10)	Stiff brown slightly sandy gravelly silty CLAY with some sub-rounded cobbles and occasional sub-rounded boulders. Gravel is sub-angular to sub-rounded, fine to coarse. Sand is fine to coarse.		▽1
				14.13	3.20			
3.50	B				(0.80)	Stiff dark brown/grey slightly sandy gravelly CLAY with some sub-rounded cobbles.Gravel is sub-angular to sub-rounded, fine to coarse.		
				13.33	4.00			

Plan

Remarks

Groundwater seepage encountered at 3.00m.
Trial pit stable.
Trial pit backfilled on completion.

Scale (approx)	Logged By	Figure No.
1:25	MMC	9225-11-19.TP10

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Site Hackettstown, Skerries			**Trial Pit Number** TP11
Machine : 8.5T Excavator **Method :** Trial Pit	**Dimensions**	**Ground Level (mOD)** 19.24	**Client** DBFL	**Job Number** 9225-11-19
	Location (dGPS) 725030.4 E 759208.9 N	**Dates** 29/11/2019	**Project Contractor** Ground Investigations Ireland	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
				19.14	(0.10) 0.10	TOPSOIL with rootlets.		
0.50	B					Soft brown sandy gravelly silty CLAY with some angular to sub-angular cobbles. Gravels are sub-angular to sub-rounded fine to coarse. Sand is fine to coarse.		
			Water strike(1) at 1.00m.		(1.70)			▽1
1.50	B		Water strike(2) at 1.50m.					▽2
				17.44	1.80	Firm brown sandy gravelly silty CLAY with some angular to sub-angular cobbles. Gravels are sub-angular to sub-rounded fine to coarse. Sand is fine to coarse.		
					(0.70)			
2.50	B			16.74	2.50	Stiff brown sandy gravelly silty CLAY with some angular to sub-angular cobbles. Gravels are sub-angular to sub-rounded fine to coarse. Sand is fine to coarse.		
					(0.90)			
				15.84	3.40	Complete at 3.40m		

Plan

Remarks

Groundwater seepage encountered at 1.00m and at 1.50m.
Trial pit unstable.
Trial pit terminated due to unstability.
Trial pit backfilled on completion.

Scale (approx)	Logged By	Figure No.
1:25	MMC	9225-11-19.TP11

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Site Hackettstown, Skerries			**Trial Pit Number** TP12
Machine : 8.5T Excavator **Method :** Trial Pit	**Dimensions**	**Ground Level (mOD)** 16.16	**Client** DBFL	**Job Number** 9225-11-19
	Location 724994.3 E 759248.2 N	**Dates** 27/11/2019	**Project Contractor** Ground Investigations Ireland	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.20)	Brown slightly sandy slightly gravelly TOPSOIL.		
				15.96	0.20	Soft brown sandy gravelly silty CLAY. Gravel is sub-angular to sub-rounded, fine to coarse. Sand is fine to coarse.		
0.50	B				(0.60)			
				15.36	0.80	Loose greyish brown clayey slightly gravelly SAND.Gravel is sub-angular to sub-rounded, fine to coarse.		
1.00	B				(0.70)			▼1
			Water strike(1) at 1.50m, rose to 1.30m in 5 mins.	14.66	1.50	Complete at 1.50m		▽1

Plan

Remarks

Groundwater encountered at 1.5m. Water filled back to 1.3m BGL after 5min.
Trial pit terminated at 1.5m due to groundwater inflow.
Trial pit backfilled on completion.

Scale (approx)	Logged By	Figure No.
1:25	MMC	9225-11-19.TP12

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Site Hackettstown, Skerries			**Trial Pit Number** TP13
Machine : 8.5T Excavator **Method :** Trial Pit	**Dimensions** 1.0m x 2.5m x 2.6m	**Ground Level (mOD)** 19.43	**Client** DBFL	**Job Number** 9225-11-19
	Location (dGPS) 725035.4 E 759292.5 N	**Dates** 29/11/2019	**Project Contractor** Ground Investigations Ireland	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.15)	MADE GROUND: Angular fine to coarse gravel.		
				19.28	0.15	MADE GROUND: Brown sandy very gravelly CLAY with many cobbles. Rare fragments of plastic present. Gravel is sub-angular to sub-rounded, fine to coarse.		
0.50	B				(0.65)			
				18.63	0.80	MADE GROUND: Brown slightly clayey gravelly SAND with some sub-rounded cobbles. Gravel is sub-angular to sub-rounded, fine to coarse.		
1.00	B				(1.80)			
				16.83	2.60	Complete at 2.60m		

Plan

Remarks

Trial pit stable.
Trial pit backfilled on completion.
No groundwater encountered duriing excavation.

Scale (approx)	Logged By	Figure No.
1:25	MMC	9225-11-19.TP13

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Site Hackettstown, Skerries			**Trial Pit Number** TPI14
Machine : 8.5T Excavator **Method :** Trial Pit	**Dimensions** 2.1m x 0.6m x 2.0m (L x W x D)	**Ground Level (mOD)** 25.54	**Client** DBFL	**Job Number** 9225-11-19
	Location 724983.3 E 759070.1 N	**Dates** 27/11/2019	**Project Contractor** Ground Investigations Ireland	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.15)	TOPSOIL.		
				25.39	0.15	Soft brown sandy gravelly silty CLAY with occasional sub-angular to sub-rounded cobbles. Gravel is sub-angular to sub-rounded, fine to coarse. Sand is fine to coarse.		
0.50	B				(0.85)			
				24.54	1.00	Medium dense brown gravelly slightly clayey SAND with occasional sub-angular to sub-rounded cobbles and occasional sub-rounded boulders. Gravel is sub-angular to sub-rounded, fine to coarse. Sand is fine to coarse.		
1.50	B				(1.00)			
				23.54	2.00	Dense brown gravelly slightly clayey SAND with occasional sub-angular to sub-rounded cobbles and occasional sub-rounded boulders. Gravel is sub-angular to sub-rounded, fine to coarse. Sand is fine to coarse.		
					(0.60)			
				22.94	2.60	Brown slightly clayey gravelly SAND with occasional sub-angular to sub-rounded cobbles and occasional sub-rounded boulders. Gravel is sub-angular to sub-rounded, fine to coarse. Sand is fine to coarse.		
					(1.40)			
				21.54	4.00			

Plan

Remarks

No groundwater encountered during excavation.
Trial pit stable.
Soakaway test carried out in pit at 2.00m BGL.
Trial pit backfilled on completion.

Scale (approx)	Logged By	Figure No.
1:25	MMC	9225-11-19.TPI14

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Site Hackettstown, Skerries			**Trial Pit Number** TPI15
Machine : 8.5T Excavator **Method :** Trial Pit	**Dimensions** 2.5m x 0.5m x 2.0m (L x W x D)	**Ground Level (mOD)** 23.15	**Client** DBFL	**Job Number** 9225-11-19
	Location 725099.2 E 759083.8 N	**Dates** 27/11/2019	**Project Contractor** Ground Investigations Ireland	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
				23.00	(0.15) 0.15	TOPSOIL.		
0.50	B				(1.65)	Soft brown sandy gravelly/silty CLAY with occasional angular to sub-angular cobbles.Gravel is sub-angular to sub-rounded, fine to coarse. Sand is fine to coarse.		
1.50	B			21.35	1.80			
					(0.30)	Firm to stiff brown sandy gravelly/silty CLAY with occasional angular to sub-angular cobbles.Gravel is sub-angular to sub-rounded, fine to coarse. Sand is fine to coarse.		
2.50	B			21.05	2.10			
					(0.90)	Stiff brown sandy gravelly silty CLAY with occasional angular to sub-angular cobbles. Gravel is sub-angular to sub-rounded, fine to coarse. Sand is fine to coarse.		
				20.15	3.00			
						Complete at 3.00m		

Plan

Remarks

No groundwater encountered during excavation.
Trial pit stable.
Soakaway test carried out in pit at 2.0mBGL
Trial pit terminated due to hard digging at 3m.

Scale (approx)	Logged By	Figure No.
1:25	MMC	9225-11-19.TPI15

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Site Hackettstown, Skerries			**Trial Pit Number** TPI16
Machine : 8.5T Excavator **Method :** Trial Pit	**Dimensions** 2.2m x 0.6m x 2.00m (L x W x D)	**Ground Level (mOD)** 24.06	**Client** DBFL	**Job Number** 9225-11-19
	Location (dGPS) 724961.1 E 759157.1 N	**Dates** 27/11/2019	**Project Contractor** Ground Investigations Ireland	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.15)	TOPSOIL.		
				23.91	0.15	Soft brown sandy gravelly silty CLAY with occasional sub-angular to sub-rounded cobbles. Gravel is sub-angular to sub-rounded, fine to coarse. Sand is fine to coarse.		
0.50	B				(0.85)			
				23.06	1.00	Brown slightly clayey gravelly SAND with occasional sub-angular to sub-rounded cobbles. Gravel is sub-angular to sub-rounded, fine to coarse. Sand is fine to coarse.		
1.50	B				(1.10)			
				21.96	2.10	Brown very gravelly slightly clayey SAND with many sub-rounded cobbles.		
2.50	B				(1.90)			
3.50	B		Water strike(1) at 3.70m.					▽1
				20.06	4.00			

Plan

Remarks

Moderate groundwater encountered at 3.7m, moderate flow.
Trial Pit Stable.
Soakaway test carried out in pit at 2.0m
Trial Pit backfilled on completion.

Scale (approx)	Logged By	Figure No.
1:25	MMC	9225-11-19.TPI16

Ground Investigations Ireland Ltd
www.gii.ie

Site Hackettstown, Skerries			**Trial Pit Number** TPI17
Machine : 8.5T Excavator **Method :** Trial Pit	**Dimensions**	**Ground Level (mOD)** 15.13	**Client** DBFL	**Job Number** 9225-11-19
	Location (dGPS) 725145 E 759187.4 N	**Dates** 27/11/2019	**Project Contractor** Ground Investigations Ireland	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.15)	TOPSOIL		
				14.98	0.15	MADE GROUND: Brown sandy slightly gravelly silty clay. Rare fragments of bricks/clay pipe.		
0.50	B				(0.55)			
				14.43	0.70	Soft to firm grey mottled orange sandy slightly gravelly silty CLAY. Gravel is sub-angular to sub-rounded, fine to coarse.		
					(1.00)			
1.50	B		Water strike(1) at 1.40m.					▽1
				13.43	1.70	Brownish grey clayey sandy GRAVEL. Gravel is sub-angular to sub-rounded.		
					(0.40)			
2.00	B			13.03	2.10	Complete at 2.10m		

Plan

Remarks

Trial Pit terminated due to collapse in gravel with presence of water.
Pit filling with water - unsuitable for soakaway.
Groundwater encountered at 1.40m. Fast flow.

Scale (approx)	Logged By	Figure No.
1:25	MMC	9225-11-19.TPI17

Ground Investigations Ireland Ltd
www.gii.ie

Site Hackettstown, Skerries			**Trial Pit Number** TPI17A
Machine : 8T 360 **Method :** Trial Pit	**Dimensions** 2.2m x 0.5m x 1.70m (L x W x D)	**Ground Level (mOD)** 15.74	**Client** DBFL	**Job Number** 9225-11-19
	Location (dGPS) 725147.5 E 759174.8 N	**Dates** 27/11/2019	**Project Contractor** Ground Investigations Ireland	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.15)	TOPSOIL.		
				15.59	0.15	MADE GROUND: Brown sandy slightly gravelly silty CLAY. Rare fragments of rope and clay pipe.		
					(0.45)			
				15.14	0.60	Soft brown sandy slightly gravelly silty CLAY with occasional angular to sub-rounded cobbles. Gravel is sub-angular to sub-rounded, fine to coarse. Sand is fine to coarse.		
			Water strike(1) at 1.20m.		(1.10)			▽1
			Water strike(2) at 1.70m.	14.04	1.70	Complete at 1.70m		▽2

Plan

Remarks

Trial pit stable.
Groundwater seepage encountered at 1.20m.
Moderate groundwater flow encountered at 1.70m.
Re dig of Trial Pit TPI17.
Soakaway test carried out in pit at 1.70m BGL
Trial pit backfilled on completion.

Scale (approx)	Logged By	Figure No.
1:25	MMC	9225-11-19.TPI17A

Ground Investigations Ireland Ltd
www.gii.ie

Site Hackettstown, Skerries			**Trial Pit Number** TPI18
Machine : 8.5T Excavator **Method :** Trial Pit	**Dimensions** 2.4m x 0.5m x 2.00m (L x W x D)	**Ground Level (mOD)** 16.10	**Client** DBFL	**Job Number** 9225-11-19
	Location (dGPS) 724942.5 E 759265.5 N	**Dates** 27/11/2019	**Project Contractor** Ground Investigations Ireland	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.20)	TOPSOIL.		
				15.90	0.20	Soft brown sandy gravelly CLAY. Gravel is sub-angular to sub-rounded, fine to coarse.		
0.50	B				(0.50)			
				15.40	0.70	Soft to firm grey matt brown sandy silty CLAY with occasional sub-angular to sub-rounded cobbles. Gravel is sub-angular to sub-rounded, fine to coarse. Sand is fine to coarse.		▽1
			Water strike(1) at 1.00m.					
1.50	B				(1.30)			
				14.10	2.00	Complete at 2.00m		

Plan

Remarks

Groundwater seepage encountered at 1.00m.
Trial pit stable.
Soakway test carried out in pit at 2.0 mBGL
Trial pit backfilled on completion.

Scale (approx)	Logged By	Figure No.
1:25	MMC	9225-11-19.TPI18

Hackettstown, Skerries, Co. Dublin –
Trial Pit Photos

TP01

TP01

TP01

TP01

TP02

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TPI17A

TPI17A

TPI17A

TPI18

TPI18

TPI18

TPI18

APPENDIX 3 – Soakaway Results

GROUND INVESTIGATIONS IRELAND
Geotechnical & Environmental

Catherinestown House,
Hazelhatch Road,
Newcastle,
Co. Dublin.
D22 YD52

Tel: 01 601 5175 / 5176
Email: info@gii.ie
Web: www.gii.ie

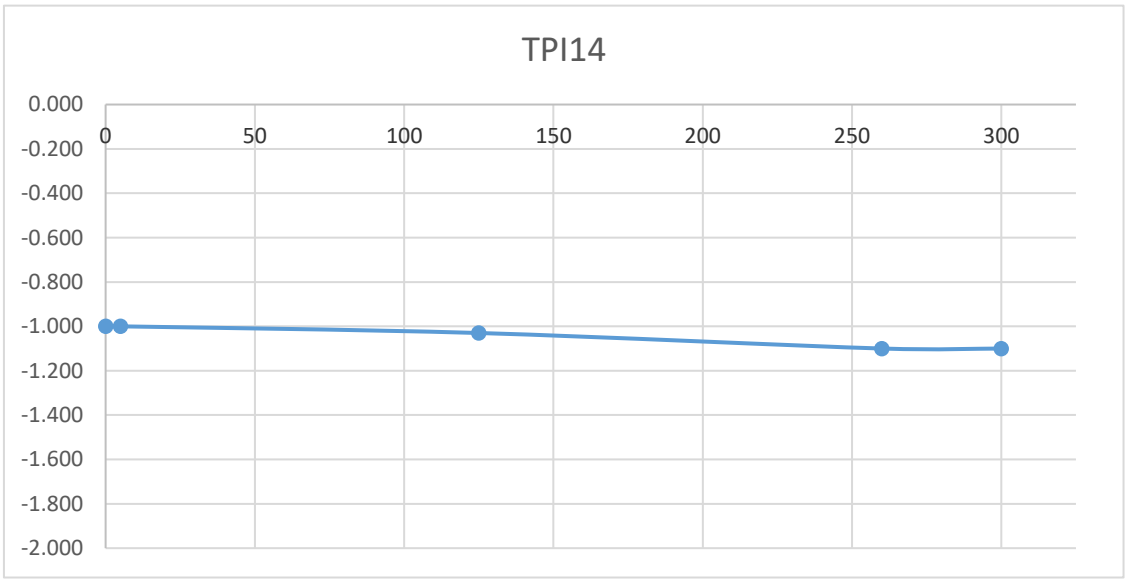
TPI14

Soakaway Test to BRE Digest 365
Trial Pit Dimensions: 2.10m X 0.60m X 2.00m (L x W x D)

Date	Time	Water level (m bgl)
27/11/2019	0	-1.000
27/11/2019	5	-1.000
27/11/2019	125	-1.030
27/11/2019	260	-1.100
27/11/2019	300	-1.100

***Soakaway failed - Pit backfilled**

Start depth	Depth of Pit	Diff	75% full	25%full
1.00	2.000	1.000	1.25	1.75



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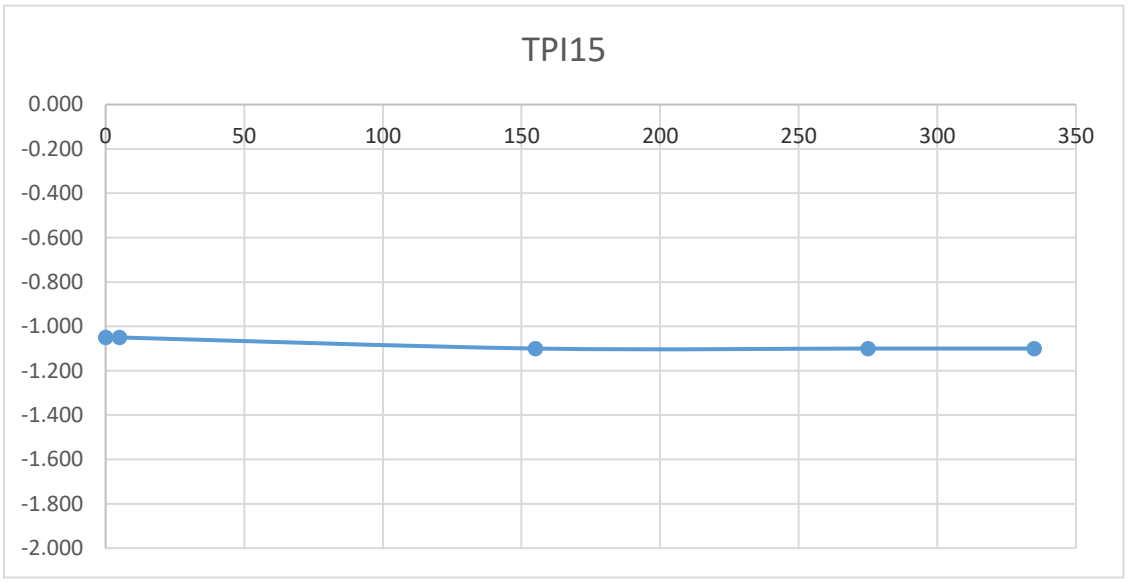
TPI15

Soakaway Test to BRE Digest 365
Trial Pit Dimensions: 2.50m X 0.50m X2.00m (L x W x D)

Date	Time	Water level (m bgl)
27/11/2019	0	-1.050
27/11/2019	5	-1.050
27/11/2019	155	-1.100
27/11/2019	275	-1.100
27/11/2019	335	-1.100

***Soakaway failed - Pit backfilled**

Start depth	Depth of Pit	Diff	75% full	25%full
1.05	2.000	0.950	1.2875	1.7625



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D22 YD52

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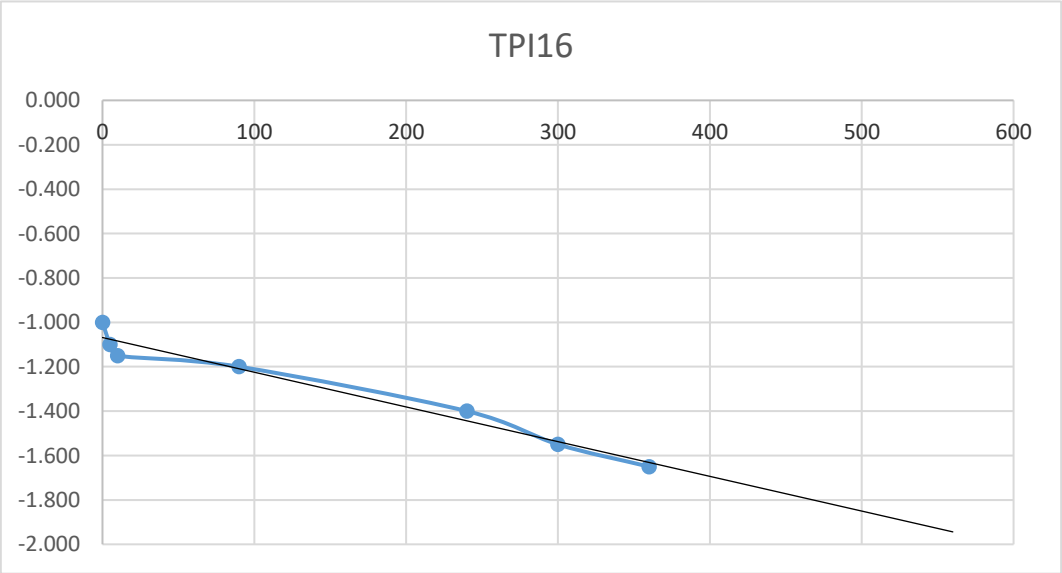
TPI16

Soakaway Test to BRE Digest 365
Trial Pit Dimensions: 2.20m X 0.60m X 2.00m (L x W x D)

Date	Time	Water level (m bgl)
27/11/2019	0	-1.000
27/11/2019	5	-1.100
27/11/2019	10	-1.150
27/11/2019	90	-1.200
27/11/2019	240	-1.400
27/11/2019	300	-1.550
27/11/2019	360	-1.650

Start depth	Depth of Pit		Diff	75% full	25%full
1.00	**2.000**		**1.000**	**1.25**	**1.75**
Length of pit (m)	Width of pit (m)			75-25Ht (m)	Vp75-25 (m3)
2.200	0.600			0.500	0.66
Tp75-25 (from graph) (s)		**19500**		50% Eff Depth	ap50 (m2)
				0.500	4.12
f =	**8.215E-06**	**m/s**			



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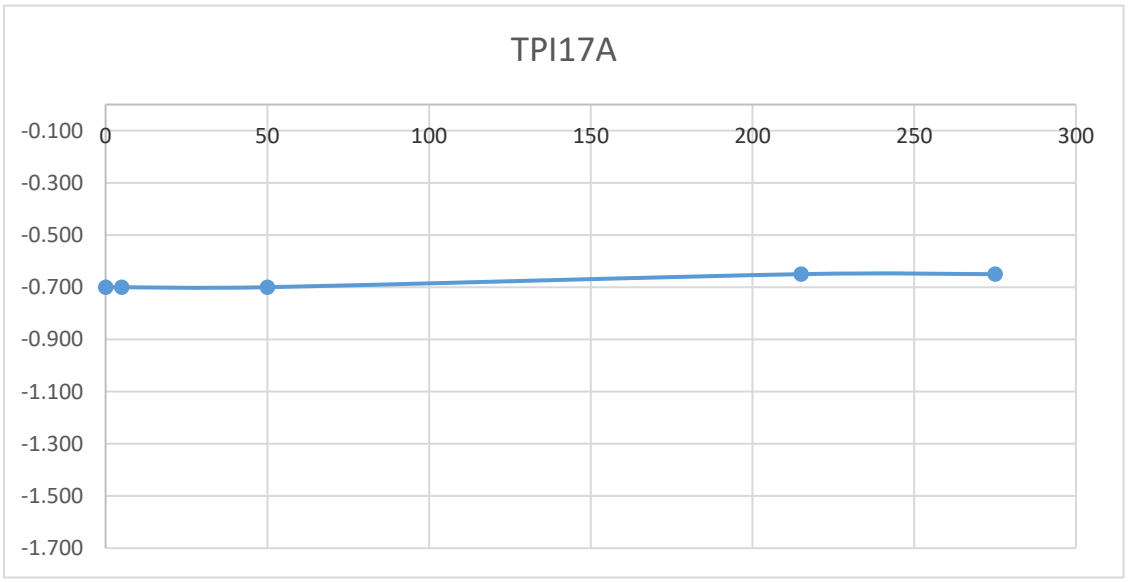
TPI17A

Soakaway Test to BRE Digest 365
Trial Pit Dimensions: 2.20m X 0.5m X 1.70m (L x W x D)

Date	Time	Water level (m bgl)
27/11/2019	0	-0.700
27/11/2019	5	-0.700
27/11/2019	50	-0.700
27/11/2019	215	-0.650
27/11/2019	275	-0.650

***Soakaway failed - Pit backfilled**

Start depth	Depth of Pit	Diff	75% full	25%full
0.70	1.700	1.000	0.95	1.45



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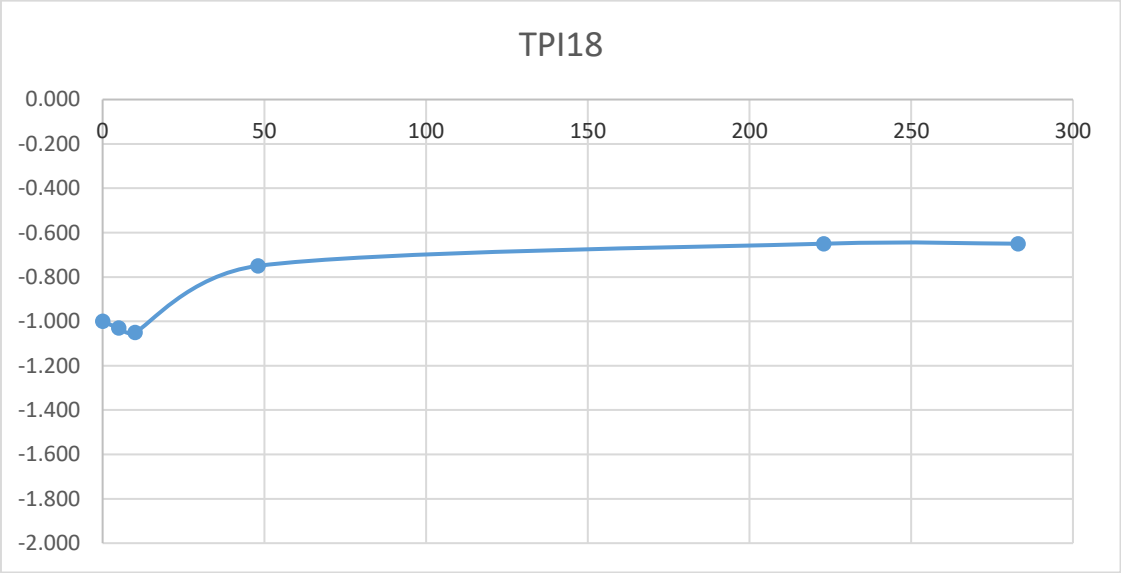
TPI18

Soakaway Test to BRE Digest 365
Trial Pit Dimensions: 2.40m X 0.50m X 2.00m (L x W x D)

Date	Time	Water level (m bgl)
27/11/2019	0	-1.000
27/11/2019	5	-1.030
27/11/2019	10	-1.050
27/11/2019	48	-0.750
27/11/2019	223	-0.650
27/11/2019	283	-0.650

***Soakaway failed - Pit backfilled**

Start depth	Depth of Pit	Diff	75% full	25%full
1.00	2.000	1.000	1.25	1.75



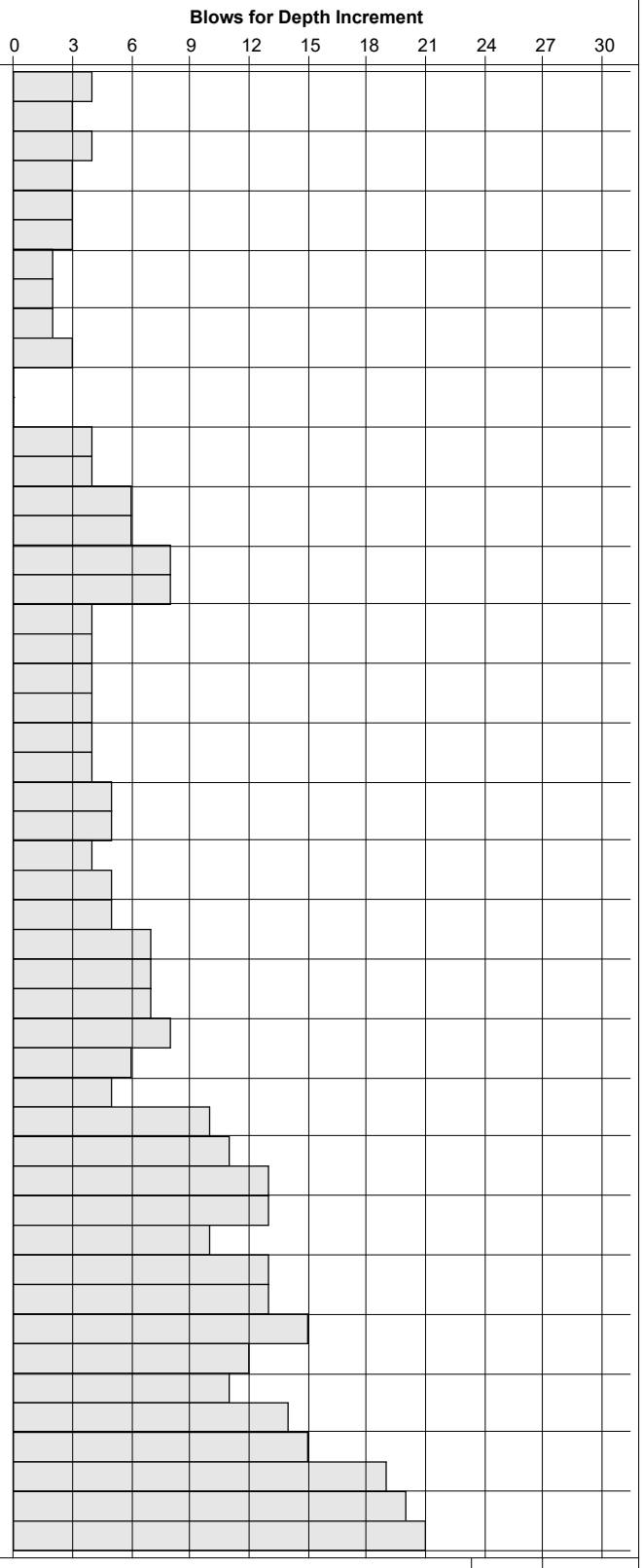
APPENDIX 4 – Dynamic Probe Records

Ground Investigations Ireland Ltd
www.gii.ie

Site	Probe Number
Hackettstown, Skerries	DP01

Method	Cone Dimensions	Ground Level (mOD)	Client	Job Number
Dynamic Probe		18.96	DBFL	9225-11-19
	Location (dGPS)	**Dates**	**Engineer**	**Sheet**
	724926.1 E 759225.3 N	21/02/2020	DBFL	1/2

Depth (m)	Blows for Depth Increment	Field Records	Level (mOD)	Depth (m)
0.00-0.10	4		18.96	0.00
0.10-0.20	3			
0.20-0.30	4			
0.30-0.40	3			
0.40-0.50	3			
0.50-0.60	3		18.46	0.50
0.60-0.70	2			
0.70-0.80	2			
0.80-0.90	2			
0.90-1.00	3			
1.00-1.10	0		17.96	1.00
1.10-1.20	0			
1.20-1.30	4			
1.30-1.40	4			
1.40-1.50	6			
1.50-1.60	6		17.46	1.50
1.60-1.70	8			
1.70-1.80	8			
1.80-1.90	4			
1.90-2.00	4			
2.00-2.10	4		16.96	2.00
2.10-2.20	4			
2.20-2.30	4			
2.30-2.40	4			
2.40-2.50	5			
2.50-2.60	5		16.46	2.50
2.60-2.70	4			
2.70-2.80	5			
2.80-2.90	5			
2.90-3.00	7			
3.00-3.10	7		15.96	3.00
3.10-3.20	7			
3.20-3.30	8			
3.30-3.40	6			
3.40-3.50	5			
3.50-3.60	10		15.46	3.50
3.60-3.70	11			
3.70-3.80	13			
3.80-3.90	13			
3.90-4.00	10			
4.00-4.10	13		14.96	4.00
4.10-4.20	13			
4.20-4.30	15			
4.30-4.40	12			
4.40-4.50	11			
4.50-4.60	14		14.46	4.50
4.60-4.70	15			
4.70-4.80	19			
4.80-4.90	20			
4.90-5.00	21		13.96	5.00



Remarks

Scale (approx)	Logged By
1:25	

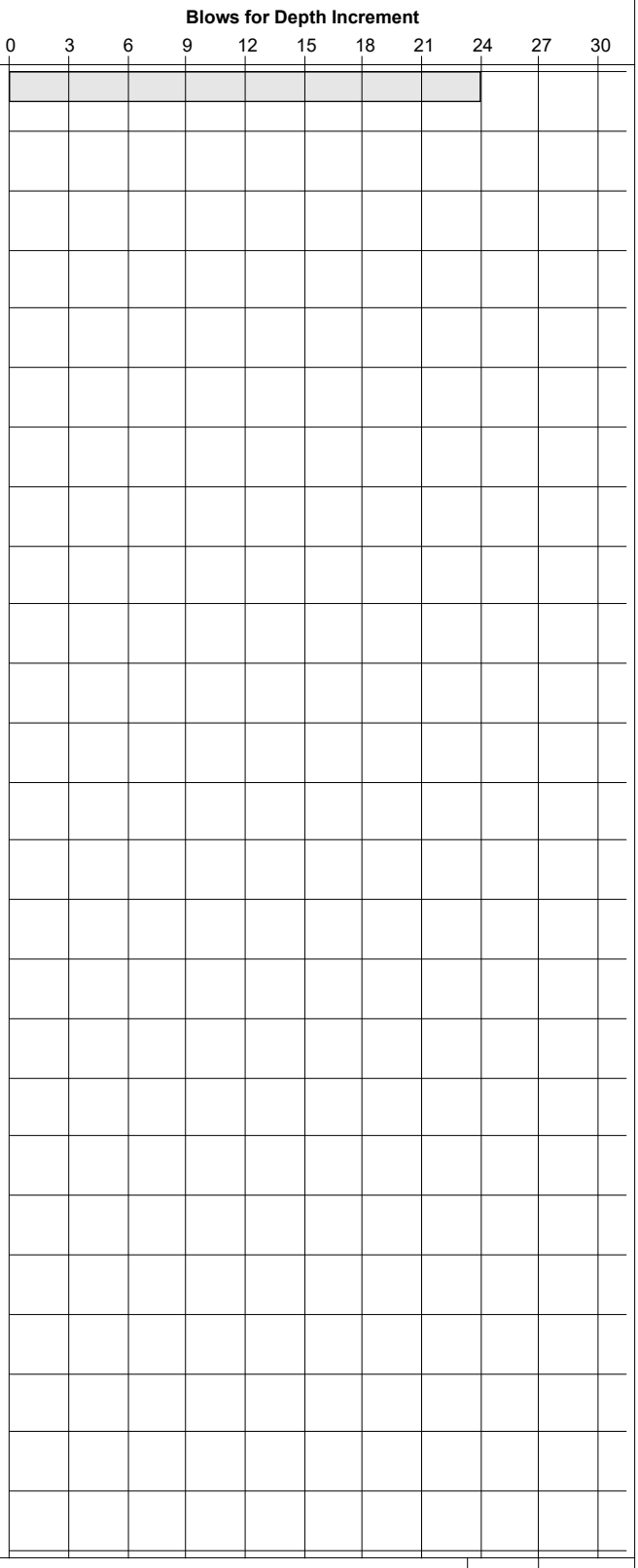
Figure No.
9225-11-19.DP01

Ground Investigations Ireland Ltd
www.gii.ie

Site	Probe Number
Hackettstown, Skerries	DP01

Method	Cone Dimensions	Ground Level (mOD)	Client	Job Number
Dynamic Probe		18.96	DBFL	9225-11-19
	Location (dGPS)	**Dates**	**Engineer**	**Sheet**
	724926.1 E 759225.3 N	21/02/2020	DBFL	2/2

Depth (m)	Blows for Depth Increment	Field Records	Level (mOD)	Depth (m)
5.00-5.10	24		13.96	5.00
			13.46	5.50
			12.96	6.00
			12.46	6.50
			11.96	7.00
			11.46	7.50
			10.96	8.00
			10.46	8.50
			9.96	9.00
			9.46	9.50
			8.96	10.00



Remarks

Scale (approx)	Logged By
1:25	

Figure No.
9225-11-19.DP01

Ground Investigations Ireland Ltd
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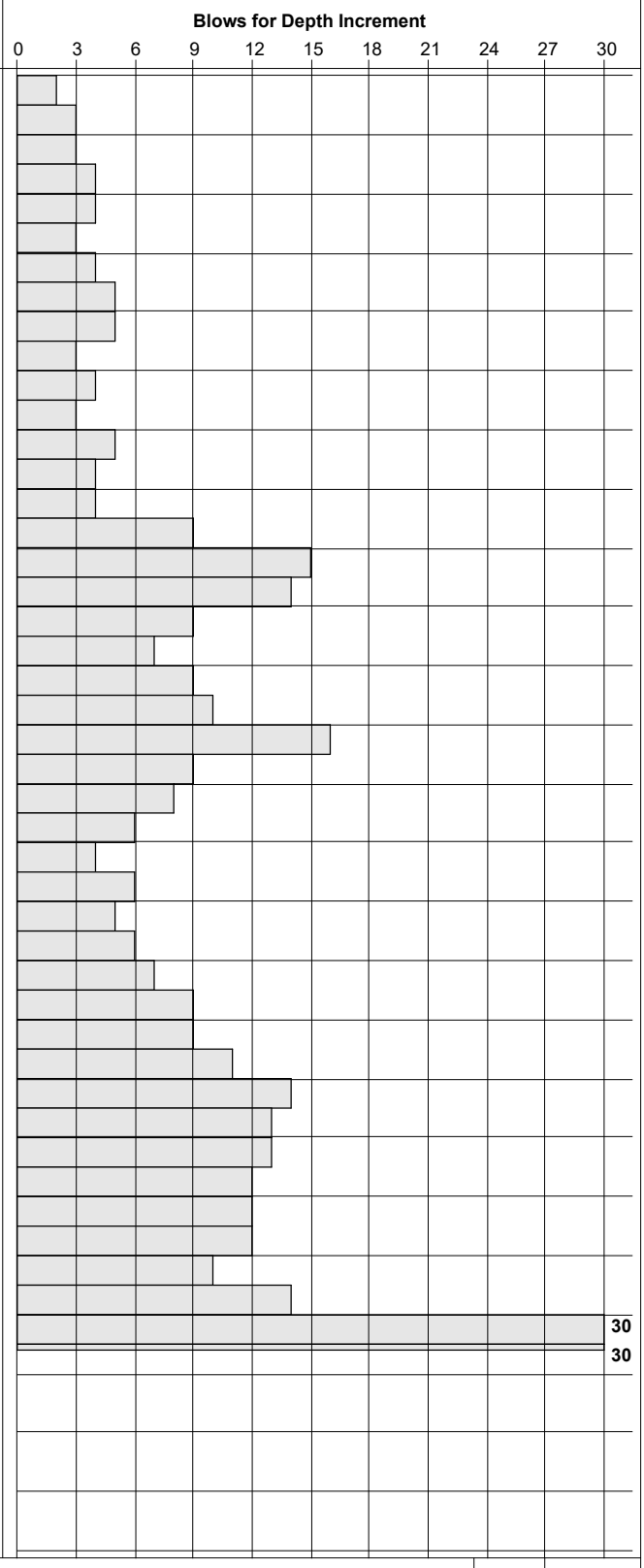
Site	Probe Number
Hackettstown, Skerries	DP02

Method	Cone Dimensions	Ground Level (mOD)	Client	Job Number
Dynamic Probe		16.27	DBFL	9225-11-19
	Location	**Dates**	**Engineer**	**Sheet**
	724992.6 E 759246.6 N	21/02/2020	DBFL	1/1

Depth (m)	Blows for Depth Increment	Field Records
0.00-0.10	2	
0.10-0.20	3	
0.20-0.30	3	
0.30-0.40	4	
0.40-0.50	4	
0.50-0.60	3	
0.60-0.70	4	
0.70-0.80	5	
0.80-0.90	5	
0.90-1.00	3	
1.00-1.10	4	
1.10-1.20	3	
1.20-1.30	5	
1.30-1.40	4	
1.40-1.50	4	
1.50-1.60	9	
1.60-1.70	15	
1.70-1.80	14	
1.80-1.90	9	
1.90-2.00	7	
2.00-2.10	9	
2.10-2.20	10	
2.20-2.30	16	
2.30-2.40	9	
2.40-2.50	8	
2.50-2.60	6	
2.60-2.70	4	
2.70-2.80	6	
2.80-2.90	5	
2.90-3.00	6	
3.00-3.10	7	
3.10-3.20	9	
3.20-3.30	9	
3.30-3.40	11	
3.40-3.50	14	
3.50-3.60	13	
3.60-3.70	13	
3.70-3.80	12	
3.80-3.90	12	
3.90-4.00	12	
4.00-4.10	10	
4.10-4.20	14	
4.20-4.30	30	
4.30-4.32	30	



Remarks

Scale (approx)	Logged By
1:25	

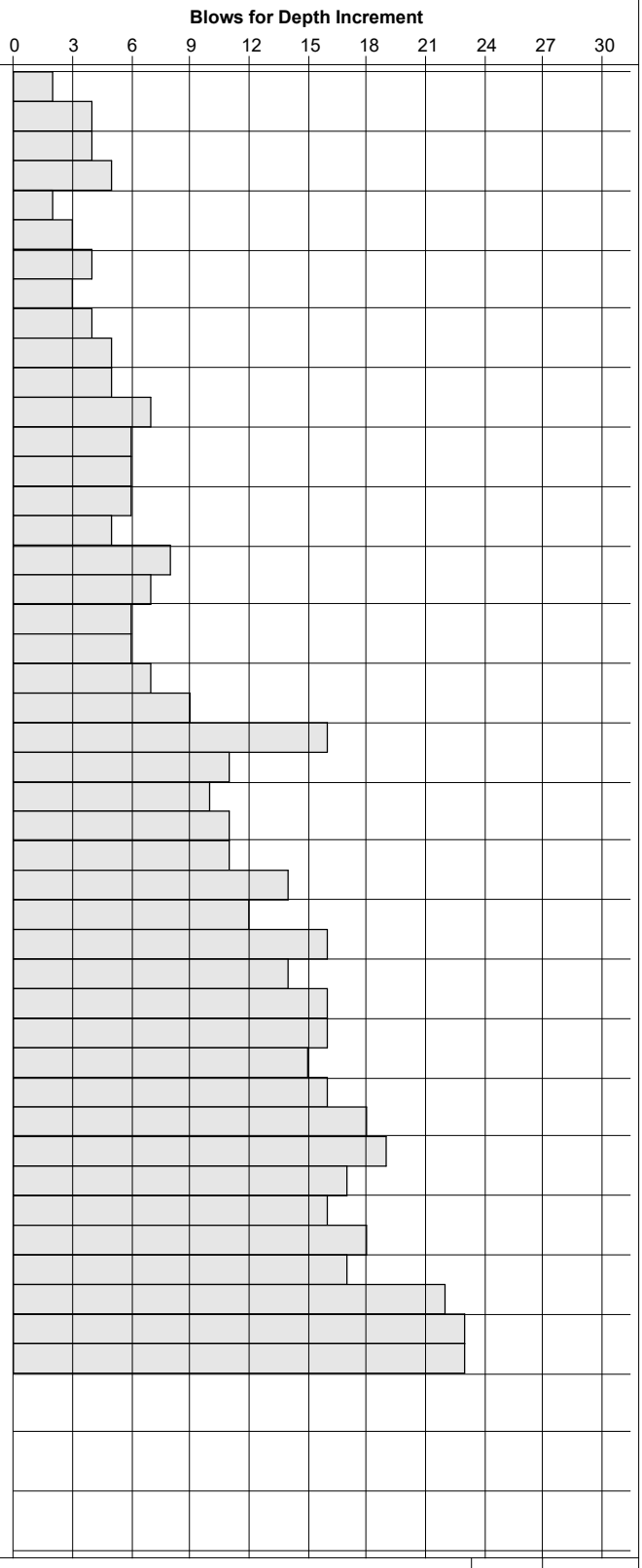
Figure No.
9225-11-19.DP02

Ground Investigations Ireland Ltd
www.gii.ie

Site	Probe Number
Hackettstown, Skerries	DP03

Method	Cone Dimensions	Ground Level (mOD)	Client	Job Number
Dynamic Probe		18.03	DBFL	9225-11-19
	Location (dGPS)	**Dates**	**Engineer**	**Sheet**
	725083.9 E 759186.9 N	21/02/2020	DBFL	1/1

Depth (m)	Blows for Depth Increment	Field Records	Level (mOD)	Depth (m)
0.00-0.10	2		18.03	0.00
0.10-0.20	4			
0.20-0.30	4			
0.30-0.40	5			
0.40-0.50	2			
0.50-0.60	3		17.53	0.50
0.60-0.70	4			
0.70-0.80	3			
0.80-0.90	4			
0.90-1.00	5			
1.00-1.10	5		17.03	1.00
1.10-1.20	7			
1.20-1.30	6			
1.30-1.40	6			
1.40-1.50	6			
1.50-1.60	5		16.53	1.50
1.60-1.70	8			
1.70-1.80	7			
1.80-1.90	6			
1.90-2.00	6			
2.00-2.10	7		16.03	2.00
2.10-2.20	9			
2.20-2.30	16			
2.30-2.40	11			
2.40-2.50	10			
2.50-2.60	11		15.53	2.50
2.60-2.70	11			
2.70-2.80	14			
2.80-2.90	12			
2.90-3.00	16			
3.00-3.10	14		15.03	3.00
3.10-3.20	16			
3.20-3.30	16			
3.30-3.40	15			
3.40-3.50	16			
3.50-3.60	18		14.53	3.50
3.60-3.70	19			
3.70-3.80	17			
3.80-3.90	16			
3.90-4.00	18			
4.00-4.10	17		14.03	4.00
4.10-4.20	22			
4.20-4.30	23			
4.30-4.40	23			
			13.53	4.50
			13.03	5.00



Remarks

Scale (approx)	Logged By
1:25	

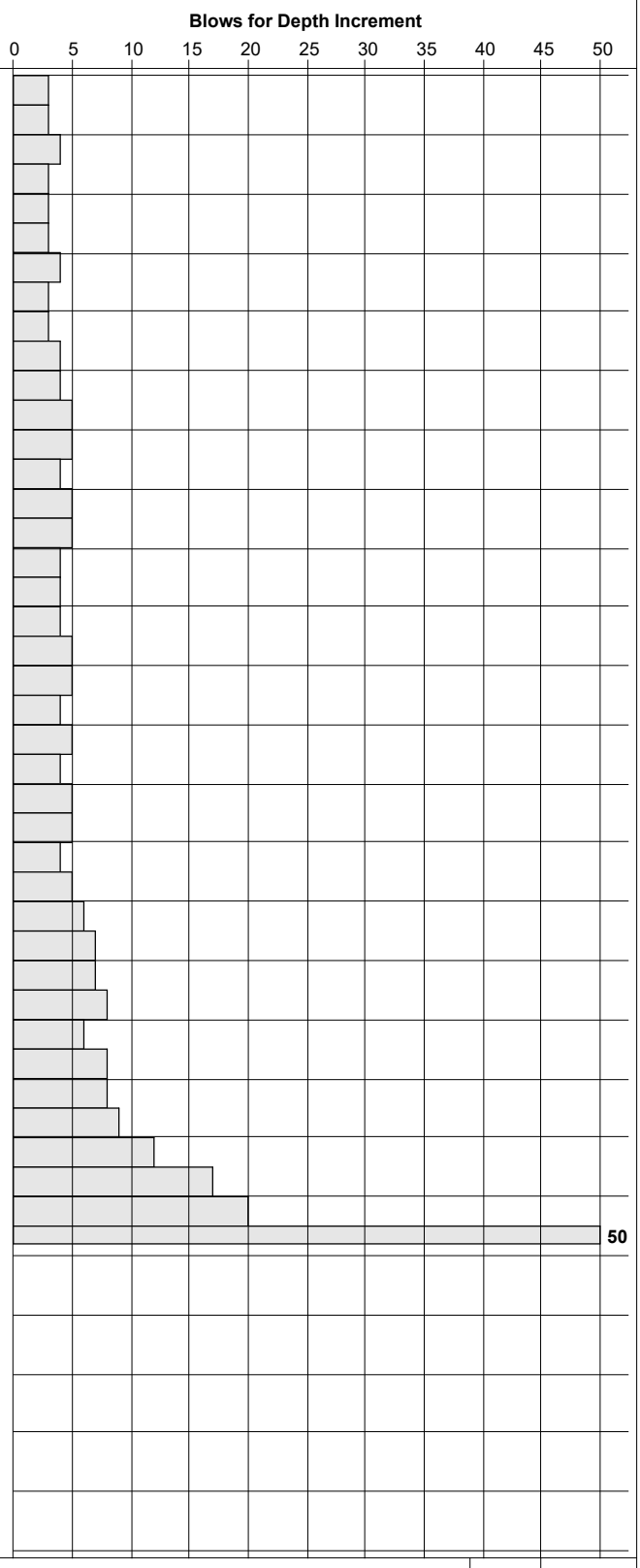
Figure No.
9225-11-19.DP03

Ground Investigations Ireland Ltd
www.gii.ie

Site	Probe Number
Hackettstown, Skerries	DP04

Method	Cone Dimensions	Ground Level (mOD)	Client	Job Number
Dynamic Probe		22.62	DBFL	9225-11-19
	Location (dGPS)	**Dates**	**Engineer**	**Sheet**
	724917.1 E 759165.5 N	22/02/2020	DBFL	1/1

Depth (m)	Blows for Depth Increment	Field Records	Level (mOD)	Depth (m)
0.00-0.10	3		22.62	0.00
0.10-0.20	3			
0.20-0.30	4			
0.30-0.40	3			
0.40-0.50	3			
0.50-0.60	3		22.12	0.50
0.60-0.70	4			
0.70-0.80	3			
0.80-0.90	3			
0.90-1.00	4			
1.00-1.10	4		21.62	1.00
1.10-1.20	5			
1.20-1.30	5			
1.30-1.40	4			
1.40-1.50	5			
1.50-1.60	5		21.12	1.50
1.60-1.70	4			
1.70-1.80	4			
1.80-1.90	4			
1.90-2.00	5			
2.00-2.10	5		20.62	2.00
2.10-2.20	4			
2.20-2.30	5			
2.30-2.40	4			
2.40-2.50	5			
2.50-2.60	5		20.12	2.50
2.60-2.70	4			
2.70-2.80	5			
2.80-2.90	6			
2.90-3.00	7			
3.00-3.10	7		19.62	3.00
3.10-3.20	8			
3.20-3.30	6			
3.30-3.40	8			
3.40-3.50	8			
3.50-3.60	9		19.12	3.50
3.60-3.70	12			
3.70-3.80	17			
3.80-3.90	20			
3.90-3.96	50		18.62	4.00
			18.12	4.50
			17.62	5.00



Remarks

Scale (approx)	Logged By
1:25	

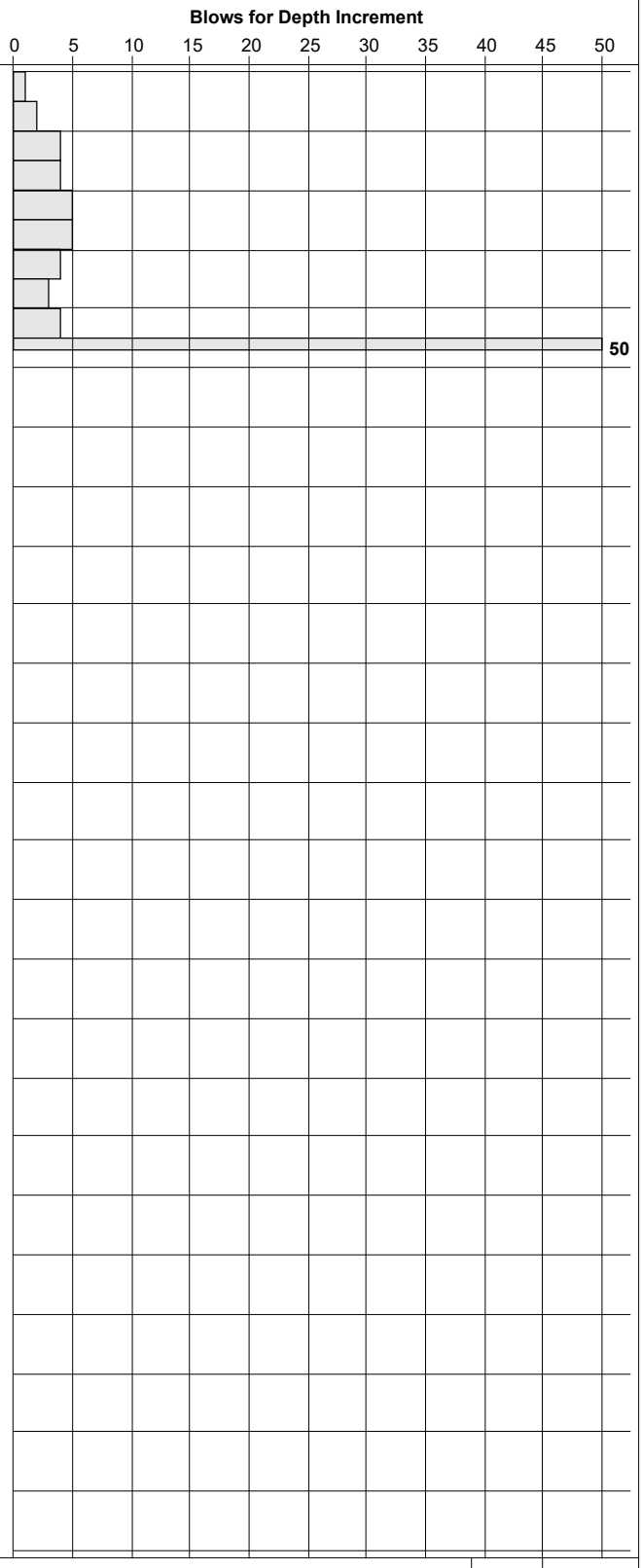
Figure No.
9225-11-19.DP04

Ground Investigations Ireland Ltd
www.gii.ie

Site	Probe Number
Hackettstown, Skerries	DP05

Method	Cone Dimensions	Ground Level (mOD)	Client	Job Number
Dynamic Probe		24.06	DBFL	9225-11-19
	Location (dGPS)	**Dates**	**Engineer**	**Sheet**
	724968.5 E 759167.1 N	22/02/2020	DBFL	1/1

Depth (m)	Blows for Depth Increment	Field Records	Level (mOD)	Depth (m)
0.00-0.10	1		24.06	0.00
0.10-0.20	2			
0.20-0.30	4			
0.30-0.40	4			
0.40-0.50	5			
0.50-0.60	5		23.56	0.50
0.60-0.70	4			
0.70-0.80	3			
0.80-0.90	4			
0.90-0.94	50		23.06	1.00
			22.56	1.50
			22.06	2.00
			21.56	2.50
			21.06	3.00
			20.56	3.50
			20.06	4.00
			19.56	4.50
			19.06	5.00



Remarks

Scale (approx)	Logged By
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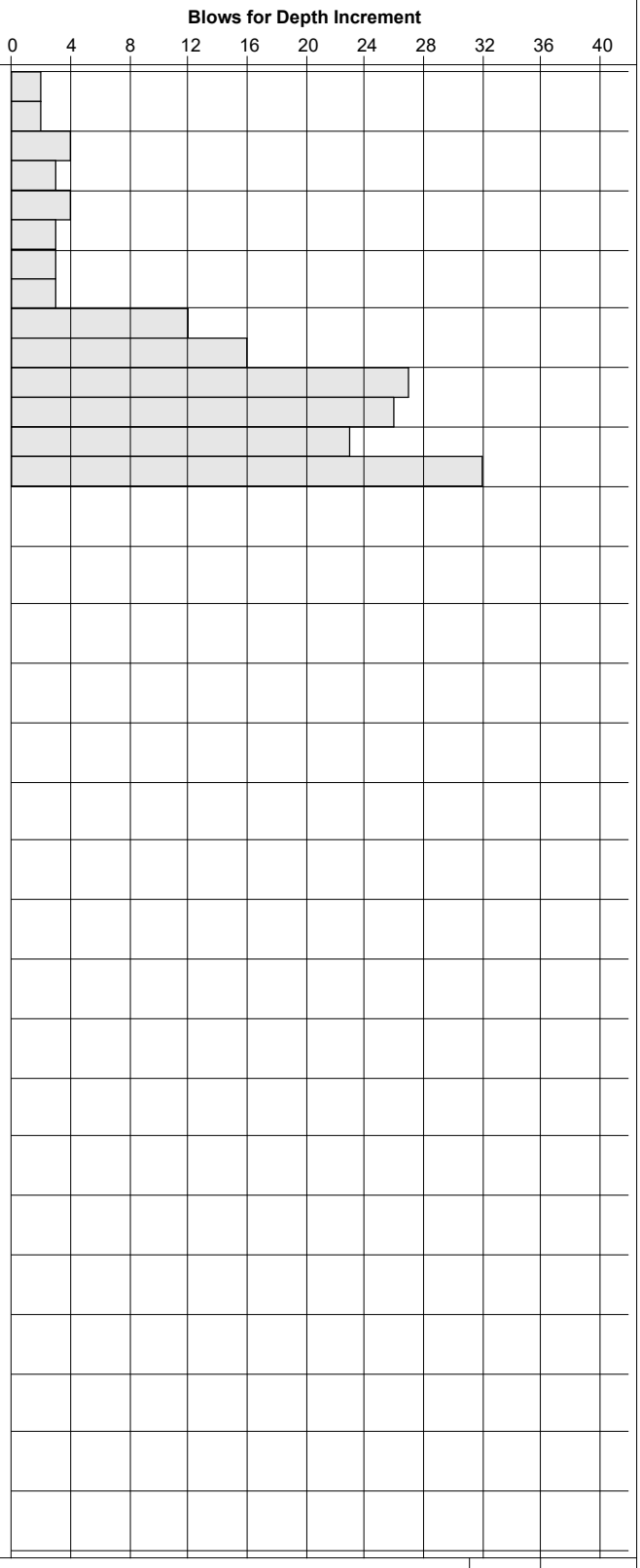
Figure No.
9225-11-19.DP05

Ground Investigations Ireland Ltd
www.gii.ie

Site	Probe Number
Hackettstown, Skerries	DP05A

Method	Cone Dimensions	Ground Level (mOD)	Client	Job Number
Dynamic Probe		24.06	DBFL	9225-11-19
	Location	**Dates**	**Engineer**	**Sheet**
	724968.5 E 759167.1 N	22/02/2020-22/03/2020	DBFL	1/1

Depth (m)	Blows for Depth Increment	Field Records	Level (mOD)	Depth (m)
0.00-0.10	2		24.06	0.00
0.10-0.20	2			
0.20-0.30	4			
0.30-0.40	3			
0.40-0.50	4			
0.50-0.60	3		23.56	0.50
0.60-0.70	3			
0.70-0.80	3			
0.80-0.90	12			
0.90-1.00	16			
1.00-1.10	27		23.06	1.00
1.10-1.20	26			
1.20-1.30	23			
1.30-1.40	32			
			22.56	1.50
			22.06	2.00
			21.56	2.50
			21.06	3.00
			20.56	3.50
			20.06	4.00
			19.56	4.50
			19.06	5.00



Remarks

Scale (approx)	Logged By
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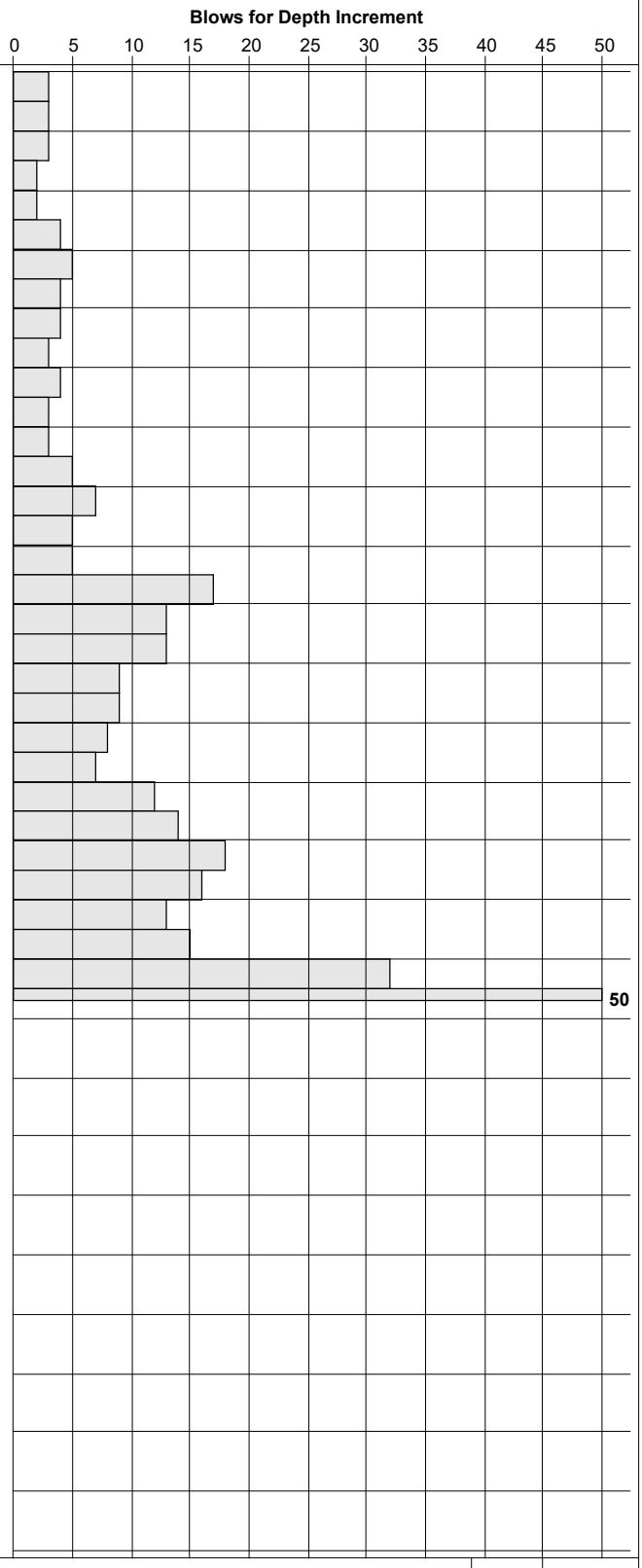
Figure No.
9225-11-19.DP05A

Ground Investigations Ireland Ltd
www.gii.ie

Site	Probe Number
Hackettstown, Skerries	DP06

Method	Cone Dimensions	Ground Level (mOD)	Client	Job Number
Dynamic Probe		23.71	DBFL	9225-11-19
	Location (dGPS)	**Dates**	**Engineer**	**Sheet**
	725020.9 E 759135.6 N	22/02/2020	DBFL	1/1

Depth (m)	Blows for Depth Increment	Field Records	Level (mOD)	Depth (m)
0.00-0.10	3		23.71	0.00
0.10-0.20	3			
0.20-0.30	3			
0.30-0.40	2			
0.40-0.50	2			
0.50-0.60	4		23.21	0.50
0.60-0.70	5			
0.70-0.80	4			
0.80-0.90	4			
0.90-1.00	3			
1.00-1.10	4		22.71	1.00
1.10-1.20	3			
1.20-1.30	3			
1.30-1.40	5			
1.40-1.50	7			
1.50-1.60	5		22.21	1.50
1.60-1.70	5			
1.70-1.80	17			
1.80-1.90	13			
1.90-2.00	13			
2.00-2.10	9		21.71	2.00
2.10-2.20	9			
2.20-2.30	8			
2.30-2.40	7			
2.40-2.50	12			
2.50-2.60	14		21.21	2.50
2.60-2.70	18			
2.70-2.80	16			
2.80-2.90	13			
2.90-3.00	15			
3.00-3.10	32		20.71	3.00
3.10-3.14	50			
			20.21	3.50
			19.71	4.00
			19.21	4.50
			18.71	5.00



Remarks

Scale (approx)	Logged By
1:25	

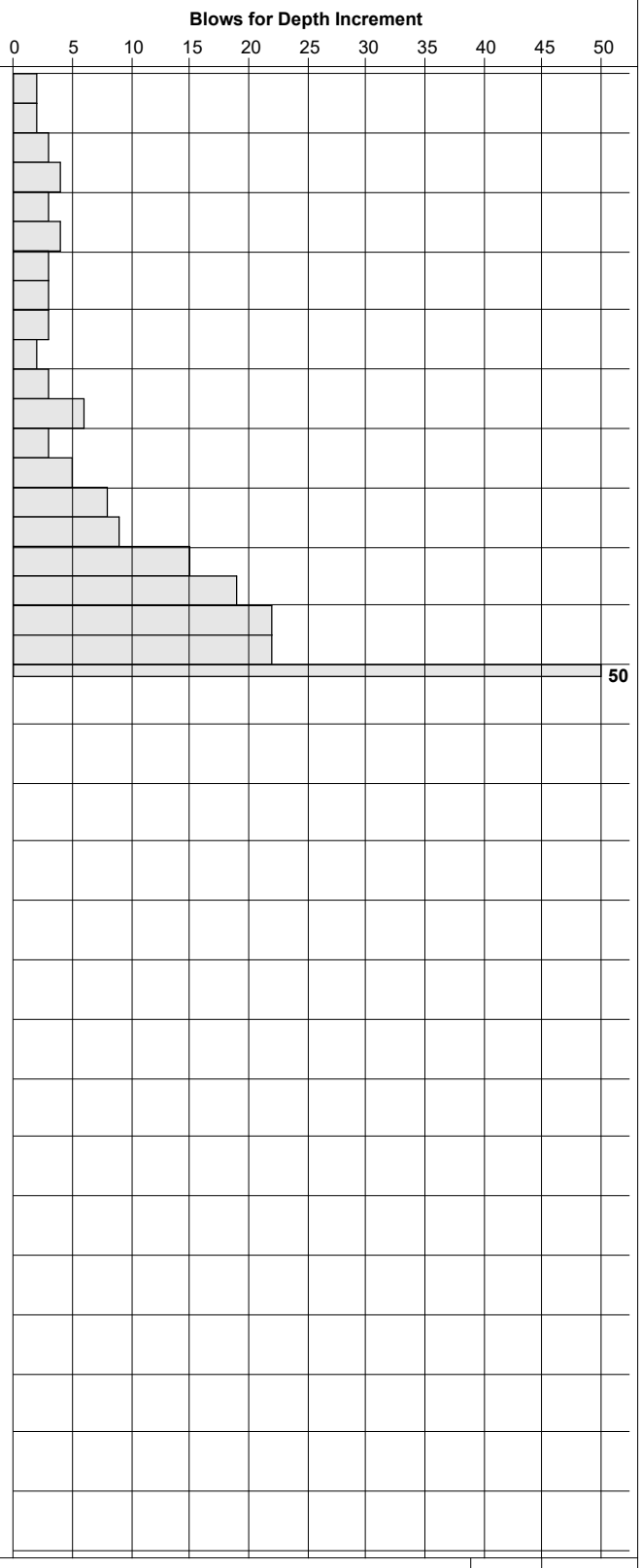
Figure No.
9225-11-19.DP06

Ground Investigations Ireland Ltd
www.gii.ie

Site	Probe Number
Hackettstown, Skerries	DP07

Method	Cone Dimensions	Ground Level (mOD)	Client	Job Number
Dynamic Probe		24.84	DBFL	9225-11-19
	Location (dGPS)	**Dates**	**Engineer**	**Sheet**
	724974.9 E 759121.3 N	22/02/2020	DBFL	1/1

Depth (m)	Blows for Depth Increment	Field Records	Level (mOD)	Depth (m)
0.00-0.10	2		24.84	0.00
0.10-0.20	2			
0.20-0.30	3			
0.30-0.40	4			
0.40-0.50	3			
0.50-0.60	4		24.34	0.50
0.60-0.70	3			
0.70-0.80	3			
0.80-0.90	3			
0.90-1.00	2			
1.00-1.10	3		23.84	1.00
1.10-1.20	6			
1.20-1.30	3			
1.30-1.40	5			
1.40-1.50	8			
1.50-1.60	9		23.34	1.50
1.60-1.70	15			
1.70-1.80	19			
1.80-1.90	22			
1.90-2.00	22			
2.00-2.04	50		22.84	2.00
			22.34	2.50
			21.84	3.00
			21.34	3.50
			20.84	4.00
			20.34	4.50
			19.84	5.00



Remarks

Scale (approx)	Logged By
1:25	

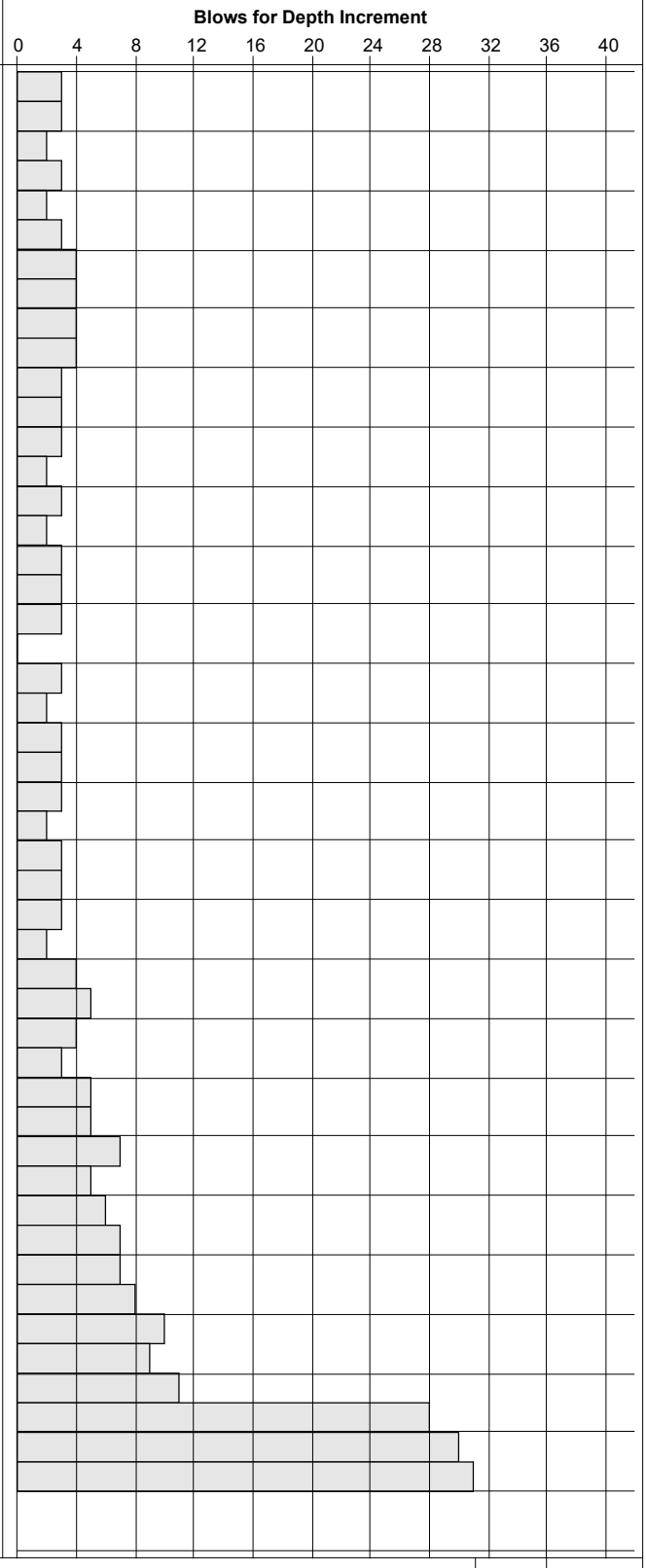
Figure No.
9225-11-19.DP07

Ground Investigations Ireland Ltd
www.gii.ie

Site	Probe Number
Hackettstown, Skerries	DP08

Method	Cone Dimensions	Ground Level (mOD)	Client	Job Number
Dynamic Probe		23.78	DBFL	9225-11-19
	Location (dGPS)	**Dates**	**Engineer**	**Sheet**
	724913.1 E 759112.2 N	22/02/2020	DBFL	1/1

Depth (m)	Blows for Depth Increment	Field Records	Level (mOD)	Depth (m)
0.00-0.10	3		23.78	0.00
0.10-0.20	3			
0.20-0.30	2			
0.30-0.40	3			
0.40-0.50	2			
0.50-0.60	3		23.28	0.50
0.60-0.70	4			
0.70-0.80	4			
0.80-0.90	4			
0.90-1.00	4			
1.00-1.10	3		22.78	1.00
1.10-1.20	3			
1.20-1.30	3			
1.30-1.40	2			
1.40-1.50	3			
1.50-1.60	2		22.28	1.50
1.60-1.70	3			
1.70-1.80	3			
1.80-1.90	3			
1.90-2.00	0			
2.00-2.10	3		21.78	2.00
2.10-2.20	2			
2.20-2.30	3			
2.30-2.40	3			
2.40-2.50	3			
2.50-2.60	2		21.28	2.50
2.60-2.70	3			
2.70-2.80	3			
2.80-2.90	3			
2.90-3.00	2			
3.00-3.10	4		20.78	3.00
3.10-3.20	5			
3.20-3.30	4			
3.30-3.40	3			
3.40-3.50	5			
3.50-3.60	5		20.28	3.50
3.60-3.70	7			
3.70-3.80	5			
3.80-3.90	6			
3.90-4.00	7			
4.00-4.10	7		19.78	4.00
4.10-4.20	8			
4.20-4.30	10			
4.30-4.40	9			
4.40-4.50	11			
4.50-4.60	28		19.28	4.50
4.60-4.70	30			
4.70-4.80	31			
			18.78	5.00



Remarks

Scale (approx)	Logged By
1:25	

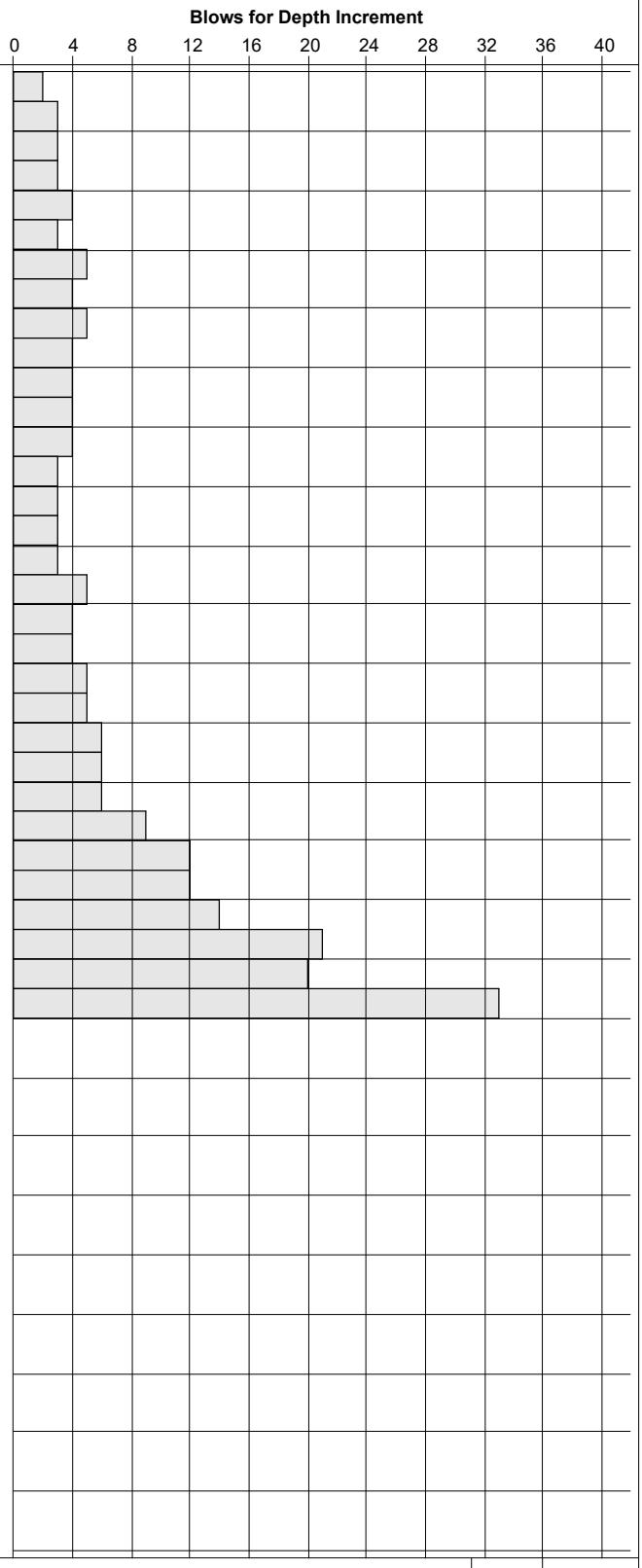
Figure No.
9225-11-19.DP08

Ground Investigations Ireland Ltd
www.gii.ie

Site	Probe Number
Hackettstown, Skerries	DP09

Method	Cone Dimensions	Ground Level (mOD)	Client	Job Number
Dynamic Probe		23.86	DBFL	9225-11-19
	Location (dGPS)	**Dates**	**Engineer**	**Sheet**
	724924.3 E 759045.5 N	22/02/2020	DBFL	1/1

Depth (m)	Blows for Depth Increment	Field Records	Level (mOD)	Depth (m)
0.00-0.10	2		23.86	0.00
0.10-0.20	3			
0.20-0.30	3			
0.30-0.40	3			
0.40-0.50	4			
0.50-0.60	3		23.36	0.50
0.60-0.70	5			
0.70-0.80	4			
0.80-0.90	5			
0.90-1.00	4			
1.00-1.10	4		22.86	1.00
1.10-1.20	4			
1.20-1.30	4			
1.30-1.40	3			
1.40-1.50	3			
1.50-1.60	3		22.36	1.50
1.60-1.70	3			
1.70-1.80	5			
1.80-1.90	4			
1.90-2.00	4			
2.00-2.10	5		21.86	2.00
2.10-2.20	5			
2.20-2.30	6			
2.30-2.40	6			
2.40-2.50	6			
2.50-2.60	9		21.36	2.50
2.60-2.70	12			
2.70-2.80	12			
2.80-2.90	14			
2.90-3.00	21			
3.00-3.10	20		20.86	3.00
3.10-3.20	33			
			20.36	3.50
			19.86	4.00
			19.36	4.50
			18.86	5.00



Remarks

Scale (approx)	Logged By
1:25	

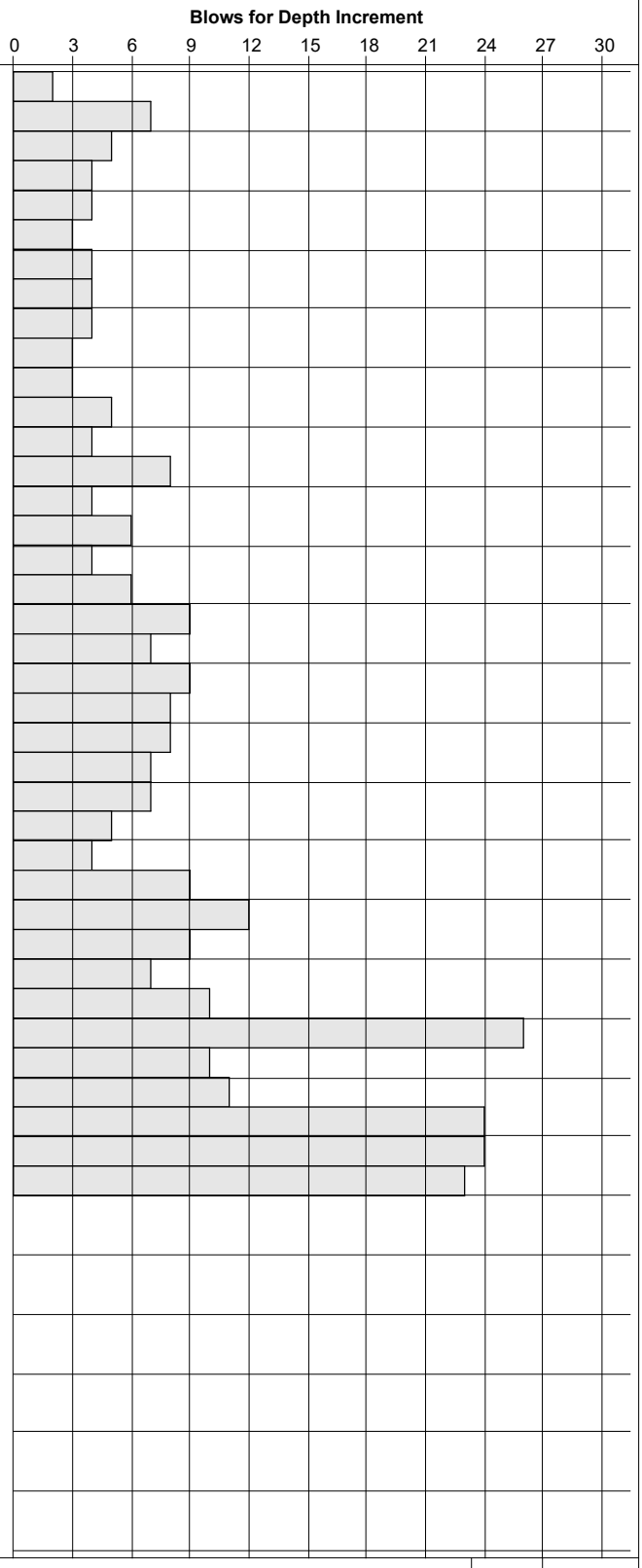
Figure No.
9225-11-19.DP09

Ground Investigations Ireland Ltd
www.gii.ie

Site	Probe Number
Hackettstown, Skerries	DP10

Method	Cone Dimensions	Ground Level (mOD)	Client	Job Number
Dynamic Probe		24.19	DBFL	9225-11-19
	Location (dGPS)	**Dates**	**Engineer**	**Sheet**
	724934.8 E 759012.3 N	22/02/2020	DBFL	1/1

Depth (m)	Blows for Depth Increment	Field Records	Level (mOD)	Depth (m)
0.00-0.10	2		24.19	0.00
0.10-0.20	7			
0.20-0.30	5			
0.30-0.40	4			
0.40-0.50	4			
0.50-0.60	3		23.69	0.50
0.60-0.70	4			
0.70-0.80	4			
0.80-0.90	4			
0.90-1.00	3			
1.00-1.10	3		23.19	1.00
1.10-1.20	5			
1.20-1.30	4			
1.30-1.40	8			
1.40-1.50	4			
1.50-1.60	6		22.69	1.50
1.60-1.70	4			
1.70-1.80	6			
1.80-1.90	9			
1.90-2.00	7			
2.00-2.10	9		22.19	2.00
2.10-2.20	8			
2.20-2.30	8			
2.30-2.40	7			
2.40-2.50	7			
2.50-2.60	5		21.69	2.50
2.60-2.70	4			
2.70-2.80	9			
2.80-2.90	12			
2.90-3.00	9			
3.00-3.10	7		21.19	3.00
3.10-3.20	10			
3.20-3.30	26			
3.30-3.40	10			
3.40-3.50	11			
3.50-3.60	24		20.69	3.50
3.60-3.70	24			
3.70-3.80	23			
			20.19	4.00
			19.69	4.50
			19.19	5.00



Remarks

Scale (approx)	Logged By
1:25	

Figure No.
9225-11-19.DP10

Ground Investigations Ireland Ltd
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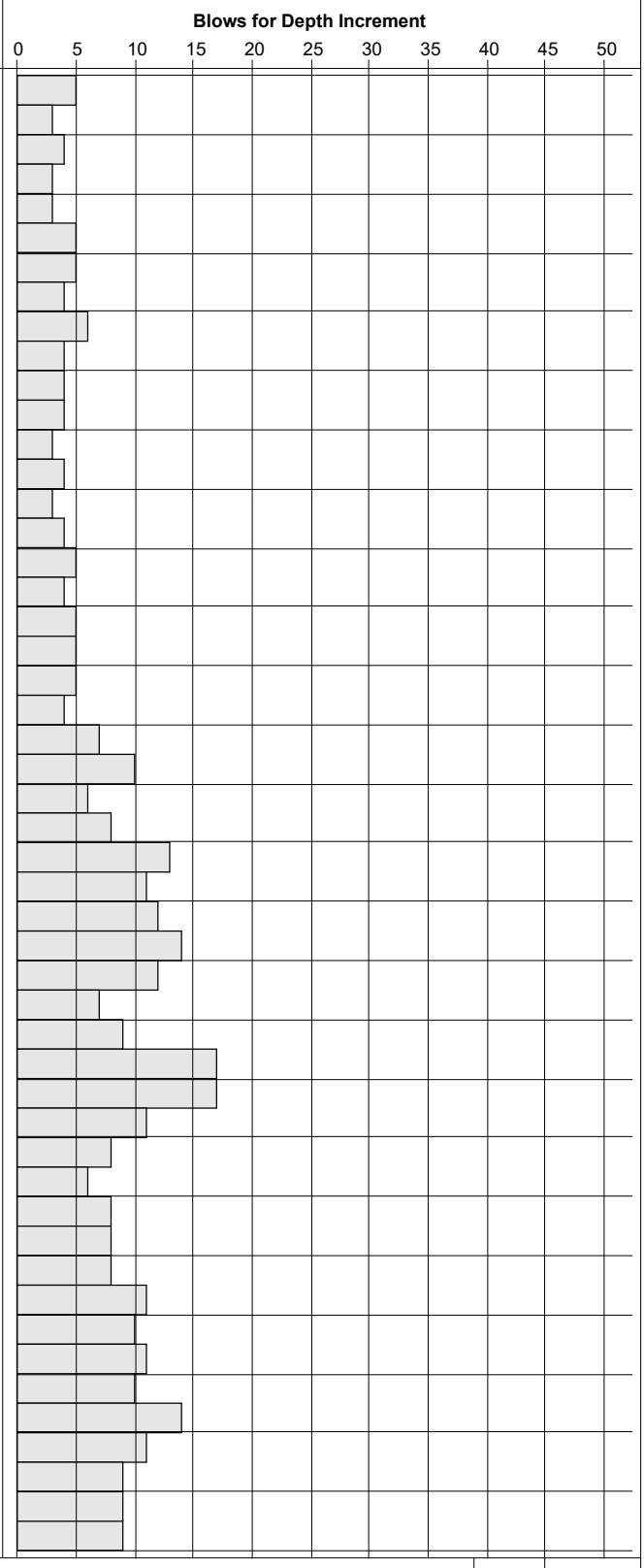
Site	Probe Number
Hackettstown, Skerries	DP11

Method	Cone Dimensions	Ground Level (mOD)	Client	Job Number
Dynamic Probe		24.85	DBFL	9225-11-19
	Location (dGPS)	**Dates**	**Engineer**	**Sheet**
	724995.3 E 758992.6 N	22/02/2020	DBFL	1/2

Depth (m)	Blows for Depth Increment	Field Records	Level (mOD)	Depth (m)
0.00-0.10	5		24.85	0.00
0.10-0.20	3			
0.20-0.30	4			
0.30-0.40	3			
0.40-0.50	3			
0.50-0.60	5		24.35	0.50
0.60-0.70	5			
0.70-0.80	4			
0.80-0.90	6			
0.90-1.00	4			
1.00-1.10	4		23.85	1.00
1.10-1.20	4			
1.20-1.30	3			
1.30-1.40	4			
1.40-1.50	3			
1.50-1.60	4		23.35	1.50
1.60-1.70	5			
1.70-1.80	4			
1.80-1.90	5			
1.90-2.00	5			
2.00-2.10	5		22.85	2.00
2.10-2.20	4			
2.20-2.30	7			
2.30-2.40	10			
2.40-2.50	6			
2.50-2.60	8		22.35	2.50
2.60-2.70	13			
2.70-2.80	11			
2.80-2.90	12			
2.90-3.00	14			
3.00-3.10	12		21.85	3.00
3.10-3.20	7			
3.20-3.30	9			
3.30-3.40	17			
3.40-3.50	17			
3.50-3.60	11		21.35	3.50
3.60-3.70	8			
3.70-3.80	6			
3.80-3.90	8			
3.90-4.00	8			
4.00-4.10	8		20.85	4.00
4.10-4.20	11			
4.20-4.30	10			
4.30-4.40	11			
4.40-4.50	10			
4.50-4.60	14		20.35	4.50
4.60-4.70	11			
4.70-4.80	9			
4.80-4.90	9			
4.90-5.00	9		19.85	5.00



Remarks

Scale (approx)	Logged By
1:25	

Figure No.
9225-11-19.DP11

Ground Investigations Ireland Ltd
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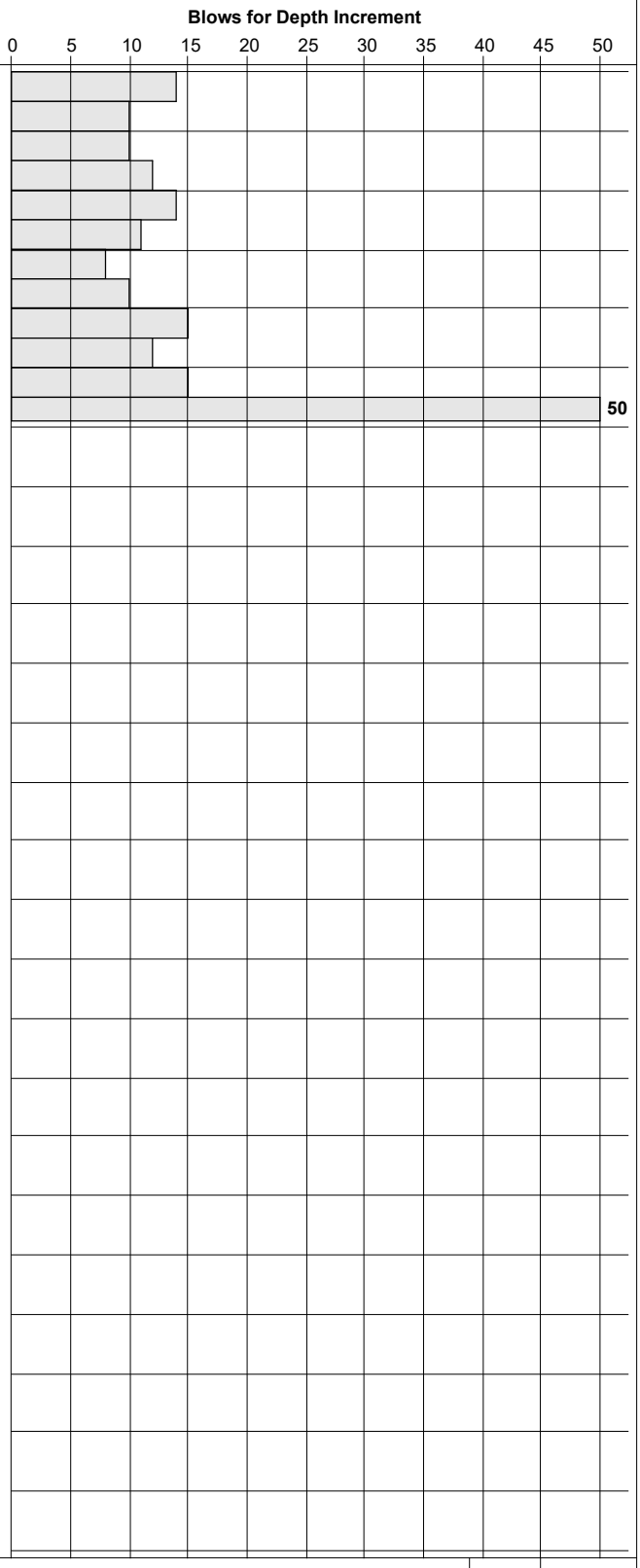
Site	Probe Number
Hackettstown, Skerries	DP11

Method	Cone Dimensions	Ground Level (mOD)	Client	Job Number
Dynamic Probe		24.85	DBFL	9225-11-19
	Location (dGPS)	**Dates**	**Engineer**	**Sheet**
	724995.3 E 758992.6 N	22/02/2020	DBFL	2/2

Depth (m)	Blows for Depth Increment	Field Records	Level (mOD)	Depth (m)
5.00-5.10	14		19.85	5.00
5.10-5.20	10			
5.20-5.30	10			
5.30-5.40	12			
5.40-5.50	14			
5.50-5.60	11		19.35	5.50
5.60-5.70	8			
5.70-5.80	10			
5.80-5.90	15			
5.90-6.00	12			
6.00-6.10	15		18.85	6.00
6.10-6.18	50			
			18.35	6.50
			17.85	7.00
			17.35	7.50
			16.85	8.00
			16.35	8.50
			15.85	9.00
			15.35	9.50
			14.85	10.00



Remarks

Scale (approx)	Logged By
1:25	

Figure No.
9225-11-19.DP11

Ground Investigations Ireland Ltd
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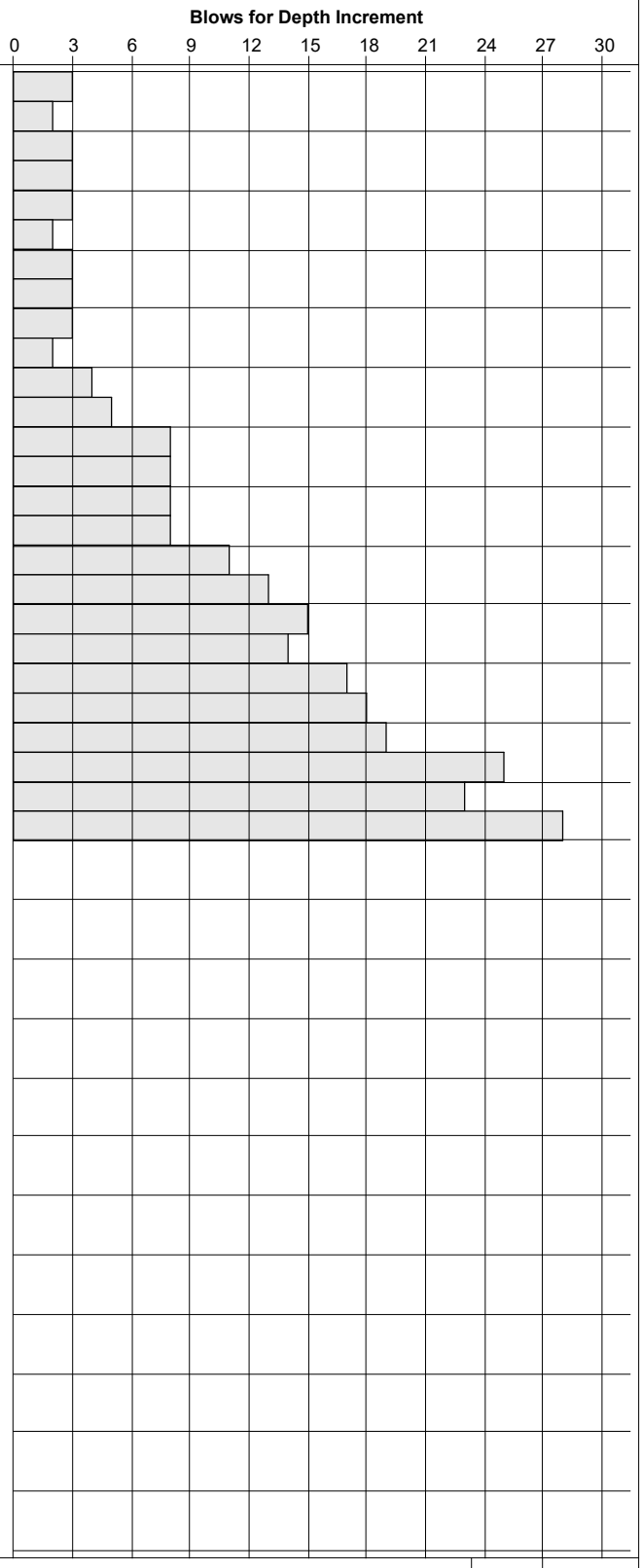
Site	Probe Number
Hackettstown, Skerries	DP12

Method	Cone Dimensions	Ground Level (mOD)	Client	Job Number
Dynamic Probe		25.88	DBFL	9225-11-19
	Location (dGPS)	**Dates**	**Engineer**	**Sheet**
	724997 E 759069.6 N	21/02/2020	DBFL	1/1

Depth (m)	Blows for Depth Increment	Field Records	Level (mOD)	Depth (m)
0.00-0.10	3		25.88	0.00
0.10-0.20	2			
0.20-0.30	3			
0.30-0.40	3			
0.40-0.50	3			
0.50-0.60	2		25.38	0.50
0.60-0.70	3			
0.70-0.80	3			
0.80-0.90	3			
0.90-1.00	2			
1.00-1.10	4		24.88	1.00
1.10-1.20	5			
1.20-1.30	8			
1.30-1.40	8			
1.40-1.50	8			
1.50-1.60	8		24.38	1.50
1.60-1.70	11			
1.70-1.80	13			
1.80-1.90	15			
1.90-2.00	14			
2.00-2.10	17		23.88	2.00
2.10-2.20	18			
2.20-2.30	19			
2.30-2.40	25			
2.40-2.50	23			
2.50-2.60	28		23.38	2.50
			22.88	3.00
			22.38	3.50
			21.88	4.00
			21.38	4.50
			20.88	5.00



Remarks

Scale (approx)	Logged By
1:25	

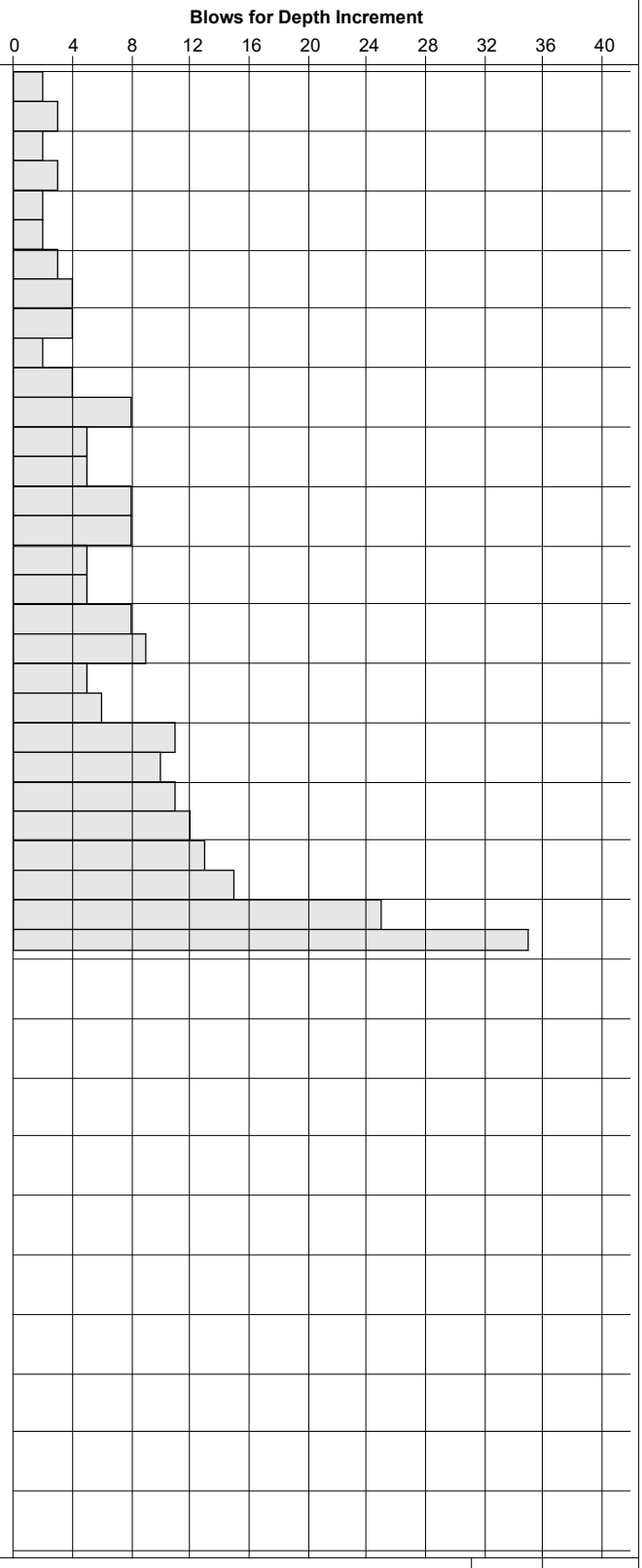
Figure No.
9225-11-19.DP12

Ground Investigations Ireland Ltd
www.gii.ie

Site	Probe Number
Hackettstown, Skerries	DP13

Method	Cone Dimensions	Ground Level (mOD)	Client	Job Number
Dynamic Probe		25.57	DBFL	9225-11-19
	Location (dGPS)	**Dates**	**Engineer**	**Sheet**
	725033.6 E 759081.3 N	21/02/2020	DBFL	1/1

Depth (m)	Blows for Depth Increment	Field Records	Level (mOD)	Depth (m)
0.00-0.10	2		25.57	0.00
0.10-0.20	3			
0.20-0.30	2			
0.30-0.40	3			
0.40-0.50	2			
0.50-0.60	2		25.07	0.50
0.60-0.70	3			
0.70-0.80	4			
0.80-0.90	4			
0.90-1.00	2			
1.00-1.10	4		24.57	1.00
1.10-1.20	8			
1.20-1.30	5			
1.30-1.40	5			
1.40-1.50	8			
1.50-1.60	8		24.07	1.50
1.60-1.70	5			
1.70-1.80	5			
1.80-1.90	8			
1.90-2.00	9			
2.00-2.10	5		23.57	2.00
2.10-2.20	6			
2.20-2.30	11			
2.30-2.40	10			
2.40-2.50	11			
2.50-2.60	12		23.07	2.50
2.60-2.70	13			
2.70-2.80	15			
2.80-2.90	25			
2.90-2.97	35		22.57	3.00
			22.07	3.50
			21.57	4.00
			21.07	4.50
			20.57	5.00



Remarks

Scale (approx)	Logged By
1:25	

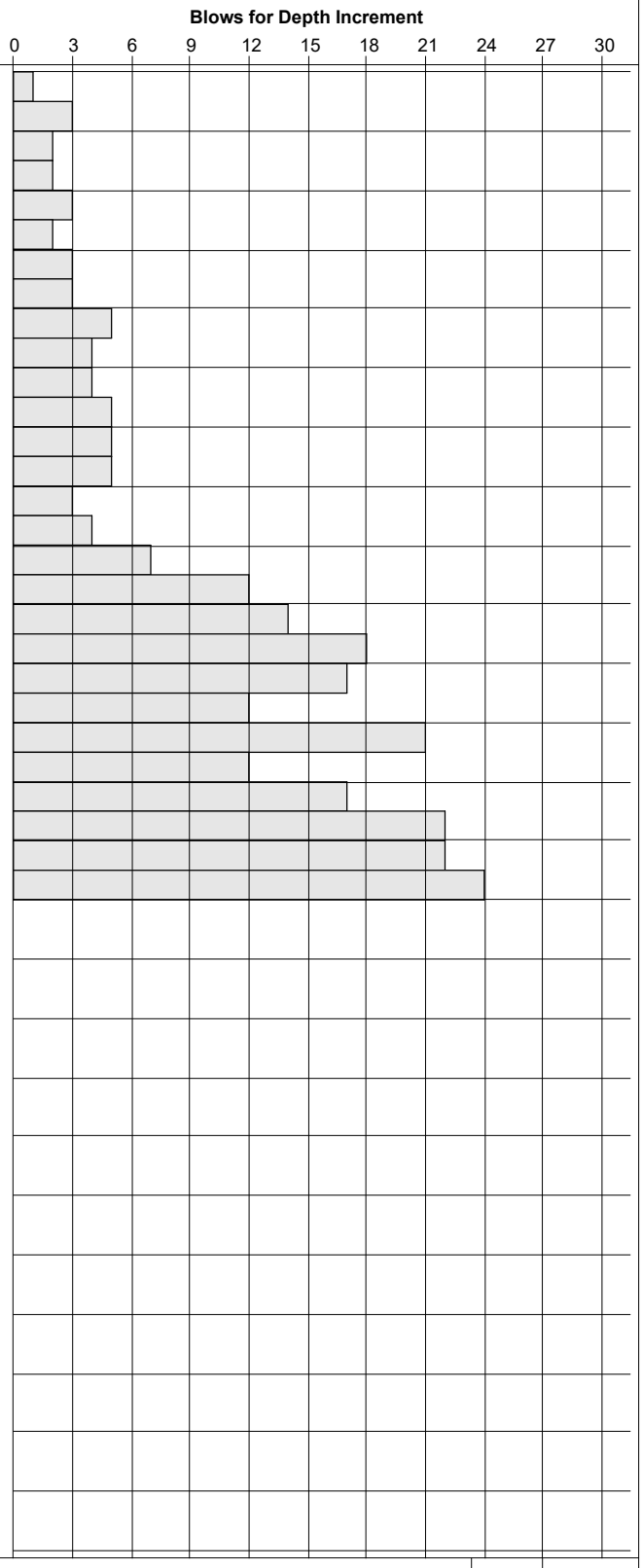
Figure No.
9225-11-19.DP13

Ground Investigations Ireland Ltd
www.gii.ie

Site	Probe Number
Hackettstown, Skerries	DP14

Method	Cone Dimensions	Ground Level (mOD)	Client	Job Number
Dynamic Probe		25.82	DBFL	9225-11-19
	Location (dGPS)	**Dates**	**Engineer**	**Sheet**
	725044 E 759049.5 N	21/02/2020	DBFL	1/1

Depth (m)	Blows for Depth Increment	Field Records	Level (mOD)	Depth (m)
0.00-0.10	1		25.82	0.00
0.10-0.20	3			
0.20-0.30	2			
0.30-0.40	2			
0.40-0.50	3			
0.50-0.60	2		25.32	0.50
0.60-0.70	3			
0.70-0.80	3			
0.80-0.90	5			
0.90-1.00	4			
1.00-1.10	4		24.82	1.00
1.10-1.20	5			
1.20-1.30	5			
1.30-1.40	5			
1.40-1.50	3			
1.50-1.60	4		24.32	1.50
1.60-1.70	7			
1.70-1.80	12			
1.80-1.90	14			
1.90-2.00	18			
2.00-2.10	17		23.82	2.00
2.10-2.20	12			
2.20-2.30	21			
2.30-2.40	12			
2.40-2.50	17			
2.50-2.60	22		23.32	2.50
2.60-2.70	22			
2.70-2.80	24			
			22.82	3.00
			22.32	3.50
			21.82	4.00
			21.32	4.50
			20.82	5.00



Remarks

Scale (approx)	Logged By
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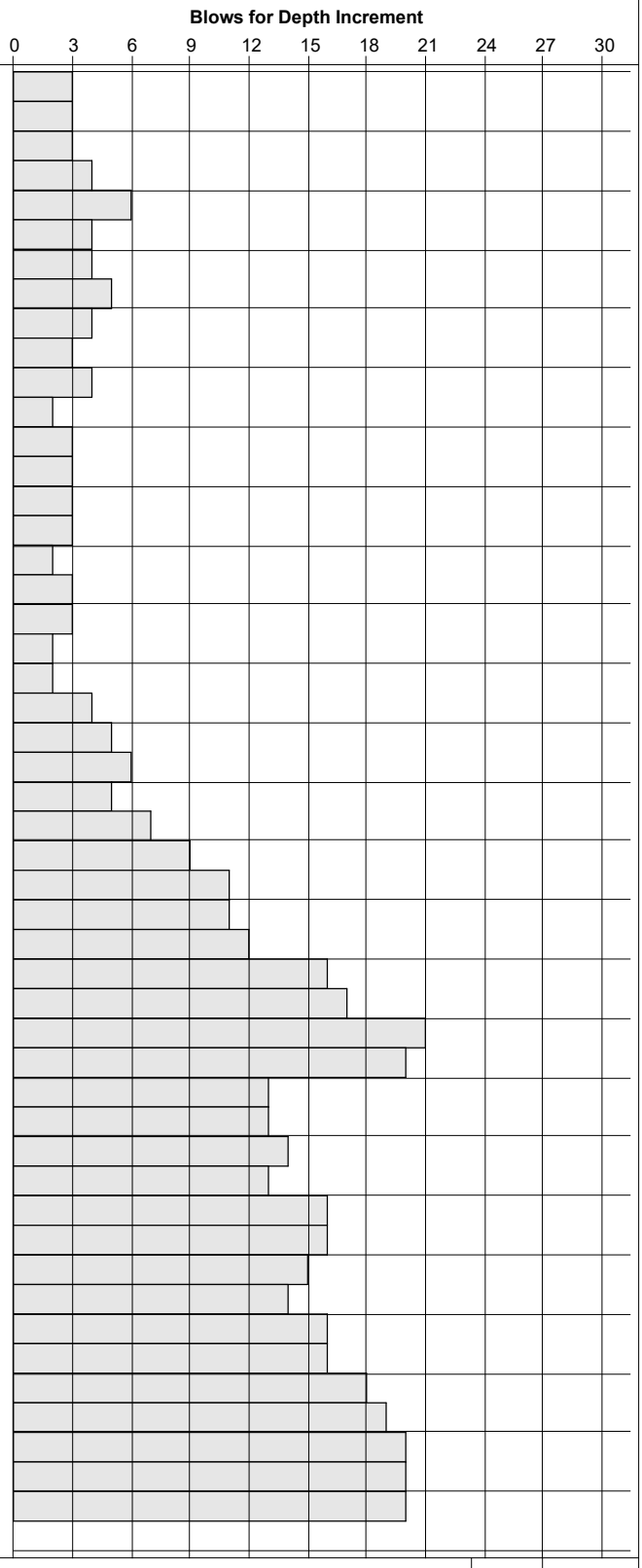
Figure No.
9225-11-19.DP14

Ground Investigations Ireland Ltd
www.gii.ie

Site	Probe Number
Hackettstown, Skerries	DP15

Method	Cone Dimensions	Ground Level (mOD)	Client	Job Number
Dynamic Probe		25.55	DBFL	9225-11-19
	Location (dGPS)	**Dates**	**Engineer**	**Sheet**
	725006.8 E 759034.3 N	21/02/2020	DBFL	1/1

Depth (m)	Blows for Depth Increment	Field Records	Level (mOD)	Depth (m)
0.00-0.10	3		25.55	0.00
0.10-0.20	3			
0.20-0.30	3			
0.30-0.40	4			
0.40-0.50	6			
0.50-0.60	4		25.05	0.50
0.60-0.70	4			
0.70-0.80	5			
0.80-0.90	4			
0.90-1.00	3			
1.00-1.10	4		24.55	1.00
1.10-1.20	2			
1.20-1.30	3			
1.30-1.40	3			
1.40-1.50	3			
1.50-1.60	3		24.05	1.50
1.60-1.70	2			
1.70-1.80	3			
1.80-1.90	3			
1.90-2.00	2			
2.00-2.10	2		23.55	2.00
2.10-2.20	4			
2.20-2.30	5			
2.30-2.40	6			
2.40-2.50	5			
2.50-2.60	7		23.05	2.50
2.60-2.70	9			
2.70-2.80	11			
2.80-2.90	11			
2.90-3.00	12			
3.00-3.10	16		22.55	3.00
3.10-3.20	17			
3.20-3.30	21			
3.30-3.40	20			
3.40-3.50	13			
3.50-3.60	13		22.05	3.50
3.60-3.70	14			
3.70-3.80	13			
3.80-3.90	16			
3.90-4.00	16			
4.00-4.10	15		21.55	4.00
4.10-4.20	14			
4.20-4.30	16			
4.30-4.40	16			
4.40-4.50	18			
4.50-4.60	19		21.05	4.50
4.60-4.70	20			
4.70-4.80	20			
4.80-4.90	20			
			20.55	5.00



Remarks

Scale (approx)	Logged By
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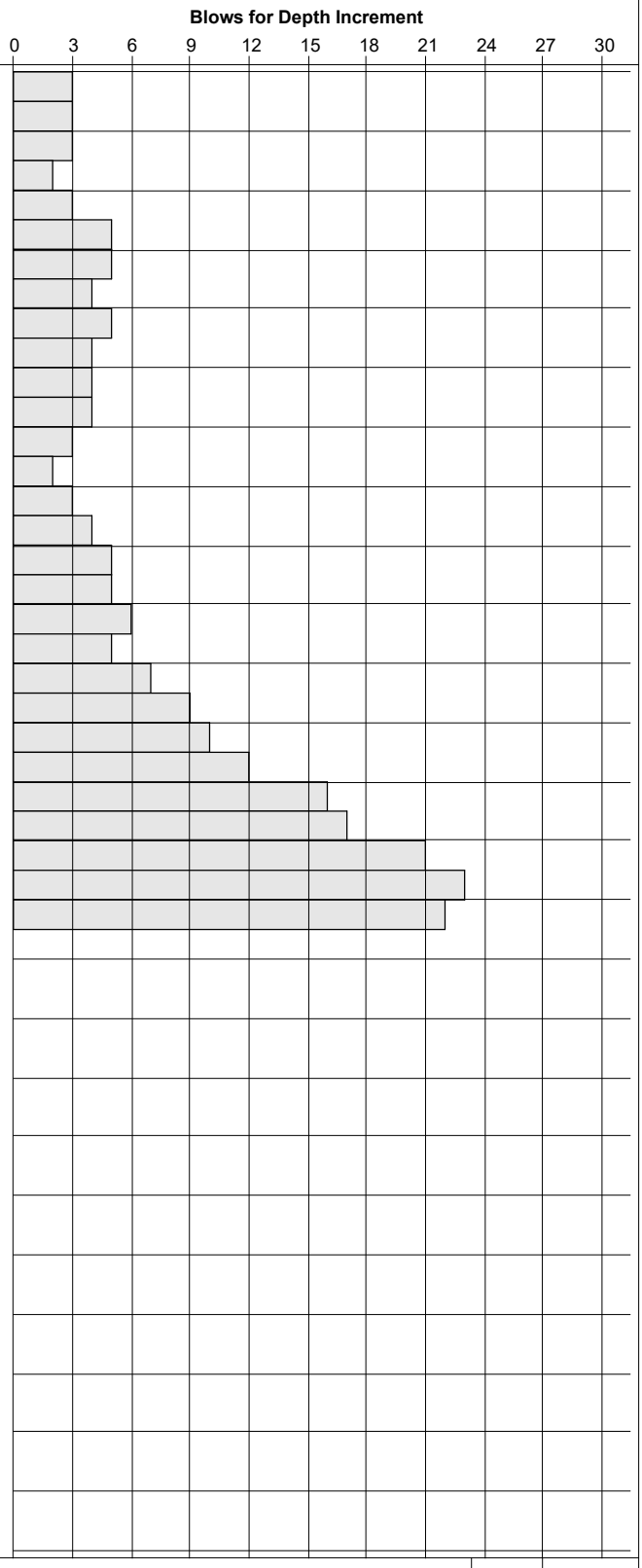
Figure No.
9225-11-19.DP15

Ground Investigations Ireland Ltd
www.gii.ie

Site	Probe Number
Hackettstown, Skerries	DP16

Method	Cone Dimensions	Ground Level (mOD)	Client	Job Number
Dynamic Probe		24.90	DBFL	9225-11-19
	Location (dGPS)	**Dates**	**Engineer**	**Sheet**
	725066.4 E 758996.3 N	22/02/2020	DBFL	1/1

Depth (m)	Blows for Depth Increment	Field Records	Level (mOD)	Depth (m)
0.00-0.10	3		24.90	0.00
0.10-0.20	3			
0.20-0.30	3			
0.30-0.40	2			
0.40-0.50	3			
0.50-0.60	5		24.40	0.50
0.60-0.70	5			
0.70-0.80	4			
0.80-0.90	5			
0.90-1.00	4			
1.00-1.10	4		23.90	1.00
1.10-1.20	4			
1.20-1.30	3			
1.30-1.40	2			
1.40-1.50	3			
1.50-1.60	4		23.40	1.50
1.60-1.70	5			
1.70-1.80	5			
1.80-1.90	6			
1.90-2.00	5			
2.00-2.10	7		22.90	2.00
2.10-2.20	9			
2.20-2.30	10			
2.30-2.40	12			
2.40-2.50	16			
2.50-2.60	17		22.40	2.50
2.60-2.70	21			
2.70-2.80	23			
2.80-2.90	22			
			21.90	3.00
			21.40	3.50
			20.90	4.00
			20.40	4.50
			19.90	5.00



Remarks

Scale (approx)	Logged By
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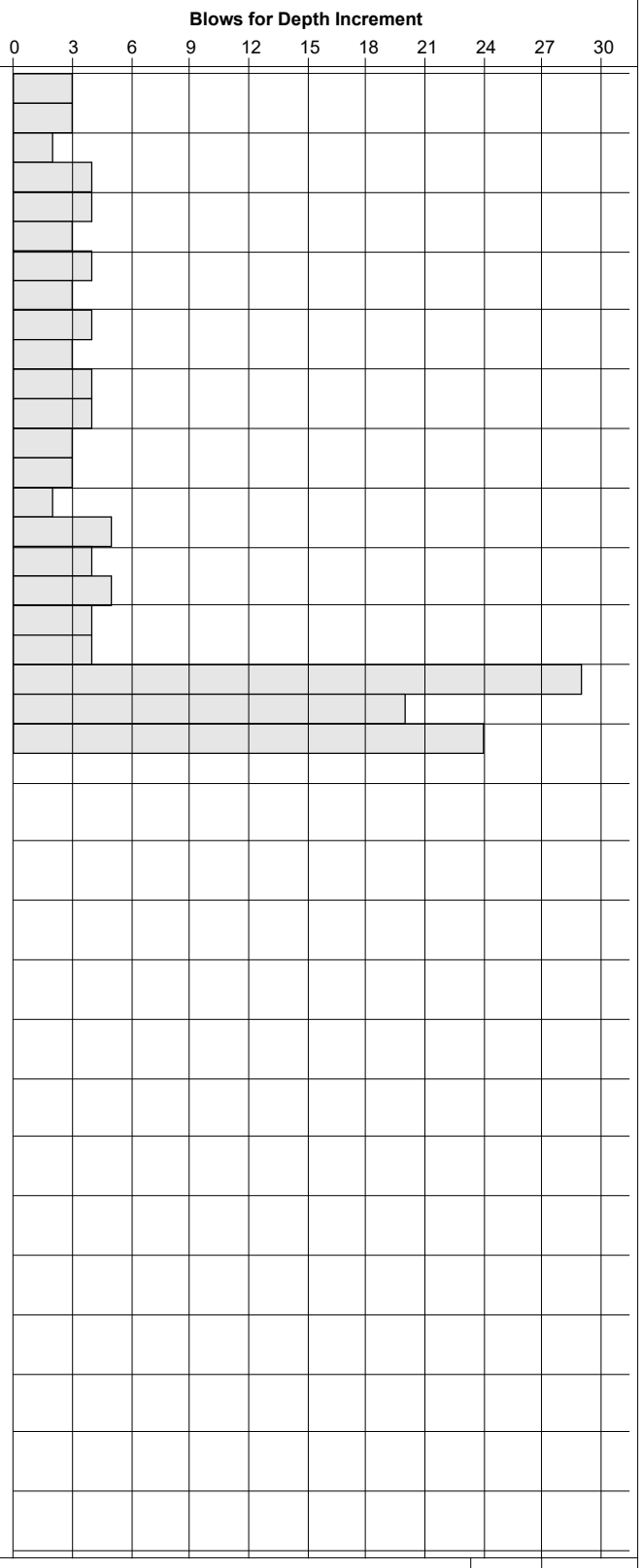
Figure No.
9225-11-19.DPH16

Ground Investigations Ireland Ltd
www.gii.ie

Site	Probe Number
Hackettstown, Skerries	DP17

Method	Cone Dimensions	Ground Level (mOD)	Client	Job Number
Dynamic Probe		23.62	DBFL	9225-11-19
	Location (dGPS)	**Dates**	**Engineer**	**Sheet**
	725100.2 E 759039.3 N	21/02/2020	DBFL	1/1

Depth (m)	Blows for Depth Increment	Field Records	Level (mOD)	Depth (m)
0.00-0.10	3		23.62	0.00
0.10-0.20	3			
0.20-0.30	2			
0.30-0.40	4			
0.40-0.50	4			
0.50-0.60	3		23.12	0.50
0.60-0.70	4			
0.70-0.80	3			
0.80-0.90	4			
0.90-1.00	3			
1.00-1.10	4		22.62	1.00
1.10-1.20	4			
1.20-1.30	3			
1.30-1.40	3			
1.40-1.50	2			
1.50-1.60	5		22.12	1.50
1.60-1.70	4			
1.70-1.80	5			
1.80-1.90	4			
1.90-2.00	4			
2.00-2.10	29		21.62	2.00
2.10-2.20	20			
2.20-2.30	24			
			21.12	2.50
			20.62	3.00
			20.12	3.50
			19.62	4.00
			19.12	4.50
			18.62	5.00



Remarks

Scale (approx)	Logged By
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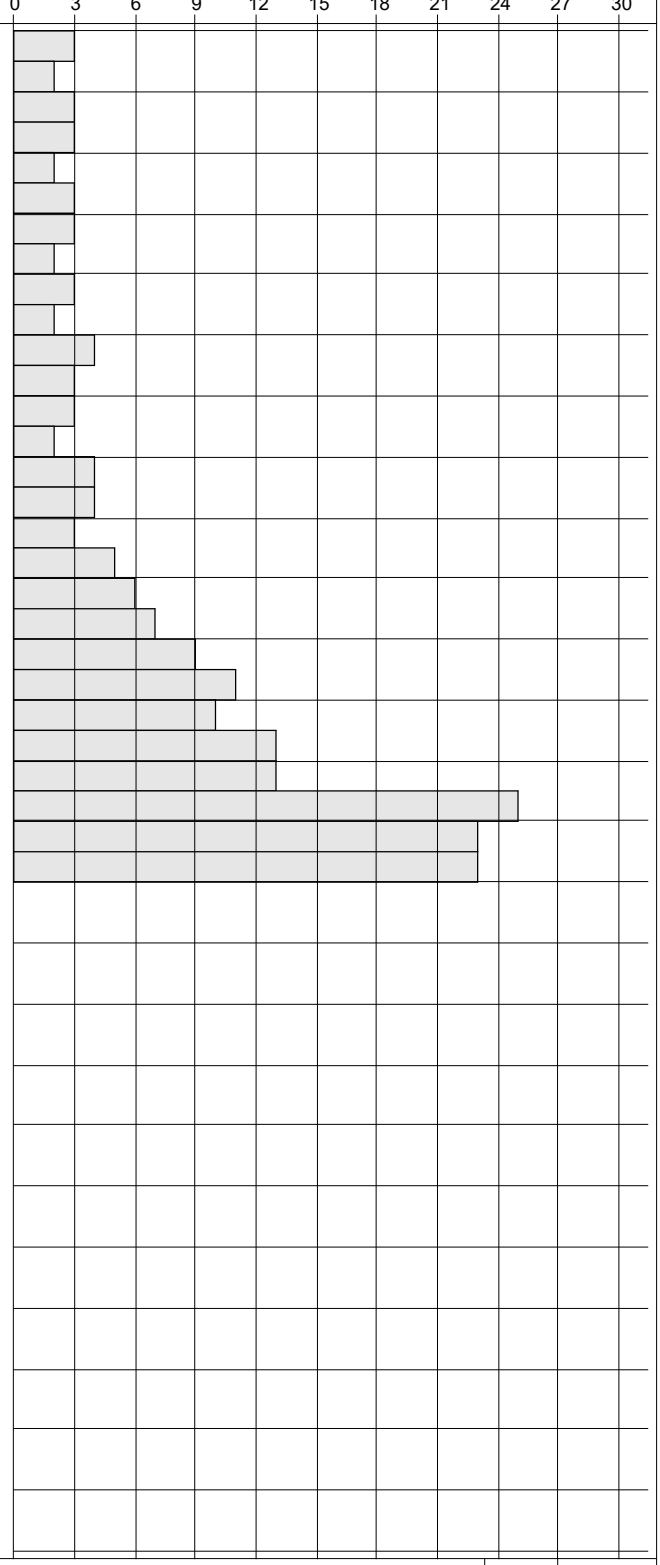
Figure No.
9225-11-19.DP17

Ground Investigations Ireland Ltd
www.gii.ie

Site	Probe Number
Hackettstown, Skerries	DP18

Method	Cone Dimensions	Ground Level (mOD)	Client	Job Number
Dynamic Probe		23.75	DBFL	9225-11-19
	Location (dGPS)	**Dates**	**Engineer**	**Sheet**
	725088.9 E 759079 N	21/02/2020	DBFL	1/1

Depth (m)	Blows for Depth Increment	Field Records	Level (mOD)	Depth (m)
0.00-0.10	3		23.75	0.00
0.10-0.20	2			
0.20-0.30	3			
0.30-0.40	3			
0.40-0.50	2			
0.50-0.60	3		23.25	0.50
0.60-0.70	3			
0.70-0.80	2			
0.80-0.90	3			
0.90-1.00	2			
1.00-1.10	4		22.75	1.00
1.10-1.20	3			
1.20-1.30	3			
1.30-1.40	2			
1.40-1.50	4			
1.50-1.60	4		22.25	1.50
1.60-1.70	3			
1.70-1.80	5			
1.80-1.90	6			
1.90-2.00	7			
2.00-2.10	9		21.75	2.00
2.10-2.20	11			
2.20-2.30	10			
2.30-2.40	13			
2.40-2.50	13			
2.50-2.60	25		21.25	2.50
2.60-2.70	23			
2.70-2.80	23			
			20.75	3.00
			20.25	3.50
			19.75	4.00
			19.25	4.50
			18.75	5.00



Remarks

Scale (approx)	Logged By
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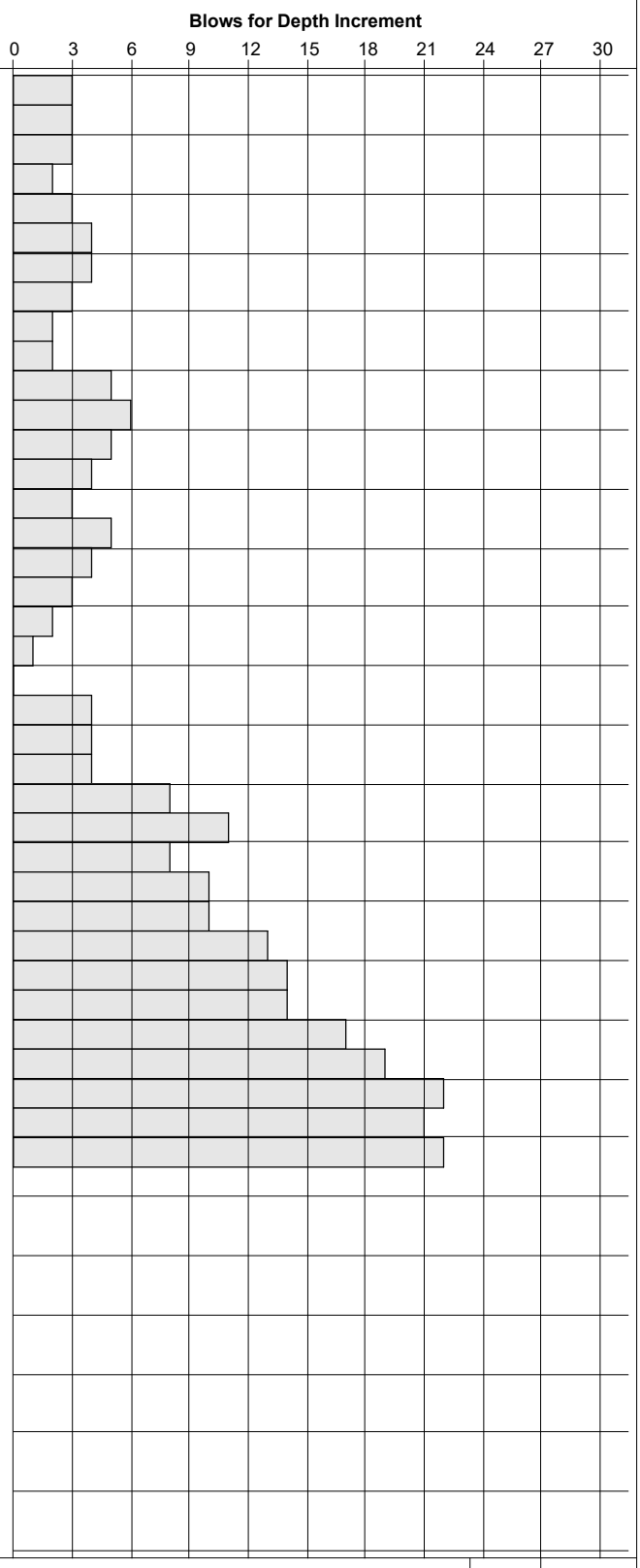
Figure No.
9225-11-19.DP18

Ground Investigations Ireland Ltd
www.gii.ie

Site	Probe Number
Hackettstown, Skerries	DP19

Method	Cone Dimensions	Ground Level (mOD)	Client	Job Number
Dynamic Probe		22.44	DBFL	9225-11-19
	Location (dGPS)	**Dates**	**Engineer**	**Sheet**
	725079.2 E 759116.1 N	21/02/2020	DBFL	1/1

Depth (m)	Blows for Depth Increment	Field Records	Level (mOD)	Depth (m)
0.00-0.10	3		22.44	0.00
0.10-0.20	3			
0.20-0.30	3			
0.30-0.40	2			
0.40-0.50	3			
0.50-0.60	4		21.94	0.50
0.60-0.70	4			
0.70-0.80	3			
0.80-0.90	2			
0.90-1.00	2			
1.00-1.10	5		21.44	1.00
1.10-1.20	6			
1.20-1.30	5			
1.30-1.40	4			
1.40-1.50	3			
1.50-1.60	5		20.94	1.50
1.60-1.70	4			
1.70-1.80	3			
1.80-1.90	2			
1.90-2.00	1			
2.00-2.10	0		20.44	2.00
2.10-2.20	4			
2.20-2.30	4			
2.30-2.40	4			
2.40-2.50	8			
2.50-2.60	11		19.94	2.50
2.60-2.70	8			
2.70-2.80	10			
2.80-2.90	10			
2.90-3.00	13			
3.00-3.10	14		19.44	3.00
3.10-3.20	14			
3.20-3.30	17			
3.30-3.40	19			
3.40-3.50	22			
3.50-3.60	21		18.94	3.50
3.60-3.70	22			
			18.44	4.00
			17.94	4.50
			17.44	5.00



Remarks

Scale (approx)	Logged By
1:25	

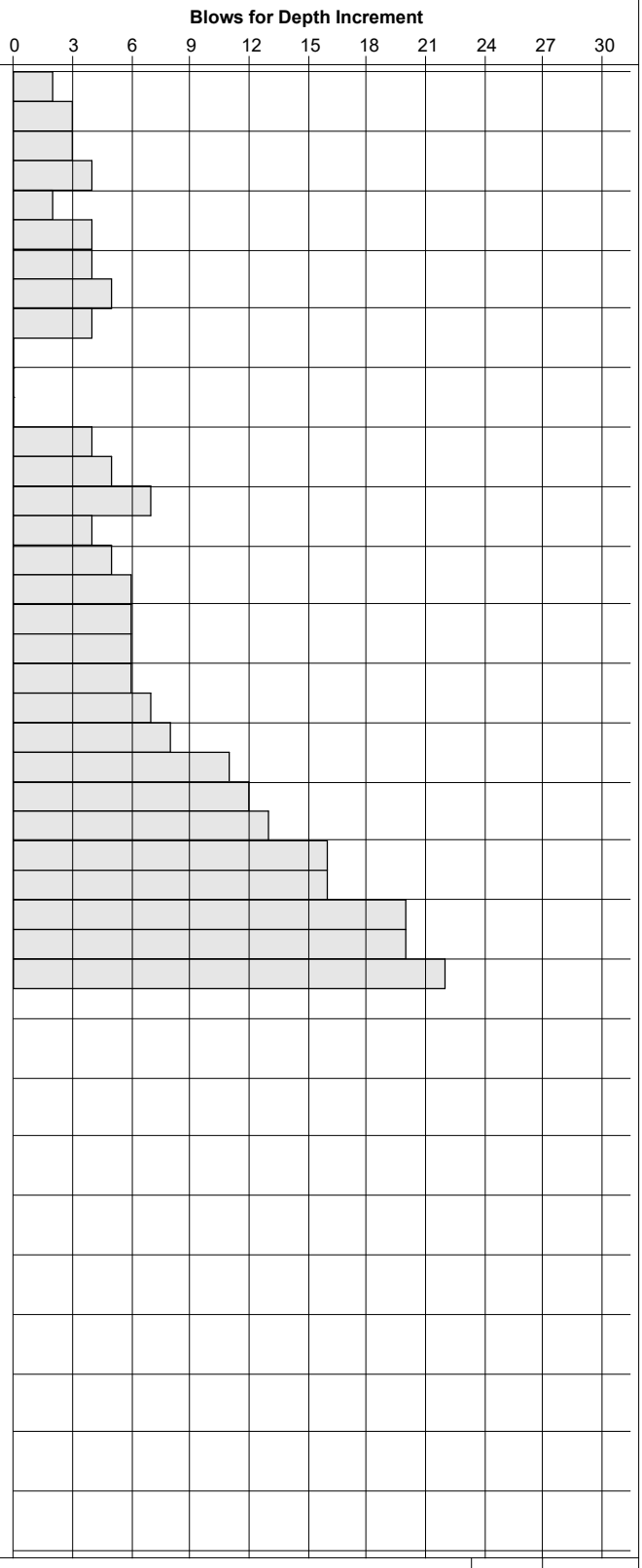
Figure No.
9225-11-19.DP19

Ground Investigations Ireland Ltd
www.gii.ie

Site	Probe Number
Hackettstown, Skerries	DP20

Method	Cone Dimensions	Ground Level (mOD)	Client	Job Number
Dynamic Probe		24.66	DBFL	9225-11-19
	Location (dGPS)	**Dates**	**Engineer**	**Sheet**
	724976.3 E 759020.8 N	21/02/2020	DBFL	1/1

Depth (m)	Blows for Depth Increment	Field Records	Level (mOD)	Depth (m)
0.00-0.10	2		24.66	0.00
0.10-0.20	3			
0.20-0.30	3			
0.30-0.40	4			
0.40-0.50	2			
0.50-0.60	4		24.16	0.50
0.60-0.70	4			
0.70-0.80	5			
0.80-0.90	4			
0.90-1.00	0			
1.00-1.10	0		23.66	1.00
1.10-1.20	0			
1.20-1.30	4			
1.30-1.40	5			
1.40-1.50	7			
1.50-1.60	4		23.16	1.50
1.60-1.70	5			
1.70-1.80	6			
1.80-1.90	6			
1.90-2.00	6			
2.00-2.10	6		22.66	2.00
2.10-2.20	7			
2.20-2.30	8			
2.30-2.40	11			
2.40-2.50	12			
2.50-2.60	13		22.16	2.50
2.60-2.70	16			
2.70-2.80	16			
2.80-2.90	20			
2.90-3.00	20			
3.00-3.10	22		21.66	3.00
			21.16	3.50
			20.66	4.00
			20.16	4.50
			19.66	5.00



Remarks

Scale (approx)	Logged By
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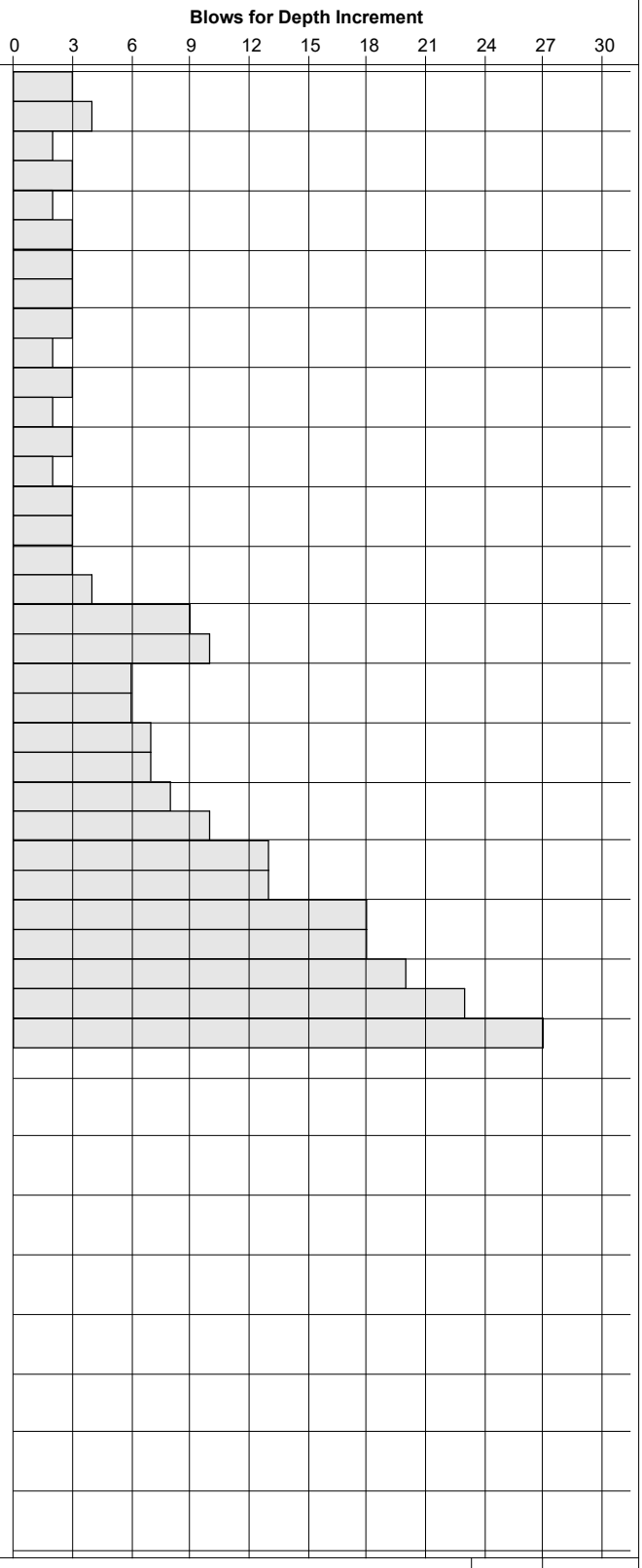
Figure No.
9225-11-19.DP20

Ground Investigations Ireland Ltd
www.gii.ie

Site	Probe Number
Hackettstown, Skerries	DP21

Method	Cone Dimensions	Ground Level (mOD)	Client	Job Number
Dynamic Probe		19.42	DBFL	9225-11-19
	Location (dGPS)	**Dates**	**Engineer**	**Sheet**
	725031.3 E 759203.7 N	22/02/2020	DBFL	1/1

Depth (m)	Blows for Depth Increment	Field Records	Level (mOD)	Depth (m)
0.00-0.10	3		19.42	0.00
0.10-0.20	4			
0.20-0.30	2			
0.30-0.40	3			
0.40-0.50	2			
0.50-0.60	3		18.92	0.50
0.60-0.70	3			
0.70-0.80	3			
0.80-0.90	3			
0.90-1.00	2			
1.00-1.10	3		18.42	1.00
1.10-1.20	2			
1.20-1.30	3			
1.30-1.40	2			
1.40-1.50	3			
1.50-1.60	3		17.92	1.50
1.60-1.70	3			
1.70-1.80	4			
1.80-1.90	9			
1.90-2.00	10			
2.00-2.10	6		17.42	2.00
2.10-2.20	6			
2.20-2.30	7			
2.30-2.40	7			
2.40-2.50	8			
2.50-2.60	10		16.92	2.50
2.60-2.70	13			
2.70-2.80	13			
2.80-2.90	18			
2.90-3.00	18			
3.00-3.10	20		16.42	3.00
3.10-3.20	23			
3.20-3.30	27			
			15.92	3.50
			15.42	4.00
			14.92	4.50
			14.42	5.00



Remarks

Scale (approx)	Logged By
1:25	

Figure No.
9225-11-19.DP21

Ground Investigations Ireland Ltd
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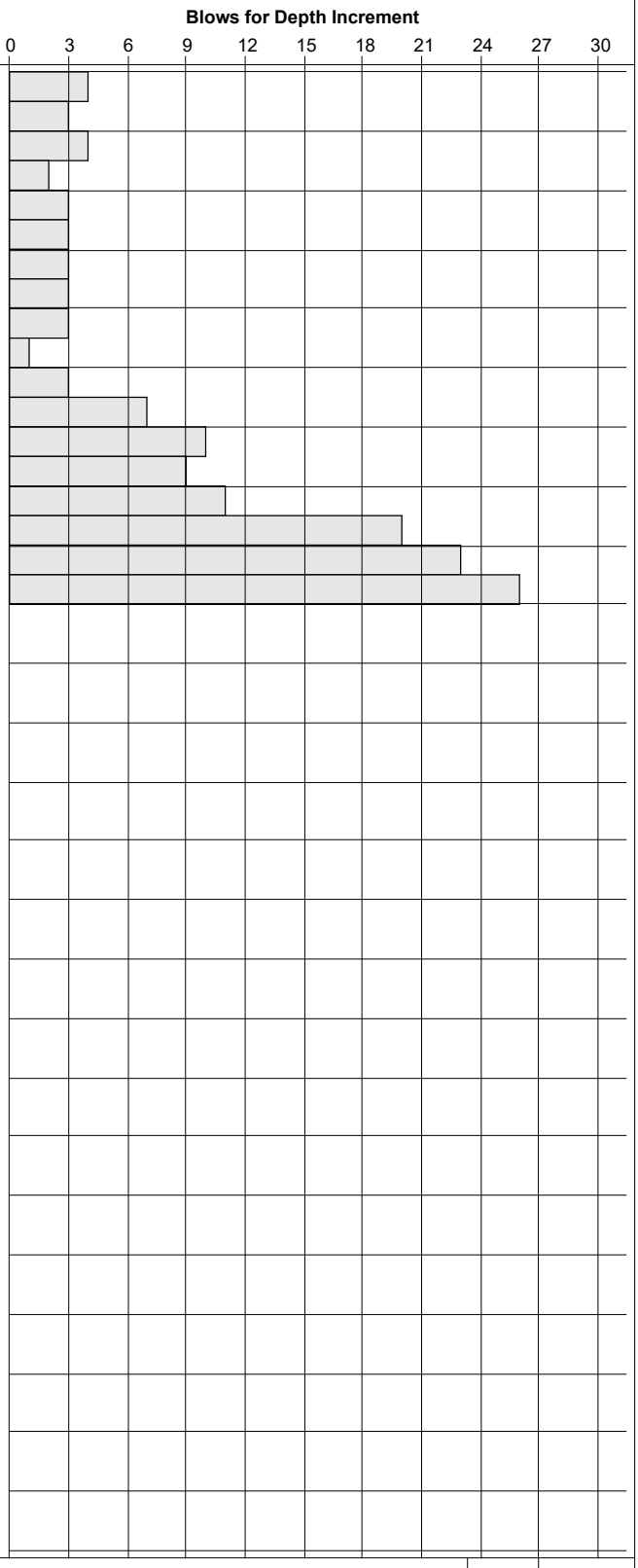
Site	Probe Number
Hackettstown, Skerries	DP22

Method	Cone Dimensions	Ground Level (mOD)	Client	Job Number
Dynamic Probe		24.07	DBFL	9225-11-19
	Location (dGPS)	**Dates**	**Engineer**	**Sheet**
	724993.6 E 759153.7 N	22/02/2020	DBFL	1/1

Depth (m)	Blows for Depth Increment	Field Records	Level (mOD)	Depth (m)
0.00-0.10	4		24.07	0.00
0.10-0.20	3			
0.20-0.30	4			
0.30-0.40	2			
0.40-0.50	3			
0.50-0.60	3		23.57	0.50
0.60-0.70	3			
0.70-0.80	3			
0.80-0.90	3			
0.90-1.00	1			
1.00-1.10	3		23.07	1.00
1.10-1.20	7			
1.20-1.30	10			
1.30-1.40	9			
1.40-1.50	11			
1.50-1.60	20		22.57	1.50
1.60-1.70	23			
1.70-1.80	26			
			22.07	2.00
			21.57	2.50
			21.07	3.00
			20.57	3.50
			20.07	4.00
			19.57	4.50
			19.07	5.00



Remarks

Scale (approx)	Logged By
1:25	

Figure No.
9225-11-19.DP22

Ground Investigations Ireland Ltd
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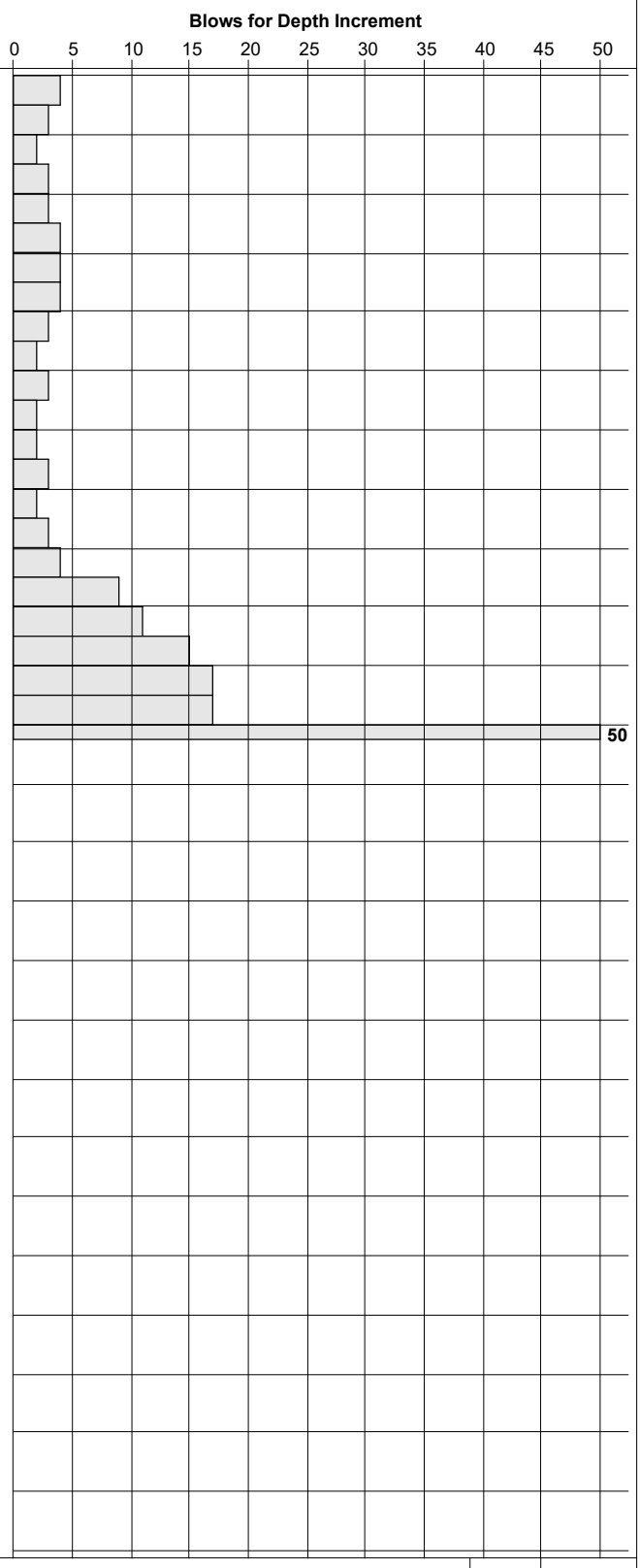
Site	Probe Number
Hackettstown, Skerries	DP23

Method	Cone Dimensions	Ground Level (mOD)	Client	Job Number
Dynamic Probe		25.41	DBFL	9225-11-19
	Location	**Dates**	**Engineer**	**Sheet**
	725005.4 E 759110.7 N	22/02/2020	DBFL	1/1

Depth (m)	Blows for Depth Increment	Field Records	Level (mOD)	Depth (m)
0.00-0.10	4		25.41	0.00
0.10-0.20	3			
0.20-0.30	2			
0.30-0.40	3			
0.40-0.50	3			
0.50-0.60	4		24.91	0.50
0.60-0.70	4			
0.70-0.80	4			
0.80-0.90	3			
0.90-1.00	2			
1.00-1.10	3		24.41	1.00
1.10-1.20	2			
1.20-1.30	2			
1.30-1.40	3			
1.40-1.50	2			
1.50-1.60	3		23.91	1.50
1.60-1.70	4			
1.70-1.80	9			
1.80-1.90	11			
1.90-2.00	15			
2.00-2.10	17		23.41	2.00
2.10-2.20	17			
2.20-2.25	50			
			22.91	2.50
			22.41	3.00
			21.91	3.50
			21.41	4.00
			20.91	4.50
			20.41	5.00



Remarks

Scale (approx)	Logged By
1:25	

Figure No.
9225-11-19.DP23

Ground Investigations Ireland Ltd
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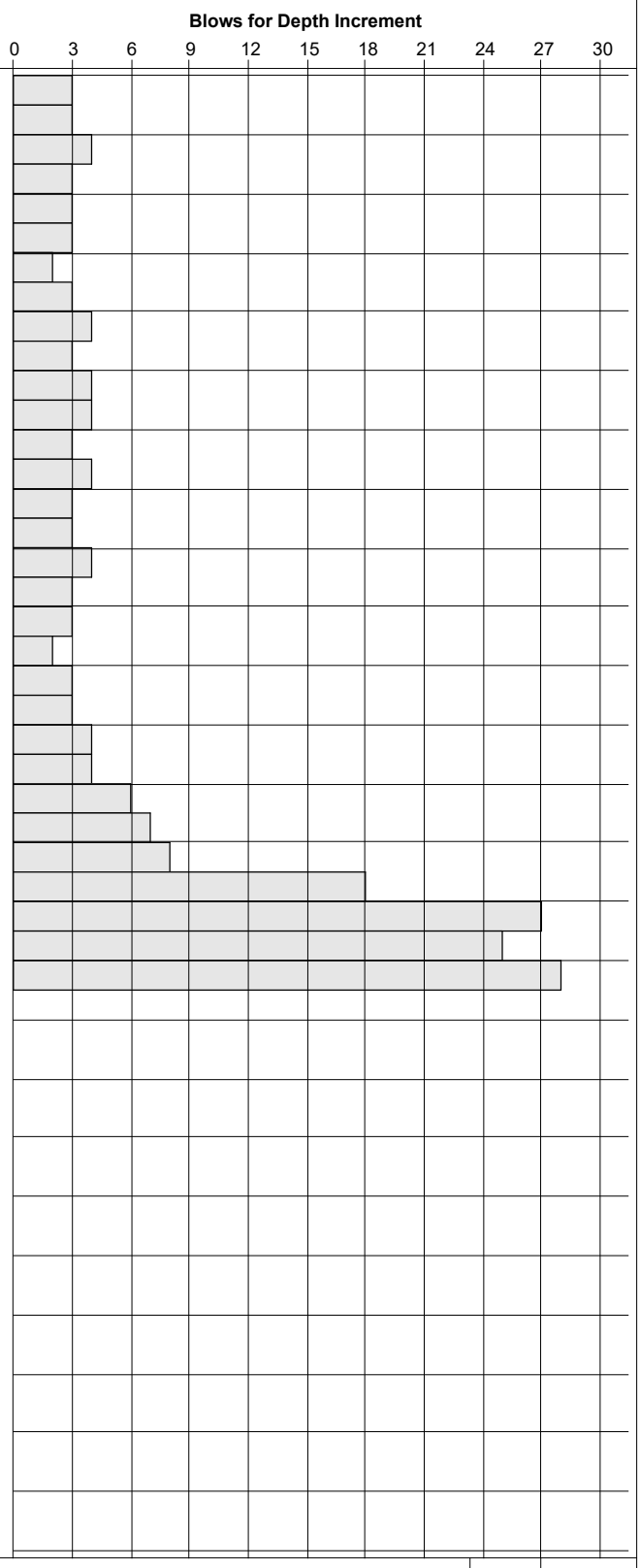
Site	Probe Number
Hackettstown, Skerries	DP24

Method	Cone Dimensions	Ground Level (mOD)	Client	Job Number
Dynamic Probe		23.99	DBFL	9225-11-19
	Location	**Dates**	**Engineer**	**Sheet**
	725047.5 E 759115.1 N	21/02/2020-21/03/2020	DBFL	1/1

Depth (m)	Blows for Depth Increment	Field Records	Level (mOD)	Depth (m)
0.00-0.10	3		23.99	0.00
0.10-0.20	3			
0.20-0.30	4			
0.30-0.40	3			
0.40-0.50	3			
0.50-0.60	3		23.49	0.50
0.60-0.70	2			
0.70-0.80	3			
0.80-0.90	4			
0.90-1.00	3			
1.00-1.10	4		22.99	1.00
1.10-1.20	4			
1.20-1.30	3			
1.30-1.40	4			
1.40-1.50	3			
1.50-1.60	3		22.49	1.50
1.60-1.70	4			
1.70-1.80	3			
1.80-1.90	3			
1.90-2.00	2			
2.00-2.10	3		21.99	2.00
2.10-2.20	3			
2.20-2.30	4			
2.30-2.40	4			
2.40-2.50	6			
2.50-2.60	7		21.49	2.50
2.60-2.70	8			
2.70-2.80	18			
2.80-2.90	27			
2.90-3.00	25			
3.00-3.10	28		20.99	3.00
			20.49	3.50
			19.99	4.00
			19.49	4.50
			18.99	5.00



Remarks

Scale (approx)	Logged By
1:25	

Figure No.
9225-11-19.DP24

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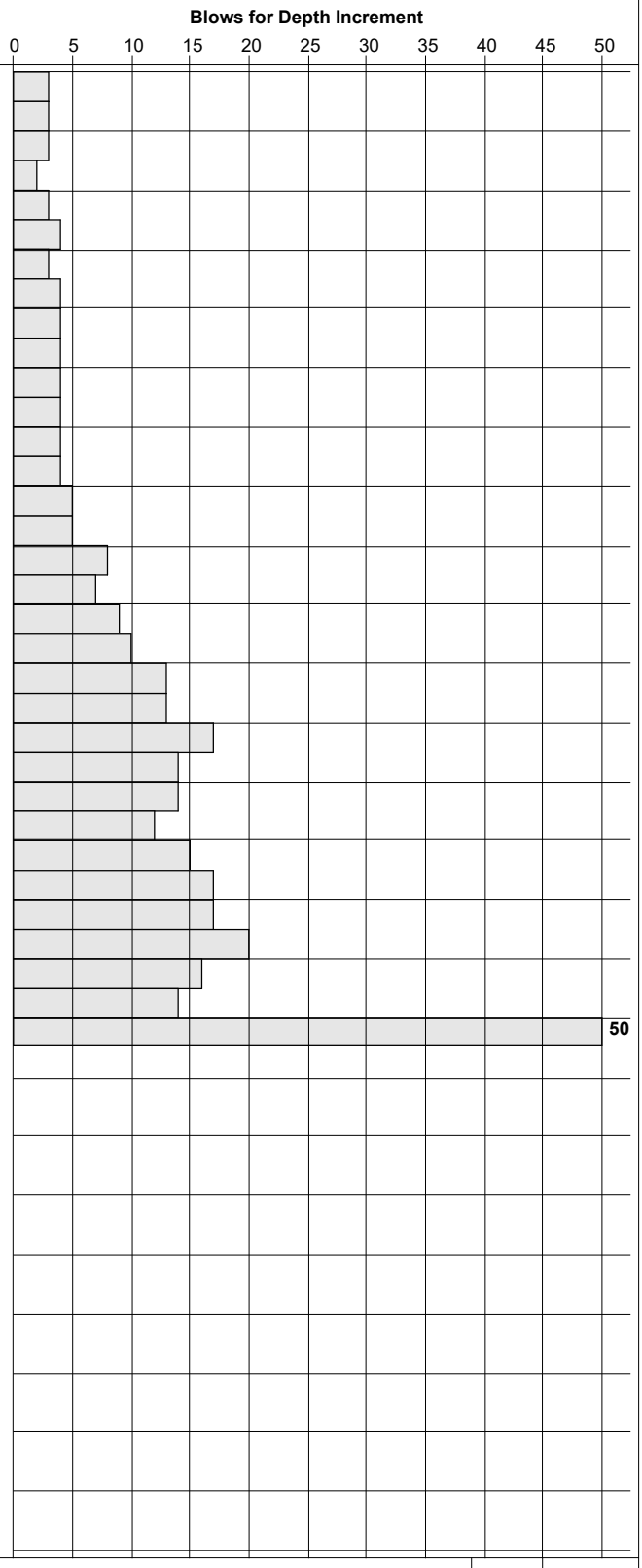
Site	Probe Number
Hackettstown, Skerries	DP25

Method	Cone Dimensions	Ground Level (mOD)	Client	Job Number
Dynamic Probe		24.58	DBFL	9225-11-19
	Location (dGPS)	**Dates**	**Engineer**	**Sheet**
	724958.5 E 759055.3 N	22/02/2020	DBFL	1/1

Depth (m)	Blows for Depth Increment	Field Records	Level (mOD)	Depth (m)
0.00-0.10	3		24.58	0.00
0.10-0.20	3			
0.20-0.30	3			
0.30-0.40	2			
0.40-0.50	3			
0.50-0.60	4		24.08	0.50
0.60-0.70	3			
0.70-0.80	4			
0.80-0.90	4			
0.90-1.00	4			
1.00-1.10	4		23.58	1.00
1.10-1.20	4			
1.20-1.30	4			
1.30-1.40	4			
1.40-1.50	5			
1.50-1.60	5		23.08	1.50
1.60-1.70	8			
1.70-1.80	7			
1.80-1.90	9			
1.90-2.00	10			
2.00-2.10	13		22.58	2.00
2.10-2.20	13			
2.20-2.30	17			
2.30-2.40	14			
2.40-2.50	14			
2.50-2.60	12		22.08	2.50
2.60-2.70	15			
2.70-2.80	17			
2.80-2.90	17			
2.90-3.00	20			
3.00-3.10	16		21.58	3.00
3.10-3.20	14			
3.20-3.29	50			
			21.08	3.50
			20.58	4.00
			20.08	4.50
			19.58	5.00



Remarks

Scale (approx)	Logged By
1:25	

Figure No.
9225-11-19.DP25

APPENDIX 5 – Cable Percussion and Rotary Borehole Records

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Site Hackettstown, Skerries			**Borehole Number** BH01
Machine : Dando 1500 **Method :** Cable Percussion	**Casing Diameter** 200mm cased to 7.10m	**Ground Level (mOD)** 19.35	**Client** DBFL	**Job Number** 9225-11-19
	Location 725040.3 E 759288.1 N	**Dates** 12/03/2020-13/03/2020	**Project Contractor** Ground Investigations Ireland	**Sheet** 1/1

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					19.20	(0.15) 0.15	FILL. Grey sandy angular medium to coarse gravel (crushed rock fill).		
0.40	B					(0.55)	MADE GROUND. Reddish brown slightly gravelly sandy silty Clay with occasional subangular to sub rounded cobblesred and brick and glass fragments. Gravel is fine to coarse subangular to subrounded.		
0.70	B				18.65	0.70 (0.30)			
1.00-1.38	SPT(C) 50/225			7,13/17,14,16,3	18.35	1.00	MADE GROUND Rreddish brown sandy gravelly CLAY with many subangular to subrounded cobbles. Gravel is fine to coarse subangular to subrounded.		
1.50	B						MADE GROUND brown slightly sandy gravelly CLAY with many subangular to subrounded cobbles. Gravel is fine to coarse subangular to subrounded.		
2.00-2.45	SPT(C) N=44			5,7/9,16,8,11		(2.20)			
2.50	B								
3.00-3.45	SPT(C) N=11			8,8/4,2,2,3					
3.30	B				16.15	3.20 (0.40)	Firm brown/grey slightly sandy slightly gravelly CLAY with occasional subangular to subrounded cobbles and woody fragments. Gravel fine to coarse subangular to subrounded.		
					15.75	3.60	Firm brown slightly sandy gravelly CLAY with occasional subangular to subrounded cobbles. Gravel is fine to coarse subangular to subrounded.		
4.00-4.45	SPT(C) N=10			2,2/3,2,2,3					
4.50	B					(2.00)			
5.00-5.45	SPT(C) N=9			2,1/2,2,2,3					▼1
					13.75	5.60	Medium dense sandy GRAVEL with occasional subangular to subrounded cobbles. Gravel is fine to coarse subangular to subrounded.		▽1
5.70	B			Water strike(1) at 5.90m, rose to 5.20m in 20 mins.					
6.00-6.45	SPT(C) N=34			3,6/6,7,9,12		(1.50)			
6.50	B								
7.10-7.30	SPT(C) 50/0			20/50	12.25	7.10	Complete at 7.10m		

Remarks
Borehole backfilled on completion.
Chiselling from 7.10m to 7.10m for 1 hour.

Scale (approx)	Logged By
1:50	CB

Figure No. 9225-11-19.BH01

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Site Hackettstown, Skerries			**Borehole Number** BH02
Machine : Dando 2000 & Beretta T44 **Method :** Cable Percussion and Rotary Core Follow on	**Casing Diameter** 200mm cased to 5.00m 96mm cased to 12.70m	**Ground Level (mOD)** 15.80	**Client** DBFL	**Job Number** 9225-11-19
	Location (dGPS) 725029.5 E 759251.3 N	**Dates** 26/02/2020-26/03/2020	**Project Contractor** Ground Investigations Ireland	**Sheet** 1/2

Depth (m)	Sample / Tests	TCR	SCR	RQD	FI	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
										(0.50)	Brown slightly sandy slightly gravelly TOPSOIL. Gravel is subrounded, fine to coarse. Sand is fine to coarse.		
									15.30	0.50	Soft greyish brown slightly gravelly sandy CLAY with rootlets and timber fragments. Gravel is subrounded, fine to coarse. Sand is fine to coarse (Possible Made Ground).		
0.90 1.00-1.45	B SPT(C) N=4							0,1/0,1,1,2		(1.20)			
									14.10	1.70	Medium dense brownish grey slightly clayey sandy subangular to subrounded, fine to coarse GRAVEL with occasional sub-rounded cobbles. Sand is fine to coarse.		▼1
2.00 2.00-2.45	B SPT(C) N=12							1,0/2,2,4,4 Water strike(1) at 2.20m, rose to 1.80m in 20 mins.					▽1
										(2.10)			
3.00 3.00-3.45	B SPT(C) N=12							4,5/4,4,3,1					
									12.00	3.80	Stiff grey slightly sandy slightly gravelly CLAY. Gravel is subrounded, fine to coarse. Sand is fine to coarse.		
4.00 4.00-4.45	B SPT(C) N=32							6,6/7,7,8,10		(1.20)			
								8,10/19,25,6					
5.00-5.35 5.00								SPT(C) 50/200	10.80	5.00	Stiff dark brownish grey slightly sandy slightly gravelly CLAY with occasional subangular to subrounded cobbles. Grave is subangular to subrounded fine to coarse. 5.00-6.00m BGL: Driller's Notes - Clay with occasional boulders		
		29											
6.70-7.15 6.70								2,6/6,5,6,6 SPT(C) N=23					
										(4.50)			
		83											
8.20-8.65 8.20								4,4/5,6,6,7 SPT(C) N=24					
		51											
9.70-9.85 9.70								6,19/50 SPT(C) 25*/140	6.30	9.50 (0.30)	Very stiff brown slightly sandy gravelly CLAY with occasional subangular cobbles. Gravel is angular to subrounded fine to coarse		
9.80								50/10	6.00	9.80			

Remarks
Borehole backfilled on completion.
Cable percussion refusal at 5.00m BGL due to obstruction, possible boulder.
Rotary Core follow on from 5.00m BGL
Chiselling from 5.35m to 5.35m for 0.5 hours.

Scale (approx)	Logged By
1:50	JS & PC

Figure No. 9225-11-19.BH02

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Site Hackettstown, Skerries			**Borehole Number** BH02
Machine : Dando 2000 & Beretta T44 **Flush :** Water **Core Dia :** 63.5 mm **Method :** Cable Percussion and Rotary Core Follow on	**Casing Diameter** 200mm cased to 5.00m 96mm cased to 12.70m	**Ground Level (mOD)** 15.80	**Client** DBFL	**Job Number** 9225-11-19
	Location (dGPS) 725029.5 E 759251.3 N	**Dates** 26/02/2020-26/03/2020	**Project Contractor** Ground Investigations Ireland	**Sheet** 2/2

Depth (m)	TCR	SCR	RQD	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
	100	54	48	NI			(1.00)	Medium strong grey fine grained LIMESTONEwith occasional calcite veining. Partially to distinctly weathered 9.80-10.80m - Mostly Non Intact		
10.80				6		5.00	10.80			
							(0.90)	Medium strong to strong grey fine grained LIMESTONE with occasional calcite veining. Partially to distinctly weathered 10.80-11.70m - Two fracture sets. F1: Closely to medium spaced, 0 to 10°, stepped rough with clay infilling. F2: Medium spaced, 60° to 80°, undulating rough		
11.20										
11.70	100	94	88	2		4.10	11.70			
							(1.00)	Strong grey fine grained LIMESTONE with occasional calcite veining. Partially weathered 11.70-12.70m - F1: Medium spaced, 60° to 80°, undulating rough with clay infilling		
12.70						3.10	12.70	Complete at 12.70m		

Remarks

Scale (approx)	Logged By
1:50	JS & PC

Figure No. 9225-11-19.BH02

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Site Hackettstown, Skerries			**Borehole Number** BH03
Machine : Dando 2000 **Method :** Cable Percussion	**Casing Diameter** 200mm cased to 6.80m	**Ground Level (mOD)** 16.41	**Client** DBFL	**Job Number** 9225-11-19
	Location (dGPS) 724940.3 E 759259.9 N	**Dates** 25/02/2020-26/02/2020	**Project Contractor** Ground Investigations Ireland	**Sheet** 1/1

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
						(0.30)	Brown slightly sandy slightly gravelly TOPSOIL. Gravel is sub-rounded, fine to coarse. Sand is fine to coarse.			
					16.11	0.30				
						(1.20)	Soft to firm brown slightly gravelly sandy CLAY with rootlets and occasional sub-rounded cobbles. Gravel is sub-rounded, fine to coarse. Sand is fine to coarse (Possible Made Ground).			
1.00-1.45 1.00	SPT(C) N=9 B			3,4/2,2,2,3						
					14.91	1.50	Soft brown gravelly sandy CLAY with rootlets and occasional sub-rounded cobbles. Gravel is sub-rounded, fine to coarse. Sand is fine to coarse.			
						(0.40)				
					14.51	1.90	Firm brownish grey slightly sandy slightly gravelly CLAY with occasional sub-rounded cobbles and boulders. Gravel is sub-rounded, fine to coarse. Sand is fine to coarse.			
2.00-2.45 2.00	SPT(C) N=9 B			2,3/2,2,3,2						
						(1.10)			▼1	
				Water strike(1) at 2.90m, rose to 2.70m in 20 mins.					▽1	
3.00	B				13.41	3.00	Stiff brownish grey slightly sandy slightly gravelly CLAY with occasional sub-rounded cobbles and boulders. Gravel is sub-rounded, fine to coarse. Sand is fine to coarse.			
3.00-3.45	SPT(C) N=17			2,3/9,3,2,3						
						(1.70)				
4.00-4.45	SPT(C) N=32			3,4/6,10,8,8						
					11.71	4.70				
4.70	B					(0.30)	Brownish grey slightly sandy clayey GRAVEL. Gravel is sub-rounded, fine to coarse. Sand is fine to coarse. (Driller notes pockets of Clay)			
5.00-5.45	SPT(C) N=21			17,6/4,5,5,7	11.41	5.00				
							Stiff brownish grey slightly gravelly sandy CLAY. Gravel is sub-rounded, fine to coarse. Sand is fine to coarse.			
5.50	B					(1.10)				
					10.31	6.10				
6.10	B					(0.30)	Firm greyish brown slightly sandy slightly gravelly CLAY. Gravel is sub-angular to sub-rounded, fine to medium. Sand is fine to coarse.			
6.40	B				10.01	6.40				
6.50-6.80	SPT(C) 50/150			14,7/5,5,40		(0.40)	Firm to stiff brown slightly sandy gravelly CLAY with occasional sub-angular to sub-rounded cobbles. Gravel is sub-angular to sub-rounded, fine to coarse. Sand is fine to coarse.			
					9.61	6.80				
							Refusal at 6.80m			

Remarks
Borehole backfilled on completion.
Refusal at 6.80m BGL due to obstruction, possible rock or boulder.
Slotted pipe with pea gravel surround from 6.8m BGL to 1.0m BGL, plain pipe with bentonite seal from 1.0m BGL to ground level, finished with an upright cover.
Chiselling from 5.00m to 5.00m for 0.25 hours.

Scale (approx)	Logged By
1:50	JS

Figure No. 9225-11-19.BH03

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Site Hackettstown, Skerries			**Borehole Number** BH04
Machine : Dando 2000 & Beretta T44 **Method :** Cable Percussion and Rotary Follow On	**Casing Diameter** 200mm cased to 3.20m 96mm cased to 12.70m	**Ground Level (mOD)** 19.92	**Client** DBFL	**Job Number** 9225-11-19
	Location (dGPS) 724984.4 E 759214.9 N	**Dates** 21/02/2020-25/03/2020	**Project Contractor** Ground Investigations Ireland	**Sheet** 1/2

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					19.77	(0.15) 0.15	Brown slightly sandy slightly gravelly TOPSOIL. Gravel is sub-rounded, fine to coarse. Sand is fine to coarse.		
1.00 1.00-1.45	B SPT(C) N=6			1,1/1,1,2,2		(1.55)	Soft reddish brown sandy gravelly silty CLAY with occasional sub-rounded cobbles. Gravel is sub-rounded, fine to coarse. Sand is fine to coarse.		
1.80 2.00-2.45	B SPT(C) N=30			4,4/6,7,8,9	18.22 17.92	1.70 (0.30) 2.00	Loose brown clayey sandy sub rounded fine to coarse GRAVEL with occasional sub-rounded cobbles and boulders. Sand is fine to coarse.		
2.50	B					(1.20)	Medium dense grey slightly clayey sandy sub-rounded, fine to coarse GRAVEL with occasional sub-rounded cobbles. Sand is fine to coarse.		
3.00-3.20	SPT(C) 50/50			10,22/50					
	TCR / **SCR** / **RQD** / **FI**								
3.20	80				16.72	3.20	Stiff brown slightly sandy gravelly CLAY with occasional subrounded cobbles. Gravel is subangular to subrounded		
3.70-4.15				5,5/5,5,7,8 SPT(C) N=25	16.37	(0.35) 3.55			
3.70	50					(1.35)	Recovery consists of medium dense grey subangular to subrounded fine to coarse GRAVEL with occasional subrounded cobbles Driller notes clay and cobbles.		
5.20-5.65				6,7/6,6,7,9 SPT(C) N=28	15.02	4.90	Stiff greyish brown slightly sandy slightly gravelly CLAY. Gravel is angular to subrounded fine to coarse		
5.20	70					(1.80)			
6.70-7.15				8,9/9,10,12,12 SPT(C) N=43	13.22	6.70	Very stiff greyish brown slightly sandy slightly gravelly CLAY. Gravel is angular to subrounded fine to coarse		
6.70	77				12.62	(0.60) 7.30	Very stiff brown slightly sandy gravelly CLAY with occasional subangular to subrounded cobbles. Gravel is subangular to subrounded fine to coarse		
8.20-8.35				12,13/50 SPT(C) 25*/140 50/10					
8.20	48					(3.40)			
9.70									

Remarks
Borehole backfilled on completion.
Refusal at 3.20m BGL due to obstruction, possible boulder.
Rotary Core follow on from 3.20m BGL
Chiselling from 3.20m to 3.20m for 0.6 hours.

Scale (approx)	Logged By
1:50	JS & PC

Figure No. 9225-11-19.BH04

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Site Hackettstown, Skerries			**Borehole Number** BH04
Machine : Dando 2000 & Beretta T44 **Flush :** Water **Core Dia :** 63.5 mm **Method :** Cable Percussion and Rotary Follow On	**Casing Diameter** 200mm cased to 3.20m 96mm cased to 12.70m	**Ground Level (mOD)** 19.92	**Client** DBFL	**Job Number** 9225-11-19
	Location (dGPS) 724984.4 E 759214.9 N	**Dates** 21/02/2020-25/03/2020	**Project Contractor** Ground Investigations Ireland	**Sheet** 2/2

Depth (m)	TCR	SCR	RQD	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
	83									
10.70				NI		9.22	10.70 (0.60)	Medium strong orange pinkish white medium grained LIMESTONE with occasional calcite veining and frequent vugs. Distinctly weathered 10.70-11.30m - Mostly Non Intact		
11.20 11.30	100	71	65	5		8.62	11.30 (1.40)	Strong orange pinkish white medium grained LIMESTONE with occasional calcite veining and frequent vugs. Partially to distinctly weathered 11.30-12.70m - F1: Closely to medium spaced, 0° to 10°, stepped rough		
12.70						7.22	12.70	Complete at 12.70m		

Remarks

Scale (approx)	Logged By
1:50	JS & PC

Figure No. 9225-11-19.BH04

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Site Hackettstown, Skerries			**Borehole Number** BH05
Machine : Dando 2000 **Method :** Cable Percussion	**Casing Diameter** 200mm cased to 2.60m	**Ground Level (mOD)** 20.94	**Client** DBFL	**Job Number** 9225-11-19
	Location (dGPS) 725019.1 E 759188.7 N	**Dates** 27/02/2020	**Project Contractor** Ground Investigations Ireland	**Sheet** 1/1

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					20.74	(0.20) 0.20	Brown slightly sandy slightly gravelly TOPSOIL. Gravel is sub-rounded, fine to coarse. Sand is fine to coarse.		
1.00-1.45 1.00	SPT(C) N=6 B			1,0/1,0,2,3		(1.80)	Soft brown slightly sandy gravelly CLAY. Gravel is sub-rounded, fine to coarse. Sand is fine to coarse (Possible Made Ground).		
2.00-2.38 2.00	SPT(C) 50/230 B			6,11/13,20,17	18.94	2.00			▼1
				Water strike(1) at 2.40m, rose to 2.00m in 20 mins.		(0.60)	Stiff brown slightly gravelly sandy CLAY with occasional sub-rounded cobbles. Gravel is sub-rounded, fine to coarse. Sand is fine to coarse.		▽1
2.60-2.62	SPT(C) 25*/20 50/0			25/50	18.34	2.60	Refusal at 2.60m		

Remarks
Borehole backfilled on completion.
Refusal at 2.60m BGL due to obstruction.
Chiselling from 2.60m to 2.60m for 0.3 hours.

Scale (approx)	Logged By
1:50	JS

Figure No. 9225-11-19.BH05

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Site Hackettstown, Skerries			**Borehole Number** BH05A
Machine : Dando 2000 **Method :** Cable Percussion	**Casing Diameter** 200mm cased to 4.60m	**Ground Level (mOD)** 21.32	**Client** DBFL	**Job Number** 9225-11-19
	Location (dGPS) 725018.9 E 759185.4 N	**Dates** 27/02/2020-28/02/2020	**Project Contractor** Ground Investigations Ireland	**Sheet** 1/1

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
					21.07	(0.25) 0.25	Brown slightly sandy slightly gravelly TOPSOIL. Gravel is sub-angular to sub-rounded, fine to coarse. Sand is fine to coarse.			
1.00-1.45 1.00	SPT(C) N=3 B			0,1/1,0,1,1		(1.55)	Very soft brown sandy gravelly CLAY with some rootlets. Gravel is sub-angular to sub-rounded, fine to coarse. Sand is fine to coarse.			
2.00-2.45 2.00	SPT(C) N=39 B			4,6/8,9,10,12	19.52	1.80	Stiff greyish brown sandy gravelly CLAY with occasional sub-rounded cobbles and boulders. Gravel is sub-rounded, fine to coarse. Sand is fine to coarse.			
				Water strike(1) at 2.80m, rose to 2.70m in 20 mins.		(1.20)			▼1	
3.00-3.32 3.10	SPT(C) 50/170 B			6,10/14,20,16	18.32	3.00	Medium dense to dense brown clayey gravelly fine to coarse SAND. Gravel is sub-angular to sub-rounded, fine to coarse.			
						(1.00)				
4.00-4.35 4.00 4.30	SPT(C) 50/200 B B			7,7/7,11,32	17.32	4.00 (0.30)	Medium dense to dense brown silty sandy sub-angular to sub-rounded, fine to coarse GRAVEL. Sand is fine to coarse.			
					17.02	4.30 (0.30)				
4.60-4.60	SPT(C) 25*/0 50/0			25/50	16.72	4.60	Stiff brownish grey slightly sandy slightly gravelly sily CLAY. Gravel is sub-angular to sub-rounded, fine to coarse. Sand is fine to coarse.			
							Refusal at 4.60m			

Remarks
Borehole backfilled on completion.
Refusal at 4.60m BGL due to obstruction. Possible boulder or rock.
Slotted pipe with pea gravel surround from 4.6m BGL to 1.0m BGL, plain pipe with bentonite seal from 1.0m BGL to ground level, finished with an upright cover.
Chiselling from 4.60m to 4.60m for 0.5 hours.

Scale (approx)	Logged By
1:50	JS

Figure No. 9225-11-19.BH05A

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Site Hackettstown, Skerries			**Borehole Number** BH06
Machine : Dando 2000 **Method :** Cable Percussion	**Casing Diameter** 200mm cased to 4.00m	**Ground Level (mOD)** 20.92	**Client** DBFL	**Job Number** 9225-11-19
	Location (dGPS) 725062.5 E 759157 N	**Dates** 20/02/2020-21/02/2020	**Project Contractor** Ground Investigations Ireland	**Sheet** 1/1

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					20.62	(0.30) 0.30	Brown slightly sandy slightly gravelly TOPSOIL. Gravel is sub-rounded, fine to coarse. Sand is fine to coarse.		
1.00-1.45 1.00	SPT(C) N=6 B			0,1/1,2,1,2		(1.80)	Soft brown slightly sandy slightly gravelly CLAY with rootlets. Gravel is sub-rounded, fine to coarse. Sand is fine to coarse (Possible Made Ground).		
2.00-2.45 2.20	SPT(C) N=27 B			2,3/5,6,8,8 Water strike(1) at 2.30m, rose to 2.20m in 20 mins.	18.82	2.10 (0.90)	Stiff brown slightly sandy slightly gravelly CLAY with occasional sub-rounded boulders. Gravel is sub-rounded, fine to coarse. Sand is fine to coarse.		▼1 ▽1
3.00-3.25 3.10	SPT(C) 50/100 B			10,13/25,25	17.92	3.00 (1.00)	Medium dense to dense brown clayey sandy GRAVEL with occasional sub-rounded cobbles. Gravel is sub-rounded, fine to coarse. Sand is fine to coarse.		▼2 ▽2
4.00-4.00	SPT(C) 25*/0 50/0			Water strike(2) at 4.00m, rose to 3.85m in 20 mins. 25/50	16.92	4.00	Refusal at 4.00m		

Remarks
Borehole backfilled on completion.
Refusal at 4.00m BGL due to obstruction, possible boulder or rock.
Chiselling from 3.70m to 3.70m for 0.3 hours. Chiselling from 4.00m to 4.00m for 0.5 hours.

Scale (approx)	Logged By
1:50	JS

Figure No. 9225-11-19.BH06

Ground Investigations Ireland Ltd
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Site Hackettstown, Skerries			**Borehole Number** BH07
Machine : Dando 2000 **Method :** Cable Percussion	**Casing Diameter** 200mm cased to 7.10m	**Ground Level (mOD)** 19.02	**Client** DBFL	**Job Number** 9225-11-19
	Location (dGPS) 724929.7 E 759222.4 N	**Dates** 24/02/2020-25/02/2020	**Project Contractor** Ground Investigations Ireland	**Sheet** 1/1

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
						(0.50)	Brown slightly sandy slightly gravelly TOPSOIL. Gravel is sub-rounded, fine to coarse. Sand is fine to coarse.			
					18.52	0.50	Soft brown slightly sandy slightly gravelly CLAY with rootlets. Gravel is sub-angular to sub-rounded, fine to coarse. Sand is fine to coarse (Possible Made Ground).			
1.00-1.45 1.00	SPT(C) N=8 B			1,2/2,1,2,3		(1.10)				
					17.42	1.60	Soft brown sandy gravelly CLAY. Gravel is sub-rounded, fine to coarse. Sand is fine to coarse.		▼1	
2.00-2.45 2.00	SPT(C) N=6 B			2,2/2,1,1,2 Water strike(1) at 2.10m, rose to 1.85m in 20 mins.		(1.40)			▽1	
3.00-3.45 3.00	SPT(C) N=11 B			1,2/2,2,3,4	16.02	3.00	Firm brown slightly sandy slightly gravelly silty CLAY. Gravel is sub-rounded, fine to medium. Sand is fine to coarse.			
						(0.40)				
3.50	B				15.62	3.40	Firm to stiff reddish brown slightly sandy slightly gravelly silty CLAY. Gravel is sub-rounded, fine to coarse. Sand is fine to coarse.			
						(0.50)				
4.00-4.45 4.20	SPT(C) N=34 B			9,7/5,9,10,10	15.12	3.90	Medium dense brown slightly clayey slightly sandy sub-angular to sub-rounded, fine to coarse GRAVEL with occasional sub-angular to sub-rounded cobbles. Sand is fine to coarse. (Driller notes occassional pockets of Clay)			
						(1.90)				
5.00-5.45 5.20	SPT(C) N=30 B			5,5/6,7,9,8						
					13.22	5.80	Stiff reddish brown slightly sandy slightly gravelly CLAY. Gravel is sub-rounded, fine to medium. Sand is fine to coarse.			
6.20	B									
6.50-6.95	SPT(C) N=29			6,5/6,6,8,9		(1.30)				
7.10-7.10	SPT(C) 25*/0 50/0			25/50	11.92	7.10	Refusal at 7.10m			

Remarks
Borehole backfilled on completion.
Refusal at 7.10m BGL due to obstruction, possible boulder or rock.
Slotted pipe with pea gravel surround from 7.0m BGL to 1.0m BGL, plain pipe with bentonite seal from 1.0m BGL to ground level, finished with an upright cover.
Chiselling from 7.10m to 7.10m for 0.6 hours.

Scale (approx)	Logged By
1:50	JS

Figure No. 9225-11-19.BH07

Ground Investigations Ireland Ltd
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Site Hackettstown, Skerries			**Borehole Number** RC08
Machine : Beretta T44 **Flush :** Water **Core Dia :** 63.5 mm **Method :** Rotary Cored	**Casing Diameter** 96mm cased to 12.70m	**Ground Level (mOD)** 19.02	**Client** DBFL	**Job Number** 9225-11-19
	Location (dGPS) 725054.4 E 759189.6 N	**Dates** 26/03/2020	**Project Contractor** Ground Investigations Ireland	**Sheet** 1/2

Depth (m)	TCR	SCR	RQD	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
						18.82	(0.20) 0.20	TOPSOIL		
	93	-					(0.80)	Soft to Firm brown slightly sandy slightly gravelly CLAY. Gravel is subangular to subrounded fine to coarse		
1.00 1.00-1.45	60	-			2,2/3,3,4,3 SPT(C) N=13	18.02	1.00 (1.20)	Firm to stiff brown slightly sandy slightly gravelly CLAY. Gravel is subangular to subrounded fine to coarse		
2.20 2.20-2.65	59	-			2,3/3,4,4,5 SPT(C) N=16	16.82	2.20 (0.90)	Stiff brown slightly sandy slightly gravelly CLAY. Gravel is subangular to subrounded fine to coarse		
						15.92	3.10 (0.60)	Stiff light brown slightly sandy gravelly CLAY with occasional subangular cobbles. Gravel is subangular to subrounded fine to coarse		
3.70 3.70-4.15	47	-			4,7/7,8,7,9 SPT(C) N=31	15.32	3.70	Very stiff grey slightly sandy gravelly CLAY with occasional subangular cobbles. Gravel is subangular to subrounded fine to coarse		
5.20 5.20-5.65	23	-			9,10/9,11,11,12 SPT(C) N=43		(3.30)			
6.70 6.70-7.15	65	-			10,9/10,11,11,10 SPT(C) N=42	12.02	7.00	Very stiff brown slightly sandy gravelly CLAY with occasional subangular cobbles and boulders of Limestone. Gravel is angular to subrounded fine to coarse		
8.20 8.20-8.36	75	-			11,14/50 SPT(C) 50/10		(4.10)			
9.70 9.70-10.08					12,12/14,15,21 SPT(C) 50/225					

Remarks
Borehole backfilled on completion.

Scale (approx)	Logged By
1:50	PC & CB

Figure No. 9225-11-19.RC08

Ground Investigations Ireland Ltd
www.gii.ie

Site Hackettstown, Skerries			**Borehole Number** RC08
Machine : Beretta T44 **Flush :** Water **Core Dia:** 63.5 mm **Method :** Rotary Cored	**Casing Diameter** 96mm cased to 12.70m	**Ground Level (mOD)** 19.02	**Client** DBFL	**Job Number** 9225-11-19
	Location (dGPS) 725054.4 E 759189.6 N	**Dates** 26/03/2020	**Project Contractor** Ground Investigations Ireland	**Sheet** 2/2

Depth (m)	TCR	SCR	RQD	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
	80	80	0							
11.10						7.92	11.10			
11.20	93	75	68	5			(1.60)	Strong grey fine grained LIMESTONE with some calcite veining. Partially weathered. One set of fractures. F1 5-15 degrees. Closely spaced undulating smooth closed.		
12.70						6.32	12.70	Complete at 12.70m		

Remarks

Scale (approx)	Logged By
1:50	PC & CB

Figure No. 9225-11-19.RC08

Ground Investigations Ireland Ltd
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Site Hackettstown, Skerries				**Borehole Number** RC09
Machine : Beretta T44 **Flush :** Water **Core Dia:** 63.5 mm **Method :** Rotary Cored	**Casing Diameter** 96mm cased to 15.50m	**Ground Level (mOD)** 25.01	**Client** DBFL	**Job Number** 9225-11-19
	Location (dGPS) 724967.4 E 759062.1 N	**Dates** 26/03/2020-27/03/2020	**Project Contractor** Ground Investigations Ireland	**Sheet** 1/2

Depth (m)	TCR	SCR	RQD	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
0.00	-	-				24.81	(0.20) 0.20	TOPSOIL			
	86	-					(2.00)	Soft to firm brown slightly sandy gravelly CLAY with occasional cobbles of limestone. Gravel is subangular-subrounded fine-coarse.			
2.20 2.20-2.65	90	-			2,2/3,3,4,6 SPT(C) N=16	22.81	2.20	Stiff brown slightly sandy gravelly CLAY with occasional cobbles of limestone. Gravel is subangular-subrounded fine-coarse.			
							(1.50)				
3.70 3.70-4.15	83	-			8,10/12,11,12,14 SPT(C) N=49	21.31	3.70	Very stiff brown slightly sandy gravelly CLAY with occasional cobbles of limestone. Gravel is subangular-subrounded fine-coarse.			
							(2.70)				
5.20 5.20-5.65	67	-			10,11/10,12,14,14 SPT(C) N=50	18.61	6.40	Poor Recovery. Recovery consists of slightly sandy clayey GRAVEL. Gravel is subangular-subrounded fine-coarse. Driller notes: gravelly Clay.			
6.70 6.70-7.15	20	-			8,8/9,10,12,16 SPT(C) N=47						
8.20 8.20-8.65	27	-			7,11/12,10,10,12 SPT(C) N=44		(5.10)				
9.70 9.70-10.15					11,13/12,12,14,16 SPT(C) N=54						

Remarks
Borehole completed at 15.50m BGL.
Borehole backfilled upon completition.
Slotted pipe with pea gravel surround from 15.50m BGL to 1.0m BGL, plain pipe with bentonite seal from 1.0m BGL to ground level, finished with an upright cover.

Scale (approx)	Logged By
1:50	CB

Figure No. 9225-11-19.RC09

Ground Investigations Ireland Ltd
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Site Hackettstown, Skerries			**Borehole Number** RC09
Machine : Beretta T44 **Flush :** Water **Core Dia :** 63.5 mm **Method :** Rotary Cored	**Casing Diameter** 96mm cased to 15.50m	**Ground Level (mOD)** 25.01	**Client** DBFL	**Job Number** 9225-11-19
	Location (dGPS) 724967.4 E 759062.1 N	**Dates** 26/03/2020-27/03/2020	**Project Contractor** Ground Investigations Ireland	**Sheet** 2/2

Depth (m)	TCR	SCR	RQD	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
	47	-									
11.20 11.20-11.21	47	-			25/50 SPT(C) 25*/10 50/0	13.51	11.50	Very stiff pinkish brown sandy gravelly CLAY. Gravel is subangular-subrounded fine-coarse.			
							(1.60)				
12.70 12.70-12.71					22,3/50 SPT(C) 25*/10 50/0	11.91	13.10				
13.10	100	64	49					Medium strong light grey fine grained LIMESTONE partially-distinctly weathered with occasional calcite veining. One set of fractures. F1 20-30 degrees. Closely spaced undulating closed smooth.			
14.20	100	83	83	8			(2.40)				
15.50						9.51	15.50	Complete at 15.50m			

Remarks

Scale (approx)	Logged By
1:50	CB

Figure No. 9225-11-19.RC09

Ground Investigations Ireland Ltd
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Site Hackettstown, Skerries			**Borehole Number** RC10
Machine : Beretta t44 **Flush :** Water **Core Dia :** 63.5 mm **Method :** Rotary Cored	**Casing Diameter** 96mm cased to 18.20m	**Ground Level (mOD)** 24.03	**Client** DBFL	**Job Number** 9225-11-19
	Location (dGPS) 724951 E 759129.3 N	**Dates** 27/03/2020	**Project Contractor** Ground Investigations Ireland	**Sheet** 1/2

Depth (m)	TCR	SCR	RQD	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.00	-	-				23.83	(0.20) 0.20	TOPSOIL		
	57	-					(2.10)	Soft light brown slightly sandy gravelly CLAY. Gravel is fine to coarse subangular to subrounded.		
2.20 2.20-2.65	87	-			1,2/4,4,5,4 SPT(C) N=17	21.73	2.30	Stiff light brown slightly sandy gravelly CLAY. Gravel is fine to coarse subangular to subrounded.		
3.70 3.70-4.15	20	-			6,6/7,8,6,5 SPT(C) N=26	20.33	3.70	Poor recovery. Recovery consists of slightly sandy clayey GRAVEL with occasional cobbles of varying lithologies. Gravel is fine to coarse subangular to subrounded. Driller notes: fine Sand and gravelly Clay.		
5.20 5.20-5.65	20	-			7,6/6,7,8,7 SPT(C) N=28					
6.70 6.70-7.15	17	-			6,7/8,8,9,9 SPT(C) N=34					
8.20 8.20-8.65	20	-			7,7/9,8,8,9 SPT(C) N=34		(10.50)			
9.70 9.70-10.15					6,6/5,4,6,5 SPT(C) N=20					

Remarks
Borehole completed at 18.20m BGL.
Borehole backfilled upon completion.

Scale (approx)	Logged By
1:50	CB

Figure No. 9225-11-19.RC10

Ground Investigations Ireland Ltd
www.gii.ie

Site Hackettstown, Skerries			**Borehole Number** RC10
Machine : Beretta t44 **Flush :** Water **Core Dia :** 63.5 mm **Method :** Rotary Cored	**Casing Diameter** 96mm cased to 18.20m	**Ground Level (mOD)** 24.03	**Client** DBFL	**Job Number** 9225-11-19
	Location (dGPS) 724951 E 759129.3 N	**Dates** 27/03/2020	**Project Contractor** Ground Investigations Ireland	**Sheet** 2/2

Depth (m)	TCR	SCR	RQD	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
	23	-								
11.20 11.20-11.65	23	-			9,10/10,9,8,10 SPT(C) N=37					
12.70 12.70-13.15	10	-			11,12/11,10,12,10 SPT(C) N=43					
						9.83	14.20	Very stiff dark brown slightly sandy slightly gravelly CLAY. Gravel is fine to coarse subangular to subrounded.		
14.20 14.20-14.20	80	-			25/50 SPT(C) 25*/0 50/0		(0.40)			
						9.43	14.60	Possible weathered rock. Hard pinkish grey gravelly CLAY. Gravel is fine to coarse subangular to subrounded.		
15.70 15.70-15.70	33	-			25/50 SPT(C) 25*/0 50/0		(2.60)			
						6.83	17.20	Complete at 17.20m		
17.20										

Remarks

Scale (approx)	Logged By
1:50	CB

Figure No. 9225-11-19.RC10

Hackettstown - Rotary Core Photographs

BH02

Hackettstown - Rotary Core Photographs

BH04

Hackettstown - Rotary Core Photographs

BH04

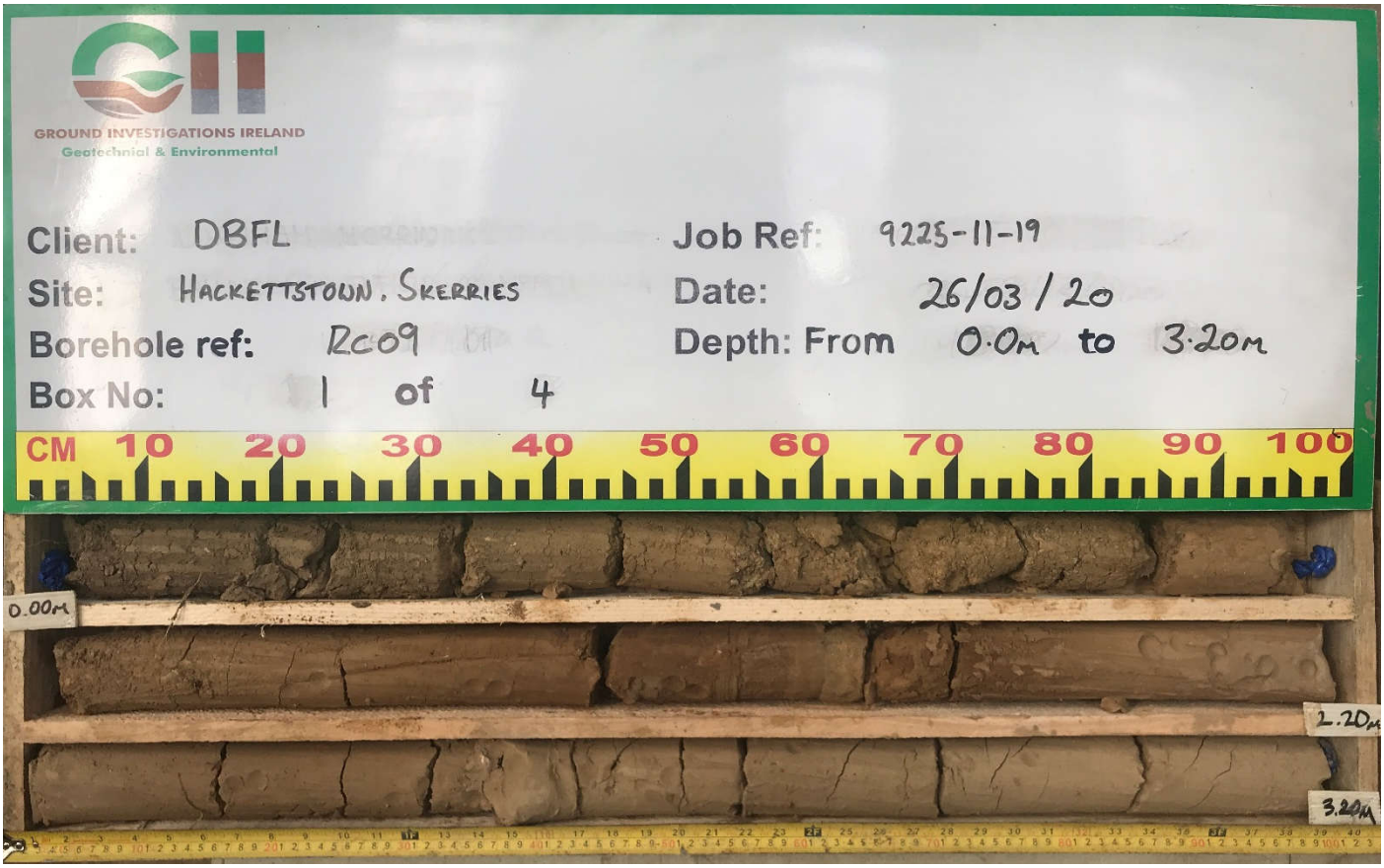
Hackettstown - Rotary Core Photographs

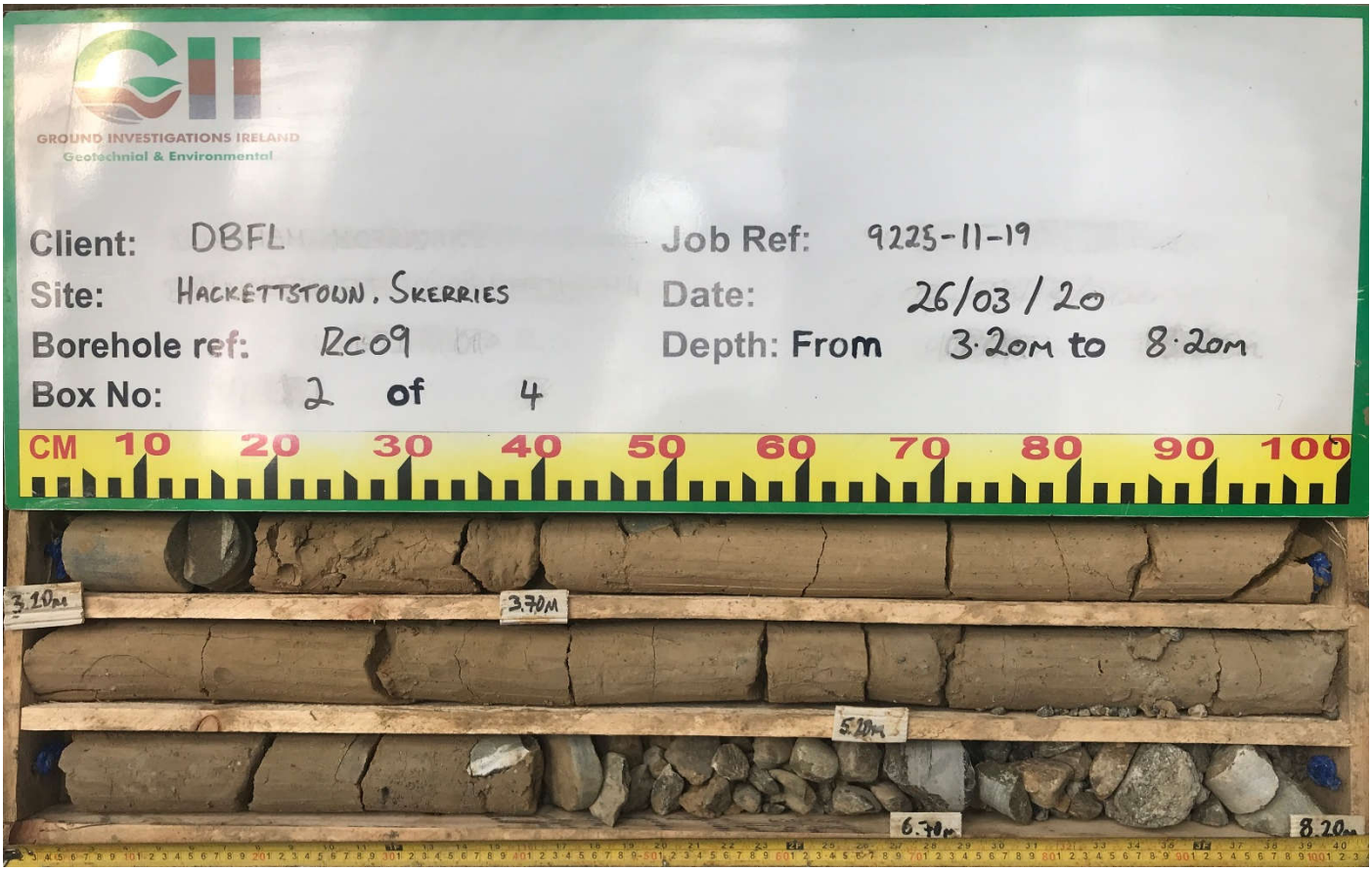
RC08

Hackettstown - Rotary Core Photographs

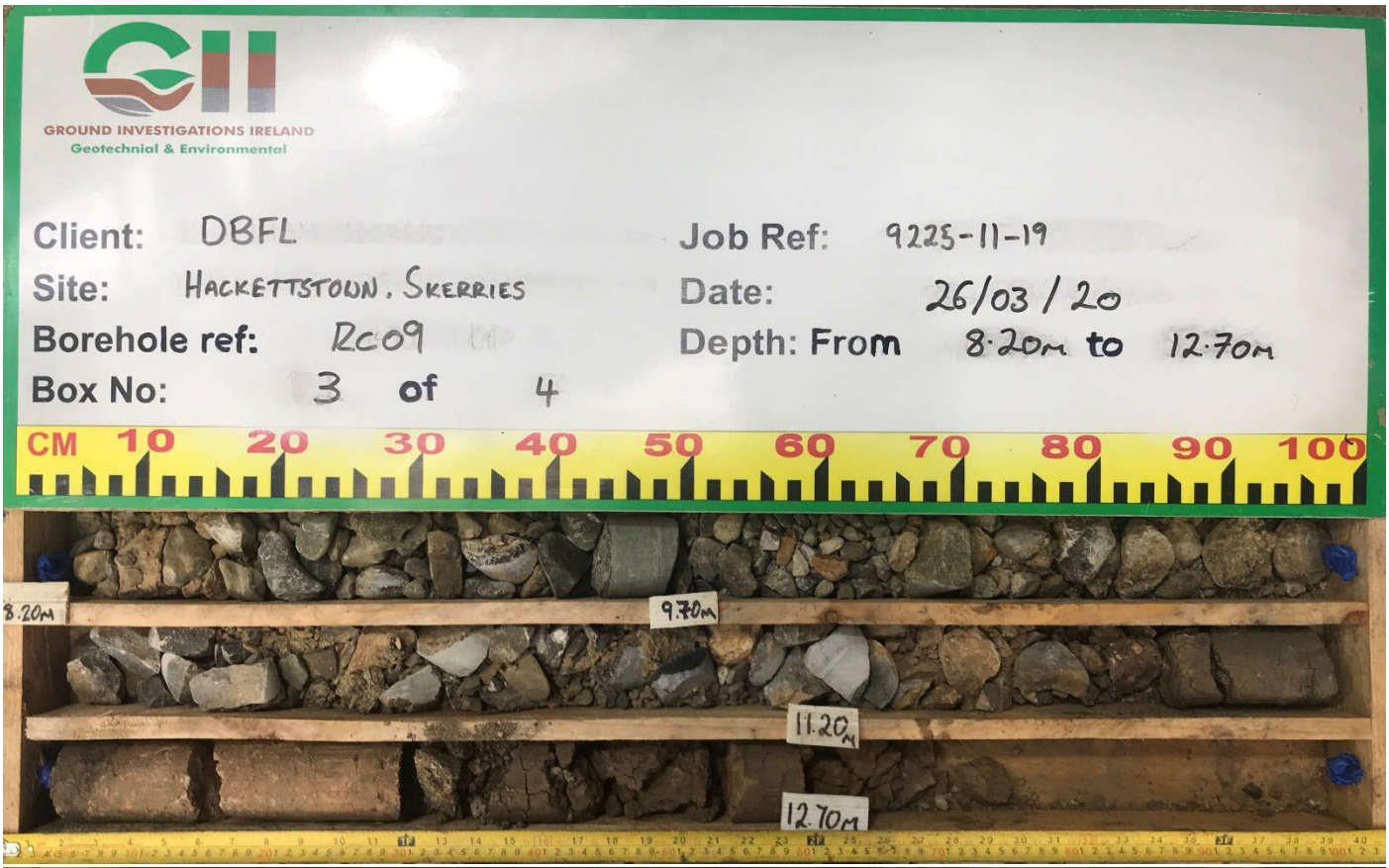
Hackettstown - Rotary Core Photographs

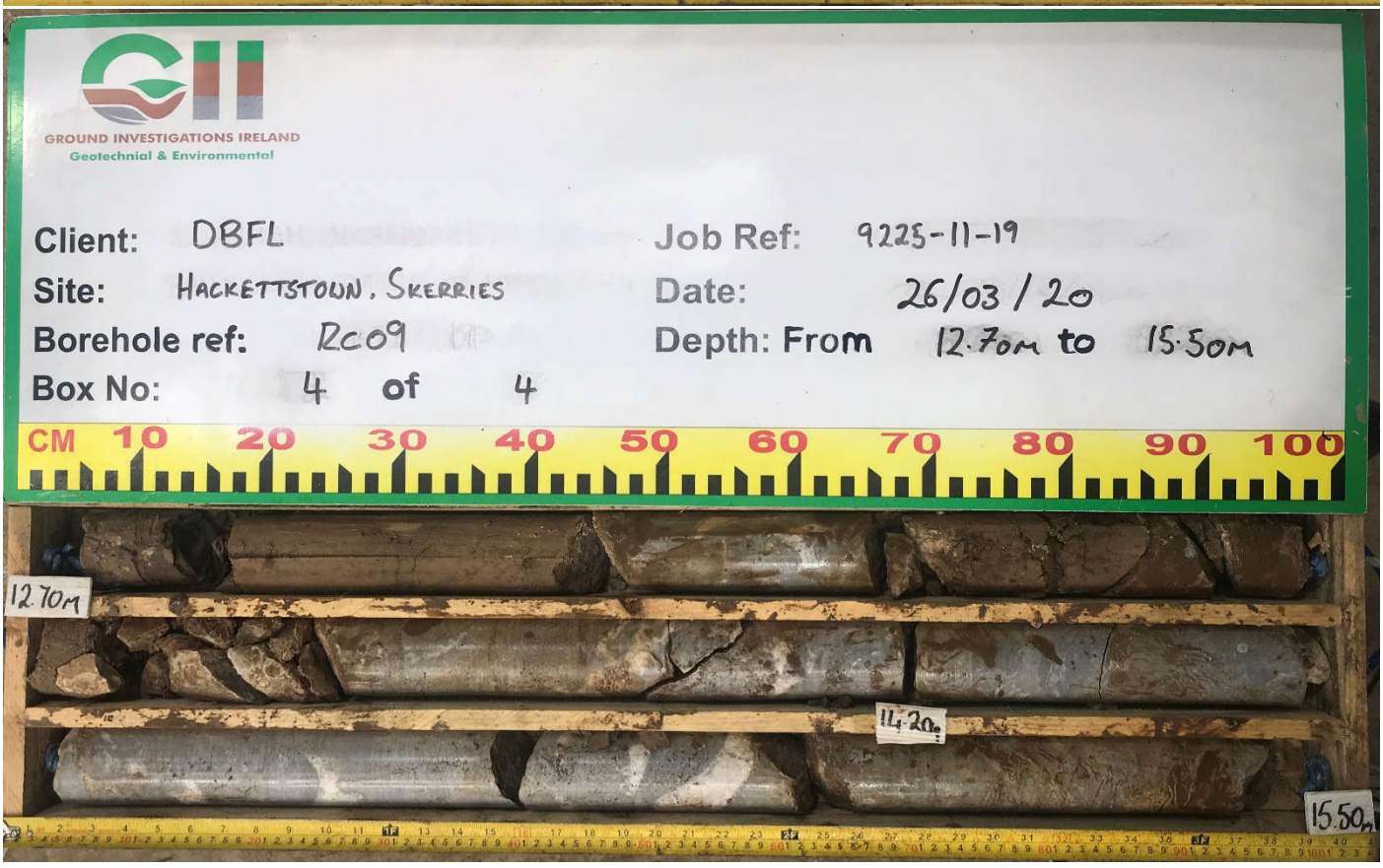
RC09





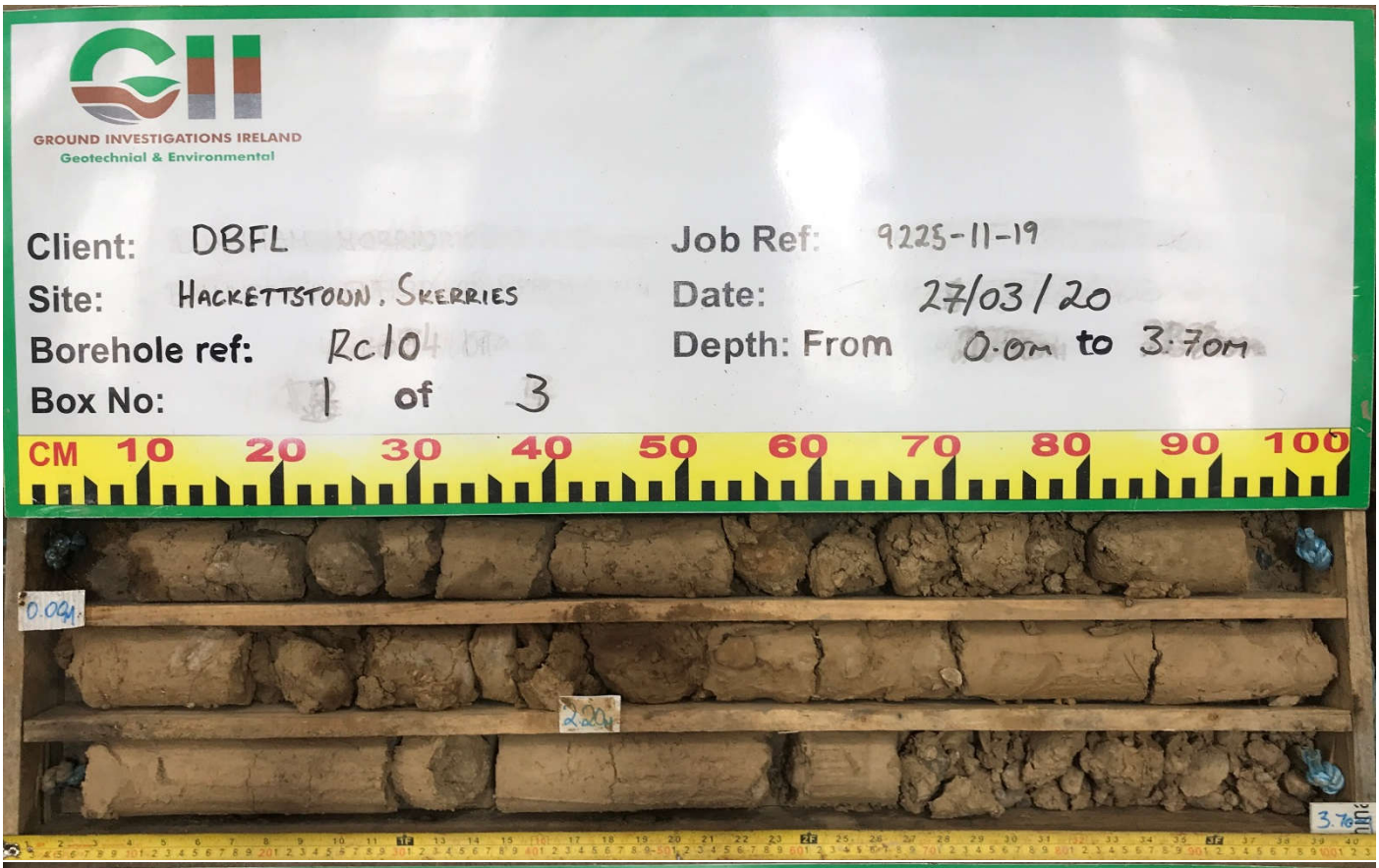
Hackettstown - Rotary Core Photographs

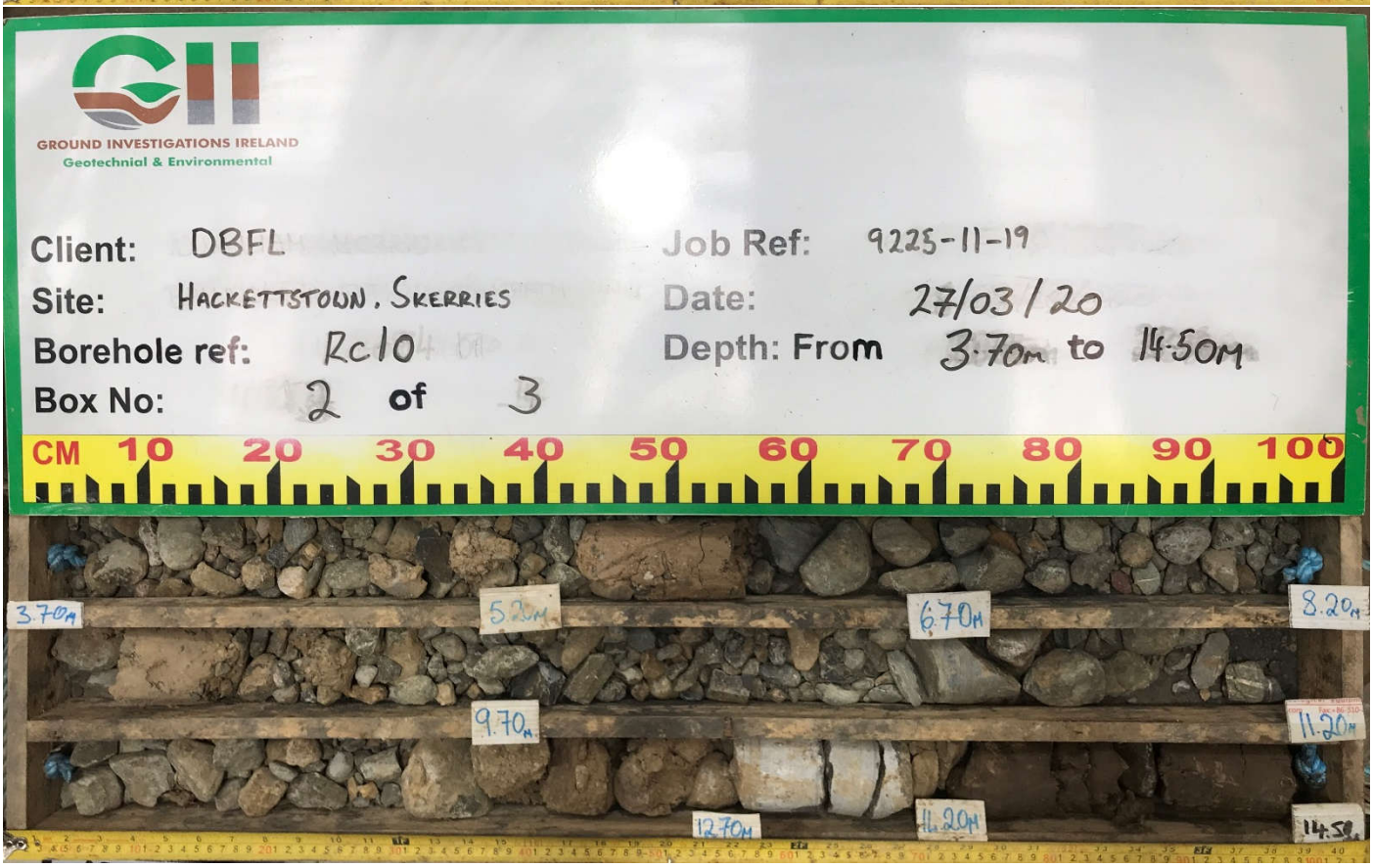




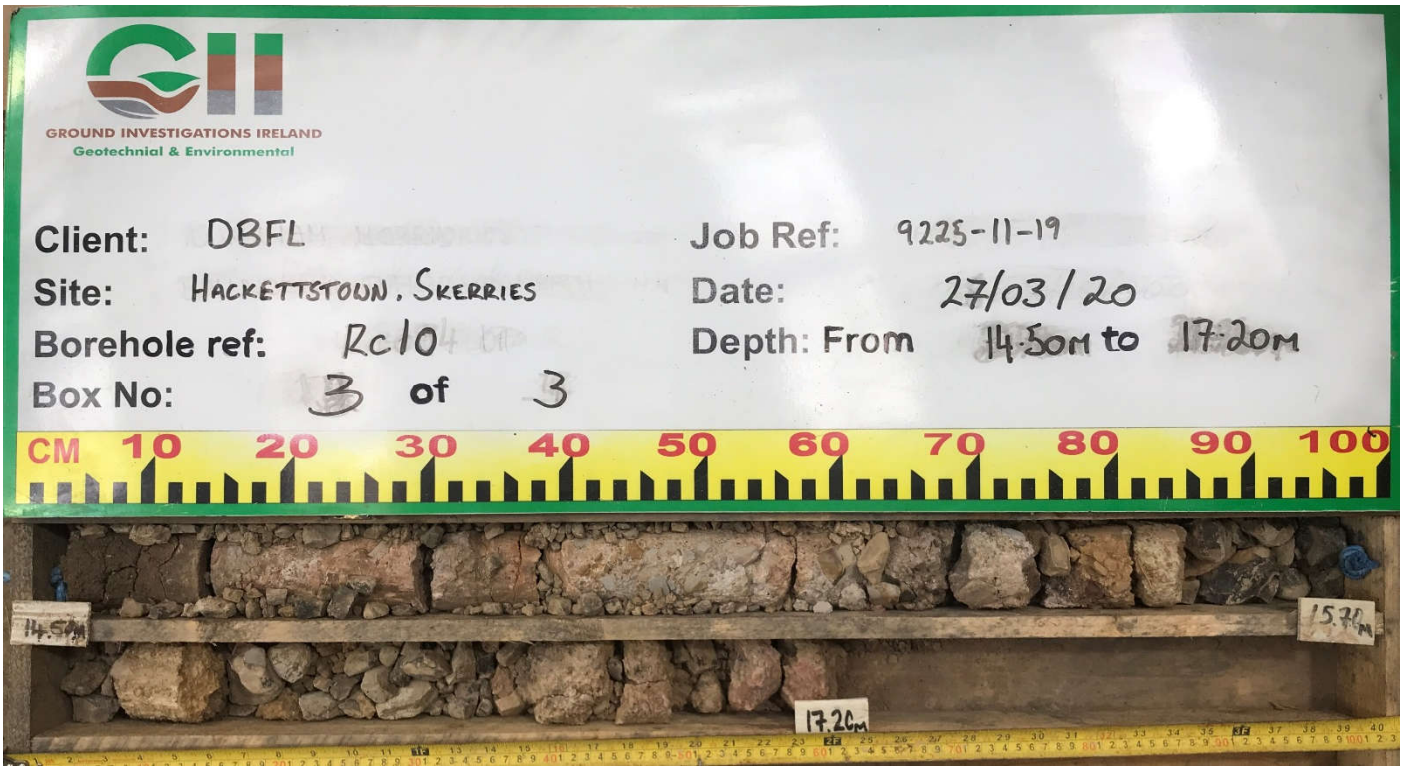
Hackettstown - Rotary Core Photographs

RC10





Hackettstown - Rotary Core Photographs



APPENDIX 6 – Laboratory Testing

National Materials Testing Laboratory Ltd.

SUMMARY OF TEST RESULTS

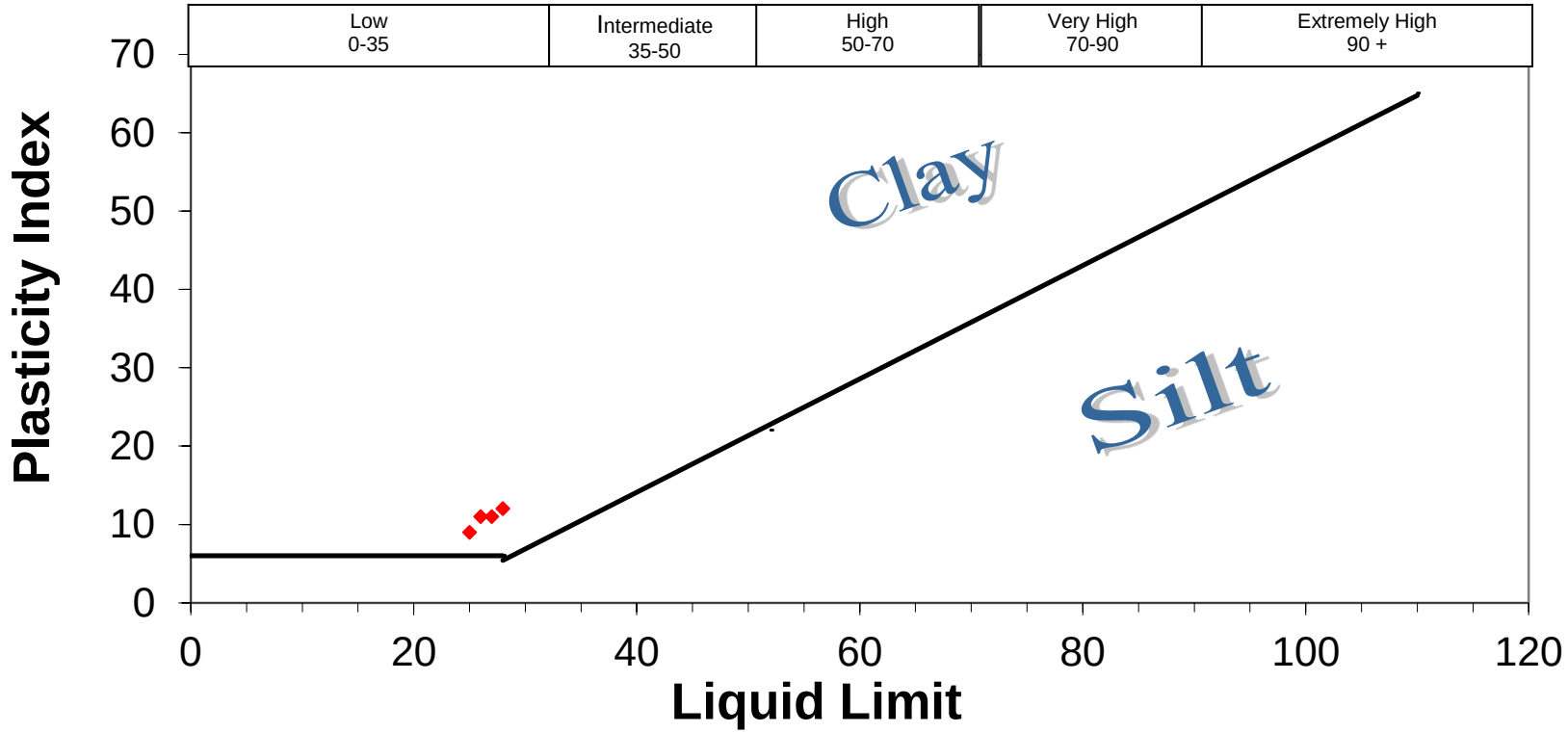
				Particle			Index Properties		Bulk	Cell	Undrained Triaxial Tests		Lab	
BH/TP	Depth	Sample	Moisture	Density	<425um	LL	PL	PI	Density	Presssure	Compressive	Strain at	Vane	Remarks
No	m	No.	%	Mg/m3	%	%	%	%	Mg/m3	kPa	Stress kPa	Failure %	kPa	
TP01	2.70	B	15.5		73.3	28	16	12						
TP09	1.50	B	13.3		52.5	25	16	9						
TP10	1.50	B	19.7		52.5	26	15	11						
TP103	1.50	B	14.1		69.5	27	16	11						

NMTL		Notes :	Job ref No.	NMTL 3139	GII Project ID:	9225-11-19
		1. All BS tests carried out using preferred (definitive) method unless otherwise stated.	Location	Hackettstown		

Revision-02

NMTL LTD
Unit 18c, Tullow Industrial Estate
Tullow
County Carlow
Tel: 00353 59 9180822
Mob: 00353 872575508
billa@nmtl.ie

Contract:	**Hackettstown**
Client:	**Ground Investigations Ireland Ltd**
Engineer:	**Mike Sutton**
GII Project ID	**9225-11-19**
Date:	**11/02/2020**
Tested By:	**Sb/Tch/Ms** **Checked:** **Bc**
Job ref No.	**NMTL 3139**

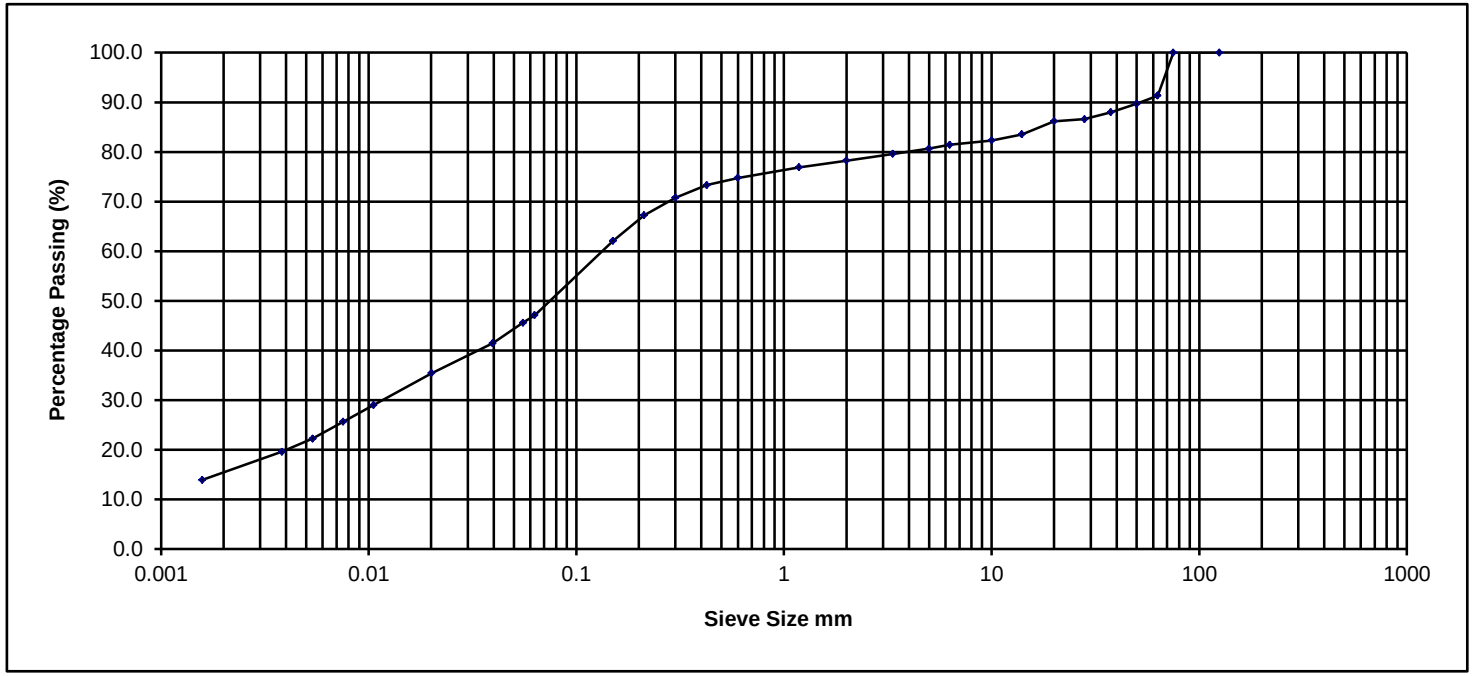


NMTL Ltd

Determination of Particle Size Distribution

BS 1377 : 1990 : Part 2 : Clauses 9.2 & 9.5

Sieve Size mm	% Passing
125.000	100.0
75.000	100.0
63.000	91.3
50.000	89.7
37.500	88.0
28.000	86.6
20.000	86.2
14.000	83.5
10.000	82.3
6.300	81.4
5.000	80.7
3.350	79.6
2.000	78.3
1.180	76.9
0.600	74.8
0.425	73.3
0.300	70.8
0.212	67.2
0.150	62.1
0.063	47.1
0.055	45.6
0.040	41.5
0.020	35.4
0.011	29.0
0.008	25.6
0.005	22.2
0.004	19.6
0.002	13.9



Percentage Particle Size

Clay	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	Cobbles	Boulder
		Silt			Sand			Gravel			
13.9		33.2			31.1			13.1		8.7	0.0

Sample Description	Brown slightly gravelly slightly sandy silty CLAY.					Project No.	NMTL 3139
						BH/TP No.	TP01
Project	Hackettstown			GII PROJECT ID: 9225-11-19		Sample No.	B
Operator	Tch	Checked	Nc	Approved	Bc	Depth	2.70m

Date sample tested 07/02/2020

NM TL Ltd

NMTL Ltd

Determination of Particle Size Distribution

BS 1377 : 1990 : Part 2 : Clauses 9.2 & 9.5

Sieve Size mm	% Passing
125.000	100.0
75.000	100.0
63.000	100.0
50.000	100.0
37.500	100.0
28.000	97.0
20.000	93.6
14.000	90.2
10.000	86.1
6.300	81.9
5.000	79.9
3.350	78.6
2.000	76.2
1.180	73.7
0.600	69.9
0.425	67.1
0.300	63.6
0.212	58.9
0.150	53.0
0.063	31.9

Percentage Particle Size

Clay	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	Cobbles	Boulder
		Silt			Sand			Gravel			
		31.9			44.3			23.8		0.0	0.0

Sample Description Brown slightly gravelly sandy SILT/CLAY

Project 0

GII PROJECT ID: 9225-11-19

Operator	Tch	Checked	Nc	Approved	Bc	Date sample tested	07/02/2020

Project No.	NMTL 3139
BH/TP No.	TP05
Sample No.	B
Depth	2.50m

NM TL Ltd

NMTL Ltd

Determination of Particle Size Distribution

BS 1377 : 1990 : Part 2 : Clauses 9.2 & 9.5

Sieve Size mm	% Passing
125.000	100.0
75.000	100.0
63.000	100.0
50.000	100.0
37.500	96.2
28.000	91.7
20.000	88.3
14.000	83.8
10.000	81.3
6.300	76.8
5.000	73.1
3.350	69.8
2.000	64.3
1.180	60.0
0.600	55.2
0.425	52.5
0.300	48.9
0.212	44.3
0.150	39.2
0.063	28.7

Percentage Particle Size

Clay	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	Cobbles	Boulder
		Silt			Sand			Gravel			
		28.7			35.6			35.7		0.0	0.0

Sample Description Brown gravelly sandy silty CLAY

Project 0

GII PROJECT ID: 9225-11-19

Operator	Tch	Checked	Nc	Approved	Bc	Date sample tested	07/02/2020

Project No.	NMTL 3139
BH/TP No.	TP09
Sample No.	B
Depth	1.5m

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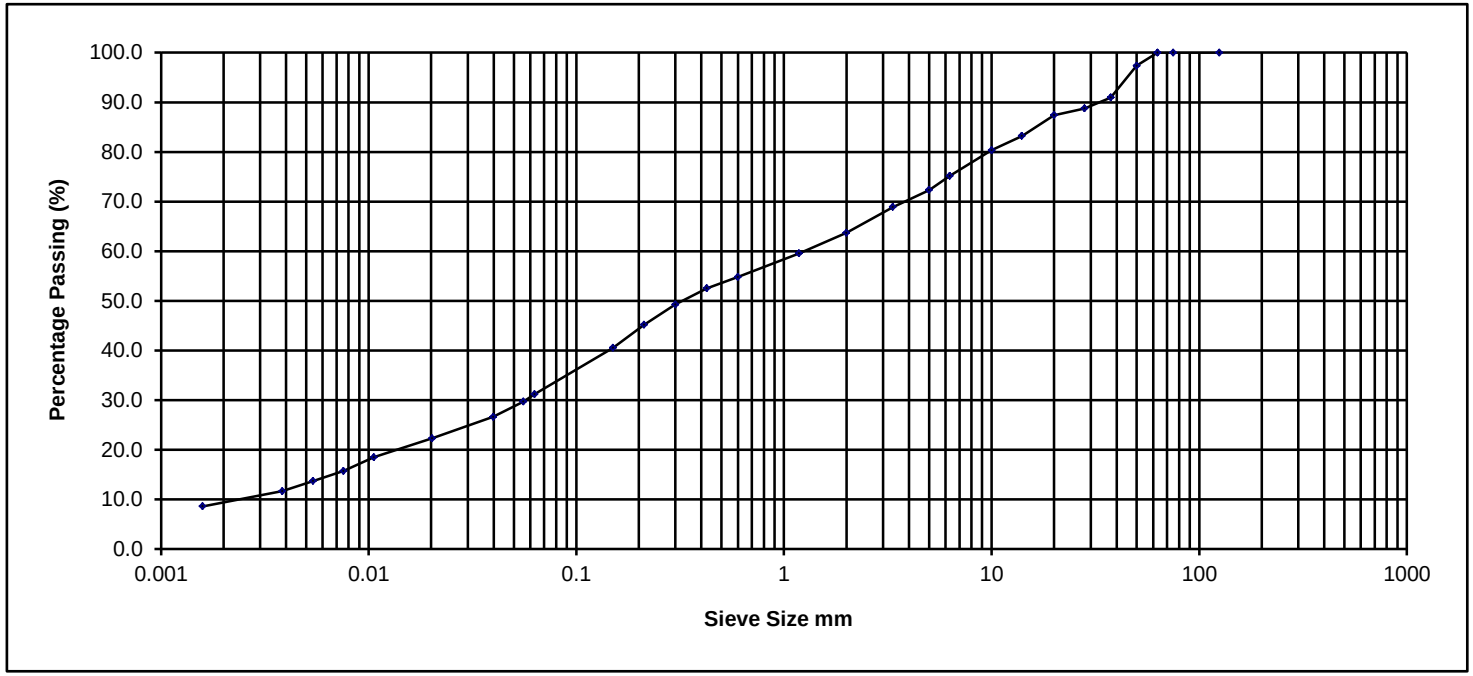
Determination of Particle Size Distribution

BS 1377 : 1990 : Part 2 : Clauses 9.2 & 9.5

Sieve Size mm	% Passing
125.000	100.0
75.000	100.0
63.000	100.0
50.000	97.4
37.500	90.9
28.000	88.8
20.000	87.4
14.000	83.2
10.000	80.3
6.300	75.2
5.000	72.3
3.350	68.9
2.000	63.7
1.180	59.6
0.600	54.8
0.425	52.5
0.300	49.3
0.212	45.2
0.150	40.5
0.063	31.2
0.056	29.7
0.040	26.6
0.020	22.3
0.011	18.5
0.008	15.7
0.005	13.7
0.004	11.7
0.002	8.6



Percentage Particle Size

Clay	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	Cobbles	Boulder
		Silt			Sand			Gravel			
8.6		22.6			32.5			36.3		0.0	0.0

Sample Description	Brown slightly sandy gravelly silty CLAY.					Project No.	NMTL 3139
						BH/TP No.	TP10
Project	Hackettstown			GII PROJECT ID: 9225-11-19		Sample No.	B
Operator	Tch	Checked	Nc	Approved	Bc	Date sample tested	07/02/2020
						Depth	1.50m

NM TL Ltd

NATIONAL MATERIALS TESTING LABORATORY LTD.

DETERMINATION OF THE CALIFORNIA BEARING RATIO TEST
BS 1377 : PART 4 : CLAUSE 7 : 1990

Soil Description: Light brown slightly sandy slightly gravelly SILT/CLAY

Date: 13-Dec-19

Test Method: BS 1377: Part 4 : 1990 :7.4

Force Measuring Device: VJT 08211 — Test 1

Preperatic: Remoulded with 2.5 kg rammer at natural moisture content

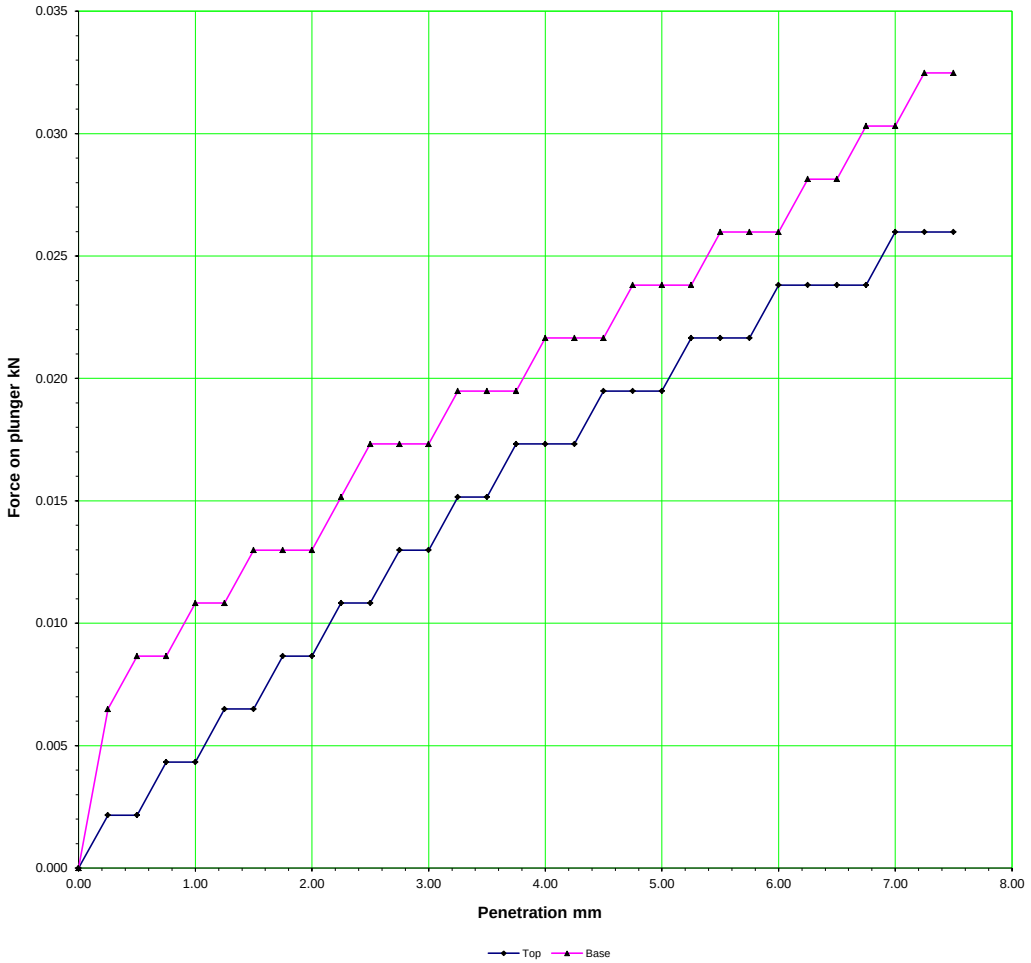
Surcharge: 10 kPa — Mean Calibration: 4.33 N/Div

Penetration of plunger mm: Force Gauge reading divisions — Force on plunger kN: 4.33 N/Div

California Bearing Ratio Results %

Penetration of plunger mm	Force Gauge reading divisions Top	Force Gauge reading divisions Bottom	Force on plunger kN Top	Force on plunger kN Bottom	California Bearing Ratio % Top	California Bearing Ratio % Base
0.00	0.0	0.0	0.000	0.000		
0.25	0.5	1.5	0.002	0.006		
0.50	0.5	2.0	0.002	0.009		
0.75	1.0	2.0	0.004	0.009		
1.00	1.0	2.5	0.004	0.011		
1.25	1.5	2.5	0.006	0.011		
1.50	1.5	3.0	0.006	0.013		
1.75	2.0	3.0	0.009	0.013		
2.00	2.0	3.0	0.009	0.013		
2.25	2.5	3.5	0.011	0.015		
2.50	**2.5**	**4.0**	**0.011**	**0.017**	**0.08**	**0.13**
2.75	3.0	4.0	0.013	0.017		
3.00	3.0	4.0	0.013	0.017		
3.25	3.5	4.5	0.015	0.019		
3.50	3.5	4.5	0.015	0.019		
3.75	4.0	4.5	0.017	0.019		
4.00	4.0	5.0	0.017	0.022		
4.25	4.0	5.0	0.017	0.022		
4.50	4.5	5.0	0.019	0.022		
4.75	4.5	5.5	0.019	0.024		
5.00	**4.5**	**5.5**	**0.019**	**0.024**	**0.10**	**0.12**
5.25	5.0	5.5	0.022	0.024		
5.50	5.0	6.0	0.022	0.026		
5.75	5.0	6.0	0.022	0.026		
6.00	5.5	6.0	0.024	0.026		
6.25	5.5	6.5	0.024	0.028		
6.50	5.5	6.5	0.024	0.028		
6.75	5.5	7.0	0.024	0.030		
7.00	6.0	7.0	0.026	0.030		
7.25	6.0	7.5	0.026	0.032		
7.50	6.0	7.5	0.026	0.032		

		Top	Middle	Base		
Moisture content after test					Specimen wt g	4585
Container No.		Tray	Tray	Tray	Diameter mm	152
Mass of wet soil + container	g	1842.9	1812.9	1390.2	Length mm	127.0
Mass of dry soil + container	g	1546.8	1525.4	1170.0		
Weight of container	g	146.2	186.1	142.8		
Mass of moisture	g	296.1	287.5	220.2	Average MC %	21.35
Dry weight	g	1400.6	1339.3	1027.2	Density Mg/m3	1.99
Moisture content	%	21.1	21.5	21.4	Dry Density Mg/m3	1.64



NM TL Ltd

Project: Hackettstown

GII Project ID: 9225-11-19

		Date		
Operator	Tch	13-Dec-19	Trial Pit No.	CBR19
Checked	Nc		Sample No.	B
Approved	Bc		Depth	0.50m

Project No. NMTL3107

NATIONAL MATERIALS TESTING LABORATORY LTD.

DETERMINATION OF THE CALIFORNIA BEARING RATIO TEST
BS 1377 : PART 4 : CLAUSE 7 : 1990

Soil Description: Brown slightly sandy slightly gravelly SILT/CLAY

Date: 13-Dec-19

Test Method: BS 1377: Part 4 : 1990 :7.4

Force Measuring Device: VJT 08211 — Test 1

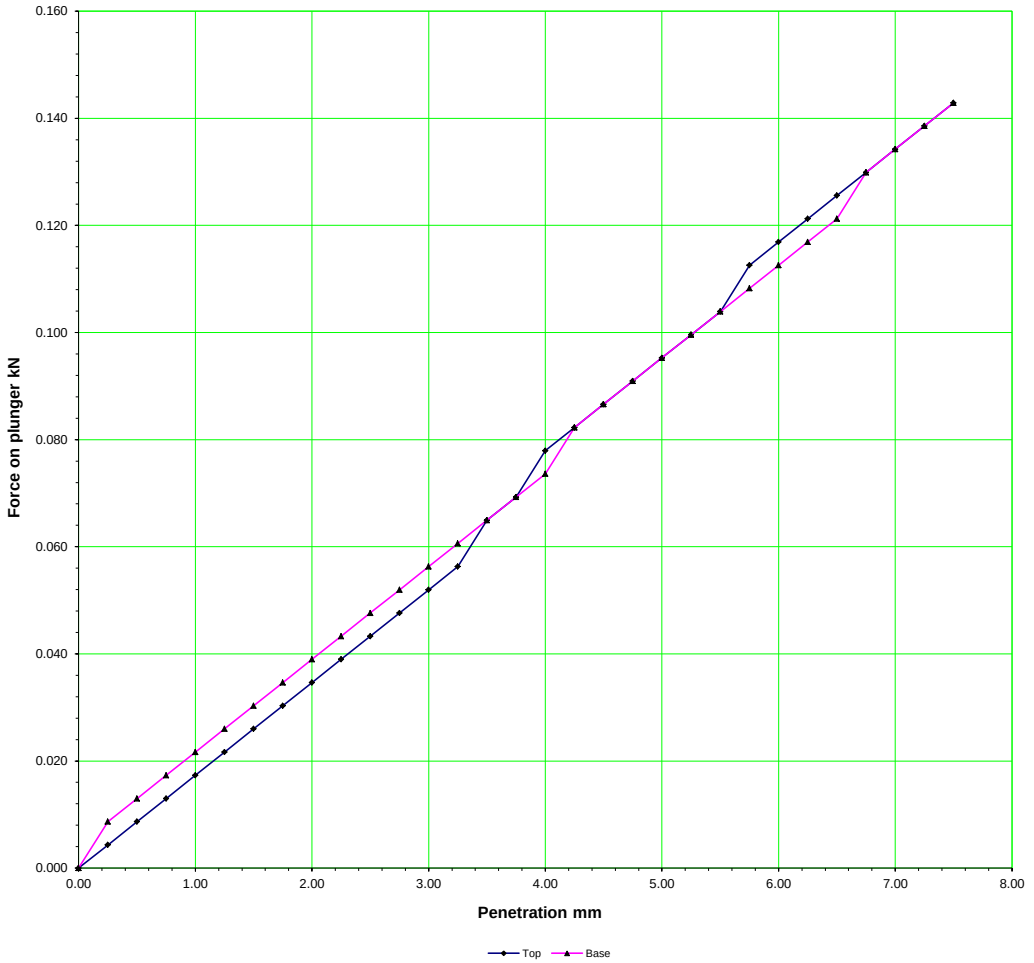
Preperatic: Remoulded with 2.5 kg rammer at natural moisture content

Surcharge: 10 kPa — Mean Calibration: 4.33 N/Div

Penetration of plunger mm | Force Gauge reading divisions | Force on plunger kN | California Bearing Ratio Results %

Penetration of plunger mm	Force Gauge reading divisions Top	Force Gauge reading divisions Bottom	Force on plunger kN Top	Force on plunger kN Bottom	California Bearing Ratio Results % Top	California Bearing Ratio Results % Base
0.00	0.0	0.0	0.000	0.000		
0.25	1.0	2.0	0.004	0.009		
0.50	2.0	3.0	0.009	0.013		
0.75	3.0	4.0	0.013	0.017		
1.00	4.0	5.0	0.017	0.022		
1.25	5.0	6.0	0.022	0.026		
1.50	6.0	7.0	0.026	0.030		
1.75	7.0	8.0	0.030	0.035		
2.00	8.0	9.0	0.035	0.039		
2.25	9.0	10.0	0.039	0.043		
2.50	**10.0**	**11.0**	**0.043**	**0.048**	**0.33**	**0.36**
2.75	11.0	12.0	0.048	0.052		
3.00	12.0	13.0	0.052	0.056		
3.25	13.0	14.0	0.056	0.061		
3.50	15.0	15.0	0.065	0.065		
3.75	16.0	16.0	0.069	0.069		
4.00	18.0	17.0	0.078	0.074		
4.25	19.0	19.0	0.082	0.082		
4.50	20.0	20.0	0.087	0.087		
4.75	21.0	21.0	0.091	0.091		
5.00	**22.0**	**22.0**	**0.095**	**0.095**	**0.48**	**0.48**
5.25	23.0	23.0	0.100	0.100		
5.50	24.0	24.0	0.104	0.104		
5.75	26.0	25.0	0.113	0.108		
6.00	27.0	26.0	0.117	0.113		
6.25	28.0	27.0	0.121	0.117		
6.50	29.0	28.0	0.126	0.121		
6.75	30.0	30.0	0.130	0.130		
7.00	31.0	31.0	0.134	0.134		
7.25	32.0	32.0	0.139	0.139		
7.50	33.0	33.0	0.143	0.143		

Moisture content after test		Top	Middle	Base	Specimen wt g	4685
Container No.		Tray	Tray	Tray	Diameter mm	152
Mass of wet soil + container	g	1759.2	1727.7	1671.1	Length mm	127.0
Mass of dry soil + container	g	1516.8	1482.4	1436.4		
Weight of container	g	190.7	145.3	148.8		
Mass of moisture	g	242.4	245.4	234.7	Average MC %	18.29
Dry weight	g	1326.1	1337.0	1287.6	Density Mg/m3	2.03
Moisture content	%	18.3	18.4	18.2	Dry Density Mg/m3	1.72



NM TL Ltd

Project: Hackettstown

GII Project ID: 9225-11-19

		Date		
Operator	Tch	13-Dec-19	Trial Pit No.	CBR20
Checked	Nc		Sample No.	B
Approved	Bc		Depth	0.50m

Project No. NMTL3107

NATIONAL MATERIALS TESTING LABORATORY LTD.

DETERMINATION OF THE CALIFORNIA BEARING RATIO TEST
BS 1377 : PART 4 : CLAUSE 7 : 1990

Soil Description: Light brown/orange brown slightly sandy slightly gravelly SILT/CLAY

Date: 13-Dec-19

Test Method: BS 1377: Part 4 : 1990 :7.4

Force Measuring Device: VJT 08211 — Test 1

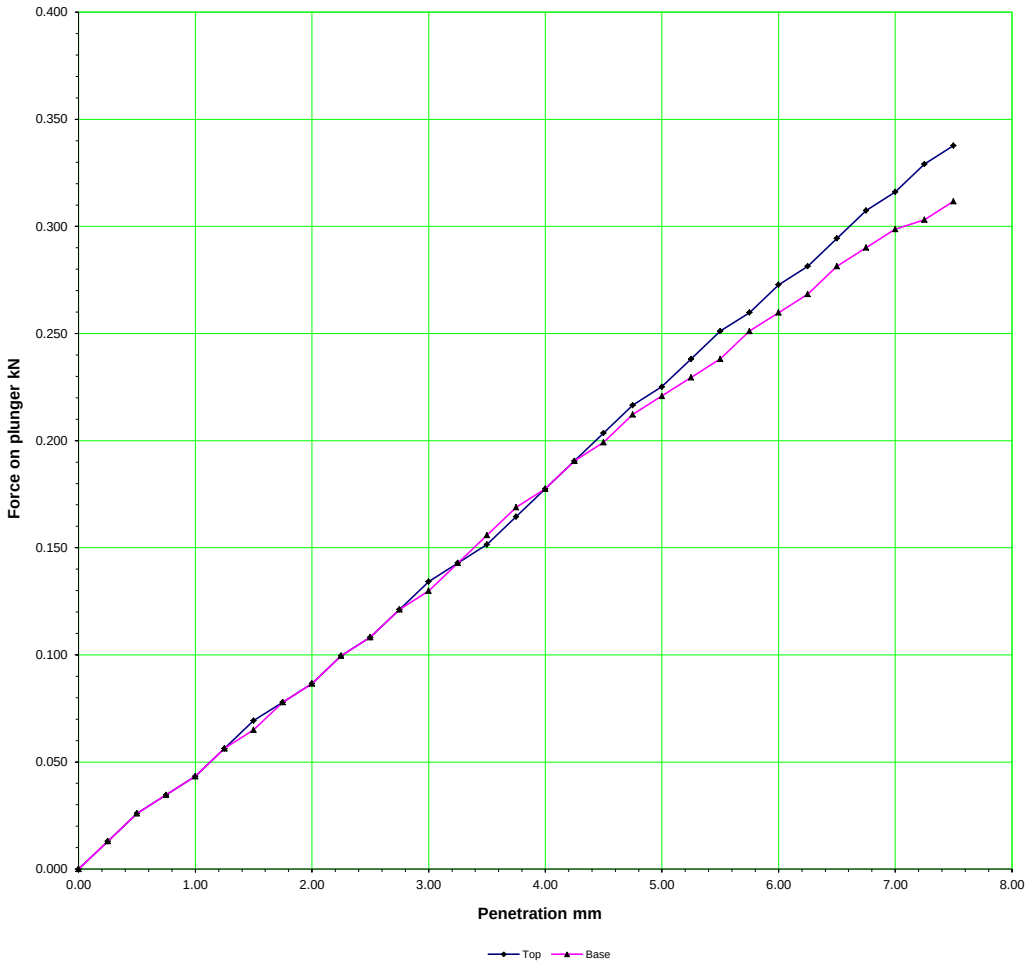
Preperatic: Remoulded with 2.5 kg rammer at natural moisture content

Surcharge: 10 kPa — Mean Calibration: 4.33 N/Div

Penetration of plunger mm / Force Gauge reading divisions / Force on plunger kN / California Bearing Ratio Results %

Penetration of plunger mm	Force Gauge reading divisions Top	Force Gauge reading divisions Bottom	Force on plunger kN Top	Force on plunger kN Bottom	California Bearing Ratio Results % Top	California Bearing Ratio Results % Base
0.00	0.0	0.0	0.000	0.000		
0.25	3.0	3.0	0.013	0.013		
0.50	6.0	6.0	0.026	0.026		
0.75	8.0	8.0	0.035	0.035		
1.00	10.0	10.0	0.043	0.043		
1.25	13.0	13.0	0.056	0.056		
1.50	16.0	15.0	0.069	0.065		
1.75	18.0	18.0	0.078	0.078		
2.00	20.0	20.0	0.087	0.087		
2.25	23.0	23.0	0.100	0.100		
2.50	**25.0**	**25.0**	**0.108**	**0.108**	**0.82**	**0.82**
2.75	28.0	28.0	0.121	0.121		
3.00	31.0	30.0	0.134	0.130		
3.25	33.0	33.0	0.143	0.143		
3.50	35.0	36.0	0.152	0.156		
3.75	38.0	39.0	0.165	0.169		
4.00	41.0	41.0	0.178	0.178		
4.25	44.0	44.0	0.191	0.191		
4.50	47.0	46.0	0.204	0.199		
4.75	50.0	49.0	0.217	0.212		
5.00	**52.0**	**51.0**	**0.225**	**0.221**	**1.13**	**1.10**
5.25	55.0	53.0	0.238	0.229		
5.50	58.0	55.0	0.251	0.238		
5.75	60.0	58.0	0.260	0.251		
6.00	63.0	60.0	0.273	0.260		
6.25	65.0	62.0	0.281	0.268		
6.50	68.0	65.0	0.294	0.281		
6.75	71.0	67.0	0.307	0.290		
7.00	73.0	69.0	0.316	0.299		
7.25	76.0	70.0	0.329	0.303		
7.50	78.0	72.0	0.338	0.312		

Moisture content after test		Top	Middle	Base	Specimen wt g	4455
Container No.		Tray	Tray	Tray	Diameter mm	152
Mass of wet soil + container	g	1610.6	1698.0	1599.2	Length mm	127.0
Mass of dry soil + container	g	1330.8	1399.3	1326.3		
Weight of container	g	148.9	144.9	188.2		
Mass of moisture	g	279.8	298.7	273.0	Average MC %	23.82
Dry weight	g	1181.9	1254.3	1138.1	Density Mg/m3	1.93
Moisture content	%	23.7	23.8	24.0	Dry Density Mg/m3	1.56



NM TL Ltd

Project: Hackettstown

GII Project ID: 9225-11-19

		Date		
Operator	Tch	13-Dec-19	Trial Pit No.	CBR21
Checked	Nc		Sample No.	B
Approved	Bc		Depth	0.50m

Project No. NMTL3107

NATIONAL MATERIALS TESTING LABORATORY LTD.

DETERMINATION OF THE CALIFORNIA BEARING RATIO TEST
BS 1377 : PART 4 : CLAUSE 7 : 1990

Soil Description: Brown slightly sandy slightly gravelly clayey/SILT

Date: 16-Dec-19

Test Method: BS 1377: Part 4 : 1990 :7.4

Force Measuring Device: VJT 08211 — Test 1

Preperatic: Remoulded with 2.5 kg rammer at natural moisture content

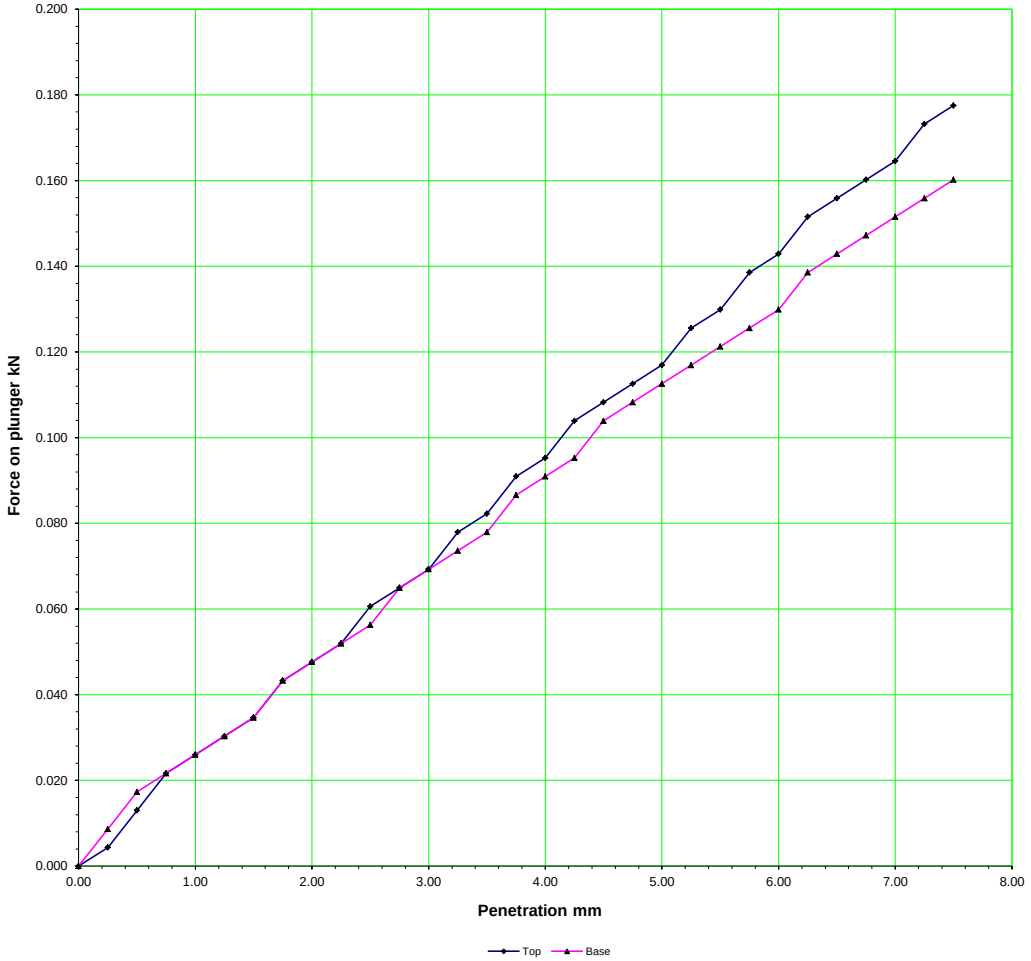
Surcharge: 10 kPa — Mean Calibration: 4.33 N/Div

Penetration of plunger mm: Force Gauge reading divisions — Force on plunger kN: 4.33 N/Div

California Bearing Ratio Results %

Penetration of plunger mm	Force Gauge reading divisions Top	Force Gauge reading divisions Bottom	Force on plunger kN Top	Force on plunger kN Bottom	California Bearing Ratio % Top	California Bearing Ratio % Base
0.00	0.0	0.0	0.000	0.000		
0.25	1.0	2.0	0.004	0.009		
0.50	3.0	4.0	0.013	0.017		
0.75	5.0	5.0	0.022	0.022		
1.00	6.0	6.0	0.026	0.026		
1.25	7.0	7.0	0.030	0.030		
1.50	8.0	8.0	0.035	0.035		
1.75	10.0	10.0	0.043	0.043		
2.00	11.0	11.0	0.048	0.048		
2.25	12.0	12.0	0.052	0.052		
2.50	**14.0**	**13.0**	**0.061**	**0.056**	**0.46**	**0.43**
2.75	15.0	15.0	0.065	0.065		
3.00	16.0	16.0	0.069	0.069		
3.25	18.0	17.0	0.078	0.074		
3.50	19.0	18.0	0.082	0.078		
3.75	21.0	20.0	0.091	0.087		
4.00	22.0	21.0	0.095	0.091		
4.25	24.0	22.0	0.104	0.095		
4.50	25.0	24.0	0.108	0.104		
4.75	26.0	25.0	0.113	0.108		
5.00	**27.0**	**26.0**	**0.117**	**0.113**	**0.58**	**0.56**
5.25	29.0	27.0	0.126	0.117		
5.50	30.0	28.0	0.130	0.121		
5.75	32.0	29.0	0.139	0.126		
6.00	33.0	30.0	0.143	0.130		
6.25	35.0	32.0	0.152	0.139		
6.50	36.0	33.0	0.156	0.143		
6.75	37.0	34.0	0.160	0.147		
7.00	38.0	35.0	0.165	0.152		
7.25	40.0	36.0	0.173	0.156		
7.50	41.0	37.0	0.178	0.160		

Moisture content after test		Top	Middle	Base	Specimen wt g	4650
Container No.		Tray	Tray	Tray	Diameter mm	152
Mass of wet soil + container	g	1817.9	1858.7	1445.2	Length mm	127.0
Mass of dry soil + container	g	1554.6	1580.3	1236.3		
Weight of container	g	185.4	144.3	144.2		
Mass of moisture	g	263.3	278.3	208.9	Average MC %	19.25
Dry weight	g	1369.2	1436.1	1092.1	Density Mg/m3	2.02
Moisture content	%	19.2	19.4	19.1	Dry Density Mg/m3	1.69



NM TL Ltd

Project: Hackettstown

GII Project ID: 9225-11-19

		Date		
Operator	Tch	16-Dec-19	Trial Pit No.	CBR22
Checked	Nc		Sample No.	B
Approved	Bc		Depth	0.50m

Project No. NMTL3107

NATIONAL MATERIALS TESTING LABORATORY LTD.

DETERMINATION OF THE CALIFORNIA BEARING RATIO TEST
BS 1377 : PART 4 : CLAUSE 7 : 1990

Soil Description Brown slightly gravelly silty SAND

Date 16-Dec-19

Test Method BS 1377: Part 4 : 1990 :7.4

Force Measuring Device VJT 08211 Test 1

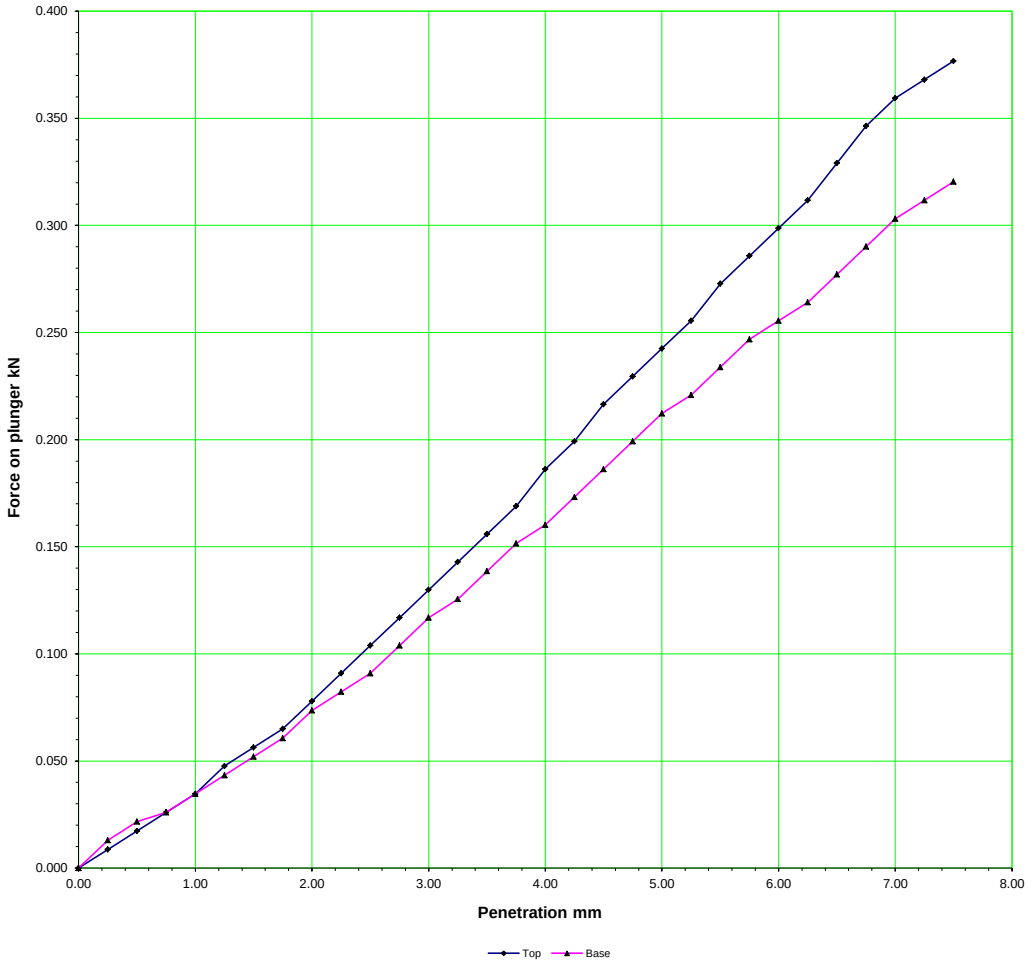
Preperatic Remoulded with 2.5 kg rammer at natural moisture content

Surcharge 10 kPa Mean Calibration 4.33 N/Div

Penetration of plunger mm | Force Gauge reading divisions | Force on plunger kN | California Bearing Ratio Results %

Penetration of plunger mm	Force Gauge reading divisions Top	Force Gauge reading divisions Bottom	Force on plunger kN Top	Force on plunger kN Bottom	California Bearing Ratio Results % Top	California Bearing Ratio Results % Base
0.00	0.0	0.0	0.000	0.000		
0.25	2.0	3.0	0.009	0.013		
0.50	4.0	5.0	0.017	0.022		
0.75	6.0	6.0	0.026	0.026		
1.00	8.0	8.0	0.035	0.035		
1.25	11.0	10.0	0.048	0.043		
1.50	13.0	12.0	0.056	0.052		
1.75	15.0	14.0	0.065	0.061		
2.00	18.0	17.0	0.078	0.074		
2.25	21.0	19.0	0.091	0.082		
2.50	**24.0**	**21.0**	**0.104**	**0.091**	**0.79**	**0.69**
2.75	27.0	24.0	0.117	0.104		
3.00	30.0	27.0	0.130	0.117		
3.25	33.0	29.0	0.143	0.126		
3.50	36.0	32.0	0.156	0.139		
3.75	39.0	35.0	0.169	0.152		
4.00	43.0	37.0	0.186	0.160		
4.25	46.0	40.0	0.199	0.173		
4.50	50.0	43.0	0.217	0.186		
4.75	53.0	46.0	0.229	0.199		
5.00	**56.0**	**49.0**	**0.242**	**0.212**	**1.21**	**1.06**
5.25	59.0	51.0	0.255	0.221		
5.50	63.0	54.0	0.273	0.234		
5.75	66.0	57.0	0.286	0.247		
6.00	69.0	59.0	0.299	0.255		
6.25	72.0	61.0	0.312	0.264		
6.50	76.0	64.0	0.329	0.277		
6.75	80.0	67.0	0.346	0.290		
7.00	83.0	70.0	0.359	0.303		
7.25	85.0	72.0	0.368	0.312		
7.50	87.0	74.0	0.377	0.320		

Moisture content after test		Top	Middle	Base	Specimen wt g	5020
Container No.		Tray	Tray	Tray	Diameter mm	152
Mass of wet soil + container	g	2138.4	1935.1	1496.9	Length mm	127.0
Mass of dry soil + container	g	1908.1	1726.2	1339.4		
Weight of container	g	189.2	187.3	188.7		
Mass of moisture	g	230.3	208.9	157.5	Average MC %	13.55
Dry weight	g	1718.9	1538.9	1150.7	Density Mg/m3	2.18
Moisture content	%	13.4	13.6	13.7	Dry Density Mg/m3	1.92



NM TL Ltd

Project: Hackettstown

GII Project ID: 9225-11-19

		Date		
Operator	Tch	16-Dec-19	Trial Pit No.	CBR23
Checked	Nc		Sample No.	B
Approved	Bc		Depth	0.50m

Project No. NMTL3107

NATIONAL MATERIALS TESTING LABORATORY LTD.

DETERMINATION OF THE CALIFORNIA BEARING RATIO TEST
BS 1377 : PART 4 : CLAUSE 7 : 1990

Soil Description Brown slightly gravelly silty SAND

Date 16-Dec-19

Test Method BS 1377: Part 4 : 1990 :7.4

Force Measuring Device VJT 08211 Test 1

Preperatic Remoulded with 2.5 kg rammer at natural moisture content

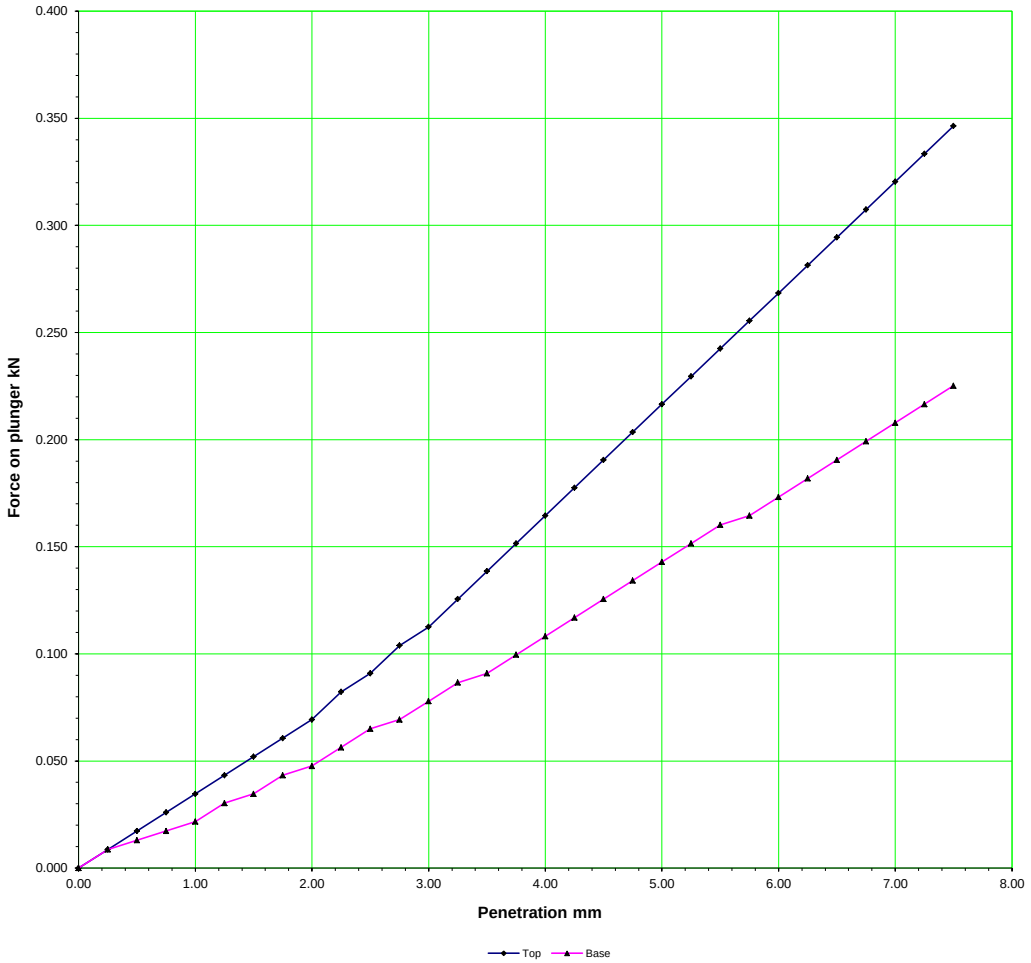
Surcharge 10 kPa Mean Calibration 4.33 N/Div

Penetration of plunger mm | Force Gauge reading divisions | Force on plunger kN | 4.33 N/Div

California Bearing Ratio Results %

Penetration of plunger mm	Force Gauge reading divisions Top	Bottom	Force on plunger kN Top	Bottom	California Bearing Ratio % Top	Base
0.00	0.0	0.0	0.000	0.000		
0.25	2.0	2.0	0.009	0.009		
0.50	4.0	3.0	0.017	0.013		
0.75	6.0	4.0	0.026	0.017		
1.00	8.0	5.0	0.035	0.022		
1.25	10.0	7.0	0.043	0.030		
1.50	12.0	8.0	0.052	0.035		
1.75	14.0	10.0	0.061	0.043		
2.00	16.0	11.0	0.069	0.048		
2.25	19.0	13.0	0.082	0.056		
2.50	**21.0**	**15.0**	**0.091**	**0.065**	**0.69**	**0.49**
2.75	24.0	16.0	0.104	0.069		
3.00	26.0	18.0	0.113	0.078		
3.25	29.0	20.0	0.126	0.087		
3.50	32.0	21.0	0.139	0.091		
3.75	35.0	23.0	0.152	0.100		
4.00	38.0	25.0	0.165	0.108		
4.25	41.0	27.0	0.178	0.117		
4.50	44.0	29.0	0.191	0.126		
4.75	47.0	31.0	0.204	0.134		
5.00	**50.0**	**33.0**	**0.217**	**0.143**	**1.08**	**0.71**
5.25	53.0	35.0	0.229	0.152		
5.50	56.0	37.0	0.242	0.160		
5.75	59.0	38.0	0.255	0.165		
6.00	62.0	40.0	0.268	0.173		
6.25	65.0	42.0	0.281	0.182		
6.50	68.0	44.0	0.294	0.191		
6.75	71.0	46.0	0.307	0.199		
7.00	74.0	48.0	0.320	0.208		
7.25	77.0	50.0	0.333	0.217		
7.50	80.0	52.0	0.346	0.225		

Moisture content after test		Top	Middle	Base	Specimen wt g	4745
Container No.		Tray	Tray	Tray	Diameter mm	152
Mass of wet soil + container	g	1810.0	1733.0	1670.5	Length mm	127.0
Mass of dry soil + container	g	1580.5	1522.4	1464.2		
Weight of container	g	144.0	187.6	144.0		
Mass of moisture	g	229.6	210.7	206.3	Average MC %	15.79
Dry weight	g	1436.5	1334.8	1320.2	Density Mg/m3	2.06
Moisture content	%	16.0	15.8	15.6	Dry Density Mg/m3	1.78



NM TL Ltd

Project: Hackettstown

GII Project ID: 9225-11-19

		Date		
Operator	Tch	16-Dec-19	Trial Pit No.	CBR24
Checked	Nc		Sample No.	B
Approved	Bc		Depth	0.50m

Project No. NMTL3107

NATIONAL MATERIALS TESTING LABORATORY LTD.

DETERMINATION OF THE CALIFORNIA BEARING RATIO TEST
BS 1377 : PART 4 : CLAUSE 7 : 1990

Soil Description: Brown slightly sandy slightly gravelly SILT/CLAY

Date: 16-Dec-19

Test Method: BS 1377: Part 4 : 1990 :7.4

Force Measuring Device: VJT 08211 — Test 1

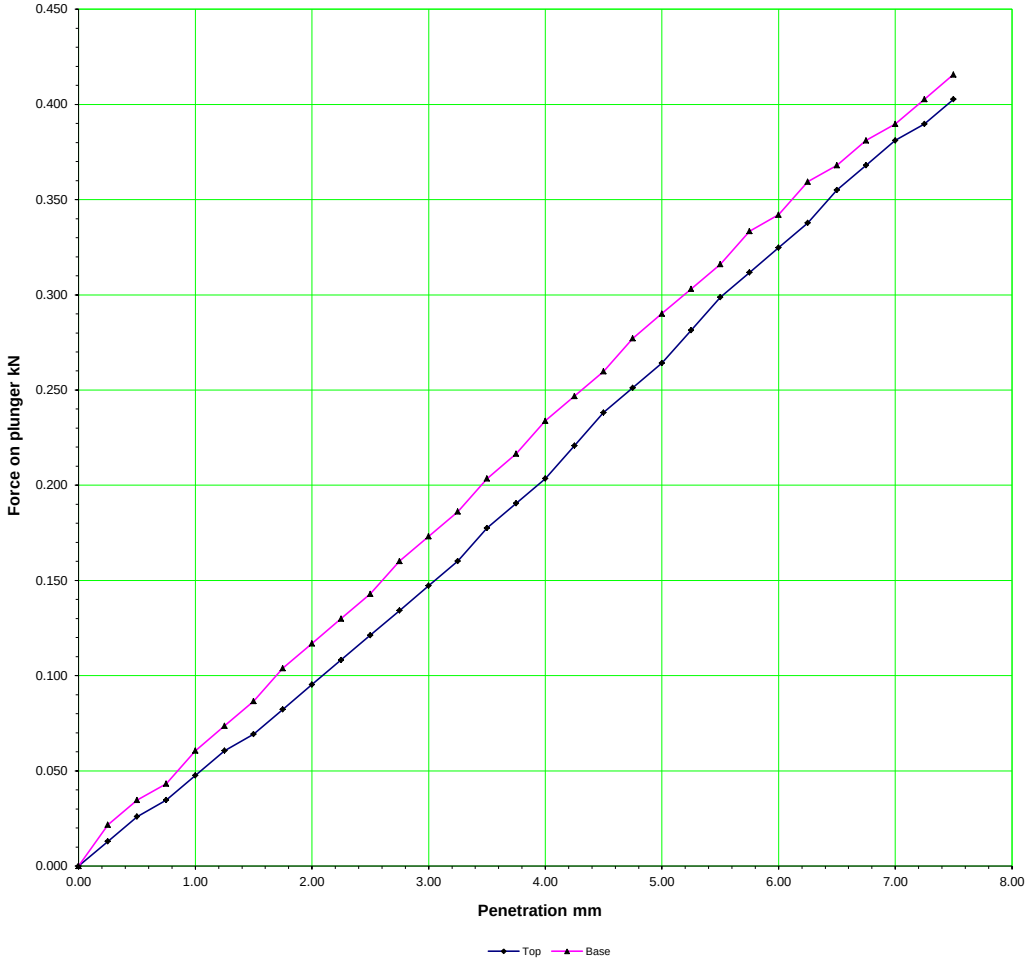
Preperatic: Remoulded with 2.5 kg rammer at natural moisture content

Surcharge: 10 kPa — Mean Calibration: 4.33 N/Div

Penetration of plunger mm | Force Gauge reading divisions | Force on plunger kN | California Bearing Ratio Results %

Penetration of plunger mm	Force Gauge reading divisions Top	Force Gauge reading divisions Bottom	Force on plunger kN Top	Force on plunger kN Bottom	California Bearing Ratio Results % Top	California Bearing Ratio Results % Base
0.00	0.0	0.0	0.000	0.000		
0.25	3.0	5.0	0.013	0.022		
0.50	6.0	8.0	0.026	0.035		
0.75	8.0	10.0	0.035	0.043		
1.00	11.0	14.0	0.048	0.061		
1.25	14.0	17.0	0.061	0.074		
1.50	16.0	20.0	0.069	0.087		
1.75	19.0	24.0	0.082	0.104		
2.00	22.0	27.0	0.095	0.117		
2.25	25.0	30.0	0.108	0.130		
2.50	**28.0**	**33.0**	**0.121**	**0.143**	**0.92**	**1.08**
2.75	31.0	37.0	0.134	0.160		
3.00	34.0	40.0	0.147	0.173		
3.25	37.0	43.0	0.160	0.186		
3.50	41.0	47.0	0.178	0.204		
3.75	44.0	50.0	0.191	0.217		
4.00	47.0	54.0	0.204	0.234		
4.25	51.0	57.0	0.221	0.247		
4.50	55.0	60.0	0.238	0.260		
4.75	58.0	64.0	0.251	0.277		
5.00	**61.0**	**67.0**	**0.264**	**0.290**	**1.32**	**1.45**
5.25	65.0	70.0	0.281	0.303		
5.50	69.0	73.0	0.299	0.316		
5.75	72.0	77.0	0.312	0.333		
6.00	75.0	79.0	0.325	0.342		
6.25	78.0	83.0	0.338	0.359		
6.50	82.0	85.0	0.355	0.368		
6.75	85.0	88.0	0.368	0.381		
7.00	88.0	90.0	0.381	0.390		
7.25	90.0	93.0	0.390	0.403		
7.50	93.0	96.0	0.403	0.416		

Moisture content after test		Top	Middle	Base	Specimen wt g	4880
Container No.		Tray	Tray	Tray	Diameter mm	152
Mass of wet soil + container	g	1879.3	1871.9	1608.8	Length mm	127.0
Mass of dry soil + container	g	1642.9	1642.3	1409.1		
Weight of container	g	148.1	188.7	145.4		
Mass of moisture	g	236.3	229.6	199.8	Average MC %	15.80
Dry weight	g	1494.8	1453.6	1263.7	Density Mg/m3	2.12
Moisture content	%	15.8	15.8	15.8	Dry Density Mg/m3	1.83



NM TL Ltd

Project: Hackettstown

GII Project ID: 9225-11-19

		Date		
Operator	Tch	16-Dec-19	Trial Pit No.	CBR25
Checked	Nc		Sample No.	B
Approved	Bc		Depth	0.50m

Project No. NMTL3107

NATIONAL MATERIALS TESTING LABORATORY LTD.

DETERMINATION OF THE CALIFORNIA BEARING RATIO TEST
BS 1377 : PART 4 : CLAUSE 7 : 1990

Soil Description Brown slightly sandy slightly gravelly SILT/CLAY

Date 16-Dec-19

Test Method BS 1377: Part 4 : 1990 :7.4

Force Measuring Device VJT 08211 Test 1

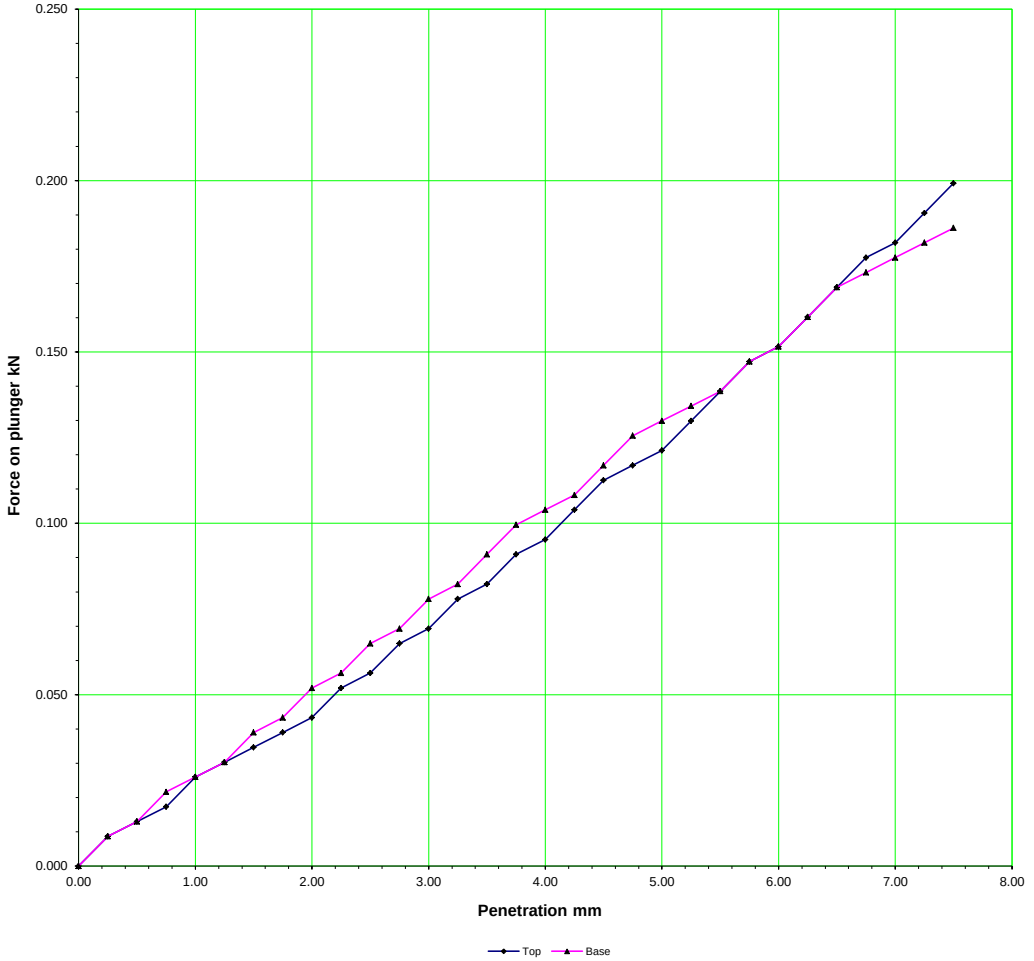
Preperatic Remoulded with 2.5 kg rammer at natural moisture content

Surcharge 10 kPa Mean Calibration 4.33 N/Div

Penetration of plunger mm | Force Gauge reading divisions | Force on plunger kN | California Bearing Ratio Results %

Penetration of plunger mm	Force Gauge reading divisions Top	Force Gauge reading divisions Bottom	Force on plunger kN Top	Force on plunger kN Bottom	California Bearing Ratio Results % Top	California Bearing Ratio Results % Base
0.00	0.0	0.0	0.000	0.000		
0.25	2.0	2.0	0.009	0.009		
0.50	3.0	3.0	0.013	0.013		
0.75	4.0	5.0	0.017	0.022		
1.00	6.0	6.0	0.026	0.026		
1.25	7.0	7.0	0.030	0.030		
1.50	8.0	9.0	0.035	0.039		
1.75	9.0	10.0	0.039	0.043		
2.00	10.0	12.0	0.043	0.052		
2.25	12.0	13.0	0.052	0.056		
2.50	**13.0**	**15.0**	**0.056**	**0.065**	**0.43**	**0.49**
2.75	15.0	16.0	0.065	0.069		
3.00	16.0	18.0	0.069	0.078		
3.25	18.0	19.0	0.078	0.082		
3.50	19.0	21.0	0.082	0.091		
3.75	21.0	23.0	0.091	0.100		
4.00	22.0	24.0	0.095	0.104		
4.25	24.0	25.0	0.104	0.108		
4.50	26.0	27.0	0.113	0.117		
4.75	27.0	29.0	0.117	0.126		
5.00	**28.0**	**30.0**	**0.121**	**0.130**	**0.61**	**0.65**
5.25	30.0	31.0	0.130	0.134		
5.50	32.0	32.0	0.139	0.139		
5.75	34.0	34.0	0.147	0.147		
6.00	35.0	35.0	0.152	0.152		
6.25	37.0	37.0	0.160	0.160		
6.50	39.0	39.0	0.169	0.169		
6.75	41.0	40.0	0.178	0.173		
7.00	42.0	41.0	0.182	0.178		
7.25	44.0	42.0	0.191	0.182		
7.50	46.0	43.0	0.199	0.186		

		Top	Middle	Base		
Moisture content after test					Specimen wt g	4765
Container No.		Tray	Tray	Tray	Diameter mm	152
Mass of wet soil + container	g	1752.5	1950.0	1546.7	Length mm	127.0
Mass of dry soil + container	g	1531.0	1698.0	1346.0		
Weight of container	g	192.4	187.3	146.0		
Mass of moisture	g	221.5	252.1	200.7	Average MC %	16.65
Dry weight	g	1338.6	1510.6	1200.0	Density Mg/m3	2.07
Moisture content	%	16.5	16.7	16.7	Dry Density Mg/m3	1.77



NM TL Ltd

Project: Hackettstown

GII Project ID: 9225-11-19

		Date		
Operator	Tch	16-Dec-19	Trial Pit No.	CBR26
Checked	Nc		Sample No.	B
Approved	Bc		Depth	0.50m

Project No. NMTL3107

POINT LOAD STRENGTH INDEX TESTS

ISRM : 1989

BH No.	Depth m	Type/ Orientation	Width (W) mm	Platen Separation (D) mm Measured	Failure Load (P) kN	De2 mm2	Point Load Index(Is) Mn/m2	IS(50) Mpa	UCS Mpa
BH02	10.15-10.35	D	195.0	63.34	15.0	4012	3.738825	4.208	84.16
BH02	10.15-10.35	A	63.3	97.93	17.0	12211	1.392218	4.773	95.45
BH04	11.4-11.60	D	97.9	63.31	5.0	4008	1.247456	1.404	28.07
BH04	11.4-11.60	A	63.3	49.66	5.0	3140	1.592379	1.404	28.07
RC08	12.2-12.4	D	203.0	63.40	18.5	4020	4.602494	5.183	103.65
RC08	12.2-12.4	A	63.4	77.80	19.4	7707	2.517285	5.435	108.70
RC08	12.6-12.7	D	96.8	63.92	11.0	4086	2.692273	3.044	60.88
RC08	12.6-12.7	A	63.9	88.65	16.0	10006	1.599014	4.428	88.55
RC09	13.1-13.3	D	198.0	63.60	16.0	4045	3.955540	4.461	89.22
RC09	13.1-13.3	A	63.6	81.82	19.2	8524	2.252538	5.353	107.07
RC09	15.0-15.2	D	201.0	63.66	19.0	4053	4.688353	5.290	105.80
RC09	15.0-15.2	A	63.7	98.25	17.0	12291	1.383164	4.733	94.67

Notes:
1. Specimens tested as received from site.
2. Orientation of specimens is not known.
3. D= Diameterial
4. A= Axial

NMTL Ltd	Project Name: **Hackettstown**	Project No. NMTL 3196	Tested	09/06/2020	Signed
			Tch		Bc

Element Materials Technology
Unit 3 Deeside Point
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Deeside
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Ground Investigations Ireland
Catherinestown House
Hazelhatch Road
Newcastle
Co. Dublin
Ireland

Attention :	Mike Sutton
Date :	16th December, 2019
Your reference :	9225-11-19
Our reference :	Test Report 19/19841 Batch 1
Location :	Hackettstown
Date samples received :	4th December, 2019
Status :	Final report
Issue :	1

Three samples were received for analysis on 4th December, 2019 of which three 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:

Phil Sommerton BSc
Senior Project Manager

Client Name: Ground Investigations Ireland
Reference: 9225-11-19
Location: Hackettstown
Contact: Mike Sutton
EMT Job No: 19/19841

Report : Solid

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

Please see attached notes for all abbreviations and acronyms

EMT Sample No.	1-3	4-6	7-9								LOD/LOR	Units	Method No.
Sample ID	TP05	TP06	TP10										
Depth	0.50	0.50	0.50										
COC No / misc													
Containers	V J T	V J T	V J T										
Sample Date	29/11/2019	29/11/2019	29/11/2019										
Sample Type	Soil	Soil	Soil										
Batch Number	1	1	1										
Date of Receipt	04/12/2019	04/12/2019	04/12/2019										
Antimony	1	2	1								<1	mg/kg	TM30/PM15
Arsenic #	10.7	8.4	9.3								<0.5	mg/kg	TM30/PM15
Barium #	58	65	67								<1	mg/kg	TM30/PM15
Cadmium #	0.5	0.4	0.5								<0.1	mg/kg	TM30/PM15
Chromium #	53.4	63.6	64.5								<0.5	mg/kg	TM30/PM15
Copper #	20	14	15								<1	mg/kg	TM30/PM15
Lead #	10	15	10								<5	mg/kg	TM30/PM15
Mercury #	<0.1	<0.1	<0.1								<0.1	mg/kg	TM30/PM15
Molybdenum #	1.2	2.6	1.2								<0.1	mg/kg	TM30/PM15
Nickel #	45.1	27.9	39.1								<0.7	mg/kg	TM30/PM15
Selenium #	1	<1	<1								<1	mg/kg	TM30/PM15
Zinc #	53	53	47								<5	mg/kg	TM30/PM15
PAH MS													
Naphthalene #	<0.04	<0.04	<0.04								<0.04	mg/kg	TM4/PM8
Acenaphthylene	<0.03	<0.03	<0.03								<0.03	mg/kg	TM4/PM8
Acenaphthene #	<0.05	<0.05	<0.05								<0.05	mg/kg	TM4/PM8
Fluorene #	<0.04	<0.04	<0.04								<0.04	mg/kg	TM4/PM8
Phenanthrene #	<0.03	<0.03	<0.03								<0.03	mg/kg	TM4/PM8
Anthracene #	<0.04	<0.04	<0.04								<0.04	mg/kg	TM4/PM8
Fluoranthene #	<0.03	<0.03	<0.03								<0.03	mg/kg	TM4/PM8
Pyrene #	<0.03	<0.03	<0.03								<0.03	mg/kg	TM4/PM8
Benzo(a)anthracene #	<0.06	<0.06	<0.06								<0.06	mg/kg	TM4/PM8
Chrysene #	<0.02	<0.02	<0.02								<0.02	mg/kg	TM4/PM8
Benzo(bk)fluoranthene #	<0.07	<0.07	<0.07								<0.07	mg/kg	TM4/PM8
Benzo(a)pyrene #	<0.04	<0.04	<0.04								<0.04	mg/kg	TM4/PM8
Indeno(123cd)pyrene	<0.04	<0.04	<0.04								<0.04	mg/kg	TM4/PM8
Dibenzo(ah)anthracene #	<0.04	<0.04	<0.04								<0.04	mg/kg	TM4/PM8
Benzo(ghi)perylene #	<0.04	<0.04	<0.04								<0.04	mg/kg	TM4/PM8
Coronene	<0.04	<0.04	<0.04								<0.04	mg/kg	TM4/PM8
PAH 6 Total #	<0.22	<0.22	<0.22								<0.22	mg/kg	TM4/PM8
PAH 17 Total	<0.64	<0.64	<0.64								<0.64	mg/kg	TM4/PM8
Benzo(b)fluoranthene	<0.05	<0.05	<0.05								<0.05	mg/kg	TM4/PM8
Benzo(k)fluoranthene	<0.02	<0.02	<0.02								<0.02	mg/kg	TM4/PM8
Benzo(j)fluoranthene	<1	<1	<1								<1	mg/kg	TM4/PM8
PAH Surrogate % Recovery	97	98	92								<0	%	TM4/PM8
Mineral Oil (C10-C40)	<30	<30	<30								<30	mg/kg	TM5/PM8/PM16

Client Name: Ground Investigations Ireland
Reference: 9225-11-19
Location: Hackettstown
Contact: Mike Sutton
EMT Job No: 19/19841

Report : Solid

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

EMT Sample No.	1-3	4-6	7-9									
Sample ID	TP05	TP06	TP10									
Depth	0.50	0.50	0.50									
COC No / misc												
Containers	V J T	V J T	V J T									
Sample Date	29/11/2019	29/11/2019	29/11/2019									
Sample Type	Soil	Soil	Soil									
Batch Number	1	1	1									
Date of Receipt	04/12/2019	04/12/2019	04/12/2019									

Please see attached notes for all abbreviations and acronyms

											LOD/LOR	Units	Method No.
TPH CWG													
Aliphatics													
>C5-C6 #	<0.1	<0.1	<0.1								<0.1	mg/kg	TM36/PM12
>C6-C8 #	<0.1	<0.1	<0.1								<0.1	mg/kg	TM36/PM12
>C8-C10	<0.1	<0.1	<0.1								<0.1	mg/kg	TM36/PM12
>C10-C12 #	<0.2	<0.2	<0.2								<0.2	mg/kg	TM5/PM8/PM16
>C12-C16 #	<4	<4	<4								<4	mg/kg	TM5/PM8/PM16
>C16-C21 #	<7	<7	<7								<7	mg/kg	TM5/PM8/PM16
>C21-C35 #	<7	<7	<7								<7	mg/kg	TM5/PM8/PM16
>C35-C40	<7	<7	<7								<7	mg/kg	TM5/PM8/PM16
Total aliphatics C5-40	<26	<26	<26								<26	mg/kg	TM5/TM36/PM8/PM12/PM16
>C6-C10	<0.1	<0.1	<0.1								<0.1	mg/kg	TM36/PM12
>C10-C25	<10	<10	<10								<10	mg/kg	TM5/PM8/PM16
>C25-C35	<10	<10	<10								<10	mg/kg	TM5/PM8/PM16
Aromatics													
>C5-EC7 #	<0.1	<0.1	<0.1								<0.1	mg/kg	TM36/PM12
>EC7-EC8 #	<0.1	<0.1	<0.1								<0.1	mg/kg	TM36/PM12
>EC8-EC10 #	<0.1	<0.1	<0.1								<0.1	mg/kg	TM36/PM12
>EC10-EC12 #	<0.2	<0.2	<0.2								<0.2	mg/kg	TM5/PM8/PM16
>EC12-EC16 #	<4	<4	<4								<4	mg/kg	TM5/PM8/PM16
>EC16-EC21 #	<7	<7	<7								<7	mg/kg	TM5/PM8/PM16
>EC21-EC35 #	<7	<7	<7								<7	mg/kg	TM5/PM8/PM16
>EC35-EC40	<7	<7	<7								<7	mg/kg	TM5/PM8/PM16
Total aromatics C5-40	<26	<26	<26								<26	mg/kg	TM5/TM36/PM8/PM12/PM16
Total aliphatics and aromatics(C5-40)	<52	<52	<52								<52	mg/kg	TM5/TM36/PM8/PM12/PM16
>EC6-EC10 #	<0.1	<0.1	<0.1								<0.1	mg/kg	TM36/PM12
>EC10-EC25	<10	<10	<10								<10	mg/kg	TM5/PM8/PM16
>EC25-EC35	<10	<10	<10								<10	mg/kg	TM5/PM8/PM16
MTBE #	<5	<5	<5								<5	ug/kg	TM31/PM12
Benzene #	<5	<5	<5								<5	ug/kg	TM31/PM12
Toluene #	<5	<5	<5								<5	ug/kg	TM31/PM12
Ethylbenzene #	<5	<5	<5								<5	ug/kg	TM31/PM12
m/p-Xylene #	<5	<5	<5								<5	ug/kg	TM31/PM12
o-Xylene #	<5	<5	<5								<5	ug/kg	TM31/PM12
PCB 28 #	<5	<5	<5								<5	ug/kg	TM17/PM8
PCB 52 #	<5	<5	<5								<5	ug/kg	TM17/PM8
PCB 101 #	<5	<5	<5								<5	ug/kg	TM17/PM8
PCB 118 #	<5	<5	<5								<5	ug/kg	TM17/PM8
PCB 138 #	<5	<5	<5								<5	ug/kg	TM17/PM8
PCB 153 #	<5	<5	<5								<5	ug/kg	TM17/PM8
PCB 180 #	<5	<5	<5								<5	ug/kg	TM17/PM8
Total 7 PCBs #	<35	<35	<35								<35	ug/kg	TM17/PM8

Element Materials Technology

Client Name: Ground Investigations Ireland
Reference: 9225-11-19
Location: Hackettstown
Contact: Mike Sutton
EMT Job No: 19/19841

Report : Solid

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

EMT Sample No.	1-3	4-6	7-9									
Sample ID	TP05	TP06	TP10									
Depth	0.50	0.50	0.50									
COC No / misc												
Containers	V J T	V J T	V J T									
Sample Date	29/11/2019	29/11/2019	29/11/2019									
Sample Type	Soil	Soil	Soil									
Batch Number	1	1	1									
Date of Receipt	04/12/2019	04/12/2019	04/12/2019									

Please see attached notes for all abbreviations and acronyms

											LOD/LOR	Units	Method No.
Natural Moisture Content	10.5	14.7	11.8								<0.1	%	PM4/PM0
Moisture Content (% Wet Weight)	9.5	12.8	10.5								<0.1	%	PM4/PM0
Hexavalent Chromium #	<0.3	<0.3	<0.3								<0.3	mg/kg	TM38/PM20
Chromium III	53.4	63.6	64.5								<0.5	mg/kg	NONE/NONE
Total Organic Carbon #	0.18	1.75	0.25								<0.02	%	TM21/PM24
pH #	7.30	7.12	7.04								<0.01	pH units	TM73/PM11
Mass of raw test portion	0.1006	0.1154	0.1056									kg	NONE/PM17
Mass of dried test portion	0.09	0.09	0.09									kg	NONE/PM17

Client Name: Ground Investigations Ireland
Reference: 9225-11-19
Location: Hackettstown
Contact: Mike Sutton
EMT Job No: 19/19841

Report : CEN 10:1 1 Batch

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

EMT Sample No.	1-3	4-6	7-9									
Sample ID	TP05	TP06	TP10									
Depth	0.50	0.50	0.50									
COC No / misc												
Containers	V J T	V J T	V J T									
Sample Date	29/11/2019	29/11/2019	29/11/2019									
Sample Type	Soil	Soil	Soil									
Batch Number	1	1	1									
Date of Receipt	04/12/2019	04/12/2019	04/12/2019									

Please see attached notes for all abbreviations and acronyms

											LOD/LOR	Units	Method No.
Dissolved Antimony #	0.002	<0.002	<0.002								<0.002	mg/l	TM30/PM17
Dissolved Antimony (A10) #	<0.02	<0.02	<0.02								<0.02	mg/kg	TM30/PM17
Dissolved Arsenic #	<0.0025	<0.0025	<0.0025								<0.0025	mg/l	TM30/PM17
Dissolved Arsenic (A10) #	<0.025	<0.025	<0.025								<0.025	mg/kg	TM30/PM17
Dissolved Barium #	<0.003	<0.003	<0.003								<0.003	mg/l	TM30/PM17
Dissolved Barium (A10) #	<0.03	<0.03	<0.03								<0.03	mg/kg	TM30/PM17
Dissolved Cadmium #	<0.0005	<0.0005	<0.0005								<0.0005	mg/l	TM30/PM17
Dissolved Cadmium (A10) #	<0.005	<0.005	<0.005								<0.005	mg/kg	TM30/PM17
Dissolved Chromium #	<0.0015	<0.0015	<0.0015								<0.0015	mg/l	TM30/PM17
Dissolved Chromium (A10) #	<0.015	<0.015	<0.015								<0.015	mg/kg	TM30/PM17
Dissolved Copper #	<0.007	<0.007	<0.007								<0.007	mg/l	TM30/PM17
Dissolved Copper (A10) #	<0.07	<0.07	<0.07								<0.07	mg/kg	TM30/PM17
Dissolved Lead #	<0.005	<0.005	<0.005								<0.005	mg/l	TM30/PM17
Dissolved Lead (A10) #	<0.05	<0.05	<0.05								<0.05	mg/kg	TM30/PM17
Dissolved Molybdenum #	<0.002	<0.002	<0.002								<0.002	mg/l	TM30/PM17
Dissolved Molybdenum (A10) #	<0.02	<0.02	<0.02								<0.02	mg/kg	TM30/PM17
Dissolved Nickel #	<0.002	<0.002	<0.002								<0.002	mg/l	TM30/PM17
Dissolved Nickel (A10) #	<0.02	<0.02	<0.02								<0.02	mg/kg	TM30/PM17
Dissolved Selenium #	<0.003	<0.003	<0.003								<0.003	mg/l	TM30/PM17
Dissolved Selenium (A10) #	<0.03	<0.03	<0.03								<0.03	mg/kg	TM30/PM17
Dissolved Zinc #	0.004	0.005	0.004								<0.003	mg/l	TM30/PM17
Dissolved Zinc (A10) #	0.04	0.05	0.04								<0.03	mg/kg	TM30/PM17
Mercury Dissolved by CVAF #	0.00001	0.00002	<0.00001								<0.00001	mg/l	TM61/PM0
Mercury Dissolved by CVAF #	<0.0001	0.0002	<0.0001								<0.0001	mg/kg	TM61/PM0
Phenol	<0.01	<0.01	<0.01								<0.01	mg/l	TM26/PM0
Phenol	<0.1	<0.1	<0.1								<0.1	mg/kg	TM26/PM0
Fluoride	<0.3	<0.3	<0.3								<0.3	mg/l	TM173/PM0
Fluoride	<3	<3	<3								<3	mg/kg	TM173/PM0
Sulphate as SO4 #	0.7	<0.5	<0.5								<0.5	mg/l	TM38/PM0
Sulphate as SO4 #	7	<5	<5								<5	mg/kg	TM38/PM0
Chloride #	<0.3	<0.3	<0.3								<0.3	mg/l	TM38/PM0
Chloride #	<3	<3	<3								<3	mg/kg	TM38/PM0
Dissolved Organic Carbon	6	4	3								<2	mg/l	TM60/PM0
Dissolved Organic Carbon	60	40	30								<20	mg/kg	TM60/PM0
pH	6.89	7.08	6.97								<0.01	pH units	TM73/PM0
Total Dissolved Solids #	42	44	50								<35	mg/l	TM20/PM0
Total Dissolved Solids #	420	440	500								<350	mg/kg	TM20/PM0

Element Materials Technology

Client Name: Ground Investigations Ireland
Reference: 9225-11-19
Location: Hackettstown
Contact: Mike Sutton
EMT Job No: 19/19841

Report : EN12457_2

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

Please see attached notes for all abbreviations and acronyms

EMT Sample No.	1-3	4-6	7-9													
Sample ID	TP05	TP06	TP10													
Depth	0.50	0.50	0.50													
COC No / misc																
Containers	V J T	V J T	V J T													
Sample Date	29/11/2019	29/11/2019	29/11/2019													
Sample Type	Soil	Soil	Soil													
Batch Number	1	1	1													
Date of Receipt	04/12/2019	04/12/2019	04/12/2019													
											Inert	Stable Non-reactive	Hazardous	LOD LOR	Units	Method No.
Solid Waste Analysis																
Total Organic Carbon #	0.18	1.75	0.25								3	5	6	<0.02	%	TM21/PM24
Sum of BTEX	<0.025	<0.025	<0.025								6	-	-	<0.025	mg/kg	TM31/PM12
Sum of 7 PCBs #	<0.035	<0.035	<0.035								1	-	-	<0.035	mg/kg	TM17/PM8
Mineral Oil	<30	<30	<30								500	-	-	<30	mg/kg	TM5/PM8/PM16
PAH Sum of 6 #	<0.22	<0.22	<0.22								-	-	-	<0.22	mg/kg	TM4/PM8
PAH Sum of 17	<0.64	<0.64	<0.64								100	-	-	<0.64	mg/kg	TM4/PM8
CEN 10:1 Leachate																
Arsenic #	<0.025	<0.025	<0.025								0.5	2	25	<0.025	mg/kg	TM30/PM17
Barium #	<0.03	<0.03	<0.03								20	100	300	<0.03	mg/kg	TM30/PM17
Cadmium #	<0.005	<0.005	<0.005								0.04	1	5	<0.005	mg/kg	TM30/PM17
Chromium #	<0.015	<0.015	<0.015								0.5	10	70	<0.015	mg/kg	TM30/PM17
Copper #	<0.07	<0.07	<0.07								2	50	100	<0.07	mg/kg	TM30/PM17
Mercury #	<0.0001	0.0002	<0.0001								0.01	0.2	2	<0.0001	mg/kg	TM61/PM0
Molybdenum #	<0.02	<0.02	<0.02								0.5	10	30	<0.02	mg/kg	TM30/PM17
Nickel #	<0.02	<0.02	<0.02								0.4	10	40	<0.02	mg/kg	TM30/PM17
Lead #	<0.05	<0.05	<0.05								0.5	10	50	<0.05	mg/kg	TM30/PM17
Antimony #	<0.02	<0.02	<0.02								0.06	0.7	5	<0.02	mg/kg	TM30/PM17
Selenium #	<0.03	<0.03	<0.03								0.1	0.5	7	<0.03	mg/kg	TM30/PM17
Zinc #	0.04	0.05	0.04								4	50	200	<0.03	mg/kg	TM30/PM17
Total Dissolved Solids #	420	440	500								4000	60000	100000	<350	mg/kg	TM20/PM0
Dissolved Organic Carbon	60	40	30								500	800	1000	<20	mg/kg	TM60/PM0
Mass of raw test portion	0.1006	0.1154	0.1056								-	-	-		kg	NONE/PM17
Dry Matter Content Ratio	89.4	77.9	85.1								-	-	-	<0.1	%	NONE/PM4
Leachant Volume	0.889	0.875	0.884								-	-	-		l	NONE/PM17
Eluate Volume	0.8	0.78	0.8								-	-	-		l	NONE/PM17
pH #	7.30	7.12	7.04								-	-	-	<0.01	pH units	TM73/PM11
Phenol	<0.1	<0.1	<0.1								1	-	-	<0.1	mg/kg	TM26/PM0
Fluoride	<3	<3	<3								-	-	-	<3	mg/kg	TM173/PM0
Sulphate as SO4 #	7	<5	<5								1000	20000	50000	<5	mg/kg	TM38/PM0
Chloride #	<3	<3	<3								800	15000	25000	<3	mg/kg	TM38/PM0

All solid results are expressed on a dry weight basis unless stated otherwise.

Client Name: Ground Investigations Ireland

Reference: 9225-11-19

Location: Hackettstown

Contact: Mike Sutton

Matrix : Solid

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	EPH Interpretation
19/19841	1	TP05	0.50	1-3	No interpretation possible
19/19841	1	TP06	0.50	4-6	No interpretation possible
19/19841	1	TP10	0.50	7-9	No interpretation possible

Client Name: Ground Investigations Ireland
Reference: 19/11/9225
Location: Hackettstown
Contact: Mike Sutton

Note:

Asbestos Screen analysis is carried out in accordance with our documented in-house methods PM042 and TM065 and HSG 248 by Stereo and Polarised Light Microscopy using Dispersion Staining Techniques and is covered by our UKAS accreditation. Detailed Gravimetric Quantification and PCOM Fibre Analysis is carried out in accordance with our documented in-house methods PM042 and TM131 and HSG 248 using Stereo and Polarised Light Microscopy and Phase Contrast Optical Microscopy (PCOM). Samples are retained for not less than 6 months from the date of analysis unless specifically requested.

Opinions, including ACM type and Asbestos level less than 0.1%, lie outside the scope of our UKAS accreditation.

Where the sample is not taken by a Element Materials Technology consultant, Element Materials Technology cannot be responsible for inaccurate or unrepresentative sampling.

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Date Of Analysis	Analysis	Result
19/19841	1	TP05	0.50	2	05/12/2019	**General Description (Bulk Analysis)**	Soil/Stone
					05/12/2019	**Asbestos Fibres**	NAD
					05/12/2019	**Asbestos ACM**	NAD
					05/12/2019	**Asbestos Type**	NAD
					05/12/2019	**Asbestos Level Screen**	NAD
19/19841	1	TP06	0.50	5	05/12/2019	**General Description (Bulk Analysis)**	Soil/Stone
					05/12/2019	**Asbestos Fibres**	NAD
					05/12/2019	**Asbestos ACM**	NAD
					05/12/2019	**Asbestos Type**	NAD
					05/12/2019	**Asbestos Level Screen**	NAD
19/19841	1	TP10	0.50	8	05/12/2019	**General Description (Bulk Analysis)**	Soil/Stone
					05/12/2019	**Asbestos Fibres**	NAD
					05/12/2019	**Asbestos ACM**	NAD
					05/12/2019	**Asbestos Type**	NAD
					05/12/2019	**Asbestos Level Screen**	NAD

Client Name: Ground Investigations Ireland
Reference: 9225-11-19
Location: Hackettstown
Contact: Mike Sutton

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Analysis	Reason
No deviating sample report results for job 19/19841						

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.: 19/19841

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, this result is not accredited.
*	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

EMT Job No: 19/19841

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
PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35°C or 105°C. Calculation based on ISO 11465 and BS1377.	PM0	No preparation is required.			AR	
TM4	Modified USEPA 8270 method for the solvent extraction and determination of PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.			AR	Yes
TM4	Modified USEPA 8270 method for the solvent extraction and determination of PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes		AR	Yes
TM5	Modified 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GCFID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM16	Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.			AR	
TM5	Modified 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GCFID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM8/PM16	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required/Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.			AR	Yes
TM5	Modified 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GCFID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM8/PM16	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required/Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.	Yes		AR	Yes
TM5/TM36	please refer to TM5 and TM36 for method details	PM8/PM12/PM16	please refer to PM8/PM16 and PM12 for method details			AR	Yes
TM17	Modified US EPA method 8270. Determination of specific Polychlorinated Biphenyl congeners by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes		AR	Yes
TM20	Modified BS 1377-3: 1990/USEPA 160.3 Gravimetric determination of Total Dissolved Solids/Total Solids	PM0	No preparation is required.	Yes		AR	Yes
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.	Yes		AD	Yes

EMT Job No: 19/19841

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
TM26	Determination of phenols by Reversed Phased High Performance Liquid Chromatography and Electro-Chemical Detection.	PM0	No preparation is required.			AR	Yes
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7, 6010B and BS EN ISO 11885 2009	PM15	Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 °C. Samples containing asbestos are not dried and ground.			AD	Yes
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7, 6010B and BS EN ISO 11885 2009	PM15	Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 °C. Samples containing asbestos are not dried and ground.	Yes		AD	Yes
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7, 6010B and BS EN ISO 11885 2009	PM17	Modified method BS EN12457-2 As received solid samples are leached with water in a 10:1 water to soil ratio for 24 hours, the moisture content of the sample is included in the ratio.	Yes		AR	Yes
TM31	Modified USEPA 8015B. Determination of Methyltertbutylether, Benzene, Toluene, Ethylbenzene and Xylene by headspace GC-FID.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes
TM31	Modified USEPA 8015B. Determination of Methyltertbutylether, Benzene, Toluene, Ethylbenzene and Xylene by headspace GC-FID.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes		AR	Yes
TM36	Modified US EPA method 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GCFID co-elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE results can be confirmed using GCMS.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes
TM36	Modified US EPA method 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GCFID co-elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE results can be confirmed using GCMS.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes		AR	Yes
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods 325.2 (Chloride), 375.4 (Sulphate), 365.2 (o-Phosphate), 353.1 (TON), 354.1 (Nitrite), 350.1 (NH4+) comparable to BS ISO 15923-1, 7196A (Hex Cr)	PM0	No preparation is required.	Yes		AR	Yes
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods 325.2 (Chloride), 375.4 (Sulphate), 365.2 (o-Phosphate), 353.1 (TON), 354.1 (Nitrite), 350.1 (NH4+) comparable to BS ISO 15923-1, 7196A (Hex Cr)	PM20	Extraction of dried and ground or as received samples with deionised water in a 2:1 water to solid ratio using a reciprocal shaker for all analytes except hexavalent chromium. Extraction of as received sample using 10:1 ratio of 0.2M sodium hydroxide to soil for hexavalent chromium using a reciprocal shaker.	Yes		AR	Yes

EMT Job No: 19/19841

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
TM60	TC/TOC analysis of Waters by High Temperature Combustion followed by NDIR detection. Based on the following modified standard methods: USEPA 9060, APHA Standard Methods for Examination of Water and Wastewater 5310B, ASTM D 7573, and USEPA 415.1.	PM0	No preparation is required.			AR	Yes
TM61	Modified US EPA methods 245.7 and 200.7. Determination of Mercury by Cold Vapour Atomic Fluorescence.	PM0	No preparation is required.	Yes		AR	Yes
TM65	Asbestos Bulk Identification method based on HSG 248.	PM42	Solid samples undergo a thorough visual inspection for asbestos fibres prior to asbestos identification using TM065.	Yes		AR	
TM73	Modified US EPA methods 150.1 and 9045D and BS1377:1990. Determination of pH by Metrohm automated probe analyser.	PM0	No preparation is required.			AR	Yes
TM73	Modified US EPA methods 150.1 and 9045D and BS1377:1990. 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
TM173	Analysis of fluoride by ISE (Ion Selective Electrode) using modified ISE method 340.2	PM0	No preparation is required.			AR	Yes
NONE	No Method Code	NONE	No Method Code			AD	Yes
NONE	No Method Code	PM17	Modified method BS EN12457-2 As received solid samples are leached with water in a 10:1 water to soil ratio for 24 hours, the moisture content of the sample is included in the ratio.				
NONE	No Method Code	PM17	Modified method BS EN12457-2 As received solid samples are leached with water in a 10:1 water to soil ratio for 24 hours, the moisture content of the sample is included in the ratio.			AR	
NONE	No Method Code	PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35°C or 105°C. Calculation based on ISO 11465 and BS1377.			AR	

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

Attention :	Mike Sutton
Date :	13th December, 2019
Your reference :	9225-11-19
Our reference :	Test Report 19/19816 Batch 1
Location :	Hackettstown
Date samples received :	4th December, 2019
Status :	Final report
Issue :	1

Two samples were received for analysis on 4th December, 2019 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:

Phil Sommerton BSc
Senior Project Manager

Element Materials Technology

Client Name: Ground Investigations Ireland
Reference: 9225-11-19
Location: Hackettstown
Contact: Mike Sutton
EMT Job No: 19/19816

Report : Solid

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

EMT Sample No.	1	2									LOD/LOR	Units	Method No.
Sample ID	TP11	TPI 14											
Depth	1.50	1.50											
COC No / misc													
Containers	T	T											
Sample Date	03/12/2019	03/12/2019											
Sample Type	Soil	Soil											
Batch Number	1	1											
Date of Receipt	04/12/2019	04/12/2019											
Sulphate as SO4 (2:1 Ext) #	0.0158	0.0099									<0.0015	g/l	TM38/PM20
pH #	7.50	7.70									<0.01	pH units	TM73/PM11

Please see attached notes for all abbreviations and acronyms

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: 9225-11-19
Location: Hackettstown
Contact: Mike Sutton

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Analysis	Reason
No deviating sample report results for job 19/19816						

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.: 19/19816

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, this result is not accredited.
*	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

EMT Job No: 19/19816

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
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods 325.2 (Chloride), 375.4 (Sulphate), 365.2 (o-Phosphate), 353.1 (TON), 354.1 (Nitrite), 350.1 (NH4+) comparable to BS ISO 15923-1, 7196A (Hex Cr)	PM20	Extraction of dried and ground or as received samples with deionised water in a 2:1 water to solid ratio using a reciprocal shaker for all analytes except hexavalent chromium. Extraction of as received sample using 10:1 ratio of 0.2M sodium hydroxide to soil for hexavalent chromium using a reciprocal shaker.	Yes		AD	Yes
TM73	Modified US EPA methods 150.1 and 9045D and BS1377:1990. 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

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Catherinestown House
Hazelhatch Road
Newcastle
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Ireland

Attention :	Mike Sutton
Date :	1st June, 2020
Your reference :	9225-11-19
Our reference :	Test Report 20/6499 Batch 1
Location :	Hackettstown, Skerries
Date samples received :	22nd May, 2020
Status :	Final report
Issue :	1

Four samples were received for analysis on 22nd May, 2020 of which four 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:

Phil Sommerton BSc
Senior Project Manager

Element Materials Technology

Client Name: Ground Investigations Ireland
Reference: 9225-11-19
Location: Hackettstown, Skerries
Contact: Mike Sutton
EMT Job No: 20/6499

Report : Liquid

Liquids/products: V=40ml vial, G=glass bottle, P=plastic bottle
$H=H_2SO_4$, Z=ZnAc, N=NaOH, HN=$HN0_3$

EMT Sample No.	1-8	9-16	17-24	25-32							LOD/LOR	Units	Method No.
Sample ID	BH07	BH101	BH103	RC09									
Depth													
COC No / misc													
Containers	V H HNUF HCL Z P G	V H HNUF HCL Z P G	V H HNUF HCL Z P G	V H HNUF HCL Z P G									
Sample Date	20/05/2020	20/05/2020	20/05/2020	20/05/2020									
Sample Type	Ground Water	Ground Water	Ground Water	Ground Water									
Batch Number	1	1	1	1									
Date of Receipt	22/05/2020	22/05/2020	22/05/2020	22/05/2020									
Dissolved Arsenic #	<2.5	2.7	<2.5	<2.5							<2.5	ug/l	TM30/PM14
Dissolved Boron	70	56	53	35							<12	ug/l	TM30/PM14
Dissolved Cadmium #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM30/PM14
Total Dissolved Chromium #	<1.5	<1.5	<1.5	<1.5							<1.5	ug/l	TM30/PM14
Dissolved Copper #	<7	<7	<7	<7							<7	ug/l	TM30/PM14
Dissolved Lead #	<5	<5	<5	<5							<5	ug/l	TM30/PM14
Dissolved Magnesium #	12.5	17.7	17.7	17.6							<0.1	mg/l	TM30/PM14
Dissolved Manganese #	161	34	199	2							<2	ug/l	TM30/PM14
Dissolved Mercury #	<1	<1	<1	<1							<1	ug/l	TM30/PM14
Dissolved Nickel #	2	2	6	<2							<2	ug/l	TM30/PM14
Dissolved Potassium #	3.4	5.0	1.7	0.7							<0.1	mg/l	TM30/PM14
Dissolved Zinc #	<3	<3	<3	<3							<3	ug/l	TM30/PM14
PAH MS													
Naphthalene #	<0.1	<0.1	<0.1	<0.1							<0.1	ug/l	TM4/PM30
Acenaphthylene #	<0.013	<0.013	<0.013	<0.013							<0.013	ug/l	TM4/PM30
Acenaphthene #	<0.013	<0.013	<0.013	<0.013							<0.013	ug/l	TM4/PM30
Fluorene #	<0.014	<0.014	<0.014	<0.014							<0.014	ug/l	TM4/PM30
Phenanthrene #	<0.011	<0.011	<0.011	<0.011							<0.011	ug/l	TM4/PM30
Anthracene #	<0.013	<0.013	<0.013	<0.013							<0.013	ug/l	TM4/PM30
Fluoranthene #	<0.012	<0.012	0.012	<0.012							<0.012	ug/l	TM4/PM30
Pyrene #	0.030	<0.013	<0.013	<0.013							<0.013	ug/l	TM4/PM30
Benzo(a)anthracene #	<0.015	<0.015	<0.015	<0.015							<0.015	ug/l	TM4/PM30
Chrysene #	<0.011	<0.011	<0.011	<0.011							<0.011	ug/l	TM4/PM30
Benzo(bk)fluoranthene #	<0.018	<0.018	<0.018	<0.018							<0.018	ug/l	TM4/PM30
Benzo(a)pyrene #	<0.016	<0.016	<0.016	<0.016							<0.016	ug/l	TM4/PM30
Indeno(123cd)pyrene #	<0.011	<0.011	<0.011	<0.011							<0.011	ug/l	TM4/PM30
Dibenzo(ah)anthracene #	<0.01	<0.01	<0.01	<0.01							<0.01	ug/l	TM4/PM30
Benzo(ghi)perylene #	<0.011	<0.011	<0.011	<0.011							<0.011	ug/l	TM4/PM30
PAH 16 Total #	<0.195	<0.195	<0.195	<0.195							<0.195	ug/l	TM4/PM30
Benzo(b)fluoranthene	<0.01	<0.01	<0.01	<0.01							<0.01	ug/l	TM4/PM30
Benzo(k)fluoranthene	<0.01	<0.01	<0.01	<0.01							<0.01	ug/l	TM4/PM30
PAH Surrogate % Recovery	76	76	76	76							<0	%	TM4/PM30
MTBE #	<5	<5	<5	<5							<5	ug/l	TM36/PM12
Benzene #	<5	<5	<5	<5							<5	ug/l	TM36/PM12
Toluene #	<5	<5	<5	<5							<5	ug/l	TM36/PM12
Ethylbenzene #	<5	<5	<5	<5							<5	ug/l	TM36/PM12
m/p-Xylene #	<5	<5	<5	<5							<5	ug/l	TM36/PM12
o-Xylene #	<5	<5	<5	<5							<5	ug/l	TM36/PM12

Please see attached notes for all abbreviations and acronyms

Element Materials Technology

Client Name: Ground Investigations Ireland
Reference: 9225-11-19
Location: Hackettstown, Skerries
Contact: Mike Sutton
EMT Job No: 20/6499

Report : Liquid

Liquids/products: V=40ml vial, G=glass bottle, P=plastic bottle
H=H_2SO_4, Z=ZnAc, N=NaOH, HN=$HN0_3$

Please see attached notes for all abbreviations and acronyms

EMT Sample No.	1-8	9-16	17-24	25-32							LOD/LOR	Units	Method No.
Sample ID	BH07	BH101	BH103	RC09									
Depth													
COC No / misc													
Containers	V H HNUF HCL Z P G	V H HNUF HCL Z P G	V H HNUF HCL Z P G	V H HNUF HCL Z P G									
Sample Date	20/05/2020	20/05/2020	20/05/2020	20/05/2020									
Sample Type	Ground Water	Ground Water	Ground Water	Ground Water									
Batch Number	1	1	1	1									
Date of Receipt	22/05/2020	22/05/2020	22/05/2020	22/05/2020									
TPH CWG													
Aliphatics													
>C5-C6 #	<10	<10	<10	<10							<10	ug/l	TM36/PM12
>C6-C8 #	<10	<10	<10	<10							<10	ug/l	TM36/PM12
>C8-C10 #	<10	<10	<10	<10							<10	ug/l	TM36/PM12
>C10-C12 #	<5	<5	<5	<5							<5	ug/l	TM5/PM16/PM30
>C12-C16 #	<10	<10	<10	<10							<10	ug/l	TM5/PM16/PM30
>C16-C21 #	<10	<10	<10	<10							<10	ug/l	TM5/PM16/PM30
>C21-C35 #	<10	<10	<10	<10							<10	ug/l	TM5/PM16/PM30
Total aliphatics C5-35 #	<10	<10	<10	<10							<10	ug/l	TM5/TM36/PM12/PM16/PM30
Aromatics													
>C5-EC7 #	<10	<10	<10	<10							<10	ug/l	TM36/PM12
>EC7-EC8 #	<10	<10	<10	<10							<10	ug/l	TM36/PM12
>EC8-EC10 #	<10	<10	<10	<10							<10	ug/l	TM36/PM12
>EC10-EC12 #	<5	<5	<5	<5							<5	ug/l	TM5/PM16/PM30
>EC12-EC16 #	<10	<10	<10	<10							<10	ug/l	TM5/PM16/PM30
>EC16-EC21 #	<10	<10	<10	<10							<10	ug/l	TM5/PM16/PM30
>EC21-EC35 #	<10	<10	<10	<10							<10	ug/l	TM5/PM16/PM30
Total aromatics C5-35 #	<10	<10	<10	<10							<10	ug/l	TM5/TM36/PM12/PM16/PM30
Total aliphatics and aromatics(C5-35) #	<10	<10	<10	<10							<10	ug/l	TM5/TM36/PM12/PM16/PM30
Total Phenols HPLC	<0.15	<0.15	<0.15	<0.15							<0.15	mg/l	TM26/PM0
Sulphate as SO4 #	26.2	60.1	89.9	21.3							<0.5	mg/l	TM38/PM0
Chloride #	31.2	27.0	49.6	51.2							<0.3	mg/l	TM38/PM0
Nitrate as NO3 #	26.2	45.4	65.2	26.8							<0.2	mg/l	TM38/PM0
Total Cyanide #	<0.01	<0.01	<0.01	<0.01							<0.01	mg/l	TM89/PM0
Ammoniacal Nitrogen as NH3 #	<0.03	<0.03	0.13	<0.03							<0.03	mg/l	TM38/PM0
Ammoniacal Nitrogen as NH4 #	0.03	<0.03	0.14	<0.03							<0.03	mg/l	TM38/PM0
Carbonate Alkalinity as CaCO3	<1	<1	<1	<1							<1	mg/l	TM75/PM0
Electrical Conductivity @25C #	522	487	483	400							<2	uS/cm	TM76/PM0
pH #	7.64	7.82	7.79	7.63							<0.01	pH units	TM73/PM0

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: 9225-11-19
Location: Hackettstown, Skerries
Contact: Mike Sutton

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Analysis	Reason
No deviating sample report results for job 20/6499						

Please note that only samples that are deviating are mentioned in this report. If no samples are listed it is because none were deviating.
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NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

EMT Job No.: 20/6499

SOILS

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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.

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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.

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

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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

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SA	ISO17025 (SANAS Ref No.T0729) accredited - South Africa
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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, this result is not accredited.
*	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

EMT Job No: 20/6499

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
TM4	Modified USEPA 8270D v5:2014 method for the solvent extraction and determination of PAHs by GC-MS.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.				
TM4	Modified USEPA 8270D v5:2014 method for the solvent extraction and determination of PAHs by GC-MS.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.	Yes			
TM5	Modified 8015B v2:1996 method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GCFID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM16/PM30	Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE/Water samples are extracted with solvent using a magnetic stirrer to create a vortex.	Yes			
TM5/TM36	please refer to TM5 and TM36 for method details	PM12/PM16/PM30	please refer to PM16/PM30 and PM12 for method details	Yes			
TM26	Determination of phenols by Reversed Phased High Performance Liquid Chromatography and Electro-Chemical Detection.	PM0	No preparation is required.				
TM30	Determination of Trace Metals by ICP-OES (Inductively Coupled Plasma – Optical Emission Spectrometry): WATERS by Modified USEPA Method 200.7, Rev. 4.4, 1994; Modified EPA Method 6010B, Rev.2, Dec 1996; Modified BS EN ISO 11885:2009: SOILS by Modified USEP	PM14	Preparation of waters and leachates for metals by ICP OES/ICP MS. Samples are filtered for Dissolved metals, and remain unfiltered for Total metals then acidified				
TM30	Determination of Trace Metals by ICP-OES (Inductively Coupled Plasma – Optical Emission Spectrometry): WATERS by Modified USEPA Method 200.7, Rev. 4.4, 1994; Modified EPA Method 6010B, Rev.2, Dec 1996; Modified BS EN ISO 11885:2009: SOILS by Modified USEP	PM14	Preparation of waters and leachates for metals by ICP OES/ICP MS. Samples are filtered for Dissolved metals, and remain unfiltered for Total metals then acidified	Yes			
TM36	Modified US EPA method 8015B v2:1996. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GCFID co-elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE re	PM12	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.	Yes			
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods: Chloride 325.2 (1978), Sulphate 375.4 (Rev.2 1993), o-Phosphate 365.2 (Rev.2 1993), TON 353.1 (Rev.2 1993), Nitrite 354.1 (1971), Hex Cr 7196A (1992), NH4+ 350.1 (Rev.2 1993 (comparabl	PM0	No preparation is required.	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.	PM0	No preparation is required.	Yes			

EMT Job No: 20/6499

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
TM75	Modified US EPA method 310.1 (1978). Determination of Alkalinity by Metrohm automated titration analyser.	PM0	No preparation is required.				
TM76	Modified US EPA method 120.1 (1982). Determination of Specific Conductance by Metrohm automated probe analyser.	PM0	No preparation is required.	Yes			
TM89	Modified USEPA method OIA-1667 (1999). Determination of cyanide by Flow Injection Analyser. Where WAD cyanides are required a Ligand displacement step is carried out before analysis.	PM0	No preparation is required.	Yes			

APPENDIX 7 – Groundwater Monitoring

GROUND INVESTIGATIONS IRELAND
Geotechnical & Environmental

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GROUNDWATER MONITORING

Hackettstown, Skerries

BOREHOLE	DATE	TIME	GROUNDWATER (m BGL)	Comments
BH03	20/05/2020	12:54	0.97	Dry weather for several weeks previous to monitoring
BH05	20/05/2020	13:45	2.66	
BH07	20/05/2020	12:46	0.97	
RC09	20/05/2020	14:15	5.15	