

Appendix A IGSL Ground Investigation

**FACTUAL REPORT ON A SITE INVESTIGATION
FOR A PROPOSED DEVELOPMENT
AT KILBRIDE
ARKLOW**

**FOR
AECOM
CONSULTING ENGINEERS**

Report No. 21948

August 2019

I Introduction

A major new residential development is proposed for a site at Kilbride, Arklow, Co. Wicklow.

An investigation of sub soil conditions in the area of the new development has been carried out by IGSL for AECOM Consulting Engineers, on behalf of Lioncor Developments Limited.

The scheduled site investigation included the following elements:

- | | |
|------------------------------------|-------|
| * Cable Percussion Borehole | 6 nr. |
| • Trial Pit Excavations | 8 nr. |
| • CBR by TRL Probe | 4 nr. |
| • BRE Digest 365 Percolation | 6 nr. |
| • Ground Water and Gas Monitoring | |
| • Geotechnical Laboratory Testing | |
| • Environmental Laboratory Testing | |

This report includes all factual data from field operations and laboratory and discusses these findings relative to the proposed new development.

II Fieldwork

The development is to take place on a greenfield site located at Kilbride, Arklow, County Wicklow. The area is quite extensive and sloping southwards towards the Avoca River. The low lying area north of the river is extremely boggy and wet and presented access difficulties for the IGSL equipment.

The site and the proposed exploratory locations are noted on the drawing and aerial map enclosed in Appendix VII. The drawing was provided by AECOM.

The various elements of the investigation are detailed in the following paragraphs. All field works were supervised by an experienced geotechnical engineer who carefully recorded stratification, recovered samples as required and prepared detailed records.

Each location was scanned electronically (CAT) to ensure that existing services were not damaged. The locations are also referenced to National Grid Co-ordinates.

Boreholes

Boreholes were 200mm diameter and were constructed using conventional cable percussion equipment. Holes were referenced BH01 to BH06 and were spaced out over the site area.

Detailed geotechnical records are contained in Appendix I to this report - the records give details of stratification, sampling, in-situ testing and groundwater. Note is also taken of any obstructions to normal boring requiring the use of the heavy chisel for advancement. It was not possible to recover undisturbed samples because of the high stone/cobble content of the strata encountered.

Boreholes BH01 and BH02 were located to the south of the site and both encountered surface topsoil and firm clay to approximately 2.00 metres. Medium dense to dense GRAVEL was noted from 1.00 to 3.80 metres. Stiff brown sandy gravelly CLAY was then noted, continuing to final refusal depths of 7.30 and 8.10 metres.

Boreholes BH03, BH04 and BH06 consistently identified stiff brown gravelly CLAY under shallow surface topsoil. The gravelly clay continued to depths between 6.00 and 7.00 metres. A stratum of dense GRAVEL underlies the gravelly clay at BH 06.

Finally at BH05 the stratification was quite different, with top soil overlying bands of loose sand and soft silty clay. At 4.50 metres dense sandy GRAVEL was noted with borehole refusal recorded at 5.90 metres BGL.

The final borehole refusal depths may be indicative of bedrock horizon. Proof core drilling was not scheduled as part of this investigation.

Ground Water / Standpipe Installation

Ground water was encountered in BHs 01, 02 and 06, generally in association with the granular soils. Relevant details are noted on the individual boring records. The remaining boreholes were dry during the construction period.

Slotted and sealed standpipes were installed in three boreholes to facilitate ground water and gas observation. Installation details are noted on the individual boring records and readings taken at intervals are presented in Appendix V.

Trial Pits

Pits were excavated using an 8 tonne tracked excavator under engineering supervision. Detailed trial pit logs with photographs are enclosed in Appendix II.

Surface top soil (400mm) overlies soft to firm mottled grey brown gravelly SILT/CLAY with strength increasing to firm/stiff below about 1.00 metre. Excavations continued to a final scheduled depth of 3.00 metres with no ground water encountered and side wall stability throughout.

Variations to the above were noted at TP03, TP07 and TP08 . At TP03 a stratum of silty SAND was noted below the clay from 2.20 to 3.50 metres. A layer of sandy GRAVEL was noted within the clay stratum at BH07, extending from 1.50 to 2.60 metres. Finally at TP08 soft SILT and loose SAND extends below top soil to 1.00 metre where the gravelly clay stratum commences.

Ground water ingress was noted in each trial pit, recorded as light seepages at depths between 1.00 and 2.00 metres.

Trial Pits were excavated to depths ranging from 3.00 to 3.50 metres. Excavations in the cohesive soils were generally quite stable. Some instability was noted in areas where granular material was encountered.

In Situ CBR by Dynamic Cone Penetrometer

The CBR value of the soils at shallow depth was established at five locations using a Dynamic Cone Penetrometer. Testing was carried out approximately 0.50 metres BGL. The test data is processed and an equivalent CBR value is calculated. Results are summarised in the following table and detailed records are presented in Appendix III.

Test No.	Depth	CBR (%)
DCP 01	0.60	27.3
DCP 02	0.50	9.9
DCP 03	0.50	8.5
DCP 04	0.60	32.3
DCP 05	0.50	8.3

Percolation Test / BRE DIGEST 365

Infiltration testing was performed at six locations in accordance with BRE Digest 365 'Soakaway Design'. Testing was carried out in Trial Pits 02, 03, 04, 06, 07 and 8.

To obtain a measure of the infiltration rate of the sub-soils, water is poured into the test pits, and records taken of the fall in water level against time. The tests are carried over two cycles following initial soakage. Designs are based on the slowest infiltration rate, which is generally calculated from the final cycle.

The infiltration rate is the volume of water dispersed per unit exposed area per unit of time, and is generally expressed as metres/minute or metres/second. In these calculations the exposed area is the sum of the base area and the average internal area of the pit sides over the test duration.

In all six locations the test medium comprised firm to stiff gravelly CLAY. No fall in water level was observed in the relatively impermeable soils. The tests are therefore classed as failures. The results are typical of the extremely low permeability boulder clay forming the stratification in the site area. Full details are contained in Appendix IV.

Water and Gas Monitoring

Standpipes were installed at BH02, BH03 and BH05 to facilitate observation and measurement of ground water levels and gas concentrations.

The site was re-visited at intervals following the installations and readings taken in the standpipes.

Ground water levels were measured using a electronic dip-meter. A Geotech GA500 Infra-Red gas monitor was used to determine gas levels (CH₄, CO₂, O₂, CO, H₂S).

Detailed records for each site visit are presented in Appendix V.

III. Testing

a. In - Situ

Standard penetration tests were carried out at approximate 1.00 metre intervals in the geotechnical boreholes to measure relative in-situ soil strength. N values are noted in the right hand column of the boring records, representing the blow count required to drive the standard sampler 300mm into the soil, following initial seating blows. Where full test penetration was not achieved the blow count for a specific penetration is recorded, or refusal is indicated where appropriate. The results of the tests are summarised as follows:

STRATUM	N VALUE RANGE	COMMENT
Brown gravelly SILT / CLAY (excluding BH05)		
1.00 metre BGL	8 to 19	Firm to Stiff
2.00 metre BGL	20 to 24	Stiff
3.00 metres BGL	28 to 34	Stiff to very Stiff
4.00 metres BGL	18 to 34	Stiff to very Stiff
> 5.00 metres BGL	17 to 50	Stiff to Hard

Limited penetration SPT tests were occasionally recorded on cobbles or boulders within the boulder clay.

SPT tests in the GRAVEL zones found in BH01 and BH02 recorded N values ranging from 18 to 31.

The SAND stratum noted in BH05 from 0.20 to 2.50 metres is loosely compacted with SPT values of N=5 and N=6. The underlying SILT CLAY at this location is soft to firm in consistence with N = 7 and N = 12 recorded.

Laboratory

A programme of laboratory testing was scheduled following completion of site operations. Testing was in accordance with the requirements of the Bill of Materials. Geotechnical testing was carried out by IGSL in its INAB-Accredited laboratory. Environmental and chemical testing was carried out in the UK by CHEMTEST Ltd. The test programme included the following elements:

- Liquid and Plastic Limits / Moisture Content
- PSD Grading by wet sieve and hydrometer.
- Compaction
- MCV
- CBR
- Sulphate Chloride and pH (BRE SO1 Suite)
- Environmental Test Suite 1
- Environmental Test Suite 2 (RILTA)

Individual test results are discussed in the following paragraphs.

Classification

Twenty two samples of the cohesive soils from the boreholes and trial pits had index properties established. A high degree of consistency was established with all results plotting in the CI / CL Zones of the Casagrande Classification indicative of sensitive low plasticity clay matrix material. Natural Moisture content ranged from 13 to 25%, but more typically from 16 to 20%.

Grading

Wet sieve with hydrometer analysis was used to establish PSD grading curves for a number of samples of both the gravelly CLAY and sandy GRAVEL soils

Generally the cohesive samples have a straight-line pattern with smooth grading from the clay to gravel fraction. The graphs are typical of heterogeneous glacial till or boulder clay.

Samples from the granular zones reflect material graded through the sand and gravel fraction with 0 to 15% passing to the fine silt/clay fraction.

Dry Density/ Moisture Content Relationship

Compaction testing was scheduled on three samples of the boulder clay. Tests were carried out in accordance with BS1377 Part 4 1990 using a 2.5 Kg Rammer.

The results indicate Maximum Dry Density ranging from 1.81 to 1.98 Mg/cu.m. with Optimum Moisture Contents ranging from 8 to 15%.

Moisture Condition Value (MCV)

Five trial pit samples had MCV values and natural moisture content established. Results reflect quite a variation in MCV from a low of 3 to a maximum of 10.7.

CBR

CBR values were determined for several samples taken in the trial pits at depths between 0.60 and 1.00 metres. Material was compacted in the CBR moulds using Static Compaction method 2.

The results are presented in detail on individual record sheets and are summarised as follows:

Location	Depth of Test	Average CBR %	Moisture Content %
TP01	0.90	2	20
TP02	1.00	3.2	18
TP03	1.00	1.3	16
TP04	0.60	8	17
TP05	1.00	4.4	21
TP06	1.00	45	11
TP07	1.00	1.8	14

The high CBR value from TP06 was from a SANDY / GRAVEL material, the remaining tests were carried out on brown gravelly CLAY.

Sulphate and pH.

Eight samples were selected for BRE SO1 sulphate chloride and pH analysis. Sulphate concentrations (SO₄ 2:1 extract) of < 0.010 g/l were established with pH values of 7.6 to 8. Chloride contents were also consistently <0.010 g/l. No special precautions are necessary to protect foundation concrete from sulphate or chloride aggression. A design class of DS-1 (ACEC Classification for Concrete) is indicated for sulphate concentrations less than 0.5 g/l.

Environmental Test Suite 1

Six samples were scheduled for testing by AECOM in accordance with Environmental Tests Suite I. Testing was carried out by CHEMTEST and the results are presented in detail in the Appendix.

Environmental Test Suite 2 (RILTA)

Two soil samples were submitted for detailed environmental analysis to RILTA (WAC) parameters. The results confirm that the material can be classified as INERT with no elevated contaminant levels recorded.

No asbestos traces were found during routine screening.

IGSL/JC
FEB 2020

Appendix I Boring Records



GEOTECHNICAL BORING RECORD

REPORT NUMBER

22153

CONTRACT Kilbride, Co. Wicklow				BOREHOLE NO. BH01	
CO-ORDINATES 724,196.05 E 674,388.54 N		RIG TYPE DANDO 2000		SHEET Sheet 1 of 1	
GROUND LEVEL (mOD) 4.72		BOREHOLE DIAMETER (mm) 200		DATE COMMENCED 06/12/2019	
		BOREHOLE DEPTH (m) 7.30		DATE COMPLETED 09/12/2019	
CLIENT Lioncor		SPT HAMMER REF. NO.		BORED BY P.THOMAS	
ENGINEER Aecom		ENERGY RATIO (%)		PROCESSED BY V.L	

Depth (m)	Description	Legend	Elevation	Depth (m)	Samples				Field Test Results	Standpipe Details
					Ref. Number	Sample Type	Depth (m)	Recovery		
0	TOPSOIL		4.42	0.30						
	Brown, very sandy SILT/CLAY		4.02	0.70	AA121843	ENV	0.50			
1	Dense grey/brown fine to coarse sandy GRAVEL with cobbles				AA121844	ENV	1.00		N = 31 (5, 9, 9, 7, 7, 8)	
					AA121845	B	1.00			
					AA121846	ENV	1.50			
2					AA121847	B	2.00			
3	Stiff to very stiff, brown, gravelly CLAY with cobbles				AA121848	B	3.00		N = 30 (3, 5, 5, 6, 9, 10)	
					AA121848	B	3.00			
					AA121848	B	3.00			
					AA121848	B	3.00			
4			1.02	3.70	AA121849	B	4.00		N = 50/225 mm (4, 3, 8, 16, 26)	
					AA121849	B	4.00			
					AA121850	B	5.00			
					AA121850	B	5.00			
5					AA126801	B	6.00		N = 33 (3, 3, 5, 5, 9, 14)	
					AA126801	B	6.00			
					AA126801	B	6.00			
					AA126801	B	6.00			
6			-2.08	6.80	AA126802	B	7.00		N = 33 (3, 3, 5, 5, 9, 14)	
					AA126802	B	7.00			
					AA126802	B	7.00			
					AA126802	B	7.00			
7	Dense angular clayey GRAVEL with broken angular cobbles		-2.58	7.30	AA126802	B	7.00		N = 50/150 mm (8, 16, 19, 31)	
	Obstruction									
	End of Borehole at 7.30 m									

HARD STRATA BORING/CHISELLING

WATER STRIKE DETAILS

From (m)	To (m)	Time (h)	Comments	Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
2.90	3.30	1.5		2.50	2.50	3.70	2.40	20	Slow
7.00	7.30	2		6.80	6.80	No	2.60	20	Rapid

GROUNDWATER PROGRESS

INSTALLATION DETAILS					Date	Hole Depth	Casing Depth	Depth to Water	Comments
Date	Tip Depth	RZ Top	RZ Base	Type					

REMARKS CAT scanned location and hand dug inspection pit carried out .
Tracked dumper required to move rig on soft ground . 3 hrs
moving rig into position .

Sample Legend

D - Small Disturbed (Tub)
B - Bulk Disturbed
LB - Large Bulk Disturbed
Env - Environmental Sample (Jar + Vial + Tub)

UT - Undisturbed 100mm Diameter Sample
P - Undisturbed Piston Sample
W - Water Sample

IGSL BH LOG 22153 BH.GPJ IGSL.GDT 17/2/20

GEOTECHNICAL BORING RECORD										REPORT NUMBER 22153	
CONTRACT Kilbride , Co.Wicklow								BOREHOLE NO. BH02			
CO-ORDINATES 724,189.90 E 674,561.14 N				RIG TYPE DANDO 2000 BOREHOLE DIAMETER (mm) 200 BOREHOLE DEPTH (m) 8.10				SHEET Sheet 1 of 1 DATE COMMENCED 11/12/2019 DATE COMPLETED 12/12/2019			
GROUND LEVEL (mOD) 11.46											
CLIENT Lioncor ENGINEER Aecom				SPT HAMMER REF. NO. ENERGY RATIO (%)				BORED BY P.THOMAS PROCESSED BY V.L			

Depth (m)	Description	Legend	Elevation	Depth (m)	Samples				Field Test Results	Standpipe Details
					Ref. Number	Sample Type	Depth (m)	Recovery		
0	TOPSOIL		11.16	0.30						
	Firm grey/brown sandy SILT/CLAY with some gravel				AA126814	ENV	0.50		N = 12 (3, 4, 4, 3, 3, 2) N = 18 (2, 4, 5, 3, 4, 6) N = 13 (1, 1, 2, 3, 3, 5) N = 27 (3, 3, 5, 7, 7, 8) N = 49 (6, 8, 10, 11, 14, 14) N = 39 (5, 7, 8, 9, 12, 10) N = 39 (4, 9, 6, 9, 9, 15) N = 50/75 mm (15, 27, 50)	
1			10.26	1.20	AA126815	ENV	1.00			
	Medium dense grey/brown silty/clayey GRAVEL				AA126816	B	1.00			
					AA126817	ENV	1.50			
2					AA126818	B	2.00			
3	Firm brown, sandy, gravelly CLAY		8.36	3.10	AA126819	B	3.00			
	Medium dense grey fine to coarse GRAVEL		7.86	3.60						
	Stiff to very stiff brown, sandy, gravelly CLAY with some cobbles		7.66	3.80	AA126820	B	4.00			
5					AA126821	B	5.00			
6					AA126822	B	6.00			
7					AA126823	B	7.00			
8	Obstruction End of Borehole at 8.10 m		3.36	8.10	AA126824	B	8.00			
9										

HARD STRATA BORING/CHISELLING				WATER STRIKE DETAILS					
From (m)	To (m)	Time (h)	Comments	Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
5.40	5.60	0.75		1.80	1.80	3.10	0.70	20	Moderate
7.90	8.10	2		3.60	3.60	4.00	3.00	20	Moderate
				7.80	7.80	No	6.50	20	Moderate

INSTALLATION DETAILS					GROUNDWATER PROGRESS				
Date	Tip Depth	RZ Top	RZ Base	Type	Date	Hole Depth	Casing Depth	Depth to Water	Comments
12-12-19	9.10	1.00	8.10	50mm SP					

REMARKS CAT scanned location and hand dug inspection pit carried out . Tracked dumper required to move rig on soft ground . 7 hrs moving rig into position . Both rig and dumper sank in very soft ground.	Sample Legend D - Small Disturbed (tub) Sample B - Bulk Disturbed LB - Large Bulk Disturbed Env - Environmental Sample (Jar + Vial + Tub) UT - Undisturbed 100mm Diameter Sample P - Undisturbed Piston Sample W - Water Sample
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GEOTECHNICAL BORING RECORD										REPORT NUMBER 22153	
CONTRACT Kilbride, Co. Wicklow								BOREHOLE NO. BH03			
CO-ORDINATES 724,040.57 E 674,786.91 N				RIG TYPE DANDO 2000				SHEET Sheet 1 of 1			
GROUND LEVEL (mOD) 21.96				BOREHOLE DIAMETER (mm) 200				DATE COMMENCED 18/12/2019			
				BOREHOLE DEPTH (m) 6.80				DATE COMPLETED 18/12/2019			
CLIENT Lioncor				SPT HAMMER REF. NO.				BORED BY P. THOMAS			
ENGINEER Aecom				ENERGY RATIO (%)				PROCESSED BY V.L			

Depth (m)	Description	Legend	Elevation	Depth (m)	Samples				Field Test Results	Standpipe Details
					Ref. Number	Sample Type	Depth (m)	Recovery		
0	TOPSOIL		21.76	0.20						
	Brown sandy SILT/CLAY (Subsoil)		21.56	0.40						
	Soft brown very sandy SILT/CLAY with occasional gravel				AA126840	ENV	0.50		N = 6 (3, 3, 2, 2, 1, 1)	
					AA126841	ENV	1.00			
					AA126842	B	1.00			
					AA126843	ENV	1.50			
	Stiff to very stiff brown, sandy, very gravelly CLAY with occasional cobbles		20.36	1.60	AA126844	B	2.00		N = 24 (2, 3, 4, 6, 7, 7)	
					AA126845	B	3.00		N = 32 (3, 5, 7, 8, 8, 9)	
					AA126846	B	4.00		N = 34 (4, 5, 7, 7, 10, 10)	
					AA126847	B	5.00		N = 17 (3, 3, 4, 3, 4, 6)	
					AA126848	B	6.00		N = 37 (2, 4, 6, 7, 10, 14)	
					AA126849	B	6.50		N = 50/150 mm (16, 9, 29, 21)	
7	Obstruction End of Borehole at 6.80 m		15.16	6.80						

HARD STRATA BORING/CHISELLING					WATER STRIKE DETAILS				
From (m)	To (m)	Time (h)	Comments	Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
3.40	6.80	0.75							No water strike
6.50	6.80	2							

INSTALLATION DETAILS					GROUNDWATER PROGRESS				
Date	Tip Depth	RZ Top	RZ Base	Type	Date	Hole Depth	Casing Depth	Depth to Water	Comments
18-12-19	6.70	1.00	6.80	50mm SP					

REMARKS CAT scanned location and hand dug inspection pit carried out . Tracked dumper required to move rig on soft ground . 4.5 hrs moving rig into position .	Sample Legend D - Small Disturbed (tub) S - Bulk Disturbed LB - Large Bulk Disturbed Env - Environmental Sample (Jar + Vial + Tub) UT - Undisturbed 100mm Diameter Sample P - Undisturbed Piston Sample W - Water Sample
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IGSL BH LOG 22153 BH.GPJ IGSL.GDT 17/2/20

		GEOTECHNICAL BORING RECORD						REPORT NUMBER 22153	
CONTRACT Kilbride , Co.Wicklow							BOREHOLE NO. BH04		
CO-ORDINATES 724,131.75 E 674,783.45 N			RIG TYPE DANDO 2000		SHEET Sheet 1 of 1				
GROUND LEVEL (mOD) 21.12			BOREHOLE DIAMETER (mm) 200 BOREHOLE DEPTH (m) 6.30		DATE COMMENCED 17/12/2019 DATE COMPLETED 17/12/2019				
CLIENT Lioncor ENGINEER Aecom			SPT HAMMER REF. NO. ENERGY RATIO (%)		BORED BY P.THOMAS PROCESSED BY V.L				

Depth (m)	Description	Legend	Elevation	Depth (m)	Samples				Field Test Results	Standpipe Details
					Ref. Number	Sample Type	Depth (m)	Recovery		
0	TOPSOIL		20.82	0.30						
1	Stiff to very stiff grey/brown, sandy, gravelly SILT/CLAY with occasional cobbles				AA126831	ENV	0.50		N = 19 (2, 3, 3, 3, 5, 8)	
					AA126832	ENV	1.00			
					AA126833	B	1.00			
					AA126834	ENV	1.50			
2					AA126835	B	2.00		N = 20 (3, 4, 3, 4, 6, 7)	
3					AA126836	B	3.00		N = 34 (4, 6, 7, 7, 9, 11)	
4	Stiff red/grey/brown sandy gravelly CLAY		16.92	4.20	AA126837	B	4.00		N = 18 (5, 4, 4, 4, 5, 5)	
5	Stiff grey/brown very sandy gravelly CLAY with occasional cobbles				AA126838	B	5.00		N = 31 (4, 5, 7, 10, 7, 7)	
					AA126839	B	5.50			
6	Dense grey angular clayey GRAVEL with angular cobbles and some boulders		15.12	6.00					N = 50/75 mm (12, 28, 50)	
	Obstruction End of Borehole at 6.30 m		14.82	6.30						
7										
8										
9										

HARD STRATA BORING/CHISELLING				WATER STRIKE DETAILS					
From (m)	To (m)	Time (h)	Comments	Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
2.70	2.90	0.75							No water strike
6.00	6.30	2							

INSTALLATION DETAILS					GROUNDWATER PROGRESS				
Date	Tip Depth	RZ Top	RZ Base	Type	Date	Hole Depth	Casing Depth	Depth to Water	Comments

REMARKS CAT scanned location and hand dug inspection pit carried out . Tracked dumper required to move rig on soft ground . 5 hrs moving rig into position .	Sample Legend D - Small Disturbed (tub) B - Bulk Disturbed LB - Large Bulk Disturbed Env - Environmental Sample (Jar + Vial + Tub) UT - Undisturbed 100mm Diameter Sample P - Undisturbed Piston Sample W - Water Sample
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IGSL BH LOG 22153 BH.GPJ IGSL GDT 17/2/20

GEOTECHNICAL BORING RECORD										REPORT NUMBER 22153	
CONTRACT Kilbride , Co.Wicklow								BOREHOLE NO. BH05			
CO-ORDINATES 724,141.74 E 675,027.49 N				RIG TYPE DANDO 2000 BOREHOLE DIAMETER (mm) 200 BOREHOLE DEPTH (m) 5.90				SHEET Sheet 1 of 1			
GROUND LEVEL (mOD) 30.30								DATE COMMENCED 05/12/2019 DATE COMPLETED 06/12/2019			
CLIENT Lioncor ENGINEER Aecom				SPT HAMMER REF. NO. ENERGY RATIO (%)				BORED BY P.THOMAS PROCESSED BY V.L			

Depth (m)	Description	Legend	Elevation	Depth (m)	Samples				Field Test Results	Standpipe Details
					Ref. Number	Sample Type	Depth (m)	Recovery		
0	TOPSOIL		30.10	0.20						
1	Loose brown slightly silty fine to coarse SAND				AA121834	ENV	0.50		N = 6 (1, 1, 1, 2, 1, 2)	
AA121835					ENV	1.00				
AA121836					B	1.00				
AA121837					ENV	1.50				
2	Firm grey/brown very sandy SILT/CLAY		27.80	2.50	AA121838	B	2.00		N = 5 (1, 1, 1, 1, 2)	
AA121839					B	3.00				
3	Dense grey fine to coarse very silty GRAVEL with occasional cobbles		25.80	4.50	AA121840	B	4.00		N = 7 (1, 1, 2, 1, 2, 2)	
AA121841					B	5.00		N = 12 (1, 1, 2, 2, 3, 5)		
AA121842					B	5.90				
6	Obstruction End of Borehole at 5.90 m									
7										
8										
9										

HARD STRATA BORING/CHISELLING				WATER STRIKE DETAILS					
From (m)	To (m)	Time (h)	Comments	Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
4.75	4.90	0.5							No water strike
5.70	5.90	2							

INSTALLATION DETAILS					GROUNDWATER PROGRESS				
Date	Tip Depth	RZ Top	RZ Base	Type	Date	Hole Depth	Casing Depth	Depth to Water	Comments
06-12-19	5.70	1.00	5.70	50mm SP					

REMARKS CAT scanned location and hand dug inspection pit carried out . Tracked dumper required to move rig on soft ground . 2 hrs moving rig into position .	Sample Legend D - Small Disturbed (tub) B - Bulk Disturbed LB - Large Bulk Disturbed Env - Environmental Sample (Jar + Vial + Tub) UT - Undisturbed 100mm Diameter Sample P - Undisturbed Piston Sample W - Water Sample
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IGSL BH LOG 22153 BH.GPJ (IGSL.GDT 17/2/20)

GEOTECHNICAL BORING RECORD										REPORT NUMBER 22153	
CONTRACT Kilbride , Co.Wicklow								BOREHOLE NO. BH06			
CO-ORDINATES 724,362.96 E 674,648.36 N				RIG TYPE DANDO 2000 BOREHOLE DIAMETER (mm) 200 BOREHOLE DEPTH (m) 8.50				SHEET Sheet 1 of 1 DATE COMMENCED 09/12/2019 DATE COMPLETED 11/12/2019			
GROUND LEVEL (mOD) 11.85											
CLIENT Lioncor ENGINEER Aecom				SPT HAMMER REF. NO. ENERGY RATIO (%)				BORED BY P.THOMAS PROCESSED BY V.L			

Depth (m)	Description	Legend	Elevation	Depth (m)	Samples				Field Test Results	Standpipe Details			
					Ref. Number	Sample Type	Depth (m)	Recovery					
0	TOPSOIL		11.55	0.30									
	Firm to stiff SILT/CLAY with some gravel				AA126803	ENV	0.50		N = 15 (2, 3, 3, 4, 4, 4)				
1	Stiff brown gravelly CLAY with occasional cobbles		10.75	1.10	AA126804	ENV	1.00						
AA126805					B	1.00							
AA126806					ENV	1.50							
2					AA126807	B	2.00		N = 23 (3, 4, 4, 5, 7, 7)				
3					AA126808	B	3.00						
4	Brown very gravelly CLAY with cobbles (Possibly claybound gravel)		7.75	4.10	AA126809	B	4.00		N = 34 (2, 4, 6, 7, 10, 11)				
5								AA126810			B	5.00	
6								AA126811			B	6.00	
7	Dark grey fine to coardr sandy GRAVEL with cobbles		5.55	6.30					N = 31 (6, 6, 8, 7, 7, 9)				
8								AA126812			B	7.00	
9								AA126813			B	8.00	
	Obstruction End of Borehole at 8.50 m		3.35	8.50					N = 39 (5, 7, 7, 8, 10, 14)				

HARD STRATA BORING/CHISELLING				WATER STRIKE DETAILS					
From (m)	To (m)	Time (h)	Comments	Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
4.50	4.70	0.5		6.30	6.30	No	4.50	20	Rapid
7.60	7.80	0.75							
8.30	8.50	1.5							

INSTALLATION DETAILS					GROUNDWATER PROGRESS				
Date	Tip Depth	RZ Top	RZ Base	Type	Date	Hole Depth	Casing Depth	Depth to Water	Comments

REMARKS CAT scanned location and hand dug inspection pit carried out . Tracked dumper required to move rig on soft ground . 3 hrs moving rig into position .	Sample Legend D - Small Disturbed (tub) B - Bulk Disturbed LB - Large Bulk Disturbed Env - Environmental Sample (Jar + Vial + Tub) UT - Undisturbed 100mm Diameter Sample P - Undisturbed Piston Sample W - Water Sample
--	--

IGSL BH LOG 22153 BH.GPJ IGSL GDT 17/2/20

Appendix II Trial Pit Records

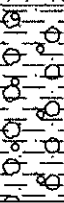
		TRIAL PIT RECORD					REPORT NUMBER 22153			
CONTRACT Kilbride						TRIAL PIT NO. TP01				
LOGGED BY V. Lowe			CO-ORDINATES 724,037.43 E 674,491.24 N			SHEET Sheet 1 of 1				
CLIENT Lioncor ENGINEER Aecom			GROUND LEVEL (m) 8.00			DATE STARTED 05/12/2019 DATE COMPLETED 05/12/2019				
						EXCAVATION METHOD 8t Excavator				
	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples			Vane Test (kPa)	Hand Penetrometer (kPa)
						Sample Ref	Type	Depth		
0.0	Dark brown TOPSOIL									
	Soft to firm brown/brownish grey sandy SILT with rare subangular to subrounded gravel		0.20	7.80						
	Firm to locally soft brown mottled grey/orange sandy slightly gravelly CLAY, gravel is subangular to rounded		0.50	7.50					88	
1.0	Firm brown/grey sandy gravelly CLAY with occasional cobbles up to 120mm, cobbles are subangular to subrounded		1.10	6.90	 (Seepage)	AA128551	B	0.90-1.00	90	
									92	
2.0	Firm to stiff light brown/brown sandy gravelly CLAY with rare cobbles and boulders up to 250mm		2.20	5.80		AA128552	B	1.90-2.00		
3.0						AA128553	B	2.90-3.00		
	End of Trial Pit at 3.20m		3.20	4.80						
4.0										

IGSL TP LOG 22153 TP.GPJ IGSL.GDT 17/2/20

Groundwater Conditions
 Seepage at 1.10m

Stability
 Stable

General Remarks
 Engineer CAT scanned area for services

		TRIAL PIT RECORD						REPORT NUMBER 22153		
CONTRACT Kilbride						TRIAL PIT NO. TP02				
LOGGED BY V. Lowe			CO-ORDINATES 724,084.99 E 674,607.52 N			SHEET Sheet 1 of 1				
CLIENT Lioncor ENGINEER Aecom			GROUND LEVEL (m) 13.64			DATE STARTED 05/12/2019 DATE COMPLETED 05/12/2019				
						EXCAVATION METHOD 8t Excavator				
	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples			Vane Test (KPa)	Hand Penetrometer (KPa)
						Sample Ref	Type	Depth		
0.0	Dark brown TOPSOIL (reworked)									
	Soft to firm brown mottled grey/orange sandy gravelly CLAY with occasional cobbles up to 170mm, gravel is subangular to rounded		0.30	13.34					50	
1.0	Firm to locally soft brown mottled grey/orange slightly sandy CLAY		1.20	12.44		AA128538	B	0.90-1.00	44	
	Firm to stiff light brown/brown sandy gravelly CLAY with rare cobbles and boulders up to 210mm		1.70	11.94	↓ (Seepage)	AA128539	B	1.50-1.60	62	
2.0						AA128540	B	2.50-2.60		
3.0	End of Trial Pit at 3.30m		3.30	10.34		AA127203	B	3.20-3.30		
4.0										
Groundwater Conditions Seepage at 1.70m										
Stability Slightly unstable down to 1.20m										
General Remarks Engineer CAT scanned area for services										

IGSL TP LOG 22153 TP.GPJ IGSLGDT 17/12/20



TRIAL PIT RECORD

REPORT NUMBER

22153

CONTRACT Kilbride

TRIAL PIT NO. TP03

LOGGED BY V. Lowe

CO-ORDINATES 724,149.91 E
674,685.57 N

SHEET Sheet 1 of 1

DATE STARTED 04/12/2019

DATE COMPLETED 04/12/2019

CLIENT Lioncor

GROUND LEVEL (m) 16.88

ENGINEER Aecom

EXCAVATION METHOD 8t Excavator

	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples			Vane Test (kPa)	Hand Penetrometer (kPa)
						Sample Ref	Type	Depth		
0.0	Dark brown TOPSOIL									
	Firm brown sandy CLAY with rare subangular to subrounded gravel		0.20	16.68						
	Firm brown mottled grey/orange sandy slightly gravelly CLAY, gravel is subangular to subrounded		0.40	16.48		AA128541	B	0.60-0.70	72	
1.0						AA128525	B	0.90-1.00	118	
									108	
	Firm brown mottled grey/orange sandy CLAY with rare subangular to subrounded gravel		1.50	15.38						
2.0						AA128526	B	1.90-2.00		
	Medium dense brown silty SAND with occasional gravel, gravel is subangular to subrounded		2.20	14.68	1 (Seepage)					
3.0						AA128527	B	2.90-3.00		
	End of Trial Pit at 3.50m		3.50	13.38						
4.0										

Groundwater Conditions
Seepage at 2.20mStability
StableGeneral Remarks
Engineer CAT scanned area for services

		TRIAL PIT RECORD						REPORT NUMBER 22153		
CONTRACT Kilbride						TRIAL PIT NO. TP04				
LOGGED BY K. Kinsella						SHEET Sheet 1 of 1				
CO-ORDINATES 724,062.45 E 674,810.62 N						DATE STARTED 04/12/2019				
GROUND LEVEL (m) 23.16						DATE COMPLETED 04/12/2019				
CLIENT Lioncor ENGINEER Aecom						EXCAVATION METHOD 8t Excavator				
	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples			Vane Test (KPa)	Hand Penetrometer (KPa)
						Sample Ref	Type	Depth		
0.0	Dark brown TOPSOIL									
	Firm brown sandy CLAY with rare subangular to subrounded gravel		0.20	22.96						
	Firm brown mottled grey/orange sandy CLAY with rare subangular to subrounded gravel		0.40	22.76						
						AA128542	B	0.60-0.70	80	
						AA128522	B	0.90-1.00	86	
1.0	Firm brown/grey sandy CLAY		1.00	22.16					108	
	Firm brown mottled grey/orange sandy CLAY with rare subangular to subrounded gravel		1.30	21.86						
					1 (Seepage)					
						AA128523	B	1.90-2.00		
2.0										
	Firm brown/grey sandy slightly gravelly CLAY, gravel is subangular to subrounded		2.60	20.56						
						AA128524	B	2.90-3.00		
3.0										
	End of Trial Pit at 3.50m		3.50	19.66						
4.0										

IGSL TP LOG 22153 TP.GPJ IGSL.GDT 17/2/20

Groundwater Conditions
Seepage at 1.60m

Stability
Stable

General Remarks
Engineer CAT scanned area for services

		TRIAL PIT RECORD						REPORT NUMBER 22153			
CONTRACT Kilbride						TRIAL PIT NO. TP05					
LOGGED BY K. Kinsella						SHEET Sheet 1 of 1					
CO-ORDINATES 724,121.30 E 674,924.19 N						DATE STARTED 04/12/2019					
GROUND LEVEL (m) 27.07						DATE COMPLETED 04/12/2019					
CLIENT Lioncor ENGINEER Aecom						EXCAVATION METHOD 8t Excavator					
	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples			Vane Test (kPa)	Hand Penetrometer (kPa)	
						Sample Ref	Type	Depth			
0.0	Dark brown TOPSOIL		0.20	26.87	 (Seepage)	AA128519	B	0.90-1.00			
	Firm brown mottled light greyish brown/light grey sandy CLAY with rare gravel and boulder up to 220mm, gravel is subangular to subrounded										
1.0											
2.0											
	Firm brownish grey/greyish brown sandy CLAY with rare gravel, gravel is subangular to subrounded		2.50	24.57		AA128520	B	1.90-2.00			
3.0						AA128521	B	2.90-3.00			
	End of Trial Pit at 3.50m		3.50	23.57		AA127201	B	3.40-3.50			
4.0											
Groundwater Conditions Seepage at 2.20m											
Stability Stable											
General Remarks Engineer CAT scanned area for services											

IGSL TP LOG 22153 TP.GPJ IGSL.GDT 17/2/20

		TRIAL PIT RECORD						REPORT NUMBER 22153		
CONTRACT Kilbride						TRIAL PIT NO. TP06				
LOGGED BY V. Lowe			CO-ORDINATES 724,325.49 E 674,562.51 N			SHEET Sheet 1 of 1				
CLIENT Lioncor ENGINEER Aecom			GROUND LEVEL (m) 9.37			DATE STARTED 04/12/2019 DATE COMPLETED 04/12/2019				
						EXCAVATION METHOD 8t Excavator				
	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples			Vane Test (kPa)	Hand Penetrometer (kPa)
						Sample Ref	Type	Depth		
0.0	Dark brown TOPSOIL									
	Firm brown sandy CLAY with occasional subangular to subrounded gravel		0.20	9.17					42	
	Loose to medium dense brown silty very gravelly SAND, gravel is subangular to rounded		0.45	8.92		AA127202	B	0.50-0.60		
1.0						AA128528	B	0.90-1.00		
	Firm to stiff brown/grey sandy CLAY with rare gravel and boulders, boulders are up to 300mm and subangular to subrounded		1.20	8.17	 (Seepage)				62	
2.0						AA128529	B	1.90-2.00		
	Stiff grey sandy CLAY with rare gravel, gravel is subangular to subrounded		2.70	6.67						
3.0						AA127203	B	3.00-3.10		
	End of Trial Pit at 3.30m		3.30	6.07						
4.0										

IGSL TP LOG 22153 TP.GPJ IGSL.GDT 17/2/20

Groundwater Conditions
Seepage at 1.40m

Stability
Stable

General Remarks
Engineer CAT scanned area for services

		TRIAL PIT RECORD				REPORT NUMBER 22153				
CONTRACT Kilbride					TRIAL PIT NO. TP07					
LOGGED BY V. Lowe		CO-ORDINATES 724,238.20 E 674,454.64 N			SHEET Sheet 1 of 1					
CLIENT Lioncor ENGINEER Aecom		GROUND LEVEL (m) 6.59			DATE STARTED 04/12/2019 DATE COMPLETED 04/12/2019					
					EXCAVATION METHOD 8t Excavator					
	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples			Vane Test (KPa)	Hand Penetrometer (KPa)
						Sample Ref	Type	Depth		
0.0	Dark brown TOPSOIL		0.20	6.39						
	Loose to medium dense brown/greyish brown slightly silty very gravelly SAND with occasional cobbles and rare boulders up to 280mm, gravel and cobbles are subangular to rounded		0.60	5.99		AA128534	B	0.50-0.60	80	
	Firm to locally soft brown mottled grey/orange sandy gravelly CLAY, gravel is subangular to rounded					AA128535	B	0.90-1.00	78	
1.0									62	
	Medium dense grey silty very sandy GRAVEL with occasional cobbles and boulders up to 310mm, gravel and cobbles are subangular to rounded		1.50	5.09	↓ (Seepage)	AA128536	B	1.90-2.00		
2.0										
	Firm to stiff brown/grey slightly sandy gravelly CLAY, gravel is subangular to subrounded Water level rose from 3.10m to 3.00m in 15 minutes		2.60	3.99	↓ (Slow)	AA128537	B	2.90-3.00		
3.0										
	End of Trial Pit at 3.20m		3.20	3.39						
4.0										

IGSL TP LOG 22153 TP GPJ IGSL GDT 17/2/20

Groundwater Conditions
Seepage at 1.50m & Slow flow at 2.60m

Stability
Sidewall collapse below 0.20m

General Remarks
Engineer CAT scanned area for services

		TRIAL PIT RECORD						REPORT NUMBER 22153		
CONTRACT Kilbride						TRIAL PIT NO. TP08				
LOGGED BY V. Lowe						SHEET Sheet 1 of 1				
CO-ORDINATES 724,310.79 E 674,417.93 N						DATE STARTED 04/12/2019				
GROUND LEVEL (m) 5.47						DATE COMPLETED 04/12/2019				
CLIENT Lioncor ENGINEER Aecom						EXCAVATION METHOD 8t Excavator				
	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples			Vane Test (KPa)	Hand Penetrometer (KPa)
						Sample Ref	Type	Depth		
0.0	Dark brown TOPSOIL									
	Firm grey sandy SILT with rare subangular to subrounded gravel		0.20	5.27						
	Loose to medium dense reddish brown slightly silty gravelly SAND, gravel is subangular to rounded		0.50	4.97		AA128530	B	0.40-0.50	42	
1.0	Firm brown mottled grey/orange very sandy gravelly CLAY with rare gravel and cobbles, cobbles are up to 150mm and subangular to subrounded Water level rose from 3.10m to 2.90m in 15 minutes		1.00	4.47	1 (Seepage)	AA128531	B	0.90-1.00	60	
2.0					2 (Slow)					
						AA128532	B	1.90-2.00		
3.0										
						AA128533	B	2.90-3.00		
3.0	End of Trial Pit at 3.10m		3.10	2.37						
4.0										

IGSL TP LOG 22153 TP-GPJ IGSL GDT 17/2/20

Groundwater Conditions
Seepage at 0.80m & Slow flow at 1.40m

Stability
Slightly unstable below 0.80m

General Remarks
Engineer CAT scanned area for services

TP01 – 1 of 2



TP01 – 2 of 2



TP02 – 1 of 2



TP02 – 2 of 2



TP03 – 1 of 2



TP03 – 2 of 2



TP04 – 1 of 2



TP04 – 2 of 2



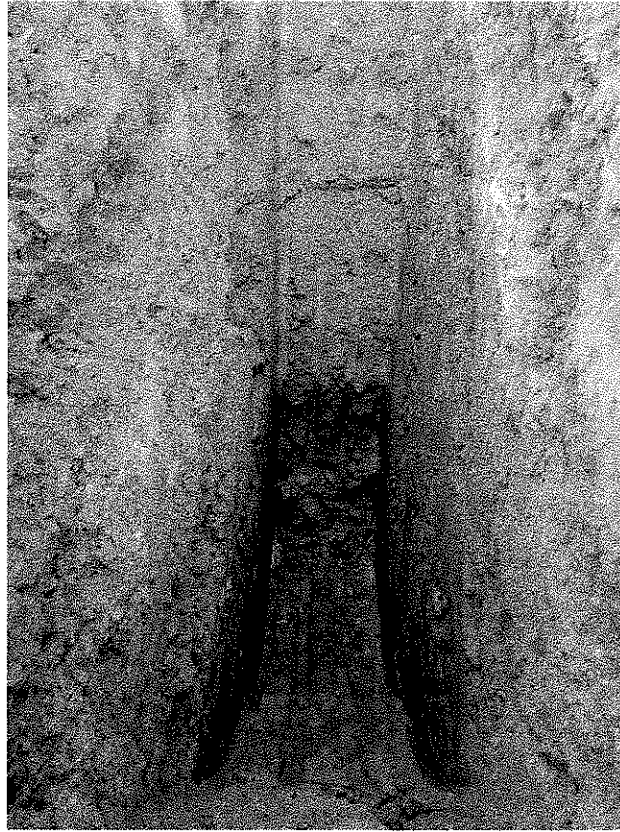
TP05 – 1 of 2



TP05 – 2 of 2



TP06 – 1 of 2



TP06 – 2 of 2



TP07 – 1 of 2



TP07 – 2 of 2



TP08 – 1 of 2



TP08 – 2 of 2



Appendix III TRL Probes (CBR)

Dynamic Cone Penetrometer

IGSL Field Records and Temps (F20)



Contract Kilbride, Arklow
Client Aecom
Contract No. 22153

Date: 06/12/2019

Test No. DCP01

DCP Zero Reading 104 mm

Block No :

Start of Test at: 0.6 m bgl

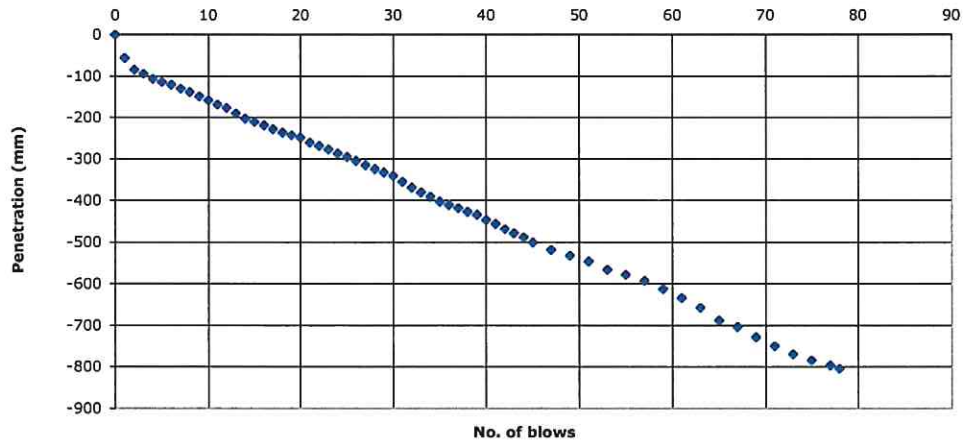
Layer No:

Co ordinates : 724252.461 674364.58 3.136

Soil Description: Medium-dense, grey, very sandy, silty GRAVEL with a medium cobble content.

No of Blows	Total Blows	Reading mm	No of Blows	Total Blows	Reading mm	No of Blows	Total Blows	Reading mm
1	0	104	1	21	364	1	42	572
1	1	160	1	22	372	1	43	582
1	2	188	1	23	380	1	44	592
1	3	198	1	24	390	1	45	604
1	4	210	1	25	398	2	47	622
1	5	218	1	26	408	2	49	636
1	6	224	1	27	418	2	51	650
1	7	234	1	28	428	2	53	670
1	8	242	1	29	436	2	55	682
1	9	252	1	30	444	2	57	696
1	10	262	1	31	458	2	59	716
1	11	272	1	32	472	2	61	738
1	12	280	1	33	484	2	63	762
1	13	294	1	34	494	2	65	792
1	14	306	1	35	506	2	67	808
1	15	314	1	36	514	2	69	832
1	16	322	1	37	522	2	71	854
1	17	332	1	38	530	2	73	874
1	18	340	1	39	538	2	75	888
1	19	346	1	40	550	2	77	900
1	20	352	1	41	560	1	78	908

DCP Chart



Start Depth 0.6 m bgl

* Penetration range (mm)	** From	to	Penetration	mm / blow
Blows	56	804	748	10
	1	78	77	

TRRL RN8

$$\text{Log}_{10}(\text{CBR}) = 2.48 - 1.057 \cdot \text{Log}_{10}(\text{mm/blow})$$

$$\text{Log}_{10}(\text{CBR}) = 1.436$$

$$\text{CBR} = 27.3$$

Dynamic Cone Penetrometer

IGSL Field Records and Temps (F20)



Contract Kilbride, Arklow
Client Aecom
Contract No. 22153

Date: 06/12/2019

Test No. DCP02

DCP Zero Reading 90 mm

Block No :

Start of Test at: 0.5 m bgl

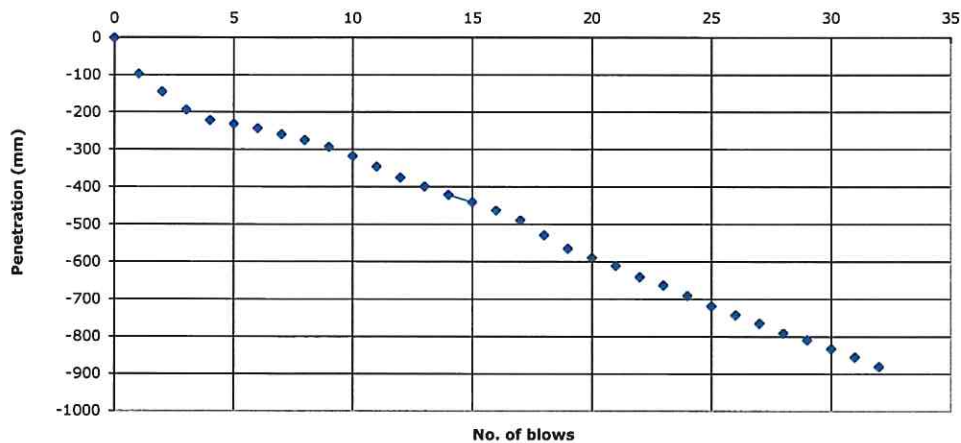
Layer No:

Co ordinates : 724513.089 674642.13 12.084

Soil Description: Soft to firm, brown sandy CLAY.

No of Blows	Total Blows	Reading mm	No of Blows	Total Blows	Reading mm	No of Blows	Total Blows	Reading mm
1	0	90	1	21	700			
1	1	186	1	22	730			
1	2	234	1	23	752			
1	3	282	1	24	780			
1	4	310	1	25	808			
1	5	320	1	26	832			
1	6	332	1	27	854			
1	7	348	1	28	880			
1	8	364	1	29	898			
1	9	382	1	30	922			
1	10	406	1	31	944			
1	11	434	1	32	970			
1	12	464						
1	13	488						
1	14	510						
1	15	530						
1	16	552						
1	17	578						
1	18	618						
1	19	654						
1	20	678						

DCP Chart



Start Depth 0.5 m bgl

* Penetration range (mm) ** From to Penetration mm / blow
Blows 96 880 784 25
 1 32 31

TRRL RN8 $\text{Log}_{10}(\text{CBR}) = 2.48 - 1.057 \cdot \text{Log}_{10}(\text{mm/blow})$ $\text{Log}_{10}(\text{CBR}) = 0.997$

CBR = 9.9

Dynamic Cone Penetrometer

IGSL Field Records and Temps (F20)



Contract Kilbride, Arklow
Client Aecom
Contract No. 22153

Date: 06/12/2019

Test No. DCP03

DCP Zero Reading 60 mm

Block No :

Start of Test at: 0.5 m bgl

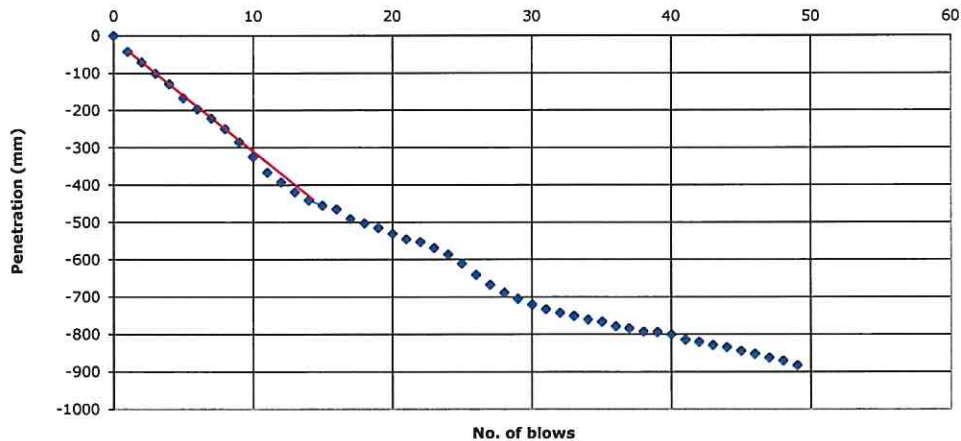
Layer No:

Co ordinates : 724277.362 674590.51 10.736

Soil Description: Firm, orangey brown sandy CLAY. Rare, fine to coarse, sub-rounded to sub-angular gravel.

No of Blows	Total Blows	Reading mm	No of Blows	Total Blows	Reading mm	No of Blows	Total Blows	Reading mm
1	0	60	1	21	604	1	42	880
1	1	102	1	22	612	1	43	888
1	2	130	1	23	628	1	44	894
1	3	160	1	24	646	1	45	904
1	4	188	1	25	670	1	46	912
1	5	226	1	26	700	1	47	922
1	6	256	1	27	726	1	48	930
1	7	280	1	28	748	1	49	942
1	8	308	1	29	764			
1	9	344	1	30	780			
1	10	384	1	31	792			
1	11	426	1	32	802			
1	12	452	1	33	810			
1	13	478	1	34	820			
1	14	500	1	35	826			
1	15	514	1	36	838			
1	16	524	1	37	844			
1	17	550	1	38	852			
1	18	562	1	39	854			
1	19	574	1	40	860			
1	20	590	1	41	874			

DCP Chart



Start Depth 0.5 m bgl

* Penetration range (mm)	** From	to	Penetration	mm / blow
Blows	42	454	412	29
	1	15	14	

TRRL RN8 $\text{Log}_{10}(\text{CBR}) = 2.48 - 1.057 \cdot \text{Log}_{10}(\text{mm/blow})$

$\text{Log}_{10}(\text{CBR}) = 0.928$

CBR = 8.5

Dynamic Cone Penetrometer

IGSL Field Records and Temps (F20)



Contract Kilbride, Arklow
Client Aecom
Contract No. 22153

Date: 06/12/2019

Test No. DCP04

DCP Zero Reading 60 mm

Block No :

Start of Test at: 0.6 m bgl

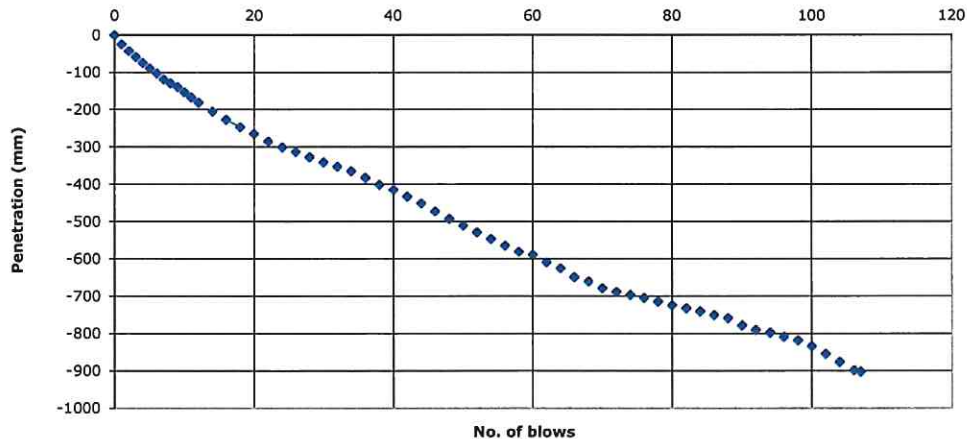
Layer No:

Co ordinates : 723917.988 674745.11 21.085

Soil Description: Firm, orangey brown sandy CLAY. Rare, fine to coarse, sub-rounded to sub-angular gravel.

No of Blows	Total Blows	Reading mm	No of Blows	Total Blows	Reading mm	No of Blows	Total Blows	Reading mm
1	0	60	2	30	400	2	72	748
1	1	84	2	32	412	2	74	756
1	2	102	2	34	424	2	76	764
1	3	118	2	36	442	2	78	774
1	4	134	2	38	460	2	80	784
1	5	148	2	40	474	2	82	792
1	6	162	2	42	492	2	84	800
1	7	178	2	44	510	2	86	810
1	8	188	2	46	532	2	88	818
1	9	198	2	48	552	2	90	838
1	10	212	2	50	570	2	92	850
1	11	226	2	52	588	2	94	858
1	12	240	2	54	606	2	96	868
2	14	264	2	56	624	2	98	878
2	16	286	2	58	640	2	100	894
2	18	306	2	60	648	2	102	914
2	20	324	2	62	668	2	104	936
2	22	344	2	64	684	2	106	958
2	24	360	2	66	708	1	107	962
2	26	372	2	68	720			
2	28	386	2	70	738			

DCP Chart



Start Depth 0.6 m bgl

* Penetration range (mm)	** From	to	Penetration	mm / blow
Blows	24	902	878	8
	1	107	106	

TRRL RN8

Log10 (CBR) = 2.48-1.057*Log10 (mm/blow)

Log10(CBR) = 1.509

CBR = 32.3

Dynamic Cone Penetrometer

IGSL Field Records and Temps (F20)



Contract Kilbride, Arklow
Client Aecom
Contract No. 22153

Date: 06/12/2019

Test No. DCP05

DCP Zero Reading 70 mm

Block No :

Start of Test at: 0.5 m bgl

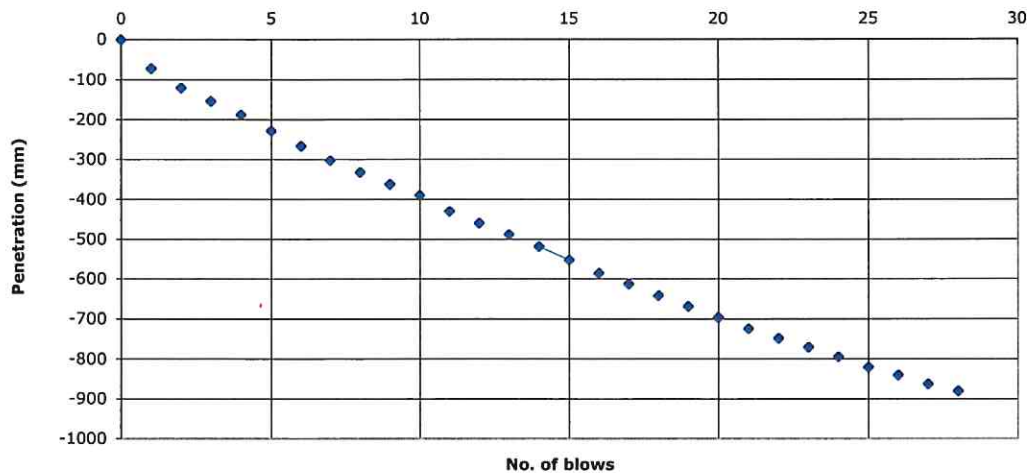
Layer No:

Co ordinates : 724227.185 674915.48 25.272

Soil Description: Firm, orangey brown sandy CLAY. Rare, fine to coarse, rounded to sub-angular gravel.

No of Blows	Total Blows	Reading mm	No of Blows	Total Blows	Reading mm	No of Blows	Total Blows	Reading mm
1	0	70	1	21	794			
1	1	142	1	22	818			
1	2	190	1	23	840			
1	3	224	1	24	864			
1	4	258	1	25	890			
1	5	298	1	26	910			
1	6	336	1	27	932			
1	7	372	1	28	950			
1	8	402						
1	9	432						
1	10	460						
1	11	500						
1	12	530						
1	13	558						
1	14	588						
1	15	622						
1	16	656						
1	17	682						
1	18	712						
1	19	738						
1	20	766						

DCP Chart



Start Depth 0.5 m bgl

* Penetration range (mm)	** From	to	Penetration	mm / blow
Blows	72	880	808	30
	1	28	27	

TRRL RN8 $\text{Log}_{10}(\text{CBR}) = 2.48 - 1.057 * \text{Log}_{10}(\text{mm/blow})$

$\text{Log}_{10}(\text{CBR}) = 0.920$

CBR = 8.3

Appendix IV BRE Digest 365



TRIAL PIT RECORD

REPORT NUMBER

22153

CONTRACT Kilbride

TRIAL PIT NO.

SA02

LOGGED BY V. Lowe

CO-ORDINATES 724,084.99 E
674,607.52 N

SHEET

Sheet 1 of 1

DATE STARTED

05/12/2019

DATE COMPLETED

05/12/2019

CLIENT Lioncor
ENGINEER Aecom

GROUND LEVEL (m) 13.64

EXCAVATION
METHOD

8t Excavator

	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples			Vane Test (KPa)	Hand Penetrometer (KPa)
						Sample Ref	Type	Depth		
0.0	Dark brown TOPSOIL (reworked)									
	Soft to firm brown mottled grey/orange sandy gravelly CLAY with occasional cobbles up to 170mm, gravel is subangular to rounded		0.30	13.34						
	End of Trial Pit at 0.90m		0.90	12.74						
1.0										
2.0										
3.0										
4.0										

Groundwater Conditions

Damp

Stability

Slightly unstable down to 0.90m

General Remarks

Engineer CAT scanned area for services



TRIAL PIT RECORD

REPORT NUMBER

22153

CONTRACT Kilbride		TRIAL PIT NO. SA03	
LOGGED BY V. Lowe		SHEET Sheet 1 of 1	
CO-ORDINATES 724,149.91 E 674,685.57 N		DATE STARTED 05/12/2019	
GROUND LEVEL (m) 16.88		DATE COMPLETED 05/12/2019	
CLIENT Lioncor		EXCAVATION 8t Excavator	
ENGINEER Aecom		METHOD	

	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples			Vane Test (KPa)	Hand Penetrometer (KPa)
						Sample Ref	Type	Depth		
0.0	Dark brown TOPSOIL									
	Firm brown sandy CLAY with rare subangular to subrounded gravel		0.20	16.68						
	Firm brown mottled grey/orange sandy slightly gravelly CLAY, gravel is subangular to subrounded		0.40	16.48						
			0.90	15.98						
1.0	End of Trial Pit at 0.90m									
2.0										
3.0										
4.0										

Groundwater Conditions

Damp

Stability

Stable

General Remarks

Engineer CAT scanned area for services

		TRIAL PIT RECORD						REPORT NUMBER 22153	
CONTRACT Kilbride						TRIAL PIT NO. SA04			
LOGGED BY V. Lowe						CO-ORDINATES 724,062.45 E 674,810.62 N			
CLIENT Lioncor ENGINEER Aecom						GROUND LEVEL (m) 23.16			
						SHEET Sheet 1 of 1			
						DATE STARTED 05/12/2019 DATE COMPLETED 05/12/2019			
						EXCAVATION METHOD 8t Excavator			

	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples			Vane Test (KPa)	Hand Penetrometer (KPa)
						Sample Ref	Type	Depth		
0.0	Dark brown TOPSOIL									
	Firm brown sandy CLAY with rare subangular to subrounded gravel		0.20	22.96						
	Firm brown mottled grey/orange sandy CLAY with rare subangular to subrounded gravel		0.40	22.76						
1.0	Firm brown/grey sandy CLAY		1.00	22.16						
	Firm brown mottled grey/orange sandy CLAY with rare subangular to subrounded gravel		1.30	21.86						
	End of Trial Pit at 1.50m		1.50	21.66						
2.0										
3.0										
4.0										

Groundwater Conditions Damp
Stability Stable
General Remarks Engineer CAT scanned area for services

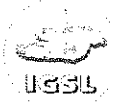
IGSL TP LOG 22153 TP.GPJ IGSL.GDT 17/2/20

		TRIAL PIT RECORD					REPORT NUMBER 22153			
CONTRACT Kilbride						TRIAL PIT NO. SA06				
LOGGED BY V. Lowe						SHEET Sheet 1 of 1				
CO-ORDINATES 724,325.49 E 674,562.51 N						DATE STARTED 05/12/2019 DATE COMPLETED 05/12/2019				
CLIENT Lioncor ENGINEER Aecom						GROUND LEVEL (m) 9.37 EXCAVATION METHOD 8t Excavator				
	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples			Vane Test (KPa)	Hand Penetrometer (KPa)
						Sample Ref	Type	Depth		
0.0	Dark brown TOPSOIL									
	Firm brown sandy CLAY with occasional subangular to subrounded gravel		0.20	9.17						
	Loose to medium dense brown silty very gravelly SAND, gravel is subangular to rounded		0.45	8.92						
1.0										
	Firm to stiff brown/grey sandy CLAY with rare gravel and boulders, boulders are up to 300mm and subangular to subrounded		1.30	8.07						
	End of Trial Pit at 1.50m		1.50	7.87						
2.0										
3.0										
4.0										
Groundwater Conditions Seepage at 1.40m										
Stability Stable										
General Remarks Engineer CAT scanned area for services										

IGSL TP LOG 22153 TP.GPJ IGSL GDT 17/2/20

		TRIAL PIT RECORD						REPORT NUMBER 22153		
CONTRACT Kilbride							TRIAL PIT NO. SA07			
LOGGED BY V. Lowe				CO-ORDINATES 724,238.20 E 674,454.64 N			SHEET Sheet 1 of 1			
CLIENT Lioncor ENGINEER Aecom				GROUND LEVEL (m) 6.59			DATE STARTED 05/12/2019 DATE COMPLETED 05/12/2019			
							EXCAVATION METHOD 8t Excavator			
	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples			Vane Test (KPa)	Hand Penetrometer (KPa)
						Sample Ref	Type	Depth		
0.0	Dark brown TOPSOIL									
	Loose to medium dense brown/greyish brown slightly silty very gravelly SAND with occasional cobbles and rare boulders up to 280mm, gravel and cobbles are subangular to rounded		0.20	6.39						
	Firm to locally soft brown mottled grey/orange sandy very gravelly CLAY, gravel is subangular to rounded		0.60	5.99						
	End of Trial Pit at 0.90m		0.90	5.69						
1.0										
2.0										
3.0										
4.0										
Groundwater Conditions Seepage at 1.50m										
Stability Sidewall collapse below 0.15m										
General Remarks Engineer CAT scanned area for services										

IGSL TP LOG 22153 TP.GPJ IGSL.GDT 17/12/20

		TRIAL PIT RECORD					REPORT NUMBER 22153			
CONTRACT Kilbride					TRIAL PIT NO. SA08					
LOGGED BY V. Lowe					SHEET Sheet 1 of 1					
CO-ORDINATES 724,310.79 E 674,417.93 N					DATE STARTED 05/12/2019					
GROUND LEVEL (m) 5.47					DATE COMPLETED 05/12/2019					
CLIENT Lioncor ENGINEER Aecom					EXCAVATION METHOD 8t Excavator					
	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples			Vane Test (kPa)	Hand Penetrometer (kPa)
						Sample Ref	Type	Depth		
0.0	Dark brown TOPSOIL									
	Firm grey sandy SILT with rare subangular to subrounded gravel		0.20	5.27						
	Loose to medium dense reddish brown slightly silty gravelly SAND, gravel is subangular to rounded		0.50	4.97						
1.0	Firm brown mottled grey/orange very clayey gravelly SAND with rare gravel and cobbles, cobbles are up to 150mm and subangular to subrounded		1.10	4.37						
	Firm brown mottled grey/orange very sandy gravelly CLAY with rare gravel and cobbles, cobbles are up to 150mm and subangular to subrounded		1.40	4.07						
	End of Trial Pit at 1.50m		1.50	3.97						
2.0										
3.0										
4.0										

IGSL TP LOG 22153 TP.GPJ IGSL.GDT 17/2/20

Groundwater Conditions
Seepage at 0.80m & Slow flow at 1.40m

Stability
Slightly unstable below 1.00m

General Remarks
Engineer CAT scanned area for services

Soakaway Design f -value from field tests

IGSL

Contract: Kilbride, Arklow, Co. Wicklow

Contract No. 22153

Test No. SA2

Engineer Aecom

Date: 05.12.2019

Summary of ground conditions

from	to	Description	Ground water
0.00	0.30	Dark brown TOPSOIL (reworked)	Damp
0.30	0.90	Soft to firm brown mottled grey/orange sandy gravelly CLAY with occasional cobbles up to 170mm, gravel is subangular to rounded	

Field Data

Depth to Water (m)	Elapsed Time (min)
0.470	0.00
0.470	1.00
0.470	2.00
0.470	3.00
0.470	4.00
0.470	5.00
0.470	6.00
0.470	7.00
0.470	8.00
0.470	9.00
0.470	10.00
0.470	12.00
0.470	14.00
0.470	16.00
0.470	18.00
0.470	20.00
0.470	25.00
0.470	30.00
0.470	60.00

Field Test

Depth of Pit (D)	0.90	m
Width of Pit (B)	0.40	m
Length of Pit (L)	1.40	m

Initial depth to Water =	0.47	m
Final depth to water =	0.47	m
Elapsed time (mins)=	60.00	

Top of permeable soil		m
Base of permeable soil		m

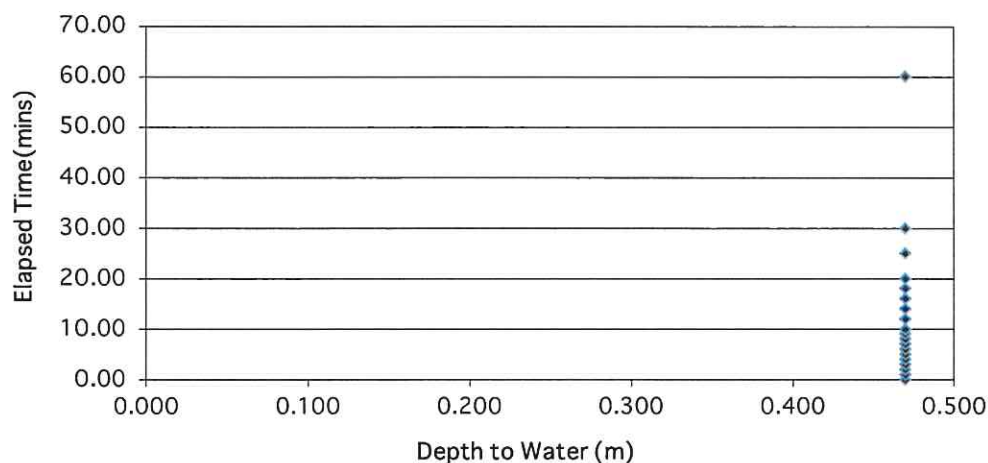
Base area=	0.56	m ²
*Av. side area of permeable stratum over test period	1.548	m ²
Total Exposed area =	2.108	m ²

Infiltration rate (f) =

Volume of water used/unit exposed area / unit time

f= 0 m/min or 0 m/sec

Depth of water vs Elapsed Time (mins)



Soakaway Design f -value from field tests

IGSL

Contract: Kilbride, Arklow, Co. Wicklow

Contract No. 22153

Test No. SA3

Engineer Aecom

Date: 05.12.2019

Summary of ground conditions

from	to	Description	Ground water
0.00	0.20	Dark brown TOPSOIL	Damp
0.20	0.40	Firm brown sandy CLAY with rare subangular to subrounded gravel	
0.40	0.90	Firm brown mottled grey/orange sandy slightly gravelly CLAY, gravel is subangular to subrounded	

Field Data

Depth to Water (m)	Elapsed Time (min)
0.550	0.00
0.550	1.00
0.550	2.00
0.550	3.00
0.550	4.00
0.550	5.00
0.550	6.00
0.550	7.00
0.550	8.00
0.550	9.00
0.550	10.00
0.550	12.00
0.550	14.00
0.550	16.00
0.550	18.00
0.550	20.00
0.550	25.00
0.550	30.00
0.550	60.00

Field Test

Depth of Pit (D)	0.90	m
Width of Pit (B)	0.40	m
Length of Pit (L)	1.40	m

Initial depth to Water =	0.55	m
Final depth to water =	0.55	m
Elapsed time (mins)=	60.00	

Top of permeable soil		m
Base of permeable soil		m

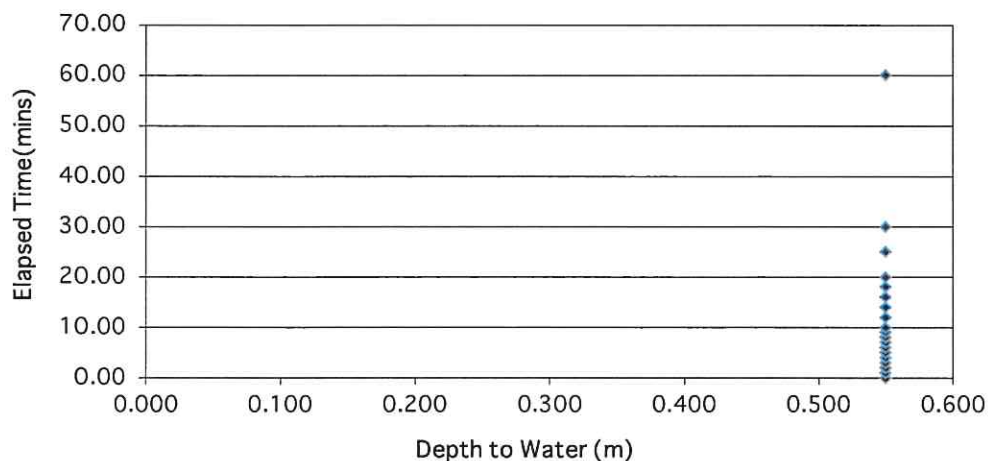
**Water level rose 30mm in 30mins

Base area=	0.56	m ²
*Av. side area of permeable stratum over test period	1.26	m ²
Total Exposed area =	1.82	m ²

Infiltration rate (f) = Volume of water used/unit exposed area / unit time

f= 0 m/min or 0 m/sec

Depth of water vs Elapsed Time (mins)



Soakaway Design f -value from field tests

IGSL

Contract: Kilbride, Arklow, Co. Wicklow

Contract No. 22153

Test No. SA4

Engineer Aecom

Date: 05.12.2019

Summary of ground conditions

from	to	Description	Ground water
0.00	0.20	Dark brown TOPSOIL	Damp
0.20	0.40	Firm brown sandy CLAY with rare subangular to subrounded gravel	
0.40	1.50	Firm brown mottled grey/orange sandy CLAY with rare gravel	

Field Data

Depth to Water (m)	Elapsed Time (min)
0.540	0.00
0.540	1.00
0.540	2.00
0.540	3.00
0.540	4.00
0.540	5.00
0.540	6.00
0.540	7.00
0.540	8.00
0.540	9.00
0.540	10.00
0.540	12.00
0.540	14.00
0.540	16.00
0.540	18.00
0.540	20.00
0.540	25.00
0.540	30.00
0.540	60.00

Field Test

Depth of Pit (D)	1.50	m
Width of Pit (B)	0.40	m
Length of Pit (L)	1.50	m

Initial depth to Water =	0.54	m
Final depth to water =	0.54	m
Elapsed time (mins)=	60.00	

Top of permeable soil		m
Base of permeable soil		m

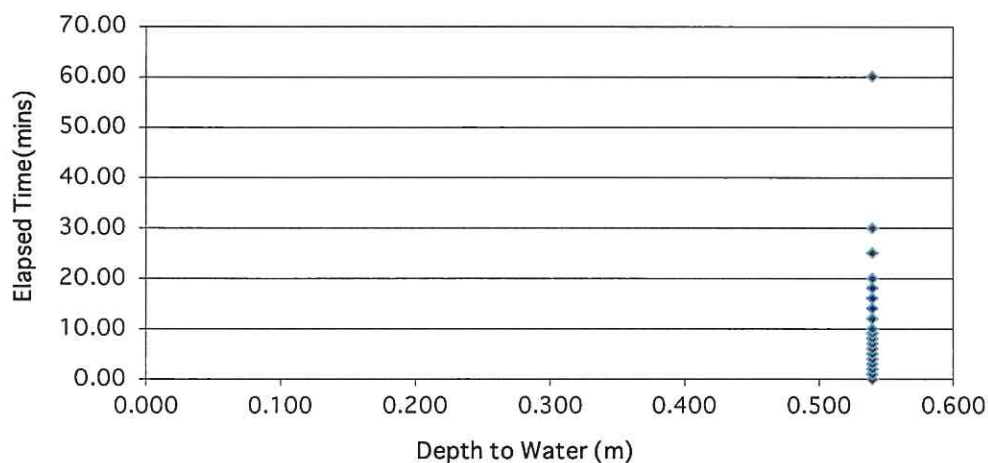
**Water level rose 20mm in 30mins

Base area=	0.6	m ²
*Av. side area of permeable stratum over test period	3.648	m ²
Total Exposed area =	4.248	m ²

Infiltration rate (f) = Volume of water used/unit exposed area / unit time

f= 0 m/min or 0 m/sec

Depth of water vs Elapsed Time (mins)



Soakaway Design f -value from field tests

IGSL

Contract: Kilbride, Arklow, Co. Wicklow

Contract No. 22153

Test No. SA6

Engineer Aecom

Date: 05.12.2019

Summary of ground conditions

from	to	Description	Ground water
0.00	0.20	Dark brown TOPSOIL	Seepage at 1.40m
0.20	0.45	Firm brown sandy CLAY with occasional subangular to subrounded gravel	
0.45	1.30	Loose to medium dense brown silty very gravelly SAND	
1.30	1.50	Firm to stiff brown/grey sandy CLAY with rare gravel and boulders up to 30cm	

Field Data

Field Test

Depth to Water (m)	Elapsed Time (min)
1.240	0.00
1.240	1.00
1.240	2.00
1.240	3.00
1.240	4.00
1.240	5.00
1.240	6.00
1.240	7.00
1.240	8.00
1.240	9.00
1.240	10.00
1.240	12.00
1.240	14.00
1.240	16.00
1.240	18.00
1.240	20.00
1.240	25.00
1.240	30.00
1.240	60.00

Depth of Pit (D)	1.50	m
Width of Pit (B)	0.40	m
Length of Pit (L)	1.30	m

Initial depth to Water =	1.24	m
Final depth to water =	1.24	m
Elapsed time (mins)=	60.00	

Top of permeable soil		m
Base of permeable soil		m

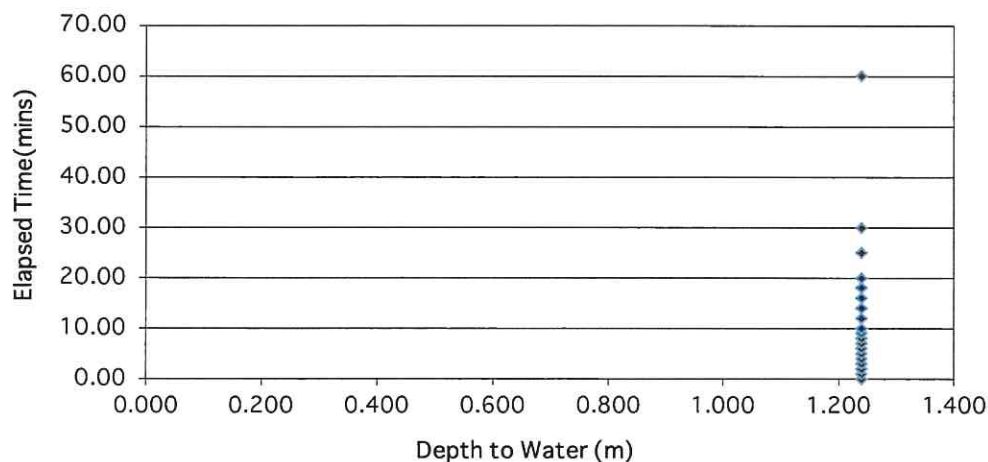
**Water level rose 30mm in 30mins

Base area=	0.52	m ²
*Av. side area of permeable stratum over test period	0.884	m ²
Total Exposed area =	1.404	m ²

Infiltration rate (f) = Volume of water used/unit exposed area / unit time

f= 0 m/min or 0 m/sec

Depth of water vs Elapsed Time (mins)



Soakaway Design f -value from field tests

IGSL

Contract: Kilbride, Arklow, Co. Wicklow

Contract No. 22153

Test No. SA7

Engineer Aecom

Date: 05.12.2019

Summary of ground conditions

from	to	Description	Ground water
0.00	0.20	Dark brown TOPSOIL	Seepage at 1.50m in adjacent TP07
0.20	0.60	Brown/greyish brown slightly silty very gravelly SAND with occasional cobbles	
0.60	0.90	Firm to locally soft brown mottled grey/orange sandy very gravelly CLAY	

Field Data

Field Test

Depth to Water (m)	Elapsed Time (min)
0.560	0.00
0.560	1.00
0.560	2.00
0.560	3.00
0.560	4.00
0.560	5.00
0.560	6.00
0.560	7.00
0.560	8.00
0.560	9.00
0.560	10.00
0.560	12.00
0.560	14.00
0.560	16.00
0.560	18.00
0.560	20.00
0.560	25.00
0.560	30.00
0.560	60.00

Depth of Pit (D)	0.90	m
Width of Pit (B)	0.40	m
Length of Pit (L)	1.30	m

Initial depth to Water =	0.56	m
Final depth to water =	0.56	m
Elapsed time (mins)=	60.00	

Top of permeable soil		m
Base of permeable soil		m

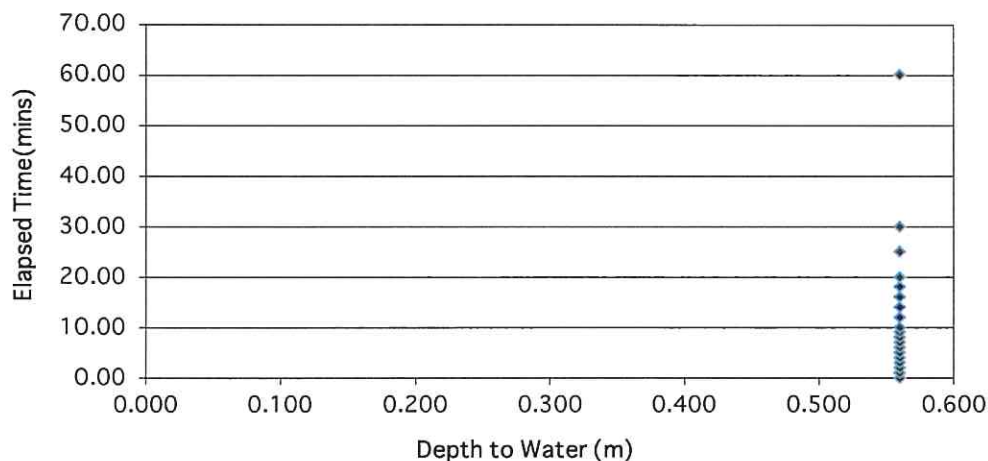
**Water level rose 20mm in 30mins

Base area=	0.52	m ²
*Av. side area of permeable stratum over test period	1.156	m ²
Total Exposed area =	1.676	m ²

Infiltration rate (f) = Volume of water used/unit exposed area / unit time

f= 0 m/min or 0 m/sec

Depth of water vs Elapsed Time (mins)



Soakaway Design f -value from field tests

IGSL

Contract: Kilbride, Arklow, Co. Wicklow

Contract No. 22153

Test No. SA8

Engineer Aecom

Date: 05.12.2019

Summary of ground conditions

from	to	Description	Ground water
0.00	0.50	Dark brown TOPSOIL and subsoil	Seepage at 0.80m and slow flow at 1.40m
0.50	1.10	Loose to medium dense reddish brown slightly silty gravelly SAND	
1.10	1.40	Firm very clayey gravelly SAND with rare gravel and cobbles up to 150mm	
1.40	1.50	Firm very sandy gravelly CLAY with rare gravel and cobbles	

Field Data

Field Test

Depth to Water (m)	Elapsed Time (min)
1.110	0.00
1.110	1.00
1.110	2.00
1.110	3.00
1.110	4.00
1.110	5.00
1.110	6.00
1.110	7.00
1.110	8.00
1.110	9.00
1.110	10.00
1.110	12.00
1.110	14.00
1.110	16.00
1.110	18.00
1.110	20.00
1.110	25.00
1.110	30.00
1.110	60.00

Depth of Pit (D)	1.50	m
Width of Pit (B)	0.40	m
Length of Pit (L)	1.40	m

Initial depth to Water =	1.11	m
Final depth to water =	1.11	m
Elapsed time (mins)=	60.00	

Top of permeable soil		m
Base of permeable soil		m

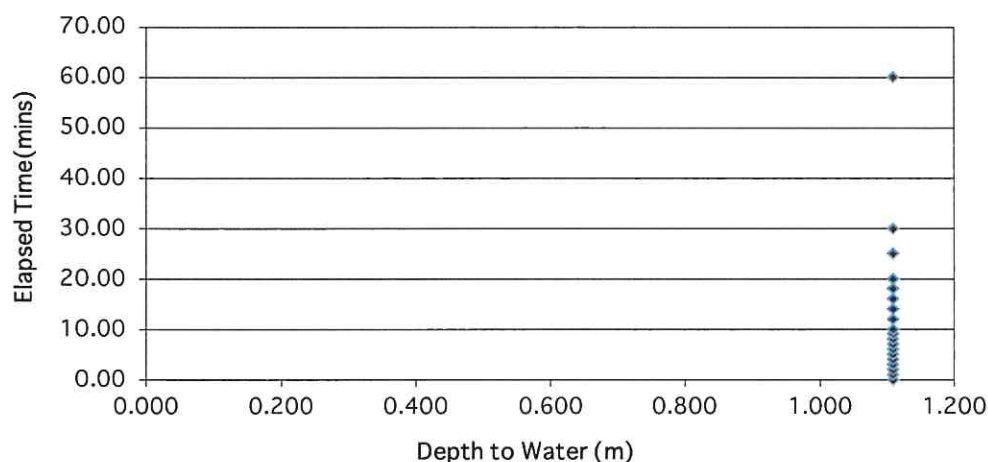
**Water level rose 100mm in 30mins

Base area=	0.56	m ²
*Av. side area of permeable stratum over test period	1.404	m ²
Total Exposed area =	1.964	m ²

Infiltration rate (f) = Volume of water used/unit exposed area / unit time

f= 0 m/min or 0 m/sec

Depth of water vs Elapsed Time (mins)



Appendix V Water and Gas Levels

Gas & Groundwater Monitoring						
Site Location	Kilbride, Arklow, Co. Wicklow					
Project No.	22153					
Client	Lioncor					
Date	16-Jan-20					
Engineer	V.Lowe					
Equipment	Geotech GA5000					
Peak / Steady State Readings						
Location ID	BH02					
Time (sec)	30	60	90	120	180	Peak
Water Level (mbgl)	1.12					
Gas Flow (l/hr)	0	0	0	0	0	0
CH4 (%)	0.0	0.0	0.0	0.0	0.0	0
CO2 (%)	0.4	0.3	0.3	0.4	0.3	0.4
O2 (%)	20.9	21.0	20.9	20.9	20.8	21
CO (ppm)	0.0	0.0	0.0	0.0	0.0	0
H2S (ppm)	0.0	0.0	0.0	0.0	0.0	0
Balance (%)	78.7	78.7	78.8	78.7	78.9	78.6
Barometric Pressure (mbar)	1001					
Weather/Temp.	Dry /6 degrees					
Location ID	BH03					
Time (sec)	30	60	90	120	180	Peak
Water Level (mbgl)	1.45					
Gas Flow (l/hr)	0	0.1	0.1	0.1	0.1	0.1
CH4 (%)	0.0	0.0	0.0	0.0	0.0	0
CO2 (%)	0.3	0.3	0.5	0.7	0.9	0.9
O2 (%)	19.5	19.3	18.8	16.6	16.2	19.5
CO (ppm)	1.0	1.0	0.0	0.0	0	1
H2S (ppm)	0.0	0.0	0.0	0.0	0	0
Balance (%)	79.2	79.4	80.7	82.7	82.7	78.6
Barometric Pressure (mbar)	1002					
Weather/Temp.	Dry / 6 degrees					
Location ID	BH05					
Time (sec)	30	60	90	120	180	Peak
Water Level (mbgl)	5.22					
Gas Flow (l/hr)	0	0	0	0	0	0
CH4 (%)	0.0	0.0	0.0	0.0	0.0	0
CO2 (%)	0.3	0.3	0.3	0.3	0.3	0.3
O2 (%)	19.6	19.8	20.3	19.8	20	20.3
CO (ppm)	0.0	0.0	0.0	0.0	0.0	0
H2S (ppm)	0.0	0.0	0.0	0.0	0.0	0
Balance (%)	80.1	79.9	79.4	79.9	79.7	80.1
Barometric Pressure (mbar)	1000					
Weather/Temp.	Dry / 6 degrees					
Comments						



Gas & Groundwater Monitoring						
Site Location	Kilbride, Arklow, Co. Wicklow					
Project No.	22153					
Client	Lioncor					
Date	14-Feb-20					
Engineer	V.Lowe					
Equipment	Geotech GA5000					
Peak / Steady State Readings						
Location ID	BH02					
Time (sec)	30	60	90	120	180	Peak
Water Level (mbgl)	0.67					
Gas Flow (l/hr)	0	0	0	0	0	0
CH4 (%)	0.0	0.0	0.0	0.0	0.0	0
CO2 (%)	0.3	0.3	0.3	0.3	0.3	0.3
O2 (%)	21.0	21.0	20.9	20.9	20.9	21
CO (ppm)	0.0	0.0	0.0	0.0	0.0	0
H2S (ppm)	0.0	0.0	0.0	0.0	0.0	0
Balance (%)	78.7	78.7	78.8	78.8	78.8	78.8
Barometric Pressure (mbar)	1005					
Weather/Temp.	Rain; 8°C					
Location ID	BH03					
Time (sec)	30	60	90	120	180	Peak
Water Level (mbgl)	1.1					
Gas Flow (l/hr)	0	0	0.1	0.1	0.1	0.1
CH4 (%)	0.0	0.0	0.0	0.0	0.0	0
CO2 (%)	0.4	0.5	0.7	0.9	1.2	1.2
O2 (%)	19.3	18.7	17.4	16.1	14.4	19.3
CO (ppm)	1.0	1.0	0.0	0.0	0	1
H2S (ppm)	0.0	0.0	0.0	0.0	0	0
Balance (%)	80.3	80.8	81.9	83.0	84.4	84.4
Barometric Pressure (mbar)	1004					
Weather/Temp.	Rain; 8°C					
Location ID	BH05					
Time (sec)	30	60	90	120	180	Peak
Water Level (mbgl)	4.04m					
Gas Flow (l/hr)	0	0	0	0	0	0
CH4 (%)	0.0	0.0	0.0	0.0	0.0	0
CO2 (%)	0.5	0.3	0.2	0.3	0.3	0.5
O2 (%)	20.8	20.9	21.1	21.0	20.9	21.1
CO (ppm)	0.0	0.0	0.0	0.0	0.0	0
H2S (ppm)	0.0	0.0	0.0	0.0	0.0	0
Balance (%)	78.7	78.8	78.7	78.7	78.8	78.8
Barometric Pressure (mbar)	1002					
Weather/Temp.	Rain; 8°C					
Comments						

Appendix VI Laboratory

a. Geotechnical

TEST REPORT

Determination of Particle Size Distribution

Tested in accordance with: BS1377:Part 2:1990, clause 9.2 & 9.5
(note: Sedimentation stage not accredited)

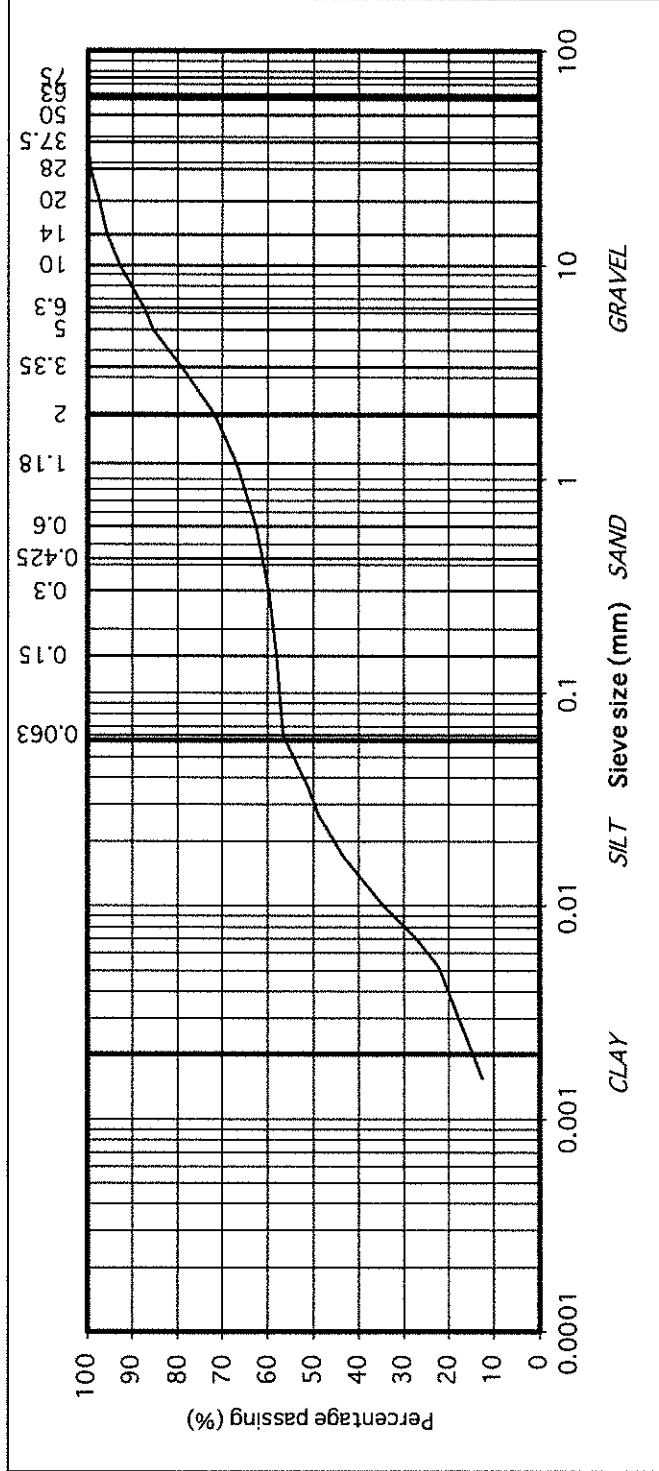


particle size	% passing	Contract No: 22153	Report No. R108843
75	100	Contract: Kilbride Development, Co. Wicklow	
63	100	BH/TP: TP01	
50	100	Sample No. AA128553	Lab. Sample No. A20/122
37.5	100	Sample Type: B	
28	99	Depth (m) 2.90	Customer: Aecom
20	97	Date Received 07/01/2020	Date Testing started 15/01/2020
14	96	Description: Brown slightly sandy, slightly gravelly, CLAY	
10	93		
6.3	87		
5	85		
3.35	79		
2	72		
1.18	67		
0.6	63		
0.425	61		
0.3	60		
0.15	58		
0.063	57		
0.037	51		
0.026	49		
0.017	43		
0.010	34		
0.007	28		
0.005	22		
0.002	13		

COBBLES	GRAVEL	SAND	SILT/CLAY
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Remarks: Brown slightly sandy, slightly gravelly, CLAY

Note: Clause 9.2 and Clause 9.5 of BS1377:Part 2:1990 have been superseded by ISO 17025:2015. Results apply to a sample as received.



IGSL Ltd Materials Laboratory		Approved by: <i>[Signature]</i>	Date: 04/02/20	Page no: 1 of 1
Persons authorised to approve report: J Barrett (Quality Manager) H Byrne (Laboratory Manager)				

TEST REPORT

Determination of Particle Size Distribution

Tested in accordance with: BS1377:Part2:1990, clause 9.2 & 9.5
(note: Sedimentation stage not accredited)



particle size	% passing	Contract No: 22153	Report No. R108844
75	100	Contract: Kilbride Development, Co. Wicklow	
63	100	BH/TP: TP02	
50	94	Sample No. AA128540	Lab. Sample No. A20/125
37.5	94	Sample Type: B	
28	94	Depth (m) 2.50	Customer: Aecom
20	90	Date Received 07/01/2020	Date Testing started 16/01/2020
14	89	Description: Brown slightly sandy, slightly gravelly, CLAY	
10	86		
6.3	82		
5	81		
3.35	78		
2	75		
1.18	72		
0.6	68		
0.425	66		
0.3	63		
0.15	58		
0.063	54		
0.039	48		
0.028	43		
0.018	37		
0.010	32		
0.007	29		
0.005	26		
0.002	17		

COBBLES

GRAVEL

SAND

SILT/CLAY

CLAY

SILT

SAND

GRAVEL

Percentage passing (%)

Note: Clause 9.2 and Clause 9.5 of BS1377:Part 2:1990 have been superseded by BS1377:Part 2:2015. Results apply to sample as received.

IGSL Ltd Materials Laboratory		Approved by: <i>J Barrett</i>	Date: 04/02/20	Page no: 1 of 1
Persons authorised to approve report: J Barrett (Quality Manager) H Byrne (Laboratory Manager)				

TEST REPORT

Determination of Particle Size Distribution

Tested in accordance with: BS1377:Part 2:1990, clause 9.2 & 9.5
(note: Sedimentation stage not accredited)



particle size	% passing	Contract No: 22153	Report No. R108914
75	100	Contract: Kilbride Development, Co. Wicklow	
63	100	BH/TP: TP03	
50	100	Sample No. AA128527	Lab. Sample No. A20/127
37.5	100	Sample Type: B	
28	100	Depth (m) 3.00	Customer: Aecom
20	100	Date Received 07/01/2020	Date Testing started 16/01/2020
14	100	Description: Brown very sandy, slightly gravelly, SILT/CLAY	
10	99	Remarks	
6.3	98		
5	97		
3.35	96		
2	93		
1.18	90		
0.6	82		
0.425	77		
0.3	68		
0.15	35		
0.063	24		

COBBLES

GRAVEL

SAND

SILT/CLAY

Note: Clause 9.2 and Clause 9.5 of BS1377:Part 2:1990 have been superseded by BS1377:Part 2:2015. Results apply to sample as received.

TEST REPORT

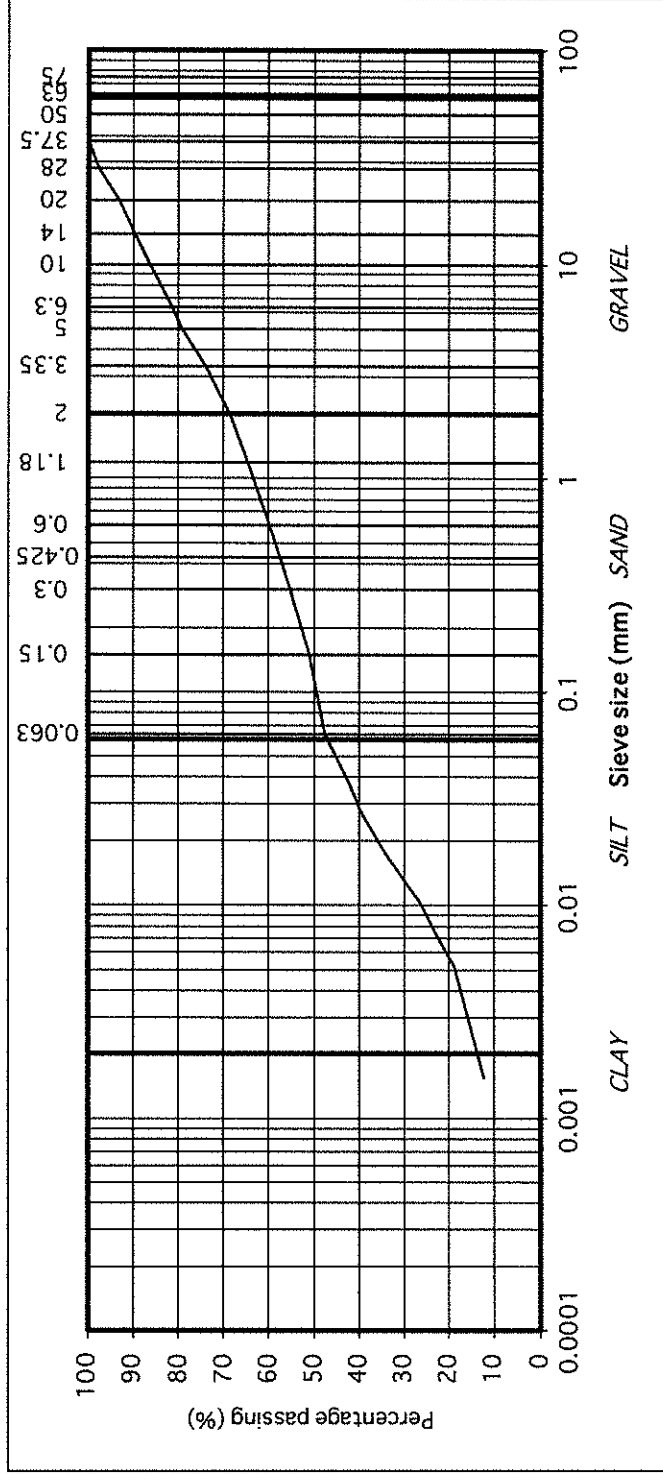
Determination of Particle Size Distribution

Tested in accordance with: BS1377:Part2:1990, clause 9.2 & 9.5
(note: Sedimentation stage not accredited)



particle size	% passing	Contract No: 22153	Report No: R108915
75	100	Contract: Kilbride Development, Co. Wicklow	
63	100	BH/TP: TP04	
50	100	Sample No. AA128524	Lab. Sample No. A20/129
37.5	100	Sample Type: B	
28	98	Depth (m) 3.00	Customer: Aecom
20	93	Date Received 07/01/2020	Date Testing started 16/01/2020
14	90	Description: Brown slightly sandy, slightly gravelly, CLAY	
10	86	Remarks	
6.3	81		
5	79		
3.35	74		
2	69		
1.18	65		
0.6	60		
0.425	58		
0.3	55		
0.15	51		
0.063	48		
0.037	42		
0.027	39		
0.017	34		
0.010	26		
0.007	23		
0.005	19		
0.002	12		

Note: Clause 9.2 and Clause 9.5 of BS1377:Part 2:1990 have been superseded by BS17892-4:2016. Results apply to samples as received.



IGSL Ltd Materials Laboratory		Approved by: <i>J Barrett</i>	Date: 04/02/20	Page no: 1 of 1
Persons authorised to approve report: J Barrett (Quality Manager) H Byrne (Laboratory Manager)				

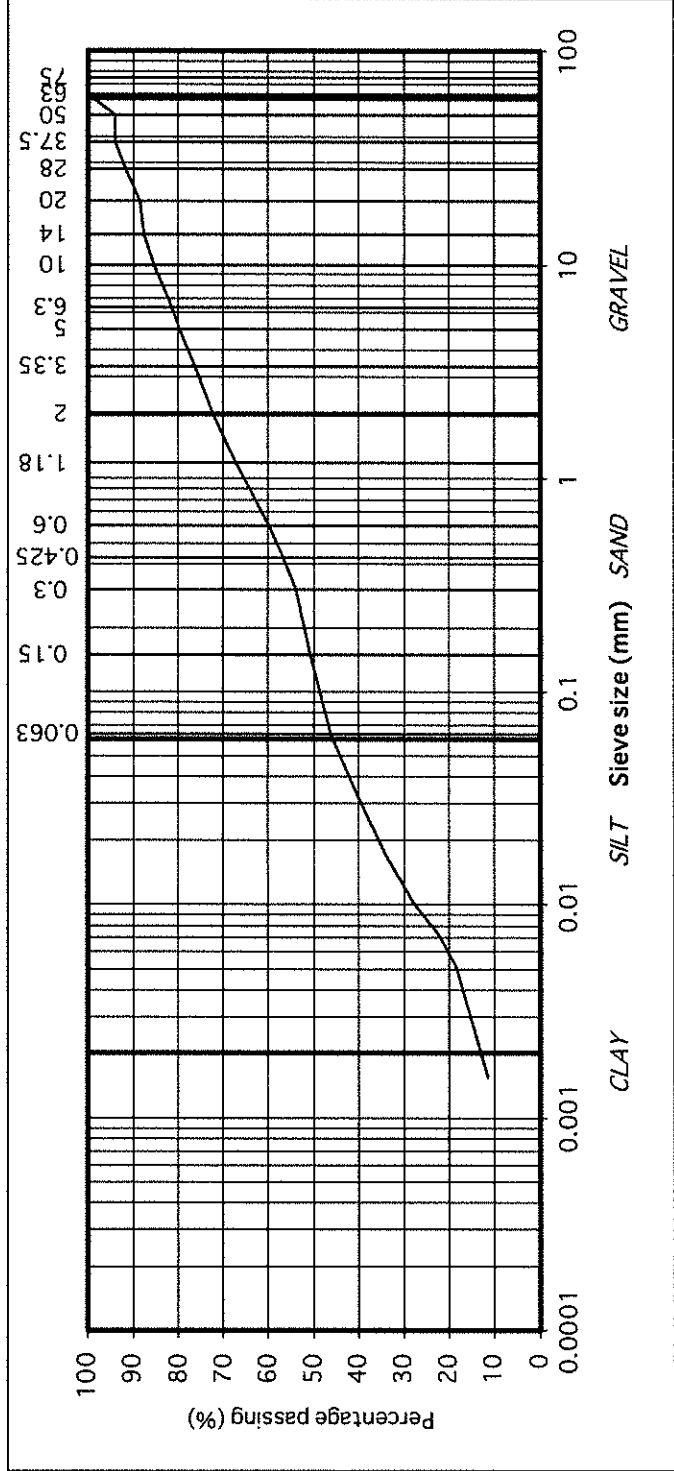
TEST REPORT

Determination of Particle Size Distribution

Tested in accordance with: BS1377:Part2:1990, clause 9.2 & 9.5
(note: Sedimentation stage not accredited)



particle size	% passing	Contract No: 22153	Report No. R108916
75	100	Contract: Kilbride Development, Co. Wicklow	
63	100	BH/TP: TP05	
50	94	Sample No. AA128521	Lab. Sample No. A20/131
37.5	94	Sample Type: B	
28	92	Depth (m) 3.00	Customer: Aecom
20	89	Date Received 07/01/2020	Date Testing started 16/01/2020
14	88	Description: Brown slightly sandy, slightly gravelly, CLAY	
10	85	Remarks	
6.3	81		
5	80		
3.35	77		
2	72		
1.18	67		
0.6	60		
0.425	57		
0.3	54		
0.15	51		
0.063	46		
0.037	41		
0.027	38		
0.017	34		
0.010	28		
0.007	22		
0.005	19		
0.002	12		



IGSL Ltd Materials Laboratory		Approved by: <i>H. Byrne</i>	Date: 04/02/20	Page no: 1 of 1
Persons authorised to approve report: J Barrett (Quality Manager) H Byrne (Laboratory Manager)				

TEST REPORT

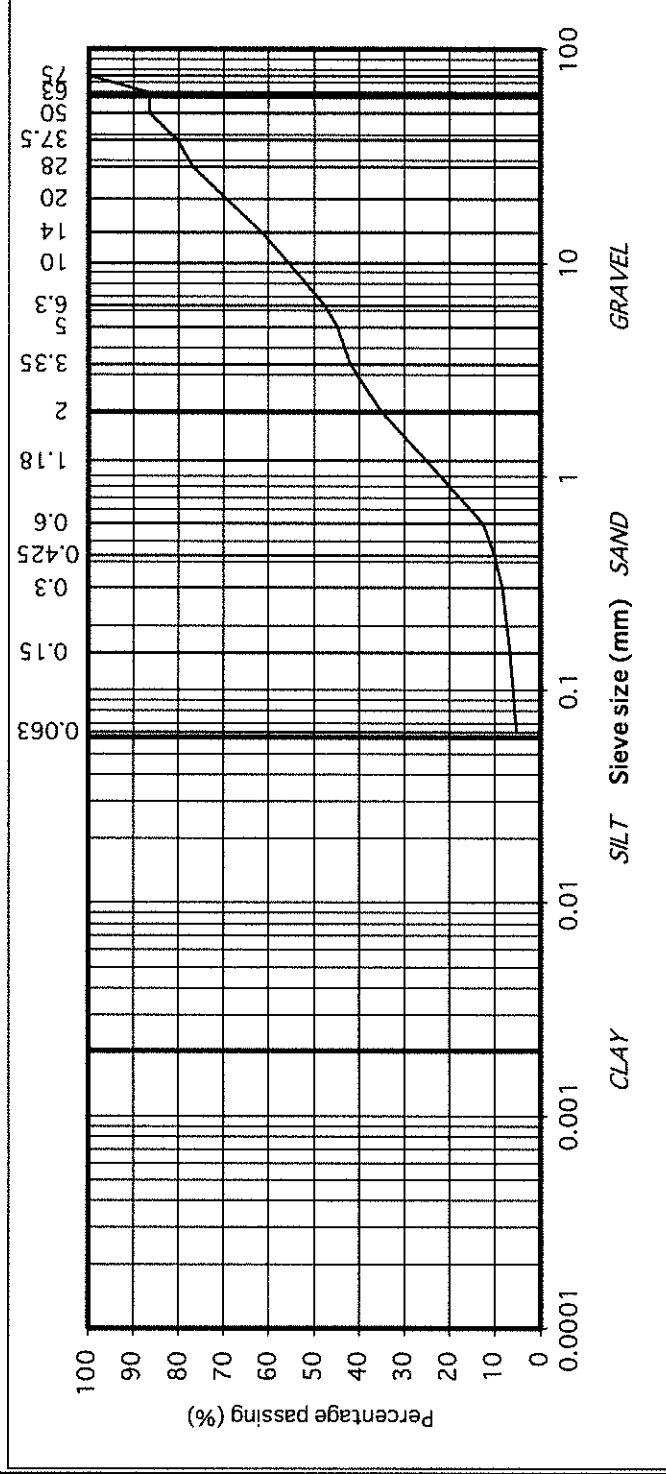
Determination of Particle Size Distribution

Tested in accordance with: BS1377:Part2:1990, clause 9.2 & 9.5
(note: Sedimentation stage not accredited)



particle size	% passing	Contract No: 22153	Report No. R1088917
75	100	Contract: Kilbride Development, Co. Wicklow	
63	87	BH/TP: TP06	
50	87	Sample No. AA128528	Lab. Sample No. A20/132
37.5	80	Sample Type: B	
28	77	Depth (m) 1.00	Customer: Aecom
20	70	Date Received 07/01/2020	Date Testing started 16/01/2020
14	62	Description: Brown clayey/silty, very sandy, GRAVEL with some cobbles	
10	56	Remarks	
6.3	48		
5	45		
3.35	42		
2	35		
1.18	25		
0.6	13		
0.425	10		
0.3	8		
0.15	7		
0.063	5		

Note: Clause 9.2 and Clause 9.5 of BS1377:Part 2:1990 have been superseded by ISO 7892-4:2016. Results apply to sample as received. Sample size did not meet the requirements of BS1377.



IGSL Ltd Materials Laboratory		Approved by: <i>A. Byrne</i>	Date: 04/02/20	Page no: 1 of 1
Persons authorised to approve report: J Barrett (Quality Manager) H Byrne (Laboratory Manager)				

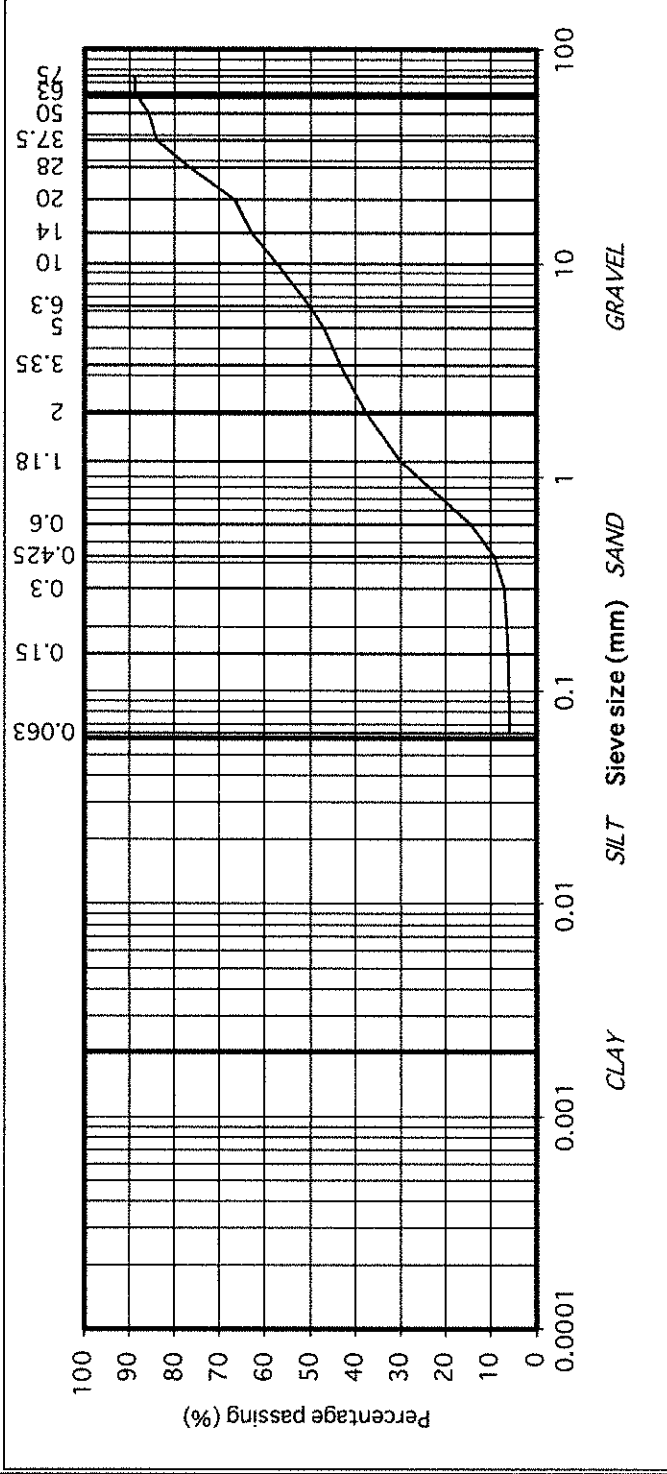
TEST REPORT

Determination of Particle Size Distribution

Tested in accordance with: BS1377:Part2:1990, clause 9.2 & 9.5
(note: Sedimentation stage not accredited)



particle size	% passing	Contract No: 22153	Report No. R108918
75	89	Contract: Kilbride Development, Co. Wicklow	
63	89	BH/TP: TP07	
50	86	Sample No. AA128536	Lab. Sample No. A20/135
37.5	84	Sample Type: B	
28	77	Depth (m) 2.00	Customer: Aecom
20	67	Date Received 07/01/2020	Date Testing started 16/01/2020
14	63	Description: Brown clayey/silty, very sandy, GRAVEL with some cobbles	
10	57	Remarks	
6.3	50		
5	47		
3.35	43		
2	38		
1.18	30		
0.6	14		
0.425	9		
0.3	7		
0.15	6		
0.063	6		



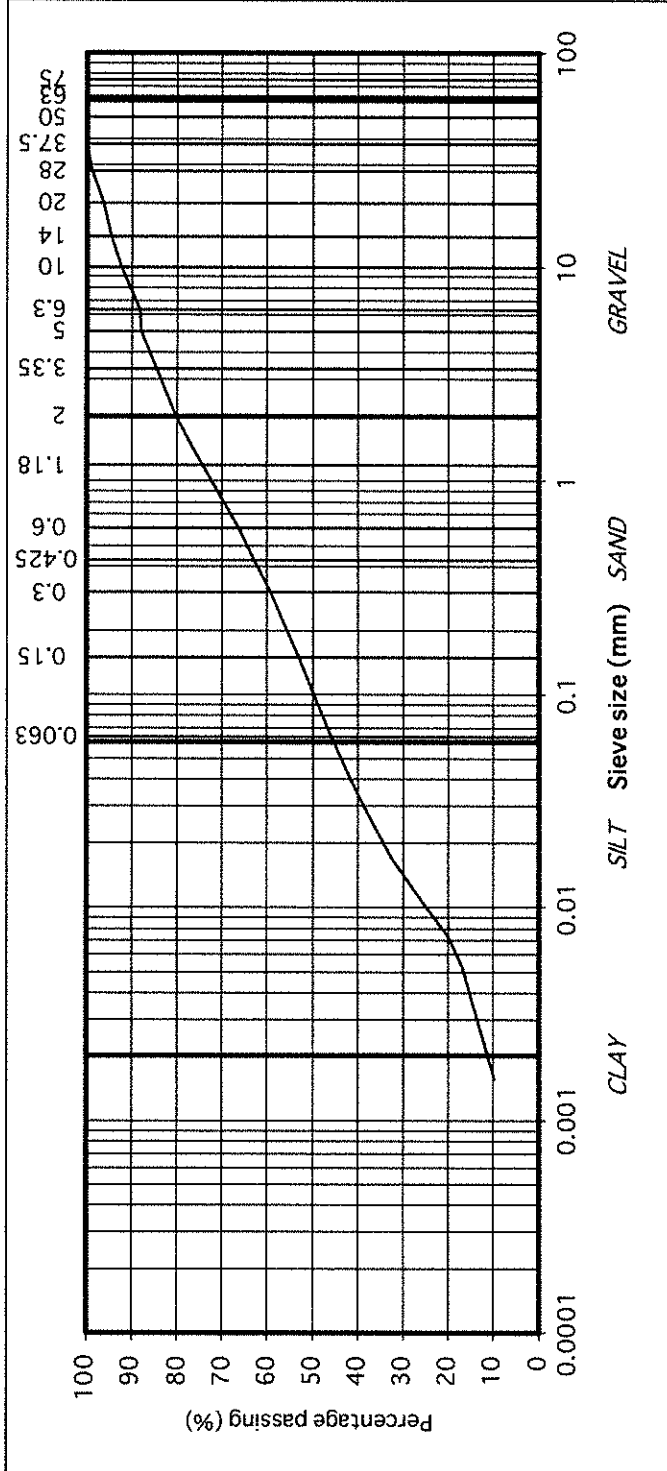
TEST REPORT

Determination of Particle Size Distribution

Tested in accordance with: BS1377:Part2:1990, clause 9.2 & 9.5
(note: Sedimentation stage not accredited)



particle size	% passing	Contract No: 22153	Report No. R108845
75	100	Contract: Kilbride Development, Co. Wicklow	
63	100	BH/TP: TP08	
50	100	Sample No. AA128332	Lab. Sample No. A20/136
37.5	100	Sample Type: B	
28	99	Depth (m) 2.00	Customer: Aecom
20	96	Date Received 07/01/2020	Date Testing started 15/01/2020
14	95	Description: Brown slightly sandy, slightly gravelly, CLAY	
10	92	Remarks	
6.3	88		
5	88		
3.35	85		
2	80		
1.18	74		
0.6	66		
0.425	63		
0.3	59		
0.15	53		
0.063	46		
0.037	41		
0.027	37		
0.017	32		
0.010	25		
0.007	20		
0.005	17		
0.002	10		



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Persons authorised to approve report: J Barrett (Quality Manager) H Byrne (Laboratory Manager)				

TEST REPORT

Determination of Particle Size Distribution

Tested in accordance with: BS1377:Part2:1990, clause 9.2 & 9.5
(note: Sedimentation stage not accredited)



particle size	% passing	Contract No: 22153	Report No. R108831
75	100	Contract: Kilbride Development, Co. Wicklow	
63	100	BH/TP: BH01	
50	100	Sample No. AA121845	Lab. Sample No. A20/105
37.5	100	Sample Type: B	
28	100	Depth (m) 1.00	Customer: Aecom
20	97	Date Received 07/01/2020	Date Testing started 15/01/2020
14	92	Description: Brown clayey/silty, very sandy, GRAVEL	
10	85	Remarks	
6.3	78		
5	74		
3.35	62		
2	48		
1.18	36		
0.6	21		
0.425	17		
0.3	13		
0.15	8		
0.063	7		

COBBLES

GRAVEL

SAND

SILT/CLAY

Note: Clause 9.2 and Clause 9.5 of BS1377-Part 2:1990 have been superseded by BS1377-Part 2:2016. Results apply to samples as received.

TEST REPORT

Determination of Particle Size Distribution

Tested in accordance with: BS1377:Part2:1990, clause 9.2 & 9.5
(note: Sedimentation stage not accredited)



particle size	% passing
75	89
63	84
50	84
37.5	81
28	76
20	71
14	67
10	58
6.3	47
5	42
3.35	32
2	24
1.18	17
0.6	7
0.425	4
0.3	2
0.15	1
0.063	1

COBBLES

GRAVEL

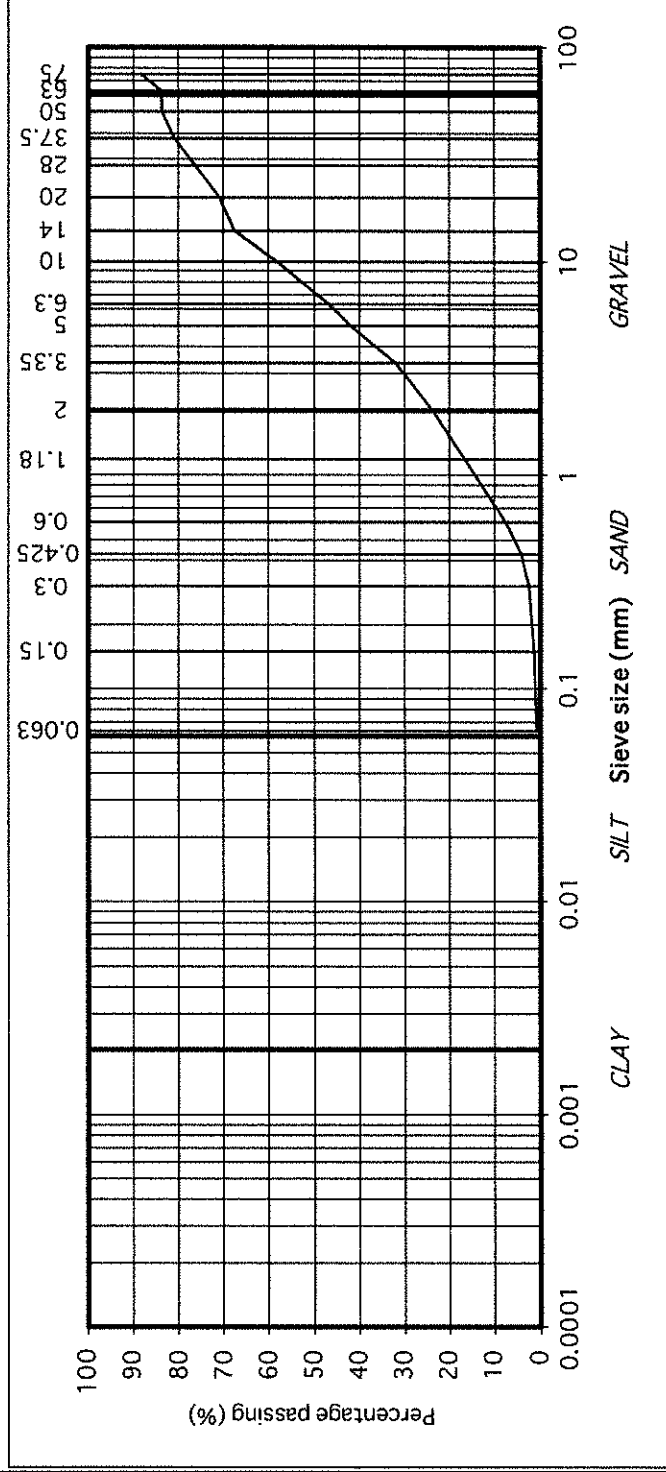
SAND

SILT/CLAY

Contract No: 22153 Report No. R108837
Contract: Kilbride Development, Co. Wicklow
BH/TP: BH01
Sample No. AA121848 Lab. Sample No. A20/106
Sample Type: B
Depth (m) 3.00 Customer: Aecom
Date Received 07/01/2020 Date Testing started 16/01/2020
Description: Brown slightly clayey/silty, very sandy, GRAVEL with some cobbles

Remarks

Note: Clause 9.2 and Clause 9.5 of BS1377:Part 2:1990 have been superseded by BS1377:Part 2:2015. Results apply to sample as received. Sample size did not meet the requirements of BS1377



IGSL Ltd Materials Laboratory		Approved by: <i>H. Byrne</i>	Date: 04/02/20	Page no: 1 of 1
Persons authorised to approve report: J Barrett (Quality Manager) H Byrne (Laboratory Manager)				

TEST REPORT

Determination of Particle Size Distribution

Tested in accordance with: BS1377:Part2:1990, clause 9.2 & 9.5
(note: Sedimentation stage not accredited)



particle size	% passing	Contract No: 22153	Report No. R108832
75	100	Contract: Kilbride Development, Co. Wicklow	
63	100	BH/TP: BH01	
50	100	Sample No. AA121850	Lab. Sample No. A20/107
37.5	100	Sample Type: B	
28	97	Depth (m) 5.00	Customer: Aecom
20	95	Date Received 07/01/2020	Date Testing started 16/01/2020
14	94	Description: Brown slightly sandy, slightly gravelly, CLAY	
10	93	Remarks	
6.3	91		
5	89		
3.35	87		
2	84		
1.18	82		
0.6	78		
0.425	77		
0.3	75		
0.15	72		
0.063	64		
0.037	54		
0.027	49		
0.017	44		
0.010	38		
0.007	31		
0.005	27		
0.002	18		

COBBLES

GRAVEL

SAND

SILT/CLAY

Percentage passing (%)

Sieve size (mm)

CLAY

SILT

SAND

GRAVEL

Note: Clause 9.2 and Clause 9.5 of BS1377 Part 2:1990 have been superseded by BS1377-2:2015. Results apply to sample as received.

TEST REPORT

Determination of Particle Size Distribution

Tested in accordance with: BS1377:Part2:1990, clause 9.2 & 9.5
(note: Sedimentation stage not accredited)



Contract No: 22153		Report No. R108838	
Contract: Kilbride Development, Co. Wicklow			
BH/TP: BH02			
Sample No. AA126818	Lab. Sample No. A20/108		
Sample Type: B			
Depth (m) 2.00	Customer: Aecom		
Date Received 07/01/2020	Date Testing started 16/01/2020		
Description: Brown clayey/silty, sandy, GRAVEL			
Remarks			
Note: Clause 9.2 and Clause 9.5 of BS1377:Part 2:1990 have been superseded by ISO 17892-4:2016. Results apply to sample as received.			

particle size	% passing	COBBLES	GRAVEL	SAND	SILT/CLAY
75	100				
63	100				
50	100				
37.5	100				
28	98				
20	95				
14	85				
10	72				
6.3	52				
5	44				
3.35	35				
2	21				
1.18	13				
0.6	8				
0.425	7				
0.3	6				
0.15	6				
0.063	6				

IGSL Ltd Materials Laboratory		Approved by: <i>H. Byrne</i>	Date: 04/02/20	Page no: 1 of 1
Persons authorised to approve report: J Barrett (Quality Manager) H Byrne (Laboratory Manager)				

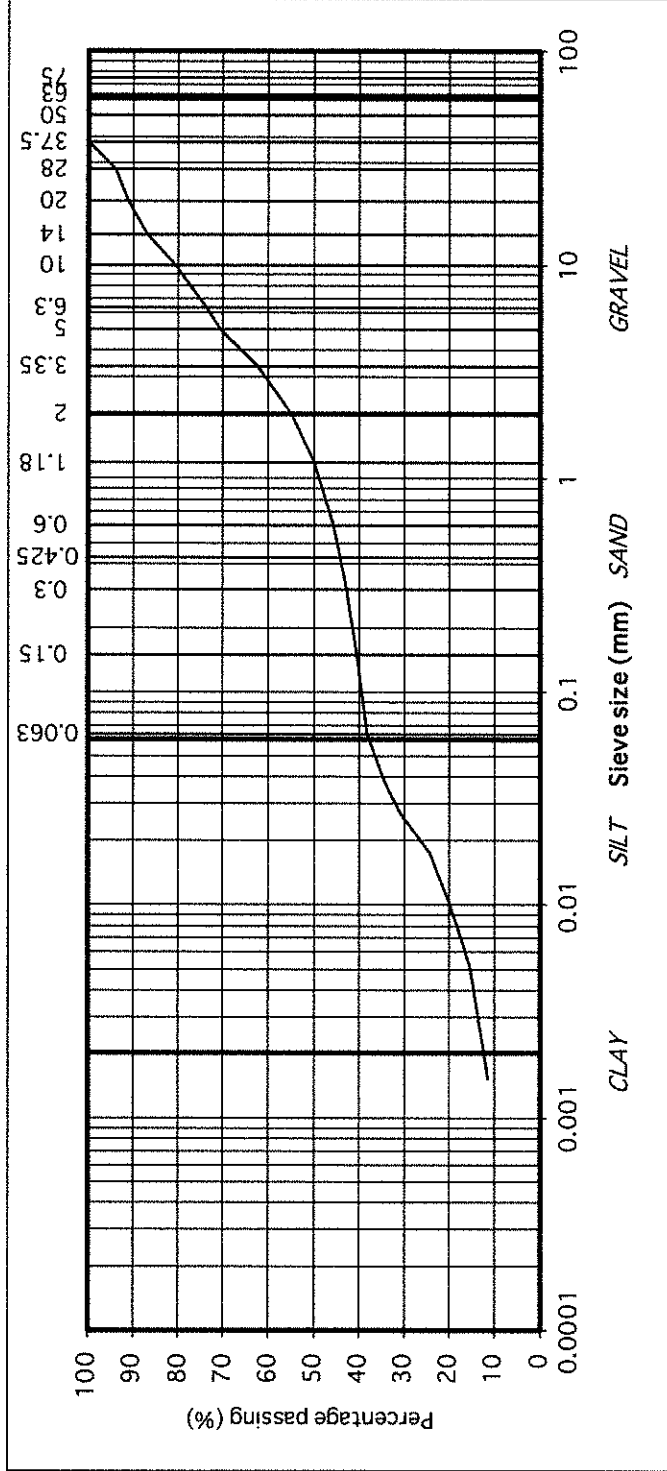
TEST REPORT

Determination of Particle Size Distribution

Tested in accordance with: BS1377:Part2:1990, clause 9.2 & 9.5
(note: Sedimentation stage not accredited)



particle size	% passing	Contract No: 22153	Report No. R108839
75	100	Contract: Kilbride Development, Co. Wicklow	
63	100	BH/TP: BH02	
50	100	Sample No. AA126820	Lab. Sample No. A20/109
37.5	100	Sample Type: B	
28	94	Depth (m) 4.00	Customer: Aecom
20	91	Date Received 07/01/2020	Date Testing started 16/01/2020
14	87	Description: Brown slightly sandy, gravelly, CLAY	
10	81	Remarks	
6.3	74		
5	71		
3.35	62		
2	55		
1.18	50		
0.6	46		
0.425	44		
0.3	43		
0.15	41		
0.063	38		
0.037	34		
0.027	31		
0.017	24		
0.010	20		
0.007	18		
0.005	15		
0.002	12		



IGSL Ltd Materials Laboratory		Approved by: <i>J Barrett</i>	Date: 04/02/20	Page no: 1 of 1
Persons authorised to approve report: J Barrett (Quality Manager) H Byrne (Laboratory Manager)				

TEST REPORT

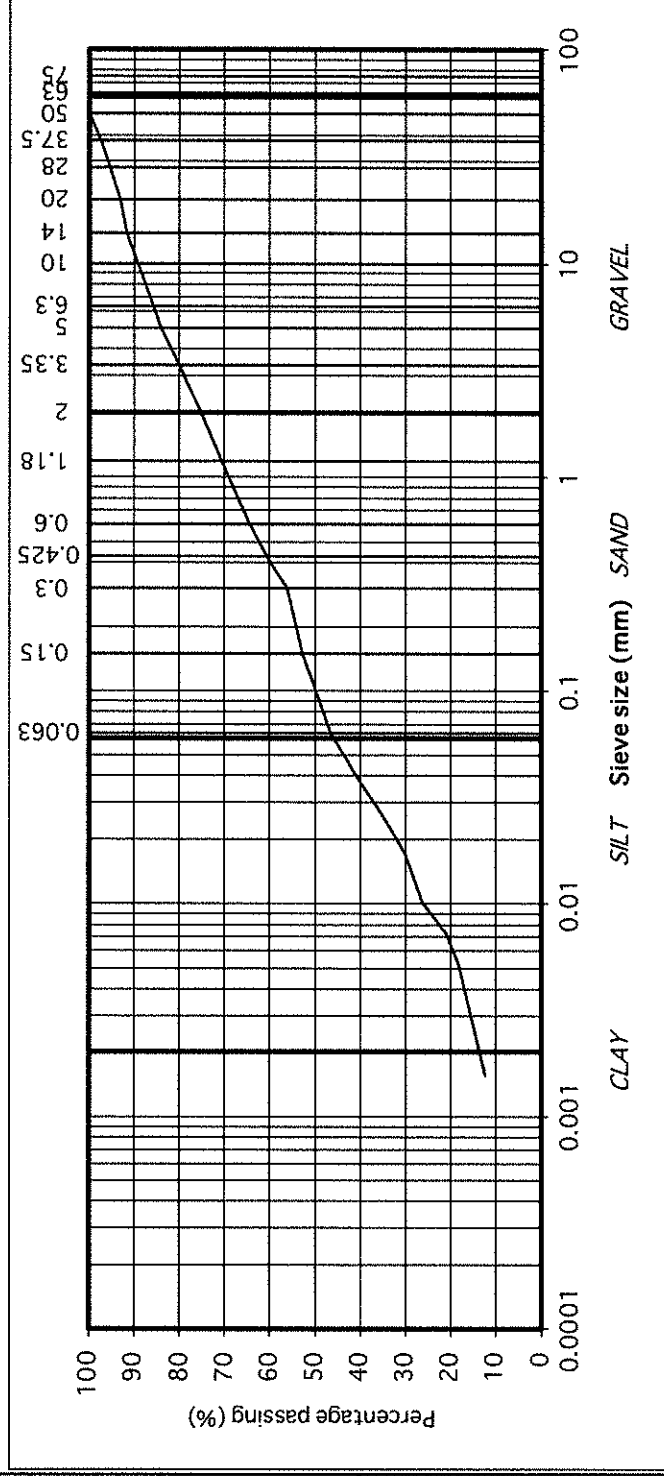
Determination of Particle Size Distribution

Tested in accordance with: BS1377:Part2:1990, clause 9.2 & 9.5
(note: Sedimentation stage not accredited)



particle size	% passing	Contract No: 22153	Report No. R108840
75	100	Contract: Kilbride Development, Co. Wicklow	
63	100	BH/TP: BH02	
50	100	Sample No. AA126823	Lab. Sample No. A20/110
37.5	97	Sample Type: B	
28	95	Depth (m) 7.00	Customer: Aecom
20	93	Date Received 07/01/2020	Date Testing started 16/01/2020
14	92	Description: Brown slightly sandy, slightly gravelly, CLAY	
10	89		
6.3	86		
5	84		
3.35	80		
2	75		
1.18	71		
0.6	64		
0.425	61		
0.3	56		
0.15	53		
0.063	47		
0.038	40		
0.027	36		
0.018	30		
0.010	26		
0.007	21		
0.005	18		
0.002	13		

Note: Clause 9.2 and Clause 9.5 of BS1377:Part 2:1990 have been superseded by ISO 7892-4:2015. Results apply to sample as received.



IGSL Ltd Materials Laboratory		Approved by: <i>J. Barrett</i>	Date: 04/02/20	Page no: 1 of 1
Persons authorised to approve report: J Barrett (Quality Manager) H Byrne (Laboratory Manager)				

TEST REPORT

Determination of Particle Size Distribution

Tested in accordance with: BS1377:Part2:1990, clause 9.2 & 9.5
(note: Sedimentation stage not accredited)



Contract No: 22153		Report No. R108910	
Contract: Kilbride Development, Co. Wicklow			
BH/TP: BH03			
Sample No. AA126846	Lab. Sample No. A20/112		
Sample Type: B	Customer: Aecom		
Depth (m) 4.00	Date Received 07/01/2020	Date Testing started 15/01/2020	
Description: Brown slightly sandy, slightly gravelly, CLAY			
Remarks			
Note: Clause 9.2 and Clause 9.5 of BS1377:Part 2:1990 have been superseded by BS1377:Part 2:2015. Results apply to sample as received.			

particle size	% passing	COBBLES	GRAVEL	SAND	SILT/CLAY
75	100				
63	100				
50	100				
37.5	97				
28	97				
20	95				
14	90				
10	87				
6.3	83				
5	80				
3.35	75				
2	68				
1.18	62				
0.6	56				
0.425	55				
0.3	53				
0.15	51				
0.063	50				
0.037	47				
0.027	42				
0.017	36				
0.010	28				
0.007	22				
0.005	17				
0.002	12				

IGSL Ltd Materials Laboratory		Approved by: <i>J Barrett</i>	Date: 04/02/20	Page no: 1 of 1
Persons authorised to approve report: J Barrett (Quality Manager) H Byrne (Laboratory Manager)				

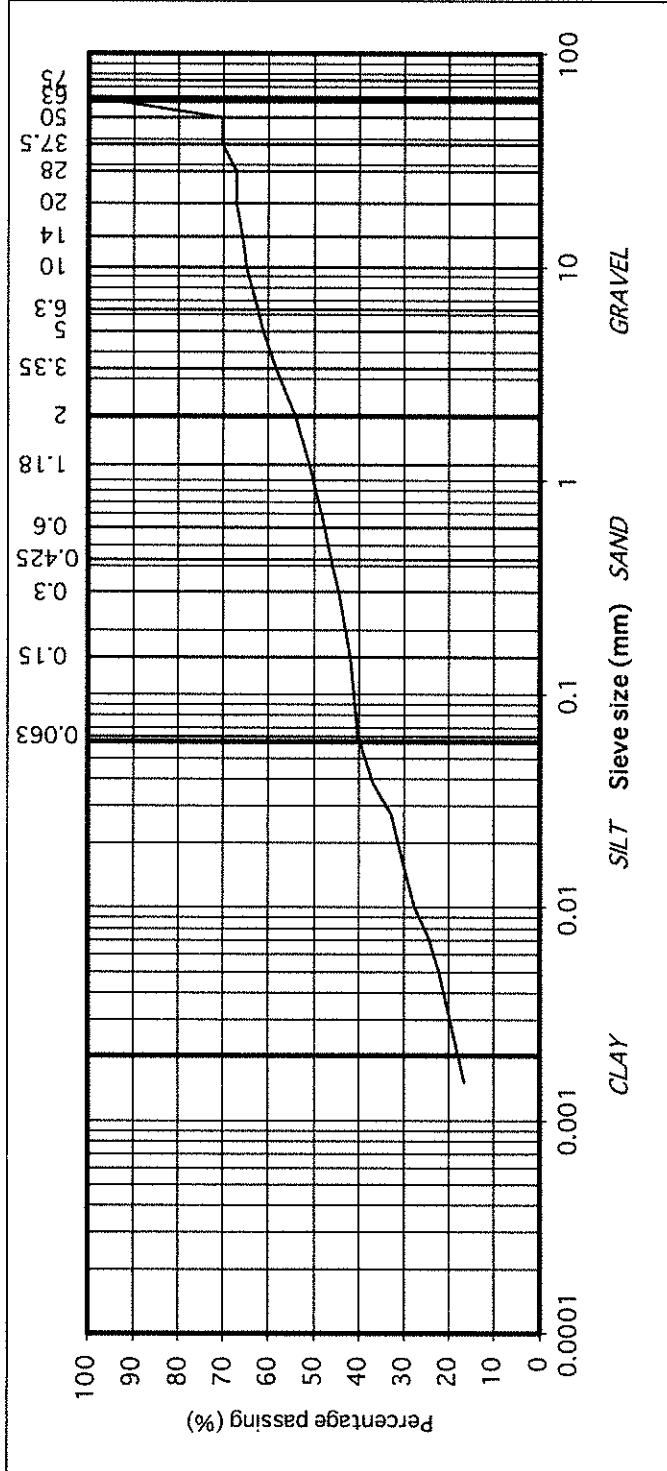
TEST REPORT

Determination of Particle Size Distribution

Tested in accordance with: BS1377:Part2:1990, clause 9.2 & 9.5
(note: Sedimentation stage not accredited)



particle size	% passing	Contract No: 22153	Report No. R108911
75	100	Contract: Kilbride Development, Co. Wicklow	
63	100	BH/TP: BH04	
50	70	Sample No. AA126836	Lab. Sample No. A20/114
37.5	70	Sample Type: B	
28	67	Depth (m) 3.00	Customer: Aecom
20	67	Date Received 07/01/2020	Date Testing started 16/01/2020
14	66	Description: Brown slightly sandy, gravelly, CLAY	
10	65	Remarks	
6.3	62		
5	61		
3.35	58		
2	54		
1.18	51		
0.6	47		
0.425	46		
0.3	44		
0.15	42		
0.063	40		
0.038	37		
0.027	33		
0.017	30		
0.010	28		
0.007	25		
0.005	22		
0.002	17		



IGSL Ltd Materials Laboratory		Approved by: <i>[Signature]</i>	Date: 04/02/20	Page no: 1 of 1
Persons authorised to approve report: J Barrett (Quality Manager) H Byrne (Laboratory Manager)				

TEST REPORT

Determination of Particle Size Distribution

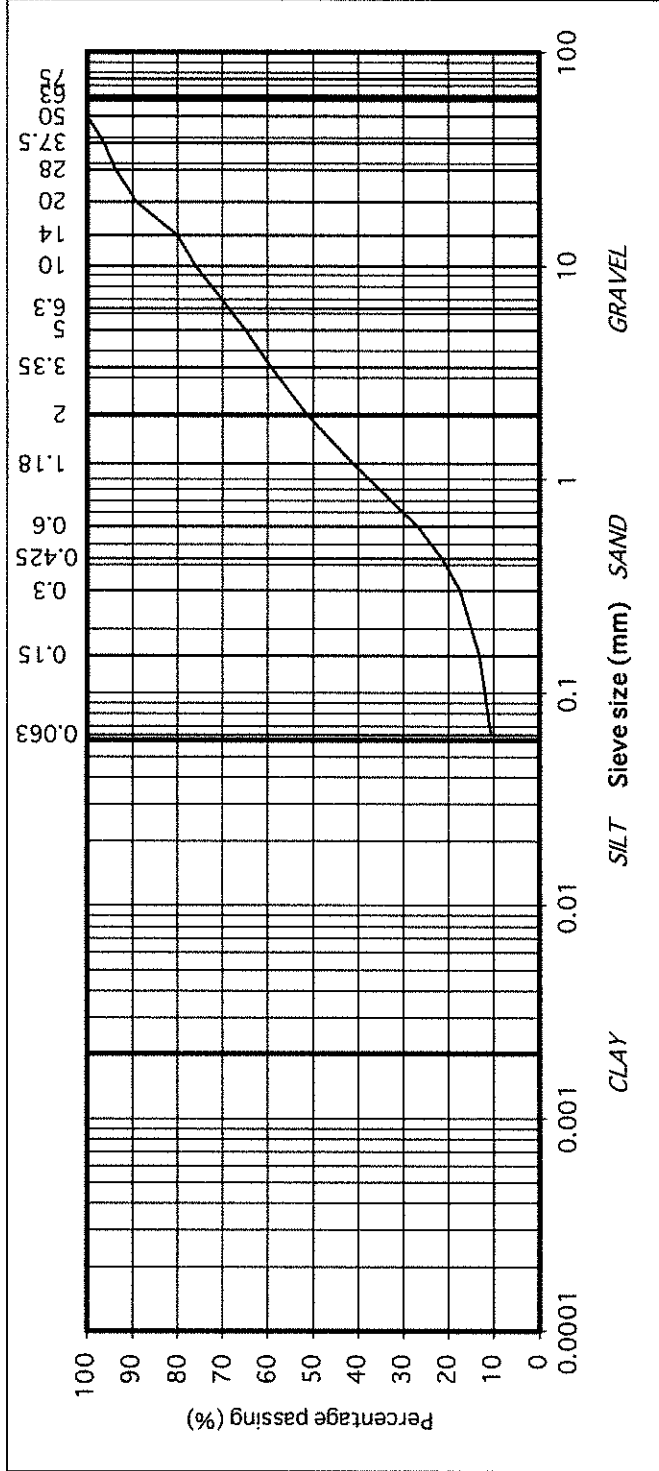
Tested in accordance with: BS1377:Part2:1990, clause 9.2 & 9.5
(note: Sedimentation stage not accredited)



particle size	% passing	Contract No: 22153	Report No. R108841
75	100	Contract: Kilbride Development, Co. Wicklow	
63	100	BH/TP: BH05	
50	100	Sample No. AA121836	Lab. Sample No. A20/116
37.5	96	Sample Type: B	
28	94	Depth (m) 1.00	Customer: Aecom
20	89	Date Received 07/01/2020	Date Testing started 16/01/2020
14	80	Description: Brown clayey/silty, very sandy, GRAVEL	
10	76		
6.3	69		
5	65		
3.35	59		
2	51		
1.18	41		
0.6	27		
0.425	21		
0.3	17		
0.15	13		
0.063	11		

COBBLES	GRAVEL	SAND	SILT/CLAY
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Remarks:
 Note: Clause 9.2 and Clause 9.5 of BS1377:Part 2:1990 have been superseded by ISO 17892-4:2015. Results apply to sample as received.



IGSL Ltd Materials Laboratory		Approved by: <i>H. Byrne</i>	Date: 04/02/20	Page no: 1 of 1
Persons authorised to approve report: J Barrett (Quality Manager) H Byrne (Laboratory Manager)				

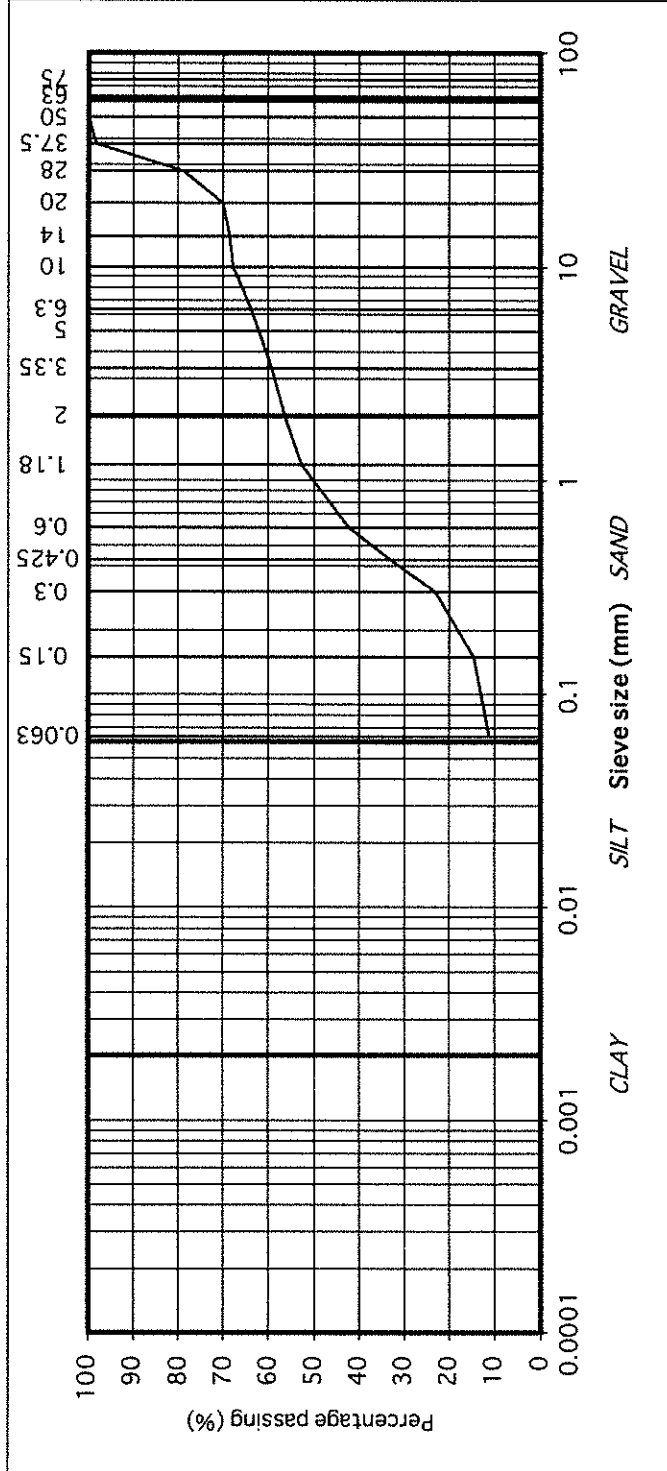
TEST REPORT

Determination of Particle Size Distribution

Tested in accordance with: BS1377:Part 2:1990, clause 9.2 & 9.5
(note: Sedimentation stage not accredited)



particle size	% passing	Contract No: 22153	Report No. R108912
75	100	Contract: Kilbride Development, Co. Wicklow	
63	100	BH/TP: BH05	
50	100	Sample No. AA121841	Lab. Sample No. A20/118
37.5	98	Sample Type: B	
28	79	Depth (m): 5.00	Customer: Aecom
20	70	Date Received: 07/01/2020	Date Testing started: 16/01/2020
14	69	Description: Brown clayey/silty, very gravelly, SAND	
10	68	Remarks	
6.3	64		
5	62		
3.35	59		
2	56		
1.18	53		
0.6	42		
0.425	33		
0.3	23		
0.15	15		
0.063	11		



TEST REPORT

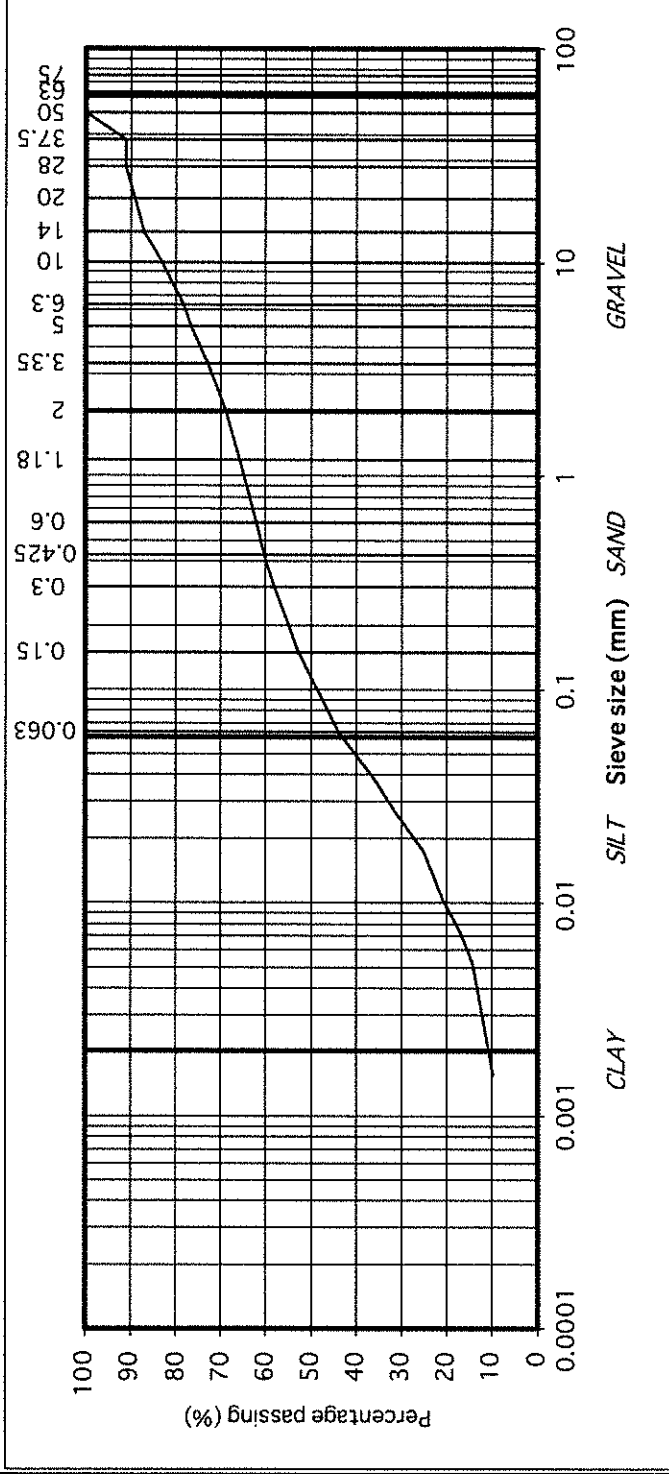
Determination of Particle Size Distribution

Tested in accordance with: BS1377:Part2:1990, clause 9.2 & 9.5
(note: Sedimentation stage not accredited)



particle size	% passing	Contract No: 22153	Report No. R108842
75	100	Contract: Kilbride Development, Co. Wicklow	
63	100	BH/TP: BH06	
50	100	Sample No. AA126807	Lab. Sample No. A20/119
37.5	91	Sample Type: B	
28	91	Depth (m) 2.00	Customer: Aecom
20	89	Date Received 07/01/2020	Date Testing started 16/01/2020
14	87	Description: Brown slightly sandy, slightly gravelly, CLAY	
10	83	Remarks	
6.3	78		
5	77		
3.35	73		
2	69		
1.18	66		
0.6	62		
0.425	60		
0.3	58		
0.15	53		
0.063	44		
0.038	36		
0.027	32		
0.018	25		
0.010	21		
0.007	17		
0.005	14		
0.002	10		

Note: Clause 9.2 and Clause 9.5 of BS1377:Part 2:1990 have been superseded by BS1377:Part 2:2015. Results apply to sample as received.



IGSL Ltd Materials Laboratory		Approved by: <i>J Barrett</i>	Date: 04/02/20	Page no: 1 of 1
Persons authorised to approve report: J Barrett (Quality Manager) H Byrne (Laboratory Manager)				

TEST REPORT

Determination of Particle Size Distribution

Tested in accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5
(note: Sedimentation stage not accredited)



particle size	% passing	Contract No: 22153	Report No. R108833
75	100	Contract: Kilbride Development , Co.Wicklow	
63	100	BH/TP : BH06	
50	100	Sample No. AA126810	Lab. Sample No. A20/120
37.5	100	Sample Type: B	
28	99	Depth (m) 5.00	Customer: Aecom
20	98	Date Received 07/01/2020	Date Testing started 16/01/2020
14	97	Description: Brown slightly sandy, slightly gravelly, CLAY	
10	94	Remarks	
6.3	91		
5	89		
3.35	87		
2	84		
1.18	81		
0.6	78		
0.425	77		
0.3	75		
0.15	71		
0.063	63		
0.038	55		
0.027	52		
0.017	43		
0.010	37		
0.007	32		
0.005	26		
0.002	15		

COBBLES

GRAVEL

SAND

SILT/CLAY

100
90
80
70
60
50
40
30
20
10
0

Percentage passing (%)

0.0001 0.001 0.01 0.1 1 10 100

Sieve size (mm)

CLAY SAND GRAVEL

Note: Clauses 9.2 and Clause 9.5 of BS1377 Part 2:1990 have been superseded by BS1377-4:2016. Results apply to sample as received.

IGSL Ltd Materials Laboratory		Approved by:	Date: 04/02/20	Page no: 1 of 1
Persons authorised to approve report: J Barrett (Quality Manager) H Byrne (Laboratory Manager)				

TEST REPORT

Determination of Particle Size Distribution

Tested in accordance with: BS1377:Part2:1990, clause 9.2 & 9.5
(note: Sedimentation stage not accredited)



Contract No:	22153	Report No.	R108913
Contract:	Kilbride Development, Co. Wicklow		
BH/TP:	BH06		
Sample No.	AA126812	Lab. Sample No.	A20/121
Sample Type:	B		
Depth (m)	7.00	Customer:	Aecom
Date Received	07/01/2020 Date Testing started		
Description:	Brown clayey/silty, very sandy, GRAVEL		
Remarks	Note: Clause 9.2 and Clause 9.5 of BS1377 Part 2:1990 have been superseded by ISO 17693-4:2016. Results apply to sample as received.		

particle size	% passing	COBBLES	GRAVEL	SAND	SILT/CLAY
75	100				
63	100				
50	100				
37.5	100				
28	95				
20	89				
14	81				
10	71				
6.3	60				
5	56				
3.35	53				
2	45				
1.18	37				
0.6	28				
0.425	24				
0.3	21				
0.15	18				
0.063	16				

IGSL Ltd Materials Laboratory		Approved by:	Date:	Page no:
		<i>J Barrett</i>	04/02/20	1 of 1
Persons authorised to approve report: J Barrett (Quality Manager) H Byrne (Laboratory Manager)				

IGSL Ltd
Materials Laboratory
M7 Business Park
Naas
Co. Kildare

Test Report

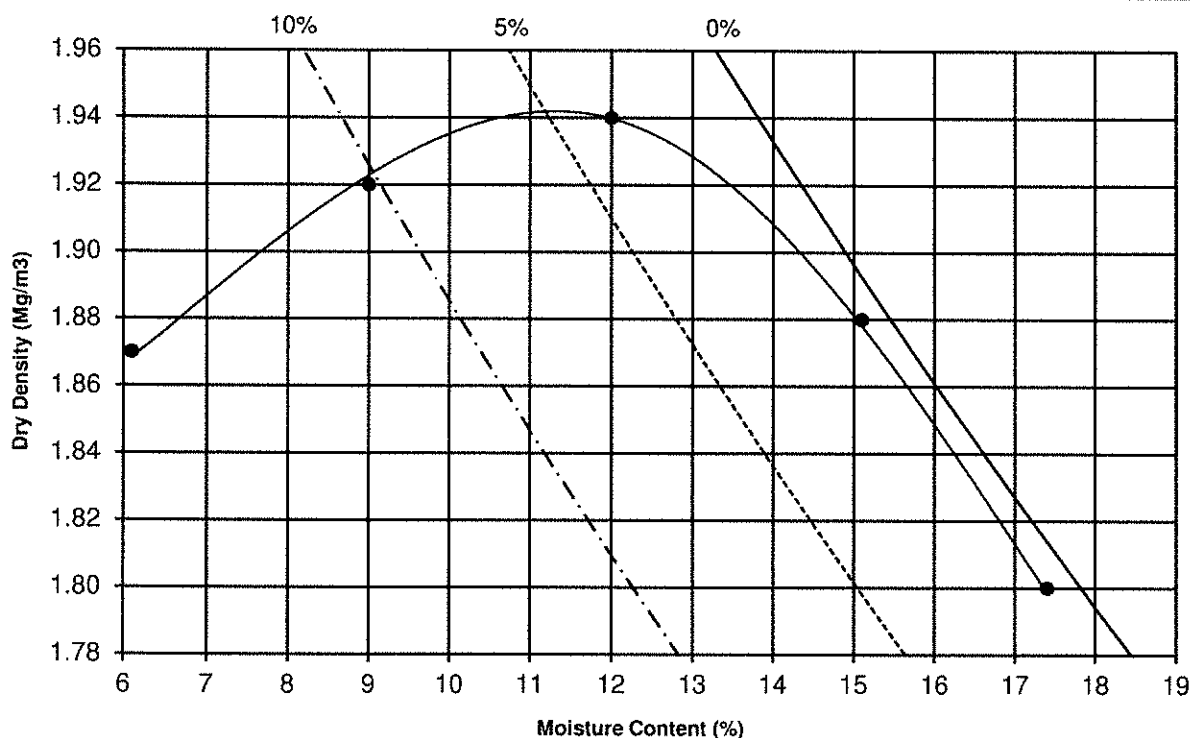
Dry Density/Moisture Content Relationship

Tested in accordance with BS1377:Part 4:1990



Report No. R109020 Contract No. 22152
Contract Name: Kilbride Development, Co. Wicklow
Lab Contract No. 22152 Location: TP02
Sample No. AA128536/37 Depth (m) 1 Material Type B
Lab sample no. A20/0124 Customer: Aecom
Date Received: 07/01/2020 Test Method: 2.5 KG Rammer
Date Tested: 27/01/2020 BS1377:Part 4:1990 3.3

Dry Density (Mg/m^3)	1.80	1.88	1.94	1.92	1.87	0.00	
Moisture Content (%)	17	15	12	9.0	6.1	0	



Maximum Dry Density (Mg/m^3): 1.94 Optimum Moisture Content (%): 12
Description: Mottled brown sandy gravelly CLAY
Sample Preparation: Material passing 20mm Single / Separate samples used
Particle Density (Mg/m^3): 2.65 Particle Density: Assumed
% retained on 20/37.5mm sieve: 35

The result relates to the specimen tested.
Opinions and interpretations are outside the scope of accreditation

Persons authorised to approve reports
J Barrett (Quality Manager)
H Byrne (Laboratory Manager)

IGSL Materials Laboratory

Approved by

Date

Page

04/02/20

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IGSL Ltd
Materials Laboratory
M7 Business Park
Naas
Co. Kildare

Test Report

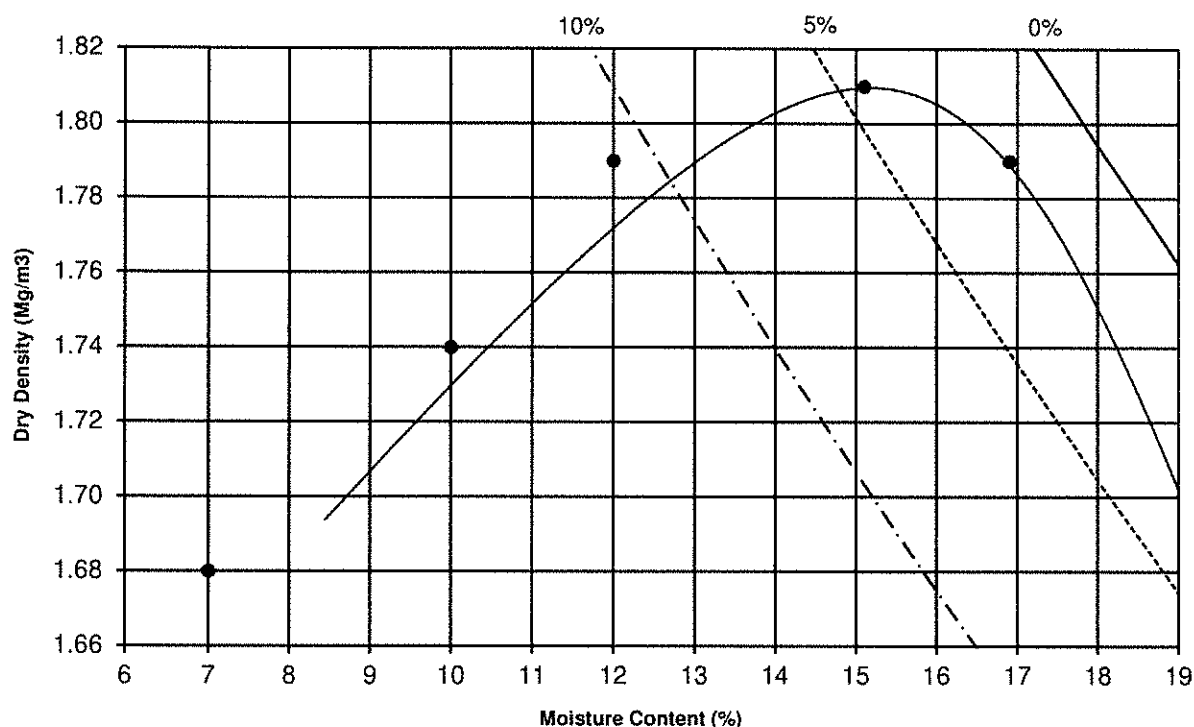
Dry Density/Moisture Content Relationship

Tested in accordance with BS1377:Part 4:1990



Report No. R108924 Contract No. 22152
Contract Name: Kilbride Development, Co. Wicklow
Lab Contract No. 22152 Location: TP04
Sample No. AA128542/43 Depth (m) 0.6 Material Type B
Lab sample no. A20/0128 Customer: Aecom
Date Received: 07/01/2020 Test Method: 2.5 KG Rammer
Date Tested: 21/01/2020 BS1377:Part 4:1990 3.3

Dry Density (Mg/m^3)	1.79	1.81	1.79	1.74	1.68	1.74	
Moisture Content (%)	17	15	12	10	7.0	20	



Maximum Dry Density (Mg/m^3): 1.81 Optimum Moisture Content (%): 15
Description: Brown sandy gravelly CLAY
Sample Preparation: Material passing 20mm Single / Separate samples used
Particle Density (Mg/m^3): 2.65 Particle Density: Assumed
% retained on 20/37.5mm sieve: 0

The result relates to the specimen tested.
Opinions and interpretations are outside the scope of accreditation

Persons authorised to approve reports
J Barrett (Quality Manager)
H Byrne (Laboratory Manager)

IGSL Materials Laboratory

Approved by

Date

Page

[Signature]

04/02/20

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IGSL Ltd
Materials Laboratory
M7 Business Park
Naas
Co. Kildare

Test Report

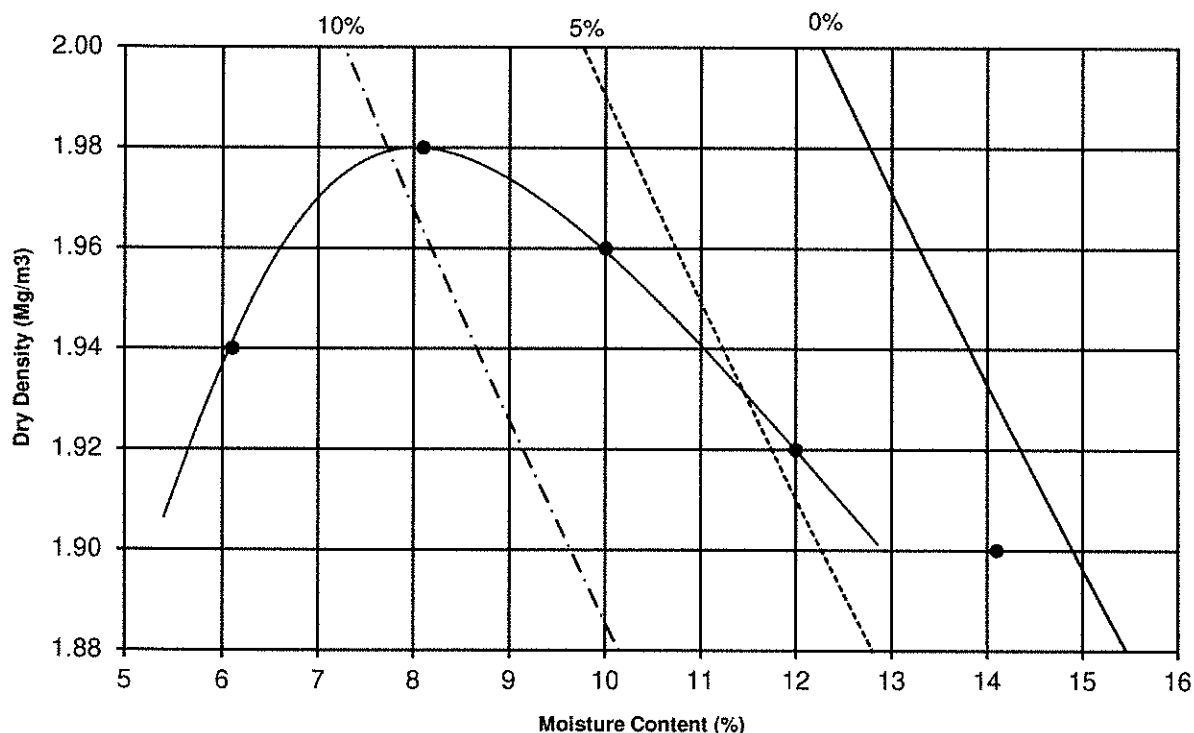
Dry Density/Moisture Content Relationship

Tested in accordance with BS1377:Part 4:1990



Report No. R108925 Contract No. 22152
Contract Name: Kilbride Development, Co. Wicklow
Lab Contract No. 22152 Location: TP07
Sample No. AA128535 Depth (m) 1 Material Type B
Lab sample no. A20/0134 Customer: Aecom
Date Received: 07/01/2020 Test Method: 2.5 KG Rammer
Date Tested: 21/01/2020 BS1377:Part 4:1990 3.3

Dry Density (Mg/m ³)	1.90	1.92	1.96	1.98	1.94	0.00	
Moisture Content (%)	14	12	10	8.1	6.1	0	



Maximum Dry Density (Mg/m³): 1.98 Optimum Moisture Content (%): 8

Description: Mottled brown sandy gravelly CLAY

Sample Preparation: Material passing 20mm Single / Separate samples used

Particle Density (Mg/m³): 2.65 Particle Density: Assumed

% retained on 20/37.5mm sieve: 9.6

The result relates to the specimen tested.
Opinions and interpretations are outside the scope of accreditation

Persons authorised to approve reports
J Barrett (Quality Manager)
H Byrne (Laboratory Manager)

IGSL Materials Laboratory

Approved by

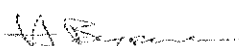
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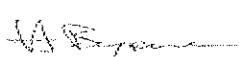
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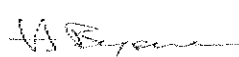
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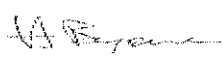
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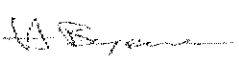
1 of 1

IGSL Ltd Materials Laboratory Unit J5,M7 Business Park Naas Co. Kildare 045 899324	Test Report																																								
	Determination of Moisture Condition Value at Natural Moisture Content																																								
	Tested in accordance with BS1377:Part 4:1990, clause 5.4																																								
<table border="0" style="width: 100%;"> <tr> <td style="width: 50%;">Report No.</td> <td>R108851</td> </tr> <tr> <td>Contract No.</td> <td>22153</td> </tr> <tr> <td>Contract Name:</td> <td>Kilbride Development , Co.Wicklow</td> </tr> <tr> <td>Customer:</td> <td>Aecom</td> </tr> <tr> <td>BH/TP</td> <td>TP02</td> </tr> <tr> <td>Sample No.</td> <td>AA128536/37</td> </tr> <tr> <td>Depth (m)</td> <td>1.00</td> </tr> <tr> <td>Sample Type:</td> <td>B</td> </tr> <tr> <td>Lab Sample No.</td> <td>A20/0124</td> </tr> <tr> <td>Source (if applicable)</td> <td>unknown</td> </tr> <tr> <td>Material Type (if applicable):</td> <td>B</td> </tr> <tr> <td>Sample Received:</td> <td>07/01/20</td> </tr> <tr> <td>Date Tested:</td> <td>21/01/20</td> </tr> <tr> <td>Sample Cert:</td> <td>N/A</td> </tr> <tr> <td>Moisture Content (%):</td> <td>16</td> </tr> <tr> <td>% Particles > 20mm (By dry mass):</td> <td>41</td> </tr> <tr> <td>MCV:</td> <td>3</td> </tr> <tr> <td>Interpretation of Plot:</td> <td>Steepest Straight Line</td> </tr> <tr> <td>Description of Soil:</td> <td>Mottled brown sandy gravelly CLAY</td> </tr> </table>				Report No.	R108851	Contract No.	22153	Contract Name:	Kilbride Development , Co.Wicklow	Customer:	Aecom	BH/TP	TP02	Sample No.	AA128536/37	Depth (m)	1.00	Sample Type:	B	Lab Sample No.	A20/0124	Source (if applicable)	unknown	Material Type (if applicable):	B	Sample Received:	07/01/20	Date Tested:	21/01/20	Sample Cert:	N/A	Moisture Content (%):	16	% Particles > 20mm (By dry mass):	41	MCV:	3	Interpretation of Plot:	Steepest Straight Line	Description of Soil:	Mottled brown sandy gravelly CLAY
Report No.	R108851																																								
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IGSL Ltd Materials Laboratory		Approved by	Date	Page																																					
			04/02/20	1 of 1																																					

IGSL Ltd Materials Laboratory Unit J5,M7 Business Park Naas Co. Kildare 045 899324	Test Report																																								
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Source (if applicable)	unknown																																								
Material Type (if applicable):	B																																								
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IGSL Ltd Materials Laboratory		Approved by 	Date 04/02/20																																						
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IGSL Ltd Materials Laboratory Unit J5,M7 Business Park Naas Co. Kildare 045 899324	Test Report																																								
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Report No.	R108853																																								
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Sample Received:	07/01/20																																								
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IGSL Ltd Materials Laboratory		Approved by	Date	Page																																					
			04/02/20	1 of 1																																					

IGSL Ltd Materials Laboratory Unit J5,M7 Business Park Naas Co. Kildare 045 899324	Test Report																																								
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<table border="0" style="width: 100%;"> <tr> <td style="width: 50%;">Report No.</td> <td style="width: 50%;">R108919</td> </tr> <tr> <td>Contract No.</td> <td>22153</td> </tr> <tr> <td>Contract Name:</td> <td>Kilbride Development , Co.Wicklow</td> </tr> <tr> <td>Customer:</td> <td>Aecom</td> </tr> <tr> <td>BH/TP</td> <td>TP06</td> </tr> <tr> <td>Sample No.</td> <td>AA128528</td> </tr> <tr> <td>Depth (m)</td> <td>1.00</td> </tr> <tr> <td>Sample Type:</td> <td>B</td> </tr> <tr> <td>Lab Sample No.</td> <td>A20/132</td> </tr> <tr> <td>Source (if applicable)</td> <td>unknown</td> </tr> <tr> <td>Material Type (if applicable):</td> <td>B</td> </tr> <tr> <td>Sample Received:</td> <td>07/01/20</td> </tr> <tr> <td>Date Tested:</td> <td>22/01/20</td> </tr> <tr> <td>Sample Cert:</td> <td>N/A</td> </tr> <tr> <td>Moisture Content (%):</td> <td>11</td> </tr> <tr> <td>% Particles > 20mm (By dry mass):</td> <td>16</td> </tr> <tr> <td>MCV:</td> <td>13.4</td> </tr> <tr> <td>Interpretation of Plot:</td> <td>Steepest Straight Line</td> </tr> <tr> <td>Description of Soil:</td> <td>Brown clayey/silty, very sandy, GRAVEL with some cobbles</td> </tr> </table>				Report No.	R108919	Contract No.	22153	Contract Name:	Kilbride Development , Co.Wicklow	Customer:	Aecom	BH/TP	TP06	Sample No.	AA128528	Depth (m)	1.00	Sample Type:	B	Lab Sample No.	A20/132	Source (if applicable)	unknown	Material Type (if applicable):	B	Sample Received:	07/01/20	Date Tested:	22/01/20	Sample Cert:	N/A	Moisture Content (%):	11	% Particles > 20mm (By dry mass):	16	MCV:	13.4	Interpretation of Plot:	Steepest Straight Line	Description of Soil:	Brown clayey/silty, very sandy, GRAVEL with some cobbles
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			04/02/20																																						
		Page	1 of 1																																						

IGSL Ltd Materials Laboratory Unit J5,M7 Business Park Naas Co. Kildare 045 899324	Test Report																																								
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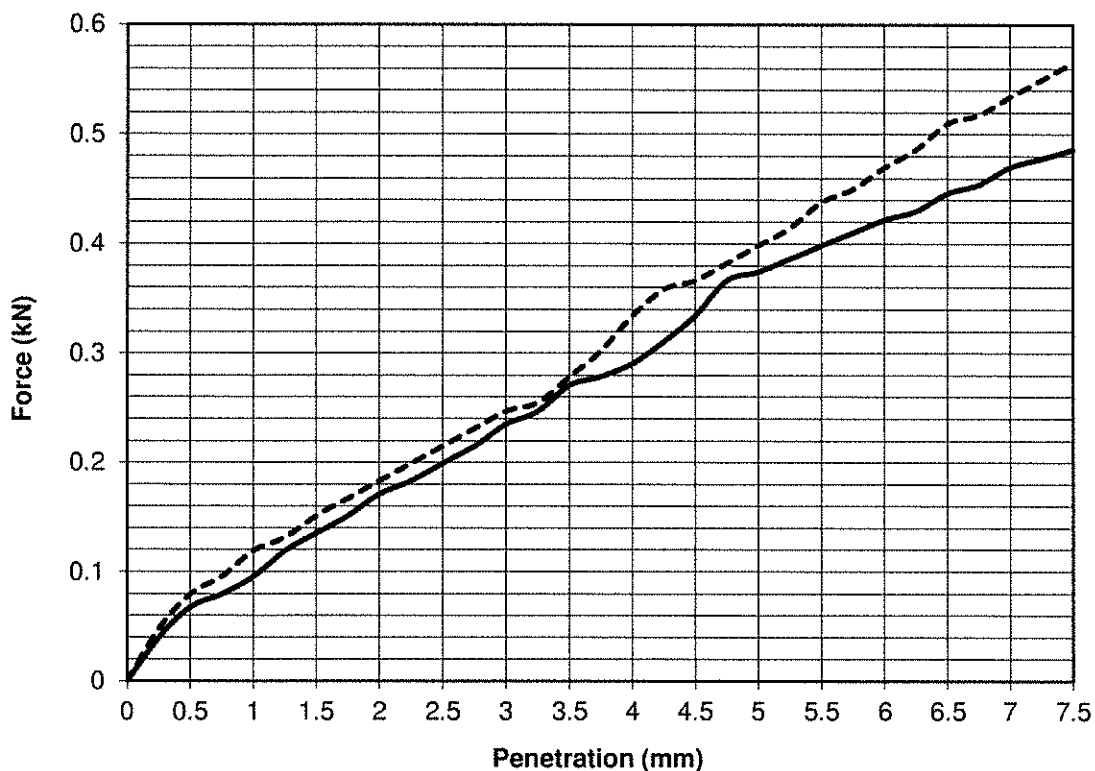
TEST REPORT

Determination of California Bearing Ratio (CBR)



Tested in accordance with BS1377:Part 4:1990, clause 7

Report No.	R108724	Contract	Kilbride Development , Co.Wicklow
Contract No.	22153	Customer	Aecom
Date received	07/01/20	Date Tested	16/01/20
BH/TP No.	TP01	Sample No.	AA128551 Type: B
Depth (m)	0.90	Lab sample No.	A20/0122



Key: ————— Top - - - - - Base

Description: Mottled grey/brown sandy gravelly CLAY			
Initial Condition:		Unsoaked	
Moisture Content (%):	20	Bulk Density (Mg/m ³):	2.08
Surcharge (kg):	4	Dry Density (Mg/m ³):	1.74
% Material >20mm:	19		
Method of compaction: Static Compaction Method 2			

Test Result	Top	Base
CBR %	1.9	2.0
Moisture Content %	19	20

Results apply to sample as received.

Persons authorized to approve reports
J Barrett (Quality Manager)
H Byrne (Laboratory Manager)

IGSL Ltd Materials Laboratory

Approved by	Date	Page No.
<i>H Byrne</i>	04/02/20	1 of 1

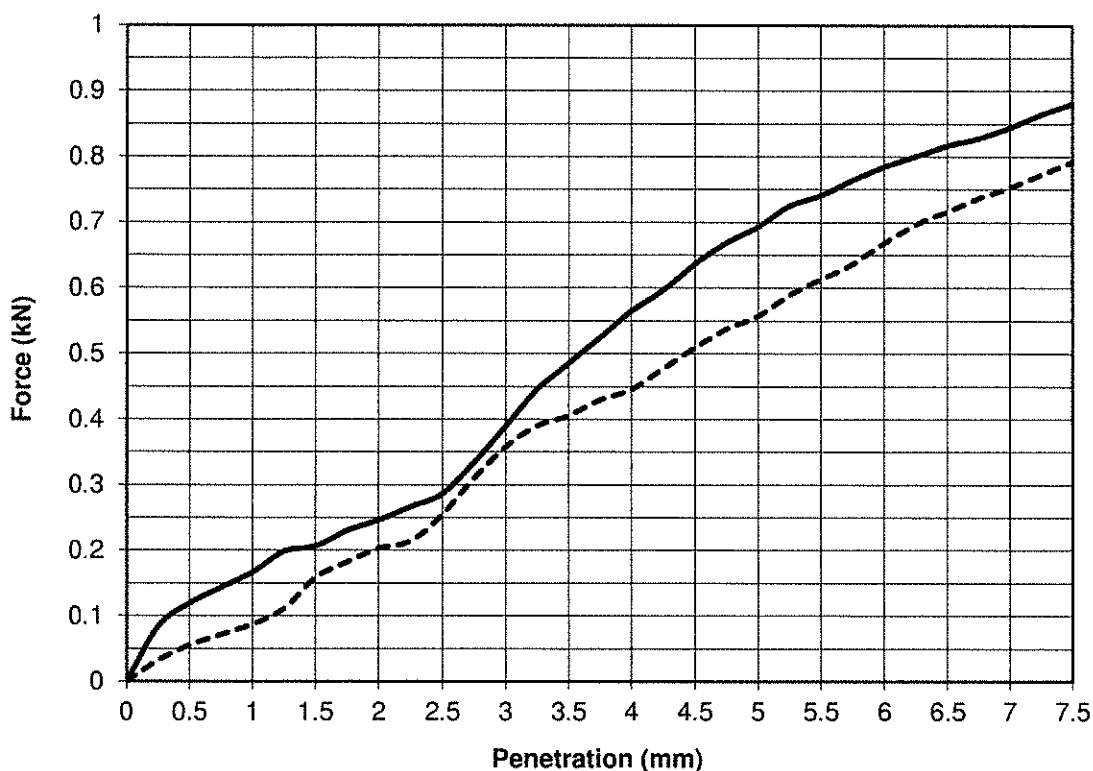
TEST REPORT

Determination of California Bearing Ratio (CBR)



Tested in accordance with BS1377:Part 4:1990, clause 7

Report No.	R108927	Contract	Kilbride Development , Co.Wicklow
Contract No.	22153	Customer	Aecom
Date received	07/01/20	Date Tested	22/01/20
BH/TP No.	TP02	Sample No.	AA128536/7 Type: B
Depth (m)	1.00	Lab sample No.	A20/0124



Key: ————— Top - - - - - Base

Description: Mottled brown sandy gravelly CLAY

Initial Condition: Unsoaked

Moisture Content (%): 18 Bulk Density (Mg/m³): 2.15

Surcharge (kg): 4 Dry Density (Mg/m³): 1.83

% Material >20mm: 35

Method of compaction: Static Compaction Method 2

Test Result	Top	Base
CBR %	3.5	2.8
Moisture Content %	17	18

Results apply to sample as received.

Persons authorized to approve reports

J Barrett (Quality Manager)

H Byrne (Laboratory Manager)

IGSL Ltd Materials Laboratory

Approved by	Date	Page No.
<i>H Byrne</i>	04/02/20	1 of 1

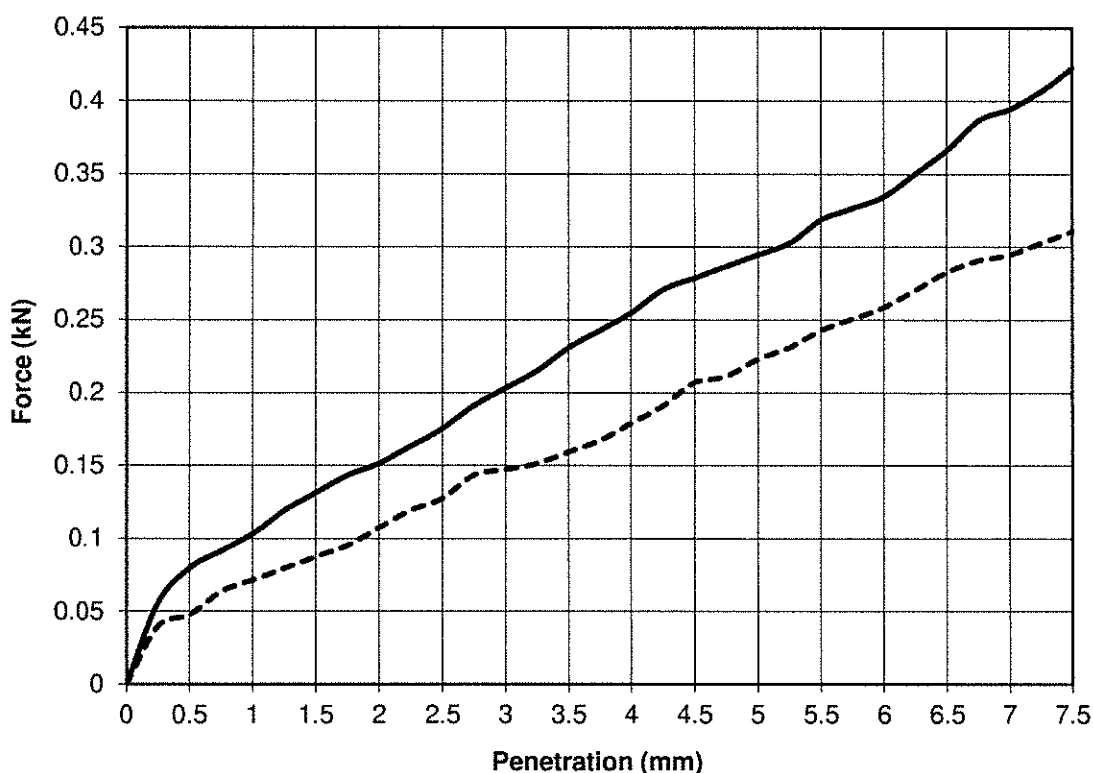
TEST REPORT

Determination of California Bearing Ratio (CBR)



Tested in accordance with BS1377:Part 4:1990, clause 7

Report No.	R108846	Contract	Kilbride Development , Co.Wicklow
Contract No.	22153	Customer	Aecom
Date received	07/01/20	Date Tested	21/01/20
BH/TP No.	TP03	Sample No.	AA128525 Type: B
Depth (m)	1.00	Lab sample No.	A20/0126



Key: ————— Top - - - - - Base

Description: Mottled brown sandy gravelly CLAY

Initial Condition: Unsoaked

Moisture Content (%): 16 Bulk Density (Mg/m³): 2.15

Surcharge (kg): 4 Dry Density (Mg/m³): 1.85

% Material >20mm: 20

Method of compaction: Static Compaction Method 2

Test Result	Top	Base
CBR %	1.5	1.1
Moisture Content %	16	16

Results apply to sample as received.

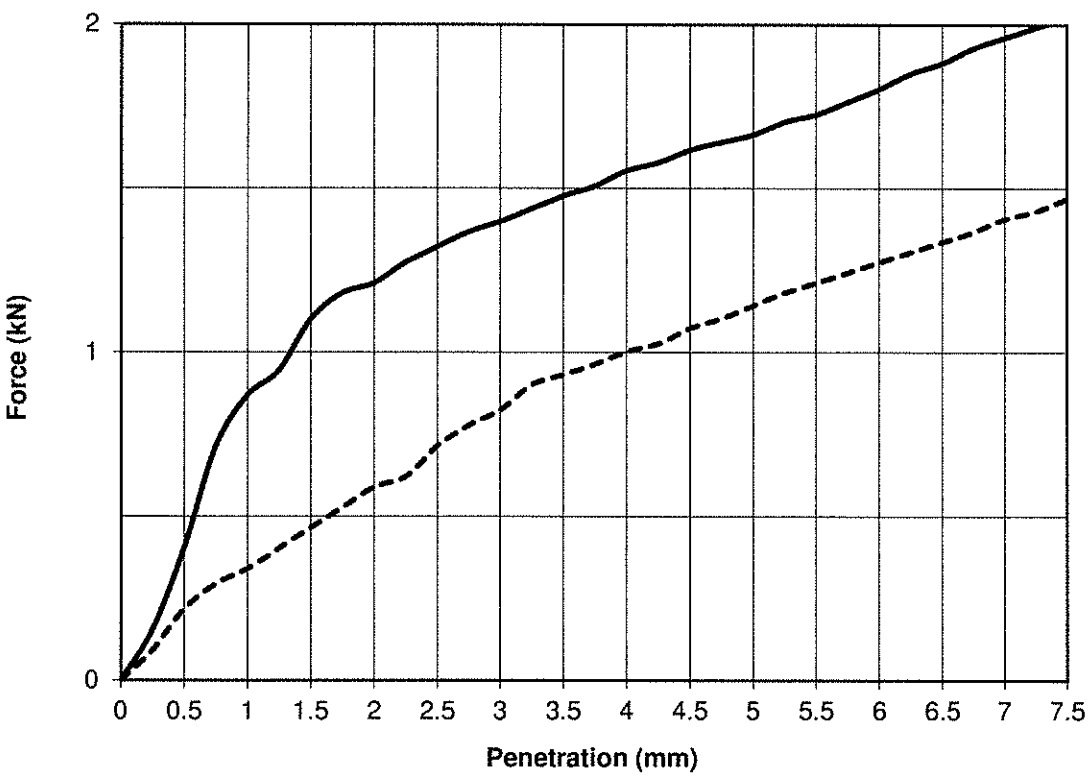
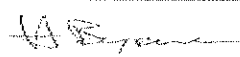
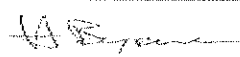
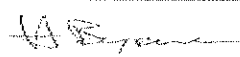
Persons authorized to approve reports

J Barrett (Quality Manager)

H Byrne (Laboratory Manager)

IGSL Ltd Materials Laboratory

Approved by	Date	Page No.
<i>H Byrne</i>	04/02/20	1 of 1

IGSL Ltd Materials Laboratory Unit J5,M7 Business Park Naas Co.Kildare 045 899324	TEST REPORT Determination of California Bearing Ratio (CBR) Tested in accordance with BS1377:Part 4:1990, clause 7																									
<table style="width: 100%; border: none;"> <tr> <td style="width: 33%;">Report No.</td> <td style="width: 33%;">R108847</td> <td style="width: 33%;">Contract</td> <td style="width: 33%;">Kilbride Development , Co.Wicklow</td> </tr> <tr> <td>Contract No.</td> <td>22153</td> <td>Customer</td> <td>Aecom</td> </tr> <tr> <td>Date received</td> <td>07/01/20</td> <td>Date Tested</td> <td>21/01/20</td> </tr> <tr> <td>BH/TP No.</td> <td>TP04</td> <td>Sample No.</td> <td>AA128542/43 Type: B</td> </tr> <tr> <td>Depth (m)</td> <td>0.60</td> <td>Lab sample No.</td> <td>A20/0128</td> </tr> </table>			Report No.	R108847	Contract	Kilbride Development , Co.Wicklow	Contract No.	22153	Customer	Aecom	Date received	07/01/20	Date Tested	21/01/20	BH/TP No.	TP04	Sample No.	AA128542/43 Type: B	Depth (m)	0.60	Lab sample No.	A20/0128				
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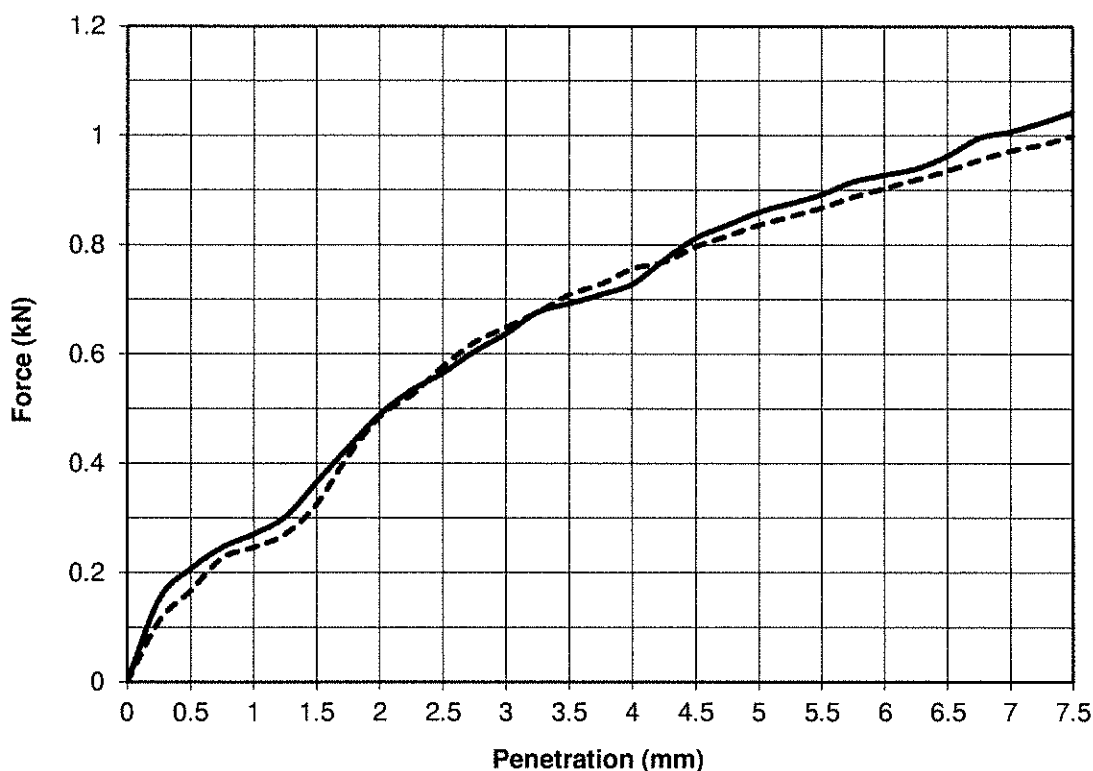
TEST REPORT

Determination of California Bearing Ratio (CBR)



Tested in accordance with BS1377:Part 4:1990, clause 7

Report No.	R108725	Contract	Kilbride Development , Co.Wicklow
Contract No.	22153	Customer	Aecom
Date received	07/01/20	Date Tested	16/01/20
BH/TP No.	TP05	Sample No.	AA128519 Type: B
Depth (m)	1.00	Lab sample No.	A20/0130



Key: ————— Top - - - - - Base

Description: Mottled brown sandy gravelly CLAY

Initial Condition: Unsoaked

Moisture Content (%): 21 Bulk Density (Mg/m³): 2.03

Surcharge (kg): 4 Dry Density (Mg/m³): 1.68

% Material >20mm: 0

Method of compaction: Static Compaction Method 2

Test Result	Top	Base
CBR %	4.3	4.4
Moisture Content %	20	21

Results apply to sample as received.

Persons authorized to approve reports

J Barrett (Quality Manager)

H Byrne (Laboratory Manager)

IGSL Ltd Materials Laboratory

Approved by	Date	Page No.
<i>H Byrne</i>	04/02/20	1 of 1

IGSL Ltd
Materials Laboratory
Unit J5,M7 Business Park
Naas Co.Kildare
045 899324

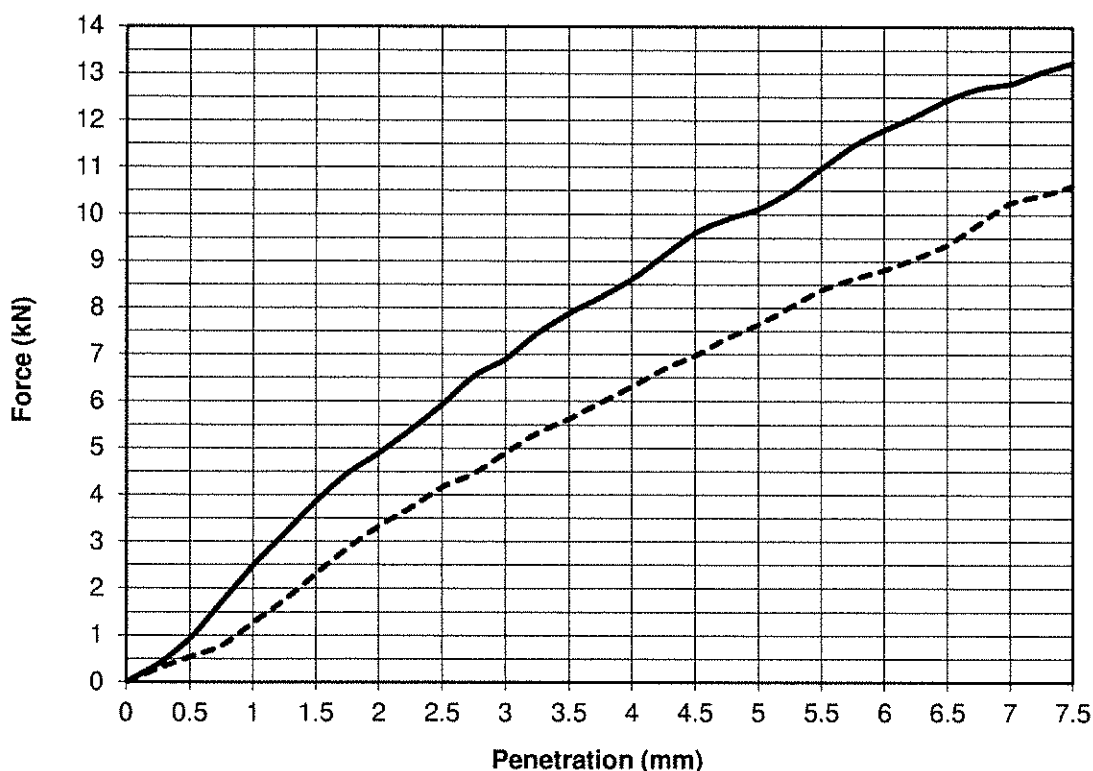
TEST REPORT

Determination of California Bearing Ratio (CBR)



Tested in accordance with BS1377:Part 4:1990, clause 7

Report No.	R108726	Contract	Kilbride Development , Co.Wicklow
Contract No.	22153	Customer	Aecom
Date received	07/01/20	Date Tested	16/01/20
BH/TP No.	TP06	Sample No.	AA128528 Type: B
Depth (m)	1.00	Lab sample No.	A20/0132



Key: ————— Top - - - - - Base

Description: Brown clayey/silty, very sandy, GRAVEL with some cobbles

Initial Condition: Unsoaked

Moisture Content (%): 11 Bulk Density (Mg/m³): 2.25

Surcharge (kg): 4 Dry Density (Mg/m³): 2.02

% Material >20mm: 0

Method of compaction: Static Compaction Method 2

Test Result	Top	Base
CBR %	51	38
Moisture Content %	11	11

Results apply to sample as received

Persons authorized to approve reports

J Barrett (Quality Manager)

H Byrne (Laboratory Manager)

IGSL Ltd Materials Laboratory

Approved by	Date	Page No.
<i>[Signature]</i>	04/02/20	1 of 1

IGSL Ltd

Materials Laboratory

Unit J5,M7 Business Park

Naas Co.Kildare

045 899324

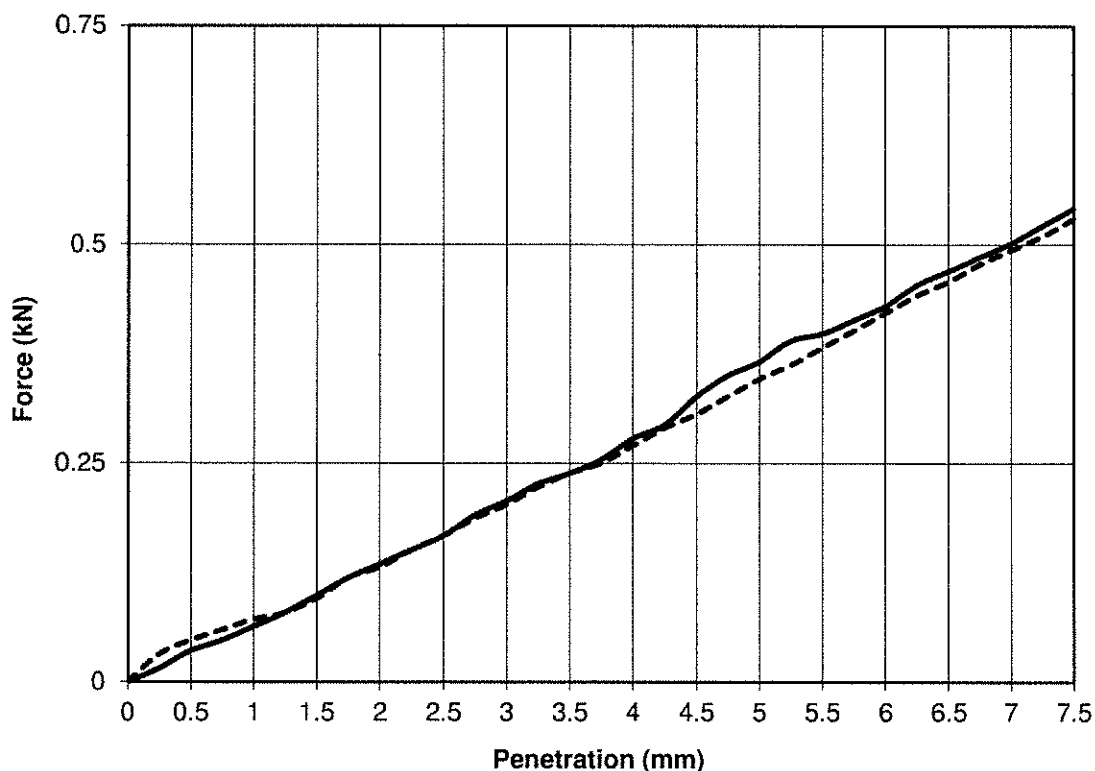
TEST REPORT

Determination of California Bearing Ratio (CBR)

Tested in accordance with BS1377:Part 4:1990, clause 7



Report No.	R108850	Contract	Kilbride Development , Co.Wicklow
Contract No.	22153	Customer	Aecom
Date received	07/01/20	Date Tested	21/01/20
BH/TP No.	TP07	Sample No.	AA128535 Type: B
Depth (m)	1.00	Lab sample No.	A20/134



Key: ————— Top - - - - - Base

Description: Mottled brown sandy gravelly CLAY

Initial Condition: Unsoaked

Moisture Content (%): 14 Bulk Density (Mg/m³): 2.16Surcharge (kg): 4 Dry Density (Mg/m³): 1.89

% Material >20mm: 9.6

Method of compaction: Static Compaction Method 2

Test Result	Top	Base
CBR %	1.8	1.7
Moisture Content %	14	14

Results apply to sample as received.

Persons authorized to approve reports

J Barrett (Quality Manager)

H Byrne (Laboratory Manager)

IGSL Ltd Materials Laboratory

Approved by

Date

04/02/20

Page No.

1 of 1

Appendix VI Laboratory

b. Chemical and Environmental



Final Report

Report No.: 20-01302-1

Initial Date of Issue: 28-Jan-2020

Client IGSL

Client Address: M7 Business Park
Naas
County Kildare
Ireland

Contact(s): Darren Keogh

Project 22153 Killbride Development Wicklow
(Aecom)

Quotation No.: Q19-18246 **Date Received:** 16-Jan-2020

Order No.: **Date Instructed:** 20-Jan-2020

No. of Samples: 16

Turnaround (Wkdays): 7 **Results Due:** 28-Jan-2020

Date Approved: 28-Jan-2020

Approved By:



Details: Darrell Hall, Director

Project: 22153 Killbride Development Wicklow (Aecom)

Client: IGSL	Chemtest Job No.: 20-01302					20-01302
Quotation No.: Q19-18246	Chemtest Sample ID.: 954291					954295
Order No.:	Client Sample Ref.: 128530					126841
	Sample Location: TP8					BH3
	Sample Type: SOIL					SOIL
	Top Depth (m): 0.40					1.00
	Bottom Depth (m): 0.50					1.00
Determinand	Accred.	SOP	Type	Units	LOD	
pH	U	1010	10:1		N/A	8.4
Ammonium	U	1220	10:1	mg/l	0.050	0.12
Ammonium	N	1220	10:1	mg/kg	0.10	1.4
Boron (Dissolved)	U	1450	10:1	µg/l	20	< 20
Boron (Dissolved)	U	1450	10:1	mg/kg	0.20	< 0.20

Client: IGSL	Chemtest Job No.:									
	Chemtest Sample ID.:									
Quotation No.: Q19-18246	Client Sample Ref.:									
Order No.:	Sample Location:									
	Sample Type:									
	Top Depth (m):									
	Bottom Depth (m):									
	Asbestos Lab:									
Determinand	Accred.	SOP	Units	LOD	20-01302	20-01302	20-01302	20-01302	20-01302	20-01302
ACM Type	U	2192		N/A						
Asbestos Identification	U	2192	%	0.001			No Asbestos Detected			No Asbestos Detected
ACM Detection Stage	U	2192		N/A			-			-
Moisture	N	2030	%	0.020	14	15	17	12	9.6	11
pH (2.5:1)	N	2010		4.0	[A] 7.8		[A] 7.8	[A] 8.2		[A] 7.8
Boron (Hot Water Soluble)	U	2120	mg/kg	0.40					< 0.40	
Magnesium (Water Soluble)	N	2120	g/l	0.010	< 0.010	< 0.010	< 0.010	< 0.010		< 0.010
Sulphate (2:1 Water Soluble) as SO4	M	2120	g/l	0.010	< 0.010	< 0.010	< 0.010	< 0.010		< 0.010
Total Sulphur	M	2175	%	0.010	[A] 0.022		[A] 0.011	[A] < 0.010		[A] < 0.010
Sulphur (Elemental)	M	2180	mg/kg	1.0					[A] < 1.0	
Chloride (Water Soluble)	U	2220	g/l	0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010		[A] < 0.010
Nitrate (Water Soluble)	N	2220	g/l	0.010	< 0.010	< 0.010	< 0.010	< 0.010		< 0.010
Cyanide (Total)	M	2300	mg/kg	0.50					[A] < 0.50	
Sulphide (Easily Liberatable)	N	2325	mg/kg	0.50					[A] 1.5	
Ammonium (Water Soluble)	M	2120	g/l	0.01	0.06		0.04	0.03		0.02
Sulphate (Acid Soluble)	M	2430	%	0.010	[A] < 0.010		[A] < 0.010	[A] < 0.010		[A] < 0.010
Arsenic	M	2450	mg/kg	1.0		11			14	9.2
Barium	M	2450	mg/kg	10					35	
Cadmium	M	2450	mg/kg	0.10					0.10	
Chromium	M	2450	mg/kg	1.0					17	
Molybdenum	M	2450	mg/kg	2.0					< 2.0	
Antimony	N	2450	mg/kg	2.0					< 2.0	
Copper	U	2450	mg/kg	0.50		18			15	11
Mercury	M	2450	mg/kg	0.10		< 0.10			< 0.10	< 0.10
Nickel	M	2450	mg/kg	0.50		40			21	17
Lead	M	2450	mg/kg	0.50		11			19	8.9
Selenium	M	2450	mg/kg	0.20		21			0.35	0.23
Zinc	U	2450	mg/kg	0.50		36			48	
Chromium (Trivalent)	N	2490	mg/kg	1.0		24			17	11
Chromium (Hexavalent)	N	2490	mg/kg	0.50		< 0.50			< 0.50	< 0.50
Total Organic Carbon	M	2625	%	0.20					[A] 0.80	
Mineral Oil	N	2670	mg/kg	10					< 10	
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0		[A] < 1.0			[A] < 1.0	[A] < 1.0
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0		[A] < 1.0			[A] < 1.0	[A] < 1.0
Aliphatic TPH >C8-C10	M	2680	mg/kg	1.0		[A] < 1.0			[A] < 1.0	[A] < 1.0
Aliphatic TPH >C10-C12	M	2680	mg/kg	1.0		[A] < 1.0			[A] < 1.0	[A] < 1.0
Aliphatic TPH >C12-C16	M	2680	mg/kg	1.0		[A] < 1.0			[A] < 1.0	[A] < 1.0

Client: IGSL		Chemtest Job No.:		20-01302	20-01302	20-01302	20-01302	20-01302	20-01302	20-01302	20-01302	20-01302	20-01302	20-01302	20-01302	20-01302	20-01302
Quotation No.: Q19-18246	Chemtest Sample ID.:	20-01302	20-01302	20-01302	20-01302	20-01302	20-01302	20-01302	20-01302	20-01302	20-01302	20-01302	20-01302	20-01302	20-01302	20-01302	20-01302
Order No.:	Client Sample Ref.:	954288	954288	954288	954289	954290	954291	954292	954293	954294	954295	954296	954297	954298	954299	954300	954301
	Sample Location:	TP1	TP1	TP3	TP5	TP6	TP8	BH01	BH02	BH02	BH3	BH3	BH3	BH3	BH3	BH3	BH3
	Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	Top Depth (m):	0.40	0.60	0.60	1.00	2.00	0.40	1.00	1.00	1.50	1.00	1.00	1.00	1.50	1.00	1.00	2.00
	Bottom Depth (m):		0.60		1.00	2.00	0.50	1.00	1.00	1.50	1.00	1.00	1.00	1.50	1.00	1.00	2.00
	Asbestos Lab:						DURHAM				DURHAM				DURHAM		
Determinand	Accred.	SOP	Units	LOD	20-01302	20-01302	20-01302	20-01302	20-01302	20-01302	20-01302	20-01302	20-01302	20-01302	20-01302	20-01302	20-01302
Aliphatic TPH >C16-C21	M	2680	mg/kg	1.0													
Aliphatic TPH >C21-C35	M	2680	mg/kg	1.0													
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0													
Total Aliphatic Hydrocarbons	N	2680	mg/kg	5.0													
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0													
Aromatic TPH >C7-C8	N	2680	mg/kg	1.0													
Aromatic TPH >C8-C10	M	2680	mg/kg	1.0													
Aromatic TPH >C10-C12	M	2680	mg/kg	1.0													
Aromatic TPH >C12-C16	M	2680	mg/kg	1.0													
Aromatic TPH >C16-C21	U	2680	mg/kg	1.0													
Aromatic TPH >C21-C35	M	2680	mg/kg	1.0													
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0													
Total Aromatic Hydrocarbons	N	2680	mg/kg	5.0													
Total Petroleum Hydrocarbons	N	2680	mg/kg	10.0													
Naphthalene	M	2700	mg/kg	0.10													
Acenaphthylene	M	2700	mg/kg	0.10													
Acenaphthene	M	2700	mg/kg	0.10													
Fluorene	M	2700	mg/kg	0.10													
Phenanthrene	M	2700	mg/kg	0.10													
Anthracene	M	2700	mg/kg	0.10													
Fluoranthene	M	2700	mg/kg	0.10													
Pyrene	M	2700	mg/kg	0.10													
Benzo[a]anthracene	M	2700	mg/kg	0.10													
Chrysene	M	2700	mg/kg	0.10													
Benzo[b]fluoranthene	M	2700	mg/kg	0.10													
Benzo[k]fluoranthene	M	2700	mg/kg	0.10													
Benzo[a]pyrene	M	2700	mg/kg	0													

Project: 22153 Killbride Development Wicklow (Aesom)

Client: IGSL		Chemtest Job No.:		20-01302	20-01302	20-01302	20-01302	20-01302	20-01302	20-01302	20-01302	20-01302	20-01302	20-01302	20-01302	20-01302
Quotation No.: Q19-18246		Chemtest Sample ID.:		954287	954288	954289	954290	954291	954292	954293	954294	954295	954296	954297	954298	954299
Order No.:		Client Sample Ref.:			128541	128519	128529	128530	121844	126815	126817	126841	128844			
		Sample Location:		TP1	TP3	TP5	TP6	TP8	BH01	BH02	BH02	BH3	BH3			
		Sample Type:		SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL			
		Top Depth (m):		0.40	0.60	1.00	2.00	0.40	1.00	1.00	1.50	1.00	2.00			
		Bottom Depth (m):			0.60	1.00	2.00	0.50	1.00	1.00	1.50	1.00	2.00			
		Asbestos Lab:						DURHAM				DURHAM				
Determinand	Accred.	SOP	Units	LOD	20-01302	20-01302	20-01302	20-01302	20-01302	20-01302	20-01302	20-01302	20-01302	20-01302	20-01302	20-01302
Acenaphthylene	N	2800	mg/kg	0.10												
Acenaphthene	M	2800	mg/kg	0.10												
Fluorene	M	2800	mg/kg	0.10												
Phenanthrene	M	2800	mg/kg	0.10												
Benzo[<i>j</i>]fluoranthene	N	2800	mg/kg	0.10												
Anthracene	M	2800	mg/kg	0.10												
Fluoranthene	M	2800	mg/kg	0.10												
Pyrene	M	2800	mg/kg	0.10												
Benzo[<i>a</i>]anthracene	M	2800	mg/kg	0.10												
Chrysene	M	2800	mg/kg	0.10												
Benzo[<i>b</i>]fluoranthene	M	2800	mg/kg	0.10												
Benzo[<i>k</i>]fluoranthene	M	2800	mg/kg	0.10												
Benzo[<i>a</i>]pyrene	M	2800	mg/kg	0.10												
Indeno(1,2,3- <i>c,d</i>)Pyrene	M	2800	mg/kg	0.10												
Dibenz[<i>a,h</i>]Anthracene	N	2800	mg/kg	0.10												
Benzo[<i>g,h,i</i>]perylene	M	2800	mg/kg	0.10												
Coronene	N	2800	mg/kg	0.10												
Total Of 17 PAH's	N	2800	mg/kg	2.0												
PCB 28	U	2815	mg/kg	0.010												
PCB 52	U	2815	mg/kg	0.010												
PCB 90+101	U	2815	mg/kg	0.010												
PCB 118	U	2815	mg/kg	0.010												
PCB 153	U	2815	mg/kg	0.010												
PCB 138	U	2815	mg/kg	0.010												
PCB 180	U	2815	mg/kg	0.010												
Total PCBs (7 Congeners)	U	2815	mg/kg	0.10												
Demeton-O	N	2820	mg/kg	0.20												
Phorate	N	2820	mg/kg	0.20												
Demeton-S	N	2820	mg/kg	0.20												
Disulfoton	N	2820	mg/kg	0.20												
Fenthion	N	2820	mg/kg	0.20												
Trichloronate	N	2820	mg/kg	0.20												
Prothiofos	N	2820	mg/kg	0.20												
Fensulphothion	N	2820	mg/kg	0.20												
Sulprofos	N	2820	mg/kg	0.20												
Azinphos-Methyl	N	2820	mg/kg	0.20												
Coumaphos	N	2820	mg/kg	0.20												
Alpha-HCH	N	2840	mg/kg	0.20												

Results - Soil

Client: IGSL		Chemtest Job No.:		20-01302		20-01302		20-01302		20-01302		20-01302		20-01302		20-01302		20-01302		20-01302	
Quotation No.: Q19-18246		Chemtest Sample ID.:		954287		954288		954289		954290		954291		954292		954293		954294		954295	
Order No.:		Client Sample Ref.:		128541		TP3		TP5		TP6		TP8		BH01		BH02		BH02		BH3	
		Sample Location:		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
		Sample Type:		0.40		0.60		1.00		2.00		0.40		1.00		1.00		1.50		1.00	
		Top Depth (m):																			
		Bottom Depth (m):																			
		Asbestos Lab:																			
Determinand	Accred.	SOP	Units	LOD																	
Gamma-HCH (Lindane)	N	2840	mg/kg	0.20																	
Beta-HCH	N	2840	mg/kg	0.20																	
Delta-HCH	N	2840	mg/kg	0.20																	
Heptachlor	N	2840	mg/kg	0.20																	
Aldrin	N	2840	mg/kg	0.20																	
Heptachlor Epoxide	N	2840	mg/kg	0.20																	
Gamma-Chlordane	N	2840	mg/kg	0.20																	
Alpha-Chlordane	N	2840	mg/kg	0.20																	
Endosulfan I	N	2840	mg/kg	0.20																	
4,4-DDE	N	2840	mg/kg	0.20																	
Dieldrin	N	2840	mg/kg	0.20																	
Endrin	N	2840	mg/kg	0.20																	
4,4-DDD	N	2840	mg/kg	0.20																	
Endosulfan II	N	2840	mg/kg	0.20																	
Endrin Aldehyde	N	2840	mg/kg	0.20																	
4,4-DDT	N	2840	mg/kg	0.20																	
Endosulfan Sulphate	N	2840	mg/kg	0.20																	
Methoxychlor	N	2840	mg/kg	0.20																	
Endrin Ketone	N	2840	mg/kg	0.20																	
Total Phenols	M	2920	mg/kg	0.30																	

Results - Soil

Client: IGSL		Chemtest Job No.:		20-01302	20-01302	20-01302	20-01302	20-01302	20-01302	20-01302	20-01302
Quotation No.: Q19-18246		Chemtest Sample ID.:		954297	954298	954299	954300	954301	954302	954303	954304
Order No.:		Client Sample Ref.:		126833	126834	121835	121836	126803	126804	126805	126806
		Sample Location:		BH4	BH4	BH5	BH5	BH6	BH6	BH6	BH6
		Sample Type:		SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
		Top Depth (m):		1.00	1.50	1.00	3.00	0.50	0.50	2.00	2.00
		Bottom Depth (m):		1.00	1.50	1.00	3.00	0.50	0.50	2.00	2.00
		Asbestos Lab:									
Determinand	Accred.	SOP	Units	LOD							
ACM Type	U	2192		N/A							
Asbestos Identification	U	2192	%	0.001							
ACM Detection Stage	U	2192		N/A							
Moisture	N	2030	%	0.020	16	16	17	16	16	9.8	[A] 7.8
pH (2.5:1)	N	2010		4.0	[A] 7.6						
Boron (Hot Water Soluble)	U	2120	mg/kg	0.40							
Magnesium (Water Soluble)	N	2120	g/l	0.010	< 0.010		< 0.010			< 0.010	
Sulphate (2:1 Water Soluble) as SO4	M	2120	g/l	0.010	< 0.010		< 0.010			< 0.010	
Total Sulphur	M	2175	%	0.010	[A] 0.048		[A] 0.011			[A] 0.012	
Sulphur (Elemental)	M	2180	mg/kg	1.0							
Chloride (Water Soluble)	U	2220	g/l	0.010	[A] < 0.010		[A] < 0.010			[A] < 0.010	
Nitrate (Water Soluble)	N	2220	g/l	0.010	< 0.010		< 0.010			< 0.010	
Cyanide (Total)	M	2300	mg/kg	0.50							
Sulphide (Easily Liberatable)	N	2325	mg/kg	0.50							
Ammonium (Water Soluble)	M	2120	g/l	0.01	0.04		0.11			0.05	
Sulphate (Acid Soluble)	M	2430	%	0.010	[A] < 0.010		[A] < 0.010			[A] < 0.010	
Arsenic	M	2450	mg/kg	1.0	8.9	5.3		8.6			
Barium	M	2450	mg/kg	10							
Cadmium	M	2450	mg/kg	0.10							
Chromium	M	2450	mg/kg	1.0							
Molybdenum	M	2450	mg/kg	2.0							
Antimony	N	2450	mg/kg	2.0							
Copper	U	2450	mg/kg	0.50	14	6.7		13			
Mercury	M	2450	mg/kg	0.10	< 0.10	< 0.10		< 0.10			
Nickel	M	2450	mg/kg	0.50	26	16		18			
Lead	M	2450	mg/kg	0.50	11	5.3		18			
Selenium	M	2450	mg/kg	0.20	0.37	< 0.20		0.26			
Zinc	U	2450	mg/kg	0.50	31	18		45			
Chromium (Trivalent)	N	2490	mg/kg	1.0	25	9.2		16			
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50	< 0.50		< 0.50			
Total Organic Carbon	M	2625	%	0.20							
Mineral Oil	N	2670	mg/kg	10							
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0		[A] < 1.0			
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0		[A] < 1.0			
Aliphatic TPH >C8-C10	M	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0		[A] < 1.0			
Aliphatic TPH >C10-C12	M	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0		[A] < 1.0			
Aliphatic TPH >C12-C16	M	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0		[A] < 1.0			

Results - Soil

Client: IGSL		Chemtest Job No.:		20-01302	20-01302	20-01302	20-01302	20-01302	20-01302	20-01302	20-01302
Quotation No.: Q19-18246		Chemtest Sample ID.:		954297	954298	954299	954300	954301	954302	954303	954304
Order No.:		Client Sample Ref.:		126833	126834	121835	121839	126803	126807	126808	126809
		Sample Location:		BH4	BH4	BH5	BH5	BH6	BH6	BH6	BH6
		Sample Type:		SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
		Top Depth (m):		1.00	1.50	1.00	3.00	0.50	2.00	2.00	2.00
		Bottom Depth (m):		1.00	1.50	1.00	3.00	0.50	2.00	2.00	2.00
		Asbestos Lab:									
Determinand	Accred.	SOP	Units	LOD							
Aliphatic TPH >C16-C21	M	2680	mg/kg	1.0							
Aliphatic TPH >C21-C35	M	2680	mg/kg	1.0							
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0							
Total Aliphatic Hydrocarbons	N	2680	mg/kg	5.0							
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0							
Aromatic TPH >C7-C8	N	2680	mg/kg	1.0							
Aromatic TPH >C8-C10	M	2680	mg/kg	1.0							
Aromatic TPH >C10-C12	M	2680	mg/kg	1.0							
Aromatic TPH >C12-C16	M	2680	mg/kg	1.0							
Aromatic TPH >C16-C21	U	2680	mg/kg	1.0							
Aromatic TPH >C21-C35	M	2680	mg/kg	1.0							
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0							
Total Aromatic Hydrocarbons	N	2680	mg/kg	5.0							
Total Petroleum Hydrocarbons	N	2680	mg/kg	10.0							
Naphthalene	M	2700	mg/kg	0.10							
Acenaphthylene	M	2700	mg/kg	0.10							
Acenaphthene	M	2700	mg/kg	0.10							
Fluorene	M	2700	mg/kg	0.10							
Phenanthrene	M	2700	mg/kg	0.10							
Anthracene	M	2700	mg/kg	0.10							
Fluoranthene	M	2700	mg/kg	0.10							
Pyrene	M	2700	mg/kg	0.10							
Benzo[a]anthracene	M	2700	mg/kg	0.10							
Chrysene	M	2700	mg/kg	0.10							
Benzo[b]fluoranthene	M	2700	mg/kg	0.10							
Benzo[k]fluoranthene	M	2700	mg/kg	0.10							
Benzo[a]pyrene	M	2700	mg/kg	0.10							
Indeno[1,2,3-c,d]Pyrene	M	2700	mg/kg	0.10							
Dibenz[a,h]Anthracene	M	2700	mg/kg	0.10							
Benzo[g,h,i]perylene	M	2700	mg/kg	0.10							
Total Of 16 PAH's	M	2700	mg/kg	2.0							
Benzene	M	2760	µg/kg	1.0							
Toluene	M	2760	µg/kg	1.0							
Ethylbenzene	M	2760	µg/kg	1.0							
m & p-Xylene	M	2760	µg/kg	1.0							
o-Xylene	M	2760	µg/kg	1.0							
Methyl Tert-Butyl Ether	M	2760	µg/kg	1.0							
Naphthalene	M	2800	mg/kg	0.10							

Results - Soil

Client: IGSL		Chemtest Job No.:		20-01302	20-01302	20-01302	20-01302	20-01302	20-01302	20-01302	20-01302
Quotation No.: Q19-18246		Chemtest Sample ID.:		954297	954298	954299	954300	954301	954302	954303	954304
Order No.:		Client Sample Ref.:		126833	126834	121835	121839	126803	126807	126808	126809
		Sample Location:		BH4	BH4	BH5	BH5	BH6	BH6	BH6	BH6
		Sample Type:		SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
		Top Depth (m):		1.00	1.50	1.00	3.00	0.50	2.00	2.00	2.00
		Bottom Depth (m):		1.00	1.50	1.00	3.00	0.50	2.00	2.00	2.00
		Asbestos Lab:									
Determinand	Accred.	SOP	Units	LOD							
Acenaphthylene	N	2800	mg/kg	0.10							
Acenaphthene	M	2800	mg/kg	0.10							
Fluorene	M	2800	mg/kg	0.10							
Phenanthrene	M	2800	mg/kg	0.10							
Benzo[<i>b</i>]fluoranthene	N	2800	mg/kg	0.10							
Anthracene	M	2800	mg/kg	0.10							
Fluoranthene	M	2800	mg/kg	0.10							
Pyrene	M	2800	mg/kg	0.10							
Benzo[<i>a</i>]anthracene	M	2800	mg/kg	0.10							
Chrysene	M	2800	mg/kg	0.10							
Benzo[<i>b</i>]fluoranthene	M	2800	mg/kg	0.10							
Benzo[<i>k</i>]fluoranthene	M	2800	mg/kg	0.10							
Benzo[<i>a</i>]pyrene	M	2800	mg/kg	0.10							
Indeno(1,2,3- <i>c,d</i>)Pyrene	M	2800	mg/kg	0.10							
Dibenz[<i>a,h</i>]Anthracene	N	2800	mg/kg	0.10							
Benzo[<i>g,h,i</i>]perylene	M	2800	mg/kg	0.10							
Coronene	N	2800	mg/kg	0.10							
Total Of 17 PAH's	N	2800	mg/kg	2.0							
PCB 28	U	2815	mg/kg	0.010							
PCB 52	U	2815	mg/kg	0.010							
PCB 90+101	U	2815	mg/kg	0.010							
PCB 118	U	2815	mg/kg	0.010							
PCB 153	U	2815	mg/kg	0.010							
PCB 138	U	2815	mg/kg	0.010							
PCB 180	U	2815	mg/kg	0.010							
Total PCBs (7 Congeners)	U	2815	mg/kg	0.10							
Demeton-O	N	2820	mg/kg	0.20	< 0.20	< 0.20		< 0.20	< 0.20	< 0.20	< 0.20
Phorate	N	2820	mg/kg	0.20	< 0.20	< 0.20		< 0.20	< 0.20	< 0.20	< 0.20
Demeton-S	N	2820	mg/kg	0.20	< 0.20	< 0.20		< 0.20	< 0.20	< 0.20	< 0.20
Disulfoton	N	2820	mg/kg	0.20	< 0.20	< 0.20		< 0.20	< 0.20	< 0.20	< 0.20
Fenthion	N	2820	mg/kg	0.20	< 0.20	< 0.20		< 0.20	< 0.20	< 0.20	< 0.20
Trichloronate	N	2820	mg/kg	0.20	< 0.20	< 0.20		< 0.20	< 0.20	< 0.20	< 0.20
Prothiofos	N	2820	mg/kg	0.20	< 0.20	< 0.20		< 0.20	< 0.20	< 0.20	< 0.20
Fensulphothion	N	2820	mg/kg	0.20	< 0.20	< 0.20		< 0.20	< 0.20	< 0.20	< 0.20
Sulprofos	N	2820	mg/kg	0.20	< 0.20	< 0.20		< 0.20	< 0.20	< 0.20	< 0.20
Azinphos-Methyl	N	2820	mg/kg	0.20	< 0.20	< 0.20		< 0.20	< 0.20	< 0.20	< 0.20
Coumaphos	N	2820	mg/kg	0.20	< 0.20	< 0.20		< 0.20	< 0.20	< 0.20	< 0.20
Alpha-HCH	N	2840	mg/kg	0.20	< 0.20	< 0.20		< 0.20	< 0.20	< 0.20	< 0.20

Project: 22153 Killbride Development Wicklow (Aecom)

Client: IGSL	Chemtest Job No.:	20-01302	20-01302	20-01302	20-01302	20-01302	20-01302	20-01302	20-01302
Quotation No.: Q19-18246	Chemtest Sample ID.:	954297	954298	954299	954300	954301	954302	954303	954304
Order No.:	Client Sample Ref.:	126833	126834	121835	121839	126803	126807	126807	126807
	Sample Location:	BH4	BH4	BH5	BH5	BH6	BH6	BH6	BH6
	Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	Top Depth (m):	1.00	1.50	1.00	3.00	0.50	2.00	2.00	2.00
	Bottom Depth (m):	1.00	1.50	1.00	3.00	0.50	2.00	2.00	2.00
	Asbestos Lab:								
Determinand	Accred.	SOP	Units	LOD					
Gamma-HCH (Lindane)	N	2840	mg/kg	0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
Beta-HCH	N	2840	mg/kg	0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
Delta-HCH	N	2840	mg/kg	0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
Heptachlor	N	2840	mg/kg	0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
Aldrin	N	2840	mg/kg	0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
Heptachlor Epoxide	N	2840	mg/kg	0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
Gamma-Chlordane	N	2840	mg/kg	0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
Alpha-Chlordane	N	2840	mg/kg	0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
Endosulfan I	N	2840	mg/kg	0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
4,4-DDE	N	2840	mg/kg	0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
Dieldrin	N	2840	mg/kg	0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
Endrin	N	2840	mg/kg	0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
4,4-DDD	N	2840	mg/kg	0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
Endosulfan II	N	2840	mg/kg	0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
Endrin Aldehyde	N	2840	mg/kg	0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
4,4-DDT	N	2840	mg/kg	0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
Endosulfan Sulphate	N	2840	mg/kg	0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
Methoxychlor	N	2840	mg/kg	0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
Endrin Ketone	N	2840	mg/kg	0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
Total Phenols	M	2920	mg/kg	0.30					

Results - Single Stage WAC

Project: 22153 Killbride Development Wicklow (Aecom)

Chemtest Job No: 20-01302		Landfill Waste Acceptance Criteria Limits Inert Waste Landfill Stable, Non-reactive hazardous waste in non-hazardous Landfill Hazardous Waste Landfill	
Chemtest Sample ID: 954291			
Sample Ref: 128530			
Sample ID: TP8			
Sample Location: 0.40			
Top Depth(m): 0.50			
Bottom Depth(m):			
Sampling Date:			
Determinand	SOP	Accred.	Units
Total Organic Carbon	2625	M	%
Loss On Ignition	2610	M	%
Total BTEX	2760	M	mg/kg
Total PCBs (7 Congeners)	2815	M	mg/kg
TPH Total WAC (Mineral Oil)	2670	M	mg/kg
Total (Of 17) PAH's	2800	N	mg/kg
pH	2010	M	
Acid Neutralisation Capacity	2015	N	mol/kg
Eluate Analysis			
Arsenic	1450	U	10:1 Eluate mg/l
Barium	1450	U	mg/kg
Cadmium	1450	U	mg/kg
Chromium	1450	U	mg/kg
Copper	1450	U	mg/kg
Mercury	1450	U	mg/kg
Molybdenum	1450	U	mg/kg
Nickel	1450	U	mg/kg
Lead	1450	U	mg/kg
Antimony	1450	U	mg/kg
Selenium	1450	U	mg/kg
Zinc	1450	U	mg/kg
Chloride	1220	U	mg/kg
Fluoride	1220	U	mg/kg
Sulphate	1220	U	mg/kg
Total Dissolved Solids	1020	N	mg/kg
Phenol Index	1920	U	mg/kg
Dissolved Organic Carbon	1610	U	mg/kg

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	9.6

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Results - Single Stage WAC

Project: 22153 Killbride Development Wicklow (Aecom)

Chemtest Job No:	20-01302			
Chemtest Sample ID:	954295			
Sample Ref:	126841			
Sample ID:	BH3			
Sample Location:	1.00			
Top Depth(m):	1.00			
Bottom Depth(m):				
Sampling Date:				
Determinand	SOP	Accred.	Units	
Total Organic Carbon	2625	M	%	[A] < 0.20
Loss On Ignition	2610	M	%	2.7
Total BTEX	2760	M	mg/kg	[A] < 0.010
Total PCBs (7 Congeners)	2815	M	mg/kg	< 0.10
TPH Total WAC (Mineral Oil)	2670	M	mg/kg	[A] < 10
Total (Of 17) PAH's	2800	N	mg/kg	< 2.0
pH	2010	M		8.2
Acid Neutralisation Capacity	2015	N	mol/kg	0.0060
Eluate Analysis				
Arsenic	1450	U	10:1 Eluate mg/l	10:1 Eluate mg/kg
Barium	1450	U	< 0.0010	< 0.050
Cadmium	1450	U	< 0.00010	< 0.010
Chromium	1450	U	< 0.0010	< 0.050
Copper	1450	U	< 0.0010	< 0.050
Mercury	1450	U	< 0.00050	< 0.0050
Molybdenum	1450	U	0.0019	< 0.050
Nickel	1450	U	< 0.0010	< 0.050
Lead	1450	U	< 0.0010	< 0.010
Antimony	1450	U	< 0.0010	< 0.010
Selenium	1450	U	< 0.0010	< 0.010
Zinc	1450	U	0.0066	< 0.50
Chloride	1220	U	< 1.0	< 10
Fluoride	1220	U	0.25	2.5
Sulphate	1220	U	< 1.0	< 10
Total Dissolved Solids	1020	N	46	450
Phenol Index	1920	U	< 0.030	< 0.30
Dissolved Organic Carbon	1610	U	6.3	63

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	16

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Deviations

In accordance with UKAS Policy on Deviating Samples TPS 63. Chemtest have a procedure to ensure 'upon receipt of each sample a competent laboratory shall assess whether the sample is suitable with regard to the requested test(s)'. This policy and the respective holding times applied, can be supplied upon request. The reason a sample is declared as deviating is detailed below. Where applicable the analysis remains UKAS/MCERTs accredited but the results may be compromised.

Sample:	Sample Ref:	Sample ID:	Sample Location:	Sampled Date:	Deviation Code(s):	Containers Received:
954287			TP1		A	Amber Glass 250ml
954287			TP1		A	Plastic Tub 500g
954288	128541		TP3		A	Amber Glass 250ml
954288	128541		TP3		A	Plastic Tub 500g
954289	128519		TP5		A	Amber Glass 250ml
954289	128519		TP5		A	Plastic Tub 500g
954290	128529		TP6		A	Amber Glass 250ml
954290	128529		TP6		A	Plastic Tub 500g
954291	128530		TP8		A	Amber Glass 250ml
954291	128530		TP8		A	Plastic Tub 500g
954292	121844		BH01		A	Amber Glass 250ml
954292	121844		BH01		A	Plastic Tub 500g
954293	126815		BH02		A	Amber Glass 250ml
954293	126815		BH02		A	Plastic Tub 500g
954294	126817		BH02		A	Amber Glass 250ml
954294	126817		BH02		A	Plastic Tub 500g
954295	126841		BH3		A	Amber Glass 250ml
954295	126841		BH3		A	Plastic Tub 500g
954296	128844		BH3		A	Amber Glass 250ml
954296	128844		BH3		A	Plastic Tub 500g
954297	126833		BH4		A	Amber Glass 250ml
954297	126833		BH4		A	Plastic Tub 500g

Deviations

In accordance with UKAS Policy on Deviating Samples TPS 63. Chemtest have a procedure to ensure 'upon receipt of each sample a competent laboratory shall assess whether the sample is suitable with regard to the requested test(s)'. This policy and the respective holding times applied, can be supplied upon request. The reason a sample is declared as deviating is detailed below. Where applicable the analysis remains UKAS/MCERT's accredited but the results may be compromised.

Sample:	Sample Ref:	Sample ID:	Sample Location:	Sampled Date:	Deviation Code(s):	Containers Received:
954298	126834		BH4		A	Amber Glass 250ml
954298	126834		BH4		A	Plastic Tub 500g
954299	121835		BH5		A	Amber Glass 250ml
954299	121835		BH5		A	Plastic Tub 500g
954300	121839		BH5		A	Amber Glass 250ml
954300	121839		BH5		A	Plastic Tub 500g
954301	126803		BH6		A	Amber Glass 250ml
954301	126803		BH6		A	Plastic Tub 500g
954302	126807		BH6		A	Amber Glass 250ml
954302	126807		BH6		A	Plastic Tub 500g

Test Methods

SOP	Title	Parameters included	Method summary
1010	pH Value of Waters	pH	pH Meter
1020	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Conductivity Meter
1220	Anions, Alkalinity & Ammonium in Waters	Fluoride; Chloride; Nitrite; Nitrate; Total; Oxidisable Nitrogen (TON); Sulfate; Phosphate; Alkalinity; Ammonium	Automated colorimetric analysis using 'Aquakem 600' Discrete Analyser.
1450	Metals in Waters by ICP-MS	Metals, including: Antimony; Arsenic; Barium; Beryllium; Boron; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Tin; Vanadium; Zinc	Filtration of samples followed by direct determination by inductively coupled plasma mass spectrometry (ICP-MS).
1610	Total/Dissolved Organic Carbon in Waters	Organic Carbon	TOC Analyser using Catalytic Oxidation
1920	Phenols in Waters by HPLC	Phenolic compounds including: Phenol, Cresols, Xylenols, Trimethylphenols Note: Chlorophenols are excluded.	Determination by High Performance Liquid Chromatography (HPLC) using electrochemical detection.
2010	pH Value of Soils	pH	pH Meter
2015	Acid Neutralisation Capacity	Acid Reserve	Titration
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES
2175	Total Sulphur in Soils	Total Sulphur	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2180	Sulphur (Elemental) in Soils by HPLC	Sulphur	Dichloromethane extraction / HPLC with UV detection
2192	Asbestos	Asbestos	Polarised light microscopy / Gravimetry
2220	Water soluble Chloride in Soils	Chloride	Aqueous extraction and measurement by 'Aquakem 600' Discrete Analyser using ferric nitrate / mercuric thiocyanate.
2300	Cyanides & Thiocyanate in Soils	Free (or easily liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Alkaline extraction followed by colorimetric determination using Automated Flow Injection Analyser.
2325	Sulphide in Soils	Sulphide	Steam distillation with sulphuric acid / analysis by 'Aquakem 600' Discrete Analyser, using N,N-dimethyl-p-phenylenediamine.
2430	Total Sulphate in soils	Total Sulphate	Acid digestion followed by determination of sulphate in extract by ICP-OES.
2450	Acid Soluble Metals in Soils	Metals, including: Arsenic; Barium; Beryllium; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Vanadium; Zinc	Acid digestion followed by determination of metals in extract by ICP-MS.
2490	Hexavalent Chromium in Soils	Chromium [VI]	Soil extracts are prepared by extracting dried and ground soil samples into boiling water. Chromium [VI] is determined by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazide.
2610	Loss on Ignition	loss on ignition (LOI)	Determination of the proportion by mass that is lost from a soil by ignition at 550°C.
2625	Total Organic Carbon in Soils	Total organic Carbon (TOC)	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2670	Total Petroleum Hydrocarbons (TPH) in Soils by GC-FID	TPH (C6–C40); optional carbon banding, e.g. 3-band – GRO, DRO & LRO*TPH C8–C40	Dichloromethane extraction / GC-FID

SOP	Title	Parameters included	Method summary
2680	TPH A/A Split	Aliphatics: >C5–C6, >C6–C8, >C8–C10, >C10–C12, >C12–C16, >C16–C21, >C21–C35, >C35–C44 Aromatics: >C5–C7, >C7–C8, >C8–C10, >C10–C12, >C12–C16, >C16–C21, >C21–C35, >C35–C44	Dichloromethane extraction / GCxGC FID detection
2700	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-FID	Acenaphthene; Acenaphthylene; Anthracene; Benzo[a]Anthracene; Benzo[a]Pyrene; Benzo[b]Fluoranthene; Benzo[ghi]Perylene; Benzo[k]Fluoranthene; Chrysene; Dibenzo[ah]Anthracene; Fluoranthene; Fluorene; Indeno[123cd]Pyrene; Naphthalene; Phenanthrene; Pyrene	Dichloromethane extraction / GC-FID (GC-FID detection is non-selective and can be subject to interference from co-eluting compounds)
2760	Volatile Organic Compounds (VOCs) in Soils by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics.(cf. USEPA Method 8260)*please refer to UKAS schedule	Automated headspace gas chromatographic (GC) analysis of a soil sample, as received, with mass spectrometric (MS) detection of volatile organic compounds.
2800	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-MS	Acenaphthene*; Acenaphthylene; Anthracene*; Benzo[a]Anthracene*; Benzo[a]Pyrene*; Benzo[b]Fluoranthene*; Benzo[ghi]Perylene*; Benzo[k]Fluoranthene; Chrysene*; Dibenzo[ah]Anthracene; Fluoranthene*; Fluorene*; Indeno[123cd]Pyrene*; Naphthalene*; Phenanthrene*; Pyrene*	Dichloromethane extraction / GC-MS
2815	Polychlorinated Biphenyls (PCB) ICES7 Congeners in Soils by GC-MS	ICES7 PCB congeners	Acetone/Hexane extraction / GC-MS
2820	Organophosphorus (O-P) Pesticides in Soils by GC-MS	Organophosphorus pesticide representative suite including Parathion, Malathion etc, plus client specific determinands	Dichloromethane extraction / GC-MS
2840	Organochlorine (O-Cl) Pesticides in Soils by GC-MS	Organochlorine pesticide representative suite including DDT and its metabolites, 'drins' and HCH etc, plus client specific determinands	Dichloromethane extraction / GC-MS
2920	Phenols in Soils by HPLC	Phenolic compounds including Resorcinol, Phenol, Methylphenols, Dimethylphenols, 1-Naphthol and Trimethylphenols Note: chlorophenols are excluded.	60:40 methanol/water mixture extraction, followed by HPLC determination using electrochemical detection.
640	Characterisation of Waste (Leaching C10)	Waste material including soil, sludges and granular waste	ComplianceTest for Leaching of Granular Waste Material and Sludge

Report Information

Key

- U UKAS accredited
- M MCERTS and UKAS accredited
- N Unaccredited
- S This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
- SN This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
- T This analysis has been subcontracted to an unaccredited laboratory
- I/S Insufficient Sample
- U/S Unsuitable Sample
- N/E not evaluated
- < "less than"
- > "greater than"

Comments or interpretations are beyond the scope of UKAS accreditation

The results relate only to the items tested

Uncertainty of measurement for the determinands tested are available upon request

None of the results in this report have been recovery corrected

All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis

All Asbestos testing is performed at the indicated laboratory

Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

- A - Date of sampling not supplied
- B - Sample age exceeds stability time (sampling to extraction)
- C - Sample not received in appropriate containers
- D - Broken Container
- E - Insufficient Sample (Applies to LOI in Trommel Fines Only)

Sample Retention and Disposal

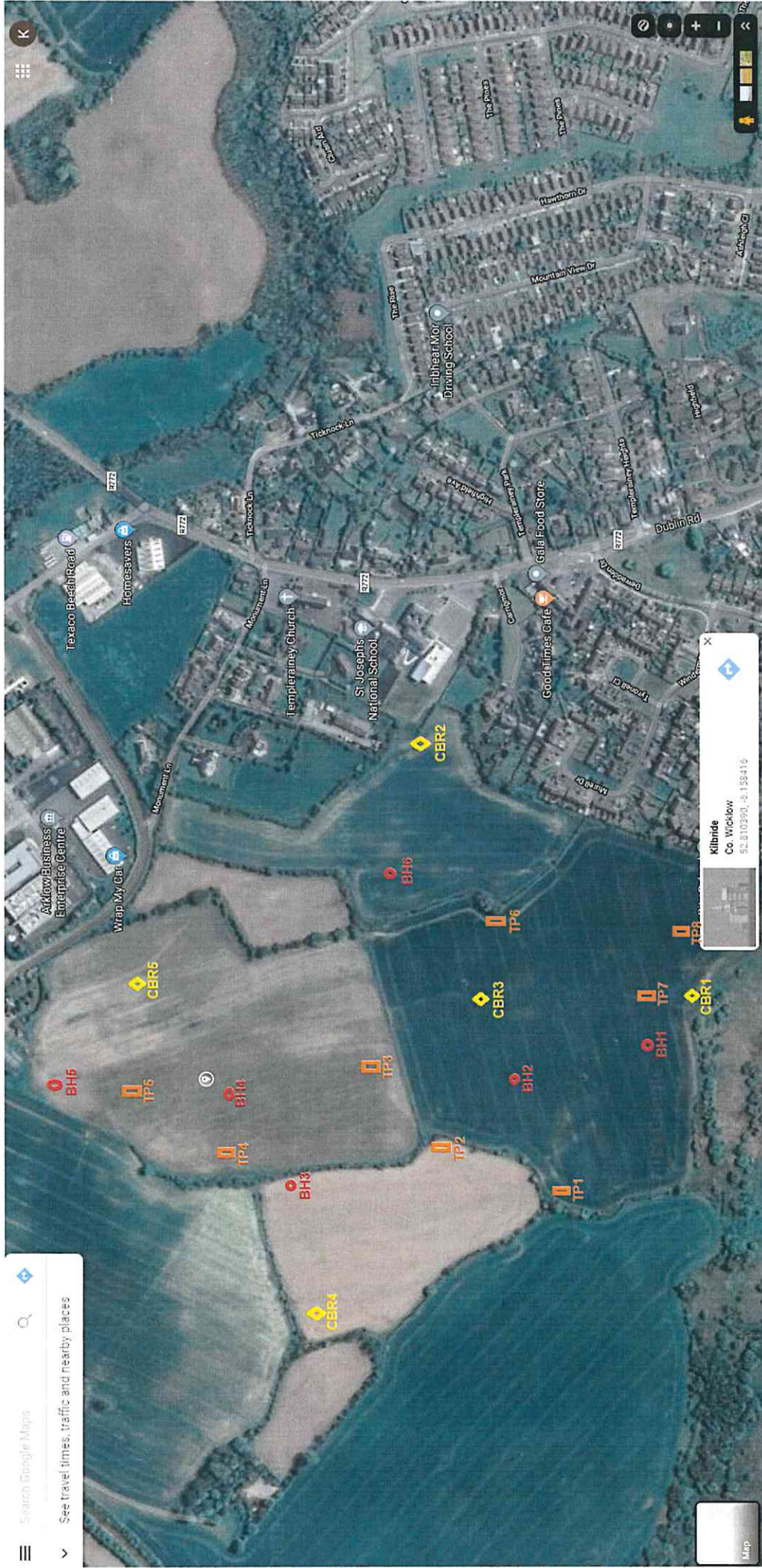
All soil samples will be retained for a period of 45 days from the date of receipt

All water samples will be retained for 14 days from the date of receipt

Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:
customerservices@chemtest.com

Appendix VII Site Plan



IGSL LTD.

Unit F, M7 Business Park

Naas, Co. Kildare

Phone: 045 846176 Fax: 846187

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