Appendix 13.2

Coastal Recession Mechanisms Investigation (2012) &
Site Investigation - Factual Report by Priority Geotechnical Ltd 2019

Report No Y2102-12

COASTAL RECESSION MECHANISMS INVESTIGATION, RINGASKIDDY, COUNTY CORK

FACTUAL REPORT ON GROUND INVESTIGATION

Carried out for:
Indaver

February 2012

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COASTAL RECESSION MECHANISMS INVESTIGATION, RINGASKIDDY, COUNTY CORK

FACTUAL REPORT ON GROUND INVESTIGATION

Report No: Y2102-12

Date: February 2012

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Issue No	Date	Details
1	February 2012	Report as submitted

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CONTENTS

Page

1 INTRODUCTION **2**

2 THE SITE AND GEOLOGY **2**
2.1 The Site
2.2 Published Geology

3 FIELDWORK **3**
3.1 General
3.2 Exploratory Holes
3.3 In Situ Testing

4 GEOTECHNICAL LABORATORY TESTING **4**

REFERENCES **6**

ENCLOSURES
A EXPLORATORY HOLE RECORDS
B IN SITU TESTING
C LABORATORY TEST RESULTS
D DRAWINGS

1 INTRODUCTION

In January 2012 Soil Mechanics (SM) was commissioned by Arup on behalf of Indaver to undertake a ground investigation near Ringaskiddy, County Cork The investigation was required to obtain geotechnical information.

The scope of the investigation, which was specified by Arup, comprised cable percussive drilled boreholes, trial pits, in situ testing and laboratory testing. The investigation was performed in accordance with the contract specification, Eurocode 7 and relevant standards (see References). The fieldwork was carried out from 19th to 27th January 2012

This report presents the factual records of the fieldwork and laboratory testing.

2 THE SITE AND GEOLOGY

2.1 The Site

The site is located in Ringaskiddy which is situated approximately 15km south east of Cork city, see Site Location Plan in Enclosure D. The site is at National Grid reference W 792 642.

The area under investigation is situated at the north-eastern end of the Ringaskiddy peninsula. The site is presently used as agricultural land and clearance of gorse bushes was needed to access the area. The area slopes down to the north where a small car park is located next to the beach. The site is bordered by Hammond Lane Metal Company to the west, agricultural land to the south, a minor road to the north and the West Channel of Cork Harbour to the east with cliffs and a shingle beach. It is this area close to the cliffs where the site investigation is concentrated.

2.2 Published Geology

The published geological map of the area, Geology of South Cork, GSI Sheet 25 1999, 1:100 000, shows that the site is underlain by purple mudstone with some sandstone from the Ballytrasna Formation, Nier Group and Upper Devonian Era.

3 FIELDWORK

3.1 General

The fieldwork was performed in general accordance with BS 5930+A2 (2010), BS EN 1997-2 (2007) and BS EN ISO 22475-1 (2006).

The exploratory hole locations were selected by ARUP and were initially set out from local features and by hand held GPS. The locations were marked on completion and the co-ordinates and reduced levels were surveyed by SM to IGR (Irish Grid Reference) and Ordnance Datum referenced to Malin Head. The approximate hole locations are shown on the Site Plan in Enclosure D.

3.2 Exploratory Holes

The exploratory holes are listed in the following table.

SUMMARY OF EXPLORATORY HOLES

TYPE	QUANTITY	MAXIMUM DEPTH (m)	REMARKS
Cable Percussive	4	10.20	Designated BH1 to BH4
Trial Pits	4	4.00	Designated TP1 to TP4
Hand Sampling Points	2	0.10	Designated GS01 and GS02 – sampling points
Field Logs	5		Designated S1 to S5

The exploratory hole records are presented in Enclosure A and should be read in conjunction with the Key which is included in that enclosure. The records provide descriptions of the materials encountered in accordance with BS EN ISO 14688-1 (2002), as amplified by BS 5930+A2 (2010). The records also give details of the samples taken together with observations made during drilling and pitting. Five locations along the slopes/cliff were also logged and designated S1 to S5 and are presented on logs in Enclosure A. Two locations on the beach were designated as soil sampling points, namely GS01 and GS02 with the samples subsequently being used for geotechnical laboratory testing as presented in Enclosure C.

On completion of the fieldwork the samples were placed in sealed containers and transported to the Belfast office of Soil Mechanics in a four wheel drive vehicle for temporary retention in secure

frostproof premises. Samples were logged at Cork, with those required for testing subsequently being transferred to the in-house laboratory on receipt of Arup's testing instructions.

3.3 In Situ Testing

In situ testing was performed in accordance with the relevant standards as tabulated below. The testing is summarised in the following table and the results are presented as detailed below. A calibration certificate for the SPT hammer is included with the logs in Enclosure A.

SUMMARY OF IN SITU TESTING

TYPE	QUANTITY	REMARKS
Standard Penetration Test (SPT)	40	BS EN ISO 22476-3 (2005). Results presented on logs in Enclosure A
Variable Permeability Test	2	Performed in standpipes of BH1 and BH3. Results presented in Enclosure B.

4 GEOTECHNICAL LABORATORY TESTING

The testing was scheduled by Arup and was performed in accordance with BS 1377 (1990) unless otherwise state. The testing was carried out during the period 6 to 19 February 2012 and is summarised below and the results are presented in Enclosure C.

SUMMARY OF LABORATORY TESTING

TYPE	REMARKS
Moisture Content Determination	42 tests
Atterberg Limit Determination	21 tests
Particle Size Distribution	22 tests
Point Load Index	tests
Light Compaction	4 tests
California Bearing Ratio	4 tests
Unconsolidated Undrained Triaxial Compression without measurement of pore pressure	4 tests
Chloride test	2 tests. Test methods are BS 1377 or others recognised in BRE Special Digest 1 (2005).
pH and Water Soluble Sulphate Content of Soils	4 tests. Test methods are BS 1377 or others recognised in BRE Special Digest 1 (2005)

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REFERENCES

BRE Special Digest 1 : 2005 : Concrete in aggressive ground. Building Research Establishment.

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

BS 5930+A2 : 2010 : Code of practice for site investigations (Amendment 2). British Standards Institution.

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

BS EN ISO 14688-1 : 2002 : Geotechnical investigation and testing - Identification and classification of soil - Part 1 Identification and description. British Standards Institution.

BS EN ISO 14689-1 : 2003 : Geotechnical investigation and testing - Identification and classification of rock - Part 1 Identification and description. British Standards Institution.

BS EN ISO 22475-1 : 2006 : Geotechnical investigation and testing – Sampling methods and groundwater measurements - Part 1 Technical principles for execution. British Standards Institution.

BS EN ISO 22476-3 : 2005 : Geotechnical investigation and testing - Field testing - Part 3 Standard penetration test. British Standards Institution.

Geology of South Cork Sheet 25, 1999. 1:100,000. Geological Survey of Ireland.

OSI Discovery Series Sheet 87, 1999. 1: 50,000 Ordnance Survey of Ireland

ENCLOSURE A

EXPLORATORY HOLE RECORDS

Key to Exploratory Hole Records	Key
Hammer Energy Report	Calibration Certificate for SPT Hammer SM34
Borehole Logs	BH1 to BH4
Trial Pit Logs	TP1 to TP4, S01 to S05
Visual Inspection	S1 to S5
Hand Sampling	GS01 and GS02

Key to Exploratory Hole Records

SAMPLES

Undisturbed

U	Driven tube sample
UT	Driven thin wall tube sample
TW	Pushed thin wall tube sample
P	Pushed piston sample

} nominally 100 mm diameter and full recovery unless otherwise stated

L	Liner sample (from Windowless or similar sampler), full recovery unless otherwise stated
CBR	CBR mould sample
BLK	Block sample
CS	Core sample (from rotary core) taken for laboratory testing
AMAL	Amalgamated sample

Disturbed

D	Small sample
B	Bulk sample

Other

W	Water sample
G	Gas sample
	Environmental chemistry samples (in more than one container where appropriate)
ES	Soil sample
EW	Water sample

Comments Sample reference numbers are assigned to every sample taken. A sample reference of 'NR' indicates that attempt was made to take a tube sample, however, there was no recovery.

Monitoring samples taken after completion of hole construction are not shown on the exploratory hole logs.

TESTS

SPT S or SPT C Standard Penetration Test, open shoe (S) or solid cone (C)

The Standard Penetration Test is defined in BS EN ISO 22476-3 (2005). The incremental blow counts are given in the Field Records column; each increment is 75 mm unless stated otherwise and any penetration under self weight in mm (SW) is noted. Where the full 300 mm test drive is achieved the total number of blows for the test drive is presented as N = ** in the Test column. Where the test drive blows reach 50 the total blow count beyond the seating drive is given (without the N = prefix).

IV	*in situ* Vane shear strength, peak (p) and remoulded (r)
HV	Hand vane shear strength, peak (p) and remoulded (r)
PP	Pocket penetrometer test, converted to shear strength
KFH, KRH, KPI	Permeability tests (KFH = falling head, KRH = rising head; KPI = packer inflow); results provided in Field Records column (one value per stage for packer tests)

DRILLING RECORDS

The mechanical indices (TCR/SCR/RQD & If) are defined in BS 5930+A2 (2010)

TCR	Total Core Recovery, %
SCR	Solid Core Recovery, %
RQD	Rock Quality Designation, %
If	Fracture spacing, mm. Minimum, typical and maximum spacings are presented. The term non-intact (NI) is used where the core is fragmented.

Flush returns, estimated percentage with colour where relevant, are given in the Records column

CRF	Core recovered (length in m) in the following run
AZCL	Assessed zone of core loss
NR	Not recovered

GROUNDWATER

▼	Groundwater strike
▽	Groundwater level after standing period

Notes:
See report text for full references of standards

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Project No. Y2102-12
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Key

Key to Exploratory Hole Records

INSTALLATION

Standpipe/ piezometer

Details of standpipe/piezometer installations are given on the Record. Legend column shows installed instrument depths including slotted pipe section or tip depth, response zone filter material type and layers of backfill.

The type of instrument installed is indicated by a code in the Legend column at the depth of the response zone:

SP	Standpipe
SPIE	Standpipe piezometer
PPIE	Pneumatic piezometer
EPIE	Electronic piezometer

Inclinometer or Slip Indicator

The installation of vertical profiling instruments is indicated on the Record. The base of tubing is shown in the Legend column.

The type of instrument installed is indicated by a code in the Legend column at the base of the tubing:

ICE	Biaxial inclinometer
ICM	Inclinometer tubing for use with probe
SLIP	Slip indicator

Settlement Points or Pressure Cells

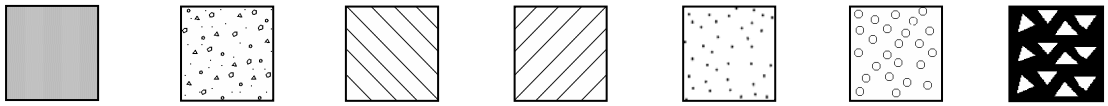
The installation of single point instruments is indicated on the Record. The location of the measuring device is shown in the Legend column.

The type of instrument installed is indicated by a code in the Legend column:

ESET	Electronic settlement cell/gauge
ETM	Magnetic extensometer settlement point
EPCE	Electronic embedment pressure cell
PPCE	Electronic push in pressure cell

INSTALLATION LEGENDS

A legend describing the installation is shown in the rightmost column. Legends additional to BS5930 are used to describe the backfill materials as indicated below.



NOTES

1 Soils and rocks are described in accordance with BS EN ISO 14688-1 (2002) and 14689-1 (2003) respectively as amplified by BS 5930+A2 (2010).

2 For fine soils consistency determined in the field by the logger is reported for those strata where undisturbed samples are available. The consistency is qualified and given (in brackets) when, in the opinion of the logger, the sample is disturbed but the assessed consistency is reasonably representative of the in situ conditions; in these circumstances it will normally underestimate consistency in situ. No consistency is given where the samples available are too disturbed to allow a reasonable assessment.

3 Evidence of the occurrence of very coarse particles (cobbles and boulders) is presented on the logs, however, because of their size in relation to the exploratory hole these records may not be fully representative of their size and frequency in the ground mass.

4 The declination of bedding and joints is given with respect to the normal to the core axis. Thus in a vertical borehole this will be the dip.

5 The assessment of SCR, RQD and Fracture Spacing excludes artificial fractures

6 Strata legends are in accordance with BS 5930+A2 (2010).

7 Water level observations of discernible entries during the advancing of the exploratory hole are given at the foot of the log and in the Legend column. The term "none observed" is used where no discrete entries are identified although this does not necessarily indicate that the hole has not been advanced below groundwater level. Under certain conditions groundwater cannot be observed, for instance, drilling with water flush or overwater, or boring at a rate much faster than water can make its way into the borehole (ref BS5930+A2:2010, Clause 47.2.7). In addition, where appropriate, water levels in the hole at the time of recovering individual samples or carrying out in situ tests and at shift changes are given in the Records column.

8 The borehole logs present the results of Standard Penetration Tests recorded in the field without correction or interpretation. However, in certain ground conditions (eg high hydraulic head or where very coarse particles are present) some judgement may be necessary in considering whether the results are representative of in situ mass conditions.

Updated March 2011

Borehole Log

Soil Mechanics

Drilled DA **Logged** AO **Checked** GF	**Start** 27/01/2012 **End** 27/01/2012	**Equipment, Methods and Remarks** DANDO 2000 Inspection pit carried out from GL to 1.20m. Cable percussive to 9.00m. Standpipe installed to 9.00m.	**Depth from** 0.00m	**to** 9.00m	**Diameter** 150mm	**Casing Depth** 9.00m	**Ground Level** +7.41 mOD **Coordinates** E 179225.23 **National Grid** N 64198.07 **Chainage**

Samples and Tests

Depth	Type & No	Records	Date Casing	Time Water
0.00-0.40	B 1			
0.10	D 2			
0.40	D 3			
0.40-0.90	B 4			
1.20-1.65	SPT S	N=16 (2,2/2,4,5,5)		dry
1.20-1.65	D 5			
1.20-1.70	B 6			
1.50-9.00	KFH	k=5.1E-7 m/s		
1.90	D 7			
2.20-2.65	SPT S	N=16 (2,4/4,4,4,4)	2.20	dry
2.20-2.65	D 8			
2.20-2.70	B 9			
3.00	D 10			
3.20-3.65	SPT S	N=25 (3,4/5,6,7,7)	3.10	dry
3.20-3.65	D 11			
3.20-3.70	B 12			
4.00	D 13			
4.20-4.65	SPT S	N=19 (2,4/6,5,4,4)	4.20	dry
4.20-4.65	D 14			
4.20-4.70	B 15			
4.70-5.15	U 16	70 blows	4.20	dry
5.15	D 17			
5.20-5.65	SPT S	N=17 (2,3/4,4,4,5)	5.00	dry
5.20-5.65	D 18			
5.20-5.70	B 19			
6.00	D 20			
6.20-6.65	SPT S	N=22 (2,5/7,7,4,4)	6.10	dry
6.20-6.70	B 21			
6.70-7.15	U 22	90 blows 300 mm rec	6.20	dry
7.15	D 23			
7.20-7.65	SPT S	N=22 (2,4/4,5,6,7)	6.20	dry
7.20-7.65	D 24			
7.20-7.70	B 25			
8.10	D 26			
8.50-8.71	SPT S	50 (10,15 for 20mm/ 26,24 for 35mm)	8.50	dry
8.50-8.80	D 27			
8.50-9.00	B 28			
			27/01/2012 9.00	dry
9.00-9.24	SPT C	50 (12,13 for 40mm/ 28,22 for 45mm)	9.00	dry

Strata

Description	Depth, *Level* (Thickness)	Legend	Backfill/ Instruments
TOPSOIL.	(0.40)		
	0.40 *+7.01*		
Stiff brown slightly sandy slightly gravelly CLAY with low subangular to subrounded cobble content of various lithologies.	(1.50)		
	1.90 *+5.51*		
Medium dense brown slightly gravelly very silty fine to coarse SAND. Gravel is subangular to subrounded fine to medium of various lithologies.	(1.10)		
	3.00 *+4.41*		
Stiff brown slightly sandy slightly gravelly CLAY with low subangular to subrounded cobble content of sandstone. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse of various lithologies.	(4.00)		
	7.00 *+0.41*		
Stiff brown slightly gravelly sandy CLAY with low subangular to subrounded cobble content of sandstone. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse of various lithologies. Occasional silty sandy gravel lenses.	(1.10)		
	8.10 *-0.69*		
Very stiff brown slightly sandy slightly gravelly CLAY with medium subangular to subrounded cobble content of sandstone. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse of sandstone.	(0.90)		
	9.00 *-1.59*		
EXPLORATORY HOLE ENDS AT 9.00 m			**SP**

Groundwater Entries

No.	Struck (m)	Post strike behaviour	Depth sealed (m)
None observed (see Key Sheet)			

Depth Related Remarks *

From	to (m)	
9.00		Terminated upon virtual refusal.

Chiselling

Depths (m)	Time	Tools used
8.70 -9.00	60 mins	Chisel

Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.

Scale 1:50

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Borehole

BH1

Sheet 1 of 1

Borehole Log

Soil Mechanics

Drilled DA **Logged** AO **Checked** GF	**Start** 26/01/2012 **End** 26/01/2012	**Equipment, Methods and Remarks** DANDO 2000 Inspection pit carried out from GL to 1.20m. Cable percussive to 10.20m. Standpipe installed to 10.00m.	**Depth from** 0.00m **to** 10.20m **Diameter** 150mm **Casing Depth** 10.00m	**Ground Level** +8.99 mOD **Coordinates** E 179229.59 **National Grid** N 64181.39 **Chainage**	

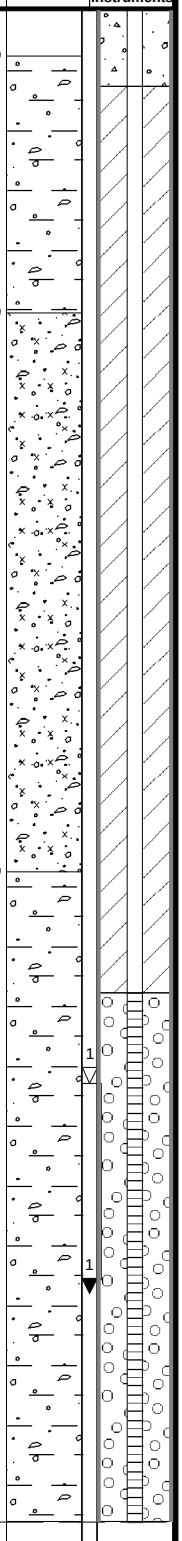
Samples and Tests

Depth	Type & No	Records	Date Casing	Time Water
0.00-0.30	B 1			
0.10	D 2			
0.30	D 3			
0.30-0.80	B 4			
1.20-1.65	SPT S	N=19 (3,4/5,5,4,5)	1.20	dry
1.20-1.70	D 5			
2.00	D 6			
2.20-2.65	SPT S	N=37 (2,4/6,8,10,13)	2.10	dry
2.20-2.65	D 7			
2.20-2.70	B 8			
3.00	D 9			
3.20-3.65	SPT S	N=26 (3,5/6,6,7,7)	3.00	dry
3.20-3.65	D 10			
3.20-3.70	B 11			
4.00	D 12			
4.20-4.65	SPT S	N=22 (2,3/4,5,6,7)	4.20	dry
4.20-4.65	D 13			
4.20-4.70	B 14			
5.00	D 15			
5.40-5.85	SPT S	N=38 (2,6/7,9,10,12)	5.20	dry
5.40-5.85	D 16			
5.70	D 17			
5.70-6.00	B 18			
6.00-6.45	SPT S	N=14 (2,4/5,2,2,5)	6.00	dry
6.00-6.45	D 19			
6.00-6.50	B 20			
6.50	U 21	75 blows	6.50	dry
6.95	D 22			
7.00-7.45	SPT S	N=27 (2,4/6,6,7,8)	6.50	damp
7.00	D 23			
7.00-7.45	B 24			
7.50	D 25			
8.00-8.45	SPT S	N=49 (2,9/11,12,12,14)	8.00	damp
8.00	D 26			
8.00-8.45	B 27			
8.40-8.50	W 28			
8.50	D 29			
9.00-9.43	SPT S	50 (4,8/10,12,14,14 for 50mm)	9.00	damp
9.00-9.50	B 30			
9.50	D 31			

Strata

Description	Depth, *Level* (Thickness)
TOPSOIL.	(0.30) 0.30 *+8.69*
Firm brown slightly sandy slightly gravelly CLAY with low subangular to subrounded cobble content of various lithologies. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse of various lithologies.	(1.70) 2.00 *+6.99*
Medium dense locally dense brown slightly gravelly very silty fine to medium SAND. Gravel is subangular to subrounded fine to medium of various lithologies.	(3.70) 5.70 *+3.29*
Firm to stiff becoming very stiff brown slightly sandy slightly gravelly CLAY with low subangular to subrounded cobble content of sandstone. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse of various lithologies.	(4.40)
Stratum continues to 10.10 m	

Legend



Backfill/ Instruments

Groundwater Entries

No.	Struck (m)	Post strike behaviour	Depth sealed (m)
1	8.40	Rose to 7.10 m after 20 minutes.	9.00

Depth Related Remarks *

From	to (m)

Chiselling

Depths (m)	Time	Tools used
10.00 -10.00	60 mins	Chisel

Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.

Scale 1:50

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Borehole

BH2

Borehole Log

Soil Mechanics

Drilled DA **Logged** AO **Checked** GF	**Start** 26/01/2012 **End** 26/01/2012	**Equipment, Methods and Remarks** DANDO 2000 Inspection pit carried out from GL to 1.20m. Cable percussive to 10.20m. Standpipe installed to 10.00m.	**Depth from to** Diameter Casing Depth 0.00m 10.20m 150mm 10.00m	**Ground Level** +8.99 mOD **Coordinates** E 179229.59 **National Grid** N 64181.39 **Chainage**

Samples and Tests

Depth	Type & No	Records	Date Casing	Time Water
10.00-10.12	SPT S	50 (10,15 for 25mm/ 50 for 20mm)	10.00	damp
10.00	D 32		26/01/2012	1800
10.20	SPT C	(25 for 0mm/50 for 0mm)	10.00	damp

Strata

Description (Continued from Sheet 1)	Depth, *Level* (Thickness)	Legend	Backfill/ Instruments
Firm to stiff becoming very stiff brown slightly sandy slightly gravelly CLAY with low subangular to subrounded cobble content of sandstone. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse of various lithologies.	10.10 *-1.11*		
Possible weathered SANDSTONE bedrock. No recovery.	10.20 *-1.21*		SP
EXPLORATORY HOLE ENDS AT 10.20 m			

Depth	Type & No	Records	Date Casing	Time Water

Groundwater Entries

No.	Struck (m)	Post strike behaviour	Depth sealed (m)

Depth Related Remarks *

From	to (m)	
10.20		Terminated upon virtual refusal. Possible bedrock.

Chiselling

Depths (m)	Time	Tools used
10.00 -10.00	60 mins	Chisel

Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.

Scale 1:50

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Project No. Y2102-12
Carried out for Indaver

Borehole

BH2

Borehole Log

Soil Mechanics

Drilled DA **Logged** AO **Checked** GF	**Start** 25/01/2012 **End** 25/01/2012	**Equipment, Methods and Remarks** DANDO 2000 Inspection pit carried out from GL to 1.20m. Cable percussive to 9.60m. Standpipe installed to 5.30m.	**Depth from** 0.00m **to** 9.60m **Diameter** 150mm **Casing Depth** 9.60m	**Ground Level** +10.00 mOD **Coordinates** E 179237.57 **National Grid** N 64163.14 **Chainage**	

Samples and Tests

Depth	Type & No	Records	Date Casing	Time Water
0.00-0.30	B 1			
0.10	D 2			
0.30	D 3			
0.30-0.80	B 4			
1.20-1.65	SPT S	N=19 (3,5/5,5,4,5)	1.20	dry
1.20-1.65	D 5			
1.20-1.70	B 6			
1.70-2.15	U 7	140 blows 400 mm rec	1.20	dry
2.15	D 8			
2.20-2.65	SPT S	N=32 (2,3/4,8,9,11)	2.20	dry
2.20-2.70	B 10			
2.20-2.65	D 9			
3.00-5.30	KFH	k=5.1E-6 m/s		
3.00	D 11			
3.20-3.65	SPT S	N=14 (1,1/2,1,2,9)	3.10	dry
3.20-3.65	D 12			
3.20-3.70	B 13			
3.70-4.15	U 14	70 blows	3.10	dry
4.15	D 15			
4.20-4.65	SPT S	N=26 (2,5/5,7,7,7)	4.20	dry
4.20-4.65	D 16			
4.20-4.70	B 17			
5.00	D 18			
5.20-5.65	SPT S	N=29 (2,2/6,7,8,8)	5.10	dry
5.20-5.65	D 19			
5.20-5.70	B 20			
6.00	D 21			
6.20-6.65	SPT S	N=34 (4,6/8,8,9,9)	6.20	dry
6.20-6.65	D 22			
6.20-6.70	B 23			
7.00	D 24			
7.20-7.65	SPT S	N=36 (4,6/11,8,8,9)	7.10	dry
7.20-7.65	D 25			
7.20-7.70	B 26			
8.00	D 27			
8.20-8.64	SPT S	50 (4,8/10,12,14,14 for 60mm)	8.20	dry
8.20-8.60	D 28			
8.20-8.70	B 29			
9.00	D 30			
9.20-9.48	SPT S	50 (4,10/22,28 for 50mm)	9.20	dry
9.20-9.50	D 31		25/01/2012	
			9.60	dry
9.60	SPT C	~~(25 for 0mm/50 for 0mm)~~	9.60	dry

Strata

Description	Depth, *Level* (Thickness)	Legend	Backfill/ Instruments
TOPSOIL.	(0.30)		
	0.30 *+9.70*		
Stiff locally firm brown slightly sandy slightly gravelly CLAY with low subangular to subrounded cobble content of sandstone. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse of various lithologies.	(3.70)		
	4.00 *+6.00*		
Stiff brown slightly gravelly sandy CLAY with low subangular to subrounded cobble content of sandstone. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse of various lithologies.	(1.00)		
	5.00 *+5.00*		
Stiff becoming very stiff brown slightly sandy slightly gravelly CLAY with low subangular to subrounded cobble content of sandstone. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse of various lithologies.	(4.50)		SP
	9.50 *+0.50*		
Possible weathered SANDSTONE bedrock. No recovery possible. 9.60 m No water ingress after 3 hours.	9.60 *+0.40*		
EXPLORATORY HOLE ENDS AT 9.60 m			

Groundwater Entries

No.	Struck (m)	Post strike behaviour	Depth sealed (m)
None observed (see Key Sheet)			

Depth Related Remarks *

From	to (m)	
9.60		Terminated upon virtual refusal. Possible bedrock.

Chiselling

Depths (m)	Time	Tools used
9.50 -9.60	60 mins	Chisel

Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.

Scale 1:50

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Project No. Y2102-12
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Borehole

BH3

Sheet 1 of 1

Borehole Log

Soil Mechanics

Drilled DA **Logged** AO **Checked** GF	**Start** 24/01/2012 **End** 24/01/2012	**Equipment, Methods and Remarks** DANDO 2000 Inspection pit carried out from GL to 1.20m. Cable percussive to 9.70m. Standpipe installed to 6.00m.	**Depth from** 0.00m	**to** 9.70m	**Diameter** 150mm	**Casing Depth** 9.70m	**Ground Level** +11.60 mOD **Coordinates** E 179248.94 **National Grid** N 64137.89 **Chainage**

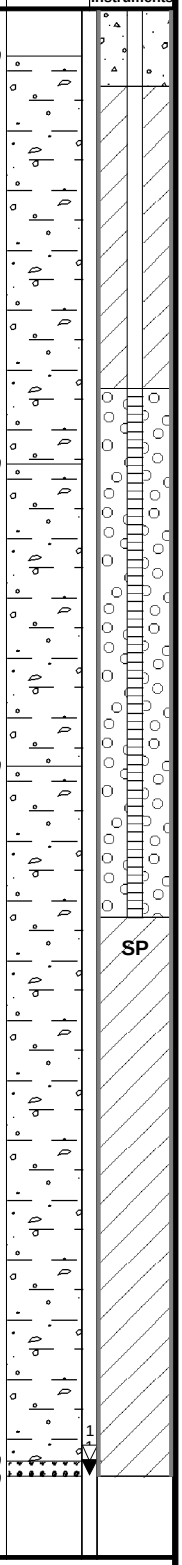
Samples and Tests

Depth	Type & No	Records	Date Casing	Time Water
0.00-0.30	B 1			
0.10	D 2			
0.21-0.66	SPT C	N=25 (4,5/6,5,7,7)		dry
0.30	D 3			
0.30-0.80	B 4			
1.20-1.70	B 5			
1.70-2.20	B 6			
1.70	U NR	100 blows No recovery		
2.00	D 7			
2.20-2.65	SPT S	N=26 (2,6/5,6,7,8)	2.20	dry
2.20-2.65	D 8			
2.20-2.70	B 9			
3.00	D 10			
3.20-3.65	SPT S	N=4 (1,1/1,1,1,1)	3.10	dry
3.20-3.65	D 11			
3.20-3.70	B 12			
4.00	D 13		4.00	
4.00-4.45	U 14	30 blows 400 mm rec		dry
4.45	D 15			
4.50-4.95	SPT S	N=12 (3,6/4,3,2,3)	4.00	dry
4.50-4.95	D 16			
4.50-5.00	B 17			
5.00	D 18			
5.50-5.95	SPT S	N=18 (4,4/4,4,4,6)	5.50	dry
5.50-5.95	D 19			
5.50-6.00	B 20			
6.00	D 21			
6.50-6.95	SPT S	N=37 (5,5/7,9,10,11)	6.50	dry
6.50-6.95	D 22			
6.50-7.00	B 23			
7.00	D 24			
7.50-7.95	SPT S	N=38 (4,8/13,10,8,7)	7.50	dry
7.50-7.95	D 25			
7.50-8.00	B 26			
8.00	D 27			
8.50-8.95	SPT S	N=42 (12,7/8,10,12,12)	8.50	dry
8.50-8.95	D 28			
8.50-9.00	B 29			
9.00	D 30			
9.50-9.75	SPT S	85 (5,20/35,50 for 20mm)	9.50	dry
9.50	D 31		24/01/2012	1800
9.60	D 32	*	25/01/2012	0800
9.70	SPT C	(25 for 0mm/50 for 0mm)	~~9.70~~	~~9.70~~ 4.90

Depth	Type & No	Records	Date Casing	Time Water

Strata

Description	Depth, *Level* (Thickness)
TOPSOIL.	(0.30) 0.30 *+11.30*
Stiff brown slightly sandy slightly gravelly CLAY with low subangular to subrounded cobble content of sandstone. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse of various lithologies.	(2.70) 3.00 *+8.60*
Soft becoming firm brown slightly sandy slightly gravelly CLAY with low subangular to subrounded cobble content of sandstone. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse of various lithologies.	(2.00) 5.00 *+6.60*
Stiff becoming very stiff brown slightly sandy slightly gravelly CLAY with low subangular to subrounded cobble content of sandstone. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse of various lithologies.	(4.60) 9.60 *+2.00*
Possible weathered SANDSTONE bedrock.	9.70 *+1.90*
EXPLORATORY HOLE ENDS AT 9.70 m	



Groundwater Entries

No.	Struck (m)	Post strike behaviour	Depth sealed (m)
1	9.60	Remained at 9.60 m after 20 minutes.	-

Depth Related Remarks *

From	to (m)	
9.70		Terminated upon virtual refusal. Possible bedrock.

Chiselling

Depths (m)	Time	Tools used
9.60 -9.70	60 mins	Chisel

Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.

Scale 1:50

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Project No. Y2102-12
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Borehole

BH4

Sheet 1 of 1

Trial Pit Log

Soil Mechanics

Logged AJ **Checked** GF	**Start** 24/01/2012 **End** 24/01/2012	**Equipment, Methods and Remarks** 13 tonne tracked excavator Machine excavated	**Dimensions and Orientation** Width - Length -	**Ground Level** +8.80 mOD **Coordinates** E 179223.15 **National Grid** N 64185.12 **Chainage**

Samples and Tests

Depth	Type & No.	Date Records
0.80	D 1	
0.80	B 2	
1.20	D 3	
1.20	B 4	
2.00	D 5	
2.00	B 6	
3.00	D 7	
3.00	B 8	
3.45	B 10	
3.45	D 9	

Strata

Description	Depth, *Level* (Thickness)	Legend	Backfill/ Instruments
TOPSOIL	(0.40)		
Firm, brown, slightly gravelly, sandy CLAY with low cobble content. Sand is fine to coarse. Gravel is fine to coarse, rounded to subrounded, of various lithologies.	0.40 *+8.40* (1.10)		
Firm to stiff, brown, slightly gravelly, sandy CLAY with low cobble content. sand is fine to coarse. Gravel is fine to coarse, rounded to subrounded, of various lithologies.	1.50 *+7.30* (0.50)		
Brown, clayey, fine to medium SAND.	2.00 *+6.80* (1.50)		
Brown, clayey, fine to medium SAND.	3.50 *+5.30* (0.50)		
EXPLORATORY HOLE ENDS AT 4.00 m	4.00 *+4.80*		

Depth	Type & No.	Records Date

Groundwater Entries

No.	Struck (m)	Post Strike Behaviour
None observed (see Key Sheet)		

Depth Related Remarks *

From to (m)

Stability Moderate to good

Shoring None

Weather Rain

Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.

Scale 1:25

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Project Coastal Recession Mechanisms Investigation, Ringaskiddy, County Cork

Project No. Y2102-12

Carried out for Indaver

Trial Pit

TP1

Sheet 1 of 1

Trial Pit Log

Soil Mechanics

Logged GF **Checked** GF	**Start** 24/01/2012 **End** 24/01/2012	**Equipment, Methods and Remarks** 13 tonne tracked excavator Machine excavated	**Dimensions and Orientation** Width - Length -	**Ground Level** +9.60 mOD **Coordinates** E 179228.54 **National Grid** N 64173.82 **Chainage**

Samples and Tests

Depth	Type & No.	Date Records
0.50	D 1	
0.50	B 2	
1.70	D 3	
1.70	B 4	
2.50	D 5	
2.50	B 6	
3.00	D 7	
3.00	B 8	
3.60	B 10	
3.60	D 9	

Strata

Description	Depth, *Level* (Thickness)	Legend	Backfill/ Instruments
TOPSOIL	0.15 *+9.45*		
Firm, brown, slightly sandy, gravelly CLAY. Gravel is rounded to subrounded, fine to coarse, of various lithologies.	(1.05)		
Brown, slightly clayey, slightly gravelly, medium to coarse SAND. Gravel is fine to medium, rounded to subrounded, of various lithologies.	1.20 *+8.40*		
	(1.30)		
Brown, slightly gravelly, clayey, fine to coarse SAND with low cobble content. Gravel is fine to medium, rounded to subrounded, of various lithologies.	2.50 *+7.10*		
	(1.10)		
EXPLORATORY HOLE ENDS AT 3.60 m	3.60 *+6.00*		

Depth	Type & No.	Records Date

Groundwater Entries

No.	Struck (m)	Post Strike Behaviour
None observed (see Key Sheet)		

Depth Related Remarks *

From to (m)

Stability Moderate

Shoring None

Weather Dry

Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.

Scale 1:25

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Project No. Y2102-12

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Trial Pit

TP2

Sheet 1 of 1

Trial Pit Log

Soil Mechanics

Logged AJ **Checked** GF	**Start** 24/01/2012 **End** 24/01/2012	**Equipment, Methods and Remarks** 13 tonne tracked excavator Machine excavated	**Dimensions and Orientation** Width - Length -	**Ground Level** +10.36 mOD **Coordinates** E 179240.78 **National Grid** N 64158.58 **Chainage**

Samples and Tests

Depth	Type & No.	Date Records
0.40	D 1	
0.40	B 2	
1.00	D 3	
1.00	B 4	
1.80	D 5	
1.80	B 6	
2.60	D 7	
2.60	B 8	
3.00	B 10	
3.00	D 9	
3.80	D 11	
3.80	B 12	

Strata

Description	Depth, *Level* (Thickness)	Legend	Backfill/ Instruments
TOPSOIL			
Firm, brown, slightly gravelly, sandy CLAY with low cobble content. Sand is fine to coarse. Gravel is fine to medium, subangular to subrounded, of various lithologies. [GLACIAL]	0.20 *+10.16* (0.80)		
Firm to stiff, becoming stiff, brown, slightly sandy, gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is fine to coarse, subangular to subrounded, of various lithologies.	1.00 *+9.36* (0.40)		
Brown, clayey, fine to coarse SAND.	1.40 *+8.96* (0.60)		
Firm, brown, slightly gravelly, sandy CLAY with low cobble content. Sand is fine to coarse. Gravel is fine to coarse, subangular to subrounded, of various lithologies.	2.00 *+8.36* (0.60)		
Very stiff, brown, gravelly, very sandy CLAY. Sand is fine to coarse. Gravel is fine to coarse, subangular to subrounded, of various lithologies.	2.60 *+7.76* (0.40)		
Firm to stiff, brown, slightly gravelly, sandy CLAY. Sand is fine to coarse. Gravel is fine to coarse, subangular to subrounded, of various lithologies.	3.00 *+7.36* (0.80)		
EXPLORATORY HOLE ENDS AT 3.80 m	3.80 *+6.56*		

Depth	Type & No.	Records Date

Groundwater Entries

No.	Struck (m)	Post Strike Behaviour

None observed (see Key Sheet)

Depth Related Remarks *

From to (m)

Stability Moderate to good

Shoring None

Weather Dry

Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.

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Trial Pit

TP3

Sheet 1 of 1

Trial Pit Log

Soil Mechanics

Logged AJ **Checked** GF	**Start** 24/01/2012 **End** 24/01/2012	**Equipment, Methods and Remarks** 13 tonne tracked excavator Machine excavated	**Dimensions and Orientation** Width - Length -	**Ground Level** +12.35 mOD **Coordinates** E 179248.82 **National Grid** N 64128.19 **Chainage**

Samples and Tests

Depth	Type & No.	Date Records
0.40	D 1	
0.40	B 2	
1.00	D 3	
1.00	B 4	
2.00	D 5	
2.00	B 6	
3.00	D 7	
3.00	B 8	
4.00	B 10	
4.00	D 9	

Strata

Description	Depth, *Level* (Thickness)	Legend	Backfill/ Instruments
TOPSOIL	0.20 *+12.15*		
Firm, brown, slightly gravelly, sandy CLAY with low cobble content. Sand is fine to coarse. Gravel is fine to coarse, rounded to subrounded, of various lithologies.	0.40 *+11.95*		
Grey and brown, rounded to subrounded cobbles.	0.50 *+11.85*		
Stiff, brown, mottled orange, slightly gravelly, sandy CLAY with medium cobble content. Sand is fine to coarse. Gravel is fine to coarse, rounded to subrounded, of various lithologies.	(1.10)		
Brown, slightly clayey fine to coarse SAND.	1.60 *+10.75*		
	(1.20)		
Stiff, brown, sandy, gravelly CLAY. Sand is fine to coarse. Gravel is fine to coarse, rounded to subrounded, of various lithologies.	2.80 *+9.55*		
	(1.20)		
EXPLORATORY HOLE ENDS AT 4.00 m	4.00 *+8.35*	1	

Depth	Type & No.	Records Date

Groundwater Entries

No.	Struck (m)	Post Strike Behaviour
1	4.00	Seepage

Depth Related Remarks *

From to (m)

Stability Moderate

Shoring None

Weather Dry and sunny

Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.

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Project No. Y2102-12
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Trial Pit
TP4
Sheet 1 of 1

Trial Pit Log

Soil Mechanics

Logged AJ **Checked** GF	**Start** 19/01/2012 **End** 19/01/2012	**Equipment, Methods and Remarks** Visual inspection	**Dimensions and Orientation** Width - Length - A D B C 240 (Deg)	**Ground Level** - **Coordinates** - **National Grid** - **Chainage**

Samples and Tests

Depth	Type & No.	Date Records

Strata

Description	Depth, *Level* (Thickness)	Legend	Backfill/ Instruments
TOPSOIL.	0.20		
Brown slightly sandy slightly gravelly CLAY with low rounded to subrounded cobble content of sandstone. Sand is fine to coarse. Gravel is angular to rounded fine to coarse of various lithologies. 0.20-4.00 m Lenses of subrounded to rounded fine to coarse gravel.	(0.80)		
Brown slightly gravelly sandy CLAY with low rounded to subrounded tabular cobble content of sandstone. Sand is fine to coarse. Gravel is angular to rounded fine to coarse of various lithologies.	1.00		
	(4.00)		

Depth	Type & No.	Records Date

Groundwater Entries

No.	Struck (m)	Post Strike Behaviour
None observed (see Key Sheet)		

Depth Related Remarks *

From to (m)

Stability Evidence of Slippage

Shoring None

Weather Dry and sunny

Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.

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Scale 1:25

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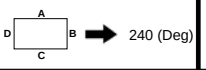
Trial Pit

S1

Trial Pit Log

Soil Mechanics

Logged AJ **Checked** GF	**Start** 19/01/2012 **End** 19/01/2012	**Equipment, Methods and Remarks** Visual inspection	**Dimensions and Orientation** Width - Length -  240 (Deg)	**Ground Level** - **Coordinates** - **National Grid** - **Chainage**

Samples and Tests

Depth	Type & No.	Date Records
		19/01/2012 dry

Strata

Description	Depth, *Level* (Thickness)	Legend	Backfill/ Instruments
Brown sandy gravelly CLAY with medium angular to subangular cobble content of sandstone and low boulder content of sandstone. Sand is fine to coarse. Gravel is angular to rounded fine to coarse of various lithologies.	5.00 (1.00)		
Brown sandy gravelly CLAY. Sand is fine to coarse. Gravel is angular to rounded fine to coarse of various lithologies.	6.00 (4.00)		
EXPLORATORY HOLE ENDS AT 10.00 m			

Depth	Type & No.	Records Date

Groundwater Entries

No. Struck (m)	Post Strike Behaviour
None observed (see Key Sheet)	

Depth Related Remarks *

From	to (m)	
10.00		Evidence of slippage at position

Stability Evidence of Slippage

Shoring None

Weather Dry and sunny

Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.

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Scale 1:25

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Trial Pit
S1
Sheet 2 of 2

Trial Pit Log

Soil Mechanics

Logged AJ **Checked** GF	**Start** 19/01/2012 **End** 19/01/2012	**Equipment, Methods and Remarks** Visual Inspection	**Dimensions and Orientation** Width - Length -	**Ground Level** - **Coordinates** - **National Grid** - **Chainage**

Samples and Tests

Depth	Type & No.	Date Records

Strata

Description	Depth, *Level* (Thickness)	Legend	Backfill/ Instruments
TOPSOIL.			
Brown slightly sandy gravelly CLAY. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse of various lithologies.	0.20 (2.80)		
Brown slightly gravelly sandy CLAY with low rounded to subrounded cobble content of sandstone. Sand is fine to coarse. Gravel is angular to rounded fine to coarse of various lithologies.	3.00 (1.00)		
Brown sandy gravelly CLAY with low subangular to angular tabular cobble content of sandstone. Sand is fine to coarse. Gravel is subrounded to rounded fine to coarse of various lithologies.	4.00 (1.00)		

Depth	Type & No.	Records Date

Groundwater Entries

No.	Struck (m)	Post Strike Behaviour

None observed (see Key Sheet)

Depth Related Remarks *

From **to (m)**

Stability Evidence of slippage

Shoring None

Weather Dry and sunny

Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.

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Scale 1:25

Project Coastal Recession Mechanisms Investigation, Ringaskiddy, County Cork

Project No. Y2102-12

Carried out for Indaver

Trial Pit

S2

Trial Pit Log

Soil Mechanics

Logged AJ **Checked** GF	**Start** 19/01/2012 **End** 19/01/2012	**Equipment, Methods and Remarks** Visual Inspection	**Dimensions and Orientation** Width - Length -	**Ground Level** - **Coordinates** - **National Grid** - **Chainage**

Samples and Tests

Depth	Type & No.	Date Records
		19/01/2012 7.20

Strata

Description	Depth, *Level* (Thickness)	Legend	Backfill/ Instruments
Brown sandy becoming very sandy CLAY. Sand is fine to coarse.	5.00 (1.00)		
Stiff brown sandy gravelly CLAY with medium angular to subangular tabular cobble content of sandstone. Sand is fine to coarse. Gravel is angular to subangular fine to coarse of sandstone. 7.10 m Crack in cliff face, Possible slippage. 7.20 m Possible small spring. 7.80 m Void where boulder has been dislogded.	6.00 (4.00)		
EXPLORATORY HOLE ENDS AT 10.00 m			

Depth	Type & No.	Records Date

Groundwater Entries

No. Struck (m)	Post Strike Behaviour
None observed (see Key Sheet)	

Depth Related Remarks *

From to (m)

Stability Evidence of slippage

Shoring None

Weather Dry and sunny

Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.

Scale 1:25

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Trial Pit
S2
Sheet 2 of 2

Trial Pit Log

Soil Mechanics

Logged AJ **Checked** GF	**Start** 19/01/2012 **End** 19/01/2012	**Equipment, Methods and Remarks** Visual inspection	**Dimensions and Orientation** Width - Length - A / D / B / C, 220 (Deg)	**Ground Level** - **Coordinates** - **National Grid** - **Chainage**

Samples and Tests

Depth	Type & No.	Date Records
		*

Strata

Description	Depth, *Level* (Thickness)	Legend	Backfill/ Instruments
TOPSOIL.	(0.30)		
Brown slightly gravelly sandy CLAY with low rounded to subrounded cobble content. Sand is fine to coarse. Gravel is angular to rounded fine to coarse of various lithologies.	0.30 (3.70)		
Brown slightly gravelly sandy CLAY with medium rounded to subrounded cobble content. Sand is fine to coarse. Gravel is angular to rounded fine to coarse of various lithologies.	4.00 (1.00)		

Depth	Type & No.	Records Date

Groundwater Entries

No.	Struck (m)	Post Strike Behaviour
None observed (see Key Sheet)		

Depth Related Remarks *

From	to (m)	
0.00	8.70	Evidence of surface water running down slope forming channels.

Stability

Shoring None

Weather Dry and sunny

Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.

Scale 1:25

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Project No. Y2102-12

Carried out for Indaver

Trial Pit

S3

Trial Pit Log

Soil Mechanics

Logged AJ **Checked** GF	**Start** 19/01/2012 **End** 19/01/2012	**Equipment, Methods and Remarks** Visual inspection	**Dimensions and Orientation** Width - Length -	**Ground Level** - **Coordinates** - **National Grid** - **Chainage**

Samples and Tests

Depth	Type & No.	Date Records
8.70	D 1	19/01/2012 Base
8.70	B 2	Base
8.70	D 3	Beach
8.70	B 4	Beach

Strata

Description	Depth, *Level* (Thickness)	Legend	Backfill/ Instruments
Brown sandy gravelly CLAY with high angular to rounded cobble content. Sand is fine to coarse. Gravel is angular to rounded fine to coarse of various lithologies.	5.00 (2.00)		
Brown sandy gravelly CLAY with medium angular to rounded cobble content and low boulder content of sandstone. Sand is fine to coarse. Gravel is angular to subrounded fine to coarse of various lithologies.	7.00 (1.30)		
Tabular angular to subangular fine to coarse GRAVEL of various lithologies.	8.30 (0.40)		
EXPLORATORY HOLE ENDS AT 8.70 m	8.70		

Depth	Type & No.	Records Date

Groundwater Entries

No.	Struck (m)	Post Strike Behaviour

None observed (see Key Sheet)

Depth Related Remarks *

From **to (m)**

Stability

Shoring None

Weather Dry and sunny

Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.

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Scale 1:25

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Project No. Y2102-12

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Trial Pit

S3

Trial Pit Log

Soil Mechanics

Logged AJ **Checked** GF	**Start** 19/01/2012 **End** 19/01/2012	**Equipment, Methods and Remarks** Visual inspection	**Dimensions and Orientation** Width - Length - A / D / B / C, 260 (Deg)	**Ground Level** - **Coordinates** - **National Grid** - **Chainage**

Samples and Tests

Depth	Type & No.	Date Records
		*

Strata

Description	Depth, *Level* (Thickness)	Legend	Backfill/ Instruments
TOPSOIL.	0.20		
Brown slightly gravelly sandy CLAY. Sand is fine to coarse. Gravel is angular to subangular fine to coarse of various lithologies.	(2.05)		
Brown slightly sandy slightly gravelly CLAY with medium subrounded to subangular cobble content. Sand is fine to coarse. Gravel is angular to rounded fine to coarse of various lithologies.	2.25		
	(3.25)		
Stratum continues to 5.50 m			

Depth	Type & No.	Records Date

Groundwater Entries

No.	Struck (m)	Post Strike Behaviour
None observed (see Key Sheet)		

Depth Related Remarks *

From	to (m)	
0.00	7.50	Parts of slope obscured by vegetation.

Stability

Shoring None

Weather Dry and sunny

Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.

Scale 1:25

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408.24 27/02/2012 15:13:46

Project Coastal Recession Mechanisms Investigation, Ringaskiddy, County Cork

Project No. Y2102-12

Carried out for Indaver

Trial Pit

S4

Trial Pit Log

Soil Mechanics

Logged AJ **Checked** GF	**Start** 19/01/2012 **End** 19/01/2012	**Equipment, Methods and Remarks** Visual inspection	**Dimensions and Orientation** Width - Length -	**Ground Level** - **Coordinates** - **National Grid** - **Chainage**

Samples and Tests

Depth	Type & No.	Date Records
7.50	D 1	19/01/2012 Base
7.50	B 2	Base
7.50	D 3	Beach
7.50	B 4	Beach

Strata

Description	Depth, *Level* (Thickness)
Brown slightly sandy slightly gravelly CLAY with medium subrounded to subangular cobble content. Sand is fine to coarse. Gravel is angular to rounded fine to coarse of various lithologies.	
Brown sandy gravelly CLAY with medium rounded to subrounded cobble content. Sand is fine to coarse. Gravel is angular to rounded fine to coarse of various lithologies.	5.50 (1.50)
Band of coarse SAND.	7.00
Brown slightly sandy very gravelly CLAY. Sand is fine to coarse. Gravel is angular to subangular fine to coarse of various lithologies.	7.20 (0.30)
EXPLORATORY HOLE ENDS AT 7.50 m	7.50

Legend

Backfill/ Instruments

Depth	Type & No.	Records Date

Groundwater Entries

No.	Struck (m)	Post Strike Behaviour

None observed (see Key Sheet)

Depth Related Remarks *

From to (m)

Stability

Shoring None

Weather Dry and sunny

Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.

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Scale 1:25

Project Coastal Recession Mechanisms Investigation, Ringaskiddy, County Cork
Project No. Y2102-12
Carried out for Indaver

Trial Pit
S4
Sheet 2 of 2

Trial Pit Log

Soil Mechanics

Logged AJ **Checked** GF	**Start** 19/01/2012 **End** 19/01/2012	**Equipment, Methods and Remarks** Visual inspection	**Dimensions and Orientation** Width - Length -	**Ground Level** - **Coordinates** - **National Grid** - **Chainage**

Samples and Tests

Depth	Type & No.	Date Records
3.40	D 1	19/01/2012 Base
3.40	B 2	Base
3.40	D 3	Beach
3.40	B 4	Beach

Strata

Description	Depth, *Level* (Thickness)	Legend	Backfill/ Instruments
TOPSOIL with rootlets.	0.20		
Brown slightly gravelly sandy CLAY. Sand is fine to coarse. Gravel is rounded to subrounded fine to coarse of various lithologies.	(0.60)		
Brown slightly gravelly sandy CLAY with low tabular cobble content. Sand is fine to coarse. Gravel is subrounded to rounded tabular fine to coarse of various lithologies.	0.80 (0.60)		
Brown slightly gravelly sandy becoming very sandy CLAY with low tabular cobble content. Sand is fine to coarse. Gravel is subrounded to rounded tabular fine to coarse of various lithologies.	1.40 (1.10)		
Brown sandy gravelly CLAY with low rounded to subrounded cobble content. Sand is fine to coarse. Gravel is angular to rounded fine to coarse of various lithologies.	2.50 (0.90)		
EXPLORATORY HOLE ENDS AT 3.40 m	3.40		

Depth	Type & No.	Records Date

Groundwater Entries

No.	Struck (m)	Post Strike Behaviour

None observed (see Key Sheet)

Depth Related Remarks *

From to (m)

Stability

Shoring None

Weather Dry

Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.

Scale 1:25

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Project Coastal Recession Mechanisms Investigation, Ringaskiddy, County Cork

Project No. Y2102-12

Carried out for Indaver

Trial Pit

S5

Trial Pit Log

Soil Mechanics

Logged	Start	Equipment, Methods and Remarks	Dimensions and Orientation	Ground Level	+1.68 mOD
Checked GF	-	Hand dug	Width -	Coordinates	E 179252.15
	End		Length -	National Grid	N 64289.49
	-			Chainage	

Samples and Tests

Strata

Depth	Type & No.	Date Records	Description	Depth, *Level* (Thickness)	Legend	Backfill/ Instruments
0.00-0.10	B 1		EXPLORATORY HOLE ENDS AT 0.10 m			

Depth	Type & No.	Records Date

Groundwater Entries

No. Struck (m)	Post Strike Behaviour

None observed (see Key Sheet)

Depth Related Remarks *

From to (m)

Stability

Shoring

Weather

Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.

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408.24 27/02/2012 15:13:20

Scale 1:25

Project	Coastal Recession Mechanisms Investigation, Ringaskiddy, County Cork
Project No.	Y2102-12
Carried out for	Indaver

Trial Pit

GS01

Trial Pit Log

Soil Mechanics

Logged	Start	Equipment, Methods and Remarks	Dimensions and Orientation	Ground Level	+1.48 mOD
Checked GF	-	Hand Dug	Width -	Coordinates	E 179241.76
	End		Length -	National Grid	N 64209.75
	-			Chainage	

Samples and Tests

Depth	Type & No.	Date Records
0.00-0.10	B 1	

Strata

Description	Depth, *Level* (Thickness)	Legend	Backfill/ Instruments
EXPLORATORY HOLE ENDS AT 0.10 m			

Depth	Type & No.	Records Date

Groundwater Entries

No. Struck (m)	Post Strike Behaviour
None observed (see Key Sheet)	

Depth Related Remarks *

From to (m)

Stability

Shoring

Weather

Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.

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Scale 1:25

Project	Coastal Recession Mechanisms Investigation, Ringaskiddy, County Cork
Project No.	Y2102-12
Carried out for	Indaver

Trial Pit

GS02

ENCLOSURE B

IN SITU TEST RESULTS

Variable Head Permeability Test Results	BH1 and BH3

Variable Head Permeability Test

TYPE OF TEST	Standpipe
	Falling Head
BOREHOLE No.	BH1
TEST NUMBER	1
DATE OF TEST	31 Jan 2012

DETAILS OF INSTALLATION:

Top of response zone	1.50	m BGL
Base of response zone	9.00	m BGL
Groundwater level for analysis	6.90	m BGL
Height of tubing above ground level (datum)	0.00	m
Diameter of standpipe tubing	50	mm

Elapsed time, t (minutes)	Depth to water from datum (m)	Head, H_t (m)	Head Ratio H_t/H_0
0	0.00	6.90	1.00
0.5	0.70	6.20	0.90
1	1.05	5.85	0.85
1.5	1.13	5.77	0.84
2	1.24	5.66	0.82
2.5	1.32	5.58	0.81
3	1.36	5.54	0.80
3.5	1.40	5.50	0.80
4	1.44	5.46	0.79
4.5	1.50	5.40	0.78
5	1.55	5.35	0.78
6	1.63	5.27	0.76
7	1.73	5.17	0.75
8	1.82	5.08	0.74
9	1.90	5.00	0.72
10	1.98	4.92	0.71
15	2.45	4.45	0.64
20	2.84	4.06	0.59
25	3.15	3.75	0.54
30	3.44	3.46	0.50
35	3.68	3.22	0.47
40	3.90	3.00	0.43
45	4.14	2.76	0.40
50	4.34	2.56	0.37
55	4.54	2.36	0.34
60	4.70	2.20	0.32
35	3.68	3.22	0.47
40	3.90	3.00	0.43
45	4.14	2.76	0.40
50	4.34	2.56	0.37
55	4.54	2.36	0.34
60	4.70	2.20	0.32

CONDITIONS OF TEST ZONE

Ref BS 5930:1999+A2 (2010) Figure 7
Piezometer tip in uniform soil

Diameter of borehole (D)	150	mm
Length of response zone (L)	7500	mm
Intake Factor (F)	11.69	m

REMARKS

Depth to groundwater prior to test	6.90	m BGL

Depth to water measured from top of standpipe
Permeability calculated using BS 5930:1999 (Section 25.4.6)

CALCULATED VALUES

Differential head at start of test, H_0	6.90	m
Differential head at end of test, H_f	2.2	m
Time Elapsed at end of test	60	mins

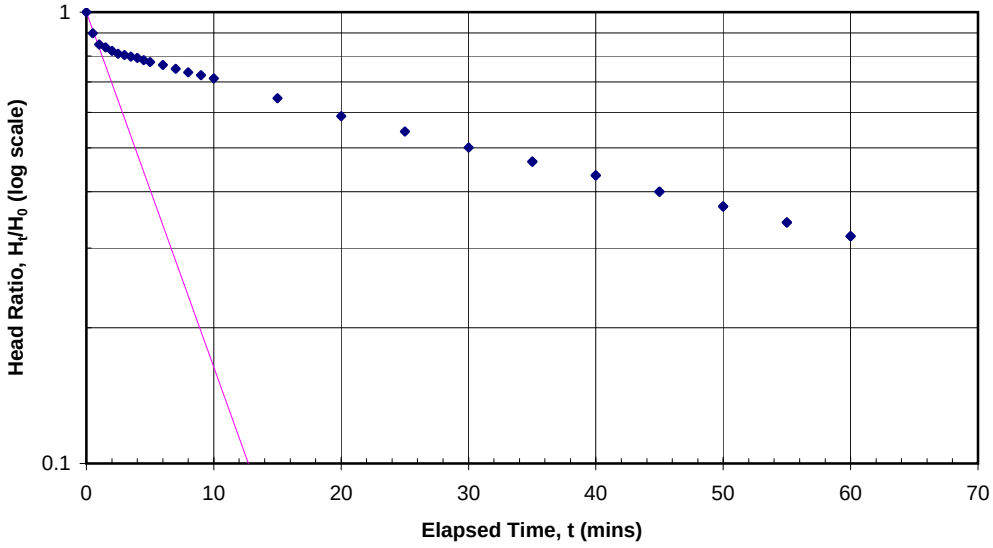
General Approach

Coordinates of best fit line to data:

t_1 = 0.0 mins	H_1/H_0 = 1.000
t_2 = 12.7 mins1	H_2/H_0= 0.100

Permeability (k) **5.1E-07 m/sec**

Head Ratio against Time



Notes:

Project	**Costal Mechanisms Investigation, Ringaskiddy, County Cork**
Project No.	**Y2101-12**
Carried out for	**ARUP**

Test

Variable Head Permeability Test

TYPE OF TEST	Standpipe
	Falling Head
BOREHOLE No.	BH3
TEST NUMBER	1
DATE OF TEST	31 Jan 2012

DETAILS OF INSTALLATION:

Top of response zone	3.00	m BGL
Base of response zone	5.30	m BGL
Groundwater level for analysis	4.98	m BGL
Height of tubing above ground level (datum)	0.00	m
Diameter of standpipe tubing	50	mm

Elapsed time, t (minutes)	Depth to water from datum (m)	Head, H_t (m)	Head Ratio H_t/H_0
0	0.00	4.98	1.00
0.5	1.99	2.99	0.60
1	2.30	2.68	0.54
1.5	2.41	2.57	0.52
2	2.55	2.43	0.49
2.5	2.66	2.32	0.47
3	2.80	2.18	0.44
3.5	2.87	2.11	0.42
4	2.94	2.04	0.41
4.5	2.99	1.99	0.40
5	3.04	1.94	0.39
6	3.10	1.88	0.38
7	3.17	1.81	0.36
8	3.19	1.79	0.36
9	3.20	1.78	0.36
10	3.22	1.76	0.35
15	3.24	1.74	0.35
20	3.26	1.72	0.35
25	3.28	1.70	0.34
30	3.29	1.69	0.34
35	3.31	1.67	0.34
40	3.32	1.66	0.33
45	3.33	1.65	0.33
50	3.34	1.64	0.33
55	3.35	1.63	0.33
60	3.36	1.62	0.33

CONDITIONS OF TEST ZONE

Ref BS 5930:1999+A2 (2010) Figure 7
Piezometer tip in uniform soil

Diameter of borehole (D)	150	mm
Length of response zone (L)	2300	mm
Intake Factor (F)	4.80	m

REMARKS

Depth to groundwater prior to test	4.98	m BGL

Depth to water measured from top of standpipe
Permeability calculated using BS 5930:1999 (Section 25.4.6)

CALCULATED VALUES

Differential head at start of test, H_0	4.98	m
Differential head at end of test, H_f	1.62	m
Time Elapsed at end of test	60	mins

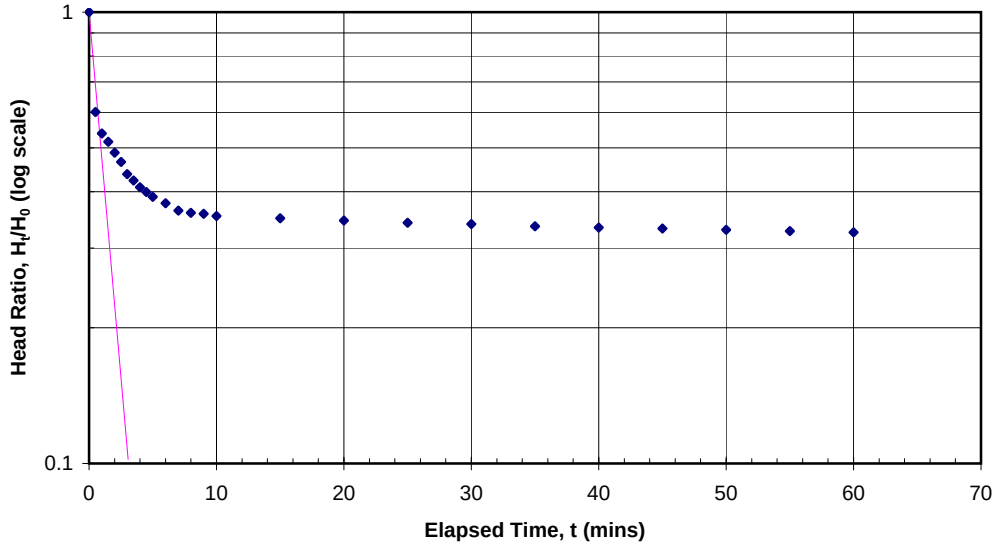
General Approach

Coordinates of best fit line to data:

t_1 = 0.0 mins H_1/H_0 = 1.000
t_2 = 3.0 mins7 H_2/H_0= 0.102

Permeability (k) **5.1E-06 m/sec**

Head Ratio against Time



Notes:

Project	**Costal Mechanisms Investigation, Ringaskiddy, County Cork**
Project No.	**Y2101-12**
Carried out for	**ARUP**

Test

ENCLOSURE C

LABORATORY TEST RESULTS

Index Properties – Summary of Results	INDX 1
Unconsolidated Undrained Triaxial Compression Tests – Summary of Results	UUSUM 1
Chemical Tests – Summary of Results	CHEM 1
Particle Size Distribution	PSD 1 to PSD 22
California Bearing Ratio	CBR 1 to 4
Dry Density / Moisture Content Relationship	COMPL 1 to 4
Undisturbed Photographs and Descriptions	

INDEX PROPERTIES - SUMMARY OF RESULTS

Project No	Project Name
Y2101-12	Costal Mechanisms Investigation, Ringaskiddy, County Cork

Hole No.	Sample No.	Depth (m) from	Depth (m) to	type	Soil Description	p Mg/m^3	p_d Mg/m^3	w %	< 425 µm sieve %	W_L %	W_P %	I_P	p_s Mg/m^3	Remarks
BH1	6	1.20	1.70	B	Brown slightly sandy slightly gravelly CLAY.			16	70 s	26 a	16	10		
BH1	5	1.20	1.65	D	Brownish grey slightly gravelly sandy CLAY.			16						
BH1	12	3.20	3.70	B	Brown slightly sandy slightly gravelly silty CLAY with 2 cobbles.			9.5	38 s	24 a	16	8		
BH1	11	3.20	3.65	D	Brownish grey slightly gravelly clayey SAND.			13						
BH1	15	4.20	4.70	B	Brown slightly sandy slightly gravelly CLAY.				45 s	26 a	17	9		
BH1	25	7.20	7.70	B	Brown slightly sandy slightly gravelly CLAY.				73 s	24 a	16	8		
BH2	11	3.20	3.70	B	Brown slightly gravelly sandy clayey SILT.			17						
BH2	10	3.20	3.65	D	Brownish grey silty SAND.			20						
BH2	18	5.70	6.00	B	Brown slightly sandy slightly gravelly CLAY with 1 cobble.			17	57 s	27 a	17	10		
BH2	17	5.70		D	Brown slightly sandy slightly gravelly CLAY.			13						
BH2	21	6.50		U	Stiff brown slightly sandy slightly gravelly CLAY.			14						
BH2	27	8.00	8.45	B	Brown slightly sandy slightly gravelly CLAY.				52 s	28 a	17	11		
BH3	6	1.20	1.70	B	Brown slightly sandy slightly gravelly CLAY.			13	73 s	30 a	17	13		
BH3	5	1.20	1.65	D	Brownish grey slightly gravelly sandy CLAY.			11						
BH3	7	1.70	2.15	U	Stiff brown slightly sightly sandy slightly gravelly CLAY.			10						
BH3	14	3.70	4.15	U	Stiff brown slightly gravelly silty CLAY with very thin bed of peat.			15						
BH3	17	4.20	4.70	B	Brown slightly sandy slightly gravelly silty CLAY.			16	71 s	25 a	17	8		
BH3	16	4.20	4.65	D	Brownish grey slightly gravelly clayey SAND.			13						
BH3	23	6.20	6.70	B	Brown slightly sandy gravelly CLAY.			14	57 s	29 a	17	12		
BH3	22	6.20	6.65	D	Brownish grey slightly gravelly sandy CLAY.			9.7						
BH3	26	7.20	7.70	B	Brown slightly sandy gravelly CLAY.			15	52 s	29 a	17	12		
BH3	25	7.20	7.65	D	Brownish grey slightly sandy slightly gravelly CLAY.			13						
BH4	6	1.70	2.20	B	Brown slightly sandy slightly gravelly CLAY.				77 s	25 a	16	9		
BH4	14	4.00	4.45	U	Firm brown slightly sandy slightly gravelly CLAY with localised softening and rare			12						
BH4	17	4.50	5.00	B	Brown slightly sandy slightly gravelly CLAY.			14	68 s	29 a	16	13		
BH4	16	4.50	4.95	D	Brownish grey slightly sandy slightly gravelly CLAY.			13						
BH4	29	8.50	9.00	B	Brownish grey slightly sandy gravelly CLAY.			15	49 s	29 a	17	12		
BH4	28	8.50	8.95	D	Brownish grey slightly gravelly sandy CLAY.			10						
S1	4	10.00		B	Brown slightly sandy gravelly CLAY with 1 cobble.			12	49 s	25 a	16	9		
S1	1	10.00		D	Brownish grey slightly sandy slightly gravelly CLAY.			12						
S2	2	10.00		B	Brown slightly sandy gravelly CLAY with rare silt pockets and 1 cobble.			12	44 s	28 a	16	12		
S2	1	10.00		D	Brown slightly sandy slightly gravelly CLAY.			7.2						

General notes: All above tests carried out to BS1377 : 1990 definitive method in all cases unless annotated otherwise. See individual test reports for further details.

Key :

p	bulk density, linear	W_L Liquid limit	W_P	Plastic limit	<425um preparation	p_s	particle density
p_d	dry density	a 4 point cone test	NP	non - plastic	n from natural soil	-g = gas jar	
w	moisture content	b 1 point cone test	I_P	Plasticity Index	s sieved specimen	-p = small pyknometer	

INDEX PROPERTIES - SUMMARY OF RESULTS

Project No	Project Name
Y2101-12	Costal Mechanisms Investigation, Ringaskiddy, County Cork

Hole No.	Sample No.	Depth (m) from	Depth (m) to	type	Soil Description	p Mg/m^3	p_d Mg/m^3	w %	< 425 µm sieve %	W_L %	W_P %	I_P	p_s Mg/m^3	Remarks
S3	2	8.70		B	Brownish grey slightly sandy gravelly CLAY.			11	48 s	29 a	17	12		
S3	1	8.70		D	Brownish grey slightly sandy slightly gravelly CLAY.			9.0						
S4	2	7.50		B	Brown slightly sandy gravelly CLAY.			11	55 s	29 a	18	11		
S4	1	7.50		D	Brownish grey slightly sandy gravelly CLAY.			12						
S5	2	3.40		B	Brown slightly sandy slightly gravelly silty CLAY.			8.9	68 s	26 a	17	9		
S5	1	3.40		D	Brown slightly gravelly sandy CLAY.			9.8						
TP1	8	3.00		B	Brown slightly gravelly sandy SILT.			16						
TP1	7	3.00		D	Brown slightly gravelly SAND.			13						
TP2	2	0.50		B	Brown slightly sandy slightly gravelly silty CLAY.			15	69 s	27 a	17	10		
TP2	1	0.50		D	Brownish grey slightly gravelly slightly clayey SAND.			12						
TP3	8	2.60		B	Brown slightly sandy slightly gravelly CLAY.			13	72 s	26 a	16	10		
TP3	7	2.60		D	Brown slightly gravelly SAND.			15						
TP4	6	2.00		B	Brown slightly gravelly sandy SILT.			23	88 s	24 b	NP			
TP4	5	2.00		D	Brownish grey SAND.			25						

General notes: All above tests carried out to BS1377 : 1990 definitive method in all cases unless annotated otherwise. See individual test reports for further details.

Key :

p	bulk density, linear	W_L Liquid limit	W_P	Plastic limit	<425um preparation	p_s	particle density
p_d	dry density	a 4 point cone test	NP	non - plastic	n from natural soil	-g =	gas jar
w	moisture content	b 1 point cone test	I_P	Plasticity Index	s sieved specimen	-p =	small pyknometer

UNCONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TESTS WITHOUT MEASUREMENT OF PORE PRESSURE - SUMMARY OF RESULTS

Project No	Project Name
Y2101-12	Costal Mechanisms Investigation, Ringaskiddy, County Cork

Hole No.	Sample No.	Depth (m) from	Depth (m) to	type	Soil Description	Density bulk Mg/m³	Density dry Mg/m³	*w* %	Test type	Dia. mm	$\acute{o}_3$ kPa	At failure / end of stage: Axial strain %	$\acute{o}_1 - \acute{o}_3$ kPa	c_u kPa	MODE	Remarks
BH1	12	3.20	3.70	B	Brown slightly sandy slightly gravelly silty CLAY with 2 cobbles.											
BH2	21	6.50		U	Stiff brown slightly sandy slightly gravelly CLAY.	2.26	1.98	14	UUM	103.2 103.2 103.2	70 100 200	11.9 14.8 18.8	157 167 179	78 84 90	C	
BH3	7	1.70	2.15	U	Stiff brown slightly sightly sandy slightly gravelly CLAY.	2.22	2.01	10	UUM	103.2 103.2 103.2	70 100	12.4 19.8	177 231	89 115	C	20% axial strain reached at 100kPa.
BH3	14	3.70	4.15	U	Stiff brown slightly gravelly silty CLAY with very thin bed of peat.	2.24	1.94	15	UUM	103.2 103.2 103.2	70 100 200	13.9 16.8 19.8	142 152 172	71 76 86	C	

General notes: Tests carried out in accordance with BS1377: Part 7: 1990, clause 8 for single stage, clause 9 for multistage tests. Specimens nominally 2:1 height diameter ratio and tested at a rate of strain of 2%/minute, unless annotated otherwise. See individual test reports for further details.

Legend					
	UU - single stage test (may be in sets of specimens)	$\acute{o}_3$	cell pressure	Mode of failure	P plastic
	UUM - multistage test on a single specimen	$\acute{o}_1 - \acute{o}_3$	deviator stress		B brittle
	suffix R - remoulded or recompacted	c_u	undrained shear strength		C compound

CHEMICAL TESTS - SUMMARY OF RESULTS

Project No	Project Name
Y2101-12	Costal Mechanisms Investigation, Ringaskiddy, County Cork

Hole No.	Sample No.	Depth (m) from	Depth (m) to	type	Soil Description	Org %	LOI %	pH	Sulphate as SO_4 Preparation/test *	Sulphate as SO_4 2:1 water sol. g/L	Sulphate as SO_4 ground water g/L	Sulphate as SO_4 acid sol. %	SD1 options TS %	SD1 options Mg mg/L NO_3 mg/L NH_4	CO_2 %	Chloride, Cl water sol. %	Chloride, Cl acid sol. %	<2 mm %	Remarks
BH1	12	3.20	3.70	B	Brown slightly sandy slightly gravelly silty CLAY with 2 cobbles.			7.8	1+3	0.83								40	
BH2	18	5.70	6.00	B	Brown slightly sandy slightly gravelly CLAY with 1 cobble.			7.6	1+3	0.95								63	
BH3	17	4.20	4.70	B	Brown slightly sandy slightly gravelly silty CLAY.			7.6	1+3	0.82						0.10		77	
BH4	17	4.50	5.00	B	Brown slightly sandy slightly gravelly CLAY.			8.4	1+3	0.81						0.14		76	

BS 1377 : definitive method unless stated :

Org Organic matter content (s-sulphides, c-chlorides identified)

LOI Mass loss on ignition at 440°C

CO_2 Carbonate content (rapid titration)

Cl Chloride content

* Sulphate tests preparation / test methods :

1. BS 1377:Part 3:1990:clause 5.3
2. BS 1377:Part 3:1990:clause 5.4
3. BS 1377:Part 3:1990:clause 5.5
4. TRL447 - 1 water soluble sulphate
5. TRL447 - 2 acid soluble sulphate
6. BR279 - groundwater sulphate

< 2mm material passing 2mm sieve

BRE Special Digest SD1, dependent options :

TS Total Sulphur to BR279 / EN ISO15178

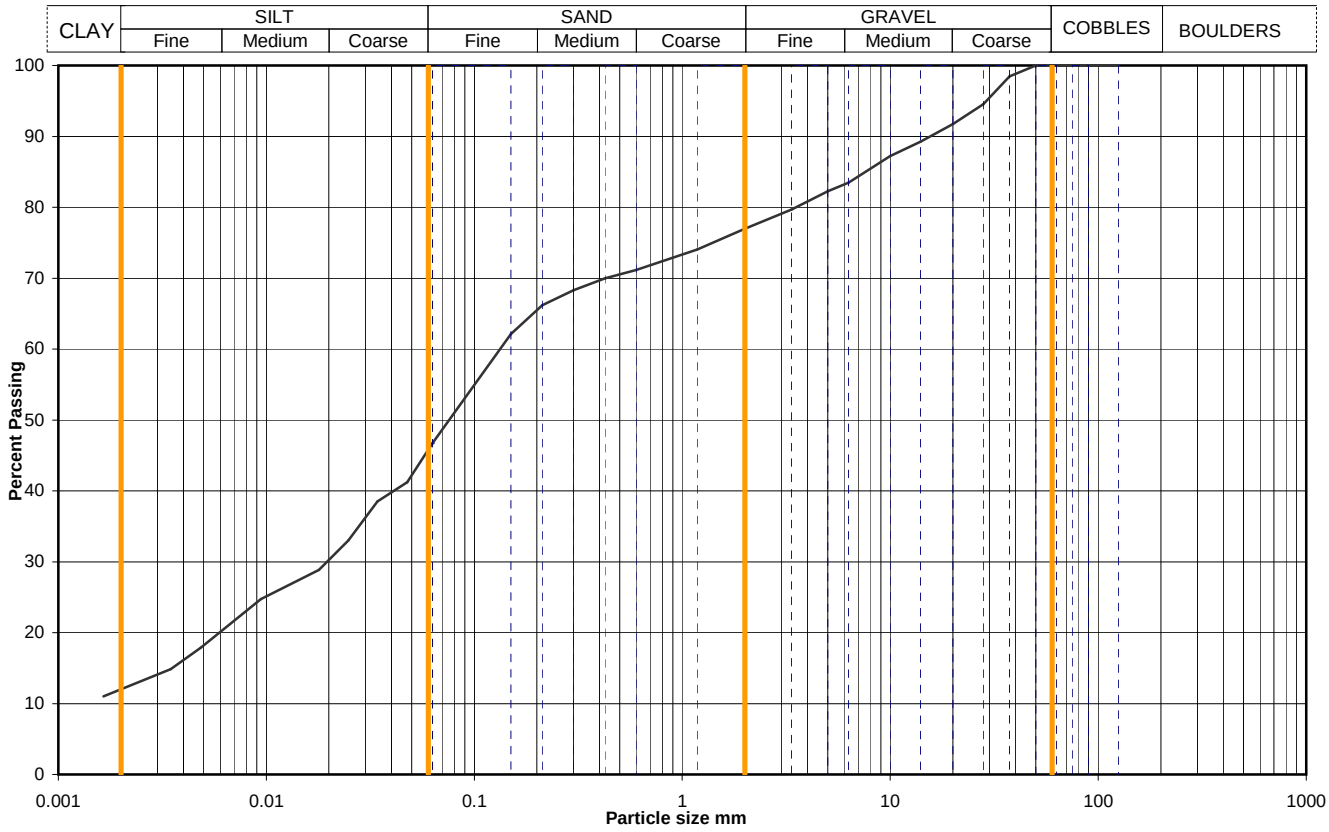
Mg Soluble Magnesium to BR279, colorimetric

NO3 Soluble Nitrate to BR279, colorimetric

NH_4 qualitative

Particle Size Distribution Analysis

Project No	Y2101-12	Sample Details:	Hole No	BH1		
Project Name	Costal Mechanisms Investigation, Ringaskiddy, County Cork		Depth (m BGL)	1.20		
			Samp No	6	Type	B
			ID	ESGY2101-12201201300000000048		
			Spec Ref			



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	47
90	100	0.0476	41
75	100	0.0342	38
63	100	0.0248	33
50	100	0.0179	29
37.5	98	0.0094	25
28	95	0.0048	18
20	92	0.0035	15
14	89	0.0016	11
10	87		
6.3	83		
5.0	82		
3.35	80		
2.00	77		
1.18	74	Particle density, Mg/m3	
0.600	71		
0.425	70	2.65 assumed	
0.300	68	Dry mass of sample, kg	
0.212	66		
0.150	62	8.6	
0.063	47		

Soil description	Brown slightly sandy slightly gravelly CLAY.		
Preparation / Pretreatment	Sieve: natural material Hydro: as BS1377		
Remarks			
Sample Proportions *<60mm values to aid description only		Whole	*<60mm
	Cobbles / boulders	0	0
	Gravel	23	23
	Sand	31	31
	Silt	34	34
	Clay	12	12

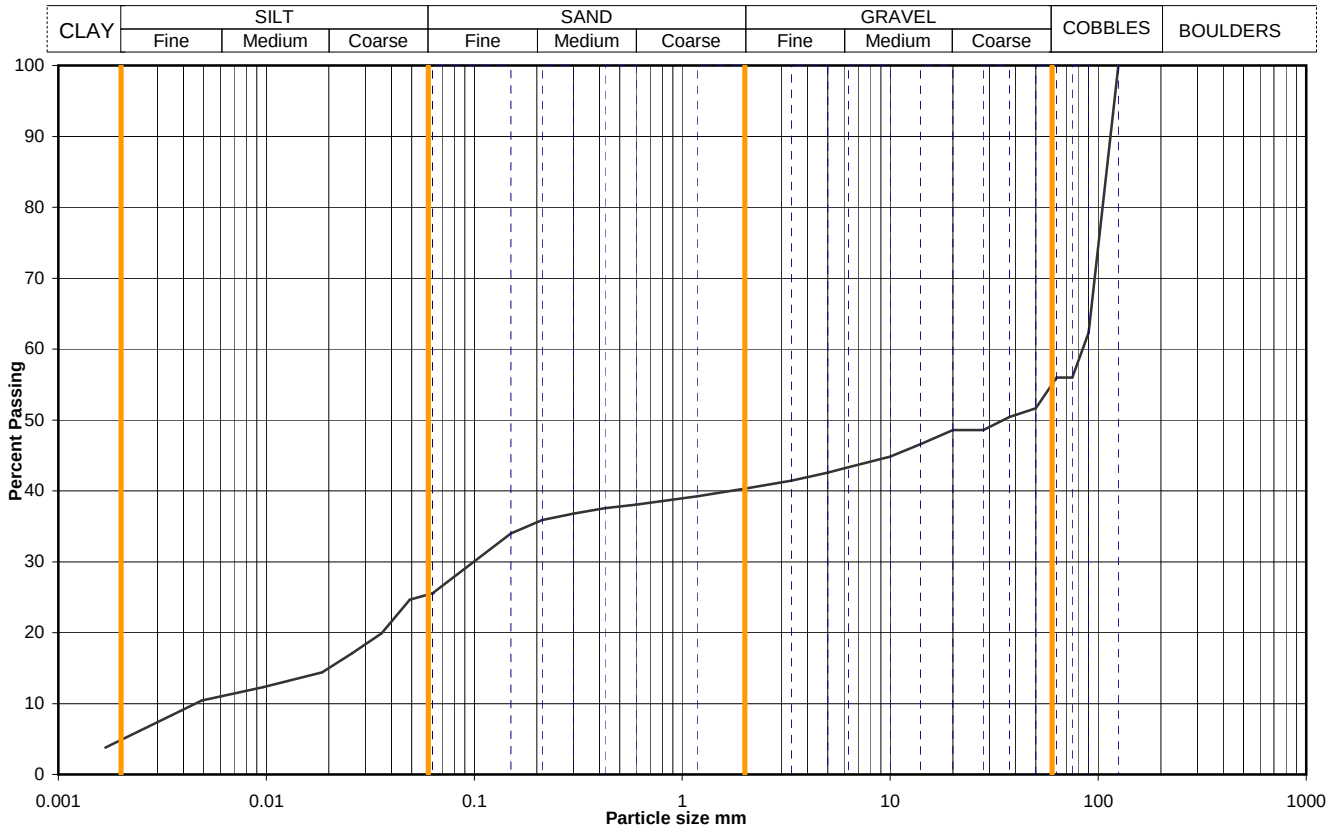
Uniformity Coefficient	D_{60} / D_{10}	Not applicable

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

QA Ref SLR 2,9 Rev 88 Aug 11	ESG Environmental Scientifics Group	UKAS TESTING 1157	Printed:22/02/2012 16:14	**Figure** **PSD 1**

Particle Size Distribution Analysis

Project No	Y2101-12	Sample Details:	Hole No	BH1		
Project Name	Costal Mechanisms Investigation, Ringaskiddy, County Cork		Depth (m BGL)	3.20		
			Samp No	12	Type	B
			ID	ESGY2101-12201201300000000054		
			Spec Ref			



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	26
90	62	0.0490	25
75	56	0.0358	20
63	56	0.0258	17
50	52	0.0185	14
37.5	50	0.0097	12
28	49	0.0049	10
20	49	0.0035	8
14	47	0.0017	4
10	45		
6.3	43		
5.0	43		
3.35	41		
2.00	40		
1.18	39	Particle density, Mg/m3	
0.600	38		
0.425	38	2.65 assumed	
0.300	37	Dry mass of sample, kg	
0.212	36		
0.150	34	8.6	
0.063	26		

Soil description	Brown slightly sandy slightly gravelly silty CLAY with 2 cobbles.		
Preparation / Pretreatment	Sieve: pre dried, Hydro: as BS1377		
Remarks			
Sample Proportions *<60mm values to aid description only		Whole	*<60mm
	Cobbles / boulders	45	0
	Gravel	15	27
	Sand	15	27
	Silt	20	36
	Clay	5	9

Uniformity Coefficient	D_{60} / D_{10}	18394

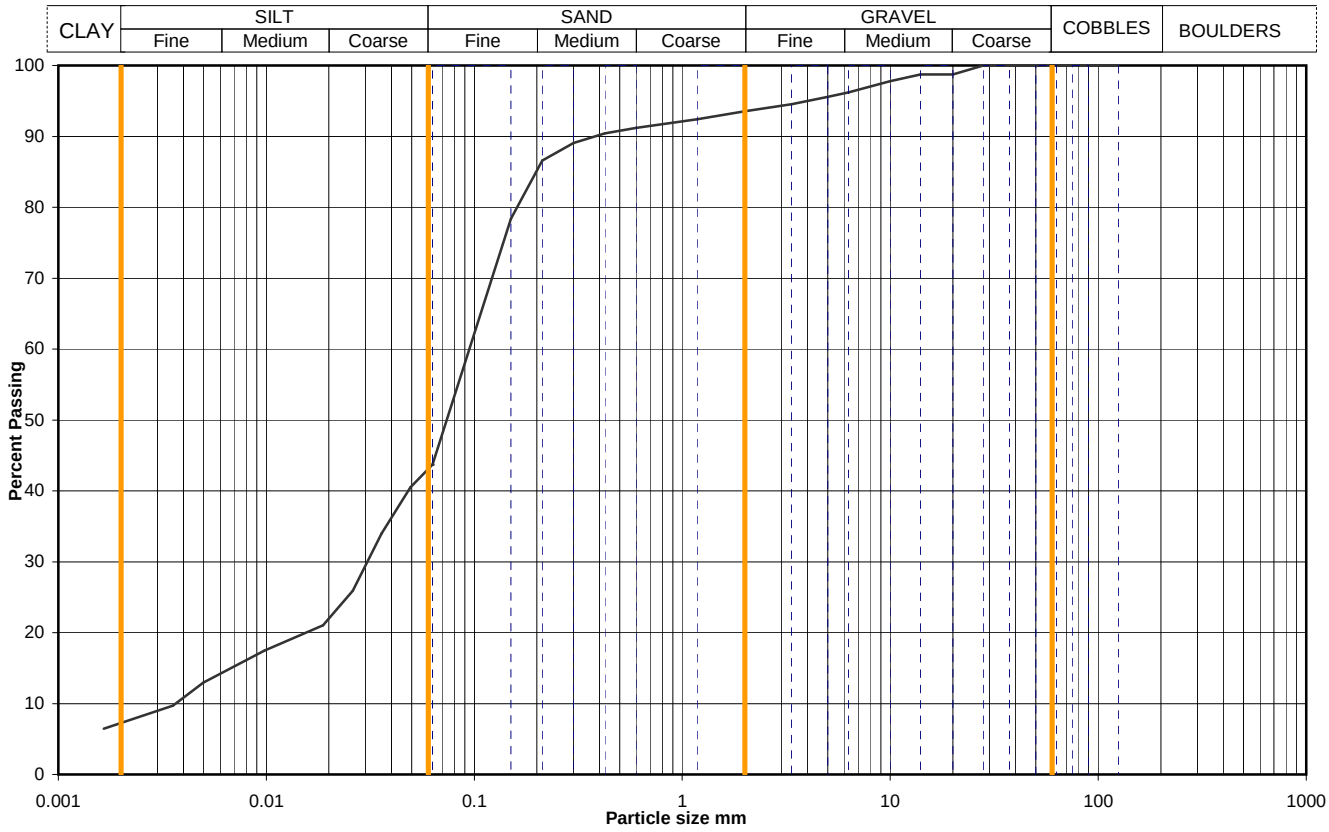
Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.3 dry sieve
	Sedimentation	9.5 hydrometer

QA Ref SLR 2,9 Rev 88 Aug 11	ESG Environmental Scientifics Group	UKAS TESTING 1157	Printed:27/02/2012 10:11

Figure **PSD 2**

Particle Size Distribution Analysis

Project No	Y2101-12	Sample Details:	Hole No	BH2		
Project Name	Costal Mechanisms Investigation, Ringaskiddy, County Cork		Depth (m BGL)	3.20		
			Samp No	11	Type	B
			ID	ESGY2101-12201201300000000081		
			Spec Ref			



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	44
90	100	0.0493	40
75	100	0.0358	34
63	100	0.0261	26
50	100	0.0188	21
37.5	100	0.0098	17
28	100	0.0050	13
20	99	0.0036	10
14	99	0.0017	6
10	98		
6.3	96		
5.0	96		
3.35	95		
2.00	94		
1.18	92	Particle density, Mg/m3	
0.600	91		
0.425	90	2.65 assumed	
0.300	89	Dry mass of sample, kg	
0.212	87		
0.150	78	10.4	
0.063	44		

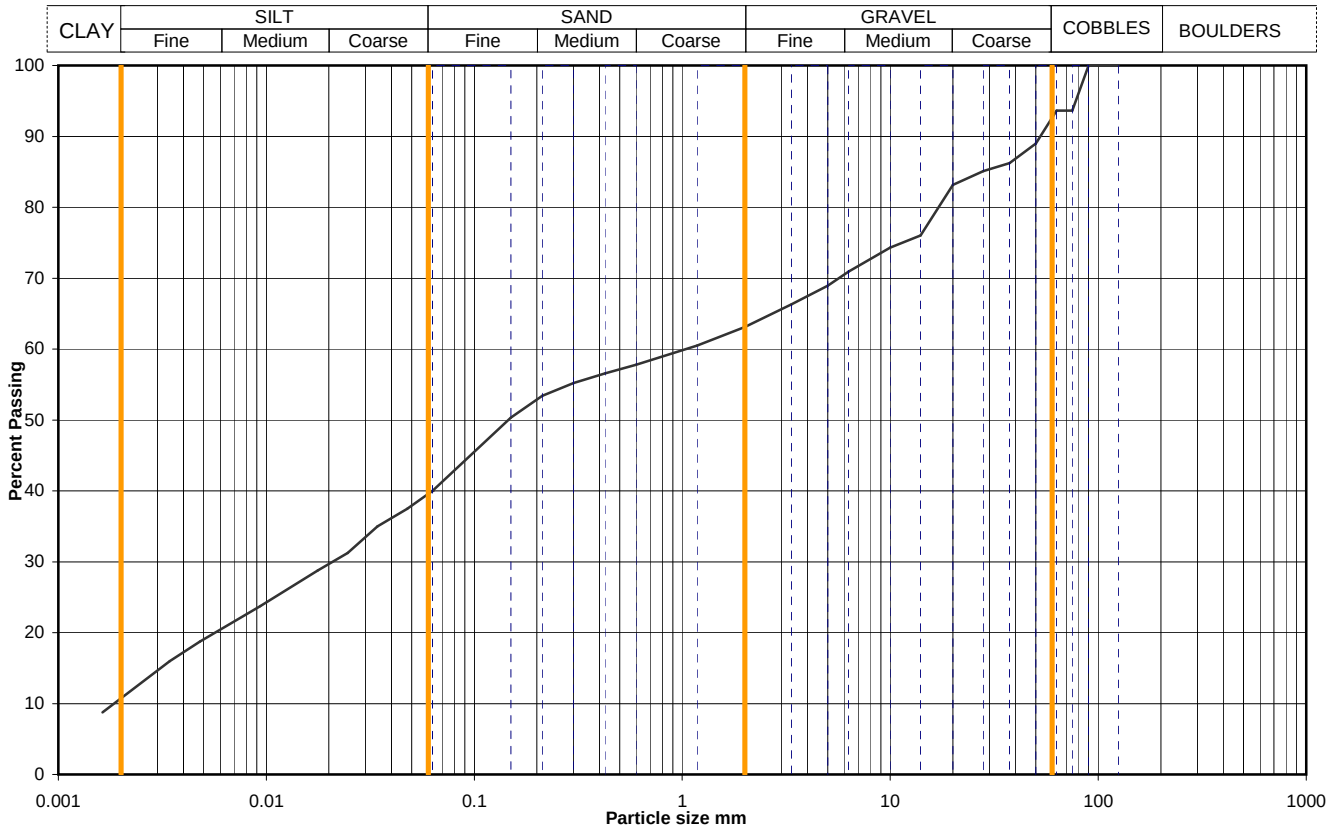
Soil description	Brown slightly gravelly sandy clayey SILT.		
Preparation / Pretreatment	Sieve: natural material Hydro: as BS1377		
Remarks			
Sample Proportions *<60mm values to aid description only		Whole	*<60mm
	Cobbles / boulders	0	0
	Gravel	6	6
	Sand	50	50
	Silt	36	36
	Clay	8	8

Uniformity Coefficient	D_{60} / D_{10}	26

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

Particle Size Distribution Analysis

Project No	Y2101-12	Sample Details:	Hole No	BH2		
Project Name	Costal Mechanisms Investigation, Ringaskiddy, County Cork		Depth (m BGL)	5.70		
			Samp No	18	Type	B
			ID	ESGY2101-12201201300000000088		
			Spec Ref			



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	40
90	100	0.0476	37
75	94	0.0342	35
63	94	0.0246	31
50	89	0.0177	29
37.5	86	0.0094	24
28	85	0.0048	19
20	83	0.0034	16
14	76	0.0016	9
10	74		
6.3	71		
5.0	69		
3.35	66		
2.00	63		
1.18	61	Particle density, Mg/m3	
0.600	58		
0.425	57	2.65 assumed	
0.300	55	Dry mass of sample, kg	
0.212	53		
0.150	50	8.8	
0.063	40		

Soil description	Brown slightly sandy slightly gravelly CLAY with 1 cobble.		
Preparation / Pretreatment	Sieve: natural material Hydro: as BS1377		
Remarks			
Sample Proportions *<60mm values to aid description only		Whole	*<60mm
	Cobbles / boulders	7	0
	Gravel	30	32
	Sand	24	26
	Silt	29	31
	Clay	10	11

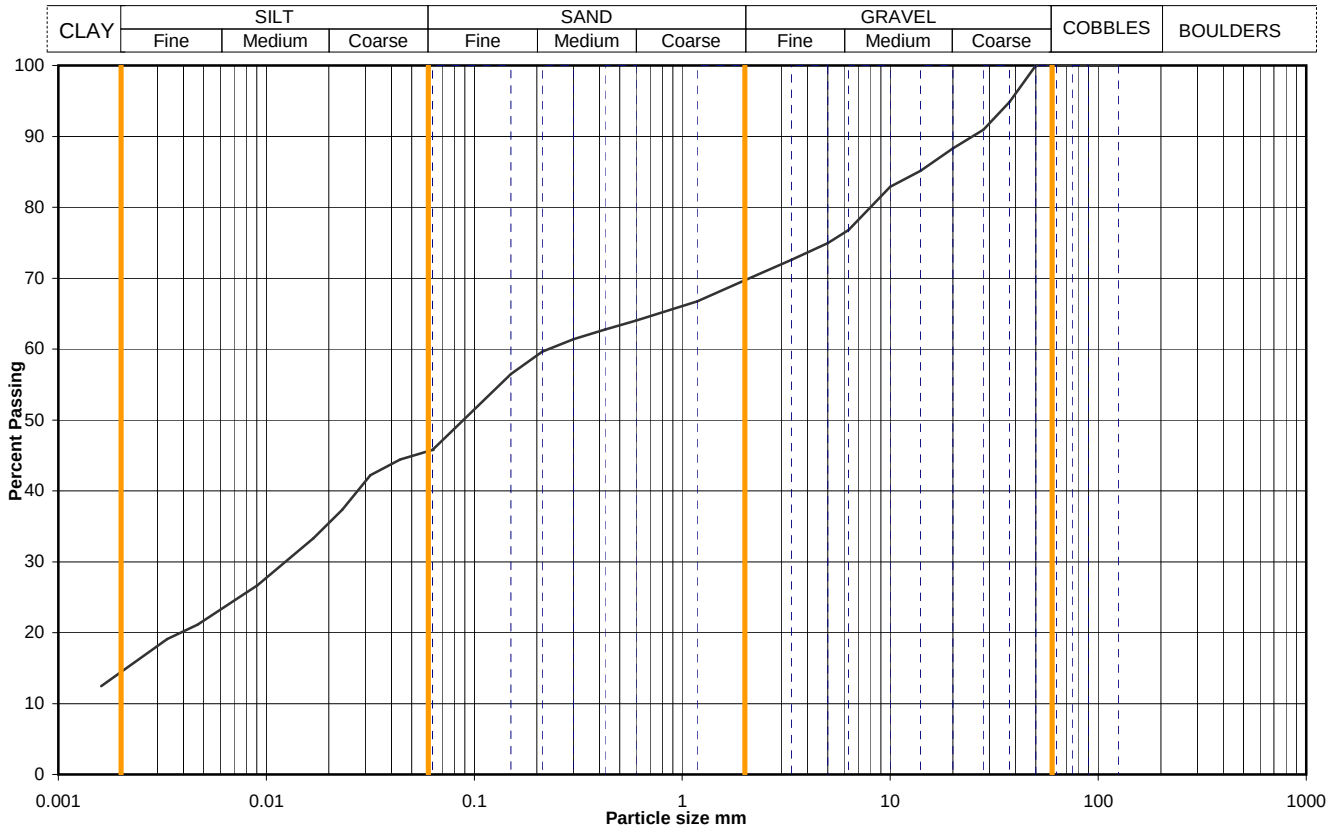
Uniformity Coefficient	D_{60} / D_{10}	562

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

QA Ref SLR 2,9 Rev 88 Aug 11	ESG Environmental Scientifics Group	UKAS TESTING 1157	Printed:22/02/2012 16:14	**Figure** **PSD 4**

Particle Size Distribution Analysis

Project No	Y2101-12	Sample Details:	Hole No	BH2		
Project Name	Costal Mechanisms Investigation, Ringaskiddy, County Cork		Depth (m BGL)	7.00		
			Samp No	24	Type	B
			ID	ESGY2101-12201201300000000094		
			Spec Ref			



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	46
90	100	0.0441	44
75	100	0.0317	42
63	100	0.0232	37
50	100	0.0168	33
37.5	95	0.0091	27
28	91	0.0047	21
20	88	0.0033	19
14	85	0.0016	12
10	83		
6.3	77		
5.0	75		
3.35	73		
2.00	70		
1.18	67	Particle density, Mg/m3	
0.600	64		
0.425	63	2.65 assumed	
0.300	61	Dry mass of sample, kg	
0.212	60		
0.150	56	9.2	
0.063	46		

Soil description	Brown slightly sandy slightly gravelly CLAY with rare rootlets.		
Preparation / Pretreatment	Sieve: natural material Hydro: as BS1377		
Remarks			
Sample Proportions *<60mm values to aid description only		Whole	*<60mm
	Cobbles / boulders	0	0
	Gravel	30	30
	Sand	24	24
	Silt	31	31
	Clay	15	15

Uniformity Coefficient	D_{60} / D_{10}	Not applicable

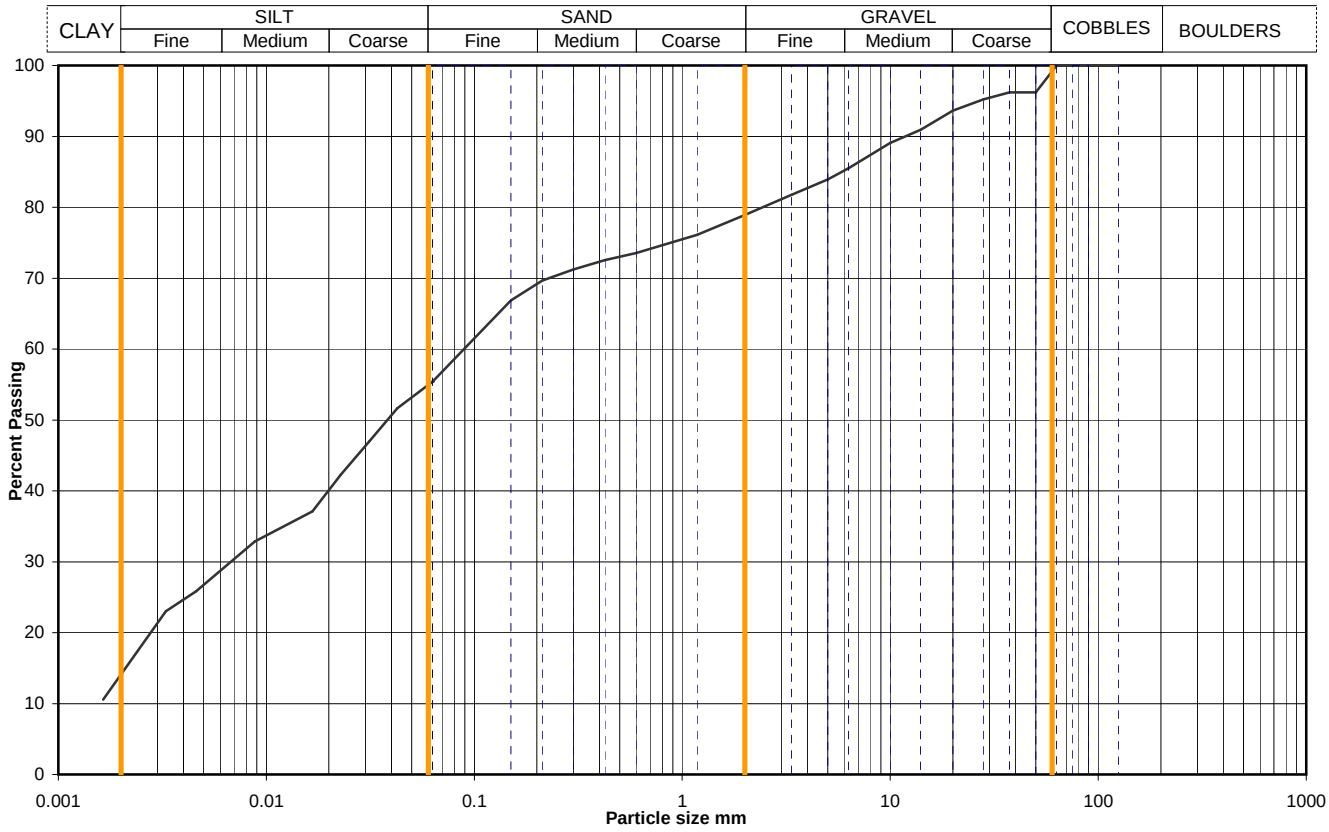
Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

QA Ref SLR 2,9 Rev 88 Aug 11	ESG Environmental Scientifics Group	UKAS TESTING 1157	Printed:22/02/2012 16:14

Figure **PSD 5**

Particle Size Distribution Analysis

Project No	Y2101-12	Sample Details:	Hole No	BH3		
Project Name	Costal Mechanisms Investigation, Ringaskiddy, County Cork		Depth (m BGL)	1.20		
			Samp No	6	Type	B
			ID	ESGY2101-12201201300000000108		
			Spec Ref			



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	55
90	100	0.0427	52
75	100	0.0312	47
63	100	0.0228	42
50	96	0.0167	37
37.5	96	0.0088	33
28	95	0.0046	26
20	94	0.0033	23
14	91	0.0016	11
10	89		
6.3	86		
5.0	84		
3.35	82		
2.00	79		
1.18	76	Particle density, Mg/m3	
0.600	74		
0.425	73	2.65 assumed	
0.300	71	Dry mass of sample, kg	
0.212	70		
0.150	67	5.7	
0.063	55		

Soil description	Brown slightly sandy slightly gravelly CLAY.		
Preparation / Pretreatment	Sieve: natural material Hydro: as BS1377		
Remarks			
Sample Proportions *<60mm values to aid description only		Whole	*<60mm
	Cobbles / boulders	1	0
	Gravel	20	20
	Sand	24	24
	Silt	41	41
	Clay	14	14

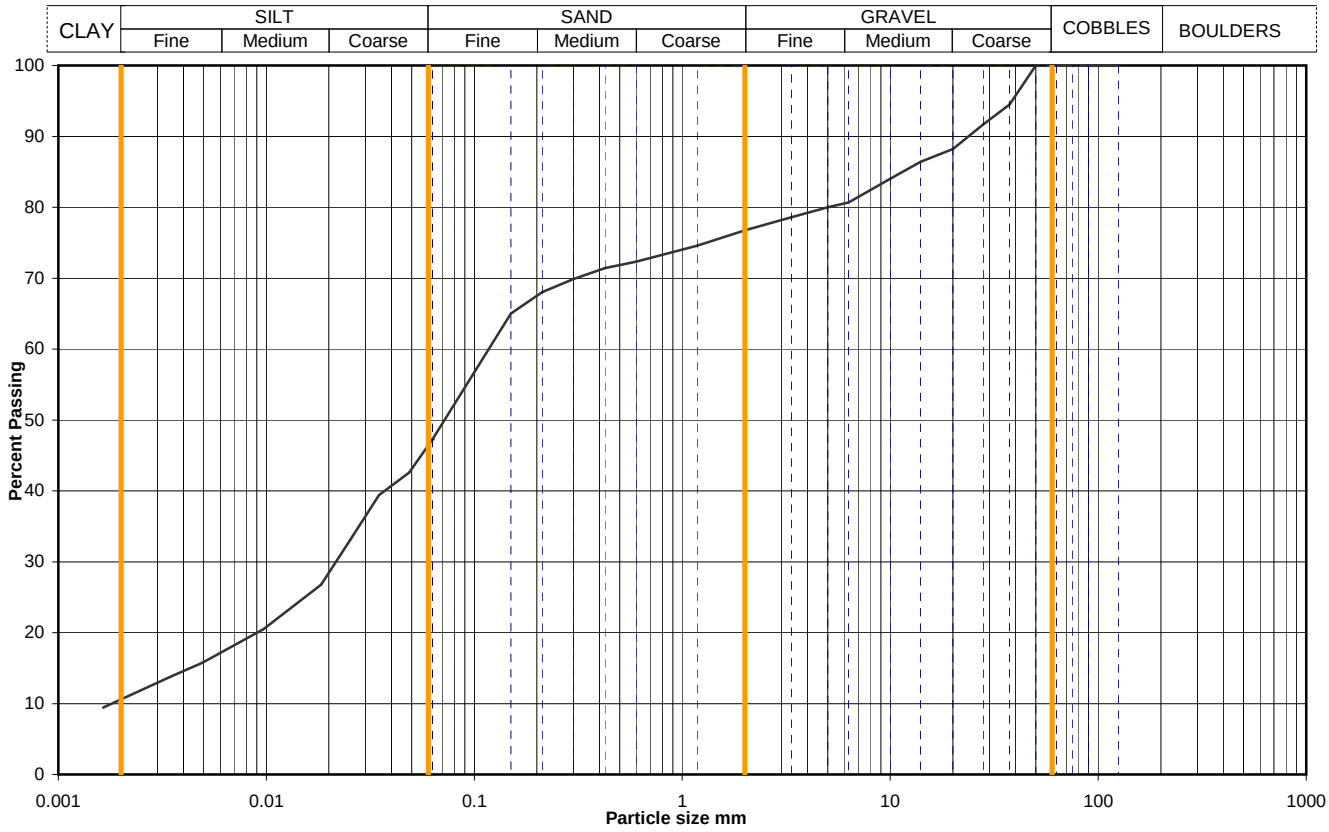
Uniformity Coefficient	D_{60} / D_{10}	Not applicable

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

QA Ref SLR 2,9 Rev 88 Aug 11	ESG Environmental Scientifics Group	UKAS TESTING 1157	Printed:22/02/2012 16:14	**Figure** **PSD 6**

Particle Size Distribution Analysis

Project No	Y2101-12	Sample Details:	Hole No	BH3		
Project Name	Costal Mechanisms Investigation, Ringaskiddy, County Cork		Depth (m BGL)	4.20		
			Samp No	17	Type	B
			ID	ESGY2101-12201201300000000119		
			Spec Ref			



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	47
90	100	0.0486	43
75	100	0.0349	39
63	100	0.0253	33
50	100	0.0183	27
37.5	95	0.0097	20
28	92	0.0049	16
20	88	0.0035	14
14	86	0.0016	9
10	84		
6.3	81		
5.0	80		
3.35	79		
2.00	77		
1.18	75	Particle density, Mg/m3	
0.600	72		
0.425	71	2.65 assumed	
0.300	70	Dry mass of sample, kg	
0.212	68		
0.150	65	8.9	
0.063	47		

Soil description	Brown slightly sandy slightly gravelly silty CLAY.		
Preparation / Pretreatment	Sieve: natural material Hydro: as BS1377		
Remarks			
Sample Proportions *<60mm values to aid description only		Whole	*<60mm
	Cobbles / boulders	0	0
	Gravel	23	23
	Sand	30	30
	Silt	36	36
	Clay	11	11

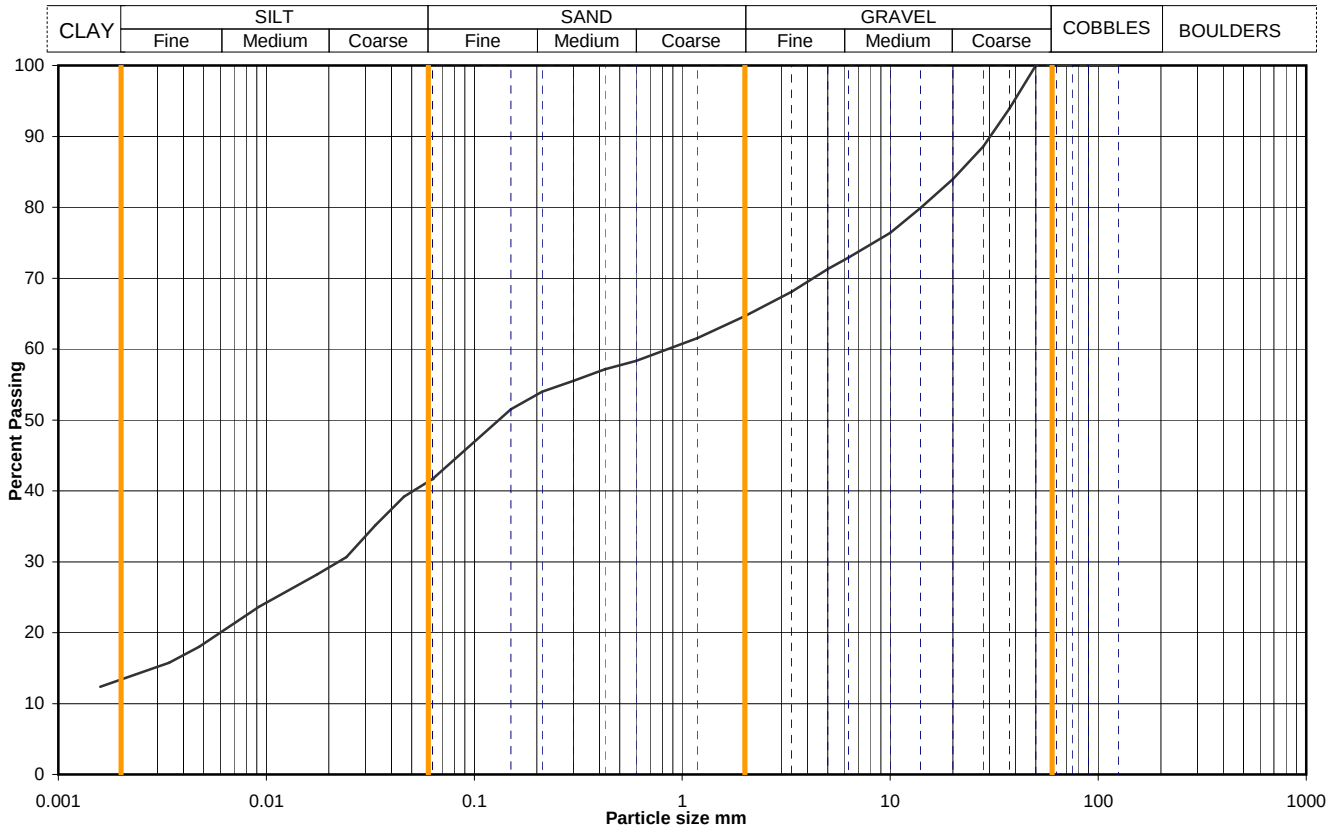
Uniformity Coefficient	D_{60} / D_{10}	65

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

QA Ref SLR 2,9 Rev 88 Aug 11	ESG Environmental Scientifics Group	UKAS TESTING 1157	Printed:22/02/2012 16:14	**Figure** **PSD 7**

Particle Size Distribution Analysis

Project No	Y2101-12	Sample Details:	Hole No	BH3		
Project Name	Costal Mechanisms Investigation, Ringaskiddy, County Cork		Depth (m BGL)	6.20		
			Samp No	23	Type	B
			ID	ESGY2101-12201201300000000125		
			Spec Ref			



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	42
90	100	0.0460	39
75	100	0.0334	35
63	100	0.0243	31
50	100	0.0174	28
37.5	94	0.0092	24
28	89	0.0048	18
20	84	0.0034	16
14	80	0.0016	12
10	76		
6.3	73		
5.0	71		
3.35	68		
2.00	65		
1.18	62	Particle density, Mg/m3	
0.600	58		
0.425	57	2.65 assumed	
0.300	56	Dry mass of sample, kg	
0.212	54		
0.150	51	8.4	
0.063	42		

Soil description	Brown slightly sandy gravelly CLAY.		
Preparation / Pretreatment	Sieve: natural material Hydro: as BS1377		
Remarks			
Sample Proportions *<60mm values to aid description only		Whole	*<60mm
	Cobbles / boulders	0	0
	Gravel	35	35
	Sand	23	23
	Silt	28	28
	Clay	14	14

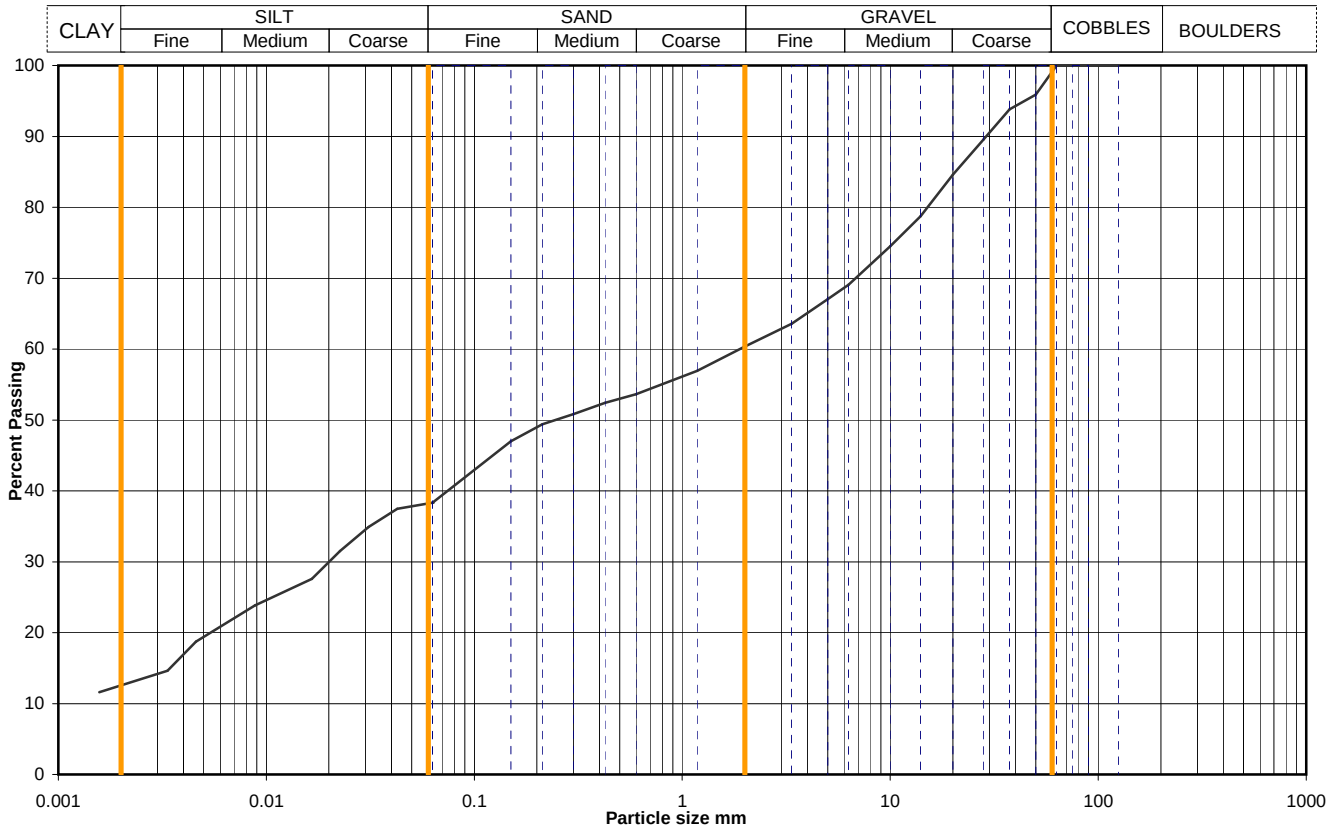
Uniformity Coefficient	D_{60} / D_{10}	Not applicable

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

QA Ref SLR 2,9 Rev 88 Aug 11	ESG Environmental Scientifics Group	UKAS TESTING 1157	Printed:22/02/2012 16:14	**Figure** **PSD 8**

Particle Size Distribution Analysis

Project No	Y2101-12	Sample Details:	Hole No	BH3		
Project Name	Costal Mechanisms Investigation, Ringaskiddy, County Cork		Depth (m BGL)	7.20		
			Samp No	26	Type	B
			ID	ESGY2101-12201201300000000128		
			Spec Ref			



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	38
90	100	0.0427	37
75	100	0.0310	35
63	100	0.0226	32
50	96	0.0166	28
37.5	94	0.0088	24
28	90	0.0046	19
20	85	0.0033	15
14	79	0.0016	12
10	75		
6.3	69		
5.0	67		
3.35	64		
2.00	60		
1.18	57	Particle density, Mg/m3	
0.600	54		
0.425	52	2.65 assumed	
0.300	51	Dry mass of sample, kg	
0.212	49		
0.150	47	11.3	
0.063	38		

Soil description	Brown slightly sandy gravelly CLAY.		
Preparation / Pretreatment	Sieve: natural material Hydro: as BS1377		
Remarks			
Sample Proportions *<60mm values to aid description only		Whole	*<60mm
	Cobbles / boulders	1	0
	Gravel	39	39
	Sand	22	22
	Silt	26	26
	Clay	12	12

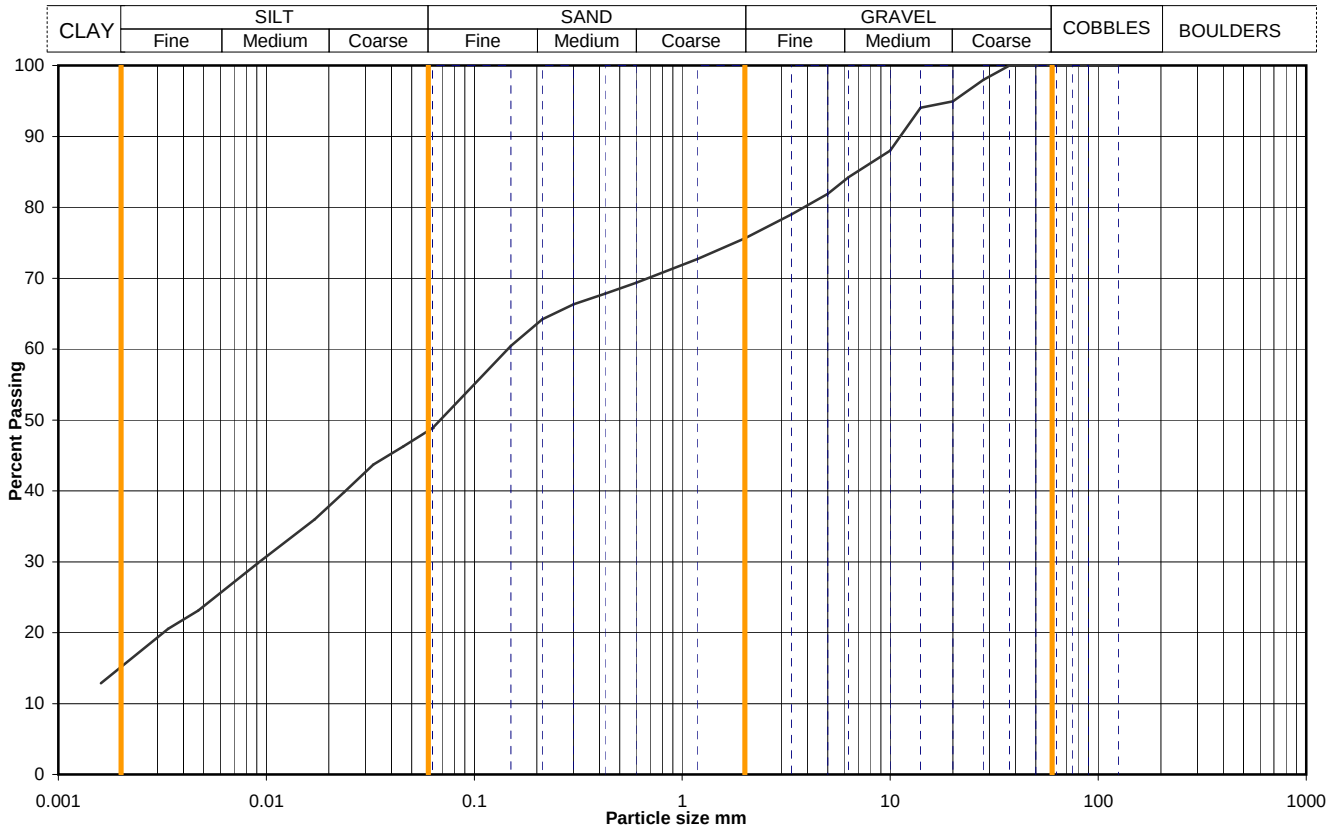
Uniformity Coefficient	D_{60} / D_{10}	Not applicable

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

QA Ref SLR 2,9 Rev 88 Aug 11	ESG Environmental Scientifics Group	UKAS TESTING 1157	Printed:22/02/2012 16:14	**Figure** **PSD 9**

Particle Size Distribution Analysis

Project No	Y2101-12	Sample Details:	Hole No	BH4		
Project Name	Costal Mechanisms Investigation, Ringaskiddy, County Cork		Depth (m BGL)	4.50		
			Samp No	17	Type	B
			ID	ESGY2101-12201201300000000151		
			Spec Ref			



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	49
90	100	0.0456	46
75	100	0.0327	44
63	100	0.0237	40
50	100	0.0171	36
37.5	100	0.0091	30
28	98	0.0047	23
20	95	0.0034	21
14	94	0.0016	13
10	88		
6.3	84		
5.0	82		
3.35	79		
2.00	76		
1.18	73	Particle density, Mg/m3	
0.600	69		
0.425	68	2.65 assumed	
0.300	66	Dry mass of sample, kg	
0.212	64		
0.150	60	8.1	
0.063	49		

Soil description	Brown slightly sandy slightly gravelly CLAY.		
Preparation / Pretreatment	Sieve: natural material Hydro: as BS1377		
Remarks			
Sample Proportions *<60mm values to aid description only		Whole	*<60mm
	Cobbles / boulders	0	0
	Gravel	24	24
	Sand	27	27
	Silt	34	34
	Clay	15	15

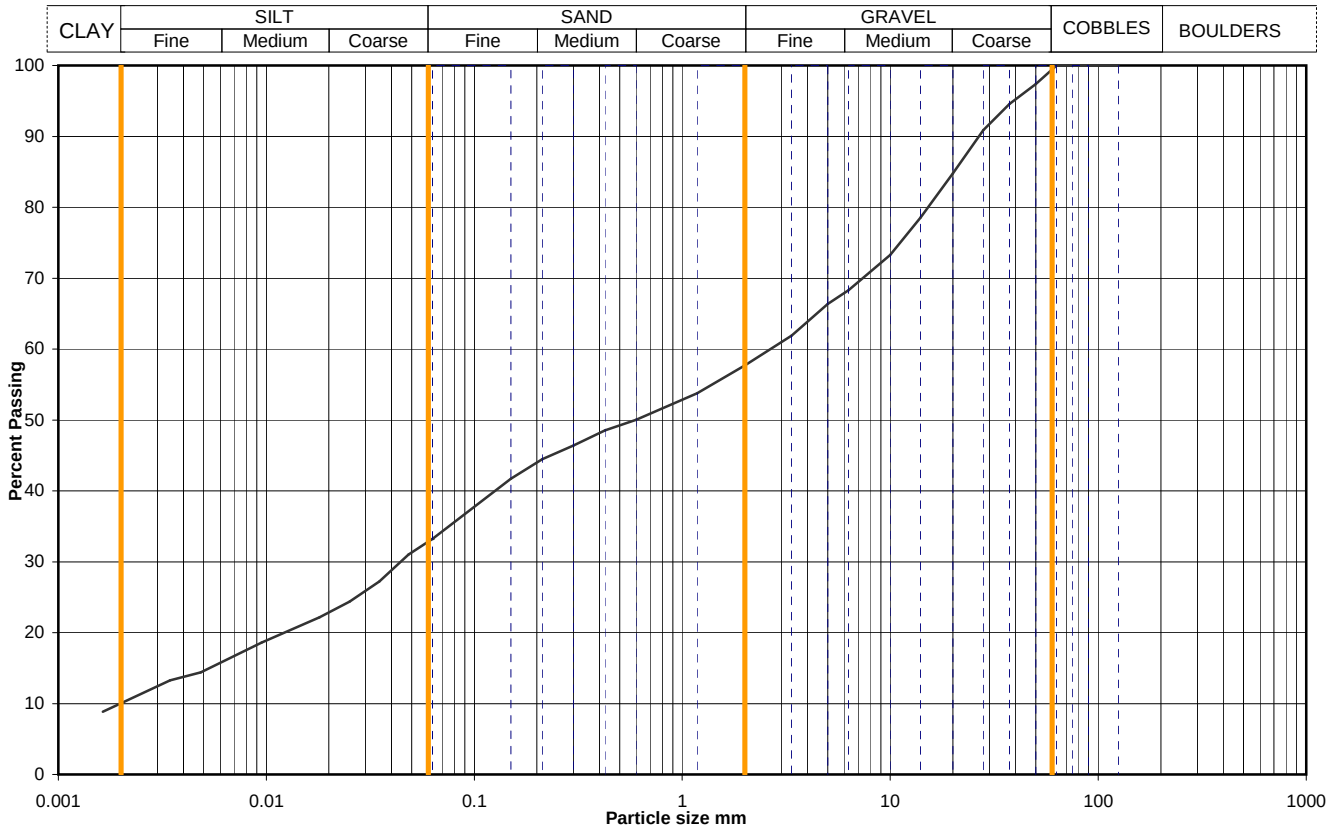
Uniformity Coefficient	D_{60} / D_{10}	Not applicable

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

QA Ref SLR 2,9 Rev 88 Aug 11	ESG Environmental Scientifics Group	UKAS TESTING 1157	Printed:22/02/2012 16:14	**Figure** **PSD 10**

Particle Size Distribution Analysis

Project No	Y2101-12	Sample Details:	Hole No	BH4		
Project Name	Costal Mechanisms Investigation, Ringaskiddy, County Cork		Depth (m BGL)	8.50		
			Samp No	29	Type	B
			ID	ESGY2101-12201201300000000163		
			Spec Ref			



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	33
90	100	0.0483	31
75	100	0.0350	27
63	100	0.0251	24
50	97	0.0180	22
37.5	95	0.0095	19
28	91	0.0048	14
20	85	0.0034	13
14	79	0.0016	9
10	73		
6.3	68		
5.0	66		
3.35	62		
2.00	58		
1.18	54	Particle density, Mg/m3	
0.600	50		
0.425	49	2.65 assumed	
0.300	46	Dry mass of sample, kg	
0.212	44		
0.150	42	9.6	
0.063	33		

Soil description	Brownish grey slightly sandy gravelly CLAY.		
Preparation / Pretreatment	Sieve: natural material Hydro: as BS1377		
Remarks			
Sample Proportions *<60mm values to aid description only		Whole	*<60mm
	Cobbles / boulders	1	0
	Gravel	41	41
	Sand	25	25
	Silt	23	23
	Clay	10	10

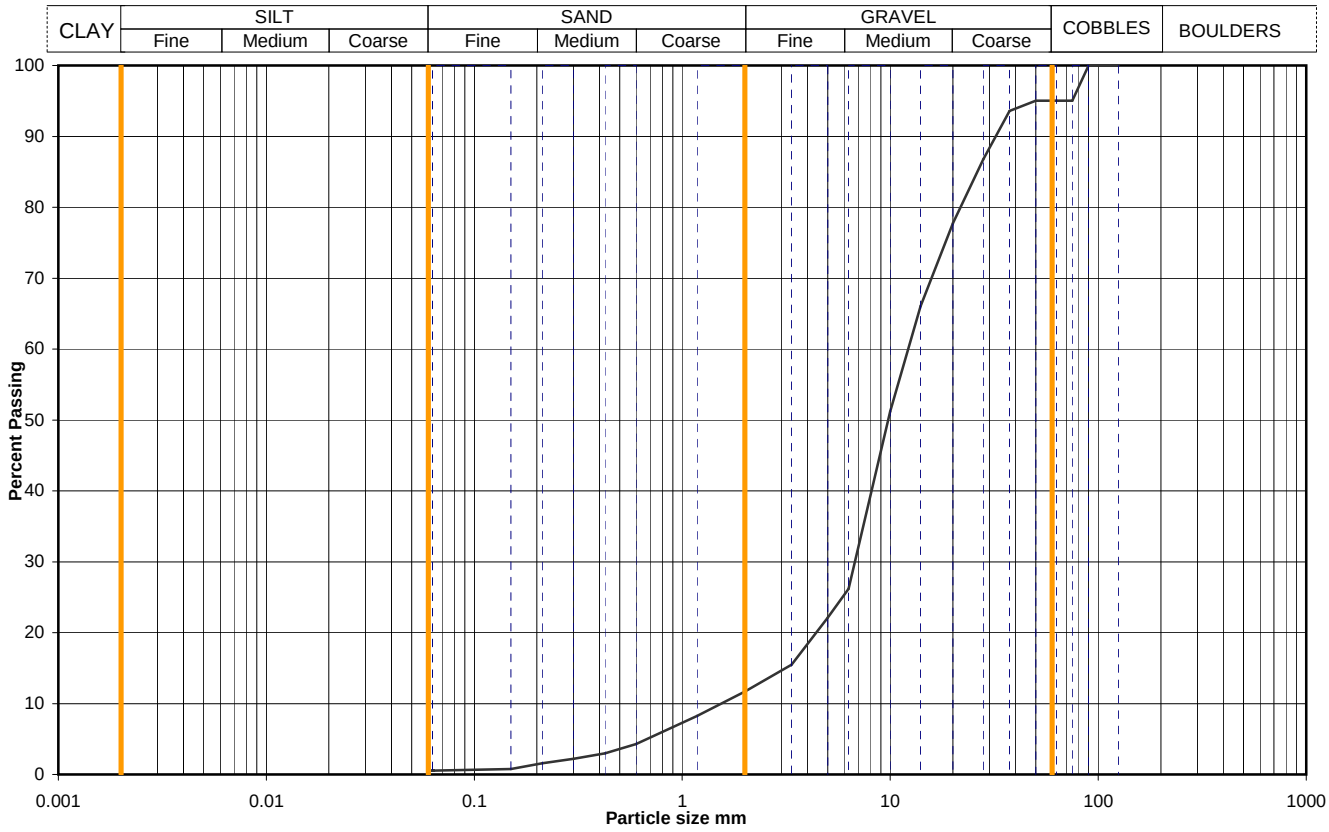
Uniformity Coefficient	D_{60} / D_{10}	1339

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

QA Ref SLR 2,9 Rev 88 Aug 11	ESG Environmental Scientifics Group	UKAS TESTING 1157	Printed:22/02/2012 16:15	**Figure** **PSD 11**

Particle Size Distribution Analysis

Project No	Y2101-12	Sample Details:	Hole No	GS01		
Project Name	Costal Mechanisms Investigation, Ringaskiddy, County Cork		Depth (m BGL)	0.00		
			Samp No	1	Type	B
			ID	ESGY2101-12201201310000000187		
			Spec Ref			



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	95		
63	95		
50	95		
37.5	94		
28	87		
20	78		
14	66		
10	51		
6.3	26		
5.0	22		
3.35	15		
2.00	12		
1.18	8		
0.600	4		
0.425	3		
0.300	2	Dry mass of sample, kg	
0.212	2		
0.150	1	15.4	
0.063	1		

Soil description	Grey sandy GRAVEL with 1 cobble.		
Preparation / Pretreatment	Sieve: natural material		
Remarks			
Sample Proportions *<60mm values to aid description only		Whole	*<60mm
	Cobbles / boulders	5	0
	Gravel	83	87
	Sand	11	12
	Silt	silt+clay =	
	Clay	1	1

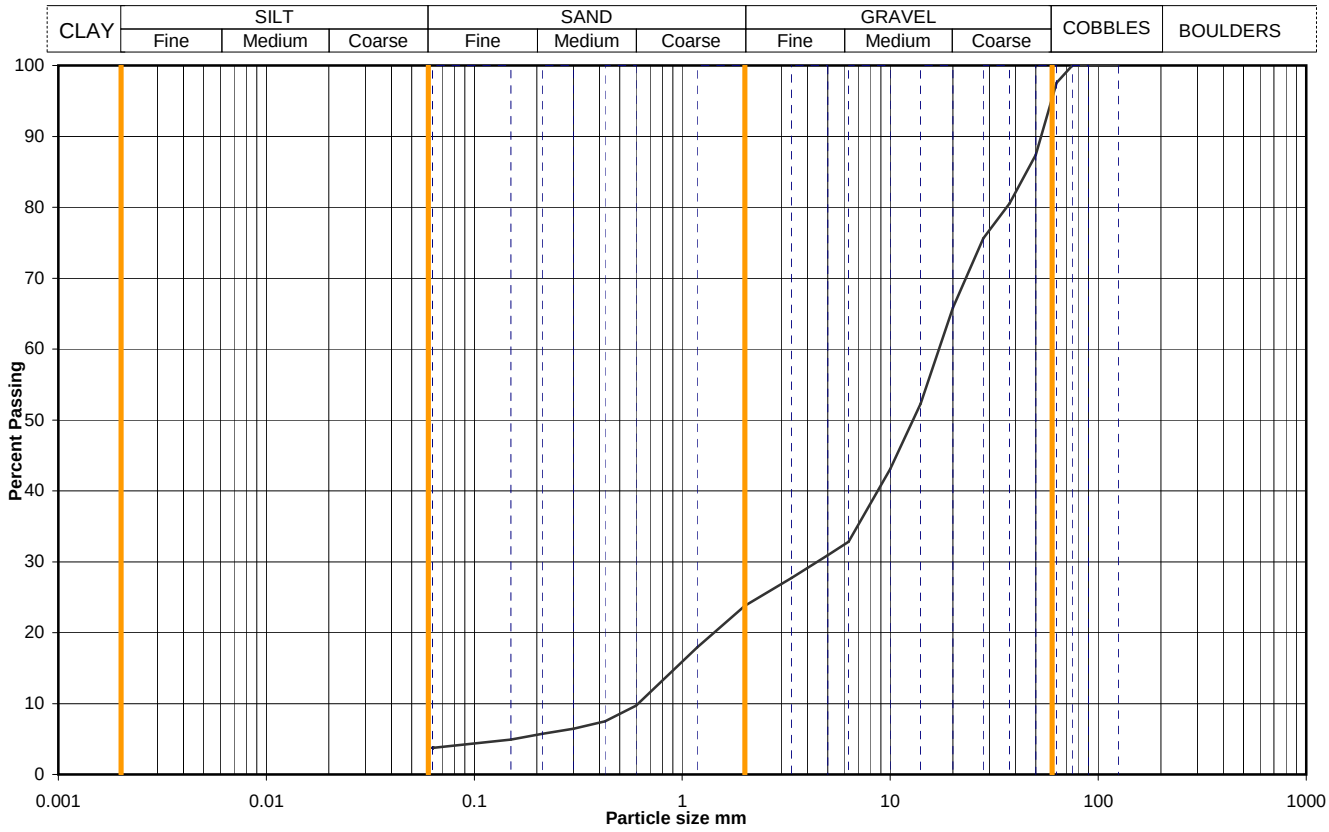
Uniformity Coefficient	D_{60} / D_{10}	8

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	none

QA Ref SLR 2,9 Rev 88 Aug 11	ESG Environmental Scientifics Group	UKAS TESTING 1157	Printed:22/02/2012 16:15	**Figure** **PSD 12**

Particle Size Distribution Analysis

Project No	Y2101-12	Sample Details:	Hole No	GS02		
Project Name	Costal Mechanisms Investigation, Ringaskiddy, County Cork		Depth (m BGL)	0.00		
			Samp No	1	Type	B
			ID	ESGY2101-12201201310000000188		
			Spec Ref			



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	98		
50	87		
37.5	81		
28	76		
20	66		
14	52		
10	43		
6.3	33		
5.0	31		
3.35	28		
2.00	24		
1.18	18		
0.600	10		
0.425	8		
0.300	6	Dry mass of sample, kg	
0.212	6	18.0	
0.150	5		
0.063	4		

Soil description	Greyish brown very sandy GRAVEL with occasional clay pockets frequent shell fragments and 1 cobble.		
Preparation / Pretreatment	Sieve: natural material		
Remarks			
Sample Proportions *<60mm values to aid description only		Whole	*<60mm
	Cobbles / boulders	5	0
	Gravel	71	75
	Sand	20	21
	Silt	silt+clay =	
	Clay	4	4

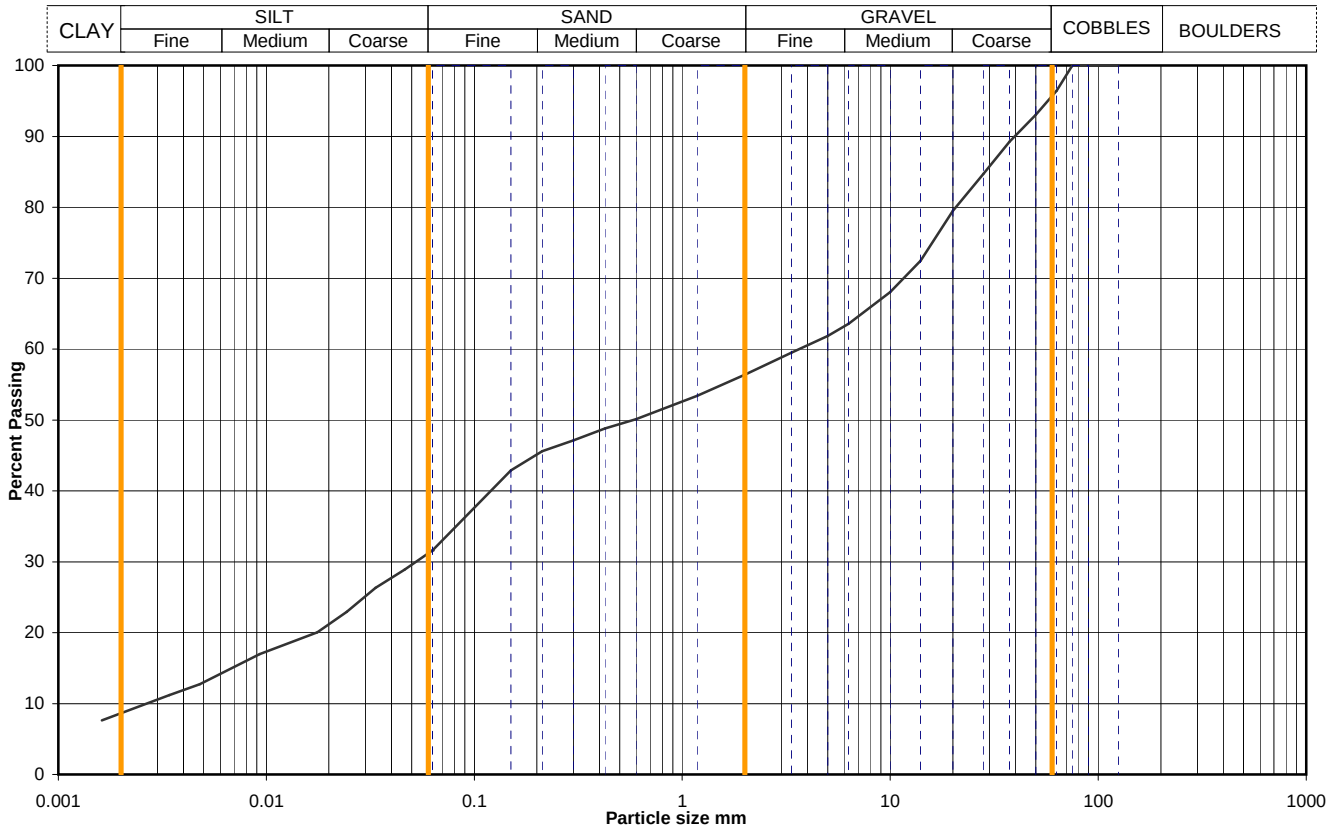
Uniformity Coefficient	D_{60} / D_{10}	28

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	none

QA Ref SLR 2,9 Rev 88 Aug 11	ESG Environmental Scientifics Group	UKAS TESTING 1157	Printed:22/02/2012 16:15	**Figure** **PSD 13**

Particle Size Distribution Analysis

Project No	Y2101-12	Sample Details:	Hole No	S1		
Project Name	Costal Mechanisms Investigation, Ringaskiddy, County Cork		Depth (m BGL)	10.00		
			Samp No	4	Type	B
			ID	ESGY2101-12201201300000000170		
			Spec Ref			



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	32
90	100	0.0463	29
75	100	0.0334	26
63	96	0.0243	23
50	93	0.0176	20
37.5	89	0.0093	17
28	85	0.0048	13
20	80	0.0034	11
14	72	0.0016	8
10	68		
6.3	64		
5.0	62		
3.35	60		
2.00	56		
1.18	53	Particle density, Mg/m3	
0.600	50		
0.425	49	2.65 assumed	
0.300	47	Dry mass of sample, kg	
0.212	46		
0.150	43	15.8	
0.063	32		

Soil description	Brown slightly sandy gravelly CLAY with 1 cobble.		
Preparation / Pretreatment	Sieve: pre dried, Hydro: as BS1377		
Remarks			
Sample Proportions *<60mm values to aid description only		Whole	*<60mm
	Cobbles / boulders	4	0
	Gravel	40	42
	Sand	25	26
	Silt	22	23
	Clay	9	9

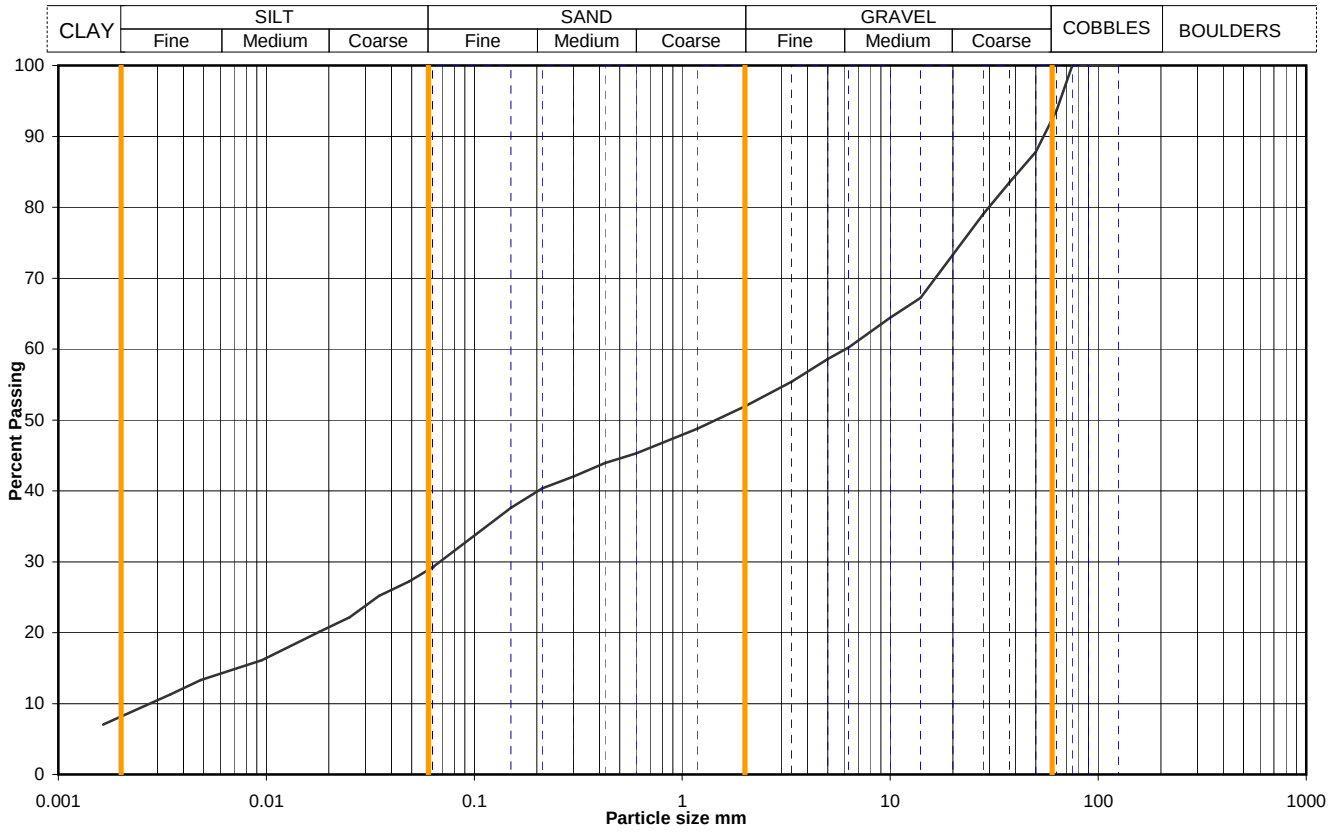
Uniformity Coefficient	D_{60} / D_{10}	1371

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

QA Ref SLR 2,9 Rev 88 Aug 11	ESG Environmental Scientifics Group	UKAS TESTING 1157	Printed:22/02/2012 16:15	**Figure** **PSD 14**

Particle Size Distribution Analysis

Project No	Y2101-12	Sample Details:	Hole No	S2		
Project Name	Costal Mechanisms Investigation, Ringaskiddy, County Cork		Depth (m BGL)	10.00		
			Samp No	2	Type	B
			ID	ESGY2101-12201201300000000172		
			Spec Ref			



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	29
90	100	0.0486	27
75	100	0.0349	25
63	94	0.0251	22
50	88	0.0180	20
37.5	84	0.0095	16
28	79	0.0048	13
20	73	0.0035	11
14	67	0.0016	7
10	64		
6.3	60		
5.0	59		
3.35	55		
2.00	52		
1.18	49	Particle density, Mg/m3	
0.600	45		
0.425	44	2.65 assumed	
0.300	42	Dry mass of sample, kg	
0.212	40		
0.150	38	9.1	
0.063	29		

Soil description	Brown slightly sandy gravelly CLAY with rare silt pockets and 1 cobble.		
Preparation / Pretreatment	Sieve: natural material Hydro: as BS1377		
Remarks			
Sample Proportions *<60mm values to aid description only		Whole	*<60mm
	Cobbles / boulders	8	0
	Gravel	40	43
	Sand	23	25
	Silt	21	23
	Clay	8	9

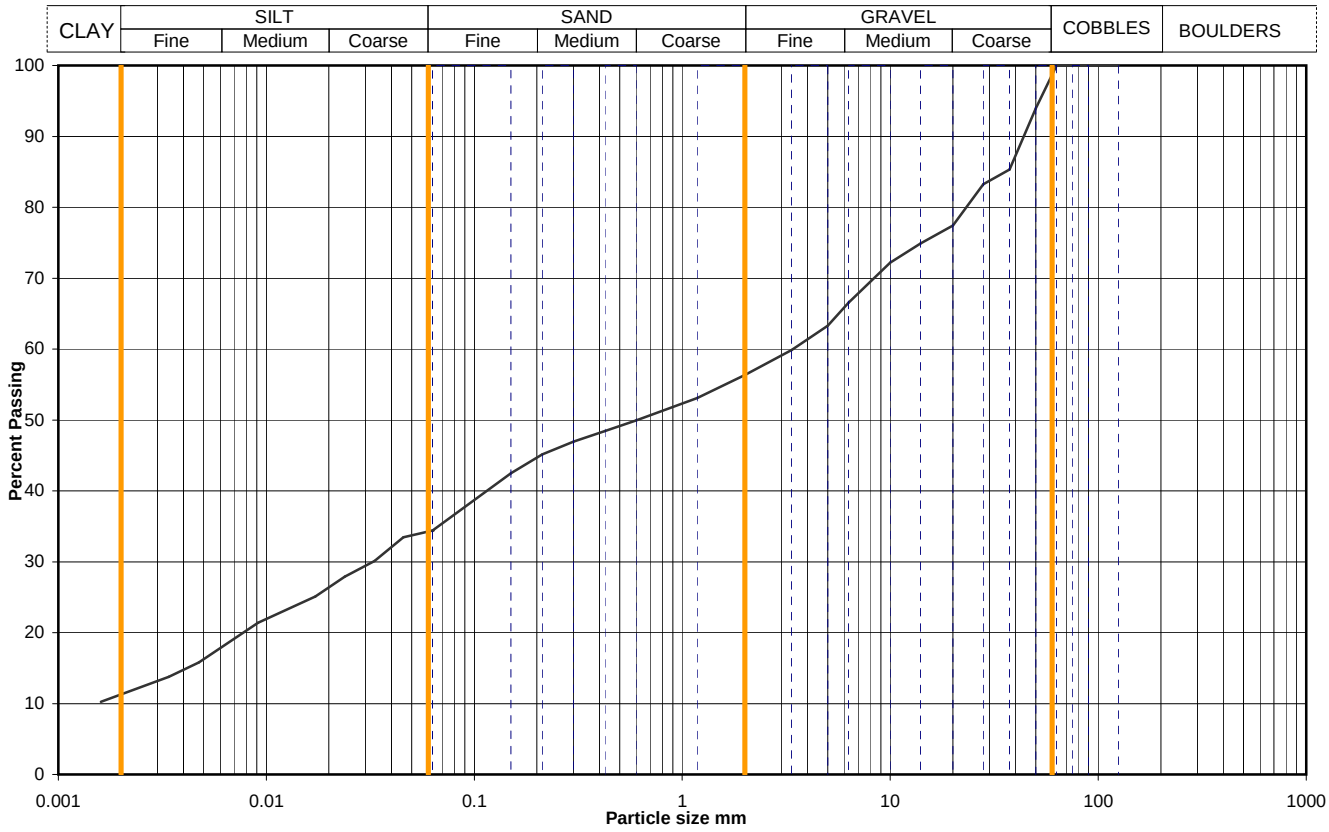
Uniformity Coefficient	D_{60} / D_{10}	2216

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

QA Ref SLR 2,9 Rev 88 Aug 11	ESG Environmental Scientifics Group	UKAS TESTING 1157	Printed:22/02/2012 16:15	**Figure** **PSD 15**

Particle Size Distribution Analysis

Project No	Y2101-12	Sample Details:	Hole No	S3		
Project Name	Costal Mechanisms Investigation, Ringaskiddy, County Cork		Depth (m BGL)	8.70		
			Samp No	2	Type	B
			ID	ESGY2101-12201201300000000176		
			Spec Ref			



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	34
90	100	0.0456	33
75	100	0.0331	30
63	100	0.0238	28
50	94	0.0172	25
37.5	85	0.0091	21
28	83	0.0047	16
20	77	0.0034	14
14	75	0.0016	10
10	72		
6.3	67		
5.0	63		
3.35	60		
2.00	56		
1.18	53	Particle density, Mg/m3	
0.600	50		
0.425	48	2.65 assumed	
0.300	47	Dry mass of sample, kg	
0.212	45		
0.150	42	11.9	
0.063	34		

Soil description	Brownish grey slightly sandy gravelly CLAY.		
Preparation / Pretreatment	Sieve: natural material Hydro: as BS1377		
Remarks			
Sample Proportions *<60mm values to aid description only		Whole	*<60mm
	Cobbles / boulders	1	0
	Gravel	43	43
	Sand	22	22
	Silt	23	23
	Clay	11	11

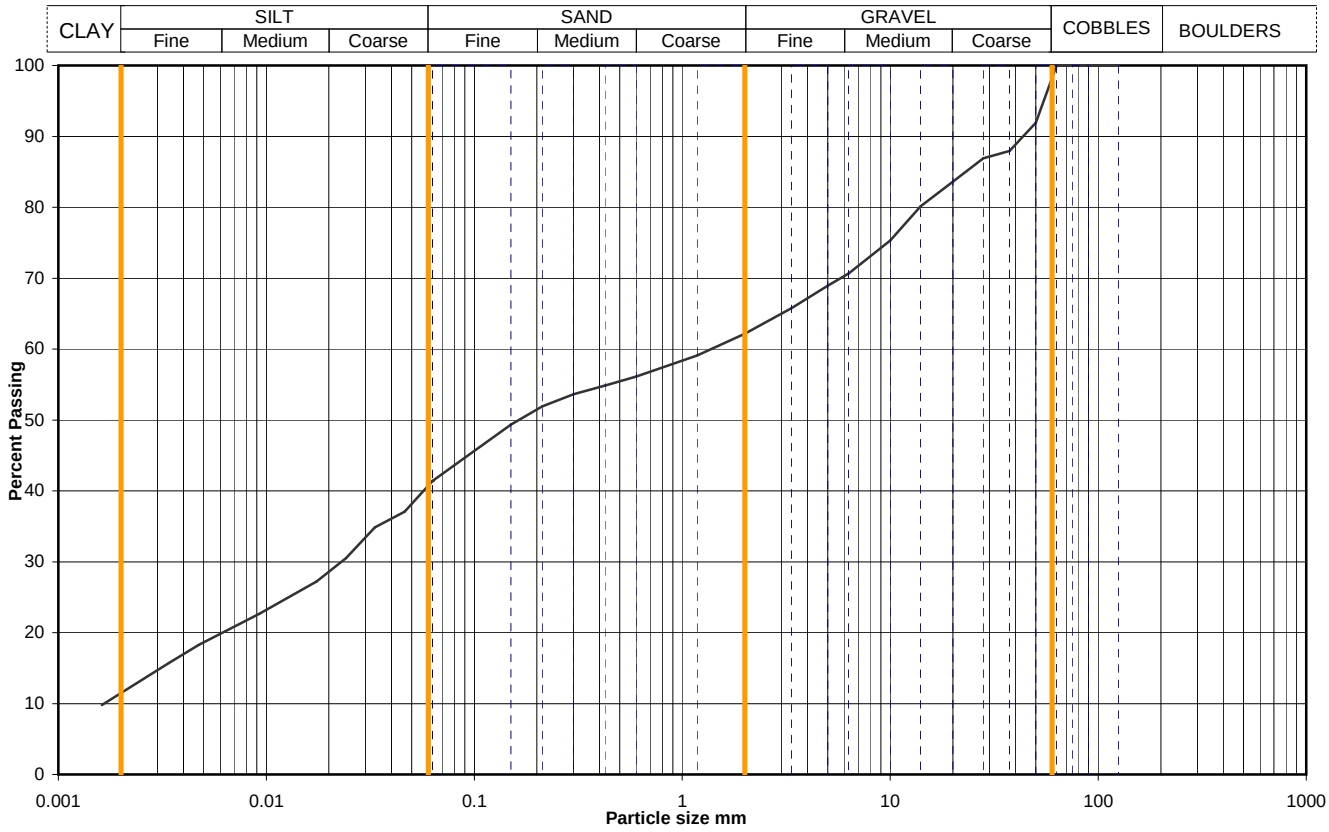
Uniformity Coefficient	D_{60} / D_{10}	Not applicable

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

QA Ref SLR 2,9 Rev 88 Aug 11	ESG Environmental Scientifics Group	UKAS TESTING 1157	Printed:22/02/2012 16:15	**Figure** **PSD 16**

Particle Size Distribution Analysis

Project No	Y2101-12	Sample Details:	Hole No	S4		
Project Name	Costal Mechanisms Investigation, Ringaskiddy, County Cork		Depth (m BGL)	7.50		
			Samp No	2	Type	B
			ID	ESGY2101-12201201300000000180		
			Spec Ref			



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	41
90	100	0.0463	37
75	100	0.0332	35
63	100	0.0242	31
50	92	0.0174	27
37.5	88	0.0092	23
28	87	0.0047	18
20	84	0.0034	16
14	80	0.0016	10
10	75		
6.3	71		
5.0	69		
3.35	66		
2.00	62		
1.18	59	Particle density, Mg/m3	
0.600	56		
0.425	55	2.65 assumed	
0.300	54	Dry mass of sample, kg	
0.212	52		
0.150	49	13.6	
0.063	41		

Soil description	Brown slightly sandy gravelly CLAY.		
Preparation / Pretreatment	Sieve: natural material Hydro: as BS1377		
Remarks			
Sample Proportions *<60mm values to aid description only		Whole	*<60mm
	Cobbles / boulders	2	0
	Gravel	36	37
	Sand	21	21
	Silt	29	30
	Clay	12	12

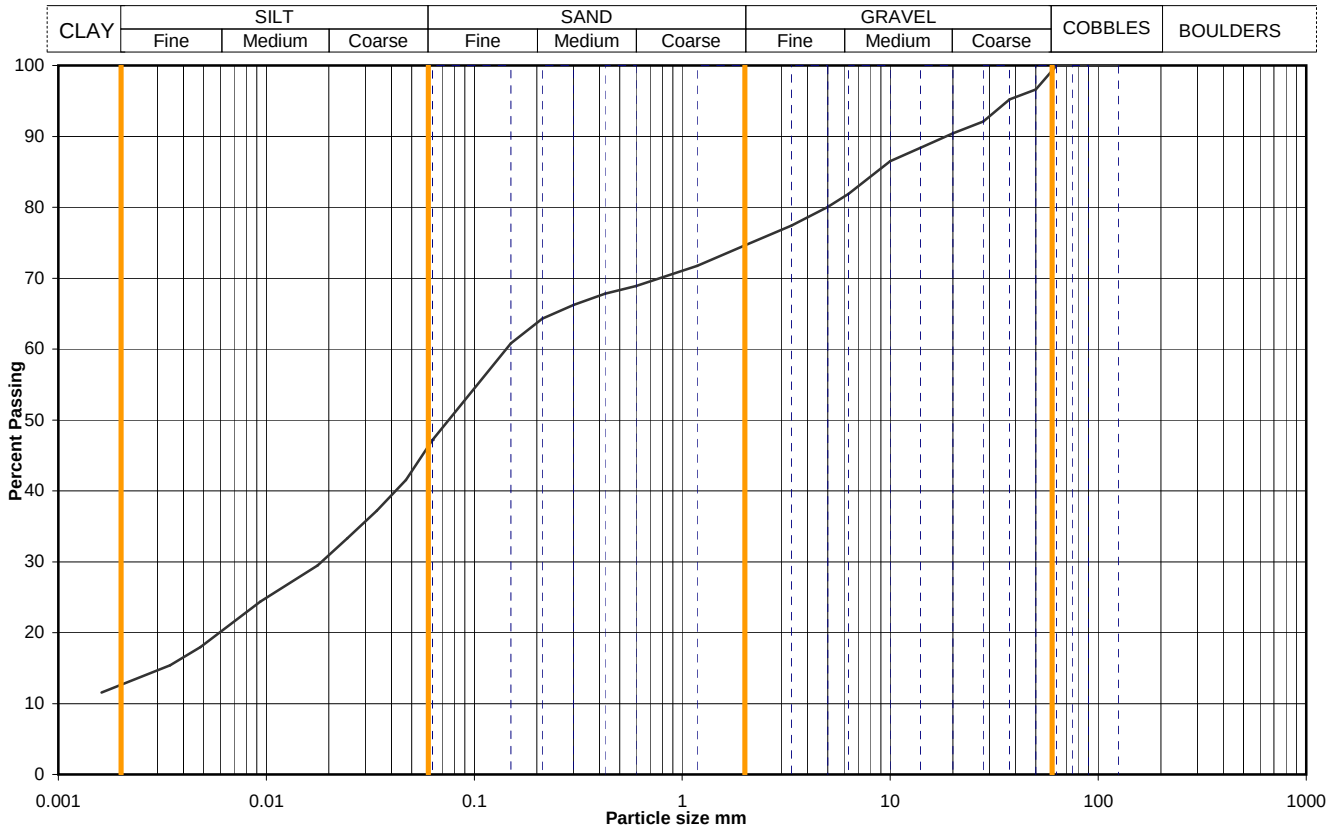
Uniformity Coefficient	D_{60} / D_{10}	831

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

QA Ref SLR 2,9 Rev 88 Aug 11	ESG Environmental Scientifics Group	UKAS TESTING 1157	Printed:22/02/2012 16:15	**Figure** **PSD 17**

Particle Size Distribution Analysis

Project No	Y2101-12	Sample Details:	Hole No	S5		
Project Name	Costal Mechanisms Investigation, Ringaskiddy, County Cork		Depth (m BGL)	3.40		
			Samp No	2	Type	B
			ID	ESGY2101-12201201300000000184		
			Spec Ref			



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	47
90	100	0.0468	42
75	100	0.0339	37
63	100	0.0245	33
50	97	0.0177	29
37.5	95	0.0094	24
28	92	0.0048	18
20	90	0.0034	15
14	88	0.0016	12
10	86		
6.3	82		
5.0	80		
3.35	77		
2.00	75		
1.18	72	Particle density, Mg/m3	
0.600	69		
0.425	68	2.65 assumed	
0.300	66	Dry mass of sample, kg	
0.212	64		
0.150	61	11.9	
0.063	47		

Soil description	Brown slightly sandy slightly gravelly silty CLAY.		
Preparation / Pretreatment	Sieve: natural material Hydro: as BS1377		
Remarks			
Sample Proportions *<60mm values to aid description only		Whole	*<60mm
	Cobbles / boulders	1	0
	Gravel	24	24
	Sand	28	28
	Silt	34	34
	Clay	13	13

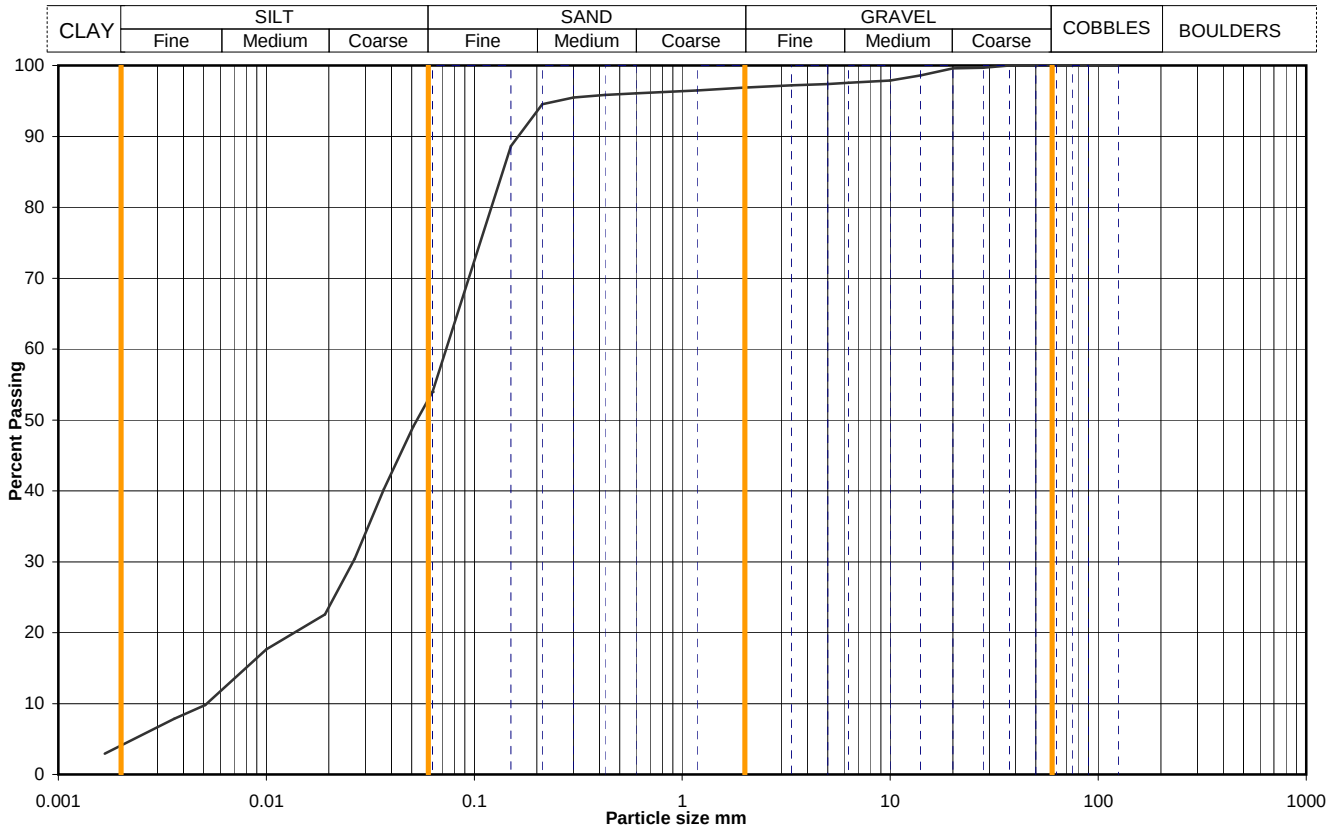
Uniformity Coefficient	D_{60} / D_{10}	Not applicable

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

QA Ref SLR 2,9 Rev 88 Aug 11	ESG Environmental Scientifics Group	UKAS TESTING 1157	Printed:22/02/2012 16:15	**Figure** **PSD 18**

Particle Size Distribution Analysis

Project No	Y2101-12	Sample Details:	Hole No	TP1		
Project Name	Costal Mechanisms Investigation, Ringaskiddy, County Cork		Depth (m BGL)	3.00		
			Samp No	8	Type	B
			ID	ESGY2101-12201201270000000008		
			Spec Ref			



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	54
90	100	0.0509	49
75	100	0.0368	40
63	100	0.0266	30
50	100	0.0192	23
37.5	100	0.0100	18
28	100	0.0051	10
20	100	0.0036	8
14	99	0.0017	3
10	98		
6.3	98		
5.0	97		
3.35	97		
2.00	97		
1.18	96	Particle density, Mg/m3	
0.600	96		
0.425	96	2.65 assumed	
0.300	95	Dry mass of sample, kg	
0.212	95		
0.150	89	13.0	
0.063	54		

Soil description	Brown slightly gravelly sandy SILT.		
Preparation / Pretreatment	Sieve: natural material Hydro: as BS1377		
Remarks			
Sample Proportions *<60mm values to aid description only		Whole	*<60mm
	Cobbles / boulders	0	0
	Gravel	3	3
	Sand	44	44
	Silt	49	49
	Clay	4	4

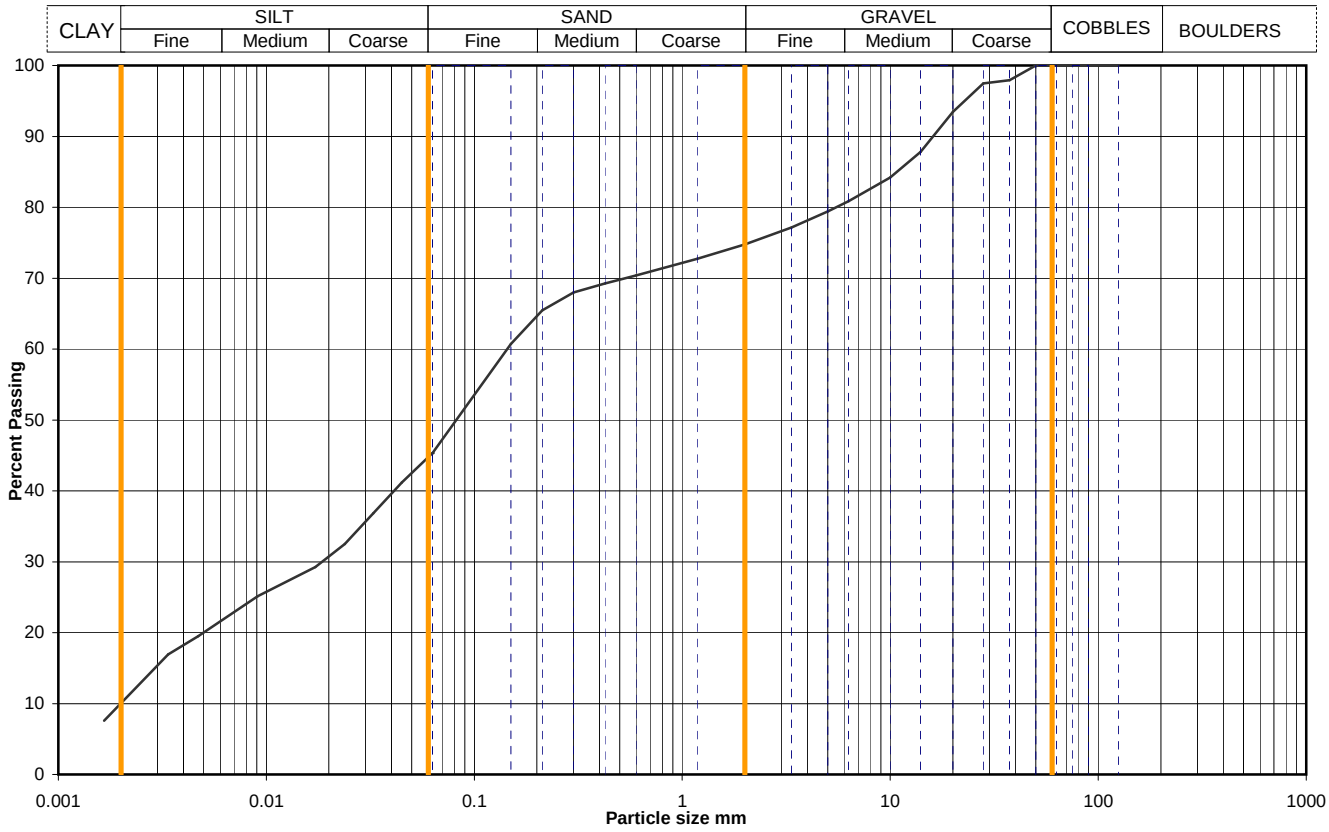
Uniformity Coefficient	D_{60} / D_{10}	14

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

QA Ref SLR 2,9 Rev 88 Aug 11	ESG Environmental Scientifics Group	UKAS TESTING 1157	Printed:22/02/2012 16:15	**Figure** **PSD 19**

Particle Size Distribution Analysis

Project No	Y2101-12	Sample Details:	Hole No	TP2		
Project Name	Costal Mechanisms Investigation, Ringaskiddy, County Cork		Depth (m BGL)	0.50		
			Samp No	2	Type	B
			ID	ESGY2101-12201201270000000012		
			Spec Ref			



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	45
90	100	0.0449	41
75	100	0.0327	37
63	100	0.0238	33
50	100	0.0172	29
37.5	98	0.0091	25
28	97	0.0047	20
20	93	0.0034	17
14	88	0.0017	8
10	84		
6.3	81		
5.0	79		
3.35	77		
2.00	75		
1.18	73	Particle density, Mg/m3	
0.600	70		
0.425	69	2.65 assumed	
0.300	68	Dry mass of sample, kg	
0.212	65		
0.150	61	9.2	
0.063	45		

Soil description	Brown slightly sandy slightly gravelly silty CLAY.		
Preparation / Pretreatment	Sieve: natural material Hydro: as BS1377		
Remarks			
Sample Proportions *<60mm values to aid description only		Whole	*<60mm
	Cobbles / boulders	0	0
	Gravel	25	25
	Sand	30	30
	Silt	35	35
	Clay	10	10

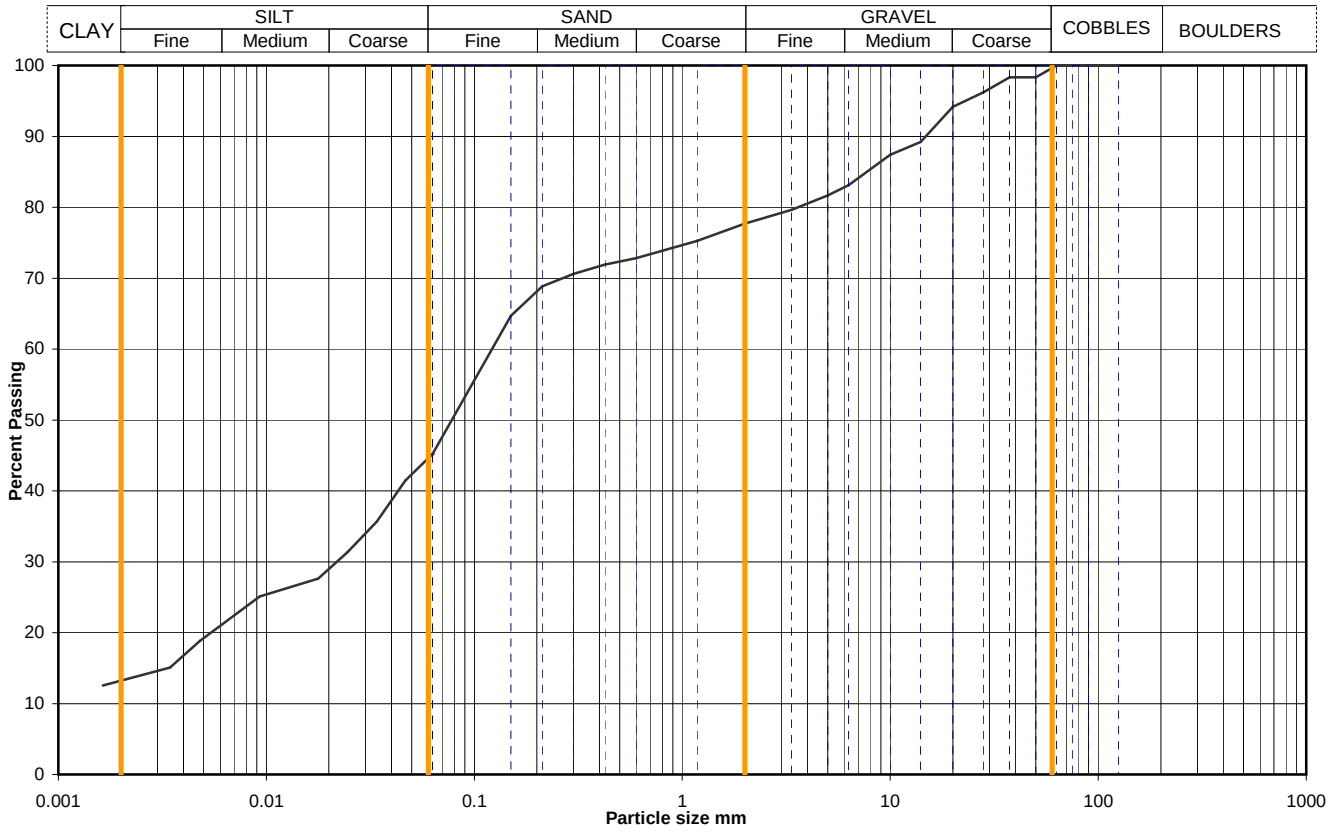
Uniformity Coefficient	D_{60} / D_{10}	72

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

QA Ref SLR 2,9 Rev 88 Aug 11	ESG Environmental Scientifics Group	UKAS TESTING 1157	Printed:22/02/2012 16:15	**Figure** **PSD 20**

Particle Size Distribution Analysis

Project No	Y2101-12	Sample Details:	Hole No	TP3		
Project Name	Costal Mechanisms Investigation, Ringaskiddy, County Cork		Depth (m BGL)	2.60		
			Samp No	8	Type	B
			ID	ESGY2101-12201201270000000028		
			Spec Ref			



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	45
90	100	0.0465	41
75	100	0.0340	36
63	100	0.0246	31
50	98	0.0177	28
37.5	98	0.0093	25
28	96	0.0048	19
20	94	0.0034	15
14	89	0.0016	13
10	87		
6.3	83		
5.0	82		
3.35	80		
2.00	78		
1.18	75	Particle density, Mg/m3	
0.600	73		
0.425	72	2.65 assumed	
0.300	71	Dry mass of sample, kg	
0.212	69		
0.150	65	16.5	
0.063	45		

Soil description	Brown slightly sandy slightly gravelly CLAY.		
Preparation / Pretreatment	Sieve: natural material Hydro: as BS1377		
Remarks			
Sample Proportions *<60mm values to aid description only		Whole	*<60mm
	Cobbles / boulders	0	0
	Gravel	22	22
	Sand	33	33
	Silt	32	32
	Clay	13	13

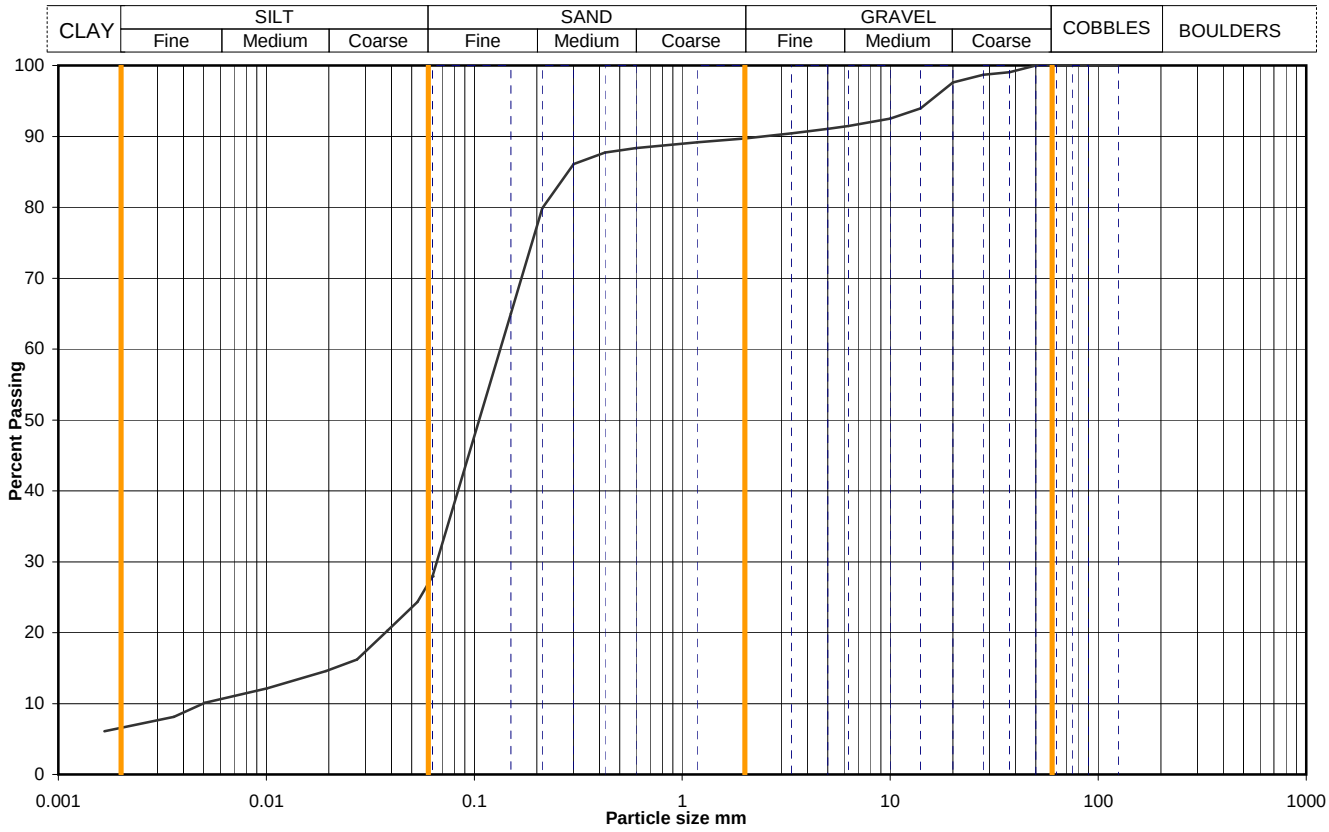
Uniformity Coefficient	D_{60} / D_{10}	Not applicable

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

QA Ref SLR 2,9 Rev 88 Aug 11	ESG Environmental Scientifics Group	UKAS TESTING 1157	Printed:22/02/2012 16:15	**Figure** **PSD 21**

Particle Size Distribution Analysis

Project No	Y2101-12	Sample Details:	Hole No	TP4		
Project Name	Costal Mechanisms Investigation, Ringaskiddy, County Cork		Depth (m BGL)	2.00		
			Samp No	6	Type	B
			ID	ESGY2101-12201201270000000038		
			Spec Ref			



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	28
90	100	0.0534	24
75	100	0.0382	20
63	100	0.0273	16
50	100	0.0194	15
37.5	99	0.0101	12
28	99	0.0051	10
20	98	0.0036	8
14	94	0.0017	6
10	93		
6.3	91		
5.0	91		
3.35	90		
2.00	90		
1.18	89	Particle density, Mg/m3	
0.600	88		
0.425	88	2.65 assumed	
0.300	86	Dry mass of sample, kg	
0.212	80		
0.150	65	10.8	
0.063	28		

Soil description	Brown slightly gravelly sandy SILT.		
Preparation / Pretreatment	Sieve: natural material Hydro: as BS1377		
Remarks			
Sample Proportions *<60mm values to aid description only		Whole	*<60mm
	Cobbles / boulders	0	0
	Gravel	10	10
	Sand	63	63
	Silt	20	20
	Clay	7	7

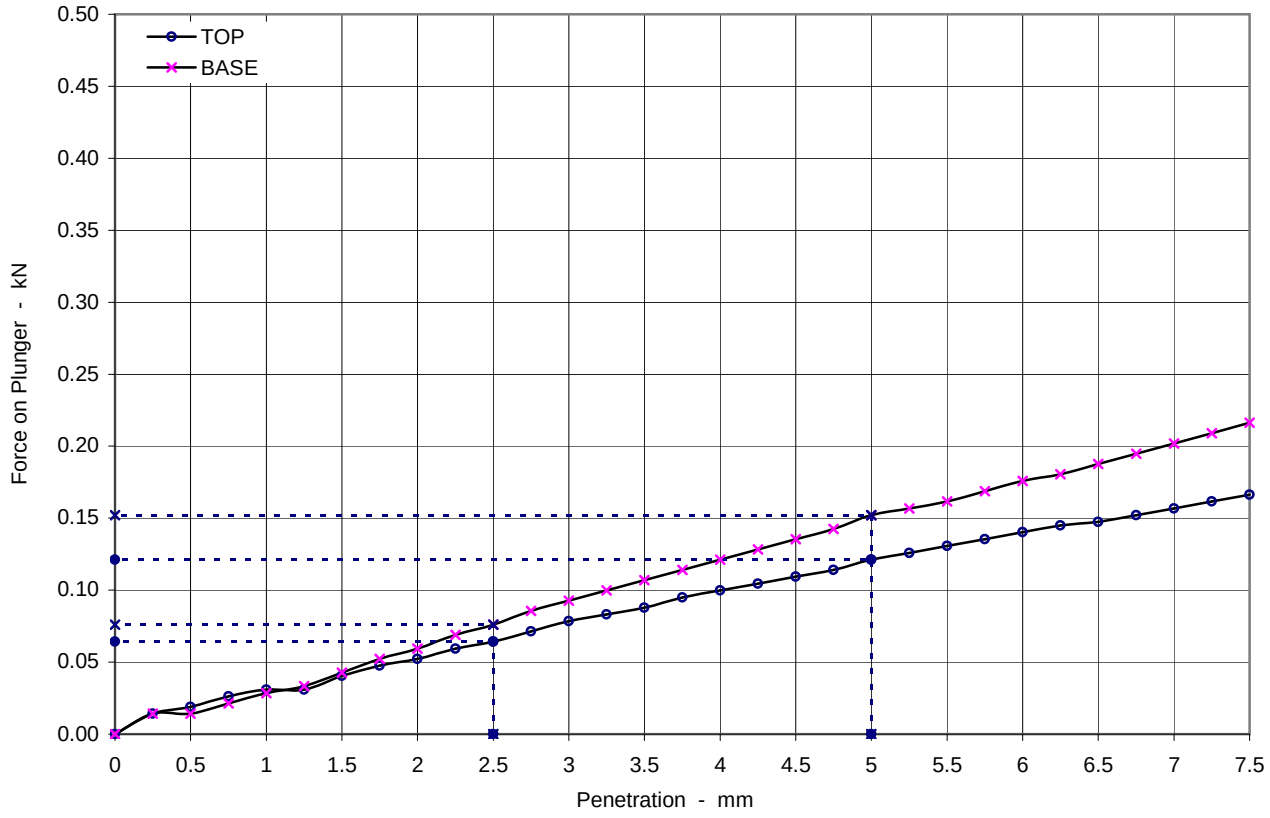
Uniformity Coefficient	D_{60} / D_{10}	27

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

QA Ref SLR 2,9 Rev 88 Aug 11	ESG Environmental Scientifics Group	UKAS TESTING 1157	Printed:22/02/2012 16:15	**Figure** **PSD 22**

California Bearing Ratio (BS1377:1990:Part 4 , section 7)

Project No	Y2101-12	Sample Details:	Hole No	S1		
Project Name	Costal Mechanisms Investigation, Ringaskiddy, County Cork		Depth (m BGL)	10.00		
			Samp No	4	Type	B
			ID	ESGY2101-12201201300000000170		
			Spec Ref			



Soil description	Brown slightly sandy gravelly CLAY with 1 cobble.

Test Conditions		
Sample Retained on 20 mm sieve	%	20

Preparation	Method of Compaction		
	Recompacted - Rammer compaction with specified effort (2.5kg)		
	Soaked test		NO
	Soaking Period	days	N/A
	Amount of Swell	mm	N/A

Surcharge applied	kg	0
	kPa	0

Notes :

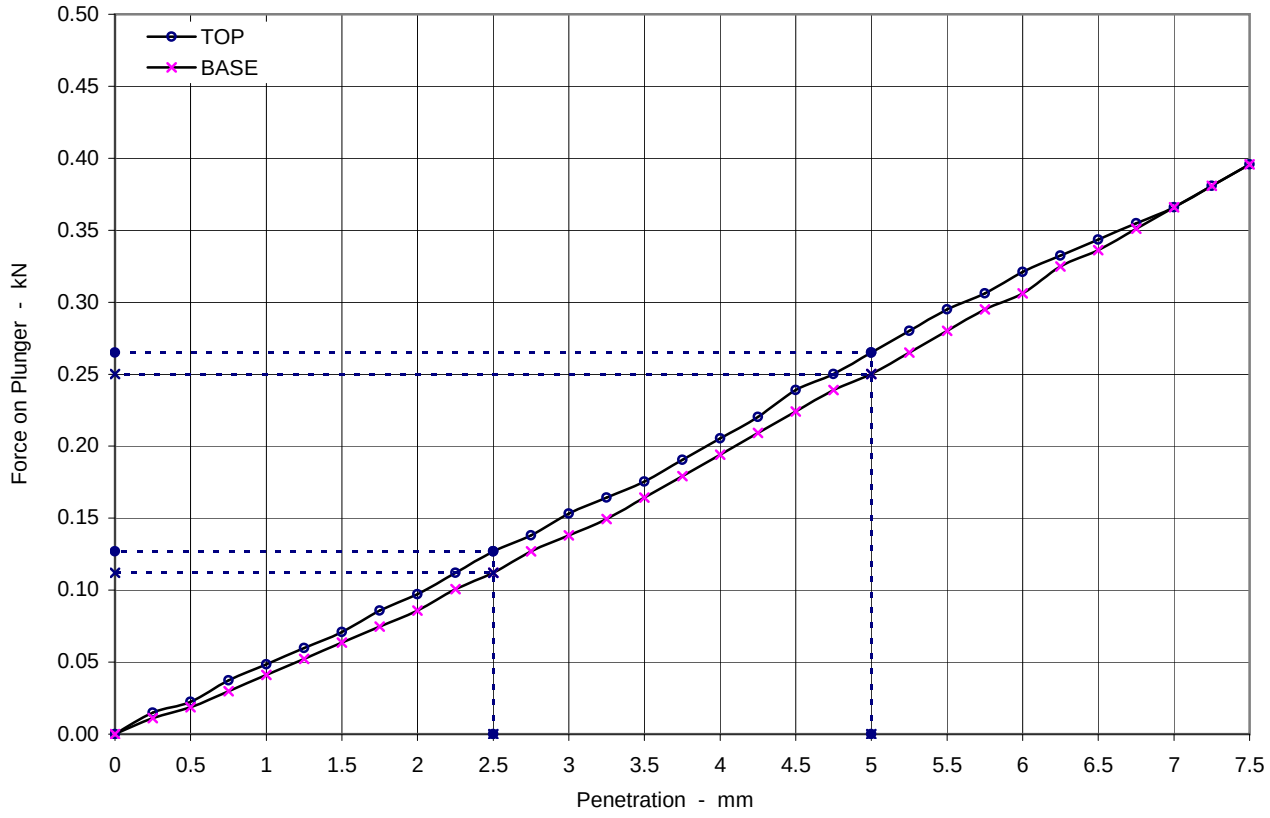
Sample Conditions		
Initial Moisture Content	%	13
Bulk Density	Mg/m³	2.19
Dry Density	Mg/m³	1.94
Moisture Content - TOP	%	13
Moisture Content - BASE	%	13

Penetration mm	CBR Values %	
	TOP	BASE
2.5	0.49	0.58
5.0	0.61	0.76

Accepted CBR %	**0.61**	**0.76**

California Bearing Ratio (BS1377:1990:Part 4 , section 7)

Project No	Y2101-12	Sample Details:	Hole No	S2		
Project Name	Costal Mechanisms Investigation, Ringaskiddy, County Cork		Depth (m BGL)	10.00		
			Samp No	2	Type	B
			ID	ESGY2101-12201201300000000172		
			Spec Ref			



Soil description	Brown slightly sandy gravelly CLAY with rare silt pockets and 1 cobble.

Test Conditions		
Sample Retained on 20 mm sieve	%	27

Preparation	Method of Compaction		
	Recompacted - Rammer compaction with specified effort (2.5kg)		
	Soaked test		NO
	Soaking Period	days	N/A
	Amount of Swell	mm	N/A

Surcharge applied	kg	0
	kPa	0

Notes :

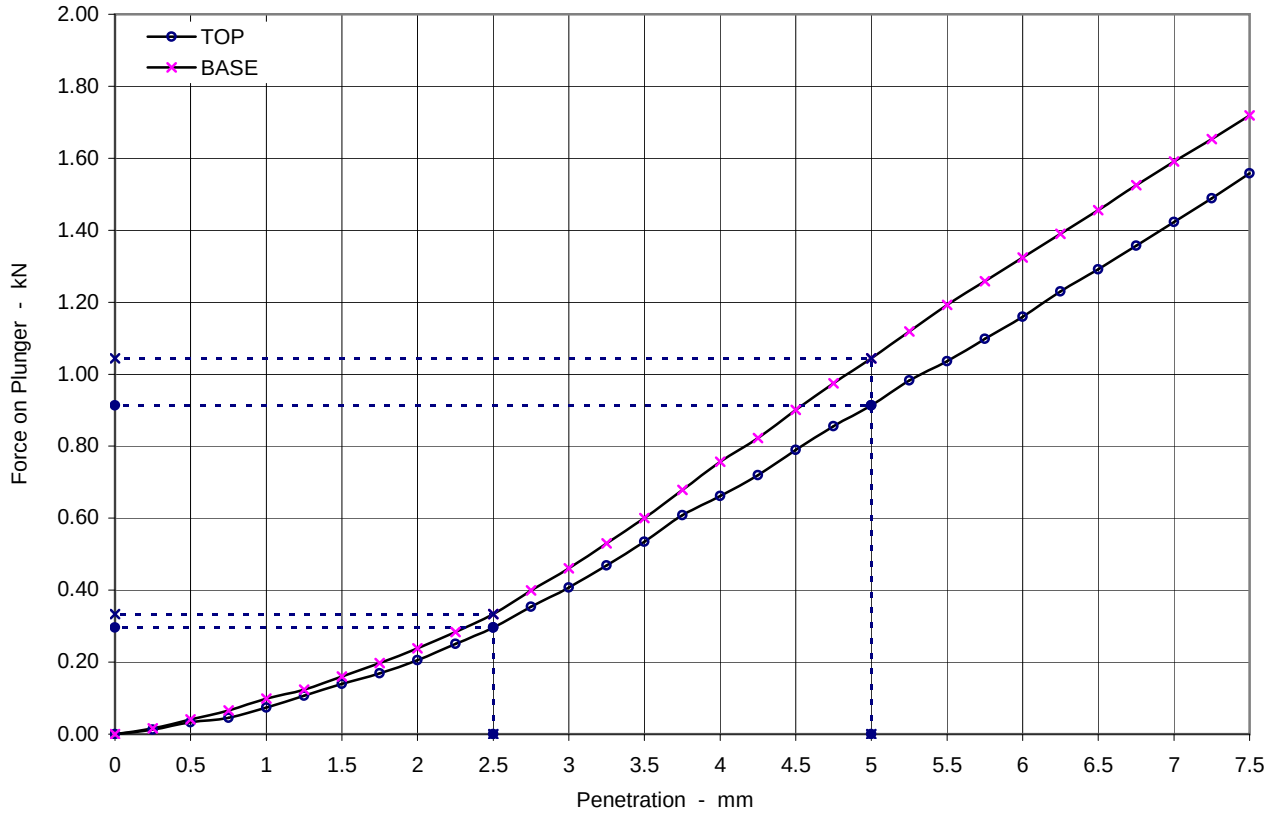
Sample Conditions		
Initial Moisture Content	%	12
Bulk Density	Mg/m³	2.25
Dry Density	Mg/m³	2.02
Moisture Content - TOP	%	12
Moisture Content - BASE	%	11

Penetration mm	CBR Values %	
	TOP	BASE
2.5	0.96	0.85
5.0	1.3	1.3

Accepted CBR %	**1.3**	**1.3**

California Bearing Ratio (BS1377:1990:Part 4 , section 7)

Project No	Y2101-12	Sample Details:	Hole No	S3		
Project Name	Costal Mechanisms Investigation, Ringaskiddy, County Cork		Depth (m BGL)	8.70		
			Samp No	2	Type	B
			ID	ESGY2101-12201201300000000176		
			Spec Ref			



Soil description	Brownish grey slightly sandy gravelly CLAY.

Test Conditions		
Sample Retained on 20 mm sieve	%	23

Preparation	Method of Compaction		
	Recompacted - Rammer compaction with specified effort (2.5kg)		
	Soaked test		NO
	Soaking Period	days	N/A
	Amount of Swell	mm	N/A

Surcharge applied	kg	0
	kPa	0

Notes :

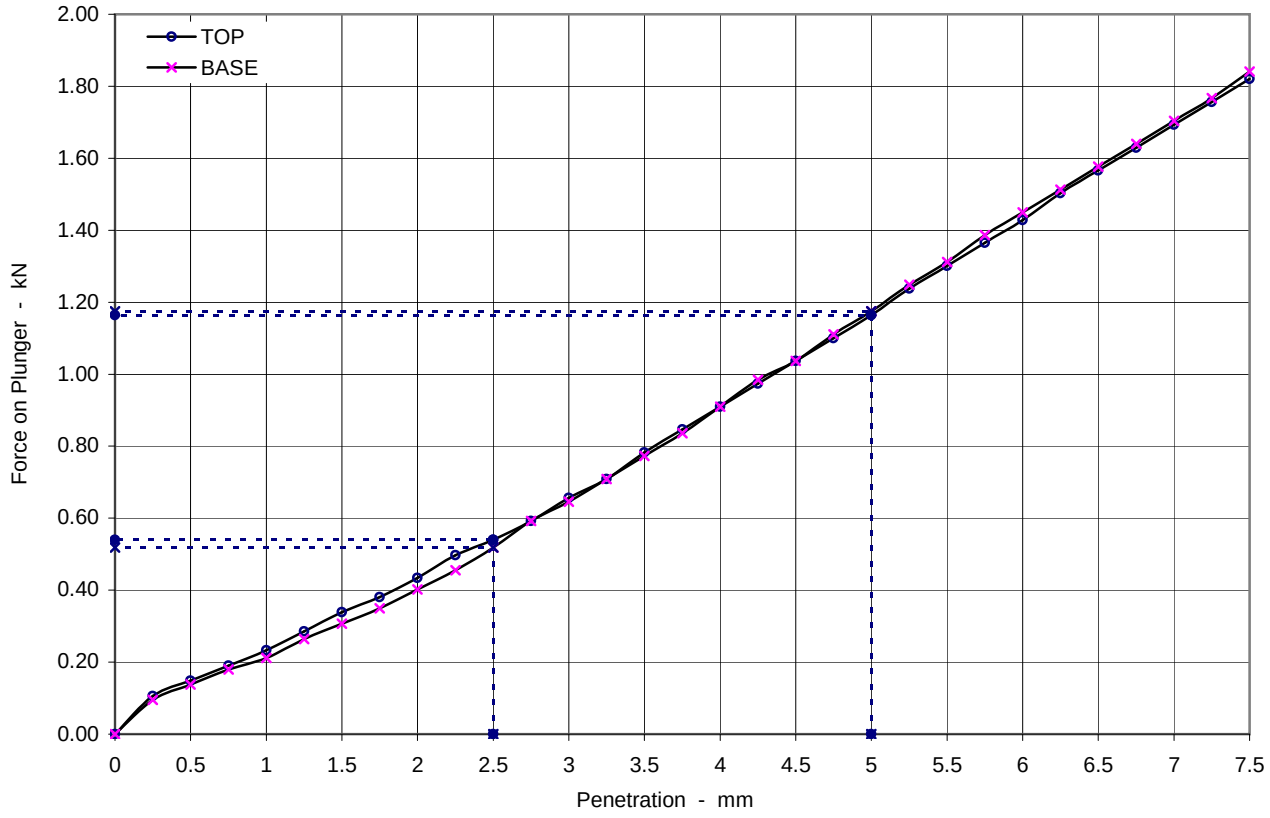
Sample Conditions		
Initial Moisture Content	%	11
Bulk Density	Mg/m³	2.25
Dry Density	Mg/m³	2.03
Moisture Content - TOP	%	11
Moisture Content - BASE	%	11

Penetration mm	CBR Values %	
	TOP	BASE
2.5	2.2	2.5
5.0	4.6	5.2

Accepted CBR %	**4.6**	**5.2**

California Bearing Ratio (BS1377:1990:Part 4 , section 7)

Project No	Y2101-12	Sample Details:	Hole No	S4		
Project Name	Costal Mechanisms Investigation, Ringaskiddy, County Cork		Depth (m BGL)	7.50		
			Samp No	2	Type	B
			ID	ESGY2101-12201201300000000180		
			Spec Ref			



Soil description	Brown slightly sandy gravelly CLAY.

Test Conditions		
Sample Retained on 20 mm sieve	%	16

Preparation	Method of Compaction		
	Recompacted - Rammer compaction with specified effort (2.5kg)		
	Soaked test		NO
	Soaking Period	days	N/A
	Amount of Swell	mm	N/A

Surcharge applied	kg	0
	kPa	0

Notes :

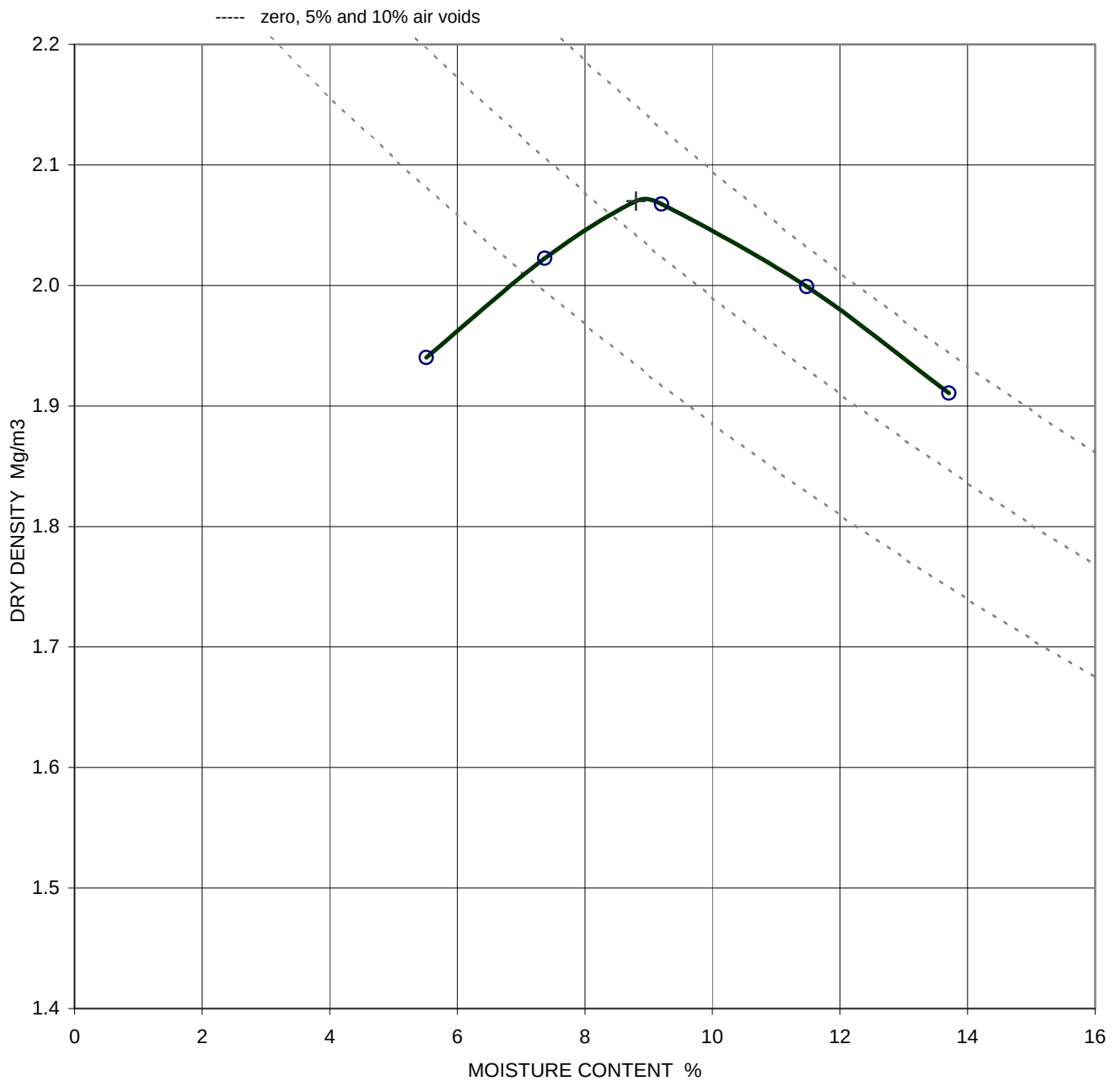
Sample Conditions		
Initial Moisture Content	%	11
Bulk Density	Mg/m³	2.23
Dry Density	Mg/m³	2.00
Moisture Content - TOP	%	11
Moisture Content - BASE	%	11

Penetration mm	CBR Values %	
	TOP	BASE
2.5	4.1	3.9
5.0	5.8	5.9

Accepted CBR %	**5.8**	**5.9**

DRY DENSITY / MOISTURE CONTENT RELATIONSHIP
BS1377 : PART 4 : 1990 : LIGHT COMPACTION, 2.5 kg rammer

Project No	Y2101-12	Sample Details:	Hole No	S1		
Project Name	Costal Mechanisms Investigation, Ringaskiddy, County Cork		Depth (m BGL)	10.00		
			Samp No	4	Type	B
			ID	ESGY2101-12201201300000000170		
			Spec Ref			



Soil description	Brown slightly sandy gravelly CLAY with 1 cobble.		
Test method	BS 1377:part 4:1990: clause 3.4, 2.5 kg rammer in a CBR mould		
Preparation	Original material was natural, composite specimens tested		
Material > 37.5mm	11	%	
Material < 37.5mm > 20mm	9	%	
Particle density, Mg/m^3	2.65	assumed	
Remarks			

Derived Parameters +

Maximum dry density, Mg/m3

2.07

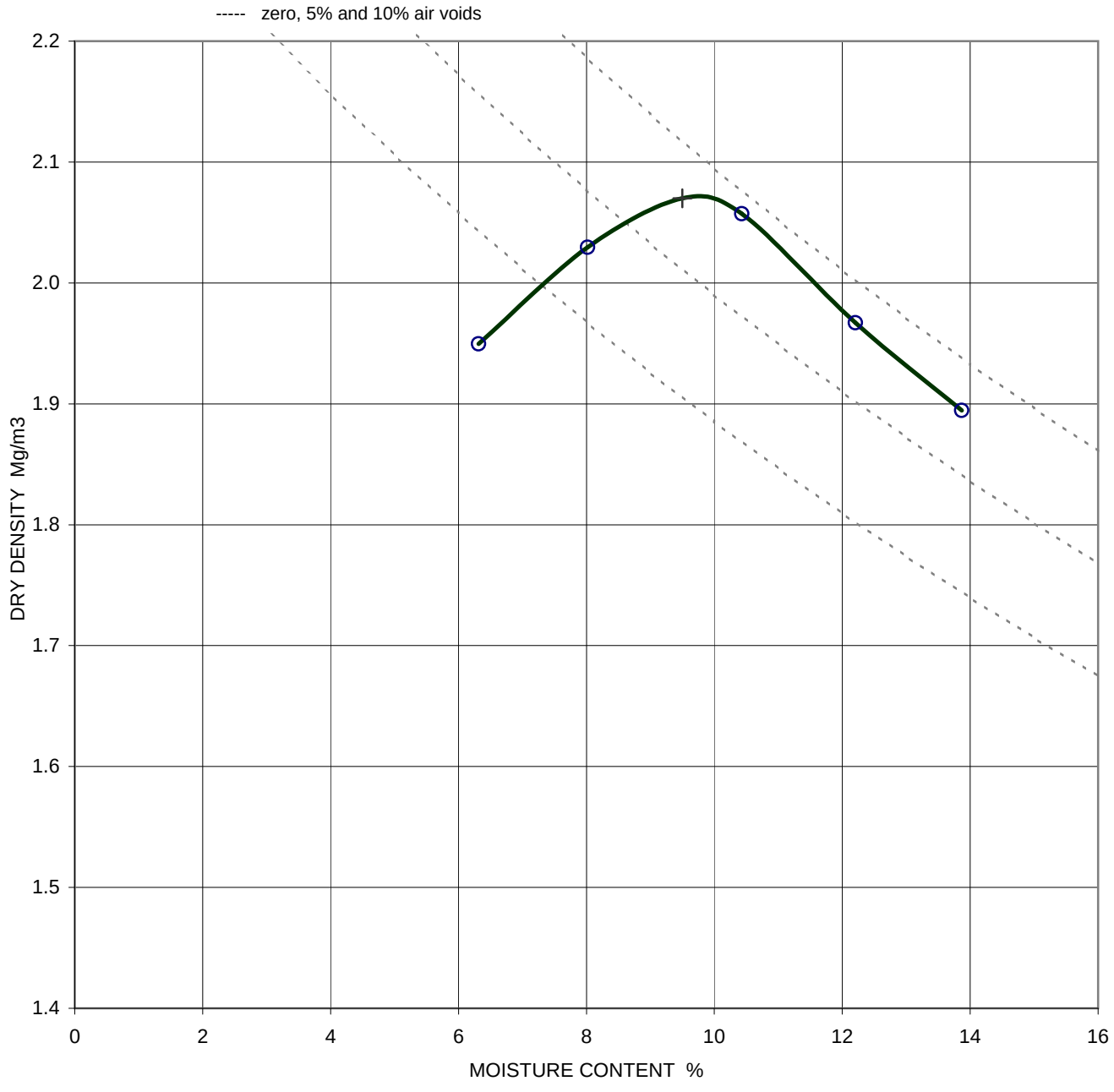
Optimum moisture content, %

8.8

QA Ref SLD 4, 3.3/4 Rev 66 Aug 11	ESG Environmental Scientifics Group	UKAS TESTING 1157	Printed:22/02/2012 16:17	**Figure** **COMPL 1**

DRY DENSITY / MOISTURE CONTENT RELATIONSHIP
BS1377 : PART 4 : 1990 : LIGHT COMPACTION, 2.5 kg rammer

Project No	Y2101-12	Sample Details:	Hole No	S2		
Project Name	Costal Mechanisms Investigation, Ringaskiddy, County Cork		Depth (m BGL)	10.00		
			Samp No	2	Type	B
			ID	ESGY2101-12201201300000000172		
			Spec Ref			



Soil description	Brown slightly sandy gravelly CLAY with rare silt pockets and 1 cobble.		
Test method	BS 1377:part 4:1990: clause 3.4, 2.5 kg rammer in a CBR mould		
Preparation	Original material was natural, composite specimens tested		
Material > 37.5mm	16	%	
Material < 37.5mm > 20mm	11	%	
Particle density, Mg/m^3	2.65	assumed	
Remarks			

Derived Parameters +

Maximum dry density, Mg/m3

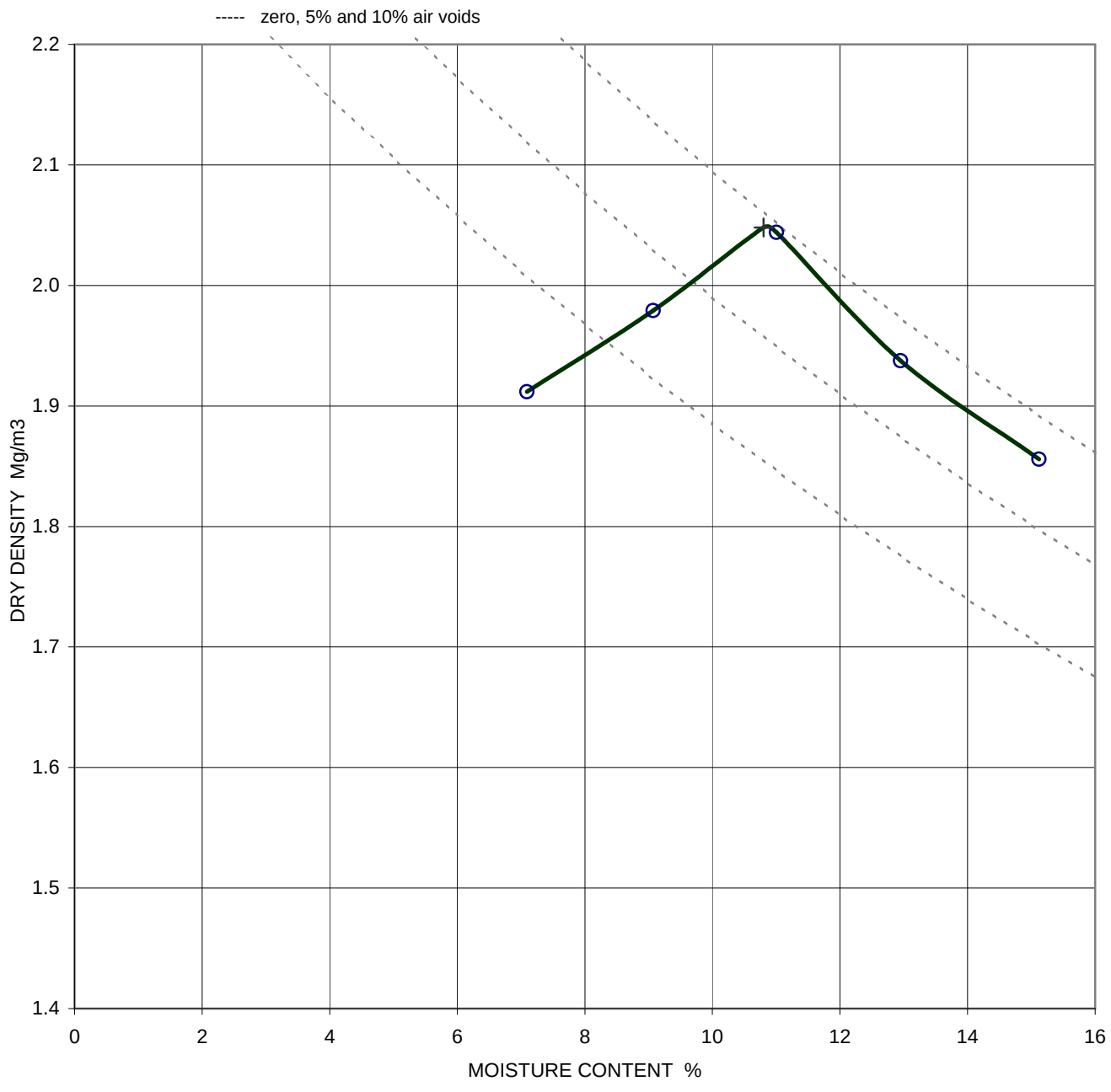
2.07

Optimum moisture content, %

9.5

DRY DENSITY / MOISTURE CONTENT RELATIONSHIP
BS1377 : PART 4 : 1990 : LIGHT COMPACTION, 2.5 kg rammer

Project No	Y2101-12	Sample Details:	Hole No	S3		
Project Name	Costal Mechanisms Investigation, Ringaskiddy, County Cork		Depth (m BGL)	8.70		
			Samp No	2	Type	B
			ID	ESGY2101-12201201300000000176		
			Spec Ref			



Soil description	Brownish grey slightly sandy gravelly CLAY.		
Test method	BS 1377:part 4:1990: clause 3.4, 2.5 kg rammer in a CBR mould		
Preparation	Original material was natural, composite specimens tested		
Material > 37.5mm	15	%	
Material < 37.5mm > 20mm	8	%	
Particle density, Mg/m^3	2.65	assumed	
Remarks			

Derived Parameters +

Maximum dry density, Mg/m3

2.05

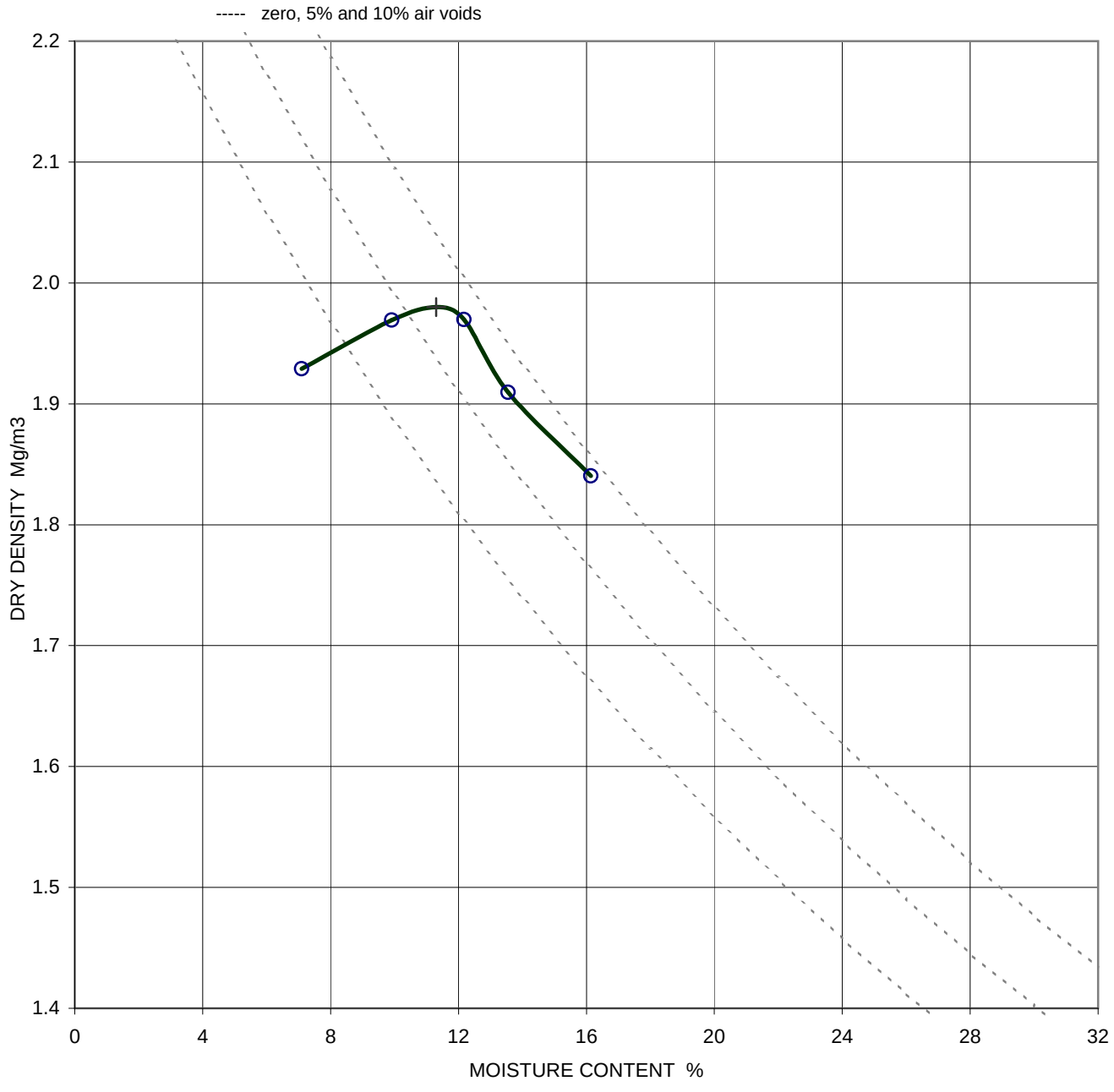
Optimum moisture content, %

11

QA Ref SLD 4, 3.3/4 Rev 66 Aug 11	ESG Environmental Scientifics Group	UKAS TESTING 1157	Printed:22/02/2012 16:17	**Figure** **COMPL 3**

DRY DENSITY / MOISTURE CONTENT RELATIONSHIP
BS1377 : PART 4 : 1990 : LIGHT COMPACTION, 2.5 kg rammer

Project No	Y2101-12	Sample Details:	Hole No	S4		
Project Name	Costal Mechanisms Investigation, Ringaskiddy, County Cork		Depth (m BGL)	7.50		
			Samp No	2	Type	B
			ID	ESGY2101-12201201300000000180		
			Spec Ref			



Soil description	Brown slightly sandy gravelly CLAY.		
Test method	BS 1377:part 4:1990: clause 3.4, 2.5 kg rammer in a CBR mould		
Preparation	Original material was natural, composite specimens tested		
Material > 37.5mm	12	%	
Material < 37.5mm > 20mm	4	%	
Particle density, Mg/m^3	2.65	assumed	
Remarks			

Derived Parameters +

Maximum dry density, Mg/m3

1.98

Optimum moisture content, %

11

Project Number:
Y2101-12
Project:
COSTAL MECHANISMS
INVESTIGATION, RINGASKIDDY,
COUNTY CORK

Sample : BH1 U22
Depth : 6.70-7.15m

Project Number:
Y2101-12
Project:
COSTAL MECHANISMS
INVESTIGATION, RINGASKIDDY,
COUNTY CORK

Sample : BH4 U14
Depth : 4.00-4.45m

UNDISTURBED SAMPLE - DESCRIPTION AND SPECIMEN LOG

BS1377 : Part 1 : 1990

Location	COSTAL MECHANISMS INVESTIGATION, RINGASKIDDY
Location No.	Y2101-12
BH / TP No.	BH4
Sample No.	U14
Depths from	4.00 to 4.45 m

Type of Sample (eg U100 / U38 / Piston Alloy / Steel / Plastic)

Assessed recovery % | Mean internal diameter mm

Initial Notes / Observations

Split & Describe + Photograph

Description and Comments	Sample	Test Taken	by	date	Further action
TOP					
(4.00 - 4.15m) EMPTY					
(4.15 - 4.22m) - wax riddled Firm light brown sl sandy sl gravelly CLAY with localised softening (evident at some gravel surfaces) Sand is FMC mainly fine, gravel is FMC subangular to subrounded (mixed lithologues). & rare Mgravel sized pockets of dl brown organic CLAY.	0.05 0.10 0.15 0.20 0.25 0.30 0.35 0.40 0.45 VOID Coarse Gravel Breaks VOID Medium Gravel sized pockets of organic CLAY.	MC S+D	CH/ CC	20/2/12	Stores Empty
BASE					

* This sheet is required for all Undisturbed samples up to 450mm long
* and no new sheet shall be started without checking for a previous sheet.
Note assessment of recovery (to 10%) and mean tube diameter (to 1mm).

UNDISTURBED SAMPLE - DESCRIPTION AND SPECIMEN LOG

BS1377 : Part 1 : 1990

Location	COSTAL MECHANISMS INVESTIGATION, RINGASKIDDY
Location No.	Y2101-12
BH / TP No.	BH1
Sample No.	U22
Depths from	6.70 to 7.15 m
Type of Sample	(eg U100 / U38 / Piston Alloy / Steel / Plastic)
Assessed recovery	%
Mean internal diameter	mm
Initial Notes / Observations	Split + Describe + Photograph

Description and Comments	Sample	Test Taken	by	date	Further action
TOP					
(6.70 - 6.89m) EMPTY					
(6.89 - 6.96m) - Disturbed Firm brown sandy gravelly CLAY. Sand is FM, gravel is FMC subangular to subrounded (mixed lithologies).	Coarse gravel; Voids / part filled voids; Intact lumps; Breaks	S+D	CC	20/2/12	Returned to stores
(6.96 - 7.06m) Brown slightly sandy slightly gravelly SILT. Sand is rare fine, gravel is FM subangular to subrounded (mixed lithologies).					
(7.06 - 7.15m) Brown gravelly FMC SAND. Gravel is mainly MC subangular to subrounded (mixed lithologies).					

0.05 0.10 0.15 0.20 0.25 0.30 0.35 0.40 0.45

BASE

* This sheet is required for all Undisturbed samples up to 450mm long
* and no new sheet shall be started without checking for a previous sheet.
Note assessment of recovery (to 10%) and mean tube diameter (to 1mm).

ENCLOSURE D

DRAWINGS

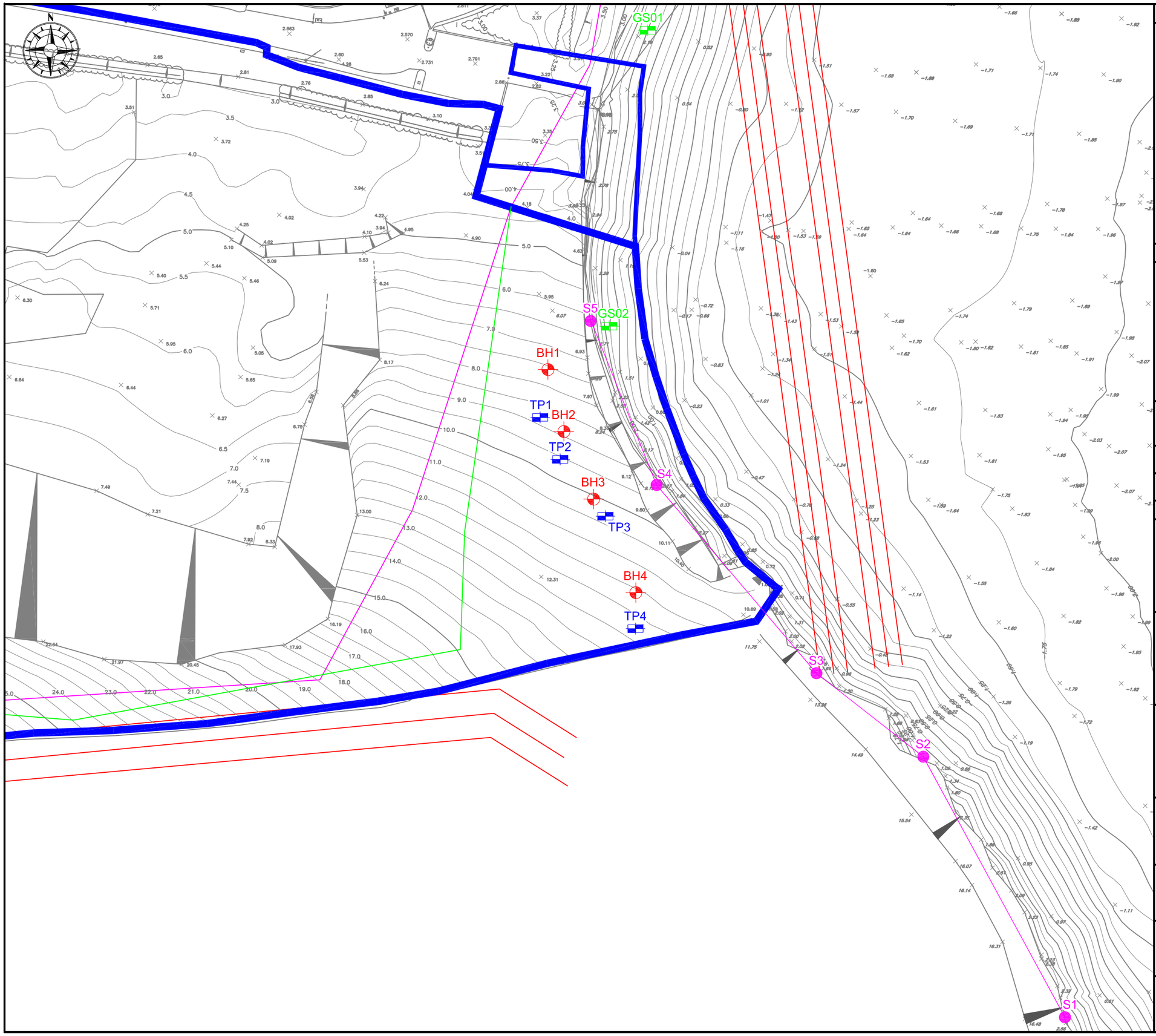
Site Location Plan	D1
Site Plan	D2

Site Location Plan

Soil Mechanics

The Site

Notes: Not to scale	**Project**	**Coastal Recession Mechanisms, Ringaskiddy, County Cork**	**Figure** **D1**
	Project No.	**Y2102-12**	
	Carried out for	**Indaver**	



GENERAL NOTES

1. Reproduced from INDAVER's Drawing No. G–001
2. Hole Locations to Irish Transverse Mecator Co–ordinate Reference System.
3. All levels are in metres and related to Ordnance Datum (Newlyn) unless indicated otherwise.

LEGEND TO SYMBOLS

- Borehole Location
- Trial Pit Location
- Observation Pit Location
- Observation Point Location

Scale: 1:1000

0 10m 20 30 40 50

x	x	x	x	x	x
Rev	Drawn	Date	Approv.	Date	Modification Details

AMENDMENTS

Title

SITE PLAN

Project

COSTAL RECESSION MECHANISMS INVESTIGATION, RINGASKIDDY, COUNTY CORK

Client

INDAVER

Soil Mechanics

Date	Drawn By	Approv. By
10/02/2012	BS	LK

Sheet Size	Scale	Project No
A3	1:1000	Y2102-12

Drawing No	Rev
D2	0

Our Ref: JMS/Rp/P19013 (*.pdf)

03rd July, 2019

Messrs. Indaver Ireland Ltd.
4th Floor,
Block 1,
Old Dunleary Road,
Dun Laoghaire,
Co. Dublin.

Re: Indaver Ringaskiddy, Site Investigation – Factual report.

Introduction

In January 2019, Priority Geotechnical were requested by Indaver Ireland Ltd., to undertake a ground investigation at Ringaskiddy, Co. Cork.

Objectives

The purpose of this ground investigation is to provide suitable geotechnical data for the design of the proposed development.

Scope

The scope of the ground investigation, which was specified by Indaver Ireland Ltd., comprised of the following:

- Cable percussion boreholes;
- Rotary boreholes;
- Trial pits;
- *In situ* Plate load tests;
- Standpipe installations;
- All associated sampling;
- Laboratory testing and
- All associated reporting.

This report presents a summary of the factual records, data obtained with regard to the ground investigation at the proposed Invader facility at Ringaskiddy, Co. Cork. This report should be read in conjunction with the accompanying exploratory logs and laboratory test data.

Site Works

This investigation was carried out in accordance with the contract specification: Specification and Related Documents for Ground Investigation in Ireland (Engineers Ireland, October 2006), Eurocode 7- Geotechnical Design Part 2, ground investigation and testing (BS EN 1997-2: 2007) and the relevant British Standards (BS 5930 (1999) Code of Practice for Site Investigation +A2:2010 and BS 1377, Method of Tests for Soil for Civil Engineering Purposes, *in situ* Tests.

The investigation fieldworks were undertaken between the 21st January and the 02nd May 2019 under the supervision of PGL, Engineering Geologist(s). Details of the plant and equipment used are detailed on the relevant exploratory records, accompanying this factual report.

Cable Percussion Boreholes

Ten (10) cable percussion boreholes were advanced to depths 3.1m below existing ground level (bgl) and 10.4m bgl using PGL's Dando 2000 rig and 200mm diameter casing. The boreholes terminated after 1 hour of chiselling. The exploratory records are attached, herein.

Location	Final Depth (m bgl)	Date Start (dd/mm/yyyy)
BH01	5.4	29/04/2019
BH03	3.3	23/04/2019
BH04	4.8	30/04/2019
BH05	5.5	01/05/2019
BH06	4.2	30/04/2019
BH07	6.4	23/04/2019
BH08	3.1	02/05/2019
BH09	7.6	26/04/2019
BH10	8.7	25/04/2019
BH11	10.4	24/04/2019

Location	Chiseling Depth Top (m bgl)	Chiseling Depth Base (m bgl)	Duration (hh:mm)
BH01	5.2	5.4	01:00
BH03	3.2	3.3	01:00
BH04	4.7	4.8	01:00
BH05	1.55	1.7	01:00
	5.3	5.5	01:00
BH06	4.1	4.2	01:00
BH07	6.2	6.4	01:00
BH08	1.6	1.75	00:30
	2.8	2.9	00:30
	3.0	3.1	01:00
BH09	3.3	4.0	01:00
	7.5	7.5	01:00
BH10	8.6	8.7	01:00
BH11	7.4	7.6	01:00
	10.2	10.4	01:00

Rotary Boreholes

Eleven (11) rotary boreholes were advanced to depths 7.2m bgl and 15.2m bgl using PGL's Deltabase 520 rotary rig and 131mm diameter Symmetrex casing system. The exploratory records are attached, herein.

Location	Final Depth (m bgl)	Date Start (dd/mm/yyyy)
RC01	9.1	05/04/2019
RC02	7.2	18/04/2019
RC03	14.5	16/04/2019
RC04	10.7	05/04/2019
RC05	13.0	10/04/2019
RC06	15.2	09/04/2019
RC07	14.0	15/04/2019
RC08	11.5	11/04/2019
RC09	13.4	28/03/2019
RC10	15.1	11/04/2019
RC11	14.0	12/04/2019

Trial Pits

Seventeen (17) trial pit excavations were dug to depths 1.2m bgl to 5.0m bgl using a 13t tracked excavator. The exploratory records are attached, herein.

Location	Final Depth (m bgl)	Date Start (dd/mmyyyy)
TP01	4.5	20/02/2019
TP02	5.0	20/02/2019
TP03	3.9	20/02/2019
TP04	1.2	21/02/2019
TP05	2.6	21/01/2019
TP06	4.8	20/02/2019
TP07	4.6	21/02/2019
TP08	4.5	22/02/2019
TP09	4.8	20/02/2019
TP10	3.4	22/02/2019
TP11	4.6	20/02/2019
TP12	4.6	21/02/2019
TP13	4.5	22/02/2019
TP14	4.5	22/02/2019
TP15	4.5	22/02/2019
TP16	1.7	21/01/2019
TPBH02	1.3	19/04/2019

Sampling

A total of one hundred and ten (110) bulk disturbed samples (B) were taken from exploratory locations in general accordance with the preparation for and methods of taking samples, together with their size, preservation and handling was in accordance with British Standard BS 5930: 1981 - Code of Practice for Site investigation, the contract documents and the Association of Geotechnical and Geoenvironmental Specialists (AGS) guide to environmental sampling, September 2010.

In-Situ Testing

Standard Penetration Test

A total of one hundred and four (104) Standard Penetration Tests, N values, were carried out in the boreholes using the 60^{o} solid cone in place of the standard split barrel sampler in accordance with Geotechnical Investigation and Testing, Part 3 Standard penetration test, BS EN ISO 22476-3:2005+A1:2011. Standard penetration tests were carried out in the cable percussion boreholes with values ranging from Nspt= 9 to Nspt= >50.

Plate Load Tests

Seven (7) number plate loading tests were undertaken between 0.6m bgl and 1.2m bgl using a 450mm diameter plate and 13t tracked excavator for reaction, in accordance with EC7 Geotechnical design Pt. 2, ground investigation and testing, EN 1997-2:2001 (E), Cl. 4.11, Plate loading test (Annex K).

SUMMARY OF IN-SIT TESTS

Test	Quantity	Comment
Standard penetration test	104Nr. 50Nr. Cable percussion 54Nr. Rotary	Nspt= 9 to Nspt=55
Plate load tests	07Nr.	PLT02, PLT07, PLT09, PLT11, PLT12, PLT14 and PLT15

Survey and Drawings

The ‘as built’ exploration locations were subsequently surveyed using Trimble 5700/5800 GPS equipment to the Ordinance Survey Irish Transverse Mercator system of co-ordinates (ITM) and elevations to Malin Head datum. The location layout (P19013_SI_A & P19013_SI_01) is attached.

Location	Easting	Northing	Ground Level (mOD)	Final Depth (m bgl)	Date Start (dd/mm/yyyy)
BH01	578972.94	564258.62	7.46	5.40	29/04/2019
BH03	578990.86	564186.14	26.16	3.30	23/04/2019
BH04	579029.25	564264.08	6.36	4.80	30/04/2019
BH05	579076.02	564309.04	4.49	5.50	01/05/2019
BH06	579074.00	564274.00	6.35	4.20	30/04/2019
BH07	579073.04	564188.51	18.84	6.40	23/04/2019
BH08	579127.64	564324.71	3.12	3.10	02/05/2019
BH09	579146.11	564288.69	5.80	7.60	26/04/2019
BH10	579134.92	564242.15	10.72	8.70	25/04/2019
BH11	579123.21	564199.50	15.29	10.40	24/04/2019
RC01	578972.94	564258.62	7.46	9.10	05/04/2019
RC02	579030.8	564245.39	7.43	7.20	18/04/2019
RC03	578990.86	564186.14	26.16	14.50	16/04/2019
RC04	579029.25	564264.08	6.36	10.70	05/04/2019
RC05	579076.02	564309.04	4.49	13.00	10/04/2019
RC06	579074.00	564274.00	6.35	15.20	09/04/2019
RC07	579073.04	564188.51	18.84	14.00	15/04/2019
RC08	579127.64	564324.71	3.12	11.50	11/04/2019
RC09	579146.11	564288.69	5.80	13.40	28/03/2019
RC10	579134.92	564242.15	10.72	15.10	11/04/2019
RC11	579123.21	564199.50	15.29	14.00	12/04/2019
TP01	578950.62	564355.43	2.39	4.50	20/02/2019
TP02	578944.86	564328.75	5.13	5.00	20/02/2019
TP03	578941.56	564289.82	7.20	3.90	20/02/2019
TP04	578968.87	564238.03	11.20	1.20	21/02/2019
TP05	578973.27	564195.71	25.71	2.60	21/01/2019
TP06	579015.78	564278.28	6.40	4.80	20/02/2019
TP07	579034.72	564234.28	8.49	4.60	21/02/2019
TP08	579029.86	564202.52	19.46	4.50	22/02/2019
TP09	579042.58	564318.40	4.03	4.80	20/02/2019
TP10	579074.06	564201.54	14.01	3.40	22/02/2019
TP11	579082.03	564325.98	3.73	4.60	20/02/2019
TP12	579104.49	564273.04	4.75	4.60	21/02/2019
TP13	579122.30	564212.09	13.01	4.50	22/02/2019

Location	Easting	Northing	Ground Level (mOD)	Final Depth (m bgl)	Date Start (dd/mm/yyyy)
TP14	579156.09	564276.81	6.60	4.50	22/02/2019
TP15	579170.76	564224.53	11.10	4.50	22/02/2019
TP16	579154.21	564216.52	12.55	1.70	21/01/2019
TPBH02	578983.46	564223.14	15.14	1.30	19/04/2019

Laboratory Testing

Laboratory testing was scheduled by PGL on behalf of Indaver Ireland Ltd. and carried out by PGL. Specialist chemical testing was undertaken by Chemtest Ltd. (UK) on behalf of PGL in accordance with BS1377 (1990), Methods of test for soils for civil engineering purposes and the ISRM suggested methods for rock characterisation, testing and monitoring.

Please note that all samples shall be retained for a period no longer than 28 days from the date of this report. Thereafter all remaining samples shall be appropriately disposed of unless a written instruction to the contrary is received by PGL prior to the date of this reporting and within the 28 day period outlined above. Laboratory testing will result in a reduction of sample quantity and in some cased the use of the full sample mass. Samples already tested may not be suitable or available for further testing.

The laboratory data is attached and summarised as follows;

SUMMARY OF LABORATORY TESTING

Type	Nr.	Remarks
Natural Moisture Content	39	10% to 22%
Atterberg Limits	12	Liquid Limit, LL 23% to 33% Plastic Limit, PL 15% to 24% Plasticity Index, PI 6 to 14
Particle Size Distribution	27	No hydrometer analysis on fine soils
pH	13	6.9 to 8.1
Sulphate (water soluble as SO_4)	13	<0.010g/l to 0.023g/l
Sulphate (acid soluble)	13	<0.010% to 0.013%
California bearing ratio (CBR) Relationship	04	TP01 0.5m, TP07 0.5m, TP07 3.0m & TP14 2.0m.

Dry density/ Moisture content relationship	04	TP01 0.5m, TP07 0.5m, TP07 3.0m & TP14 2.0m.
Moisture Condition Value (MCV) relationship	03	TP07 0.5m, TP07 3.0m, TP14 2.0m.
Small direct Shear Box	04	TP10 0.5m, TP12 1.0m, TP12 2.5m & TP13 1.5m.
Point loads IS(50)	27	0.4MPa to 6.1MPa

Published Geology

The geology of the study area (GSI 1:100,000 mapping Sheet 25) is characterised by three geological formations namely; the Ballysteen Formation (BA, dark muddy Limestone and Shale), Waulsortion Limestones (WA, Massive unbedded Limestone) and the Cuskinny Member (KNcu, flaser bedded Mudstone and Sandstone). The units are offset by a series of east west trending structural faults and north south trending structural faults.

Teagasc subsoil mapping indicates that the area is underlain by Glacial till deposits derived from Devonian Sandstones and Marine beach sediments. Outcropping bedrock was noted north and south of the site. The national groundwater vulnerability mapping indicated the area is of extreme vulnerability with rock at or near the surface.

Historical geotechnical report ID:3033 titled “Irish Steel” was undertaken within the study area. Topsoil where encountered was 150mm to 300mm in thickness. This was underlain by mixed glacial deposits of Clay and Gravel. Bedrock was variable being 0.4m to 11.0m where encountered.

Ground conditions

The full details of the ground conditions encountered are provided for on the exploratory records accompanying this report. The records provide descriptions, in accordance with BS 5930 (1999) +A2: 2010 and Eurocode 7, Geotechnical Investigation and Testing, Identification and classification of soils, Part 1, Identification and description (EN ISO 14688-1: 2002)– Identification and Classification of Soil, Part 2: Classification Principles (EN ISO 14688-2:2004) and Identification and Classification of Rock, Part 1: Identification & Description (EN ISO 14689-1:2004) of the materials encountered, *in situ* testing and details of the samples taken, together with any observations made during the site investigation.

Groundwater conditions

Groundwater is recorded when encountered during boring over a period of 20 minutes, noting any changes that may occur.

Groundwater conditions observed in the excavations are those appertaining to the period of the investigation. Groundwater levels may be subject to diurnal, seasonal and climatic variations and can also be affected by drainage conditions or tidal variations etc.

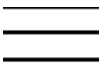
Groundwater was encountered between 3.0m bgl and 10.0m bgl during the period of works. Four (4) 50mm diameter HDPE standpipes were installed as per the scope of works. The groundwater regime should be assessed from monitoring standpipes where available.

SUMMARY OF STANDPIPE INSTALLATIONS

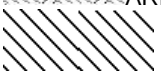
Location	Depth Top (m bgl)	Depth Base (m bgl)	Diameter (mm)	Pipe Type
RC03	0.0	2.8	50	PLAIN
RC03	2.8	14.0	50	SLOTTED
RC04	0.0	5.0	50	PLAIN
RC04	5.0	10.7	50	SLOTTED
RC05	0.0	6.0	50	PLAIN
RC05	6.0	13.0	50	SLOTTED
RC08	0.0	6.0	50	PLAIN
RC08	6.0	11.5	50	SLOTTED

Excavations were backfilled with gravel, bentonite and arisings.


GRAVEL Backfill to installation/ borehole

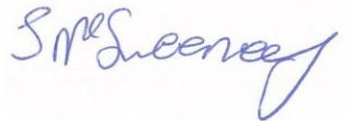

uPVC slotted pipe


ARISINGS Backfill


BENTONITE Backfill to installation/ borehole

Should you have any queries in relation to the data presented, please do not hesitate to contact our office.

Yours sincerely,
For **Priority Geotechnical,**



James McSweeney BSc
Engineering Geologist

No responsibility can be held by PGL for ground conditions between exploratory locations. The exploratory logs provide for ground profiles and configuration of strata relevant to the investigation depths achieved during the fieldworks. Caution shall be taken when extrapolating between such exploratory locations. No liability is accepted for ground conditions extraneous to the exploratory locations. Where additional information becomes available any assessment may be subject to review and change.

This report has been prepared for the employer Ireland and their Representative(s) as outline, herein. The information should not be used without their prior written permission. PGL accepts no responsibility or liability for this document being used other than for the purposes for which it was intended.

KEY TO SYMBOLS ON EXPLORATORY HOLE RECORDS

All linear dimensions are in metres or millimetres

DESCRIPTIONS

**	Drillers Description
Friable	Easily crumbled

SAMPLES

U( )	Undisturbed 102mm diameter sample, ( ) denotes number of blows to drive sampler
U( )F, U( )P	F- not recovered, P-partially recovered
U38	Undisturbed 38mm diameter sample
P(F), (P)	Piston sample - disturbed
B	Bulk sample - disturbed
D	Jar Sample - disturbed
W	Water Sample
CBR	California Bearing Ratio mould sample
ES	Chemical Sample for Contamination Analysis
SPTLS	Standard Penetration Test S lump sample from split sampler

CORE RECOVERY AND ROCK QUALITY

TCR	Total Core Recovery (% of Core Run)
SCR	Solid Core Recovery (length of core having at least one full diameter as % of core run)
RQD	Rock Quality Designation (length of solid core greater than 100mm as % of core run)

Where there is insufficient space for the TCR, SCR and RQD, the results may be found in the remarks column

If	Fracture Spacing in mm (Minimum/Average/Maximum) NI - non intact, NR - no recovery
AZCL	Assumed Zone of Core Loss
NI	Non intact

GROUNDWATER

▽	Groundwater strike
▼	Groundwater level after standing period
Date/Water	Date of shift (day/month)/Depth to water at end of previous shift shown above the date and depth to water at beginning of shift given below the date

INSITU TESTING

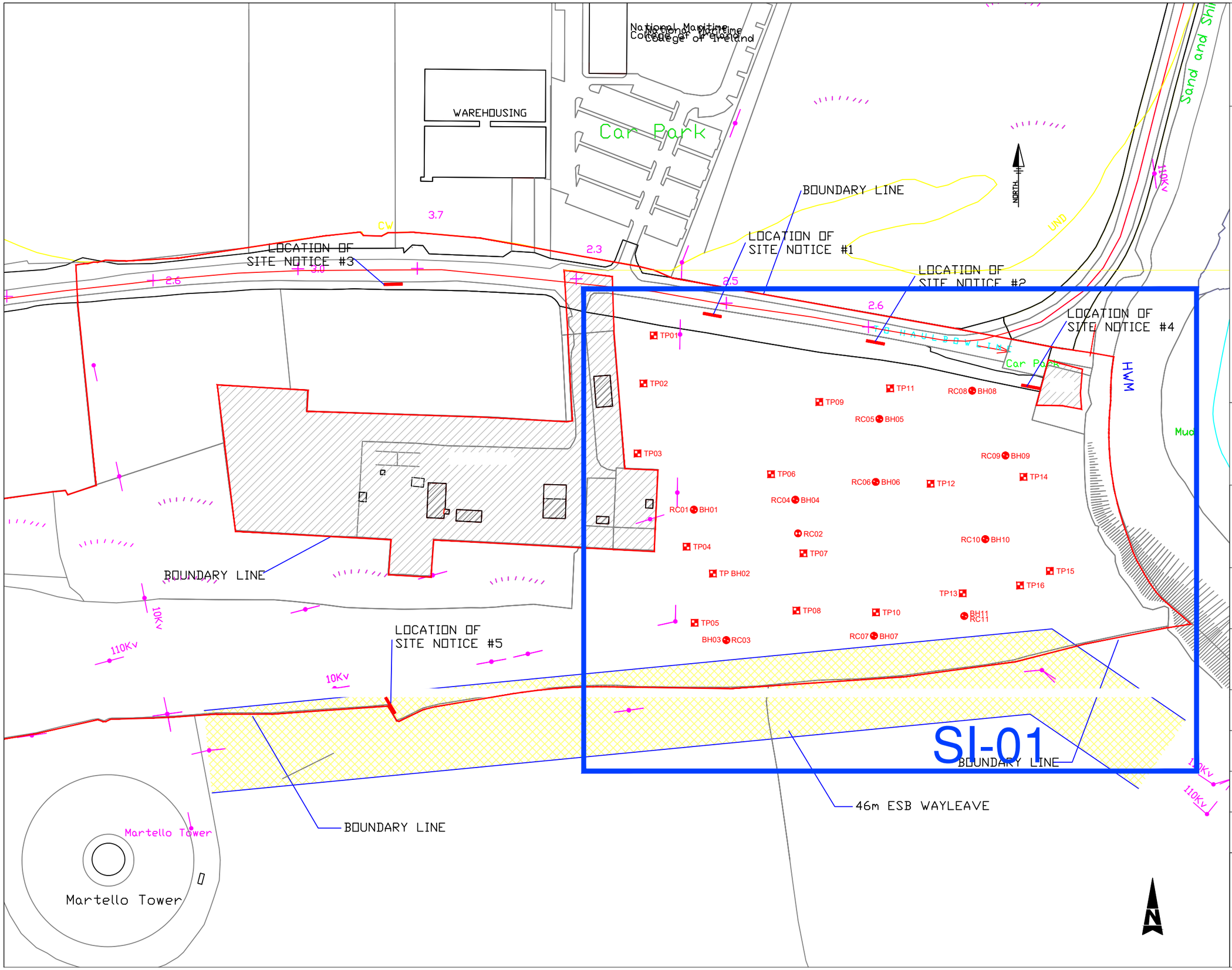
S	Standard Penetration Test - split barrel sampler
C	Standard Penetration Test - solid 60^o cone
SW	Self Weight Penetration
Ivp, HVp (R)	In Situ Vane Test, Hand Vane Test (R) demonstrates remoulded strength
K(F), (C), (R), (P)	Permeability Test
HP	Hand Penetrometer Test

MEASURED PROPERTIES

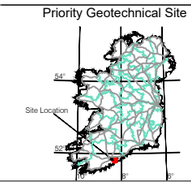
N	Standard Penetration Test - blows required to drive 300mm after seating drive
x/y	Denotes x blows for y mm within the Standard Penetration Test
x*/y	Denotes x blows for y mm within the seating drive
c_u	Undrained Shear Strength (kN/m^2)
CBR	California Bearing Ratio

ROTARY DRILLING SIZES

Index Letter	Nominal Diameter (mm)	
	Borehole	Core
N	75	54
H	99	76
P	120	92
S	146	113



Priority Geotechnical Site



JOB NAME:

Indaver Ringaskiddy Co. Cork

Sheet Title:

EXPLORATORY LOCATION LAYOUT

JOB NUMBER:

P19013

DRAWING NUMBER:

P19013-SI-A

DRAWN BY:

G.C.

DATE:

04/06/2019

SCALE:

1:2000 ON A3

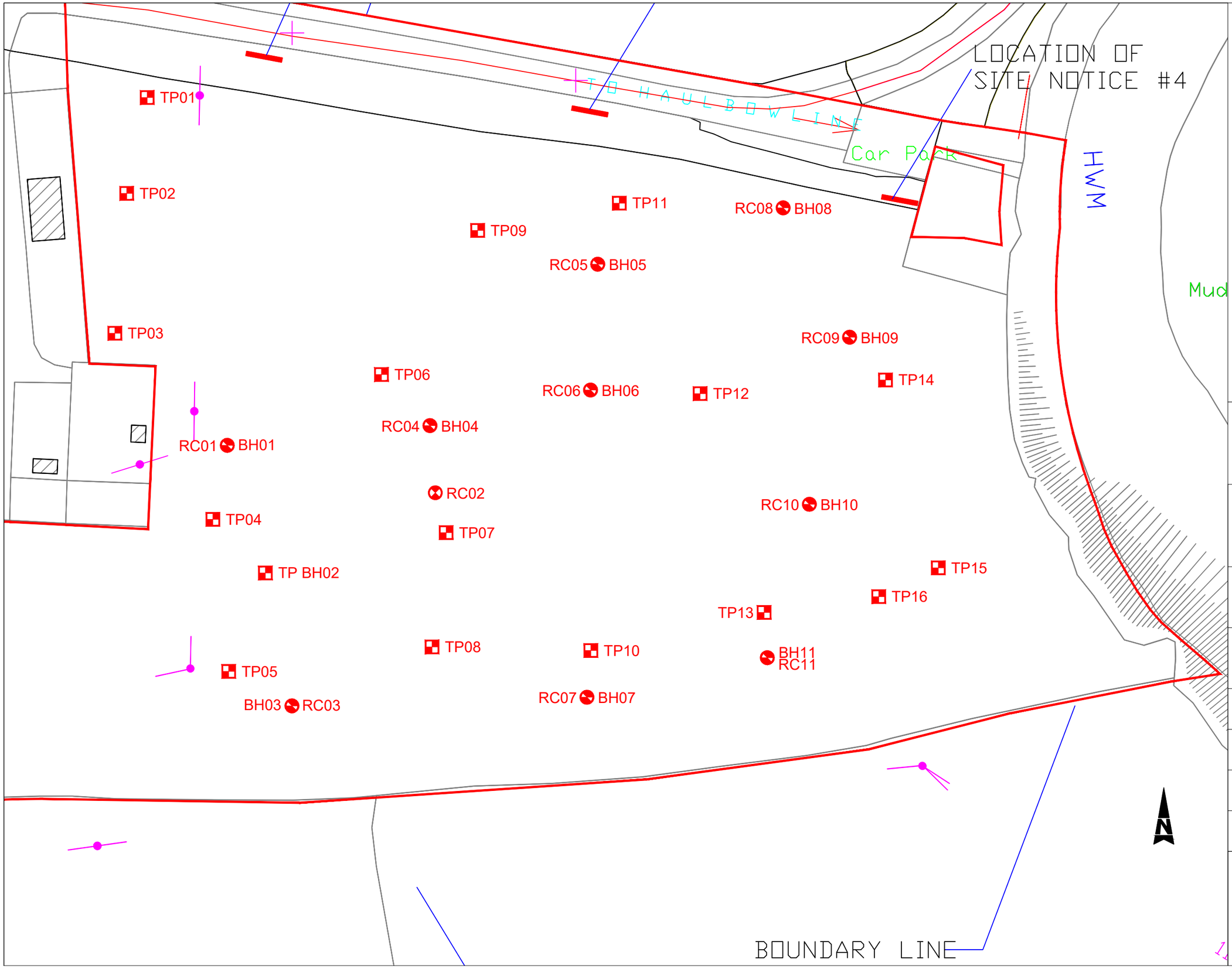
APPROVED:

GH

REVISION:

D01

pgl priority geotechnical



KEY:

- TP00 Denotes Trial Pit location
- BH00 Denotes Borehole location
- DP00 Denotes Dynamic Probe location

JOB NAME:

Indaver Ringaskiddy Co. Cork

Sheet Title:

EXPLORATORY LOCATION PLAN

JOB NUMBER:

P19013

DRAWING NUMBER:

P19013-SI-01

DRAWN BY:

G.C.

DATE:

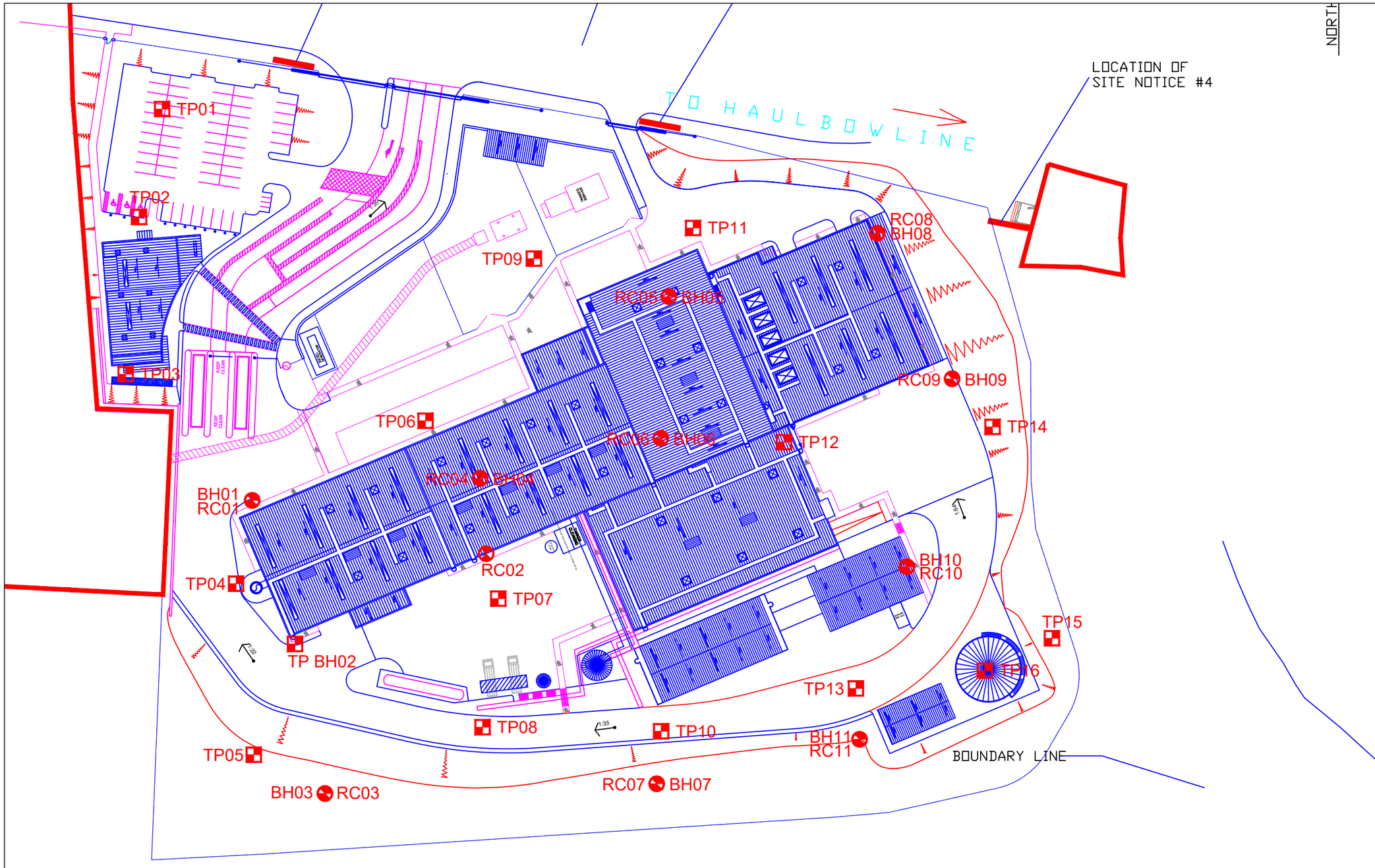
04/06/2019

SCALE:	APPROVED:
1:1000 ON A3	GH

REVISION:

D01

pgl priority geotechnical



KEY:

- TP00 Denotes Trial Pit location
- BH00 Denotes Borehole location
- DP00 Denotes Dynamic Probe location

JOB NAME:

Indaver Ringaskiddy Co. Cork

Sheet Title:

EXPLORATORY LOCATION PLAN

JOB NUMBER:

P19013

DRAWING NUMBER:

P19013-SI-02

DRAWN BY:

G.C.

DATE:

12/06/2019

SCALE:	APPROVED:
1:1000 ON A3	GH

REVISION:

D01

pgl priority geotechnical

pgl priority geotechnical	**Priority Geotechnical Ltd.** **Tel: 021 4631600** **Fax: 021 4638690** **www.prioritygeotechnical.ie**	**Drilled By:** PC **Logged By:** PH/SR	Borehole No. **BH01** Sheet 1 of 1

Project Name:	Indaver	**Project No.** P19013	**Co-ords:**	578973E - 564259N	**Hole Type** CP
Location:	Ringaskiddy, Co. Cork		**Level:**	7.46m OD	**Scale** 1:50
Client:	Indaver Ireland		**Date:**	29/04/2019 - 29/04/2019	

Well Backfill	Water Strike (m bgl)	Sample and In Situ Testing: Depth (m bgl)	Type	Results	Depth (m bgl)	Level (mOD)	Legend	Stratum Description
		0.00 - 1.00	B					Brown, slightly gravelly sandy CLAY. Sand is fine to coarse. Gravel is fine to coarse and sub-angular to sub-rounded. *0.00m - 1.00m: Driller noted cobble content.*
		1.00 - 2.00 1.00	B SPT (C)	N=13 (2,3/3,3,3,4)	1.00	6.46		Firm, brown, slightly sandy gravelly SILT with low cobble content. Sand is fine to coarse. Gravel is fine to coarse and angular to sub-rounded. Cobbles are 63mm to 90mm dia and angular.
		2.00 - 3.00 2.00	B SPT (C)	N=22 (4,4/5,5,6,6)	2.00	5.46		Stiff, brown, slightly gravelly sandy CLAY. Sand is fine to coarse. Gravel is fine to coarse and sub-angular to sub-rounded.
		3.00 - 4.00 3.00	B SPT()	N=30 (6,5/7,7,8,8)				
		4.00 - 5.00 4.00	B SPT (C)	N=33 (7,8/8,7,9,9)				
		5.00	SPT (C)	50 (7,10/50 for 5mm)				
					5.40	2.06		End of Borehole at 5.400m

Groundwater:

Struck (m bgl)	Rose to	After (mins)	Sealed	Comment
				None encountered.

Hole Information:

Depth (m bgl)	Hole Dia (mm)	Casing Dia (mm)
5.40	200	200

Equipment: Dando 2000.

Chiselling Details:

Top (m)	Base (m)	Duration (hh:mm)	Tool
5.20	5.40	01:00	Chisel.

Remarks:

Borehole terminated at 5.40m bgl due to obstruction.

Shift Data:

GW (m bgl)	Shift	Depth (m bgl)	Remarks
	29/04/2019 08:00	0.00	Start of shift.
Dry	29/04/2019 18:00	5.40	End of borehole.

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Project Name:	Indaver	**Project No.** P19013	**Co-ords:**	578973E - 564259N	**Hole Type** Rotary cored
Location:	Ringaskiddy, Co. Cork		**Level:**	7.46m OD	**Scale** 1:50
Client:	Indaver Ireland		**Dates:**	05/04/2019	05/04/2019

Well	Water Strike (m)	Depth (m)	Type /Fs (min, max, avg)	Coring (%) TCR	SCR	RQD	Depth (m) / Fl (/m)	Level (mOD)	Legend	Stratum Description
		N=27 (6,7/6,6,8,7) (C)								Open hole boring. Driller described: Stiff, Clay with boulder content.
		N=46 (10,9/9,12,13,12) (C)								
		N=39 (11,14/10,10,10,9) (C)					4.50	2.96		
		~~45 (18,21/45 for 75mm)~~ (C)					5.80	1.66		Open hole boring. Driller described: Stiff, Clay with boulder content. Possible weathered rock.
		5.80 - 6.80	5mm 13mm 10mm	100	100	0				Lithology: Weak to strong, light grey, MUDSTONE. Weathering: Heavily weathered; most fractures have a light to moderate clay smearing. Most fracture surfaces have a brown/orange/black staining. Fractures: Heavily fractured and dominated by sub-vertical to vertical fractures. Prevalent set dips 85 to 90 degrees, with very close spacing and undulate rough/sub-planar rough to undulate smooth/sub-planar smooth fracture surface texture. 2nd set dips 0 to 10 degrees, with close to wide spacing and undulate rough to stepped rough fracture surface texture. 3rd set dips 45 degrees, with wide spacing and undulate rough to sub-planar rough fracture surface texture.
		6.80 - 8.30	5mm 30mm 10mm	100	73	0				
	▼	8.30 - 9.10		84	13	0	8.30	-0.84		

Groundwater:				
Struck (m bgl)	**Rose to**	**After (min)**	**Sealed**	**Comment**
8.60				See shift data.

Hole Information:		
Hole Depth (m bgl)	**Hole Dia (mm)**	**Casing Dia (mm)**
9.10	76	131

Equipment:	Deltabase 520
Method:	Compressed air mist.

Remarks:

Borehole terminated at 9.10m bgl.

Shift Data:

Groundwater (m bgl)	Shift	Hole Depth (m bgl)	Remarks
	05/04/2019 08:00	0.00	Start of shift.
8.60	05/04/2019 18:00	9.10	End of borehole.

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Project Name:	Indaver	**Project No.** P19013	**Co-ords:**	578973E - 564259N	**Hole Type** Rotary cored
Location:	Ringaskiddy, Co. Cork		**Level:**	7.46m OD	**Scale** 1:50
Client:	Indaver Ireland		**Dates:**	05/04/2019	05/04/2019

Well	Water Strike (m)	Depth (m)	Type /Fs (min, max, avg)	Coring (%) TCR	SCR	RQD	Depth (m) / Fl (/m)	Level (mOD)	Legend	Stratum Description
							9.10	-1.64		Weathered Bedrock. Rusty brown, gravelly SAND with some heavily weathered MUDSTONE rock (as a 100mm dia cobble). Sand is fine to coarse. Gravel is fine to coarse and angular. End of Borehole at 9.100m

10 11 12 13 14 15 16 17 18

Groundwater:

Struck (m bgl)	Rose to	After (min)	Sealed	Comment
8.60				See shift data.

Hole Information:

Hole Depth (m bgl)	Hole Dia (mm)	Casing Dia (mm)
9.10	76	131

Equipment:	Deltabase 520
Method:	Compressed air mist.

Remarks:

Borehole terminated at 9.10m bgl.

Shift Data:

Groundwater (m bgl)	Shift	Hole Depth (m bgl)	Remarks
	05/04/2019 08:00	0.00	Start of shift.
8.60	05/04/2019 18:00	9.10	End of borehole.

Photographic Record

Number:	**RC01**	**Project**	Indaver Ringaskiddy Co. Cork.	
		Project No	P19013	
		Engineer	Indaver Ireland Ltd	

Priority Geotechnical Ltd. Tel: 021 4631600 Fax: 021 4638690 www.prioritygeotechnical.ie	Drilled By: KM/LM Logged By: SR	Borehole No. **RC02** Sheet 1 of 1

Project Name:	Indaver	**Project No.** P19013	**Co-ords:** 579031E - 564245N	**Hole Type** Rotary cored
Location:	Ringaskiddy, Co. Cork		**Level:** 7.43m OD	**Scale** 1:50
Client:	Indaver Ireland		**Dates:** 18/04/2019	18/04/2019

Well	Water Strike (m)	Depth (m)	Type /Fs (min, max, avg)	Coring (%) TCR	SCR	RQD	Depth (m) / FI (/m)	Level (mOD)	Legend	Stratum Description
							1.50	5.93		Open hole boring. Driller described: CLAY.
		N=33 (7,8/8,9,8,8) (C)								Open hole boring. Driller described: Stiff, gravelly CLAY.
	▼	N=44 (10,14/10,11,11,12) (C)					3.00	4.43		Open hole boring. Driller described: Stiff, gravelly CLAY. Assumed broken/ weathered rock. *3.00m: Artesian water strike.*
		~~0 (44 for 75mm/0~~ for 0mm) (C)					4.20	3.23		
		4.20 - 5.70	10mm 30mm 20mm	100	43	10	8/m			Lithology: Weak to strong, grey, MUDSTONE. Weathering: Moderately to heavily fractured. Most fractures have a light to moderate clay smear and an orange discoloration. Fractures: Heavily to moderately fractured. Heavily fractured from 4.20m to 5.20m bgl. Moderately fractured from 5.20 to 7.20m bgl. Majority of the core is solid and intact though there is a large broken portion. 1st set dips 70 to 80 degrees, with very close to medium spacing and undulate rough fracture surface texture. 2nd set dips 90 degrees, with very close to close spacing and undulate rough fracture surface texture. 3rd set dips 10 to 30 degrees, with medium to wide spacing and stepped rough to undulate rough fracture surface texture. *4.20m - 5.00m Heavily fractured, not intact. Many sub-vertical fractures.* *5.85m - 5.90m: Not intact.*
		5.70 - 7.20	50mm 190mm 80mm 50mm 410mm 50mm	100	91	21	8/m 4/m			
							7.20	0.23		End of Borehole at 7.200m

Groundwater:

Struck (m bgl)	Rose to	After (min)	Sealed	Comment
3.00				See shift data.

Hole Information:

Hole Depth (m bgl)	Hole Dia (mm)	Casing Dia (mm)
7.20	76	131

Equipment:	Deltabase 520
Method:	Compressed air mist.

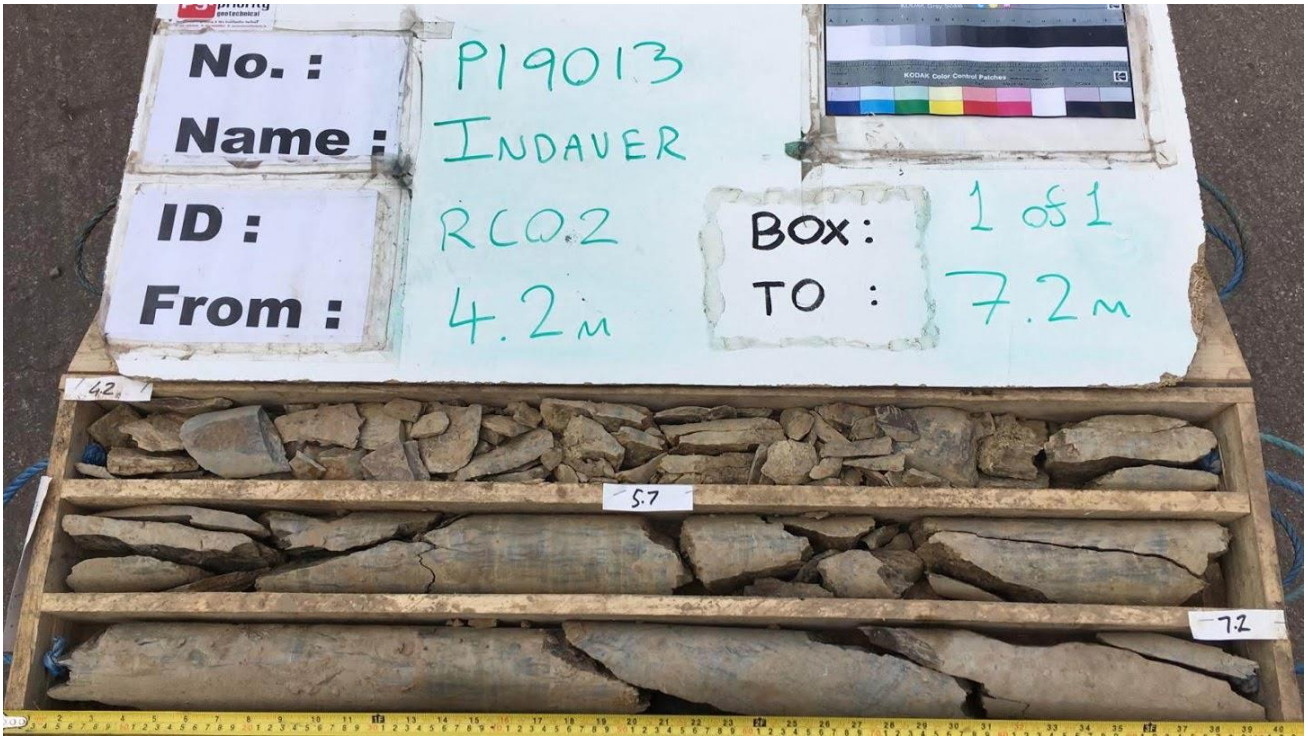
Remarks:

Borehole terminated at 7.20m bgl.

Shift Data:

Groundwater (m bgl)	Shift	Hole Depth (m bgl)	Remarks
	18/04/2019 08:00	0.00	Start of shift.
0.0	18/04/2019 14:00	7.20	End of borehole.

Photographic Record



Number:	**RC02**	**Project** **Project No** **Engineer**	Indaver Ringaskiddy Co. Cork. P19013 Indaver Ireland Ltd	

Priority Geotechnical Ltd. Tel: 021 4631600 Fax: 021 4638690 www.prioritygeotechnical.ie	Drilled By: PC Logged By: SR	Borehole No. **BH03** Sheet 1 of 1

Project Name:	Indaver	**Project No.** P19013	**Co-ords:**	578991E - 564186N	**Hole Type** CP
Location:	Ringaskiddy, Co. Cork		**Level:**	26.16m OD	**Scale** 1:50
Client:	Indaver Ireland		**Date:**	23/04/2019 - 23/04/2019	

Well Backfill	Water Strike (m bgl)	Sample and In Situ Testing: Depth (m bgl)	Type	Results	Depth (m bgl)	Level (mOD)	Legend	Stratum Description
		0.00 - 1.00	B					Brown, slightly sandy gravelly SILT with low cobble content. Sand is fine to coarse. Gravel is fine to coarse, rounded to sub-angular and of varied lithology. Cobbles are 63mm to 130mm dia and sub-rounded.
		1.00 - 2.00 1.00	B SPT (C)	N=12 (2,2/2,3,3,4)	1.00	25.16		Firm, brown, slightly sandy gravelly SILT. Sand is fine to coarse. Gravel is fine to coarse, rounded to sub-angular and of varied lithology.
		2.00 - 3.00 2.00	B SPT (C)	N=21 (4,4/4,5,6,6)	2.00	24.16		Stiff, brown, slightly sandy gravelly SILT with medium cobble content. Sand is fine to coarse. Gravel is fine to coarse, rounded to sub-angular and of varied lithology. Cobbles are 63mm to 100mm dia, sub-rounded and of varied lithology.
		3.00	SPT (C)	36 (6,10/36 for 75mm)				
					3.30	22.86		End of Borehole at 3.300m

Groundwater:

Struck (m bgl)	Rose to	After (mins)	Sealed	Comment
				None encountered.

Hole Information:

Depth (m bgl)	Hole Dia (mm)	Casing Dia (mm)
3.30	200	200

Equipment: Dando 2000.

Chiselling Details:

Top (m)	Base (m)	Duration (hh:mm)	Tool
3.20	3.30	01:00	Chisel.

Remarks:

Borehole terminated at 3.30m bgl due to obstruction.

Shift Data:

GW (m bgl)	Shift	Depth (m bgl)	Remarks
	23/04/2019 08:00	0.00	Start of shift.
Dry	23/04/2019 18:00	3.30	End of borehole.

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Project Name:	Indaver	**Project No.** P19013	**Co-ords:**	578991E - 564186N	**Hole Type** Rotary cored
Location:	Ringaskiddy, Co. Cork		**Level:**	26.16m OD	**Scale** 1:50
Client:	Indaver Ireland		**Dates:**	16/04/2019	17/04/2019

Well	Water Strike (m)	Depth (m)	Type /Fs (min, max, avg)	Coring (%) TCR	SCR	RQD	Depth (m) / FI (/m)	Level (mOD)	Legend	Stratum Description
		N=24 (6,7/6,6,5,7) (C)								Open hole boring. Driller described: Stiff, CLAY with broken rock.
		N=64 (12,14/64 for 225mm) (C)								
		3.50 - 4.00		100	80	26	3.50 8/m	22.66		Lithology: Weak to strong, grey MUDSTONE.
		4.00 - 5.00	50mm 200mm 100mm	100	90	13				Weathering: Moderate to heavily weathered. The majority of fractures have a moderate amount of clay smearing and black/orange discolouration.
		5.00 - 6.50	30mm 200mm 100mm	100	100	41	7/m 4/m			Fractures: Moderately to heavily fractured from 10.50m to 14.50m bgl. Dominated by steep to sub-vertical fractures. Main, prevalent set dips 30 to 45 degrees, with very close to medium undulate rough fracture surface texture. 2nd set dips 10 to 20 degrees, with close to medium spacing and undulate to stepped rough fracture surface texture. 3rd set dips 70 to 85 degrees with wide spacing and undulate rough fracture surface texture.
	▼	6.50 - 8.10	70mm 400mm 200mm 50mm 340mm 80mm	100	94	19	6/m			
		8.10 - 9.50	60mm 240mm 180mm	88	84	6	6/m 7/m			

Groundwater:

Struck (m bgl)	Rose to	After (min)	Sealed	Comment
7.50				See shift data.

Hole Information:

Hole Depth (m bgl)	Hole Dia (mm)	Casing Dia (mm)
14.50	76	131

Equipment:	Deltabase 520
Method:	Compressed air.

Remarks:

Borehole terminated at 14.50m bgl.

Shift Data:

Groundwater (m bgl)	Shift	Hole Depth (m bgl)	Remarks
	16/04/2019 15:00	0.00	Start of shift.
Dry.	16/04/2019 18:00	4.00	End of shift.
Dry	17/04/2019 08:00	4.00	Start of shift.
10.00	17/04/2019 18:00	14.50	End of borehole.

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Project Name:	Indaver	**Project No.** P19013	**Co-ords:**	578991E - 564186N	**Hole Type** Rotary cored
Location:	Ringaskiddy, Co. Cork		**Level:**	26.16m OD	**Scale** 1:50
Client:	Indaver Ireland		**Dates:**	16/04/2019	17/04/2019

Well	Water Strike (m)	Depth (m)	Type /Fs (min, max, avg)	Coring (%) TCR	SCR	RQD	Depth (m) / FI (/m)	Level (mOD)	Legend	Stratum Description
			30mm 150mm 80mm							Lithology: Weak to strong, grey MUDSTONE. Weathering: Moderate to heavily weathered. The majority of fractures have a moderate amount of clay smearing and black/orange discolouration. Fractures: Moderately to heavily fractured from 10.50m to 14.50m bgl. Dominated by steep to sub-vertical fractures. Main, prevalent set dips 30 to 45 degrees, with very close to medium undulate rough fracture surface texture. 2nd set dips 10 to 20 degrees, with close to medium spacing and undulate to stepped rough fracture surface texture. 3rd set dips 70 to 85 degrees with wide spacing and undulate rough fracture surface texture.
		9.50 - 11.00	10mm 170mm 80mm	100	97	0	9/m			
		11.00 - 12.50	50mm 200mm 90mm 50mm 100mm 50mm	100	60	0	8/m 8/m			
		12.50 - 14.00	20mm 100mm 50mm	100	53	0	6/m			
		14.00 - 14.50		100	20	0				
							14.50	11.66		End of Borehole at 14.500m

10 11 12 13 14 15 16 17 18

Groundwater:

Struck (m bgl)	Rose to	After (min)	Sealed	Comment
7.50				See shift data.

Hole Information:

Hole Depth (m bgl)	Hole Dia (mm)	Casing Dia (mm)
14.50	76	131

Equipment:	Deltabase 520
Method:	Compressed air.

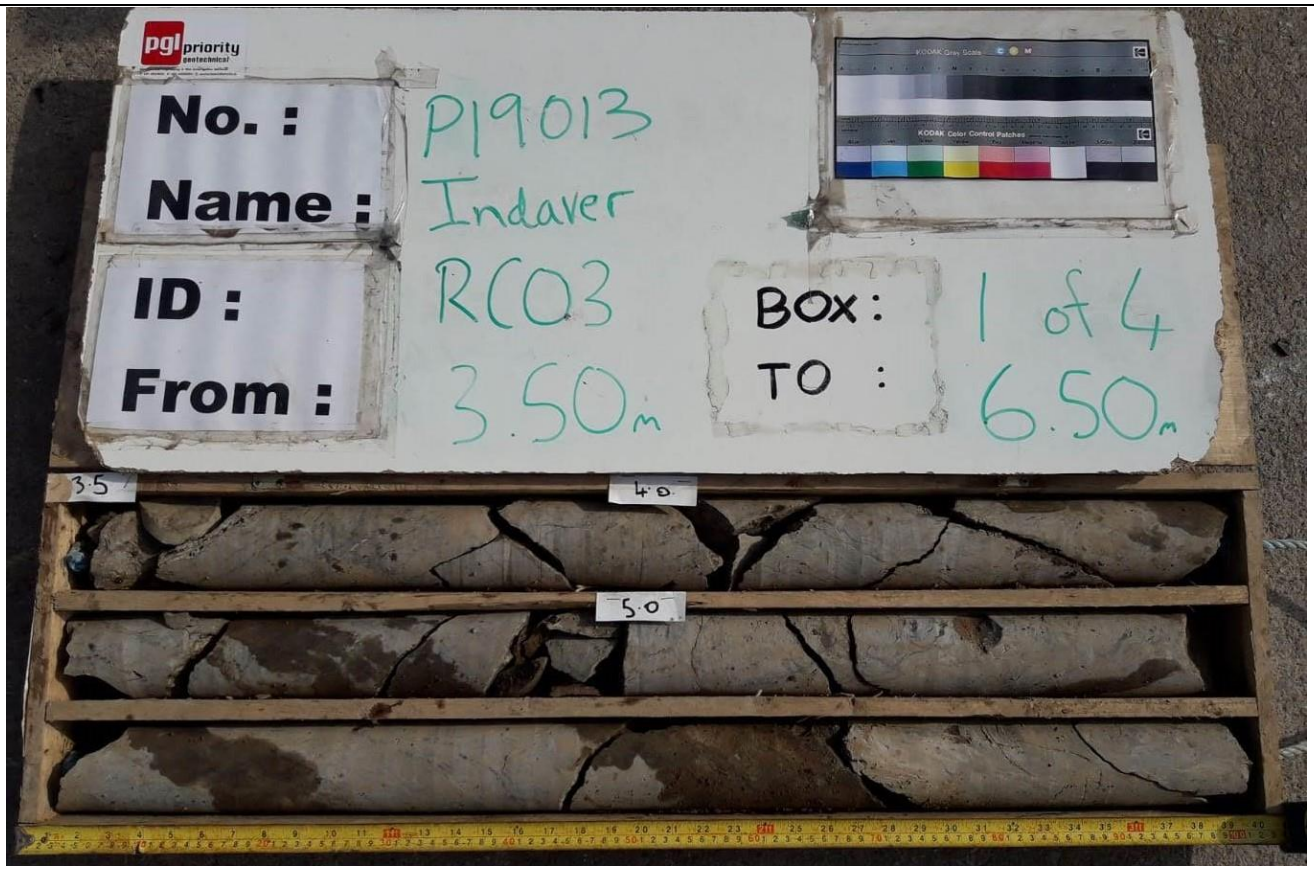
Remarks:

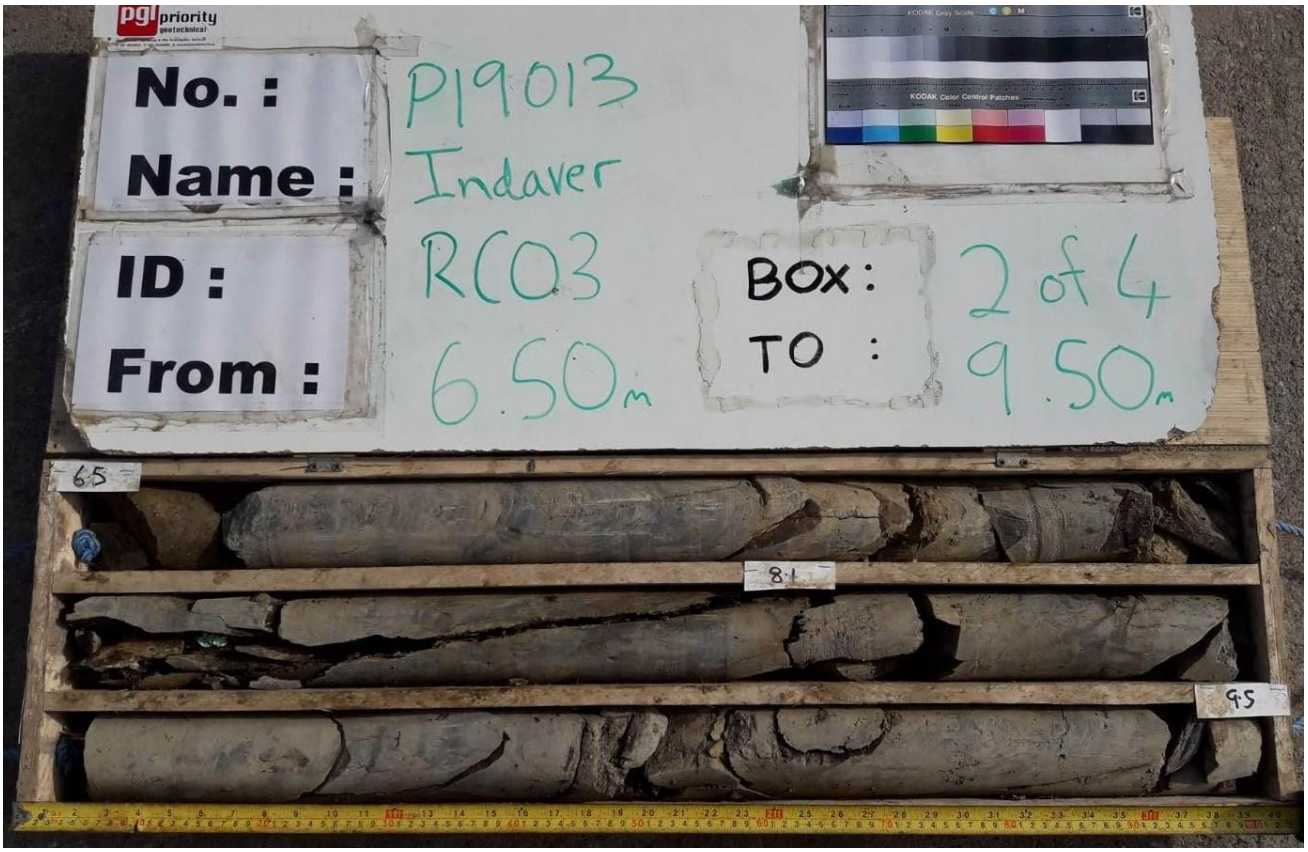
Borehole terminated at 14.50m bgl.

Shift Data:

Groundwater (m bgl)	Shift	Hole Depth (m bgl)	Remarks
	16/04/2019 15:00	0.00	Start of shift.
Dry.	16/04/2019 18:00	4.00	End of shift.
Dry	17/04/2019 08:00	4.00	Start of shift.
10.00	17/04/2019 18:00	14.50	End of borehole.

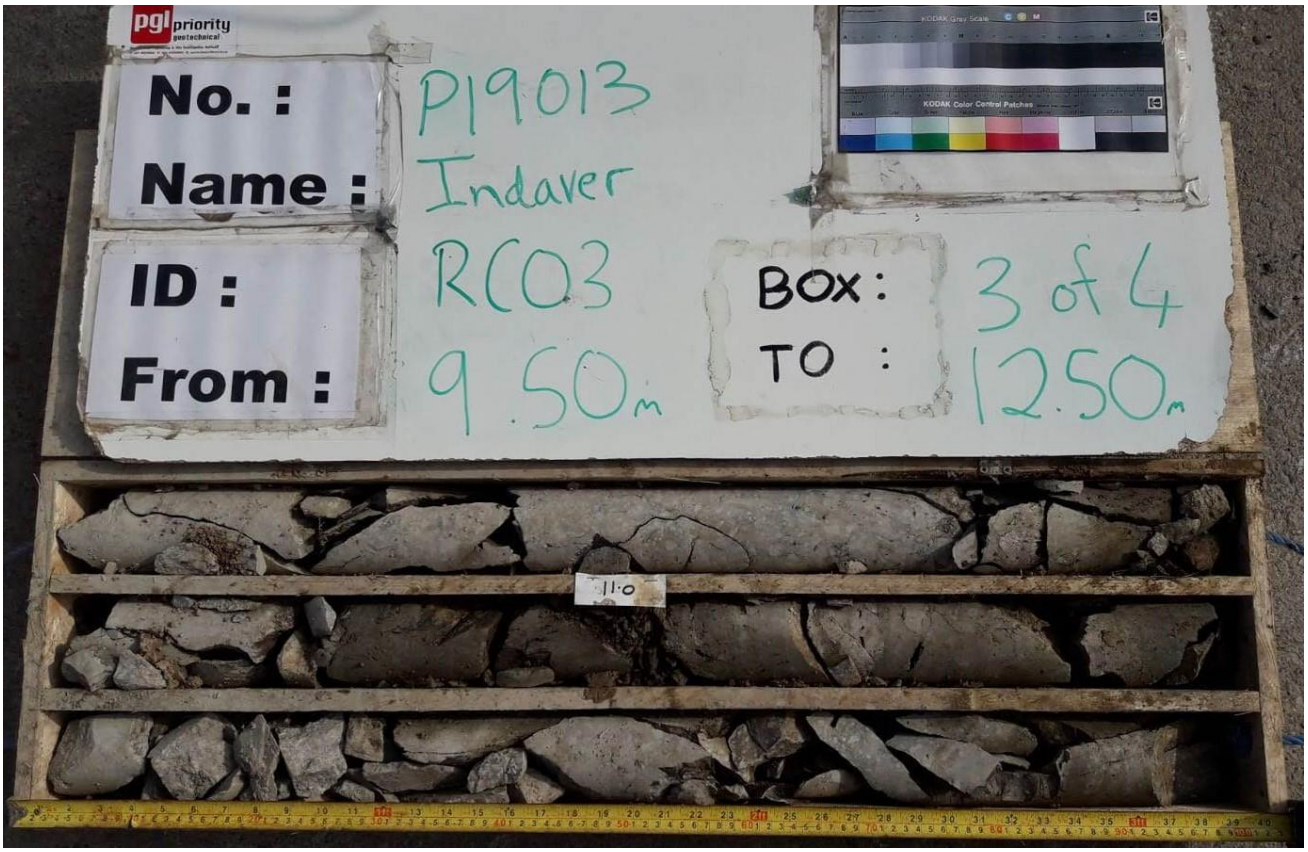
Photographic Record

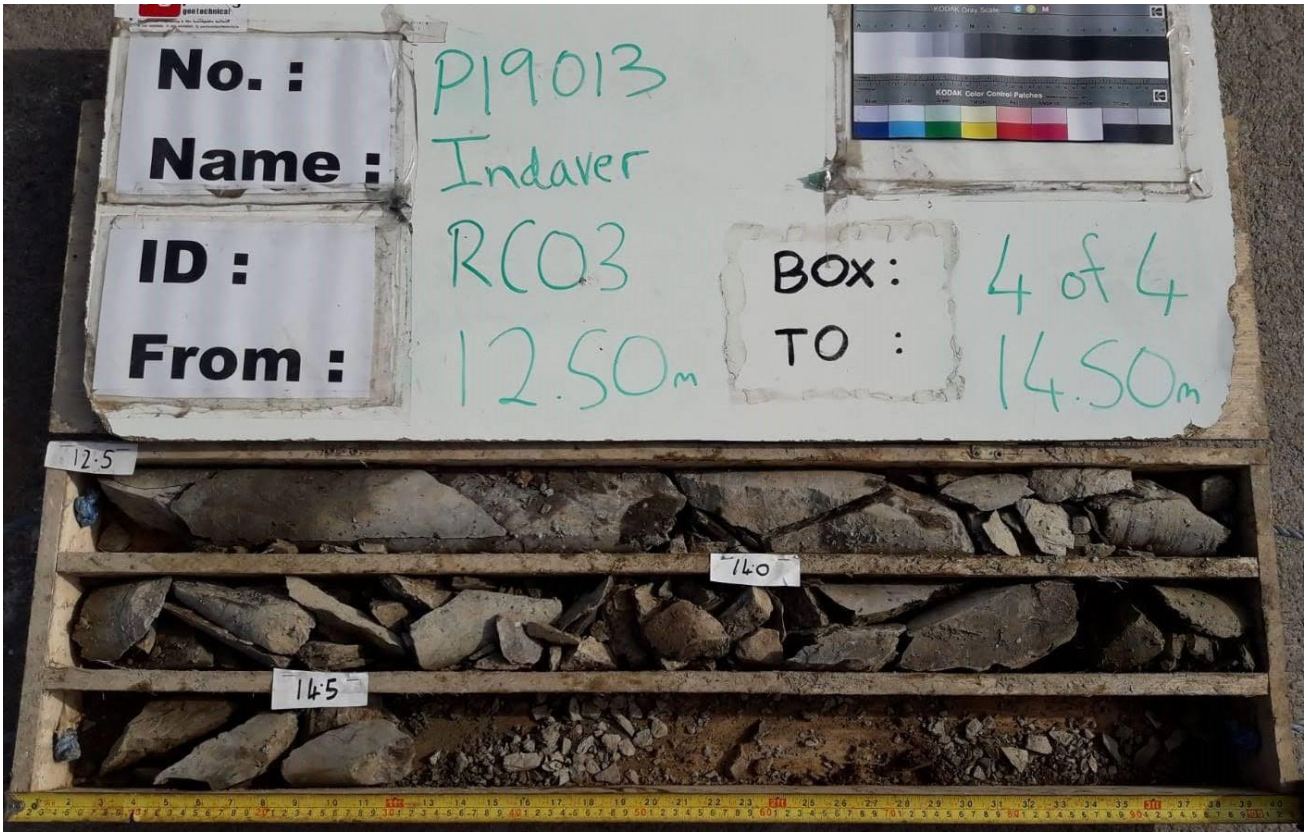




Number:	**RC03**	**Project**	Indaver Ringaskiddy Co. Cork.	
		Project No	P19013	
		Engineer	Indaver Ireland Ltd	

Photographic Record





Number:	**RC03**	**Project**	Indaver Ringaskiddy Co. Cork.	
		Project No	P19013	
		Engineer	Indaver Ireland Ltd	

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Drilled By:	Borehole No.
PC	**BH04**
Logged By:	Sheet 1 of 1
PH/SR	

Project Name:	Indaver	**Project No.** P19013	**Co-ords:**	579029E - 564264N	**Hole Type** CP
Location:	Ringaskiddy, Co. Cork		**Level:**	6.36m OD	**Scale** 1:50
Client:	Indaver Ireland		**Date:**	30/04/2019 - 30/04/2019	

Well Backfill	Water Strike (m bgl)	Sample and In Situ Testing			Depth (m bgl)	Level (mOD)	Legend	Stratum Description
		Depth (m bgl)	Type	Results				
		0.00 - 1.00	B					Firm to stiff, brown, slightly gravelly sandy SILT. Driller noted cobble content. Sand is fine to coarse. Gravel is fine to coarse, angular to sub-rounded and of varied lithology.
		1.00 - 2.00 1.00	B SPT (C)	N=14 (2,3/3,3,4,4)				
		2.00 - 3.00 2.00	B SPT (C)	N=23 (4,4/5,6,6,6)				
		3.00 - 4.00 3.00	B SPT (C)	N=29 (6,5/7,7,8,7)				
		4.00 - 4.60 4.00	B SPT (C)	N=37 (7,8/8,9,9,11)	4.00	2.36		Stiff, brown, slightly sandy gravelly SILT with high cobble content. Sand is fine to coarse. Gravel is fine to coarse and sub-rounded. Cobbles are 63mm to 190mm dia, angular and of varied lithology.
		4.60	SPT (C)	25 (43 for 80mm/25 for 0mm)	4.80	1.56		End of Borehole at 4.800m

Groundwater:

Struck (m bgl)	Rose to	After (mins)	Sealed	Comment
				None encountered.

Hole Information:

Depth (m bgl)	Hole Dia (mm)	Casing Dia (mm)
4.80	200	200

Equipment: Dando 2000.

Chiselling Details:

Top (m)	Base (m)	Duration (hh:mm)	Tool
4.70	4.80	01:00	Chisel.

Remarks:

Borehole terminated at 4.80m bgl due to obstruction.

Shift Data:

GW (m bgl)	Shift	Depth (m bgl)	Remarks
	30/04/2019 08:00	0.00	Start of shift.
Dry	30/04/2019 18:00	4.80	End of borehole.

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Drilled By:	Borehole No.
KM	**RC04**
Logged By:	Sheet 1 of 2
SR	

Project Name:	Indaver	**Project No.** P19013	**Co-ords:**	579029E - 564264N	**Hole Type** Rotary cored
Location:	Ringaskiddy, Co. Cork		**Level:**	6.36m OD	**Scale** 1:50
Client:	Indaver Ireland		**Dates:**	05/04/2019	08/04/2019

Well	Water Strike (m)	Depth (m)	Type /Fs (min, max, avg)	Coring (%) TCR	SCR	RQD	Depth (m) / Fl (/m)	Level (mOD)	Legend	Stratum Description
										Open hole boring. Driller described: CLAY.
		N=35 (6,10/9,7,13,6) (C)					1.50	4.86		Open hole boring. Driller described: Stiff, CLAY.
		N=11 (3,3/2,4,3,2) (C)								
		N=25 (6,6/8,6,5,6) (C)								
		59 (10,16/59 for 225mm) (C)								
		5.50 - 6.50		100	0	0	5.50	0.86		Core run attempted. Weathered rock. Recovered as: Grey, brown, gravelly COBBLES.
		6.50 - 7.50		100	0	0				
		7.50 - 8.00		100	0	0				
		8.00 - 8.50		100	24	0				
		8.50 - 9.20		100	14	0				

Groundwater:

Struck (m bgl)	Rose to	After (min)	Sealed	Comment
				See shift data.

Hole Information:

Hole Depth (m bgl)	Hole Dia (mm)	Casing Dia (mm)
10.70	76	131

Equipment:	Deltabase 520
Method:	Compressed air mist.

Remarks:

Borehole terminated at 10.70m bgl. Standpipe installed. Depth response zone from 5.00m to 10.70m.

Shift Data:

Groundwater (m bgl)	Shift	Hole Depth (m bgl)	Remarks
	05/04/2019 08:00	0.00	Start of shift.
Dry	05/04/2019 18:00	3.00	End of shift.
Dry	08/04/2019 08:00	3.00	Start of shift.
4.5	08/04/2019 18:00	10.70	End of borehole.

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Project Name:	Indaver	**Project No.** P19013	**Co-ords:**	579029E - 564264N	**Hole Type** Rotary cored
Location:	Ringaskiddy, Co. Cork		**Level:**	6.36m OD	**Scale** 1:50
Client:	Indaver Ireland		**Dates:**	05/04/2019	08/04/2019

Well	Water Strike (m)	Depth (m)	Type /Fs (min, max, avg)	Coring (%) TCR	SCR	RQD	Depth (m) / Fl (/m)	Level (mOD)	Legend	Stratum Description
										Core run attempted. Weathered rock. Recovered as: Grey, brown, gravelly COBBLES.
		9.20 - 10.70	5mm 70mm 50mm	100	65		9.75 10/m 10.70	-3.40 -4.34		Lithology: Weak to strong, grey, MUDSTONE. Weathering: Weathered rock from 5.50m to 9.75m recovered as gravelly COBBLES. Core itself is lightly weathered with minor clay smearing on fracture surfaces with orange/black discolouration. Fractures: Heavily fractured from 5.50m to 9.75m. Mostly solid and intact from 9.75m to 10.70m. Set 1 Dipping 45 to 60 degrees, close to medium spacing, sub-planar to undulated smooth fracture surfaces. Set 2 dipping 0 to 10 degrees, close to medium spacing, undulated rough. Detail: Largely not intact from 5.50m to 9.75m. End of Borehole at 10.700m

10 11 12 13 14 15 16 17 18

Groundwater:

Struck (m bgl)	Rose to	After (min)	Sealed	Comment
				See shift data.

Hole Information:

Hole Depth (m bgl)	Hole Dia (mm)	Casing Dia (mm)
10.70	76	131

Equipment:	Deltabase 520
Method:	Compressed air mist.

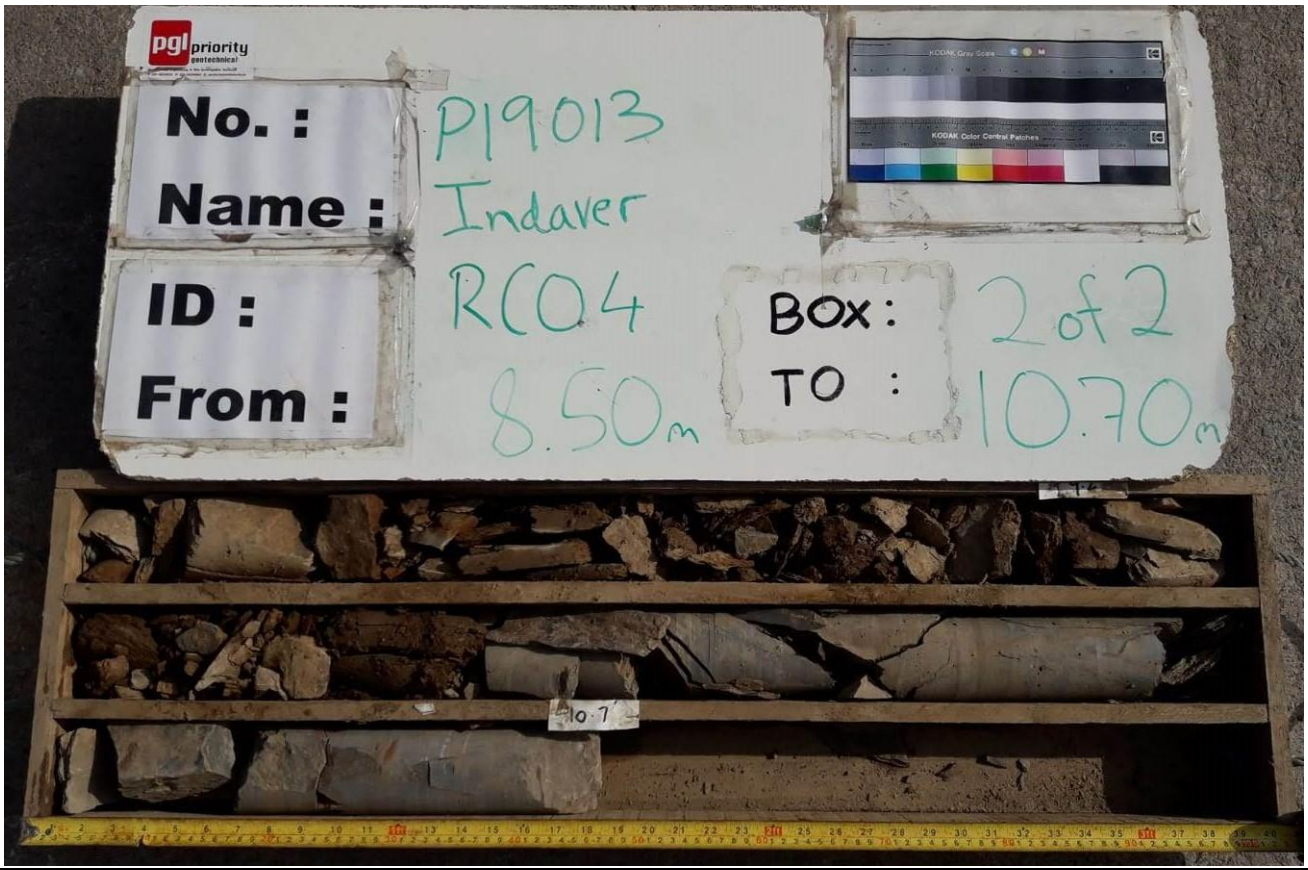
Remarks:

Borehole terminated at 10.70m bgl. Standpipe installed. Depth response zone from 5.00m to 10.70m.

Shift Data:

Groundwater (m bgl)	Shift	Hole Depth (m bgl)	Remarks
	05/04/2019 08:00	0.00	Start of shift.
Dry	05/04/2019 18:00	3.00	End of shift.
Dry	08/04/2019 08:00	3.00	Start of shift.
4.5	08/04/2019 18:00	10.70	End of borehole.

Photographic Record



Number:	**RC04**	**Project** Indaver Ringaskiddy Co. Cork. **Project No** P19013 **Engineer** Indaver Ireland Ltd	

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Drilled By:	Borehole No.
PC	**BH05**
Logged By:	Sheet 1 of 1
OD	

Project Name:	Indaver	**Project No.** P19013	**Co-ords:**	579076E - 564309N	**Hole Type** CP
Location:	Ringaskiddy, Co. Cork		**Level:**	4.49m OD	**Scale** 1:50
Client:	Indaver Ireland		**Date:**	01/05/2019 - 01/05/2019	

Well Backfill	Water Strike (m bgl)	Sample and In Situ Testing			Depth (m bgl)	Level (mOD)	Legend	Stratum Description
		Depth (m bgl)	Type	Results				
		0.00 - 1.00	B					Stiff, light brown, slightly sandy slightly gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is fine to coarse, sub-angular to sub-rounded. Cobbles are 63mm to 90mm dia, sub-angular to sub-rounded.
		1.00 - 2.00 1.00	B SPT (C)	N=40 (8,9/9,10,10,11)				
		2.00 - 3.00 2.00	B SPT (C)	N=20 (5,5/5,4,5,6)				
		3.00 - 4.00 3.00	B SPT (C)	N=24 (4,5/5,6,6,7)				
		4.00 - 5.00 4.00	B SPT (C)	N=27 (5,6/6,7,7,7)				
		5.00	SPT (C)	36 (8,9/36 for 75mm)				
					5.50	-1.01		End of Borehole at 5.500m

1 2 3 4 5 6 7 8 9

Groundwater:

Struck (m bgl)	Rose to	After (mins)	Sealed	Comment
				None encountered.

Hole Information:

Depth (m bgl)	Hole Dia (mm)	Casing Dia (mm)
5.50	200	200

Equipment: Dando 2000

Chiselling Details:

Top (m)	Base (m)	Duration (hh:mm)	Tool
1.55	1.70	01:00	Chisel
5.30	5.50	01:00	Chisel

Remarks:

Borehole terminated at 5.50m bgl due to obstruction.

Shift Data:

GW (m bgl)	Shift	Depth (m bgl)	Remarks
	01/05/2019 08:00	0.00	Start of shift.
Dry	01/05/2019 18:00	5.50	End of borehole.

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Project Name: Indaver	**Project No.** P19013	**Co-ords:** 579076E - 564309N	**Hole Type** Rotary cored
Location: Ringaskiddy, Co. Cork		**Level:** 4.49m OD	**Scale** 1:50
Client: Indaver Ireland		**Dates:** 10/04/2019	10/04/2019

Well	Water Strike (m)	Depth (m)	Type /Fs (min, max, avg)	Coring (%) TCR	SCR	RQD	Depth (m) / FI (/m)	Level (mOD)	Legend	Stratum Description
		N=24 (4,6/6,4,9,5) (C)								Open hole boring. Driller described: Stiff, CLAY.
		N=22 (3,3/5,6,7,4) (C)								
		N=27 (4,4/6,8,7,6) (C)								
		~~25 (14,19/25 for 0mm)~~ (C)					6.00	-1.51		Lithology: Weak to strong, grey, MUDSTONE.
		6.00 - 7.00	30mm 140mm 50mm	100	80	0	8/m			Weathering: Most fractures have moderate to strong clay smearing with orange/black discolouration.
		7.00 - 8.00	20mm 100mm 50mm	100	95	0	9/m			Fractures: Heavily fractured and mostly intact. Set 1 dipping 70 to 80 degrees, close to medium spacing, sub-planar smooth to undulated smooth fracture surfaces. Set 2 dipping 0 to 20 degrees, close to medium spacing, undulated rough to stepped rough.
		8.00 - 9.00	5mm 100mm 50mm	100	70	0	8/m			Detail: Not intact from 6.10m to 6.30m, 8.00m to 8.10m , 8.25m to 8.35m, 9.80m to 10.00m and 11.00m to 11.30m.

Groundwater:

Struck (m bgl)	Rose to	After (min)	Sealed	Comment
				See shift data.

Hole Information:

Hole Depth (m bgl)	Hole Dia (mm)	Casing Dia (mm)
13.00	76	131

Equipment:	Deltabase 520
Method:	Compressed air mist.

Remarks:

Borehole terminated at 13.00m bgl. Standpipe installed. Depth response zone from 6.00m to 13.00m.

Shift Data:

Groundwater (m bgl)	Shift	Hole Depth (m bgl)	Remarks
	10/04/2019 08:00	0.00	Start of shift.
4.7	10/04/2019 18:00	13.00	End of borehole.

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Project Name: Indaver	**Project No.** P19013	**Co-ords:** 579076E - 564309N	**Hole Type** Rotary cored
Location: Ringaskiddy, Co. Cork		**Level:** 4.49m OD	**Scale** 1:50
Client: Indaver Ireland		**Dates:** 10/04/2019	10/04/2019

Well	Water Strike (m)	Depth (m)	Type /Fs (min, max, avg)	Coring (%) TCR	SCR	RQD	Depth (m) / FI (/m)	Level (mOD)	Legend	Stratum Description
		9.00 - 9.80	20mm 150mm 60mm	100	98	0	7/m			Lithology: Weak to strong, grey, MUDSTONE. Weathering: Most fractures have moderate to strong clay smearing with orange/black discolouration. Fractures: Heavily fractured and mostly intact. Set 1 dipping 70 to 80 degrees, close to medium spacing, sub-planar smooth to undulated smooth fracture surfaces. Set 2 dipping 0 to 20 degrees, close to medium spacing, undulated rough to stepped rough. Detail: Not intact from 6.10m to 6.30m, 8.00m to 8.10m , 8.25m to 8.35m, 9.80m to 10.00m and 11.00m to 11.30m.
		9.80 - 11.00	40mm 370mm 100mm	100	79	29	4/m			
		11.00 - 12.30	100mm 200mm 180mm	100	78	15	4/m			
			30mm 70mm 50mm				6/m			
							13.00	-8.51		End of Borehole at 13.000m

10 11 12 13 14 15 16 17 18

Groundwater:

Struck (m bgl)	Rose to	After (min)	Sealed	Comment
				See shift data.

Hole Information:

Hole Depth (m bgl)	Hole Dia (mm)	Casing Dia (mm)
13.00	76	131

Equipment:	Deltabase 520
Method:	Compressed air mist.

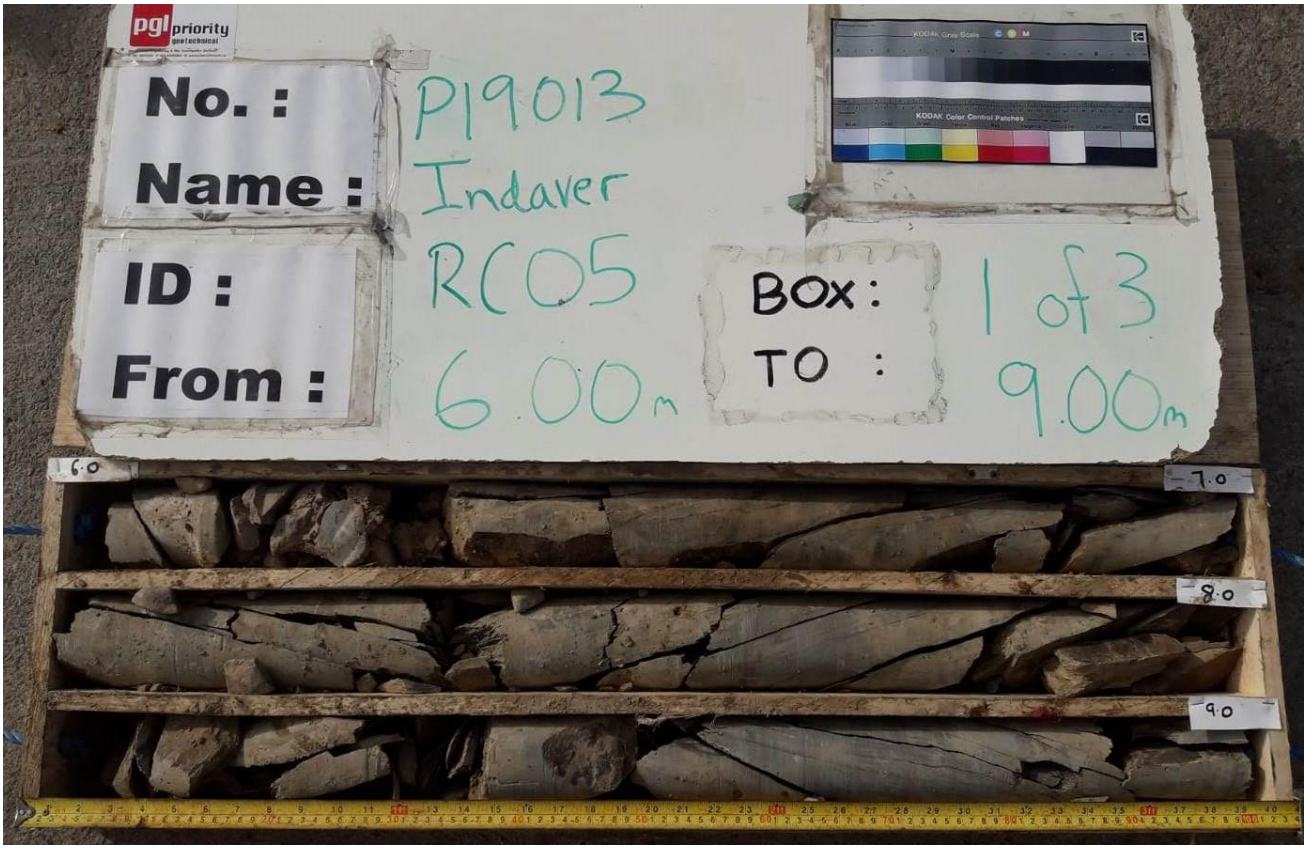
Remarks:

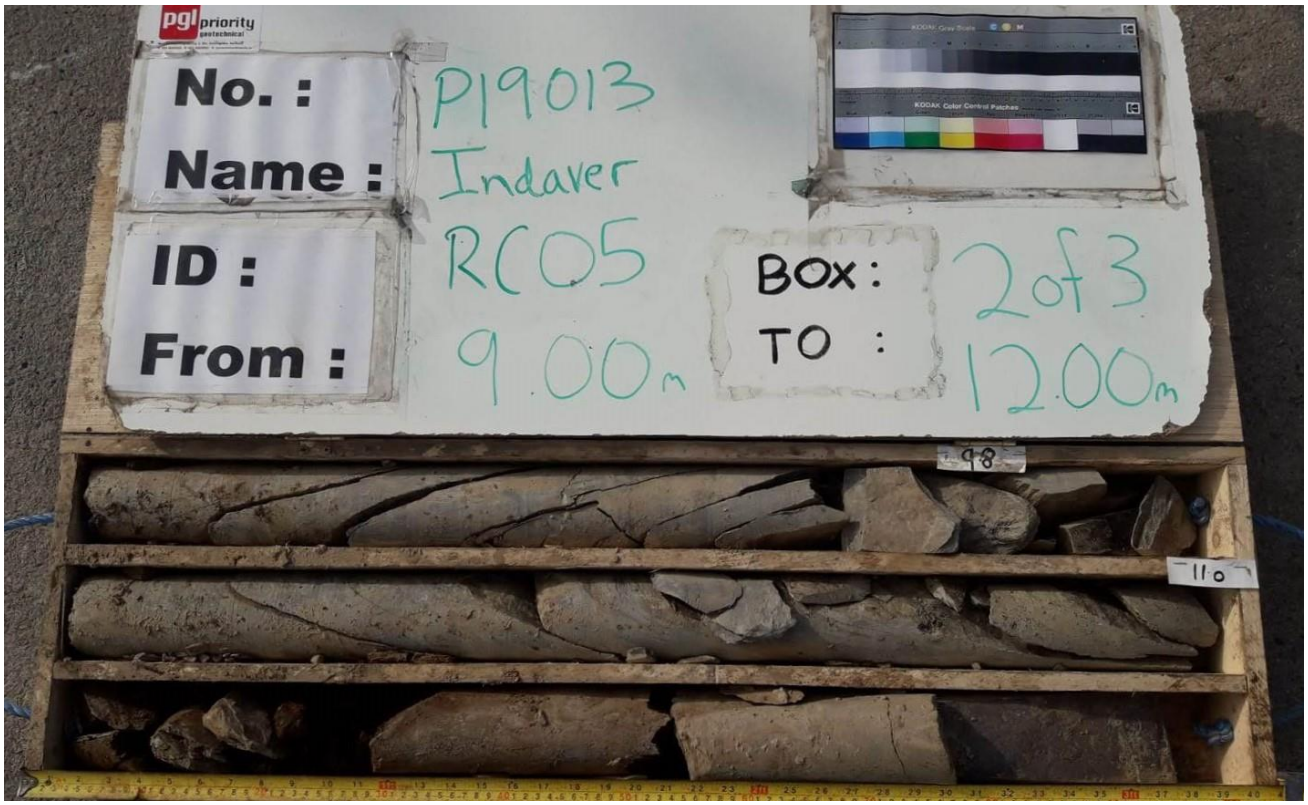
Borehole terminated at 13.00m bgl. Standpipe installed. Depth response zone from 6.00m to 13.00m.

Shift Data:

Groundwater (m bgl)	Shift	Hole Depth (m bgl)	Remarks
	10/04/2019 08:00	0.00	Start of shift.
4.7	10/04/2019 18:00	13.00	End of borehole.

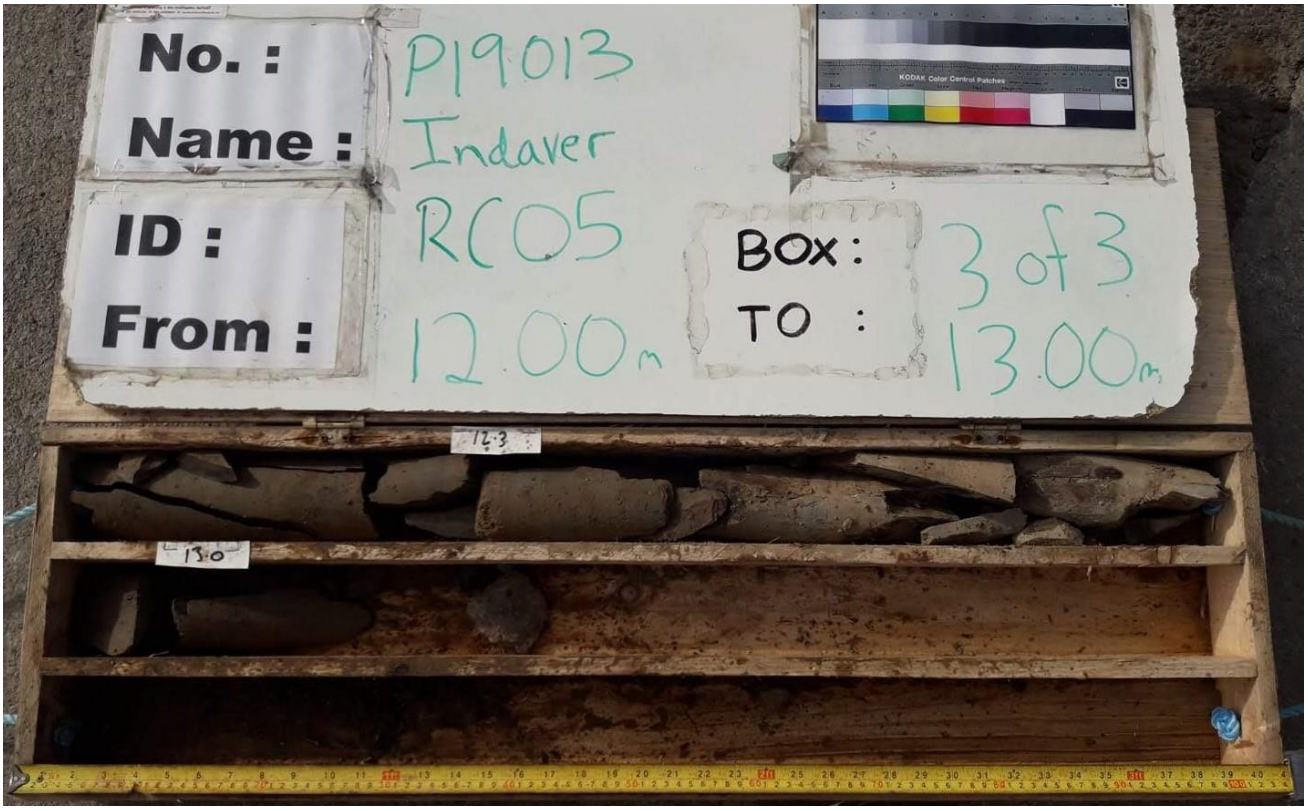
Photographic Record





Number:	**RC05**	**Project**	Indaver Ringaskiddy Co. Cork.	
		Project No	P19013	
		Engineer	Indaver Ireland Ltd	

Photographic Record



Number:	**RC05**	**Project** **Project No** **Engineer**	Indaver Ringaskiddy Co. Cork. P19013 Indaver Ireland Ltd	

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Project Name:	Indaver	**Project No.** P19013	**Co-ords:**	579074E - 564274N	**Hole Type** CP
Location:	Ringaskiddy, Co. Cork		**Level:**	6.35m OD	**Scale** 1:50
Client:	Indaver Ireland		**Date:**	30/04/2019 - 30/04/2019	

Well Backfill	Water Strike (m bgl)	Sample and In Situ Testing			Depth (m bgl)	Level (mOD)	Legend	Stratum Description
		Depth (m bgl)	Type	Results				
		0.00 - 1.00	B					Stiff, light brown slightly sandy slightly gravelly CLAY with low cobble content.
		1.00 - 2.00 1.00	B SPT (C)	N=17 (3,3/4,4,4,5)				
		2.00 - 3.00 2.00	B SPT (C)	N=20 (4,4/5,5,4,6)				
		3.00 - 4.00 3.00	B SPT (C)	N=27 (5,6/6,7,7,7)				
		4.00	SPT (C)	0 (50 for 80mm/0 for 0mm)	4.20	2.15		End of Borehole at 4.200m

1 2 3 4 5 6 7 8 9

Groundwater:

Struck (m bgl)	Rose to	After (mins)	Sealed	Comment
				None encountered.

Hole Information:

Depth (m bgl)	Hole Dia (mm)	Casing Dia (mm)
4.20	200	200

Equipment: Dando 2000

Chiselling Details:

Top (m)	Base (m)	Duration (hh:mm)	Tool
4.10	4.20	01:00	Chisel.

Remarks:

Borehole terminated at 4.20m bgl due to obstruction.

Shift Data:

GW (m bgl)	Shift	Depth (m bgl)	Remarks
	30/04/2019 08:00	0.00	Start of shift.
Dry	30/04/2019 18:00	4.20	End of borehole.

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Project Name:	Indaver	**Project No.** P19013	**Co-ords:**	579074E - 564274N	**Hole Type** Rotary cored
Location:	Ringaskiddy, Co. Cork		**Level:**	6.35m OD	**Scale** 1:50
Client:	Indaver Ireland		**Dates:**	09/04/2019	09/04/2019

Well	Water Strike (m)	Depth (m)	Type /Fs (min, max, avg)	Coring (%) TCR	SCR	RQD	Depth (m) / Fl (/m)	Level (mOD)	Legend	Stratum Description
		N=33 (8,9/9,8,8,8) (C)								Open hole boring. Driller described: CLAY.
		N=28 (9,7/7,6,8,7) (C)								
		4.20 - 4.70 25 (10,15/25 for 0mm) (C)		90	28	28	4.20 1/m	2.15		Lithology: Weak to strong, grey, MUDSTONE. Weathering: Lightly weathered, most fracture surfaces have light to moderate clay smearing with orange/black discolouration. Fractures: Light to moderate with heavy fracturing from 4.70m to 6.90m. Set 1 dipping 80 to 90 degrees, very close to closely spaced, undulated smooth to sub-planar smooth. Set 2 dipping 10 to 30 degrees, close to widely spaced, undulated rough to stepped rough. Set 3 dipping 45 to 55 degrees, close to widely spaced, undulated rough to stepped rough. Detail: Brown gravelly CLAY infill from 4.14m to 4.40m. Not intact from 4.70m to 6.10m and 8.80m to 8.90m
		4.70 - 5.30		100	50	0				
		5.30 - 6.40		100	41	0				
		6.40 - 7.90	30mm 90mm 14mm	100	93	0	50/m			
		7.90 - 9.50	30mm 280mm 50mm	100	91	19	7/m			

Groundwater:

Struck (m bgl)	Rose to	After (min)	Sealed	Comment
6.40				See shift data.

Hole Information:

Hole Depth (m bgl)	Hole Dia (mm)	Casing Dia (mm)
15.20	76	131

Equipment:	Deltabase 520
Method:	Compressed air mist

Remarks:

Borehole terminated at 15.20m bgl.

Shift Data:

Groundwater (m bgl)	Shift	Hole Depth (m bgl)	Remarks
	09/04/2019 08:00	0.00	Start of shift.
6.0	09/04/2019 18:00	15.20	End of borehole.

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Project Name: Indaver	**Project No.** P19013	**Co-ords:** 579074E - 564274N	**Hole Type** Rotary cored
Location: Ringaskiddy, Co. Cork		**Level:** 6.35m OD	**Scale** 1:50
Client: Indaver Ireland		**Dates:** 09/04/2019	09/04/2019

Well	Water Strike (m)	Depth (m)	Type /Fs (min, max, avg)	Coring (%) TCR	SCR	RQD	Depth (m) / FI (/m)	Level (mOD)	Legend	Stratum Description
		9.50 - 9.90	20mm 100mm 40mm	100	88	0	3/m			Lithology: Weak to strong, grey, MUDSTONE. Weathering: Lightly weathered, most fracture surfaces have light to moderate clay smearing with orange/black discolouration. Fractures: Light to moderate with heavy fracturing from 4.70m to 6.90m. Set 1 dipping 80 to 90 degrees, very close to closely spaced, undulated smooth to sub-planar smooth. Set 2 dipping 10 to 30 degrees, close to widely spaced, undulated rough to stepped rough. Set 3 dipping 45 to 55 degrees, close to widely spaced, undulated rough to stepped rough. Detail: Brown gravelly CLAY infill from 4.14m to 4.40m. Not intact from 4.70m to 6.10m and 8.80m to 8.90m
		9.90 - 11.20	30mm 320mm 50mm	100	100	18	5/m			
		11.20 - 12.60	20mm 380mm 60mm	93	86	21	6/m			
		12.60 - 14.10	50mm 230mm 60mm	97	93	17	6/m			
		14.10 - 15.20	20mm 310mm 80mm	100	100	18	8/m			
							15.20	-8.85		End of Borehole at 15.200m

10 11 12 13 14 15 16 17 18

Groundwater:

Struck (m bgl)	Rose to	After (min)	Sealed	Comment
6.40				See shift data.

Hole Information:

Hole Depth (m bgl)	Hole Dia (mm)	Casing Dia (mm)
15.20	76	131

Equipment:	Deltabase 520
Method:	Compressed air mist

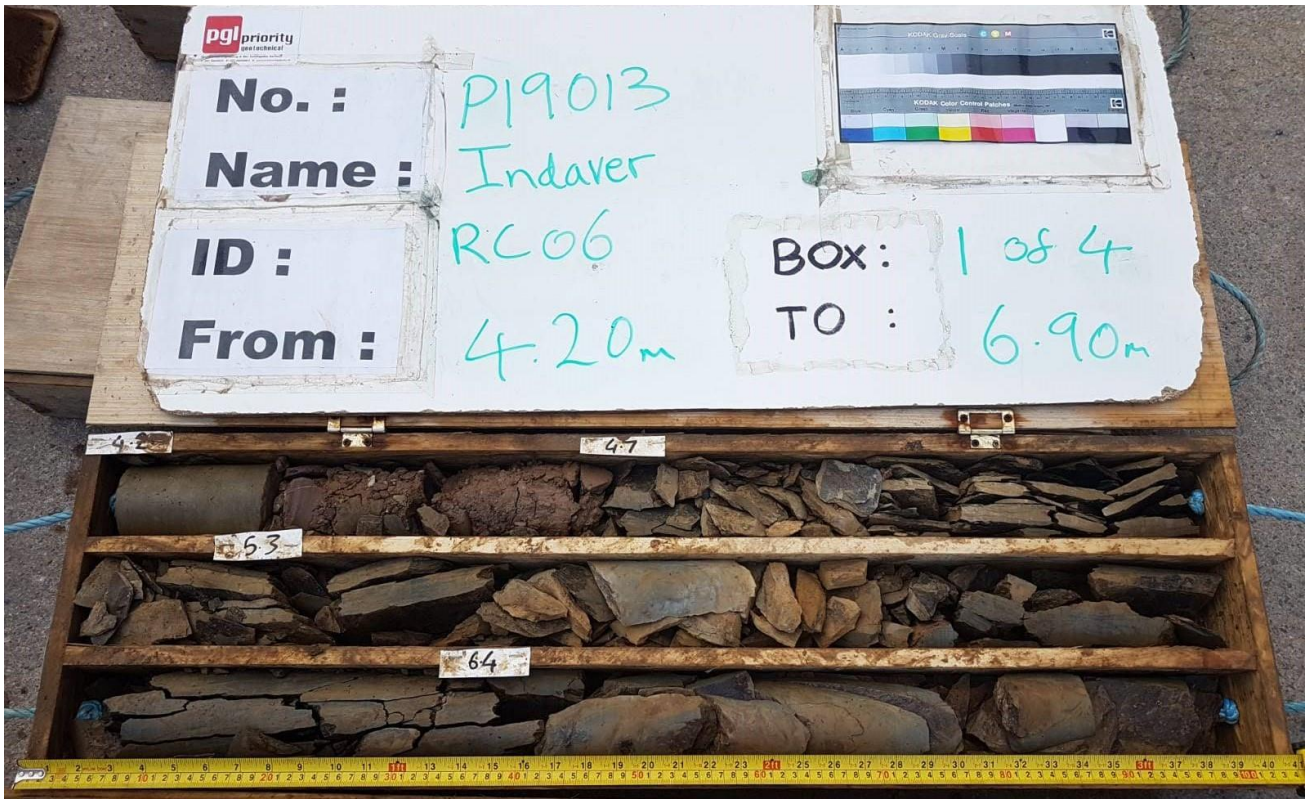
Remarks:

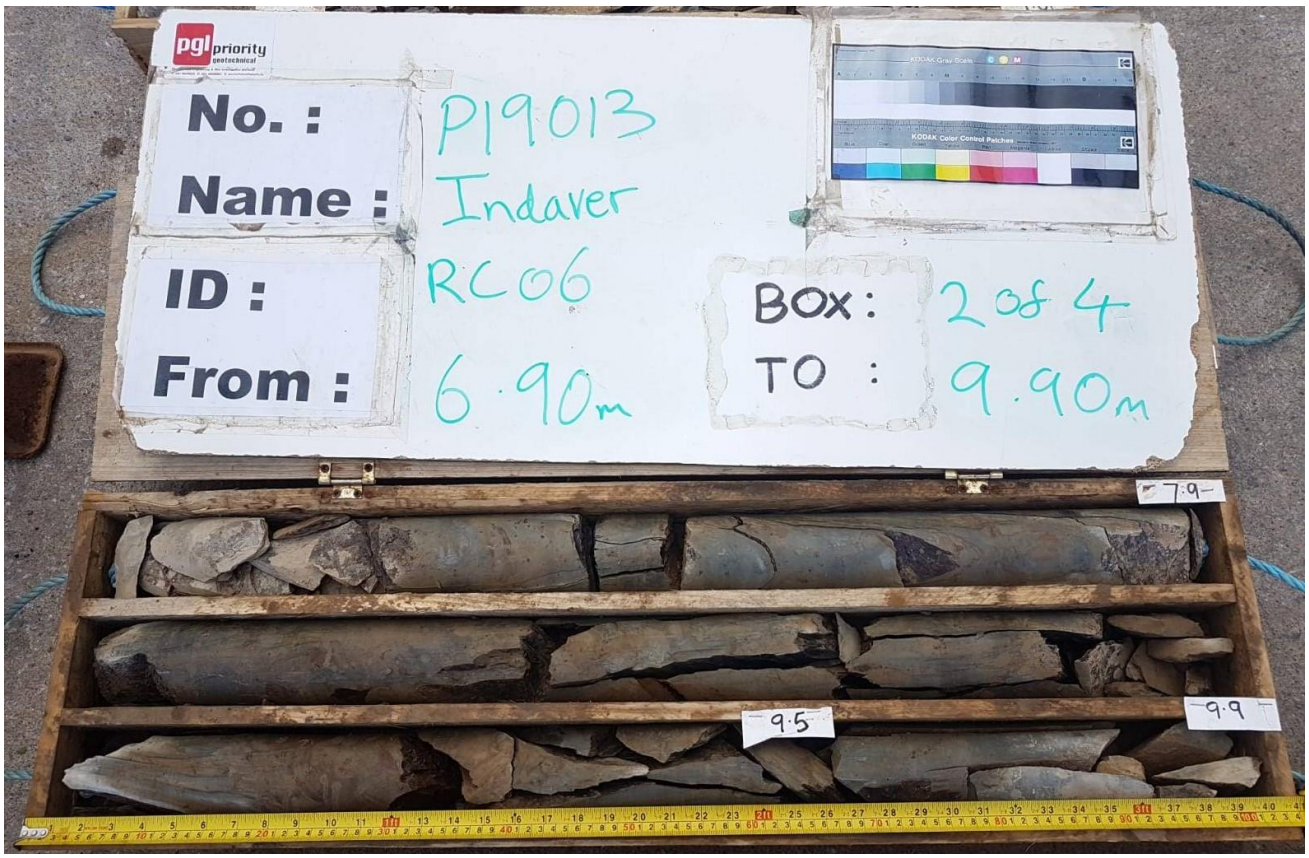
Borehole terminated at 15.20m bgl.

Shift Data:

Groundwater (m bgl)	Shift	Hole Depth (m bgl)	Remarks
	09/04/2019 08:00	0.00	Start of shift.
6.0	09/04/2019 18:00	15.20	End of borehole.

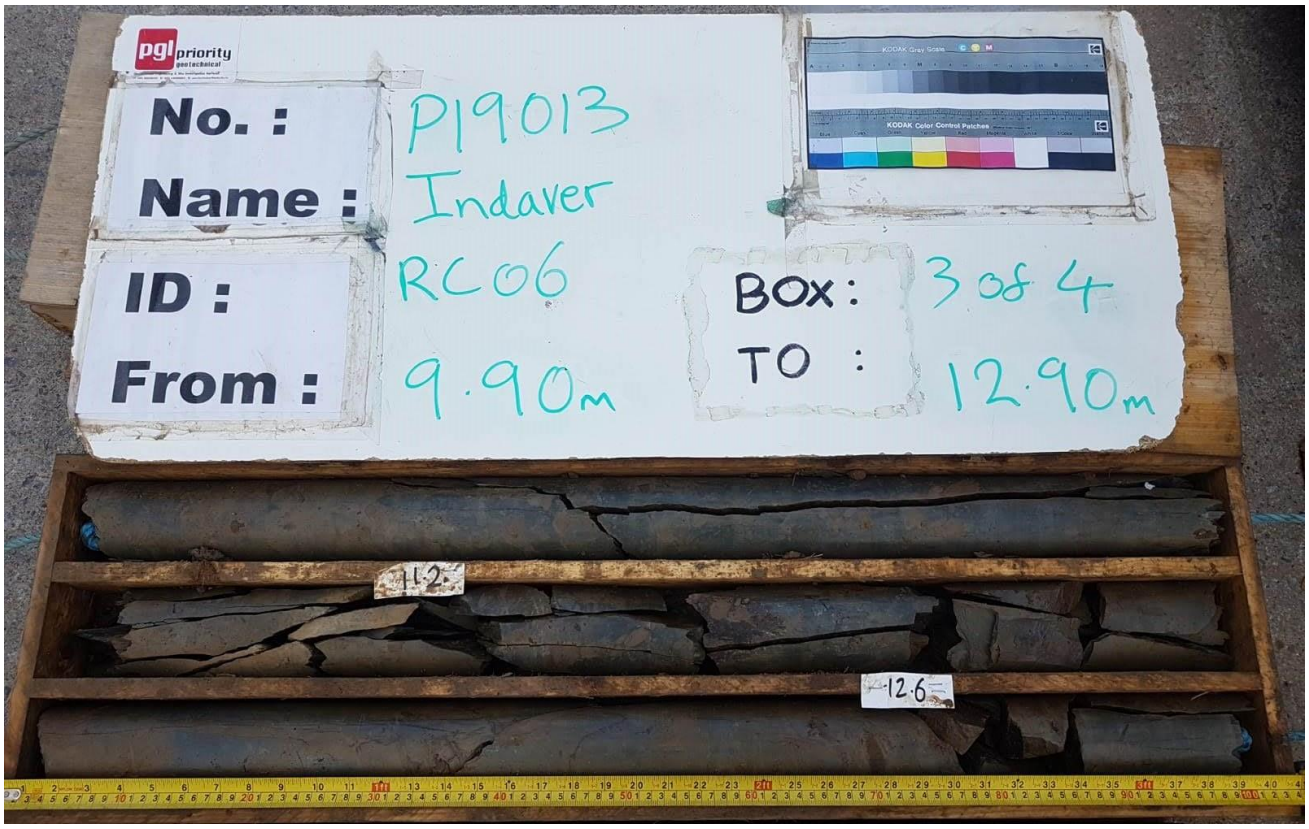
Photographic Record





Number:	**RC06**	**Project** **Project No** **Engineer**	Indaver Ringaskiddy Co. Cork. P19013 Indaver Ireland Ltd	

Photographic Record



Number:	**RC06**	**Project**	Indaver Ringaskiddy Co. Cork.	
		Project No	P19013	
		Engineer	Indaver Ireland Ltd	

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Project Name:	Indaver	**Project No.** P19013	**Co-ords:**	579073E - 564189N	**Hole Type** CP
Location:	Ringaskiddy, Co. Cork		**Level:**	18.84m OD	**Scale** 1:50
Client:	Indaver Ireland		**Date:**	23/04/2019 - 24/04/2019	

Well Backfill	Water Strike (m bgl)	Sample and In Situ Testing			Depth (m bgl)	Level (mOD)	Legend	Stratum Description
		Depth (m bgl)	Type	Results				
		0.00 - 1.00	B					Brown, slightly gravelly SILT with low cobble content. Gravel is fine to coarse and rounded to sub-angular. Cobbles are 63mm to 130mm dia, angular and of varied lithology.
		1.00 - 2.00 1.00	B SPT (C)	N=18 (3,4/4,5,4,5)	1.00	17.84		Brown, silty sandy GRAVEL with low to medium cobble content. Sand is fine to coarse. Gravel is fine to coarse, rounded to angular and of varied lithology. Cobbles are 63mm to 130mm dia and sub-angular.
		2.00 - 3.00 2.00	B SPT (C)	N=22 (4,4/5,5,6,6)				
		3.00 - 4.00 3.00	B SPT (C)	N=23 (4,4/5,6,6,6)				
		4.00 - 5.00 4.00	B SPT (C)	N=27 (6,6/7,7,6,7)	4.00	14.84		Stiff, brown, slightly sandy gravelly SILT with high cobble content. Sand is fine to coarse. Gravel is fine to coarse and angular to sub-rounded. Cobbles are 63mm to 180mm dia, angular to sub-rounded and of varied lithology.
		5.00 - 6.00 5.00	B SPT (C)	N=23 (6,6/7,8,8,0)				
		6.00	SPT (C)	35 (8,9/35 for 75mm)				
					6.40	12.44		End of Borehole at 6.400m

1 2 3 4 5 6 7 8 9

Groundwater:

Struck (m bgl)	Rose to	After (mins)	Sealed	Comment
				None encountered.

Hole Information:

Depth (m bgl)	Hole Dia (mm)	Casing Dia (mm)
6.40	200	200

Equipment: Dando 2000.

Chiselling Details:

Top (m)	Base (m)	Duration (hh:mm)	Tool
6.20	6.40	01:00	Chisel.

Remarks:

Borehole terminated at 6.40m bgl due to obstruction.

Shift Data:

GW (m bgl)	Shift	Depth (m bgl)	Remarks
	23/04/2019 08:00	0.00	Start of shift.
Dry	23/04/2019 18:00	5.00	End of shift.
Dry	24/04/2019 08:00	5.00	Start of shift.
Dry	24/04/2019 18:00	6.40	End of borehole.

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Project Name:	Indaver	**Project No.** P19013	**Co-ords:**	579073E - 564189N	**Hole Type** Rotary cored
Location:	Ringaskiddy, Co. Cork		**Level:**	18.84m OD	**Scale** 1:50
Client:	Indaver Ireland		**Dates:**	15/04/2019	16/04/2019

Well	Water Strike (m)	Depth (m)	Type /Fs (min, max, avg)	Coring (%) TCR	SCR	RQD	Depth (m) / Fl (/m)	Level (mOD)	Legend	Stratum Description
		N=17 (4,2/4,5,4,4) (C)								Open hole boring. Driller described: Stiff, CLAY.
		N=21 (3,5/5,6,5,5) (C)								
		N=25 (6,7/7,7,6,5) (C)								
		N=29 (6,8/8,8,6,7) (C)					6.00	12.84		Open hole boring. Driller described: Medium dense to dense, GRAVEL.
		N=48 (9,10/10,12,12,14) (C)								

Groundwater:

Struck (m bgl)	Rose to	After (min)	Sealed	Comment
9.00				See shift data.

Hole Information:

Hole Depth (m bgl)	Hole Dia (mm)	Casing Dia (mm)
14.00	76	131

Equipment:	Deltabase 520
Method:	Compressed air.

Remarks:

Borehole terminated at 14.00m bgl.

Shift Data:

Groundwater (m bgl)	Shift	Hole Depth (m bgl)	Remarks
	15/04/2019 10:00	0.00	Start of shift.
Dry.	15/04/2019 18:00	10.50	End of shift.
9.00	16/04/2019 08:00	10.50	Start of shift.
9.00	16/04/2019 15:00	14.00	End of borehole.

pgl priority geotechnical	**Priority Geotechnical Ltd.** **Tel: 021 4631600** **Fax: 021 4638690** **www.prioritygeotechnical.ie**	**Drilled By:** KM/LM **Logged By:** SR	Borehole No. **RC07** Sheet 2 of 2

Project Name: Indaver	**Project No.** P19013	**Co-ords:** 579073E - 564189N	**Hole Type** Rotary cored
Location: Ringaskiddy, Co. Cork		**Level:** 18.84m OD	**Scale** 1:50
Client: Indaver Ireland		**Dates:** 15/04/2019	16/04/2019

Well	Water Strike (m)	Depth (m)	Type /Fs (min, max, avg)	Coring (%) TCR	SCR	RQD	Depth (m) / FI (/m)	Level (mOD)	Legend	Stratum Description
		N=48 (8,11/12,11,14,11) (C)								Open hole boring. Driller described: Medium dense to dense, GRAVEL.
		~~43 (10,12/43 for~~ 125mm) (C)					10.50	8.34		
		10.50 - 12.00		66	0	0				Core runs attempted. Poor recovery. Recovered as: Brown, silty GRAVEL with low cobble content. Gravel is fine to coarse, angular. Cobbles are up to 90mm dia, angular.
		12.00 - 12.50		100	0	0				
		12.50 - 13.00		100	10	0				
		13.00 - 13.40		100	75	40	13.00	5.84		Lithology: Weak to strong, grey MUDSTONE.
		13.40 - 13.60	20mm	100	0	0	5/m			Weathering: Core has a brown, silty smear.
		13.60 - 13.80	210mm	100	100	0				
		13.80 - 14.00	50mm	100	0	0				Fractures: Core is heavily fractured. Dominated by steep to sub-vertical fractures. Poor RQD due to steep fractures. Main, prevalent set dips of 70 degrees, with very close spacing and undulate rough fracture surface texture. 2nd set dips 10 to 25 degrees, with very close spacing and undulate to stepped rough fracture surface texture.
							14.00	4.84		End of Borehole at 14.000m

10 11 12 13 14 15 16 17 18

Groundwater:

Struck (m bgl)	Rose to	After (min)	Sealed	Comment
9.00				See shift data.

Hole Information:

Hole Depth (m bgl)	Hole Dia (mm)	Casing Dia (mm)
14.00	76	131

Equipment:	Deltabase 520
Method:	Compressed air.

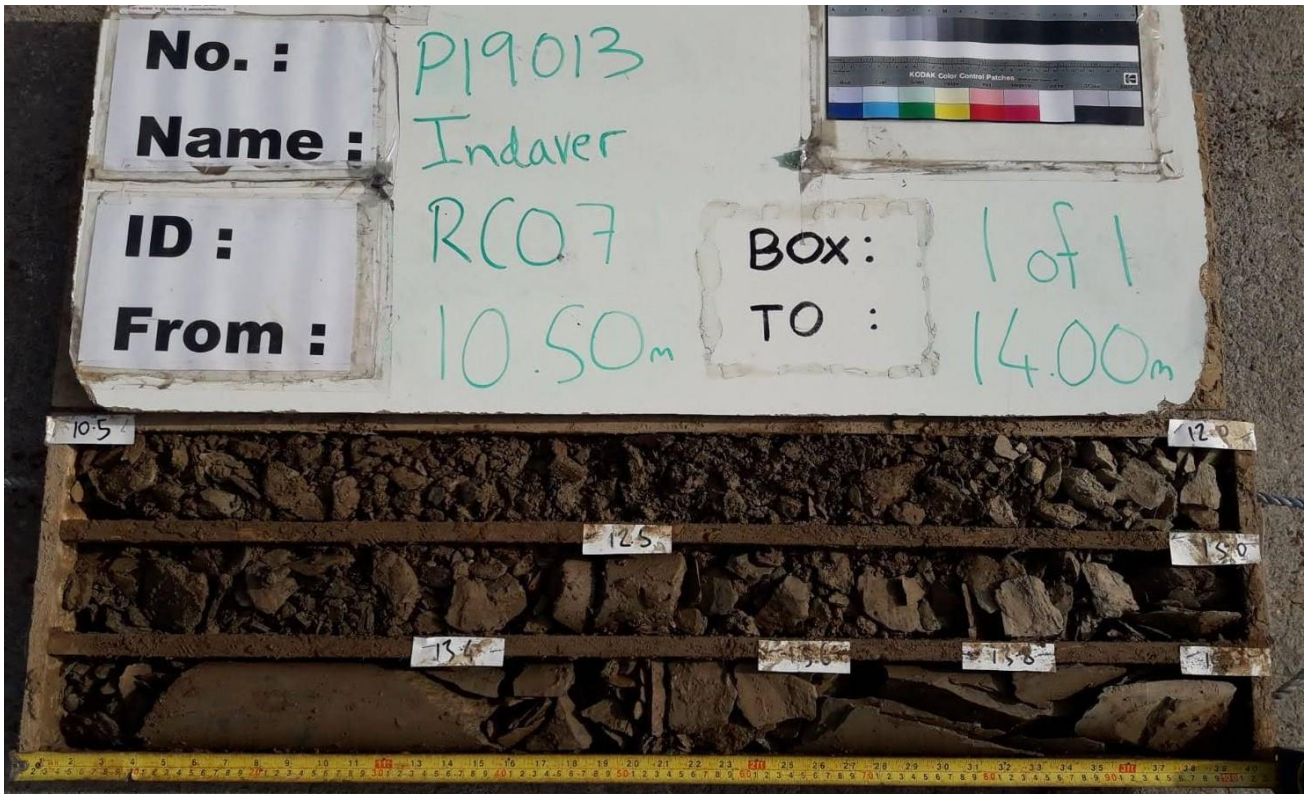
Remarks:

Borehole terminated at 14.00m bgl.

Shift Data:

Groundwater (m bgl)	Shift	Hole Depth (m bgl)	Remarks
	15/04/2019 10:00	0.00	Start of shift.
Dry.	15/04/2019 18:00	10.50	End of shift.
9.00	16/04/2019 08:00	10.50	Start of shift.
9.00	16/04/2019 15:00	14.00	End of borehole.

Photographic Record



Number:	**RC07**	**Project** **Project No** **Engineer**	Indaver Ringaskiddy Co. Cork. P19013 Indaver Ireland Ltd	

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Drilled By:	Borehole No.
PC	**BH08**
Logged By:	Sheet 1 of 1
OD	

Project Name:	Indaver	**Project No.** P19013	**Co-ords:**	579128E - 564325N	**Hole Type** CP
Location:	Ringaskiddy, Co. Cork		**Level:**	3.12m OD	**Scale** 1:50
Client:	Indaver Ireland		**Date:**	02/05/2019 - 02/05/2019	

Well Backfill	Water Strike (m bgl)	Sample and In Situ Testing			Depth (m bgl)	Level (mOD)	Legend	Stratum Description
		Depth (m bgl)	Type	Results				
		0.00 - 1.00	B					Stiff, light brown, slightly sandy gravelly CLAY with cobble content.
		1.00 - 2.00	B					
		1.00	SPT (C)	N=36 (5,6/8,8,9,11)				
		2.00	SPT (C)	N=40 (8,9/10,10,11,9)				
		3.00	SPT (C)	0 (25 for 0mm/0 for 0mm)	3.10	0.02		End of Borehole at 3.100m

Groundwater:

Struck (m bgl)	Rose to	After (mins)	Sealed	Comment
				None encountered.

Hole Information:

Depth (m bgl)	Hole Dia (mm)	Casing Dia (mm)
3.10	200	200

Equipment: Dando 2000

Chiselling Details:

Top (m)	Base (m)	Duration (hh:mm)	Tool
1.60	1.75	00:30	Chisel
2.80	2.90	00:30	Chisel
3.00	3.10	01:00	Chisel

Remarks:

Borehole terminated at 3.10m bgl due to obstruction.

Shift Data:

GW (m bgl)	Shift	Depth (m bgl)	Remarks
	02/05/2019 08:00	0.00	Start of shift.
Dry	02/05/2019 18:00	3.10	End of borehole.

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Project Name:	Indaver	**Project No.** P19013	**Co-ords:**	579128E - 564325N	**Hole Type** Rotary cored
Location:	Ringaskiddy, Co. Cork		**Level:**	3.12m OD	**Scale** 1:50
Client:	Indaver Ireland		**Dates:**	11/04/2019	11/04/2019

Well	Water Strike (m)	Depth (m)	Type /Fs (min, max, avg)	Coring (%) TCR	SCR	RQD	Depth (m) / FI (/m)	Level (mOD)	Legend	Stratum Description
										Open hole boring. Driller described: Stiff, CLAY.
		N=15 (5,4/4,3,4,4) (C)								
		N=18 (4,6/5,5,4,4) (C)								
		N=24 (5,5/6,5,8,5) (C)								
	▼	N=49 (11,14/10,12,14,13) (C)								
		N=52 (10,12/12,10,14,16) (C)								
		~~25 (19,20/25 for 0mm)~~ 8.50 (C) 9.20		100	100	14	8.50 6/m	-5.38		Lithology: Weak to strong, grey, MUDSTONE.

Groundwater:

Struck (m bgl)	Rose to	After (min)	Sealed	Comment
6.00				See shift data.

Hole Information:

Hole Depth (m bgl)	Hole Dia (mm)	Casing Dia (mm)
11.50	76	131

Equipment:	Deltabase 520
Method:	Compressed air mist.

Remarks:

Borehole terminated at 11.50m bgl. Standpipe installed. Depth response zone from 6.00m to 11.50m bgl.

Shift Data:

Groundwater (m bgl)	Shift	Hole Depth (m bgl)	Remarks
	11/04/2019 08:00	0.00	Start of shift.
4.8	11/04/2019 18:00	11.50	End of borehole.

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Project Name:	Indaver	**Project No.** P19013	**Co-ords:**	579128E - 564325N	**Hole Type** Rotary cored
Location:	Ringaskiddy, Co. Cork		**Level:**	3.12m OD	**Scale** 1:50
Client:	Indaver Ireland		**Dates:**	11/04/2019	11/04/2019

Well	Water Strike (m)	Depth (m)	Type /Fs (min, max, avg)	Coring (%) TCR	SCR	RQD	Depth (m) / FI (/m)	Level (mOD)	Legend	Stratum Description
			40mm 130mm 80mm							Lithology: Weak to strong, grey, MUDSTONE. Weathering: Relatively fresh, though most fractures have light clay smearing.
		9.20 - 10.00		100	57	0	8/m			Fractures: Heavily fractured. Set 1 dipping 70 degrees, closely spaced, sub-planar smooth to undulated smooth. Set 2 dipping 0 to 15 degrees, close to medium spacing, sub-planar rough to stepped.
		10.00 - 11.50	10mm 180mm 80mm 10mm 160mm 70mm	100	100	0	8/m			Detail: Not intact from 9.20m to 9.40m and 9.95m to 10.05m bgl.
							11.50	-8.38		End of Borehole at 11.500m

Groundwater:

Struck (m bgl)	Rose to	After (min)	Sealed	Comment
6.00				See shift data.

Hole Information:

Hole Depth (m bgl)	Hole Dia (mm)	Casing Dia (mm)
11.50	76	131

Equipment: Deltabase 520

Method: Compressed air mist.

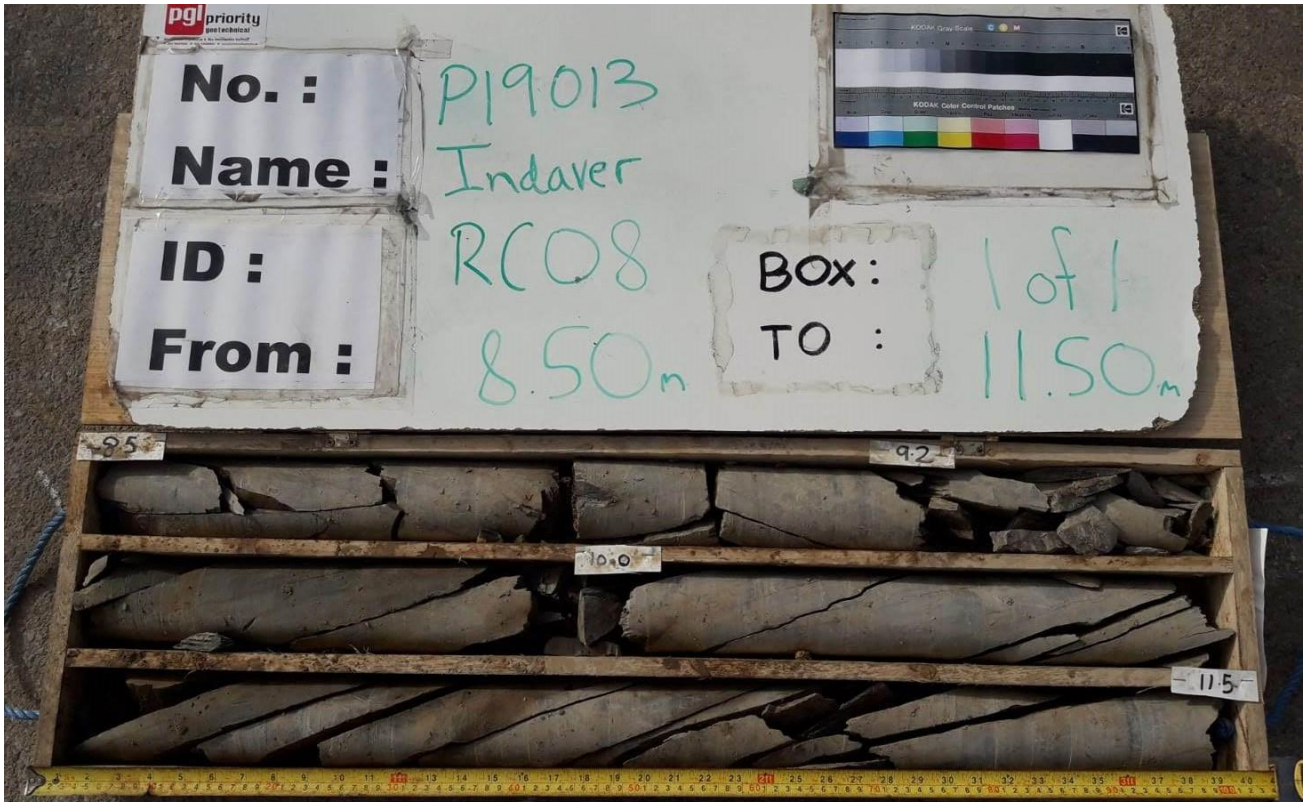
Remarks:

Borehole terminated at 11.50m bgl. Standpipe installed. Depth response zone from 6.00m to 11.50m bgl.

Shift Data:

Groundwater (m bgl)	Shift	Hole Depth (m bgl)	Remarks
	11/04/2019 08:00	0.00	Start of shift.
4.8	11/04/2019 18:00	11.50	End of borehole.

Photographic Record



Number:	**RC08**	**Project**	Indaver Ringaskiddy Co. Cork.	
		Project No	P19013	
		Engineer	Indaver Ireland Ltd	

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Project Name:	Indaver	**Project No.** P19013	**Co-ords:**	579146E - 564289N	**Hole Type** CP
Location:	Ringaskiddy, Co. Cork		**Level:**	5.80m OD	**Scale** 1:50
Client:	Indaver Ireland		**Date:**	26/04/2019 - 19/04/2019	

Well Backfill	Water Strike (m bgl)	Sample and In Situ Testing: Depth (m bgl)	Type	Results	Depth (m bgl)	Level (mOD)	Legend	Stratum Description
		0.00 - 1.00	B					Brown, slightly gravelly SILT. Gravel is fine to coarse, angular to sub-rounded and of varied lithology.
		1.00 - 2.00 1.00	B SPT (C)	N=16 (3,3/4,4,4,4)	1.00	4.80		Stiff, brown, slightly gravelly SILT with medium cobble content and low organic content. Gravel is fine to coarse, sub-angular to sub-rounded and of varied lithology. Cobbles are 63mm to 100mm dia, sub-rounded to sub-angular and of varied lithology. Organic content is wood and branches or roots.
		2.00 - 3.00 2.00	B SPT (C)	N=17 (4,4/5,4,4,4)				
		3.00 - 4.00 3.30	B SPT (C)	N=19 (4,4/4,5,5,5)				
		4.00 - 5.50	B		4.00	1.80		Brown, gravelly SILT with high cobble content. Gravel is fine to coarse and sub-angular to sub-rounded. Cobbles are 63mm to 160mm dia and angular to sub-angular.
		5.50 - 7.00 5.50	B SPT (C)	N=27 (5,6/6,7,7,7)	5.50	0.30		Stiff, brown, slightly sandy gravelly SILT with low cobble content. Sand is fine to coarse. Gravel is fine to coarse and angular to sub-rounded. Cobbles are 63mm to 95mm dia and angular.
		7.00	SPT (C)	N=55 (5,6/5,10,15,25)				
					7.60	-1.80		End of Borehole at 7.600m

Groundwater:

Struck (m bgl)	Rose to	After (mins)	Sealed	Comment
				None encountered.

Hole Information:

Depth (m bgl)	Hole Dia (mm)	Casing Dia (mm)
7.60	200	200

Equipment: Dando 2000.

Chiselling Details:

Top (m)	Base (m)	Duration (hh:mm)	Tool
3.30	4.00	01:00	Chisel.
7.50	7.50	01:00	Chisel.

Remarks:

Borehole terminated at 7.60m bgl due to obstruction.

Shift Data:

GW (m bgl)	Shift	Depth (m bgl)	Remarks
	26/04/2019 08:00	0.00	Start of shift.
Dry	26/04/2019 18:00	5.50	End of shift.
Dry	29/04/2019 08:00	5.50	Start of shift.
Dry	29/04/2019 18:00	7.60	End of borehole.

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Project Name: Indaver	**Project No.** P19013	**Co-ords:** 579146E - 564289N	**Hole Type** Rotary cored
Location: Ringaskiddy, Co. Cork		**Level:** 5.80m OD	**Scale** 1:50
Client: Indaver Ireland		**Dates:** 28/03/2019	04/04/2019

Well	Water Strike (m)	Depth (m)	Type /Fs (min, max, avg)	Coring (%) TCR	SCR	RQD	Depth (m) / Fl (/m)	Level (mOD)	Legend	Stratum Description
										Open hole boring. Driller described: CLAY with boulder content.
		N=15 (3,3/4,4,3,4) (C)								
		N=17 (6,5/4,5,4,4) (C)								
		N=30 (7,6/7,7,8,8) (C)								
		N=17 (3,4/4,2,5,6) (C)								
		N=32 (6,5/9,8,7,8) (C)								
							9.00	-3.20		

1 2 3 4 5 6 7 8 9

Groundwater:

Struck (m bgl)	Rose to	After (min)	Sealed	Comment
10.00				See shift data.

Hole Information:

Hole Depth (m bgl)	Hole Dia (mm)	Casing Dia (mm)
13.40	76	131

Equipment:	Deltabase 520
Method:	Compressed air mist.

Remarks:

Borehole terminated at 13.40m bgl.

Shift Data:

Groundwater (m bgl)	Shift	Hole Depth (m bgl)	Remarks
	28/03/2019 08:00	0.00	Start of shift.
Dry	28/03/2019 18:00	3.00	End of shift.
Dry	29/03/2019 08:00	3.00	Start of shift.
Dry	29/03/2019 18:00	7.50	End of shift.
Dry	03/04/2019 08:00	7.50	Start of shift.
Dry.	03/04/2019 18:00	10.40	End of shift.

pgl priority geotechnical	**Priority Geotechnical Ltd.** **Tel: 021 4631600** **Fax: 021 4638690** **www.prioritygeotechnical.ie**	**Drilled By:** KM **Logged By:** SR	Borehole No. **RC09** Sheet 2 of 2

Project Name:	Indaver	**Project No.** P19013	**Co-ords:**	579146E - 564289N	**Hole Type** Rotary cored
Location:	Ringaskiddy, Co. Cork		**Level:**	5.80m OD	**Scale** 1:50
Client:	Indaver Ireland		**Dates:**	28/03/2019	04/04/2019

Well	Water Strike (m)	Depth (m)	Type /Fs (min, max, avg)	Coring (%) TCR	SCR	RQD	Depth (m) / Fl (/m)	Level (mOD)	Legend	Stratum Description
		N=44 (10,12/14,12,9,9) (C)								Open hole boring. Driller described: CLAY with boulder content. Possible weathered rock.
		~~25 (17,20/25 for 0mm)~~ (C)					10.40	-4.60		
		10.40 - 11.40	10mm 150mm 50mm	100	55	0	6/m			Lithology: Weak to strong, light grey, MUDSTONE. Weathering: Light to moderate weathering; moderate to heavy clay smear on fractures, with some possible evidence of dissolution in the rock (small, rare cavities).
		11.40 - 11.90		100	100	60				
		11.90 - 13.40	80mm 230mm 160mm 10mm 450mm 180mm	97	97	35	6/m 5/m			Fractures: Heavily fractures from 10.40 to 11.40m bgl. lightly fractures from 11.40 to 13.40m bgl. 1st set dips 0 to 20 degrees, with close to medium spacing and undulate rough to stepped rough fracture surface texture. 2nd set dips 75 to 90 degrees, with very close to medium spacing and undulate rough to sub-planar smooth fracture surface texture. *11.30 - 11.40 Not intact*
							13.40	-7.60		End of Borehole at 13.400m

10 11 12 13 14 15 16 17 18

Groundwater:

Struck (m bgl)	Rose to	After (min)	Sealed	Comment
10.00				See shift data.

Hole Information:

Hole Depth (m bgl)	Hole Dia (mm)	Casing Dia (mm)
13.40	76	131

Equipment:	Deltabase 520
Method:	Compressed air mist.

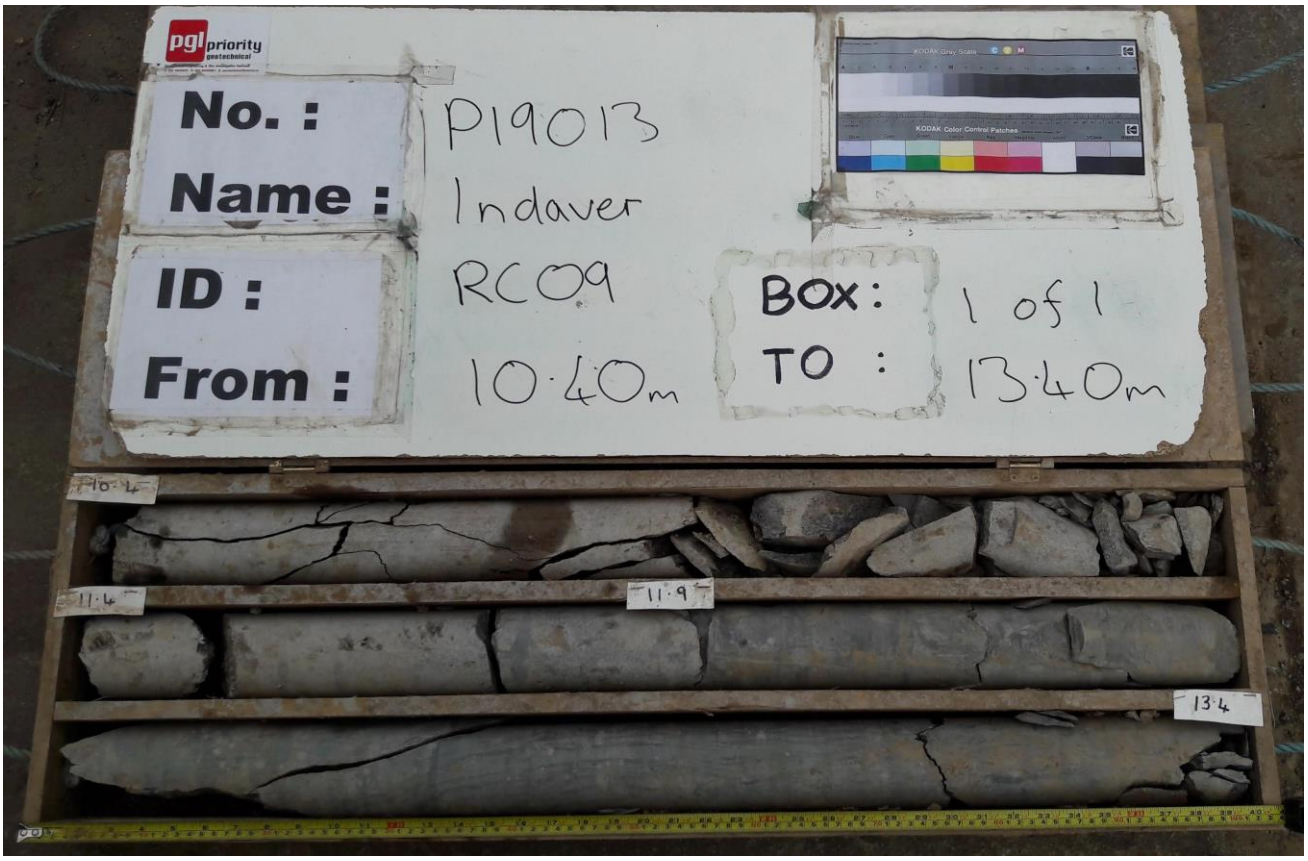
Remarks:

Borehole terminated at 13.40m bgl.

Shift Data:

Groundwater (m bgl)	Shift	Hole Depth (m bgl)	Remarks
	28/03/2019 08:00	0.00	Start of shift.
Dry	28/03/2019 18:00	3.00	End of shift.
Dry	29/03/2019 08:00	3.00	Start of shift.
Dry	29/03/2019 18:00	7.50	End of shift.
Dry	03/04/2019 08:00	7.50	Start of shift.
Dry.	03/04/2019 18:00	10.40	End of shift.

Photographic Record



Number:	**RC09**	**Project** **Project No** **Engineer**	Indaver Ringaskiddy Co. Cork. P19013 Indaver Ireland Ltd	

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Drilled By:	Borehole No.
PC	**BH10**
Logged By:	Sheet 1 of 1
PH/SR	

Project Name:	Indaver	**Project No.** P19013	**Co-ords:**	579135E - 564242N	**Hole Type** CP
Location:	Ringaskiddy, Co. Cork		**Level:**	10.72m OD	**Scale** 1:50
Client:	Indaver Ireland		**Date:**	25/04/2019 - 25/04/2019	

Well Backfill	Water Strike (m bgl)	Sample and In Situ Testing			Depth (m bgl)	Level (mOD)	Legend	Stratum Description
		Depth (m bgl)	Type	Results				
		0.00 - 1.00	B					Brown, slightly gravelly SILT with low cobble content. Gravel is fine to coarse and sub-rounded. Cobbles are 63mm to 80mm dia and sub-rounded.
		1.00 - 2.00 1.00	B SPT (C)	N=9 (2,2/2,2,2,3)	1.00	9.72		Firm, brown, slightly gravelly sandy CLAY. Sand is fine to coarse. Gravel is fine to coarse and sub-angular to sub-rounded.
		2.00 - 3.00 2.00	B SPT (C)	N=15 (2,3/3,4,4,4)				
		3.00 - 4.00 3.00	B SPT (C)	N=18 (2,3/4,4,5,5)	3.00	7.72		Medium dense, brown, slightly silty SAND. Sand is fine to coarse.
		4.00 - 5.50 4.00	B SPT (C)	N=20 (4,4/5,5,5,5)	4.00	6.72		Medium dense, brown, slightly silty SAND. Sand is fine.
		5.50 - 7.00 5.50	B SPT (C)	N=33 (6,8/8,9,8,8)	5.50	5.22		Stiff, brown, slightly gravelly sandy CLAY. Sand is fine to coarse. Gravel is fine to coarse and sub-angular to sub-rounded.
		7.00 - 8.50 7.00	B SPT (C)	N=44 (8,9/10,10,11,13)	7.00	3.72		Stiff, brown, slightly sandy slightly gravelly SILT/CLAY. Driller noted angular cobble content. Sand is fine to coarse. Gravel is fine to coarse and sub-angular to rounded.
		8.50	SPT (C)	25 (39 for 85mm/25 for 0mm)	8.70	2.02		End of Borehole at 8.700m

1 2 3 4 5 6 7 8 9

Groundwater:

Struck (m bgl)	Rose to	After (mins)	Sealed	Comment
				None encountered.

Hole Information:

Depth (m bgl)	Hole Dia (mm)	Casing Dia (mm)
8.70	200	200

Equipment: Dando 2000.

Chiselling Details:

Top (m)	Base (m)	Duration (hh:mm)	Tool
8.60	8.70	01:00	Chisel.

Remarks:

Borehole terminated at 8.70m bgl due to refusal.

Shift Data:

GW (m bgl)	Shift	Depth (m bgl)	Remarks
	25/04/2019 08:00	0.00	Start of shift.
Dry	25/04/2019 18:00	8.70	End of borehole.

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Drilled By:	Borehole No.
KM	**RC10**
Logged By:	Sheet 1 of 2
SR	

Project Name:	Indaver	**Project No.** P19013	**Co-ords:**	579135E - 564242N	**Hole Type** Rotary cored
Location:	Ringaskiddy, Co. Cork		**Level:**	10.72m OD	**Scale** 1:50
Client:	Indaver Ireland		**Dates:**	11/04/2019	12/04/2019

Well	Water Strike (m)	Depth (m)	Type /Fs (min, max, avg)	Coring (%) TCR	SCR	RQD	Depth (m) / Fl (/m)	Level (mOD)	Legend	Stratum Description
										Open hole boring. Driller described: Stiff, CLAY.
		N=18 (5,4/4,5,6,3) (C)								
		N=14 (3,6/3,3,4,4) (C)								
		N=23 (4,6/6,5,6,6) (C)								
		N=35 (7,8/7,10,9,9) (C)								
	▼	N=29 (10,11/10,6,7,6) (C)								

1 2 3 4 5 6 7 8 9

Groundwater:

Struck (m bgl)	Rose to	After (min)	Sealed	Comment
9.10				See shift data.
8.00				See shift data.

Hole Information:

Hole Depth (m bgl)	Hole Dia (mm)	Casing Dia (mm)
15.10	76	131

Equipment:	Deltabase 520
Method:	Compressed air mist.

Remarks:

Borehole terminated at 15.10m bgl.

Shift Data:

Groundwater (m bgl)	Shift	Hole Depth (m bgl)	Remarks
Dry.	11/04/2019 08:00	0.00	Start of shift.
Dry.	11/04/2019 18:00	10.10	End of shift.
9.10	12/04/2019 08:00	10.10	Start of shift.
8.00	12/04/2019 18:00	15.10	End of borehole.

pgl priority geotechnical	**Priority Geotechnical Ltd.** **Tel: 021 4631600** **Fax: 021 4638690** **www.prioritygeotechnical.ie**	**Drilled By:** KM **Logged By:** SR	Borehole No. **RC10** Sheet 2 of 2

Project Name: Indaver	**Project No.** P19013	**Co-ords:** 579135E - 564242N	**Hole Type** Rotary cored
Location: Ringaskiddy, Co. Cork		**Level:** 10.72m OD	**Scale** 1:50
Client: Indaver Ireland		**Dates:** 11/04/2019	12/04/2019

Well	Water Strike (m)	Depth (m)	Type /Fs (min, max, avg)	Coring (%) TCR	SCR	RQD	Depth (m) / FI (/m)	Level (mOD)	Legend	Stratum Description
		N=38 (8,8/7,10,11,10) (C)								Open hole boring. Driller described: Stiff, CLAY.
		0 (44 for 140mm/0 for 0mm) 10.10 - 10.90 (C)		100	0	0	10.10	0.62		Lithology: Weak to strong, grey, MUDSTONE. Weathering: Moderately weathered; most fractures have a moderate to heavy clay smear and orange/brown/black staining. Fractures: Moderately to heavily fractured. Dominated by steep to sub-vertical fractures, though mostly solid and intact with some portions not intact. Poor RQD due to steep fractures. Main, prevalent set dips 75 to 85 degrees, with very close to close spacing and undulate smooth fracture surface texture. 2nd set dips 10 to 25 degrees, with close to medium spacing and undulate to stepped rough fracture surface texture. *10.10 - 10.90 Not intact* *11.90 - 12.10 Not intact* *13.00 - 13.10 Not intact* *13.70 - 13.85 Not intact*
		10.90 - 12.10	10mm 70mm 50mm	100	79	0	8/m			
		12.10 - 13.10	10mm 280mm 50mm	90	90	10	6/m			
		13.10 - 13.60	15mm 110mm 30mm	100	100	0	7/m			
		13.60 - 15.10	10mm 300mm 260mm	97	87	13	4/m			
							15.10	-4.38		End of Borehole at 15.100m

Groundwater:

Struck (m bgl)	Rose to	After (min)	Sealed	Comment
9.10				See shift data.
8.00				See shift data.

Hole Information:

Hole Depth (m bgl)	Hole Dia (mm)	Casing Dia (mm)
15.10	76	131

Equipment:	Deltabase 520
Method:	Compressed air mist.

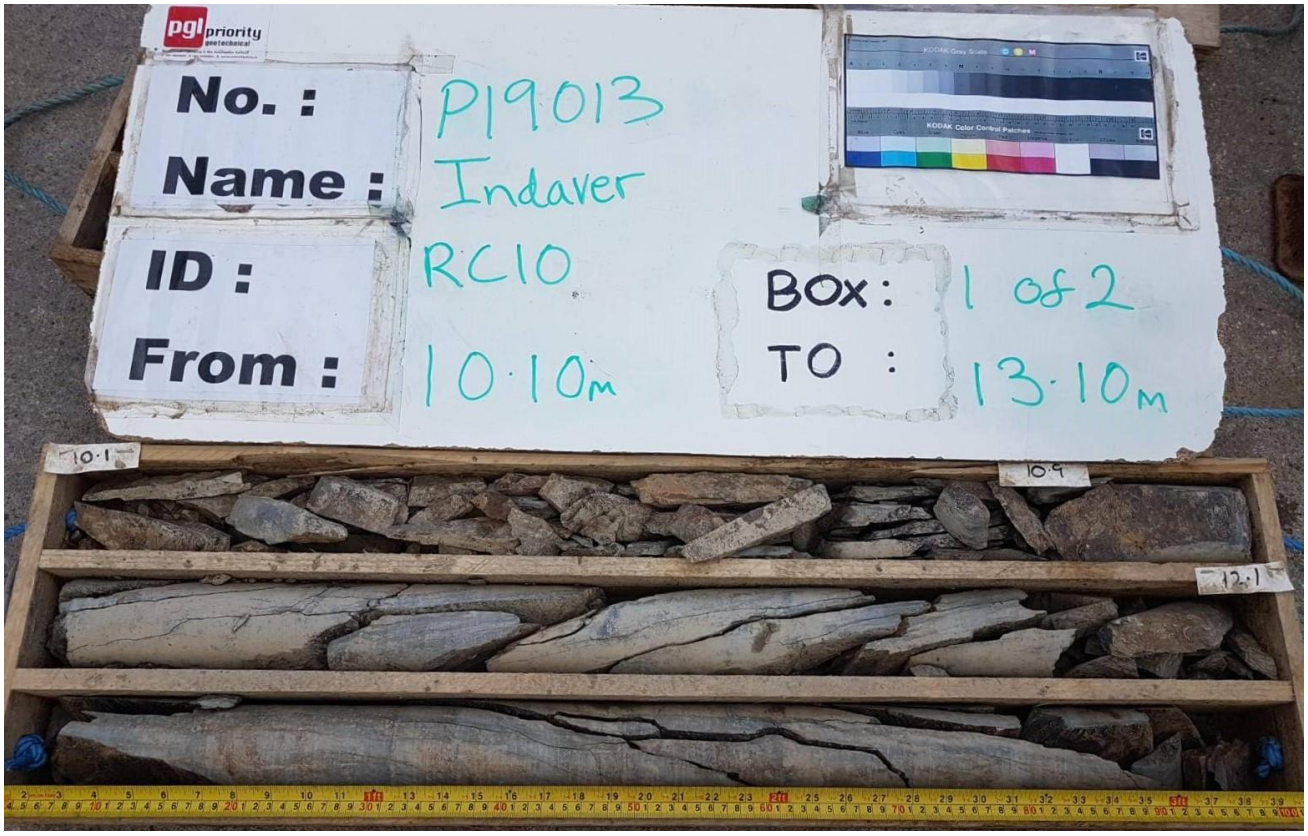
Remarks:

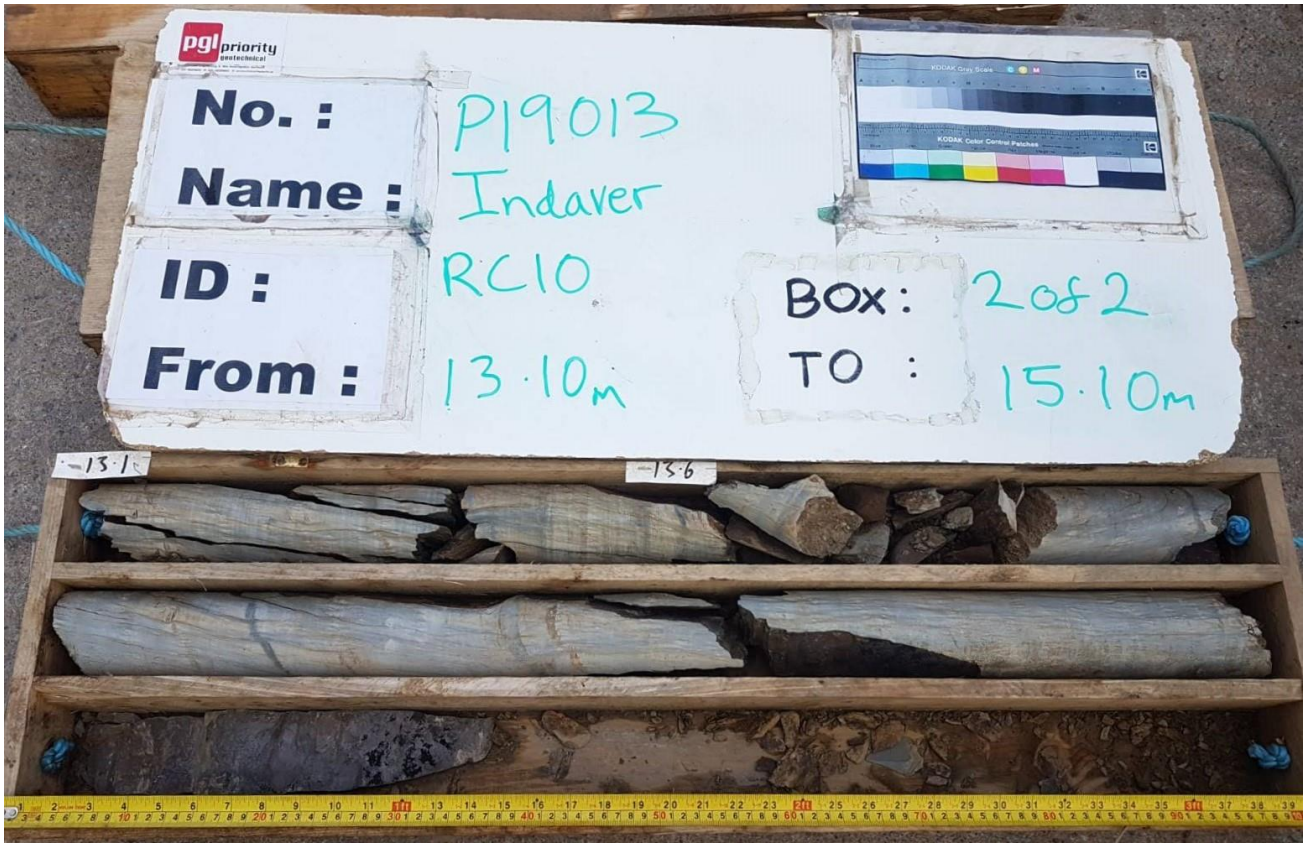
Borehole terminated at 15.10m bgl.

Shift Data:

Groundwater (m bgl)	Shift	Hole Depth (m bgl)	Remarks
Dry.	11/04/2019 08:00	0.00	Start of shift.
Dry.	11/04/2019 18:00	10.10	End of shift.
9.10	12/04/2019 08:00	10.10	Start of shift.
8.00	12/04/2019 18:00	15.10	End of borehole.

Photographic Record





Number:	**RC10**	**Project**	Indaver Ringaskiddy Co. Cork.	
		Project No	P19013	
		Engineer	Indaver Ireland Ltd	

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Project Name:	Indaver	**Project No.** P19013	**Co-ords:**	579123E - 564199N	**Hole Type** CP
Location:	Ringaskiddy, Co. Cork		**Level:**	15.28m OD	**Scale** 1:50
Client:	Indaver Ireland		**Date:**	24/04/2019 - 09/05/2504	

Well Backfill	Water Strike (m bgl)	Sample and In Situ Testing: Depth (m bgl)	Type	Results	Depth (m bgl)	Level (mOD)	Legend	Stratum Description
		0.00 - 1.00	B					Stiff, light brown, slightly gravelly CLAY with low cobble content. Gravel is fine to coarse, sub-angular to sub-rounded. Cobbles are 63mm to 170mm, sub-angular to sub-rounded.
		1.00 - 2.00 1.00	B SPT (C)	N=14 (2,2/3,3,4,4)				
		2.00 - 3.00 2.00	B SPT (C)	N=17 (4,4/4,5,4,4)	2.00	13.28		Stiff, light brown, slightly sandy gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is fine to coarse, sub-angular to sub-rounded. Cobbles are 63mm to 160mm dia, sub-angular to sub-rounded.
		3.00 - 4.00 3.00	B SPT (C)	N=26 (5,5/6,6,7,7)				
		4.00 - 5.50 4.00	B SPT (C)	N=26 (6,6/7,6,6,7)				
		5.50 - 7.00 5.50	B SPT (C)	N=30 (6,6/5,8,9,8)				
		7.00	SPT (C)	45 (8,9/45 for 150mm)				
		7.50 - 8.50	B					
		8.50 - 10.00	B					

Groundwater:

Struck (m bgl)	Rose to	After (mins)	Sealed	Comment
				None encountered.

Hole Information:

Depth (m bgl)	Hole Dia (mm)	Casing Dia (mm)
10.40	200	200

Equipment: Dando 2000

Chiselling Details:

Top (m)	Base (m)	Duration (hh:mm)	Tool
7.40	7.60	01:00	Chisel
10.20	10.40	01:00	Chisel

Remarks:

Borehole terminated at 5.50m bgl due to obstruction.

Shift Data:

GW (m bgl)	Shift	Depth (m bgl)	Remarks
	24/04/2019 08:00	0.00	Start of shift.
Dry	24/04/2019 18:00	8.50	End of borehole.
Dry	25/04/2019 08:00	8.50	Start of shift.
Dry	25/04/2019 18:00	10.40	End of borehole.

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Drilled By:	Borehole No.
PC	**BH11**
Logged By:	Sheet 2 of 2
OD	

Project Name:	Indaver	**Project No.** P19013	**Co-ords:**	579123E - 564199N	**Hole Type** CP
Location:	Ringaskiddy, Co. Cork		**Level:**	15.28m OD	**Scale** 1:50
Client:	Indaver Ireland		**Date:**	24/04/2019 - 09/05/2504	

Well Backfill	Water Strike (m bgl)	Sample and In Situ Testing			Depth (m bgl)	Level (mOD)	Legend	Stratum Description
		Depth (m bgl)	Type	Results				
		10.00	SPT (C)	40 (10,15/40 for 75mm)	10.40	4.88		Stiff, light brown, slightly sandy gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is fine to coarse, sub-angular to sub-rounded. Cobbles are 63mm to 160mm dia, sub-angular to sub-rounded.
								End of Borehole at 10.400m

10 11 12 13 14 15 16 17 18

Groundwater:

Struck (m bgl)	Rose to	After (mins)	Sealed	Comment
				None encountered.

Hole Information:

Depth (m bgl)	Hole Dia (mm)	Casing Dia (mm)
10.40	200	200

Equipment: Dando 2000

Chiselling Details:

Top (m)	Base (m)	Duration (hh:mm)	Tool
7.40	7.60	01:00	Chisel
10.20	10.40	01:00	Chisel

Remarks:

Borehole terminated at 5.50m bgl due to obstruction.

Shift Data:

GW (m bgl)	Shift	Depth (m bgl)	Remarks
	24/04/2019 08:00	0.00	Start of shift.
Dry	24/04/2019 18:00	8.50	End of borehole.
Dry	25/04/2019 08:00	8.50	Start of shift.
Dry	25/04/2019 18:00	10.40	End of borehole.

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Project Name:	Indaver	**Project No.** P19013	**Co-ords:**	579123E - 564199N	**Hole Type** Rotary cored
Location:	Ringaskiddy, Co. Cork		**Level:**	15.28m OD	**Scale** 1:50
Client:	Indaver Ireland		**Dates:**	12/04/2019	15/04/2019

Well	Water Strike (m)	Depth (m)	Type /Fs (min, max, avg)	Coring (%) TCR	SCR	RQD	Depth (m) / Fl (/m)	Level (mOD)	Legend	Stratum Description
										Open hole boring. Driller described: Stiff, CLAY.
		N=32 (6,6/8,7,8,9) (C)								
		N=29 (2,9/8,8,6,7) (C)								
		N=22 (4,9/9,4,3,6) (C)								
		N=33 (7,7/8,9,9,7) (C)								
		N=47 (10,11/11,12,14,10) (C)								

1 2 3 4 5 6 7 8 9

Groundwater:

Struck (m bgl)	Rose to	After (min)	Sealed	Comment
				See shift data.

Hole Information:

Hole Depth (m bgl)	Hole Dia (mm)	Casing Dia (mm)
14.00	76	131

Equipment: Deltabase 520

Method: Compressed air.

Remarks:

Borehole terminated at 14.00m bgl.

Shift Data:

Groundwater (m bgl)	Shift	Hole Depth (m bgl)	Remarks
	12/04/2019 08:00	0.00	Start of shift.
Dry.	12/04/2019 18:00	13.50	End of shift.
10.0	15/04/2019 08:00	13.50	Start of shift.
10.0	15/04/2019 10:00	14.00	End of borehole.

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Project Name:	Indaver	**Project No.** P19013	**Co-ords:**	579123E - 564199N	**Hole Type** Rotary cored
Location:	Ringaskiddy, Co. Cork		**Level:**	15.28m OD	**Scale** 1:50
Client:	Indaver Ireland		**Dates:**	12/04/2019	15/04/2019

Well	Water Strike (m)	Depth (m)	Type /Fs (min, max, avg)	Coring (%) TCR	SCR	RQD	Depth (m) / Fl (/m)	Level (mOD)	Legend	Stratum Description
		N=47 (12,12/14,10,12,11) (C) N=73 (10,9/14,16,18,25) (C)								Open hole boring. Driller described: Stiff, CLAY.
		11.00 - 12.50	30mm 210mm 130mm	100	86	30	11.00 5/m	4.28		Lithology: Weak to strong, grey MUDSTONE. Weathering: Moderately weathered; most fractures have a moderate to heavy clay smear and orange/brown/black staining. Fractures: Moderately to heavily fractured. Dominated by steep to sub-vertical fractures, though mostly solid and intact with some portions not intact. Poor RQD due to steep fractures. Main, prevalent set dips 70 to 80 degrees, with very close to close spacing and undulate smooth fracture surface texture. 2nd set dips 20 to 30 degrees, with close to medium spacing and undulate rough fracture surface texture.
		12.50 - 14.00	50mm 100mm 80mm 60mm 190mm 90mm	100	93	9	6/m 8/m 14.00	1.28		End of Borehole at 14.000m

Groundwater:

Struck (m bgl)	Rose to	After (min)	Sealed	Comment
				See shift data.

Hole Information:

Hole Depth (m bgl)	Hole Dia (mm)	Casing Dia (mm)
14.00	76	131

Equipment:	Deltabase 520
Method:	Compressed air.

Remarks:

Borehole terminated at 14.00m bgl.

Shift Data:

Groundwater (m bgl)	Shift	Hole Depth (m bgl)	Remarks
	12/04/2019 08:00	0.00	Start of shift.
Dry.	12/04/2019 18:00	13.50	End of shift.
10.0	15/04/2019 08:00	13.50	Start of shift.
10.0	15/04/2019 10:00	14.00	End of borehole.

Photographic Record

Number:	**RC11**	**Project** **Project No** **Engineer**	Indaver Ringaskiddy Co. Cork. P19013 Indaver Ireland Ltd	

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Trial Pit No
TP01
Sheet 1 of 1

Project Name: Indaver	**Project No.** P19013	**Co-ords:** 578951E - 564355N **Level:** 2.39m OD	**Date** 20/02/2019
Location: Ringaskiddy, Co. Cork		**Dimensions (m):** 3.50 x 2.00 **Depth:** 4.50m BGL	**Scale** 1:25
Client: Indaver Ireland			**Logged** DMC

Water Strike & Backfill	Samples & In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m OD)	Legend	Stratum Description
							(TOPSOIL)
	0.50 - 1.50	B		0.40	1.99		Soft, brown, slightly sandy slightly gravelly SILT. Sand is fine to medium.
	2.00 - 2.90	B					
▼	3.00 - 3.50	B		2.90	-0.51		Soft, brown, slightly sandy slightly gravelly SILT with medium cobble content. Sand is fine to coarse. Gravel is fine to coarse and angular to sub-angular. Cobbles are 63mm to 100mm dia, angular and of SANDSTONE lithology.
	4.00 - 4.50	B		3.80	-1.41		MUDSTONE bedrock. Recovered as: GRAVEL and COBBLES. Gravel is coarse and angular. Cobbles are 63mm to 200mm dia and angular.
				4.50	-2.11		End of Pit at 4.500m

Stability: Moderate.
Plant: 13T track machine.
Backfill: Arisings.

Groundwater: 3.60m: Slow rate of flow.

Remarks: Trial pit terminated at required depth.

Photographic Record

Number:	**TP01**	**Project**	Indaver Ringaskiddy Co. Cork.
		Project No	P19013
		Engineer	Indaver Ireland Ltd

Photographic Record

Number:	**TP01**	**Project**	Indaver Ringaskiddy Co. Cork.
		Project No	P19013
		Engineer	Indaver Ireland Ltd

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Trial Pit No
TP02
Sheet 1 of 1

Project Name: Indaver	**Project No.** P19013	**Co-ords:** 578945E - 564329N **Level:** 5.13m OD	**Date** 20/02/2019
Location: Ringaskiddy, Co. Cork		**Dimensions (m):** 5.00 × 3.00 **Depth:** 5.00m BGL	**Scale** 1:25
Client: Indaver Ireland			**Logged** DMC

Water Strike & Backfill	Samples & In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m OD)	Legend	Stratum Description	
				0.60	4.53		(TOPSOIL)	
				0.90	4.23		(MADE GROUND) Soft, brown, gravelly CLAY with tree roots. Gravel is fine to coarse.	
	1.00 - 1.50	B					(MADE GROUND) Soft, brown, slightly sandy gravelly SILT with medium cobble content. Cobbles are sub-angular to angular.	1
	2.00 - 2.50	B						2
	3.00 - 3.50	B		2.90	2.23		Soft, grey brown, slightly gravelly sandy SILT with low cobble content. Sand is fine to coarse. Gravel is fine to coarse and angular. Cobbles are 63mm to 150mm dia, sub-angular to sub-rounded and of SANDSTONE lithology.`	3
	4.00 - 5.00	B		3.70	1.43		MUDSTONE bedrock. Recovered as: GRAVEL and COBBLES. Gravel is coarse and angular.	4
▼				5.00	0.13		End of Pit at 5.000m	5

Stability: Moderate.
Plant: 13T track machine.
Backfill: Arisings.

Groundwater: 4.80m: Slow rate of flow.

Remarks: Trial pit terminated at 5.00m bgl. Plate load test undertaken at 1.0m bgl.

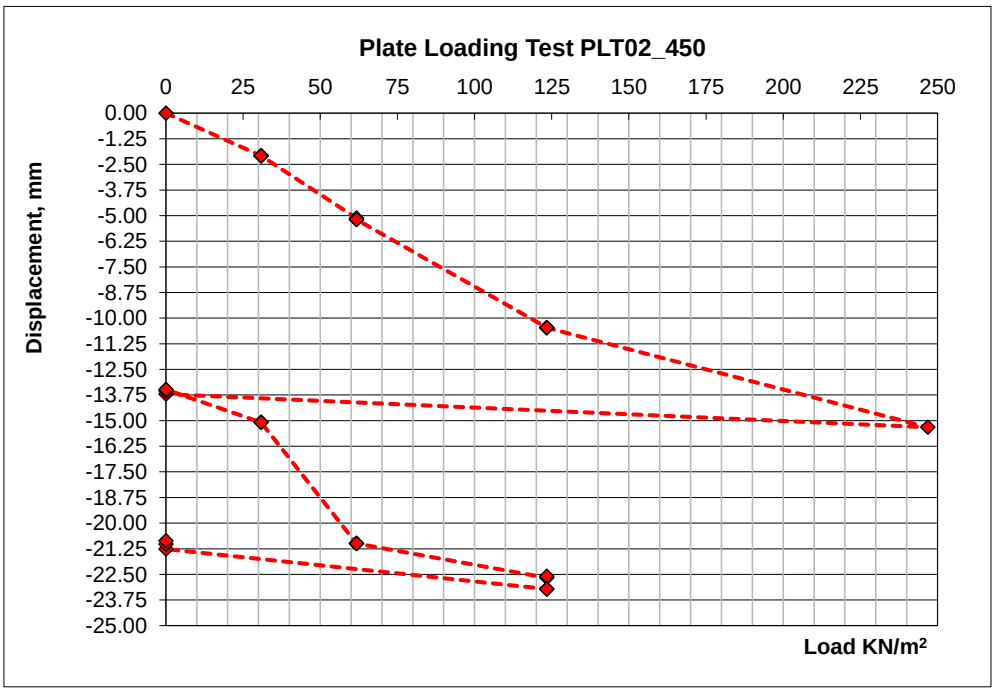
JOB REF:	P19013
JOB Name:	Indaver

Plate Bearing Test	PLT 02	**E: 578944.856**	
Test Number	1	**N: 564328.748**	
Depth	1.00m bgl	**mOD**	**5.126**
Bedding Material			
Date	20/02/2019		
Ground Conditions	Sandy gravelly SILT		
Seating Load	0.75t/ 25kPa		
Plate Diameter	**450** mm		
Plate Area	0.1589625 m2		

	G1	G2	G3	
Zero gauge	**0.00**	**0.00**	**0.00**	**0.00 mm**

Pressure (t)	Pressure (kPa)	Time (min)	Div (mm)	Div (mm)	Div (mm)	Average	D h, mm
0	0	0	0.00	0.00	0.00	0.00	0.00
0.5	31	1	2.12	2.74	1.40	2.09	-2.09
0.5	31	2	2.12	2.74	1.40	2.09	-2.09
0.5	31	3	2.12	2.74	1.40	2.09	-2.09
1	62	1	5.10	6.57	3.70	5.12	-5.12
1	62	2	5.18	6.67	3.71	5.19	-5.19
1	62	3	5.18	6.67	3.71	5.19	-5.19
2	123	1	10.74	13.29	7.36	10.46	-10.46
2	123	2	10.75	13.31	7.36	10.47	-10.47
2	123	3	10.75	13.31	7.36	10.47	-10.47
4	247	1	10.75	22.39	12.84	15.33	-15.33
0	0	1	-	16.94	10.49	13.72	-13.72
0	0	2	-	16.71	10.40	13.56	-13.56
0	0	3	-	16.60	10.36	13.48	-13.48
0.5	31	1	2.03	1.85	0.94	15.09	-15.09
0.5	31	2	2.03	1.86	0.94	15.09	-15.09
1	62	1	5.64	4.18	2.09	17.45	-21.00
1	62	2	5.64	4.18	2.09	17.45	-21.00
1	62	3	5.64	4.18	2.09	17.45	-21.00
2	123	1	7.78	5.82	3.32	19.12	-22.67
2	123	2	7.81	-	3.33	19.05	-22.60
2	123	1	-	-	6.20	19.68	-23.23
2	123	2	-	-	6.19	19.67	-23.22
0	0	1	5.64	4.44	2.64	17.72	-21.27
0	0	2	5.36	4.12	2.52	17.48	-21.03
0	0	3	5.18	3.90	2.42	17.31	-20.86

Load to Achieve 1.25mm of Settlement:	**18** kPa
Subgrade Modulus (MN/m^2/m) k $_{750}$:	**10**
Estimated CBR (NRA DMRB HD25-26 3.62)	**1** %
Plate scaling factor	**0.60**
Plate rigidity factor	**1.18**
Estimated failure load Δh 0.1R	**-** kPa
Estimated undrained shear strength	**-** kPa



Photographic Record

Number:	**TP02**	**Project**	Indaver Ringaskiddy Co. Cork.	
		Project No	P19013	
		Engineer	Indaver Ireland Ltd	

Photographic Record

Number:	**TP02**	**Project**	Indaver Ringaskiddy Co. Cork.
		Project No	P19013
		Engineer	Indaver Ireland Ltd

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Trial Pit No
TP03
Sheet 1 of 1

Project Name: Indaver	**Project No.** P19013	**Co-ords:** 578942E - 564290N **Level:** 7.20m OD	**Date** 20/02/2019
Location: Ringaskiddy, Co. Cork		**Dimensions (m):** 4.00 x 2.00 **Depth:** 3.90m BGL	**Scale** 1:25
Client: Indaver Ireland			**Logged** DMJC

Water Strike & Backfill	Samples & In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m OD)	Legend	Stratum Description
							(TOPSOIL) Firm, brown, gravelly SILT with plastic inclusions. Gravel is fine to coarse and sub-angular.
	0.50 - 1.50	B		0.40	6.80		(MADE GROUND) Soft, brown, silty very sandy GRAVEL with medium cobble content. Cobbles are sub-angular to rounded and of SANDSTONE lithology.
	2.00 - 2.50	B		2.00	5.20		Soft to firm, light brown, slightly sandy gravelly SILT with high cobble content. Sand is fine to coarse. Gravel is fine to coarse and sub-angular. Cobbles are sub-angular to rounded and of SANDSTONE lithology.
	3.00 - 3.50	B					
	3.70 - 3.90	B		3.70	3.50		SANDSTONE bedrock. Recovered as: Angular, blocky COBBLES.
				3.90	3.30		End of Pit at 3.900m

1 2 3 4 5

Stability: Moderate.
Plant: 13T track machine.
Backfill: Arisings.

Groundwater: None encountered.

Remarks: Trial pit terminated at 3.90m bgl due to refusal on suspected SANDSTONE bedrock.

Photographic Record

Number:	**TP03**	**Project**	Indaver Ringaskiddy Co. Cork.	
		Project No	P19013	
		Engineer	Indaver Ireland Ltd	

Photographic Record

Number:	**TP03**	**Project** Indaver Ringaskiddy Co. Cork. **Project No** P19013 **Engineer** Indaver Ireland Ltd	

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Trial Pit No
TP04
Sheet 1 of 1

Project Name: Indaver	**Project No.** P19013	**Co-ords:** 578969E - 564238N **Level:** 11.20m OD	**Date** 21/02/2019
Location: Ringaskiddy, Co. Cork		**Dimensions (m):** 3.00 × 2.00 **Depth:** 1.20m BGL	**Scale** 1:25
Client: Indaver Ireland			**Logged** DMC

Water Strike & Backfill	Samples & In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m OD)	Legend	Stratum Description
							(TOPSOIL).
	0.50 - 1.20	B		0.40	10.80		MUDSTONE bedrock. Recovered as: Angular to tabular COBBLES and BOULDERS.
				1.20	10.00		End of Pit at 1.200m

Stability: Good.
Plant: 13T track machine.
Backfill: Arisings.

Groundwater: None encountered.

Remarks: Trial pit terminated at 1.20m bgl due to refusal on bedrock.

Photographic Record

Number:	**TP04**	**Project**	Indaver Ringaskiddy Co. Cork.
		Project No	P19013
		Engineer	Indaver Ireland Ltd

Photographic Record

Number:	**TP04**	**Project** Indaver Ringaskiddy Co. Cork. **Project No** P19013 **Engineer** Indaver Ireland Ltd	

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Trial Pit No
TP05
Sheet 1 of 1

Project Name: Indaver	**Project No.** P19013	**Co-ords:** 578973E - 564196N **Level:** 25.71m OD	**Date** 21/01/2019
Location: Ringaskiddy, Co. Cork		**Dimensions (m):** 3.50 x 2.00 **Depth:** 2.60m BGL	**Scale** 1:25
Client: Indaver Ireland			**Logged** DMC

Water Strike & Backfill	Samples & In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m OD)	Legend	Stratum Description
							(TOPSOIL)
	0.50 - 1.50	B		0.40	25.31		Firm, brown, slightly sandy gravelly CLAY with medium cobble content. Gravel is fine to coarse.
	1.50 - 2.00	B		1.50	24.21		Very clayey very sandy GRAVEL. Sand is fine to coarse. Gravel is fine to coarse.
	2.30 - 2.60	B		2.30	23.41		SANDSTONE bedrock. Recovered as: Angular COBBLES and BOULDERS.
				2.60	23.11		End of Pit at 2.600m

1
2
3
4
5

Stability: Moderate.
Plant: 13T track machine.
Backfill: Arisings.

Groundwater: None encountered.

Remarks: Trial pit terminated at 2.60m bgl due to refusal on suspected SANDSTONE bedrock.

Photographic Record

Number:	**TP05**	**Project**	Indaver Ringaskiddy Co. Cork.	
		Project No	P19013	
		Engineer	Indaver Ireland Ltd	

Photographic Record

Number:	**TP05**	**Project**	Indaver Ringaskiddy Co. Cork.
		Project No	P19013
		Engineer	Indaver Ireland Ltd

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Trial Pit No
TP06
Sheet 1 of 1

Project Name: Indaver	**Project No.** P19013	**Co-ords:** 579016E - 564278N **Level:** 6.40m OD	**Date** 20/02/2019
Location: Ringaskiddy, Co. Cork		**Dimensions (m):** 3.50 x 2.00	**Scale** 1:25
Client: Indaver Ireland		**Depth:** 4.80m BGL	**Logged** DMC

Water Strike & Backfill	Samples & In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m OD)	Legend	Stratum Description
							(TOPSOIL)
	0.50 - 1.50	B		0.40	6.00		Soft to firm, brown, slightly sandy gravelly CLAY with medium cobble content. Sand is fine to coarse. Gravel is fine to coarse and sub-angular. Cobbles are 63mm to 150mm dia, sub-angular to sub-rounded and of SANDSTONE lithology. *0.40m - 4.80m: Increasing gravel content with depth.*
	2.00 - 2.50	B					
	3.00 - 3.50	B					
	4.00 - 4.80	B					
				4.80	1.60		End of Pit at 4.800m

Stability: Moderate.
Plant: 13T track machine.
Backfill: Arisings.
Groundwater: None encountered.
Remarks: Trial pit terminated at 4.80m bgl, required depth.

Photographic Record

Number:	**TP06**	**Project** Indaver Ringaskiddy Co. Cork. **Project No** P19013 **Engineer** Indaver Ireland Ltd	

Photographic Record

Number:	**TP06**	**Project**	Indaver Ringaskiddy Co. Cork.
		Project No	P19013
		Engineer	Indaver Ireland Ltd

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Trial Pit No
TP07
Sheet 1 of 1

Project Name: Indaver	**Project No.** P19013	**Co-ords:** 579035E - 564234N **Level:** 8.49m OD	**Date** 21/02/2019
Location: Ringaskiddy, Co. Cork		**Dimensions (m):** 4.00 x 3.00 **Depth:** 4.60m BGL	**Scale** 1:25
Client: Indaver Ireland			**Logged** DMC

Water Strike & Backfill	Samples & In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m OD)	Legend	Stratum Description
							(TOPSOIL)
	0.50 - 1.50	B		0.40	8.09		Firm, brown, slightly gravelly CLAY. Gravel is fine to coarse and sub-angular.
	2.00 - 2.40	B					
	2.40 - 3.00	B					
	3.00 - 3.50	B					
▼	3.60 - 4.60	B		3.60	4.89		MUDSTONE bedrock. Recovered as: Angular tabular GRAVEL and COBBLES.
				4.60	3.89		End of Pit at 4.600m

Stability: Good/Moderate.
Plant: 13T track machine.
Backfill: Arisings.

Groundwater: 3.60m: Steady rate of flow.

Remarks: Trial pit terminated at 4.60m bgl. Required depth 4.50m bgl. PBT carried out at 1.20m bgl.

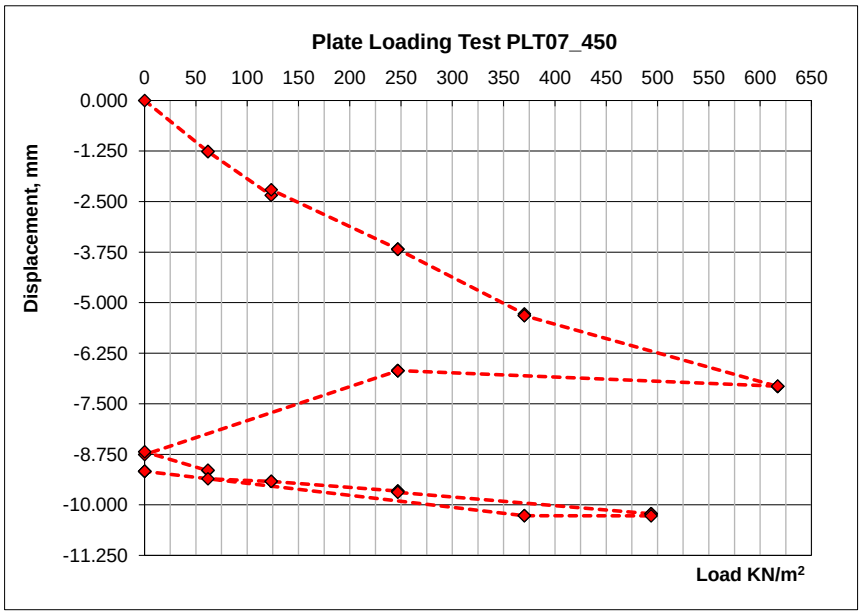
JOB REF:	P19013
JOB Name:	Indaver

Plate Bearing Test	PLT 07	**E: 579034.723**	
Test Number	1	**N: 564234.276**	
Depth	1.20m bgl	**mOD**	**8.493**
Bedding Material			
Date	20/02/2019		
Ground Conditions	Gravelly SILT		
Seating Load	0.75t/ 25kPa		
Plate Diameter	**450** mm		
Plate Area	0.1589625 m2		

	G1	G2	G3	
Zero gauge	**0.00**	**0.00**	**0.00**	**0.00 mm**

Pressure (t)	Pressure (kPa)	Time (min)	Div (mm)	Div (mm)	Div (mm)	Average	D h, mm
0	0	0	0.00	0.00	0.00	0.00	0.000
1	62	1	1.03	1.34	1.42	1.26	-1.263
1	62	2	1.03	1.34	1.42	1.26	-1.263
2	123	1	1.73	2.63	2.68	2.35	-2.347
2	123	2	1.30	2.63	2.70	2.21	-2.210
4	247	1	2.58	4.49	3.94	3.67	-3.670
4	247	2	2.58	4.49	3.97	3.68	-3.680
4	247	3	2.58	4.49	3.97	3.68	-3.680
6	370	1	5.18	5.63	5.02	5.28	-5.277
6	370	2	5.18	5.65	5.14	5.32	-5.323
6	370	3	5.18	5.65	5.14	5.32	-5.323
10	617	1	-	7.30	6.84	7.07	-7.070
10	617	2	-	7.27	6.88	7.08	-7.075
10	617	3	-	7.24	6.89	7.07	-7.065
4	247	1	-	6.64	6.72	6.68	-6.680
4	247	2	-	6.64	6.73	6.69	-6.685
4	247	3	-	6.64	6.73	6.69	-6.685
4	247	4	-	6.64	6.73	6.69	-6.685
0	0	1	-	4.49	5.93	5.21	-8.757
0	0	2	-	4.35	5.93	5.14	-8.687
1	62	1	-	4.88	6.34	5.61	-9.157
1	62	2	-	4.85	6.35	5.60	-9.147
1	62	3	-	5.00	6.62	5.81	-9.357
2	123	1	-	5.10	6.65	5.88	-9.422
2	123	2	-	5.10	6.65	5.88	-9.422
4	247	1	-	5.20	7.02	6.11	-9.657
4	247	2	-	5.20	7.02	6.11	-9.657
4	247	3	-	5.22	7.07	6.15	-9.692
8	494	1	-	5.73	7.62	6.68	-10.222
8	494	2	-	5.73	7.62	6.68	-10.222
8	494	3	-	5.73	7.62	6.68	-10.222
8	494	4	-	5.83	7.62	6.73	-10.272
6	370	1	-	6.11	7.33	6.72	-10.267
6	370	2	-	6.11	7.33	6.72	-10.267
0	0	1	-	5.11	6.14	5.63	-9.172
0	0	2	-	5.11	6.14	5.63	-9.172
0	0	3	-	5.11	6.14	5.63	-9.172

Load to Achieve 1.25mm of Settlement:	**61**	kPa
Subgrade Modulus ($MN/m^2/m$) k_{750}:	**35**	
Estimated CBR (NRA DMRB HD25-26 3.62)	**4**	%
Plate scaling factor	**0.60**	
Plate rigidity factor	**1.18**	
Estimated failure load Δh 0.1R	**194**	kPa
Estimated undrained shear strength	**32**	kPa



Photographic Record

Number:	**TP07**	**Project**	Indaver Ringaskiddy Co. Cork.	
		Project No	P19013	
		Engineer	Indaver Ireland Ltd	

Photographic Record

Number:	**TP07**	**Project** Indaver Ringaskiddy Co. Cork. **Project No** P19013 **Engineer** Indaver Ireland Ltd	

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Trial Pit No
TP08
Sheet 1 of 1

Project Name: Indaver	**Project No.** P19013	**Co-ords:** 579030E - 564203N **Level:** 19.46m OD	**Date** 22/02/2019
Location: Ringaskiddy, Co. Cork		**Dimensions (m):** 3.50 x 2.00 **Depth:** 4.50m BGL	**Scale** 1:25
Client: Indaver Ireland			**Logged** DMC

Water Strike & Backfill	Samples & In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m OD)	Legend	Stratum Description
							(TOPSOIL)
				0.30	19.16		Soft, brown, slightly sandy gravelly CLAY. Sand is fine to coarse. Gravel is fine to coarse and sub-angular.
	0.50 - 1.00	B					
	1.50 - 1.80	B					
				1.80	17.66		Firm, brown, clayey sandy GRAVEL with high cobble content. Gravel is fine to coarse and sub-angular. Cobbles are 63mm to 200mm dia, sub-angular to rounded and of SANDSTONE lithology.
	2.00 - 3.00	B					
	3.50 - 4.50	B					
				4.50	14.96		End of Pit at 4.500m

1 2 3 4 5

Stability: Moderate.
Plant: 13T track machine.
Backfill: Arisings.

Groundwater: None encountered.

Remarks: Trial pit terminated at required depth.

Photographic Record

Number:	**TP08**	**Project**	Indaver Ringaskiddy Co. Cork.
		Project No	P19013
		Engineer	Indaver Ireland Ltd

Photographic Record

Number:	**TP08**	**Project**	Indaver Ringaskiddy Co. Cork.
		Project No	P19013
		Engineer	Indaver Ireland Ltd

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Trial Pit No
TP09
Sheet 1 of 1

Project Name: Indaver	**Project No.** P19013	**Co-ords:** 579043E - 564318N **Level:** 4.03m OD	**Date** 20/02/2019
Location: Ringaskiddy, Co. Cork		**Dimensions (m):** 4.00 x 3.00 **Depth:** 4.80m BGL	**Scale** 1:25
Client: Indaver Ireland			**Logged** DMC

Water Strike & Backfill	Samples & In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m OD)	Legend	Stratum Description
							(TOPSOIL)
	0.50 - 1.50	B		0.40	3.63		Soft, brown, slightly sandy gravelly CLAY with medium cobble content becoming gravelly and firm with depth. Sand is fine to coarse. Gravel is fine to coarse.
	2.00 - 3.00	B					
	3.00 - 4.00	B					
▼	4.40 - 4.80	B		4.40	-0.37		Slightly sandy gravelly CLAY with high cobble content. Cobbles are 63mm to 200mm dia, sub-angular to rounded and of Sandstone lithology.
				4.80	-0.77		End of Pit at 4.800m

1 2 3 4 5

Stability: Moderate.
Plant: 13T track machine.
Backfill: Arisings.

Groundwater: 4.40m: Slow rate of flow.

Remarks: Trial pit terminated at 4.80m bgl. Plate load test carried out at 0.6m bgl.

JOB REF:	P19013
JOB Name:	Indaver

Plate Bearing Test	PLT 09	**E: 579042.577**	
Test Number	1	**N: 564318.395**	
Depth	0.60m bgl	**mOD**	**4.028**
Bedding Material			
Date	20/02/2019		
Ground Conditions	Gravelly SILT		
Seating Load	0.75t/ 25kPa		

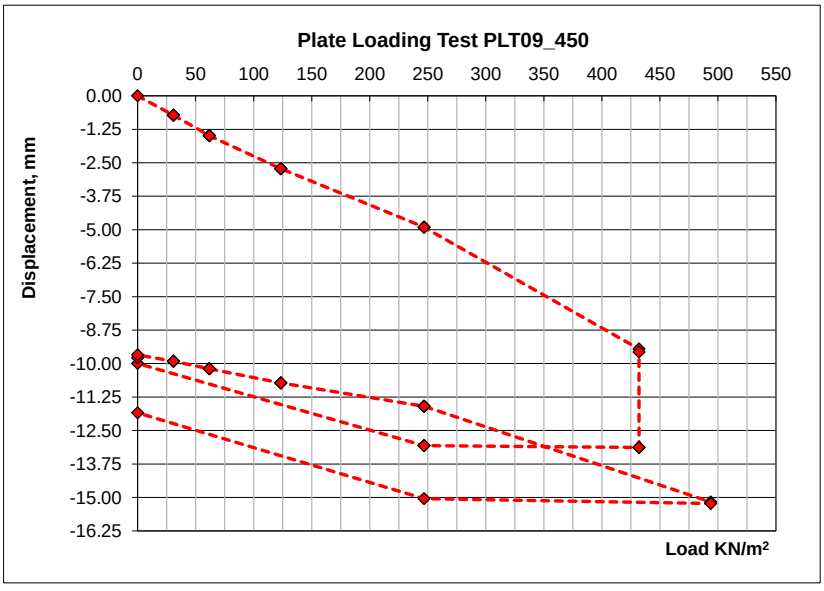
Plate Diameter **450** mm

Plate Area 0.1589625 m2

	G1	G2	G3	
Zero gauge	**0.00**	**0.00**	**0.00**	**0.00 mm**

Pressure (t)	Pressure (kPa)	Time (min)	Div (mm)	Div (mm)	Div (mm)	Average	D h, mm
0	0	0	0.00	0.00	0.00	0.00	0.00
0.5	31	1	0.65	0.78	0.75	0.73	-0.73
0.5	31	2	0.65	0.78	0.75	0.73	-0.73
0.5	31	3	0.65	0.78	0.75	0.73	-0.73
0.5	31	4	0.65	0.78	0.75	0.73	-0.73
1	62	1	1.30	1.58	1.57	1.48	-1.48
1	62	2	1.30	1.59	1.57	1.49	-1.49
1	62	3	1.32	1.59	1.57	1.49	-1.49
1	62	4	1.32	1.59	1.57	1.49	-1.49
2	123	1	2.51	2.85	2.81	2.72	-2.72
2	123	2	2.51	2.85	2.81	2.72	-2.72
2	123	3	2.51	2.85	2.81	2.72	-2.72
2	123	4	2.51	2.85	2.81	2.72	-2.72
4	247	1	4.53	5.18	5.00	4.90	-4.90
4	247	2	4.53	5.18	5.01	4.91	-4.91
4	247	3	4.53	5.18	5.01	4.91	-4.91
7	432	1	8.48	10.00	9.89	9.46	-9.46
7	432	2	8.54	10.19	9.98	9.57	-9.57
7	432	3	8.54	10.21	10.00	9.58	-13.13
7	432	4	8.54	10.22	10.01	9.59	-13.14
7	432	5	8.54	10.22	10.01	9.59	-13.14
4	247	1	8.49	10.14	9.92	9.52	-13.06
4	247	2	8.49	10.14	9.92	9.52	-13.06
4	247	3	8.49	10.14	9.92	9.52	-13.06
0	0	1	5.65	7.00	6.70	6.45	-10.00
0	0	2	5.39	6.76	6.59	6.25	-9.79
0	0	3	5.25	6.61	6.52	6.13	-9.67
0.5	31	1	0.20	0.27	0.24	6.36	-9.91
0.5	31	2	0.20	0.27	0.24	6.36	-9.91
0.5	31	3	0.20	0.27	0.24	6.36	-9.91
1	62	1	0.39	0.54	0.64	6.65	-10.20
1	62	2	0.39	0.54	0.64	6.65	-10.20
1	62	3	0.39	0.54	0.64	6.65	-10.20
2	123	1	0.79	1.05	1.31	7.18	-10.72
2	123	2	0.79	1.05	1.31	7.18	-10.72
2	123	3	0.79	1.05	1.31	7.18	-10.72
4	247	2	1.40	1.99	2.38	8.05	-11.60
4	247	1	1.40	1.99	2.38	8.05	-11.60
4	247	2	1.40	1.99	2.38	8.05	-11.60
8	494	1	4.14	5.95	6.39	11.62	-15.17
8	494	2	4.17	6.00	6.49	11.68	-15.23
4	247	1	4.03	5.79	6.29	11.50	-15.04
0	0	1	1.21	2.54	2.74	8.29	-11.84

Load to Achieve 1.25mm of Settlement:	**52**	kPa
Subgrade Modulus (MN/m^2/m) k_{750}:	**29**	
Estimated CBR (NRA DMRB HD25-26 3.62)	**3**	%
Plate scaling factor	**0.60**	
Plate rigidity factor	**1.18**	
Estimated failure load Δh 0.1R	**124**	kPa
Estimated undrained shear strength	**21**	kPa



Photographic Record

Number:	**TP09**	**Project**	Indaver Ringaskiddy Co. Cork.	
		Project No	P19013	
		Engineer	Indaver Ireland Ltd	

Photographic Record

Number:	**TP09**	**Project**	Indaver Ringaskiddy Co. Cork.	
		Project No	P19013	
		Engineer	Indaver Ireland Ltd	

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Trial Pit No
TP10
Sheet 1 of 1

Project Name: Indaver	**Project No.** P19013	**Co-ords:** 579074E - 564202N **Level:** 14.01m OD	**Date** 22/02/2019
Location: Ringaskiddy, Co. Cork		**Dimensions (m):** 3.50 x 2.00 **Depth:** 3.40m BGL	**Scale** 1:25
Client: Indaver Ireland			**Logged** DMC

Water Strike & Backfill	Samples & In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m OD)	Legend	Stratum Description
							(TOPSOIL)
	0.50 - 1.50	B		0.40	13.61		Clayey very sandy GRAVEL with low cobble content. Sand is fine to coarse. Gravel is fine to coarse and sub-angular.
	1.50 - 2.00	B					
	2.50 - 3.40	B		2.30	11.71		Stiff, brown to weathered black, very clayey very sandy GRAVEL with high cobble content and medium boulder content. Gravel is fine to coarse and sub-angular. Cobbles are 63mm to 200mm dia, sub-angular to rounded and of SANDSTONE lithology. Boulders are 200mm to 400mm dia, sub-angular to rounded and of SANDSTONE lithology.
				3.40	10.61		End of Pit at 3.400m

1 2 3 4 5

Stability: Moderate.
Plant: 13T track machine.
Backfill: Arisings.

Groundwater: None encountered.

Remarks: Trial pit terminated at 3.40m bgl due to steep incline of location and 'hard' strata.

Photographic Record

Number:	**TP10**	**Project**	Indaver Ringaskiddy Co. Cork.	
		Project No	P19013	
		Engineer	Indaver Ireland Ltd	

Photographic Record

Number:	**TP10**	**Project**	Indaver Ringaskiddy Co. Cork.
		Project No	P19013
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Trial Pit No
TP11
Sheet 1 of 1

Project Name: Indaver	**Project No.** P19013	**Co-ords:** 579082E - 564326N **Level:** 3.73m OD	**Date** 20/02/2019
Location: Ringaskiddy, Co. Cork		**Dimensions (m):** 4.50 × 3.00 **Depth:** 4.60m BGL	**Scale** 1:25
Client: Indaver Ireland			**Logged** DMC

Water Strike & Backfill	Samples & In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m OD)	Legend	Stratum Description
							(TOPSOIL)
	0.50 - 1.50	B		0.40	3.33		Soft, brown, slightly sandy slightly gravely CLAY with low cobble content. Sand is fine to coarse. Gravel is fine to coarse.
	2.00 - 2.50	B					
▼	3.10 - 4.00	B		3.10	0.63		Soft, brown, slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is fine to coarse.
	4.00 - 4.60	B					
				4.60	-0.87		End of Pit at 4.600m

Stability: Very poor from 3.00m bgl
Plant: 13T track machine.
Backfill: Arisings.

Groundwater: 3.10m: Slow rate of flow.

Remarks: Trial pit terminated at 4.60m bgl. PBT carried out at 1.00m bgl.

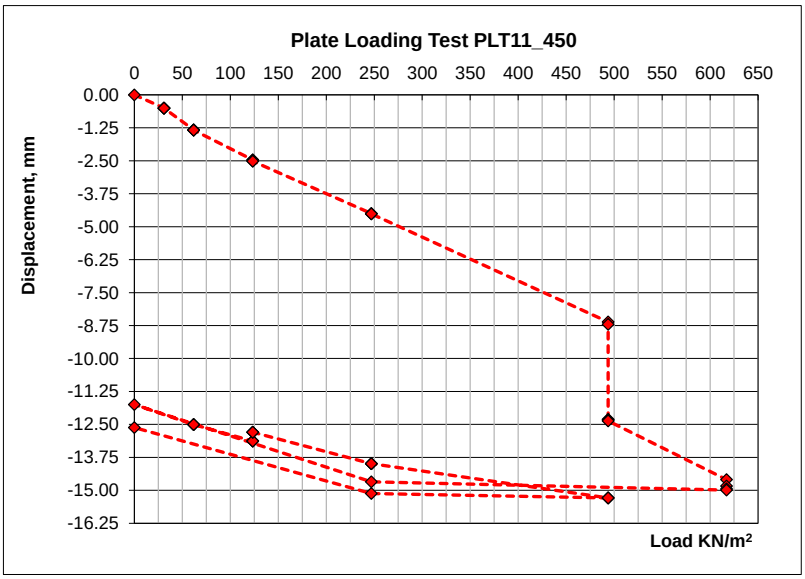
JOB REF:	P19013
JOB Name:	Indaver

Plate Bearing Test	PLT 11	**E: 579082.029**	
Test Number	1	**N: 564325.977**	
Depth	1.00m bgl	**mOD**	**3.727**
Bedding Material			
Date	20/02/2019		
Ground Conditions	Sandy gravelly SILT		
Seating Load	0.75t/ 25kPa		
Plate Diameter	**450** mm		
Plate Area	0.1589625 m2		

	G1	G2	G3	
Zero gauge	**0.00**	**0.00**	**0.00**	**0.00 mm**

Pressure (t)	Pressure (kPa)	Time (min)	Div (mm)	Div (mm)	Div (mm)	Average	D h, mm
0	0	0	0.00	0.00	0.00	0.00	0.00
0.5	31	1	0.66	0.39	0.45	0.50	-0.50
0.5	31	2	0.67	0.40	0.45	0.51	-0.51
0.5	31	3	0.68	0.40	0.45	0.51	-0.51
0.5	31	4	0.68	0.40	0.45	0.51	-0.51
1	62	1	1.65	1.11	1.21	1.32	-1.32
1	62	2	1.66	1.12	1.21	1.33	-1.33
1	62	3	1.67	1.13	1.22	1.34	-1.34
1	62	4	1.67	1.13	1.23	1.34	-1.34
2	123	1	2.90	2.21	2.28	2.46	-2.46
2	123	2	2.94	2.20	2.28	2.47	-2.47
2	123	3	2.98	2.27	2.28	2.51	-2.51
2	123	4	2.99	2.28	2.28	2.52	-2.52
4	247	1	4.71	4.34	4.44	4.50	-4.50
4	247	2	4.72	4.36	4.46	4.51	-4.51
4	247	3	4.72	4.36	4.46	4.51	-4.51
8	494	1	7.93	8.70	9.20	8.61	-8.61
8	494	2	8.03	8.78	9.30	8.70	-8.70
8	494	3	8.08	8.83	9.36	8.76	-12.30
8	494	4	8.10	8.86	9.39	8.78	-12.33
8	494	5	8.13	8.90	9.42	8.82	-12.36
10	617	1	9.76	11.29	12.09	11.05	-14.59
10	617	2	9.96	11.54	12.37	11.29	-14.84
10	617	3	10.08	11.64	12.46	11.39	-14.94
10	617	4	10.12	11.70	12.51	11.44	-14.99
4	247	1	9.96	11.32	12.11	11.13	-14.68
0	0	1	7.68	8.10	8.82	8.20	-11.75
1	62	1	0.62	0.83	0.82	8.96	-12.50
1	62	2	0.62	0.83	0.82	8.96	-12.50
1	62	3	0.62	0.83	0.82	8.96	-12.50
2	123	1	1.14	1.51	1.51	9.59	-13.13
2	123	2	1.14	1.51	1.51	9.59	-13.13
2	123	3	1.14	1.51	1.51	9.59	-13.13
2	123	1	0.79	1.05	1.31	9.25	-12.80
2	123	2	0.79	1.05	1.31	9.25	-12.80
2	123	3	0.79	1.05	1.31	9.25	-12.80
4	247	1	1.76	2.48	2.49	10.44	-13.99
4	247	2	1.76	2.48	2.49	10.44	-13.99
4	247	3	1.76	2.48	2.49	10.44	-13.99
8	494	1	2.56	3.96	4.10	11.74	-15.29
8	494	2	2.56	3.96	4.10	11.74	-15.29
8	494	3	2.56	3.96	4.10	11.74	-15.29
4	247	1	2.48	3.77	3.86	11.57	-15.12
0	0	1	0.61	1.03	0.98	9.07	-12.62

Load to Achieve 1.25mm of Settlement:	**59**	kPa
Subgrade Modulus (MN/m^2/m) k_{750}:	**33**	
Estimated CBR (NRA DMRB HD25-26 3.62)	**4**	%
Plate scaling factor	**0.60**	
Plate rigidity factor	**1.18**	
Estimated failure load Δh 0.1R	**178**	kPa
Estimated undrained shear strength	**30**	kPa



Photographic Record

Number:	**TP11**	**Project**	Indaver Ringaskiddy Co. Cork.	
		Project No	P19013	
		Engineer	Indaver Ireland Ltd	

Photographic Record

Number:	**TP11**	**Project** Indaver Ringaskiddy Co. Cork. **Project No** P19013 **Engineer** Indaver Ireland Ltd	

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Trial Pit No
TP12
Sheet 1 of 1

Project Name: Indaver	**Project No.** P19013	**Co-ords:** 579104E - 564273N **Level:** 4.74m OD	**Date** 21/02/2019
Location: Ringaskiddy, Co. Cork		**Dimensions (m):** 5.00 x 3.00 **Depth:** 4.60m BGL	**Scale** 1:25
Client: Indaver Ireland			**Logged** DMC

Water Strike & Backfill	Samples & In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m OD)	Legend	Stratum Description
							(TOPSOIL)
	0.30 - 0.70	B		0.30	4.44		Brown, SAND. Sand is fine.
	1.00 - 2.00	B		0.70	4.04		Soft to firm, brown, slightly sandy gravelly SILT with low cobble content. Sand is fine to coarse. Gravel is fine to coarse and angular. Cobbles are sub-rounded and of SANDSTONE lithology.
	2.50 - 3.00	B		2.40	2.35		Brown, slightly sandy slightly gravelly SILT with low cobble content. Sand is fine to coarse.
	3.50 - 4.00	B					
	4.30 - 4.60	B		4.30	0.44		Soft, brown, slightly sandy slightly gravelly CLAY with some pockets of sand. Sand is fine to coarse. Gravel is fine to coarse and sub-angular to sub-rounded.
				4.60	0.14		End of Pit at 4.600m

1 2 3 4 5

Stability: Very poor.
Plant: 13T track machine.
Backfill: Arisings.

Groundwater: None encountered.

Remarks: Trial pit terminated at 4.60m bgl. PBT carried out at 1.00m bgl.

JOB REF:	P19013
JOB Name:	Indaver

GPS Test Location

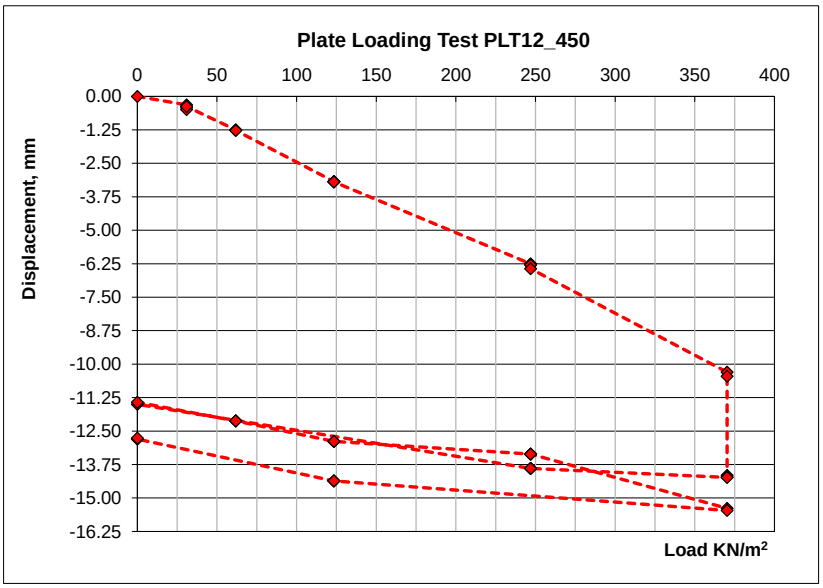
Plate Bearing Test	PLT 12
Test Number	1
Depth	1.00m bgl
Bedding Material	
Date	21/02/2019
Ground Conditions	Gravelly SILT
Seating Load	0.75t/ 25kPa
Plate Diameter	**450** mm
Plate Area	0.1589625 m2

E: 579104.487	
N: 564273.035	
mOD	**4.745**

	G1	G2	G3	
Zero gauge	**0.00**	**0.00**	**0.00**	**0.00 mm**

Pressure (t)	Pressure (kPa)	Time (min)	Div (mm)	Div (mm)	Div (mm)	Average	D h, mm
0	0	0	0.00	0.00	0.00	0.00	0.00
0.5	31	1	0.34	0.26	0.35	0.32	-0.32
0.5	31	2	0.44	0.36	0.48	0.43	-0.43
0.5	31	3	0.50	0.42	0.55	0.49	-0.49
0.5	31	4	0.52	0.05	0.57	0.38	-0.38
1	62	1	1.20	1.27	1.29	1.25	-1.25
1	62	2	1.20	1.28	1.30	1.26	-1.26
1	62	3	1.21	1.29	1.32	1.27	-1.27
2	123	1	2.87	3.29	3.37	3.18	-3.18
2	123	2	2.87	3.30	3.39	3.19	-3.19
2	123	3	2.87	3.30	3.40	3.19	-3.19
2	123	4	2.87	3.30	3.40	3.19	-3.19
4	247	1	5.89	6.19	6.67	6.25	-6.25
4	247	2	5.90	6.23	6.73	6.29	-6.29
4	247	3	5.90	6.24	6.76	6.30	-6.30
4	247	4	5.90	6.64	6.76	6.43	-6.43
6	370	1	8.47	10.73	11.69	10.30	-10.30
6	370	2	8.48	10.94	11.95	10.46	-10.46
6	370	3	8.71	11.00	12.12	10.61	-14.16
6	370	4	8.75	11.10	12.15	10.67	-14.21
6	370	5	8.75	11.12	12.18	10.68	-14.23
4	247	1	8.19	10.86	11.99	10.35	-13.89
4	247	2	8.19	10.86	11.99	10.35	-13.89
4	247	3	8.19	10.86	11.99	10.35	-13.89
0	0	1	6.28	8.29	9.30	7.96	-11.50
0	0	2	6.24	8.18	9.22	7.88	-11.43
1	62	1	0.78	0.51	0.80	8.58	-12.12
1	62	2	0.78	0.50	0.80	8.57	-12.12
1	62	3	0.78	0.50	0.80	8.57	-12.12
2	123	1	1.87	1.05	1.45	9.34	-12.88
2	123	2	1.87	1.05	1.45	9.34	-12.88
2	123	3	1.87	1.05	1.45	9.34	-12.88
4	247	1	1.58	1.88	2.35	9.82	-13.36
4	247	2	1.58	1.88	2.35	9.82	-13.36
4	247	3	1.58	1.88	2.35	9.82	-13.36
6	370	1	3.51	3.81	4.55	11.84	-15.38
6	370	2	3.60	3.89	4.63	11.92	-15.47
2	123	1	1.98	2.90	3.92	10.81	-14.36
2	123	2	1.98	2.90	3.92	10.81	-14.36
2	123	3	1.98	2.90	3.92	10.81	-14.36
0	0	1	1.20	1.18	1.75	9.26	-12.80
0	0	2	1.18	1.14	1.70	9.22	-12.77

Load to Achieve 1.25mm of Settlement:	**62**	kPa
Subgrade Modulus ($MN/m^2/m$) k_{750}:	**35**	
Estimated CBR (NRA DMRB HD25-26 3.62)	**5**	%
Plate scaling factor	**0.60**	
Plate rigidity factor	**1.18**	
Estimated failure load Δh 0.1R	**203**	kPa
Estimated undrained shear strength	**34**	kPa



Photographic Record

Number:	**TP12**	**Project**	Indaver Ringaskiddy Co. Cork.	
		Project No	P19013	
		Engineer	Indaver Ireland Ltd	

Photographic Record

Number:	**TP12**	**Project**	Indaver Ringaskiddy Co. Cork.
		Project No	P19013
		Engineer	Indaver Ireland Ltd

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Trial Pit No
TP13
Sheet 1 of 1

Project Name: Indaver	**Project No.** P19013	**Co-ords:** 579122E - 564212N **Level:** 13.01m OD	**Date** 22/02/2019
Location: Ringaskiddy, Co. Cork		**Dimensions (m):** 3.50 x 2.00 **Depth:** 4.50m BGL	**Scale** 1:25
Client: Indaver Ireland			**Logged** DMC

Water Strike & Backfill	Samples & In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m OD)	Legend	Stratum Description
							(TOPSOIL)
	0.50 - 1.50	B		0.40	12.61		Light brown, slightly gravelly sandy CLAY with low cobble content. Sand is fine to medium. Gravel is fine to medium and sub-angular to sub-rounded.
	1.50 - 2.50	B					
	2.50 - 3.40	B					
	3.50 - 4.50	B		3.40	9.61		Clayey very sandy GRAVEL with medium cobble content. Sand is fine to coarse. Gravel is fine to coarse and sub-angular to rounded. Cobbles are 63mm to 120mm dia, sub-rounded and of SANDSTONE lithology.
				4.50	8.51		End of Pit at 4.500m

1 2 3 4 5

Stability: Moderate.
Plant: 13T track machine.
Backfill: Arisings.

Groundwater: None encountered.

Remarks: Trial pit terminated at required depth.

Photographic Record

Number:	**TP13**	**Project**	Indaver Ringaskiddy Co. Cork.	
		Project No	P19013	
		Engineer	Indaver Ireland Ltd	

Photographic Record

Number:	**TP13**	**Project**	Indaver Ringaskiddy Co. Cork.
		Project No	P19013
		Engineer	Indaver Ireland Ltd

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Trial Pit No
TP14
Sheet 1 of 1

Project Name: Indaver	**Project No.** P19013	**Co-ords:** 579156E - 564277N **Level:** 6.60m OD	**Date** 22/02/2019
Location: Ringaskiddy, Co. Cork		**Dimensions (m):** 4.50 × 3.00	**Scale** 1:25
Client: Indaver Ireland		**Depth:** 4.50m BGL	**Logged** DMC

Water Strike & Backfill	Samples & In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m OD)	Legend	Stratum Description
							(TOPSOIL)
				0.30	6.30		Soft to firm, brown, slightly gravelly sandy CLAY with low cobble content. Sand is fine to coarse. Gravel is fine to coarse and sub-angular. Cobbles are sub-rounded to rounded and of Sandstone lithology.
	0.50 - 1.50	B					
	2.00 - 2.50	B					
▼	3.00 - 3.50	B					
	4.00 - 4.50	B					
				4.50	2.10		End of Pit at 4.500m

Stability: Good stability.
Plant: 13T track machine.
Backfill: Arisings.

Groundwater: 3.10m: Slow rate of flow.

Remarks: Trial pit terminated at required depth. PBT carried out at 1.00m bgl.

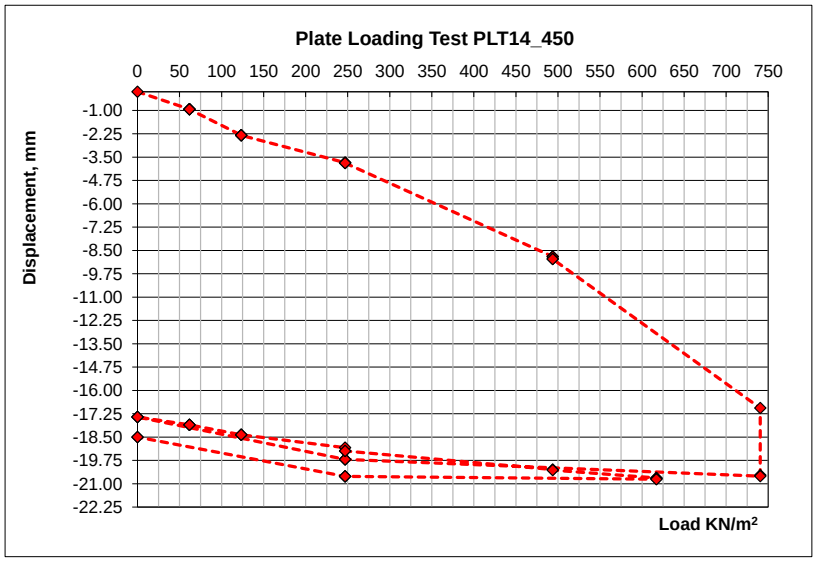
JOB REF:	P19013
JOB Name:	Indaver

Plate Bearing Test	PLT 14	**E: 579156.094**	
Test Number	1	**N: 564276.812**	
Depth	1.00m bgl	**mOD**	**6.596**
Bedding Material			
Date	22/02/2019		
Ground Conditions	Sandy gravelly SILT		
Seating Load	0.75t/ 25kPa		
Plate Diameter	**450** mm		
Plate Area	0.1589625 m2		

	G1	G2	G3	
Zero gauge	**0.00**	**0.00**	**0.00**	**0.00 mm**

Pressure (t)	Pressure (kPa)	Time (min)	Div (mm)	Div (mm)	Div (mm)	Average	D h, mm
0	0	0	0.00	0.00	0.00	0.00	0.00
1	62	1	0.92	0.88	1.00	0.93	-0.93
1	62	2	0.92	0.89	1.00	0.94	-0.94
1	62	3	0.93	0.90	1.00	0.94	-0.94
1	62	4	0.93	0.90	1.01	0.95	-0.95
2	123	1	2.32	2.28	2.38	2.33	-2.33
2	123	2	2.32	2.29	2.39	2.33	-2.33
2	123	3	2.32	2.29	2.40	2.34	-2.34
2	123	4	2.32	2.29	2.40	2.34	-2.34
4	247	1	3.76	3.70	3.93	3.80	-3.80
4	247	2	3.77	3.71	3.94	3.81	-3.81
4	247	3	3.79	3.72	3.94	3.82	-3.82
4	247	4	3.79	3.72	3.94	3.82	-3.82
8	494	1	8.53	8.90	9.06	8.83	-8.83
8	494	2	8.53	8.92	9.07	8.84	-8.84
8	494	3	8.84	8.93	9.08	8.95	-8.95
8	494	4	8.86	8.93	9.09	8.96	-8.96
12	741	1	17.10	16.83	16.89	16.94	-16.94
12	741	3	17.19	16.87	16.92	16.99	-20.54
12	741	5	17.23	16.93	16.99	17.05	-20.60
4	247	1	15.20	16.80	16.43	16.14	-19.69
4	247	2	15.20	16.80	16.43	16.14	-19.69
4	247	3	15.20	16.80	16.43	16.14	-19.69
0	0	1	13.60	13.85	14.20	13.88	-17.43
0	0	2	13.60	13.85	14.20	13.88	-17.43
0	0	3	13.60	13.85	14.20	13.88	-17.43
1	62	1	0.38	0.40	0.47	14.30	-17.85
1	62	2	0.38	0.40	0.47	14.30	-17.85
1	62	3	0.38	0.40	0.47	14.30	-17.85
2	123	1	1.03	0.92	0.90	14.83	-18.38
2	123	2	1.03	0.92	0.90	14.83	-18.38
2	123	3	1.03	0.92	0.90	14.83	-18.38
4	247	1	1.83	1.20	1.89	15.52	-19.07
4	247	2	1.84	1.72	1.89	15.70	-19.25
4	247	3	1.84	1.73	1.89	15.70	-19.25
8	494	1	2.69	2.82	2.93	16.70	-20.24
8	494	3	2.73	2.83	2.95	16.72	-20.27
10	617	1	3.01	2.96	3.80	17.14	-20.69
10	617	2	3.04	2.98	3.82	17.16	-20.71
10	617	3	3.04	3.02	3.85	17.19	-20.73
10	617	4	3.07	3.04	3.87	17.21	-20.76
4	247	1	2.98	2.82	3.72	17.06	-20.60
4	247	2	2.98	2.82	3.72	17.06	-20.60
4	247	3	2.98	2.82	3.72	17.06	-20.60
0	0	1	0.92	1.17	1.14	14.96	-18.51
0	0	2	0.92	1.17	1.14	14.96	-18.51

Load to Achieve 1.25mm of Settlement:	**75**	kPa
Subgrade Modulus ($MN/m^2/m$) k_{750}:	**42**	
Estimated CBR (NRA DMRB HD25-26 3.62)	**6**	%
Plate scaling factor	**0.60**	
Plate rigidity factor	**1.18**	
Estimated failure load Δh 0.1R	**318**	kPa
Estimated undrained shear strength	**53**	kPa



Photographic Record

Number:	**TP14**	**Project**	Indaver Ringaskiddy Co. Cork.
		Project No	P19013
		Engineer	Indaver Ireland Ltd

Photographic Record

Number:	**TP14**	**Project**	Indaver Ringaskiddy Co. Cork.
		Project No	P19013
		Engineer	Indaver Ireland Ltd

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Trial Pit No
TP15
Sheet 1 of 1

Project Name: Indaver	**Project No.** P19013	**Co-ords:** 579171E - 564225N **Level:** 11.10m OD	**Date** 22/02/2019
Location: Ringaskiddy, Co. Cork		**Dimensions (m):** 4.50 × 3.00	**Scale** 1:25
Client: Indaver Ireland		**Depth:** 4.50m BGL	**Logged** DMC

Water Strike & Backfill	Samples & In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m OD)	Legend	Stratum Description
							(TOPSOIL)
				0.30	10.80		Firm, brown, slightly sandy gravelly CLAY with medium cobble content. Sand is fine to coarse. Gravel is fine to coarse and sub-angular to sub-rounded. Cobbles are 63mm to 200mm dia, sub-angular and of SANDSTONE lithology.
	1.00 - 2.00	B					
	2.20 - 2.80	B		2.20	8.90		Brown, slightly gravelly sandy CLAY. Sand is fine to medium.
	3.00 - 3.80	B		2.80	8.30		Soft, brown, slightly gravelly sandy CLAY. Sand is fine to coarse. Gravel is fine to coarse and sub-rounded.
▼	4.00 - 4.50	B		3.90	7.20		Slightly gravelly sandy CLAY. Sand is fine to medium.
				4.50	6.60		End of Pit at 4.500m

Stability: Moderate.
Plant: 13T track machine.
Backfill: Arisings.

Groundwater: 3.90m: Trickle rate of flow.

Remarks: Trial pit terminated at required depth. PBT carried out at 1.00m bgl.

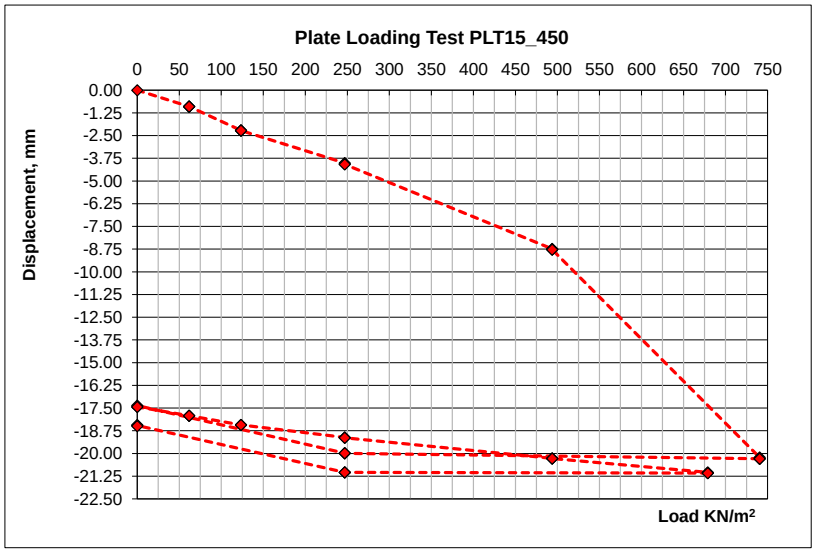
JOB REF:	P19013
JOB Name:	Indaver

Plate Bearing Test	PLT 15	**E: 579170.757**	
Test Number	1	**N: 564224.526**	
Depth	1.00m bgl	**mOD**	**11.096**
Bedding Material			
Date	22/02/2019		
Ground Conditions	Sandy gravelly CLAY		
Seating Load	0.75t/ 25kPa		
Plate Diameter	**450** mm		
Plate Area	0.1589625 m2		

	G1	G2	G3	
Zero gauge	**0.00**	**0.00**	**0.00**	**0.00 mm**

Pressure (t)	Pressure (kPa)	Time (min)	Div (mm)	Div (mm)	Div (mm)	Average	D h, mm
0	0	0	0.00	0.00	0.00	0.00	0.00
1	62	1	0.86	0.83	1.01	0.90	-0.90
1	62	2	0.86	0.84	1.01	0.90	-0.90
1	62	3	0.86	0.84	1.01	0.90	-0.90
1	62	4	0.86	0.84	1.01	0.90	-0.90
2	123	1	2.11	2.09	2.43	2.21	-2.21
2	123	2	2.11	2.10	2.43	2.21	-2.21
2	123	3	2.11	2.11	2.44	2.22	-2.22
2	123	4	2.11	2.11	2.44	2.22	-2.22
4	247	1	3.76	3.84	4.44	4.01	-4.01
4	247	3	3.81	3.89	4.49	4.06	-4.06
4	247	5	3.83	3.92	4.51	4.09	-4.09
8	494	1	8.72	8.31	9.18	8.74	-8.74
8	494	2	8.72	8.34	9.21	8.76	-8.76
8	494	3	8.72	8.36	9.23	8.77	-8.77
8	494	4	8.72	8.37	9.24	8.78	-8.78
12	741	1	16.14	16.37	17.49	16.67	-20.21
12	741	2	16.14	16.48	17.59	16.74	-20.28
12	741	3	16.14	16.48	17.59	16.74	-20.28
12	741	4	16.14	16.49	17.59	16.74	-20.29
4	247	1	15.86	16.23	17.25	16.45	-19.99
4	247	2	15.86	16.23	17.23	16.44	-19.99
4	247	3	15.86	16.23	17.23	16.44	-19.99
0	0	1	13.23	13.72	14.50	13.82	-17.36
0	0	2	13.60	13.85	14.20	13.88	-17.43
0	0	3	13.60	13.85	14.20	13.88	-17.43
1	62	1	0.46	0.37	0.63	14.37	-17.92
1	62	2	0.46	0.37	0.63	14.37	-17.92
1	62	3	0.46	0.37	0.63	14.37	-17.92
2	123	1	0.95	0.89	1.16	14.88	-18.43
2	123	2	0.95	0.89	1.16	14.88	-18.43
2	123	3	0.95	0.89	1.16	14.88	-18.43
4	247	1	1.65	1.57	1.85	15.57	-19.12
4	247	2	1.65	1.58	1.86	15.58	-19.13
4	247	3	1.66	1.59	1.86	15.59	-19.13
8	494	1	2.71	2.77	3.04	16.72	-20.27
8	494	2	2.72	2.78	3.05	16.73	-20.28
8	494	3	2.72	2.78	3.05	16.73	-20.28
11	679	1	3.34	3.87	-	17.49	-21.04
11	679	2	3.35	3.93	-	17.52	-21.07
11	679	3	3.35	3.94	-	17.53	-21.08
11	679	4	3.36	3.94	-	17.53	-21.08
4	247	1	3.25	3.74	3.83	17.49	-21.04
4	247	2	3.25	3.74	3.83	17.49	-21.04
4	247	3	3.25	3.74	3.83	17.49	-21.04
0	0	1	0.79	1.17	1.14	14.92	-18.46
0	0	2	0.69	1.17	1.14	14.88	-18.43
0	0	3	0.60	1.19	1.38	14.94	-18.49

Load to Achieve 1.25mm of Settlement:	**78**	kPa
Subgrade Modulus (MN/m^2/m) k $_{750}$:	**44**	
Estimated CBR (NRA DMRB HD25-26 3.62)	**7**	%
Plate scaling factor	**0.60**	
Plate rigidity factor	**1.18**	
Estimated failure load Δh 0.1R	**347**	kPa
Estimated undrained shear strength	**58**	kPa



Photographic Record

Number:	**TP15**	**Project**	Indaver Ringaskiddy Co. Cork.
		Project No	P19013
		Engineer	Indaver Ireland Ltd

Photographic Record

Number:	**TP15**	**Project**	Indaver Ringaskiddy Co. Cork.	
		Project No	P19013	
		Engineer	Indaver Ireland Ltd	

Priority Geotechnical Ltd.
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Trial Pit No
TP16
Sheet 1 of 1

Project Name: Indaver	**Project No.** P19013	**Co-ords:** 579154E - 564217N **Level:** 12.54m OD	**Date** 21/01/2019
Location: Ringaskiddy, Co. Cork		**Dimensions (m):** 3.00 x 1.80 **Depth:** 1.70m BGL	**Scale** 1:25
Client: Indaver Ireland			**Logged** DMC

Water Strike & Backfill	Samples & In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m OD)	Legend	Stratum Description
				0.20	12.34		(TOPSOIL)
							(MADE GROUND) Firm, brown, gravelly CLAY. Gravel is fine to coarse and sub-angular to sub-rounded.
				1.10	11.44		(MADE GROUND). Marker SAND. Sand is fine to medium.
							300mm dia yellow plastic gas main.
				1.70	10.84		End of Pit at 1.700m

Stability: Moderate.
Plant: Track machine and hand dug.
Backfill: Arisings.

Groundwater: None encountered.

Remarks: Trial pit terminated at 1.70m bgl due to services. 300mm dia yellow plastic gas main at 1.55m bgl.

Photographic Record

Number:	**TP16**	**Project**	Indaver Ringaskiddy Co. Cork.
		Project No	P19013
		Engineer	Indaver Ireland Ltd

Photographic Record

Number:	**TP16**	**Project**	Indaver Ringaskiddy Co. Cork.	
		Project No	P19013	
		Engineer	Indaver Ireland Ltd	

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Trial Pit No
TPBH02
Sheet 1 of 1

Project Name: Indaver	**Project No.** P19013	**Co-ords:** 578983E - 564223N **Level:** 15.14m OD	**Date** 19/04/2019
Location: Ringaskiddy, Co. Cork		**Dimensions (m):** 3.00 x 1.00 **Depth:** 1.30m BGL	**Scale** 1:25
Client: Indaver Ireland			**Logged** DMC

Water Strike & Backfill	Samples & In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m OD)	Legend	Stratum Description
	0.50 - 0.90	B					Soft, brown, slightly sandy gravelly SILT. Sand is fine to coarse. Gravel is fine to coarse and sub-angular.
	1.00 - 1.30	B		0.90	14.24		MUDSTONE bedrock. Recovered as: Angular, tabular COBBLES and BOULDERS.
				1.30	13.84		End of Pit at 1.300m

1
2
3
4
5

Stability: Moderate.
Plant: 14T track machine.
Backfill: Arisings.

Groundwater: None encountered.

Remarks: Trial pit terminated at 1.30m bgl due to refusal on suspected MUDSTONE bedrock. Required depth 4.50m bgl.

KEY TO SYMBOLS - LABORATORY TEST RESULT

U	Undisturbed Sample	
P	Piston Sample	
TWS	Thin Wall Sample	
B	Bulk Sample - Disturbed	
D	Jar Sample - Disturbed	
W	Water Sample	
pH	Acidity/Alkalinity Index	
SO_3	% - Total Sulphate Content (acid soluble)	
SO_3	g/ltr - Water Soluble Sulphate (Water or 2:1 Aqueous Soil Extract)	
+	Calcareous Reaction	
Cl	Chloride Content	
PI	Plasticity Index	
<425	% of material in sample passing 425 micron sieve	
LL	Liquid Limit	
PL	Plastic Limit	
MC	Water Content	
NP	Non Plastic	
Yb	Bulk Density	
Yd	Dry Density	
Ps	Particle Density	
U/D	Undrained/Drained Triaxial	
U/C	Unconsolidated/Consolidated Triaxial	
T/M	Single Stage/Multistage Triaxial	
100/38	Sample Diameter (mm)	
REM	Remoulded Triaxial Test Specimen	
TST	Triaxial Suction Test	
V	Vane Test	
DSB	Drained Shear Box	
RSB	Residual Shear Box	
RS	Ring Shear	
σ_3	Cell Pressure	
σ_1-σ_3	Deviator Stress	
c	Cohesion	
c_	Effective Cohesion Intercept	
ϕ	Angle of Shearing Resistance - Degrees	
ϕ_	Effective Angle of Shearing Resistance	
εf	Strain at Failure	
*	Failed under 1st Load	
**	Failed under 2nd Load	
#	Untestable	
##	Excessive Strain	
p_o	Effective Overburden Pressure	
m_v	Coefficient of Volume Decrease	
c_v	Coefficient of Consolidation	
Opt	Optimum	
Nat	Natural	
Std	Standard Compaction - 2.5kg Rammer	(¶ CBR)
Hvy	Heavy Compaction - 4.5kg Rammer	(§ CBR)
Vib	Vibratory Compaction	
CBR	California Bearing Ratio	
Sat m.c.	Saturation Moisture Content	
MCV	Moisture Condition Value	

pgl priority geotechnical	**Natural Moisture Content/Atterberg Limits Summary** **BS 1377 : Part 2 : 1990 : Clause 3**	**Job Ref**
Location	**Indaver**	**P19013**

Hole ID	Sample Ref	Depth (m)	Sample Type	Sample Description	MC	LL	PL	PI	% Pass 425
TP01	1	0.5	B	Slightly sandy slightly gravelly SILT	18	24	18	6	80.3
TP01	3	3	B	Slightly sandy slightly gravelly CLAY	18	31	19	12	76.2
TP02	1	1	B	Slightly sandy gravelly SILT	21	34	24	10	62.9
TP02	2	2	B	Slightly sandy gravelly SILT	16				
TP02	3	3	B	Slightly gravelly sandy SILT	13	23	17	6	70
TP02	4	4	B	GRAVEL	18				
TP05	1	0.5	B	Very clayey very sandy GRAVEL	11				
TP05	2	1.5	B	Very clayey very sandy GRAVEL	12	31	17	14	49.9
TP06	1	0.5	B	Clayey sandy GRAVEL	15	25	16	9	73.5
TP06	2	2	B	Clayey sandy GRAVEL	14				
TP06	3	3	B	Clayey sandy GRAVEL	14				
TP06	4	4	B	Clayey sandy GRAVEL	13				
TP07	1	0.5	B	Slightly sandy gravelly CLAY with low cobble content	13	24	17	7	69
TP07	2	2	B	Slightly sandy gravelly CLAY	11				
TP07	3	2.4	B	Slightly sandy gravelly CLAY	11				
TP07	4	3	B	Slightly sandy gravelly CLAY	10				
TP07	5	3.6	B	GRAVEL	13				
TP08	1	0.5	B	Slightly sandy gravelly CLAY with low cobble content	14				
TP08	2	1.5	B	Slightly sandy gravelly CLAY	14				
TP08	3	2	B	Clayey sandy GRAVEL with medium cobble content	10				

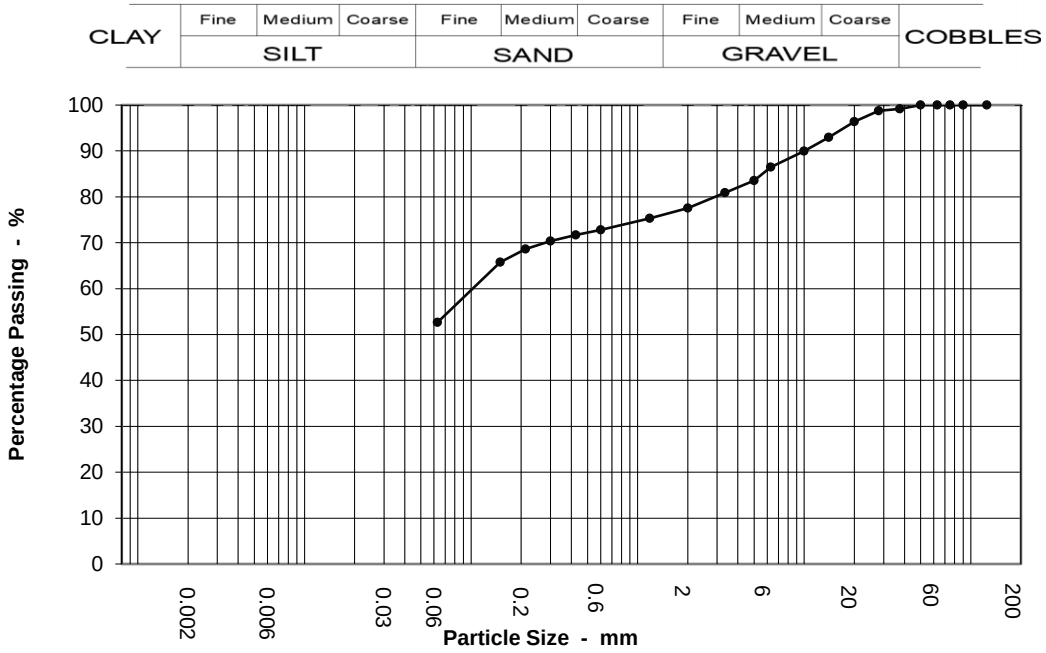
pgl priority geotechnical	**Natural Moisture Content/Atterberg Limits Summary** **BS 1377 : Part 2 : 1990 : Clause 3**	**Job Ref**
Location	**Indaver**	**P19013**

Hole ID	Sample Ref	Depth (m)	Sample Type	Sample Description	MC	LL	PL	PI	% Pass 425
TP08	4	3.5	B	Clayey sandy GRAVEL	10				
TP09	1	0.5	B	Slightly sandy gravelly CLAY	14				
TP09	2	2	B	Slightly sandy gravelly CLAY	13				
TP09	3	3	B	Slightly sandy gravelly CLAY	18				
TP09	4	4.4	B	Slightly sandy gravelly CLAY	15				
TP11	1	0.5	B	Slightly sandy slightly gravelly CLAY with low cobble content	15	30	17	13	70.3
TP11	2	2	B	Slightly sandy slightly gravelly CLAY	18				
TP11	3	3.1	B	Slightly sandy slightly gravelly CLAY	22	30	20	10	74.6
TP13	1	0.5	B	Slightly gravelly sandy CLAY with low cobble content	12				
TP13	2	1.5	B	Slightly gravelly sandy CLAY	13				
TP13	3	2.5	B	Slightly gravelly sandy CLAY	18				
TP13	4	3.5	B	Clayey very sandy GRAVEL with low cobble content	12				
TP14	1	0.5	B	Slightly sandy gravelly CLAY	15	25	15	10	72.7
TP14	2	2	B	Slightly sandy gravelly CLAY	10				
TP14	3	3	B	Slightly sandy gravelly CLAY	15				
TP15	1	1	B	Slightly sandy gravelly CLAY	20	30	17	13	83.6
TP15	2	2.2	B	Slightly gravelly sandy CLAY	18				
TP15	3	3	B	Slightly gravelly sandy CLAY	19	33	19	14	69.7
TP15	4	4	B	Slightly gravelly sandy CLAY	21				

PARTICLE SIZE DISTRIBUTION

BS 1377 : Part 2 : 1990 : Clause 9

		Job Ref	**P19013**
		Borehole / Pit No	TP01
Location	**Indaver**	Sample No	1
		Depth	0.50 m
Soil Description	Slightly sandy slightly gravelly SILT	Sample type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	99		
28	99		
20	96		
14	93		
10	90		
6.3	86		
5	84		
3.35	81		
2	78		
1.18	75		
0.6	73		
0.425	72		
0.3	70		
0.212	69		
0.15	66		
0.063	53		

Test Method	
BS 1377 : Part 2 : 1990	
Sieving	Clause 9.3
Sedimentation	N/A

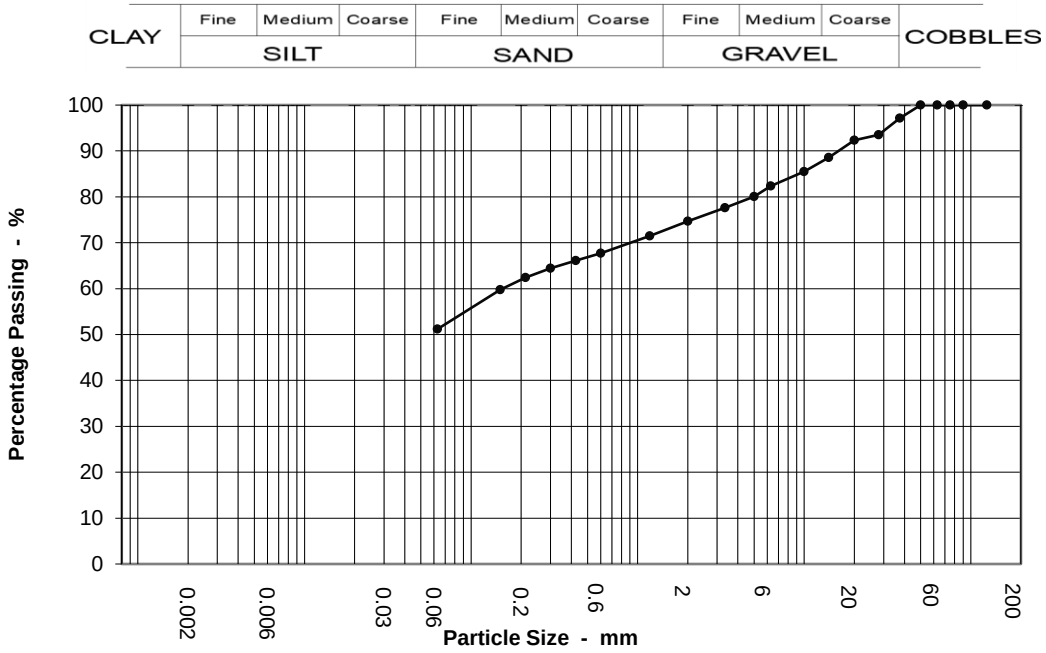
Sample Proportions	
Cobbles	0.0
Gravel	22.0
Sand	25.0
Silt & Clay	53.0

Grading Analysis	
D100	50.00
D60	0.10
D10	
Uniformity Coefficient	

PARTICLE SIZE DISTRIBUTION

BS 1377 : Part 2 : 1990 : Clause 9

		Job Ref	**P19013**
		Borehole / Pit No	TP01
Location	**Indaver**	Sample No	3
		Depth	3.00 m
Soil Description	Slightly sandy slightly gravelly CLAY	Sample type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	97		
28	94		
20	92		
14	89		
10	85		
6.3	82		
5	80		
3.35	78		
2	75		
1.18	71		
0.6	68		
0.425	66		
0.3	64		
0.212	62		
0.15	60		
0.063	51		

Test Method	
BS 1377 : Part 2 : 1990	
Sieving	Clause 9.3
Sedimentation	N/A

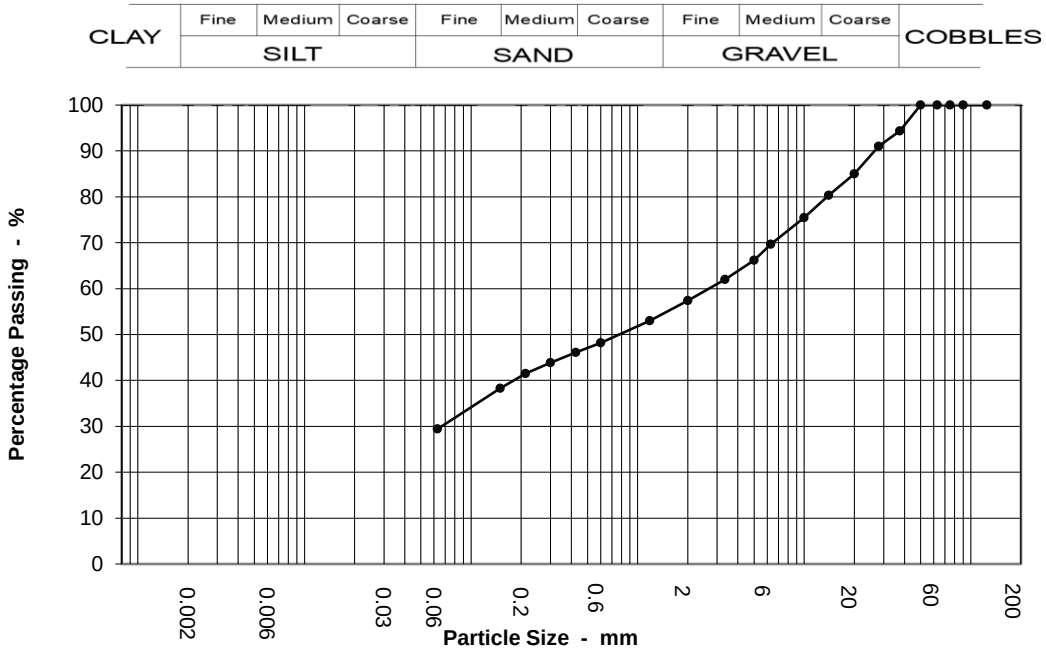
Sample Proportions	
Cobbles	0.0
Gravel	25.0
Sand	23.0
Silt & Clay	51.0

Grading Analysis	
D100	50.00
D60	0.16
D10	
Uniformity Coefficient	

PARTICLE SIZE DISTRIBUTION

BS 1377 : Part 2 : 1990 : Clause 9

		Job Ref	**P19013**
		Borehole / Pit No	TP02
Location	**Indaver**	Sample No	1
		Depth	1.00 m
Soil Description	Slightly sandy gravelly SILT	Sample type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	94		
28	91		
20	85		
14	80		
10	75		
6.3	70		
5	66		
3.35	62		
2	57		
1.18	53		
0.6	48		
0.425	46		
0.3	44		
0.212	41		
0.15	38		
0.063	29		

Test Method	
BS 1377 : Part 2 : 1990	
Sieving	Clause 9.3
Sedimentation	N/A

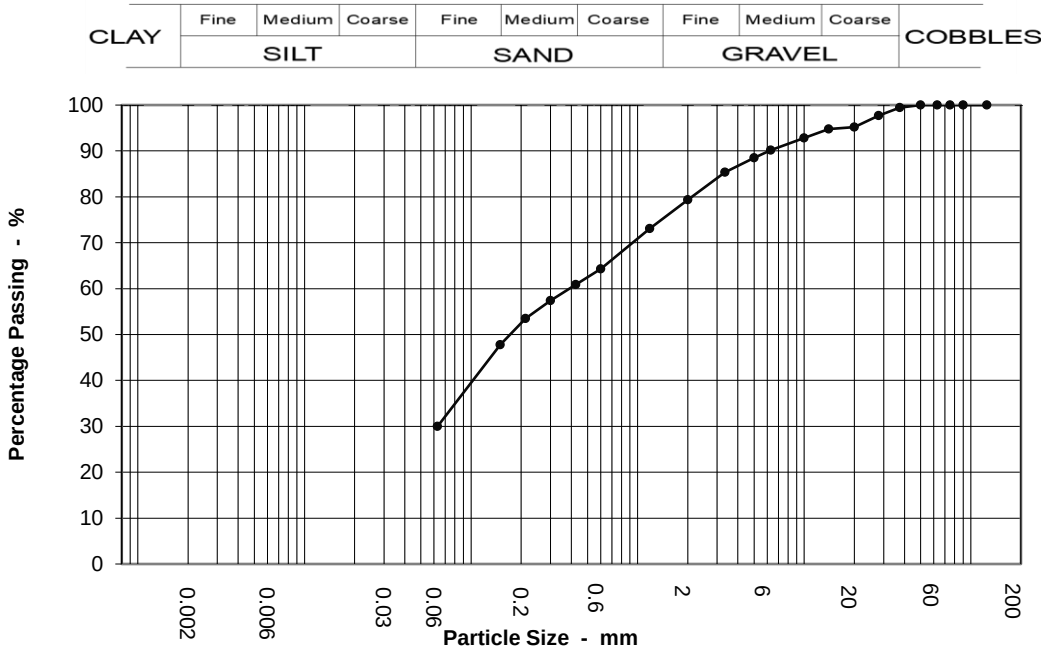
Sample Proportions	
Cobbles	0.0
Gravel	43.0
Sand	28.0
Silt & Clay	29.0

Grading Analysis	
D100	50.00
D60	2.68
D10	
Uniformity Coefficient	

PARTICLE SIZE DISTRIBUTION

BS 1377 : Part 2 : 1990 : Clause 9

		Job Ref	**P19013**
		Borehole / Pit No	TP02
Location	**Indaver**	Sample No	3
		Depth	3.00 m
Soil Description	Slightly gravelly sandy SILT	Sample type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	99		
28	98		
20	95		
14	95		
10	93		
6.3	90		
5	88		
3.35	85		
2	79		
1.18	73		
0.6	64		
0.425	61		
0.3	57		
0.212	53		
0.15	48		
0.063	30		

Test Method	
BS 1377 : Part 2 : 1990	
Sieving	Clause 9.3
Sedimentation	N/A

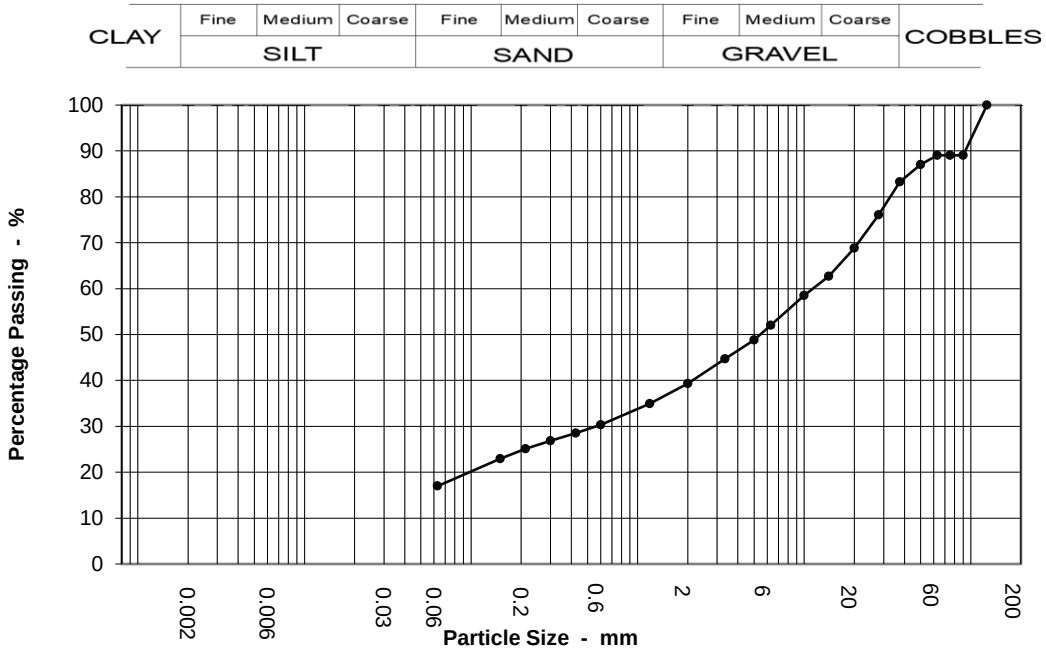
Sample Proportions	
Cobbles	0.0
Gravel	21.0
Sand	49.0
Silt & Clay	30.0

Grading Analysis	
D100	50.00
D60	0.39
D10	
Uniformity Coefficient	

PARTICLE SIZE DISTRIBUTION

BS 1377 : Part 2 : 1990 : Clause 9

		Job Ref	**P19013**
		Borehole / Pit No	TP03
Location	**Indaver**	Sample No	1
		Depth	0.50 m
Soil Description	Silty very sandy GRAVEL with medium cobble content	Sample type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	89		
75	89		
63	89		
50	87		
37.5	83		
28	76		
20	69		
14	63		
10	58		
6.3	52		
5	49		
3.35	45		
2	39		
1.18	35		
0.6	30		
0.425	29		
0.3	27		
0.212	25		
0.15	23		
0.063	17		

Test Method	
BS 1377 : Part 2 : 1990	
Sieving	Clause 9.3
Sedimentation	N/A

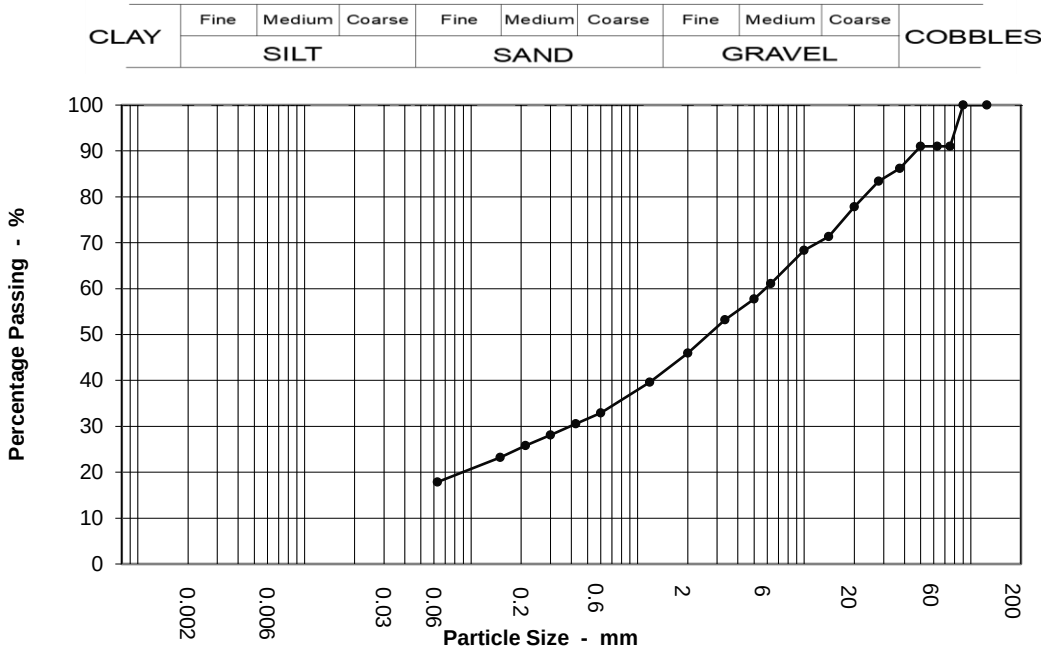
Sample Proportions	
Cobbles	11.0
Gravel	50.0
Sand	22.0
Silt & Clay	17.0

Grading Analysis	
D100	125.00
D60	11.30
D10	
Uniformity Coefficient	

PARTICLE SIZE DISTRIBUTION

BS 1377 : Part 2 : 1990 : Clause 9

		Job Ref	**P19013**
		Borehole / Pit No	TP03
Location	**Indaver**	Sample No	2
		Depth	2.00 m
Soil Description	Silty very sandy GRAVEL with low cobble content	Sample type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	91		
63	91		
50	91		
37.5	86		
28	83		
20	78		
14	71		
10	68		
6.3	61		
5	58		
3.35	53		
2	46		
1.18	40		
0.6	33		
0.425	31		
0.3	28		
0.212	26		
0.15	23		
0.063	18		

Test Method	
BS 1377 : Part 2 : 1990	
Sieving	Clause 9.3
Sedimentation	N/A

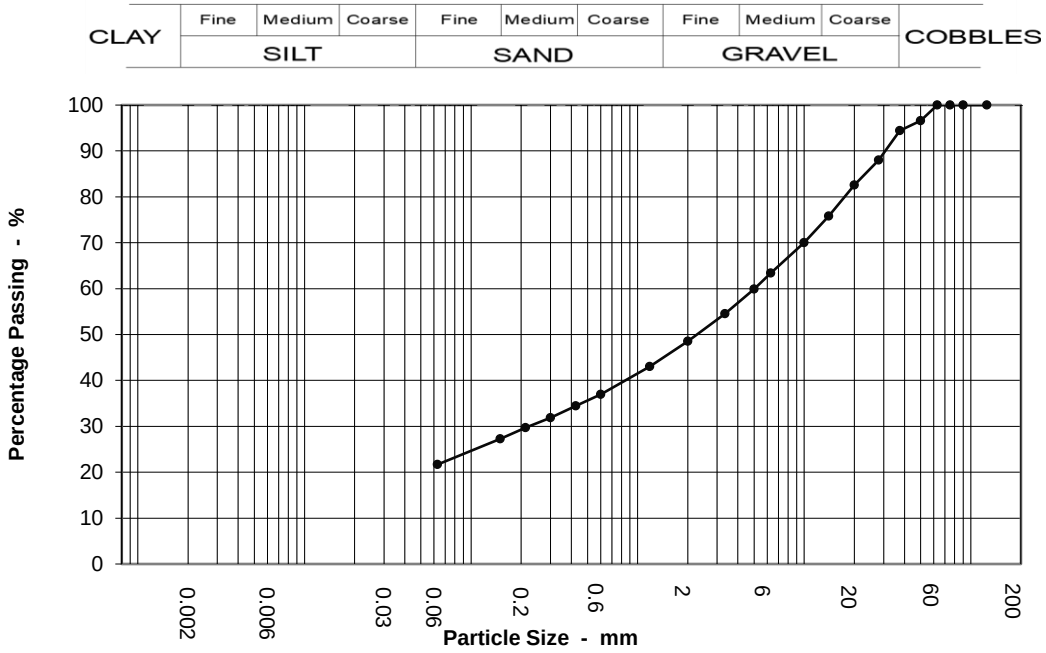
Sample Proportions	
Cobbles	9.0
Gravel	45.0
Sand	28.0
Silt & Clay	18.0

Grading Analysis	
D100	90.00
D60	5.85
D10	
Uniformity Coefficient	

PARTICLE SIZE DISTRIBUTION

BS 1377 : Part 2 : 1990 : Clause 9

		Job Ref	**P19013**
		Borehole / Pit No	TP05
Location	**Indaver**	Sample No	2
		Depth	1.50 m
Soil Description	Very clayey very sandy GRAVEL	Sample type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	97		
37.5	94		
28	88		
20	83		
14	76		
10	70		
6.3	63		
5	60		
3.35	55		
2	49		
1.18	43		
0.6	37		
0.425	34		
0.3	32		
0.212	30		
0.15	27		
0.063	22		

Test Method	
BS 1377 : Part 2 : 1990	
Sieving	Clause 9.3
Sedimentation	N/A

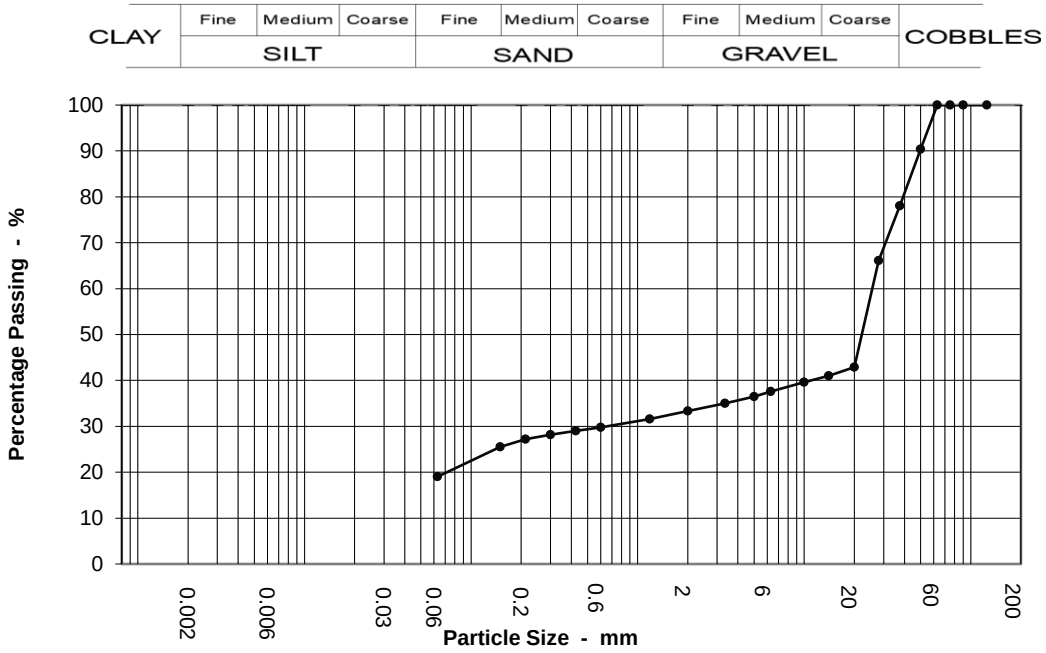
Sample Proportions	
Cobbles	0.0
Gravel	51.0
Sand	27.0
Silt & Clay	22.0

Grading Analysis	
D100	63.00
D60	5.04
D10	
Uniformity Coefficient	

PARTICLE SIZE DISTRIBUTION

BS 1377 : Part 2 : 1990 : Clause 9

		Job Ref	**P19013**
		Borehole / Pit No	TP06
Location	**Indaver**	Sample No	1
		Depth	0.50 m
Soil Description	Clayey sandy GRAVEL	Sample type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	90		
37.5	78		
28	66		
20	43		
14	41		
10	40		
6.3	38		
5	36		
3.35	35		
2	33		
1.18	32		
0.6	30		
0.425	29		
0.3	28		
0.212	27		
0.15	26		
0.063	19		

Test Method	
BS 1377 : Part 2 : 1990	
Sieving	Clause 9.3
Sedimentation	N/A

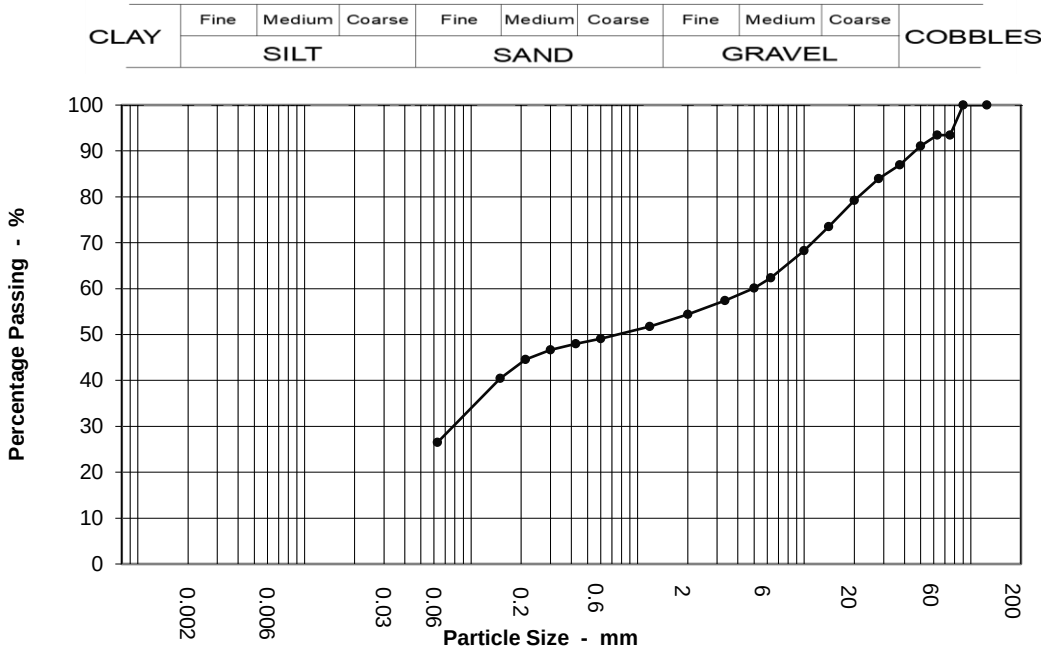
Sample Proportions	
Cobbles	0.0
Gravel	67.0
Sand	14.0
Silt & Clay	19.0

Grading Analysis	
D100	63.00
D60	25.60
D10	
Uniformity Coefficient	

PARTICLE SIZE DISTRIBUTION

BS 1377 : Part 2 : 1990 : Clause 9

		Job Ref	**P19013**
		Borehole / Pit No	TP07
Location	**Indaver**	Sample No	1
		Depth	0.50 m
Soil Description	Slightly sandy gravelly CLAY with low cobble content	Sample type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	93		
63	93		
50	91		
37.5	87		
28	84		
20	79		
14	73		
10	68		
6.3	62		
5	60		
3.35	57		
2	54		
1.18	52		
0.6	49		
0.425	48		
0.3	47		
0.212	45		
0.15	40		
0.063	27		

Test Method	
BS 1377 : Part 2 : 1990	
Sieving	Clause 9.3
Sedimentation	N/A

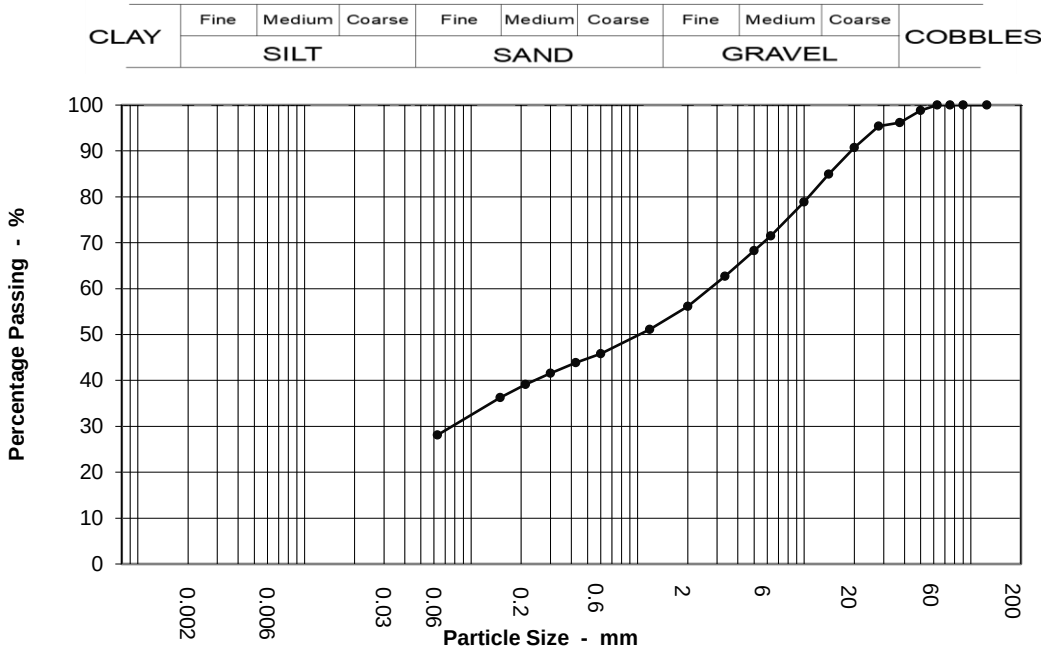
Sample Proportions	
Cobbles	7.0
Gravel	39.0
Sand	28.0
Silt & Clay	27.0

Grading Analysis	
D100	90.00
D60	4.91
D10	
Uniformity Coefficient	

PARTICLE SIZE DISTRIBUTION

BS 1377 : Part 2 : 1990 : Clause 9

		Job Ref	**P19013**
		Borehole / Pit No	TP07
Location	**Indaver**	Sample No	4
		Depth	3.00 m
Soil Description	Slightly sandy gravelly CLAY	Sample type	B



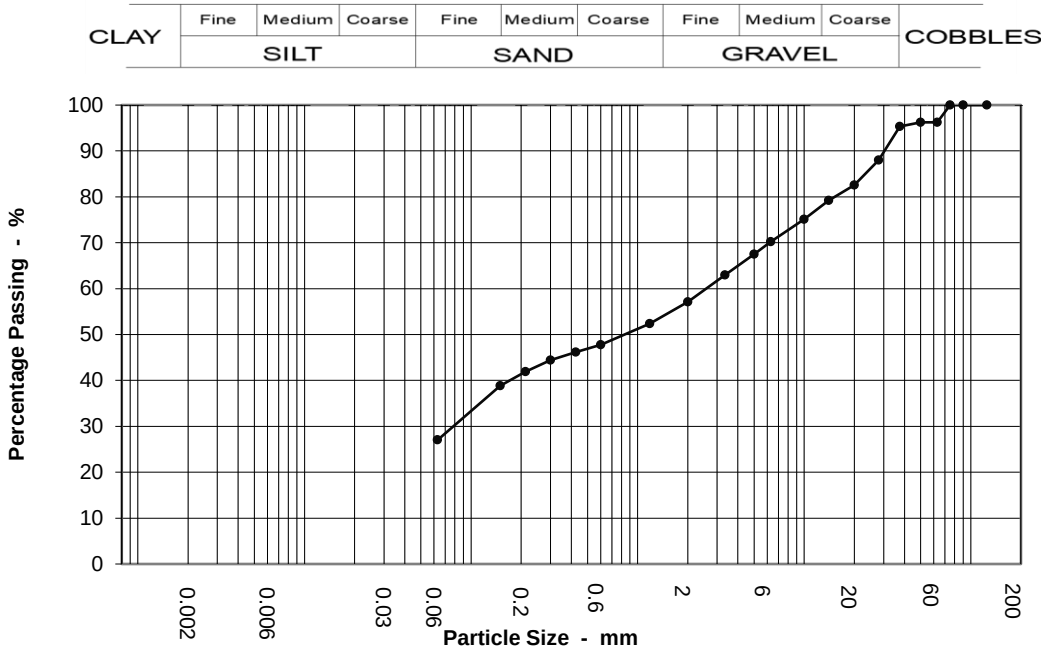
Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	99		
37.5	96		
28	95		
20	91		
14	85		
10	79		
6.3	71		
5	68		
3.35	63		
2	56		
1.18	51		
0.6	46		
0.425	44		
0.3	42		
0.212	39		
0.15	36		
0.063	28		

Test Method	
BS 1377 : Part 2 : 1990	
Sieving	Clause 9.3
Sedimentation	N/A

Sample Proportions	
Cobbles	0.0
Gravel	44.0
Sand	28.0
Silt & Clay	28.0

Grading Analysis	
D100	63.00
D60	2.71
D10	
Uniformity Coefficient	

pgl priority geotechnical	**PARTICLE SIZE DISTRIBUTION** **BS 1377 : Part 2 : 1990 : Clause 9**	**Job Ref**	**P19013**
		Borehole / Pit No	TP08
Location	**Indaver**	Sample No	1
		Depth	0.50 m
Soil Description	Slightly sandy gravelly CLAY with low cobble content	Sample type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	96		
50	96		
37.5	95		
28	88		
20	83		
14	79		
10	75		
6.3	70		
5	67		
3.35	63		
2	57		
1.18	52		
0.6	48		
0.425	46		
0.3	44		
0.212	42		
0.15	39		
0.063	27		

Test Method	
BS 1377 : Part 2 : 1990	
Sieving	Clause 9.3
Sedimentation	N/A

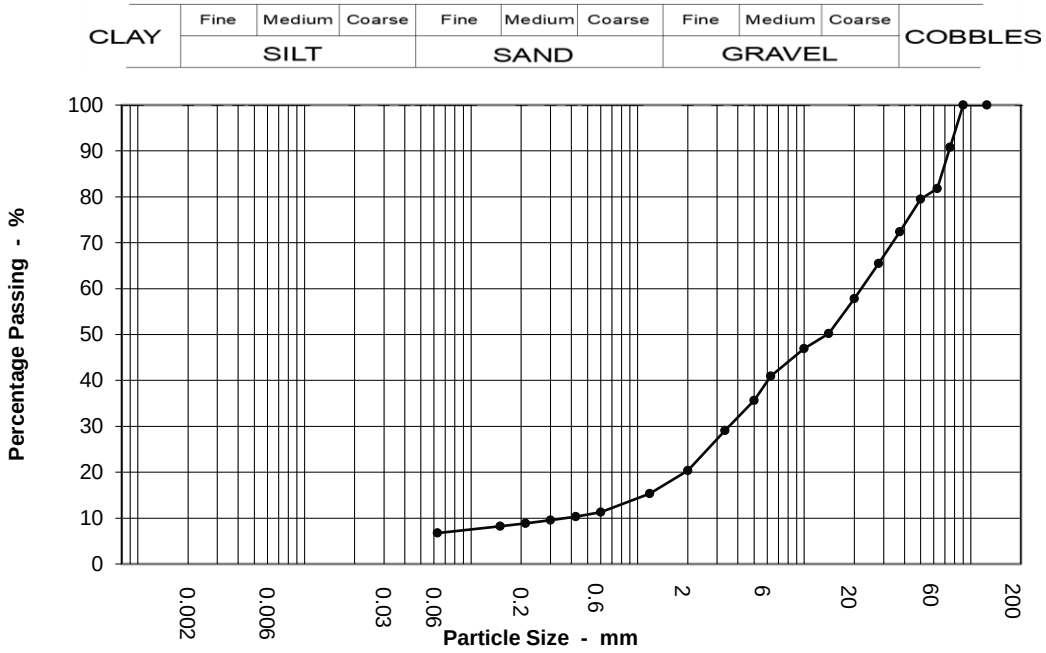
Sample Proportions	
Cobbles	4.0
Gravel	39.0
Sand	30.0
Silt & Clay	27.0

Grading Analysis	
D100	75.00
D60	2.58
D10	
Uniformity Coefficient	

PARTICLE SIZE DISTRIBUTION

BS 1377 : Part 2 : 1990 : Clause 9

		Job Ref	**P19013**
		Borehole / Pit No	TP08
Location	**Indaver**	Sample No	3
		Depth	2.00 m
Soil Description	Clayey sandy GRAVEL with medium cobble content	Sample type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	91		
63	82		
50	79		
37.5	72		
28	65		
20	58		
14	50		
10	47		
6.3	41		
5	36		
3.35	29		
2	20		
1.18	15		
0.6	11		
0.425	10		
0.3	10		
0.212	9		
0.15	8		
0.063	7		

Test Method	
BS 1377 : Part 2 : 1990	
Sieving	Clause 9.3
Sedimentation	N/A

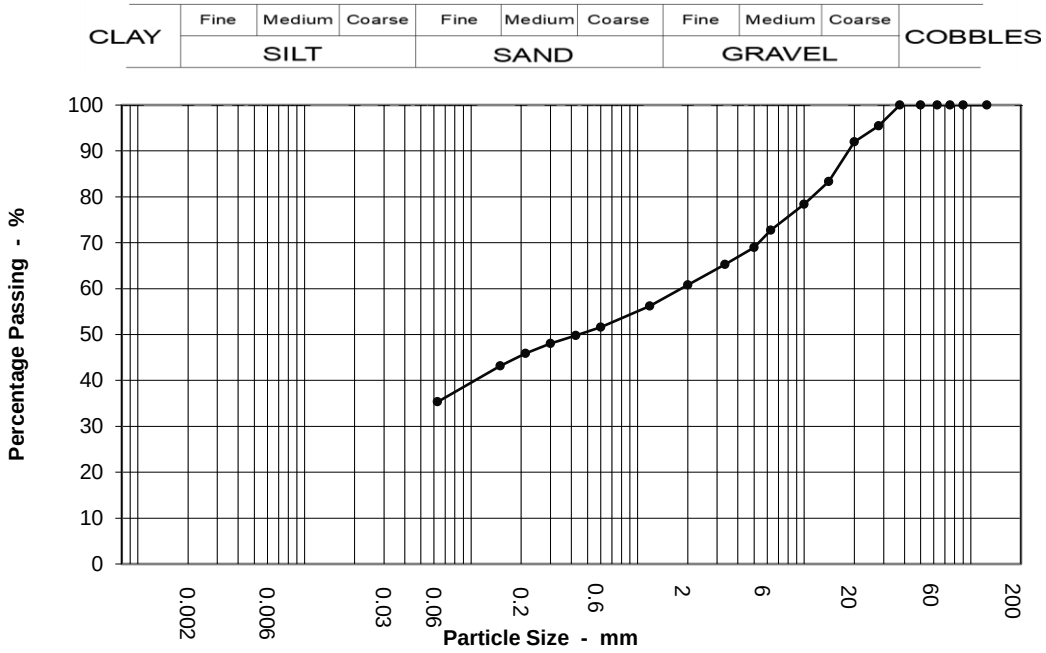
Sample Proportions	
Cobbles	18.0
Gravel	61.0
Sand	14.0
Silt & Clay	7.0

Grading Analysis	
D100	90.00
D60	22.00
D10	0.37
Uniformity Coefficient	59.00

PARTICLE SIZE DISTRIBUTION

BS 1377 : Part 2 : 1990 : Clause 9

		Job Ref	**P19013**
		Borehole / Pit No	TP09
Location	**Indaver**	Sample No	1
		Depth	0.50 m
Soil Description	Slightly sandy gravelly CLAY	Sample type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	95		
20	92		
14	83		
10	78		
6.3	73		
5	69		
3.35	65		
2	61		
1.18	56		
0.6	52		
0.425	50		
0.3	48		
0.212	46		
0.15	43		
0.063	35		

Test Method	
BS 1377 : Part 2 : 1990	
Sieving	Clause 9.3
Sedimentation	N/A

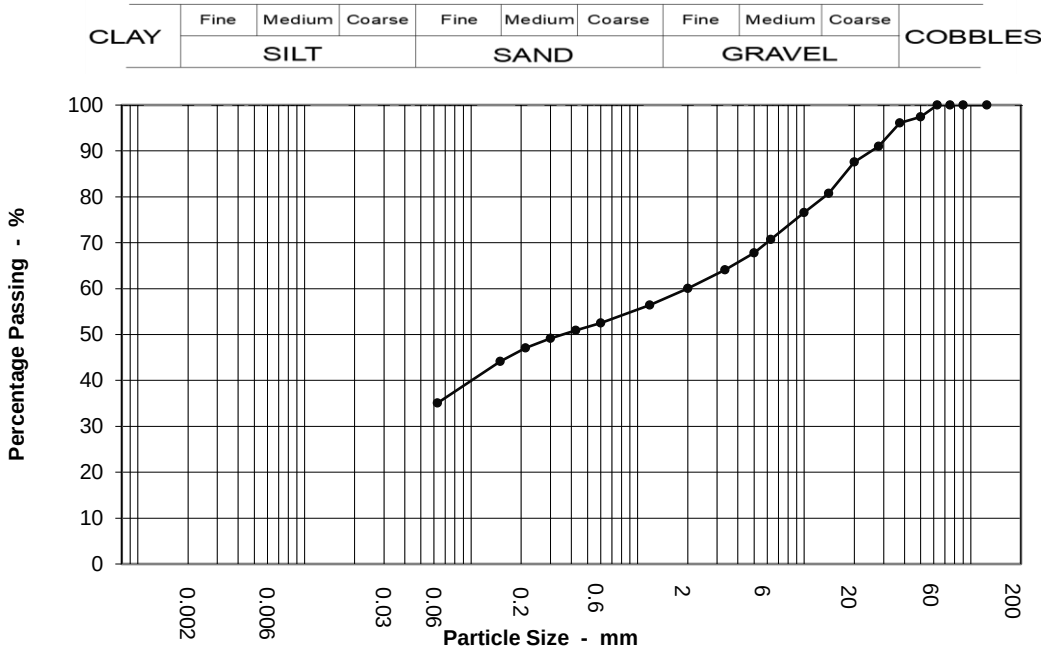
Sample Proportions	
Cobbles	0.0
Gravel	39.0
Sand	25.0
Silt & Clay	35.0

Grading Analysis	
D100	37.50
D60	1.83
D10	
Uniformity Coefficient	

PARTICLE SIZE DISTRIBUTION

BS 1377 : Part 2 : 1990 : Clause 9

		Job Ref	**P19013**
		Borehole / Pit No	TP09
Location	**Indaver**	Sample No	4
		Depth	4.40 m
Soil Description	Slightly sandy gravelly CLAY	Sample type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	97		
37.5	96		
28	91		
20	88		
14	81		
10	77		
6.3	71		
5	68		
3.35	64		
2	60		
1.18	56		
0.6	53		
0.425	51		
0.3	49		
0.212	47		
0.15	44		
0.063	35		

Test Method	
BS 1377 : Part 2 : 1990	
Sieving	Clause 9.3
Sedimentation	N/A

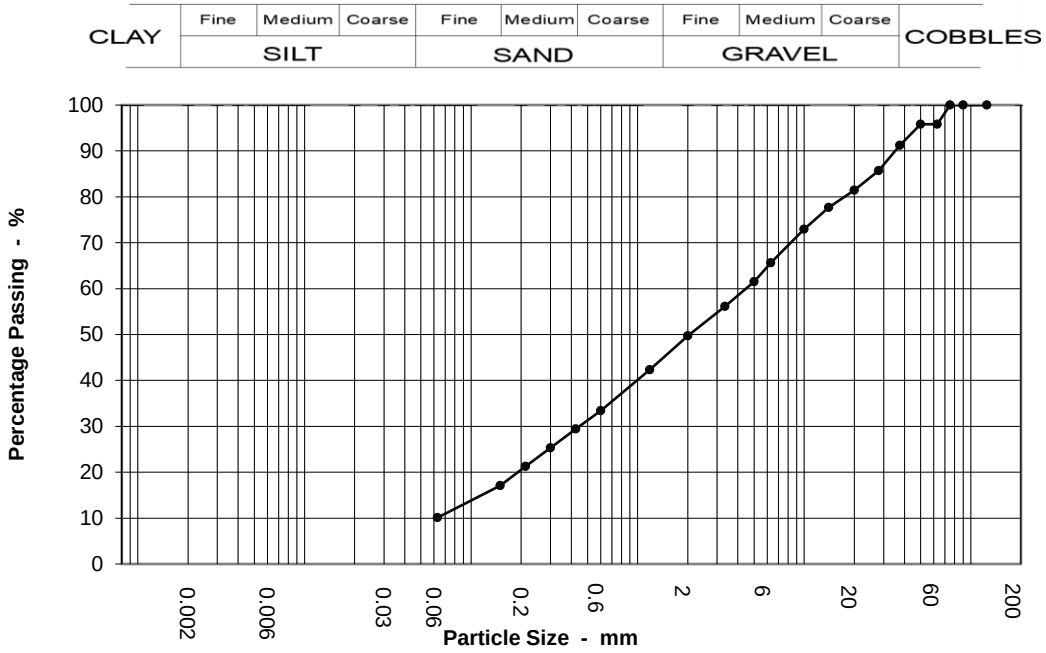
Sample Proportions	
Cobbles	0.0
Gravel	40.0
Sand	25.0
Silt & Clay	35.0

Grading Analysis	
D100	63.00
D60	1.99
D10	
Uniformity Coefficient	

PARTICLE SIZE DISTRIBUTION

BS 1377 : Part 2 : 1990 : Clause 9

		Job Ref	**P19013**
		Borehole / Pit No	TP10
Location	**Indaver**	Sample No	2
		Depth	1.50 m
Soil Description	Clayey very sandy GRAVEL with low cobble content	Sample type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	96		
50	96		
37.5	91		
28	86		
20	81		
14	78		
10	73		
6.3	66		
5	62		
3.35	56		
2	50		
1.18	42		
0.6	33		
0.425	29		
0.3	25		
0.212	21		
0.15	17		
0.063	10		

Test Method	
BS 1377 : Part 2 : 1990	
Sieving	Clause 9.3
Sedimentation	N/A

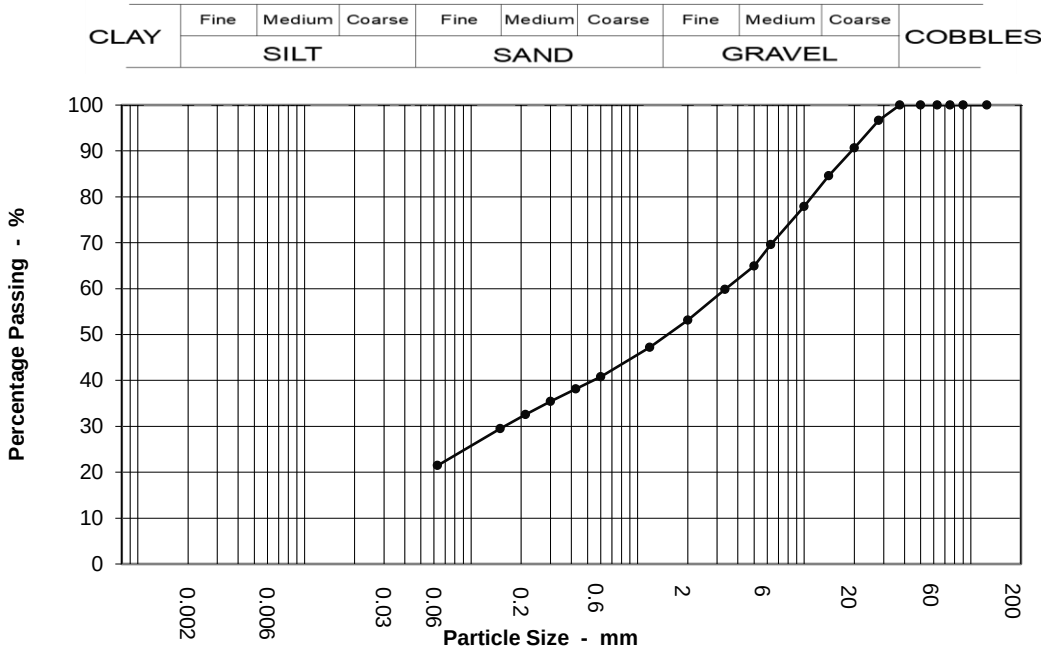
Sample Proportions	
Cobbles	4.0
Gravel	46.0
Sand	40.0
Silt & Clay	10.0

Grading Analysis	
D100	75.00
D60	4.46
D10	
Uniformity Coefficient	

PARTICLE SIZE DISTRIBUTION

BS 1377 : Part 2 : 1990 : Clause 9

		Job Ref	**P19013**
		Borehole / Pit No	TP10
Location	**Indaver**	Sample No	3
		Depth	2.50 m
Soil Description	Very clayey very sandy GRAVEL	Sample type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	97		
20	91		
14	85		
10	78		
6.3	70		
5	65		
3.35	60		
2	53		
1.18	47		
0.6	41		
0.425	38		
0.3	35		
0.212	33		
0.15	30		
0.063	21		

Test Method	
BS 1377 : Part 2 : 1990	
Sieving	Clause 9.3
Sedimentation	N/A

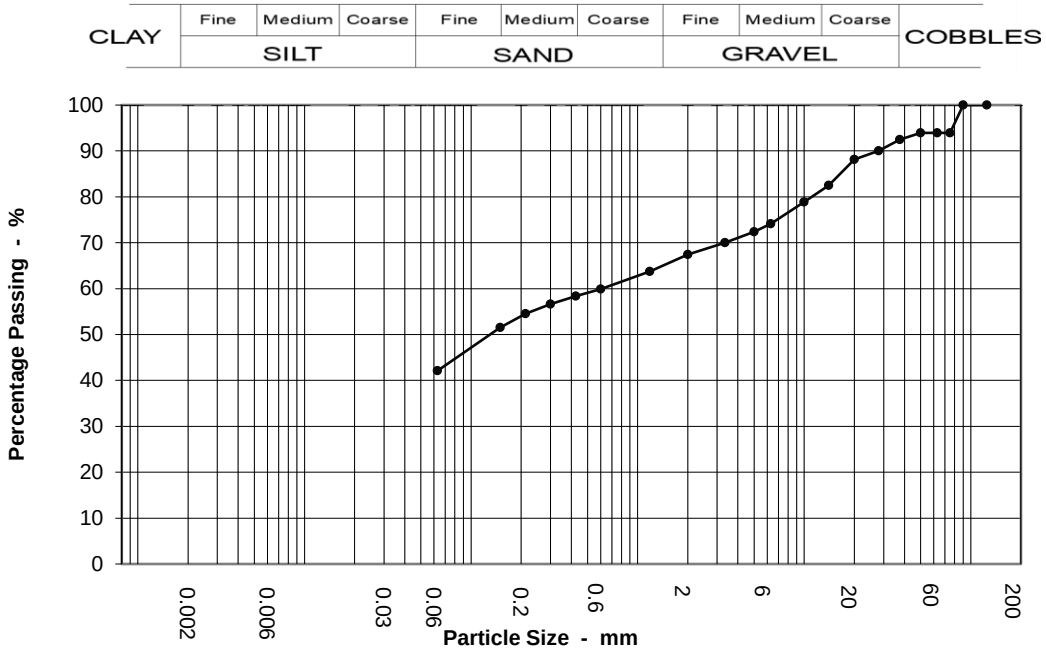
Sample Proportions	
Cobbles	0.0
Gravel	47.0
Sand	32.0
Silt & Clay	21.0

Grading Analysis	
D100	37.50
D60	3.39
D10	
Uniformity Coefficient	

PARTICLE SIZE DISTRIBUTION

BS 1377 : Part 2 : 1990 : Clause 9

		Job Ref	**P19013**
		Borehole / Pit No	TP11
Location	**Indaver**	Sample No	1
		Depth	0.50 m
Soil Description	Slightly sandy slightly gravelly CLAY with low cobble content	Sample type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	94		
63	94		
50	94		
37.5	92		
28	90		
20	88		
14	83		
10	79		
6.3	74		
5	72		
3.35	70		
2	67		
1.18	64		
0.6	60		
0.425	58		
0.3	57		
0.212	55		
0.15	52		
0.063	42		

Test Method	
BS 1377 : Part 2 : 1990	
Sieving	Clause 9.3
Sedimentation	N/A

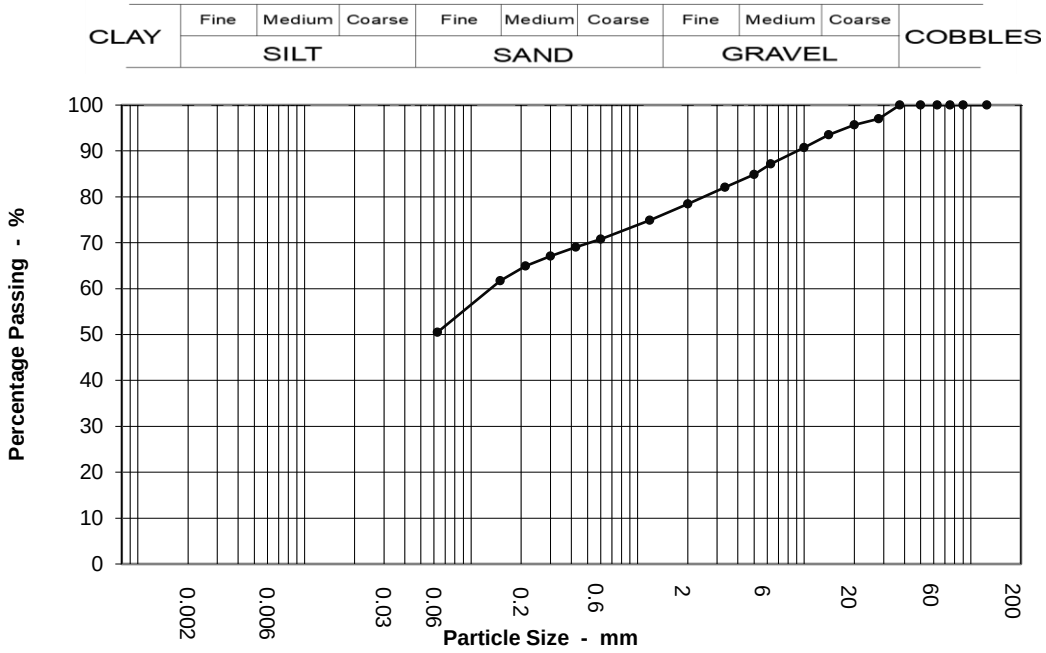
Sample Proportions	
Cobbles	6.0
Gravel	26.0
Sand	25.0
Silt & Clay	42.0

Grading Analysis	
D100	90.00
D60	0.61
D10	
Uniformity Coefficient	

PARTICLE SIZE DISTRIBUTION

BS 1377 : Part 2 : 1990 : Clause 9

		Job Ref	**P19013**
		Borehole / Pit No	TP11
Location	**Indaver**	Sample No	3
		Depth	3.10 m
Soil Description	Slightly sandy slightly gravelly CLAY	Sample type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	97		
20	96		
14	94		
10	91		
6.3	87		
5	85		
3.35	82		
2	78		
1.18	75		
0.6	71		
0.425	69		
0.3	67		
0.212	65		
0.15	62		
0.063	51		

Test Method	
BS 1377 : Part 2 : 1990	
Sieving	Clause 9.3
Sedimentation	N/A

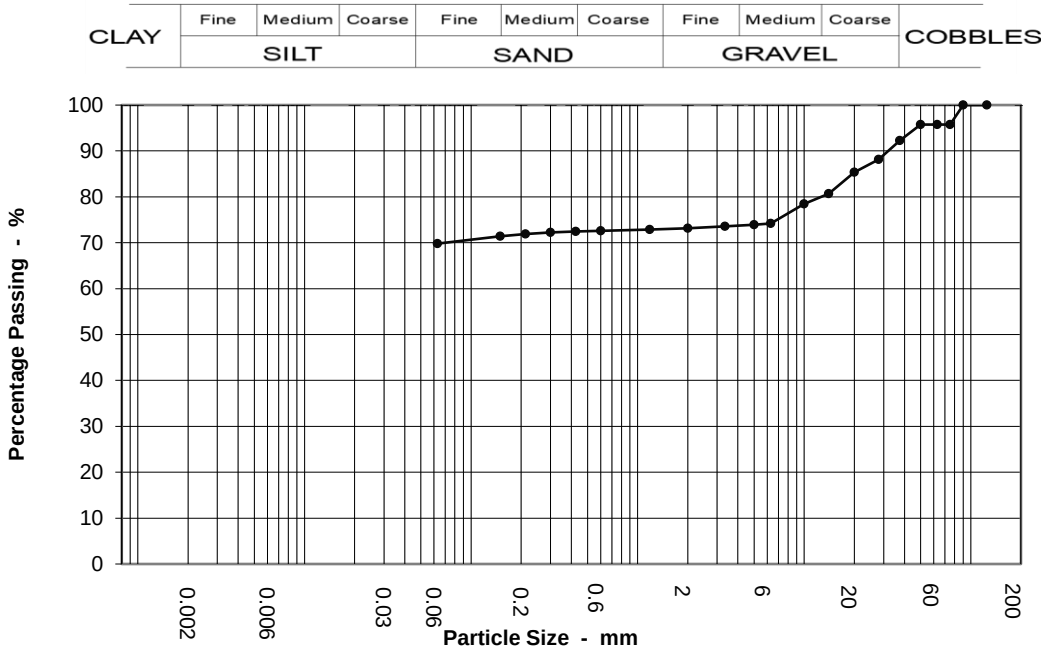
Sample Proportions	
Cobbles	0.0
Gravel	22.0
Sand	28.0
Silt & Clay	51.0

Grading Analysis	
D100	37.50
D60	0.13
D10	
Uniformity Coefficient	

PARTICLE SIZE DISTRIBUTION

BS 1377 : Part 2 : 1990 : Clause 9

		Job Ref	**P19013**
		Borehole / Pit No	TP12
Location	**Indaver**	Sample No	3
		Depth	2.50 m
Soil Description	Slightly sandy slightly gravelly SILT with low cobble content	Sample type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	96		
63	96		
50	96		
37.5	92		
28	88		
20	85		
14	81		
10	78		
6.3	74		
5	74		
3.35	74		
2	73		
1.18	73		
0.6	73		
0.425	72		
0.3	72		
0.212	72		
0.15	71		
0.063	70		

Test Method	
BS 1377 : Part 2 : 1990	
Sieving	Clause 9.3
Sedimentation	N/A

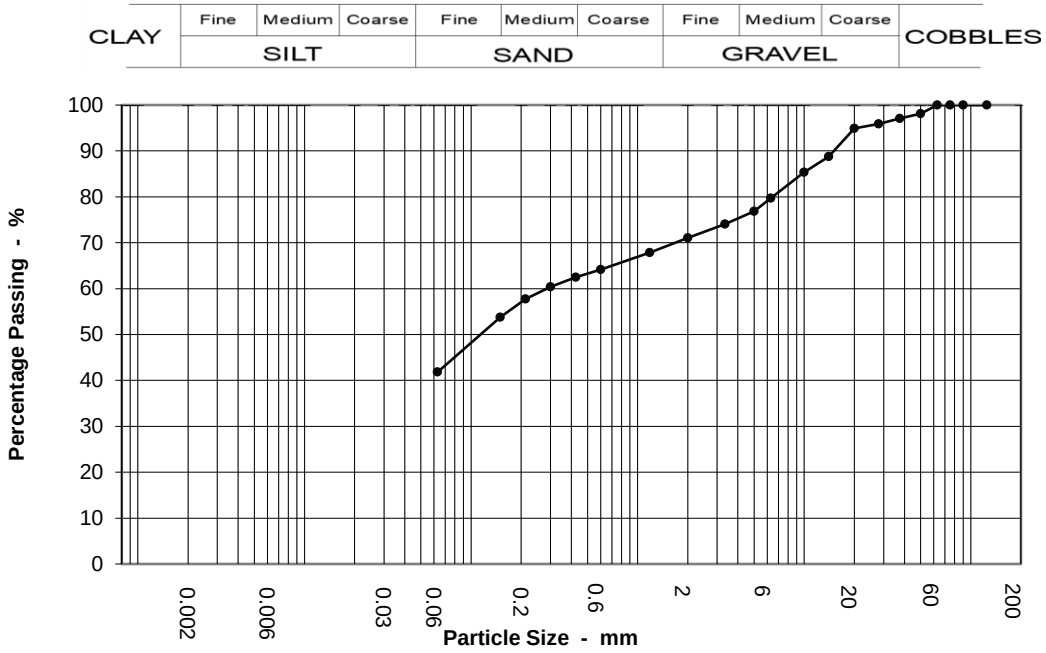
Sample Proportions	
Cobbles	4.0
Gravel	23.0
Sand	3.0
Silt & Clay	70.0

Grading Analysis	
D100	90.00
D60	
D10	
Uniformity Coefficient	

PARTICLE SIZE DISTRIBUTION

BS 1377 : Part 2 : 1990 : Clause 9

		Job Ref	**P19013**
		Borehole / Pit No	TP12
Location	**Indaver**	Sample No	5
		Depth	4.30 m
Soil Description	Slightly sandy slightly gravelly CLAY	Sample type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	98		
37.5	97		
28	96		
20	95		
14	89		
10	85		
6.3	80		
5	77		
3.35	74		
2	71		
1.18	68		
0.6	64		
0.425	62		
0.3	60		
0.212	58		
0.15	54		
0.063	42		

Test Method	
BS 1377 : Part 2 : 1990	
Sieving	Clause 9.3
Sedimentation	N/A

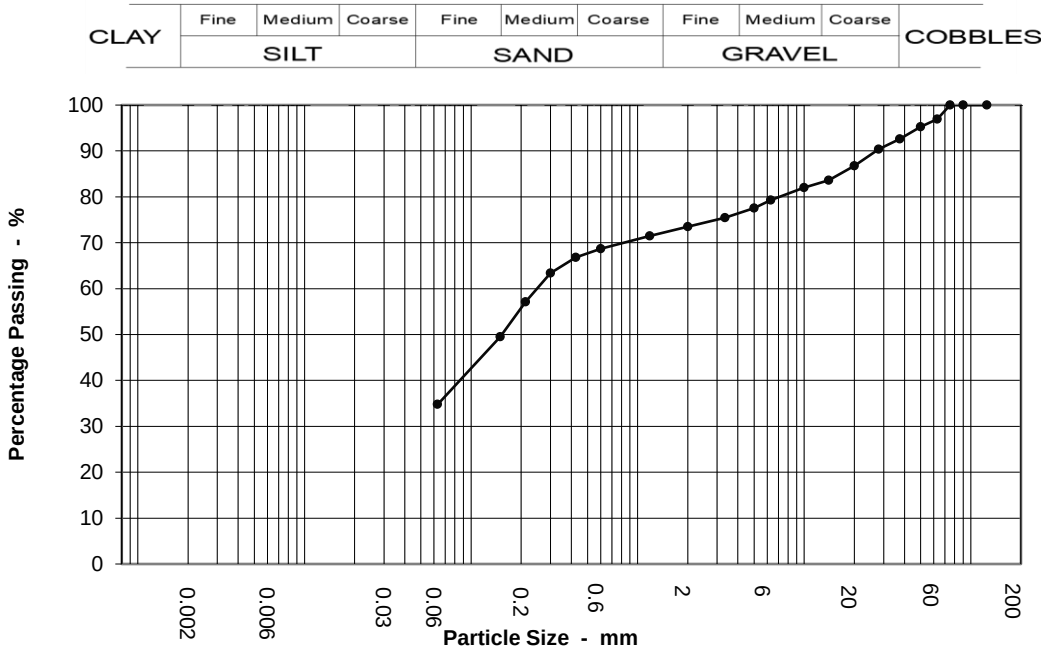
Sample Proportions	
Cobbles	0.0
Gravel	29.0
Sand	29.0
Silt & Clay	42.0

Grading Analysis	
D100	63.00
D60	0.29
D10	
Uniformity Coefficient	

PARTICLE SIZE DISTRIBUTION

BS 1377 : Part 2 : 1990 : Clause 9

		Job Ref	**P19013**
		Borehole / Pit No	TP13
Location	**Indaver**	Sample No	1
		Depth	0.50 m
Soil Description	Slightly gravelly sandy CLAY with low cobble content	Sample type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	97		
50	95		
37.5	93		
28	90		
20	87		
14	84		
10	82		
6.3	79		
5	78		
3.35	75		
2	73		
1.18	72		
0.6	69		
0.425	67		
0.3	63		
0.212	57		
0.15	50		
0.063	35		

Test Method	
BS 1377 : Part 2 : 1990	
Sieving	Clause 9.3
Sedimentation	N/A

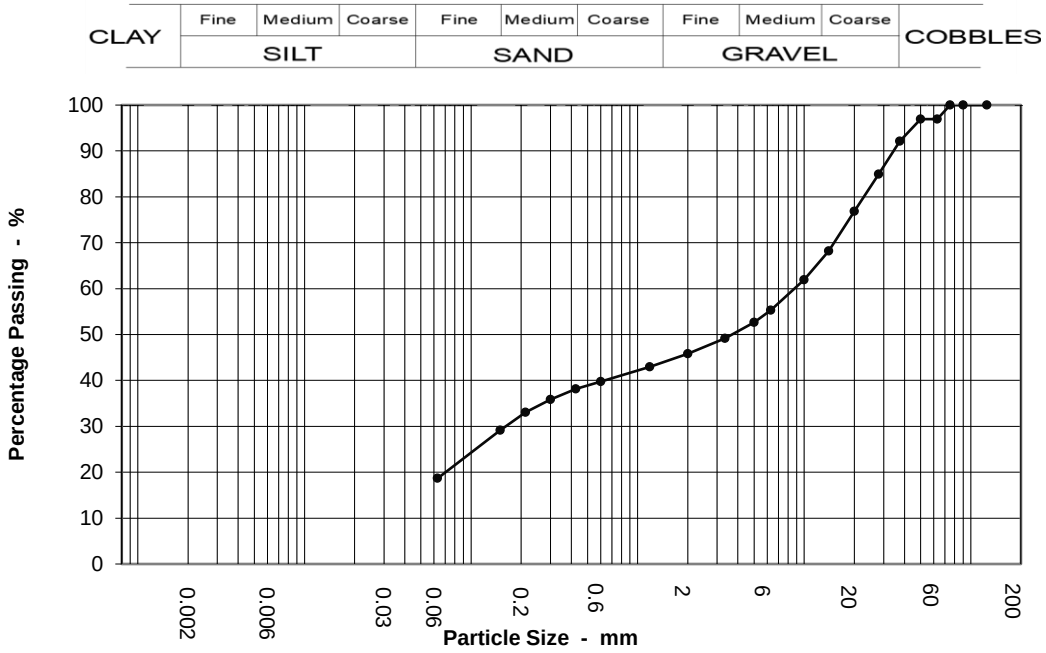
Sample Proportions	
Cobbles	3.0
Gravel	23.0
Sand	39.0
Silt & Clay	35.0

Grading Analysis	
D100	75.00
D60	0.25
D10	
Uniformity Coefficient	

PARTICLE SIZE DISTRIBUTION

BS 1377 : Part 2 : 1990 : Clause 9

		Job Ref	**P19013**
		Borehole / Pit No	TP13
Location	**Indaver**	Sample No	4
		Depth	3.50 m
Soil Description	Clayey very sandy GRAVEL with low cobble content	Sample type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	97		
50	97		
37.5	92		
28	85		
20	77		
14	68		
10	62		
6.3	55		
5	53		
3.35	49		
2	46		
1.18	43		
0.6	40		
0.425	38		
0.3	36		
0.212	33		
0.15	29		
0.063	19		

Test Method	
BS 1377 : Part 2 : 1990	
Sieving	Clause 9.3
Sedimentation	N/A

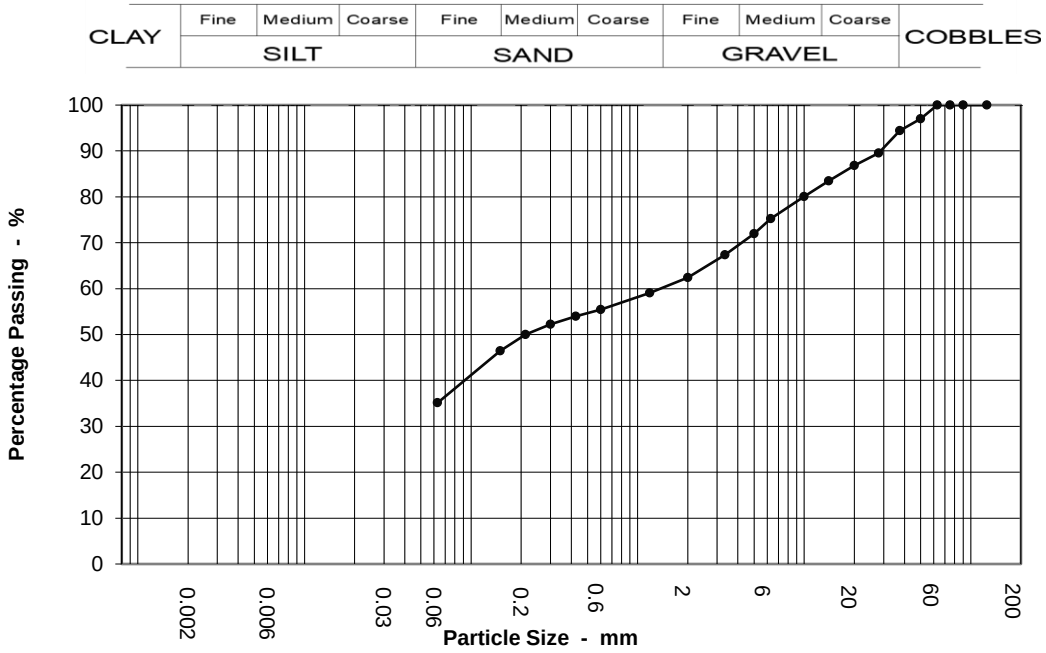
Sample Proportions	
Cobbles	3.0
Gravel	51.0
Sand	27.0
Silt & Clay	19.0

Grading Analysis	
D100	75.00
D60	8.75
D10	
Uniformity Coefficient	

PARTICLE SIZE DISTRIBUTION

BS 1377 : Part 2 : 1990 : Clause 9

		Job Ref	**P19013**
		Borehole / Pit No	TP14
Location	**Indaver**	Sample No	1
		Depth	0.50 m
Soil Description	Slightly sandy gravelly CLAY	Sample type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	97		
37.5	94		
28	90		
20	87		
14	83		
10	80		
6.3	75		
5	72		
3.35	67		
2	62		
1.18	59		
0.6	55		
0.425	54		
0.3	52		
0.212	50		
0.15	46		
0.063	35		

Test Method	
BS 1377 : Part 2 : 1990	
Sieving	Clause 9.3
Sedimentation	N/A

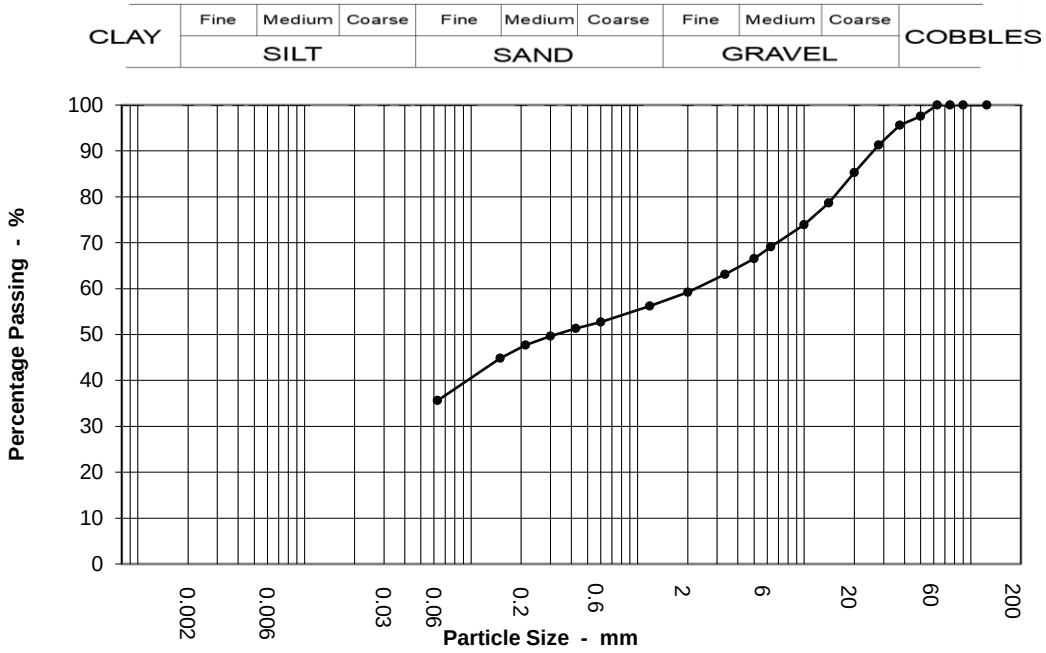
Sample Proportions	
Cobbles	0.0
Gravel	38.0
Sand	27.0
Silt & Clay	35.0

Grading Analysis	
D100	63.00
D60	1.37
D10	
Uniformity Coefficient	

PARTICLE SIZE DISTRIBUTION

BS 1377 : Part 2 : 1990 : Clause 9

		Job Ref	**P19013**
		Borehole / Pit No	TP15
Location	**Indaver**	Sample No	1
		Depth	1.00 m
Soil Description	Slightly sandy gravelly CLAY	Sample type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	98		
37.5	96		
28	91		
20	85		
14	79		
10	74		
6.3	69		
5	67		
3.35	63		
2	59		
1.18	56		
0.6	53		
0.425	51		
0.3	50		
0.212	48		
0.15	45		
0.063	36		

Test Method	
BS 1377 : Part 2 : 1990	
Sieving	Clause 9.3
Sedimentation	N/A

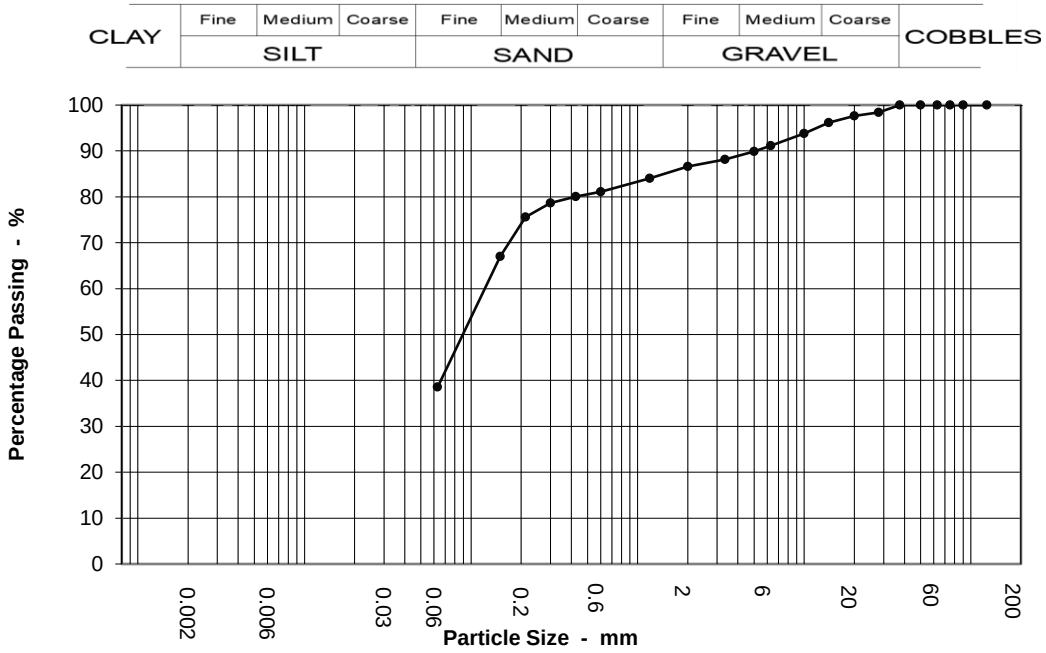
Sample Proportions	
Cobbles	0.0
Gravel	41.0
Sand	24.0
Silt & Clay	36.0

Grading Analysis	
D100	63.00
D60	2.21
D10	
Uniformity Coefficient	

PARTICLE SIZE DISTRIBUTION

BS 1377 : Part 2 : 1990 : Clause 9

		Job Ref	**P19013**
		Borehole / Pit No	TP15
Location	**Indaver**	Sample No	2
		Depth	2.20 m
Soil Description	Slightly gravelly sandy CLAY	Sample type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	98		
20	98		
14	96		
10	94		
6.3	91		
5	90		
3.35	88		
2	87		
1.18	84		
0.6	81		
0.425	80		
0.3	79		
0.212	76		
0.15	67		
0.063	39		

Test Method	
BS 1377 : Part 2 : 1990	
Sieving	Clause 9.3
Sedimentation	N/A

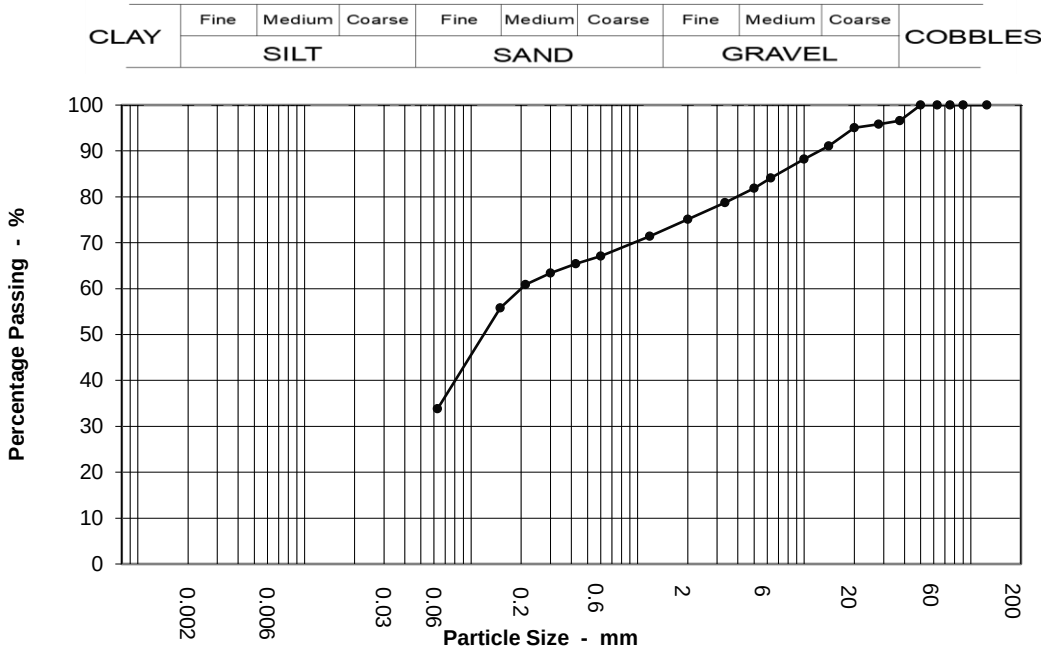
Sample Proportions	
Cobbles	0.0
Gravel	13.0
Sand	48.0
Silt & Clay	39.0

Grading Analysis	
D100	37.50
D60	0.12
D10	
Uniformity Coefficient	

PARTICLE SIZE DISTRIBUTION

BS 1377 : Part 2 : 1990 : Clause 9

		Job Ref	**P19013**
		Borehole / Pit No	TP15
Location	**Indaver**	Sample No	3
		Depth	3.00 m
Soil Description	Slightly gravelly sandy CLAY	Sample type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	97		
28	96		
20	95		
14	91		
10	88		
6.3	84		
5	82		
3.35	79		
2	75		
1.18	71		
0.6	67		
0.425	65		
0.3	63		
0.212	61		
0.15	56		
0.063	34		

Test Method	
BS 1377 : Part 2 : 1990	
Sieving	Clause 9.3
Sedimentation	N/A

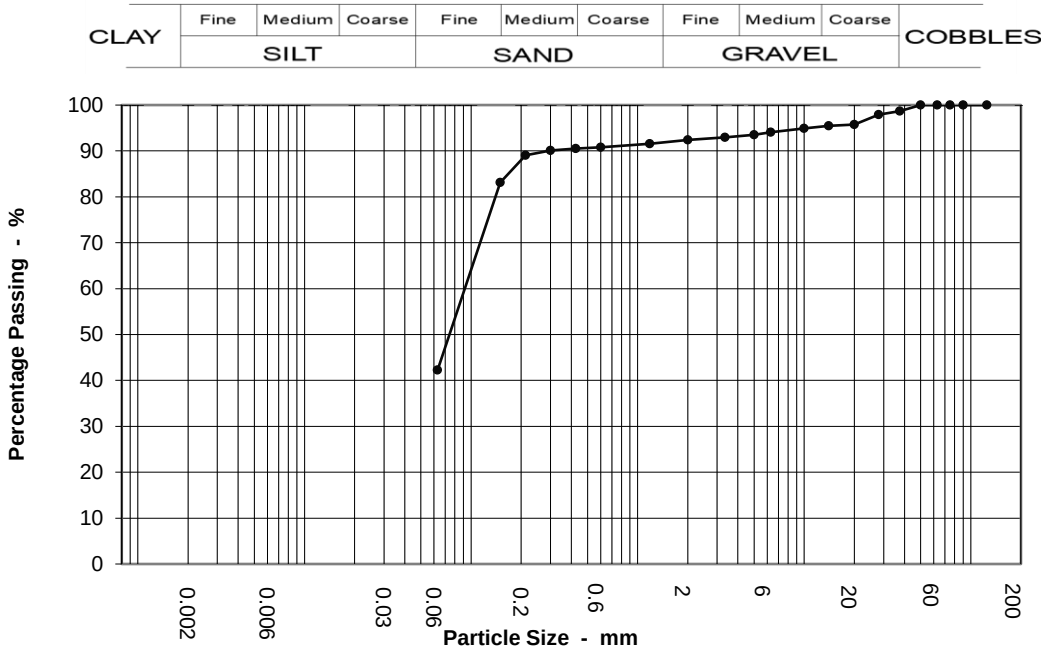
Sample Proportions	
Cobbles	0.0
Gravel	25.0
Sand	41.0
Silt & Clay	34.0

Grading Analysis	
D100	50.00
D60	0.20
D10	
Uniformity Coefficient	

PARTICLE SIZE DISTRIBUTION

BS 1377 : Part 2 : 1990 : Clause 9

		Job Ref	**P19013**
		Borehole / Pit No	TP15
Location	**Indaver**	Sample No	4
		Depth	4.00 m
Soil Description	Slightly gravelly sandy CLAY	Sample type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	99		
28	98		
20	96		
14	96		
10	95		
6.3	94		
5	93		
3.35	93		
2	92		
1.18	92		
0.6	91		
0.425	91		
0.3	90		
0.212	89		
0.15	83		
0.063	42		

Test Method	
BS 1377 : Part 2 : 1990	
Sieving	Clause 9.3
Sedimentation	N/A

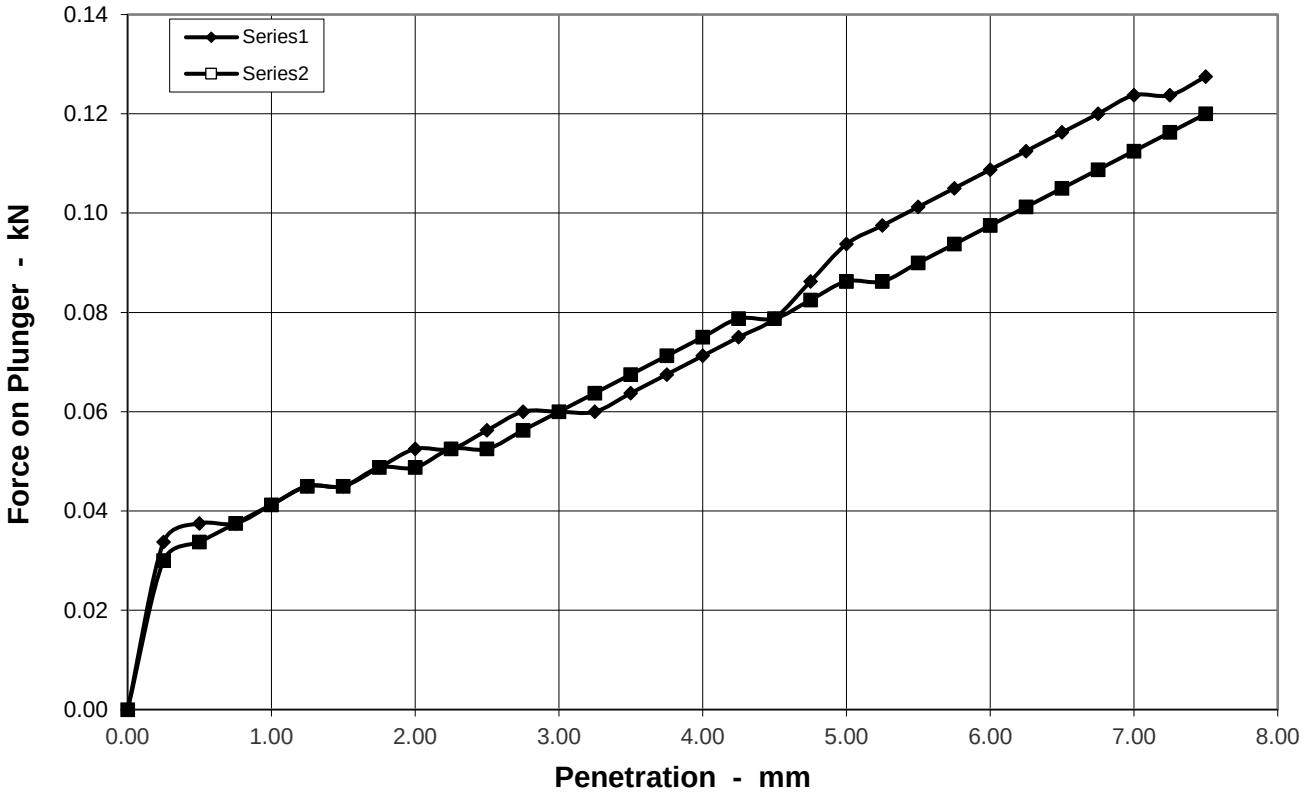
Sample Proportions	
Cobbles	0.0
Gravel	8.0
Sand	50.0
Silt & Clay	42.0

Grading Analysis	
D100	50.00
D60	0.09
D10	
Uniformity Coefficient	

CALIFORNIA BEARING RATIO

BS 13377 : Part 4 : 1990 Clause 7.4

		Job Ref	**P19013**
		Borehole / Pit No	TP01
Site Name	**Indaver**	Sample No	1
		Depth	0.5 m
Soil Description	Slightly sandy slightly gravelly SILT		



Preparation	Method of Compation		
	Hammer type		2.5kg Rammer
	Soaking Period	days	
	Amount of Swell	mm	

Sample Conditions		
Natural Moisture Content	%	18.0
Moisture Content - TOP	%	20.1
Moisture Content - BASE	%	16.0
Bulk Density	Mg/m³	2.09
Dry Density	Mg/m³	1.77

Test Conditions		
Sample Retained on 20 mm sieve	%	3.6
Seating Load - TOP	N	
Seating Load - BASE	N	
Surcharge	kg	8

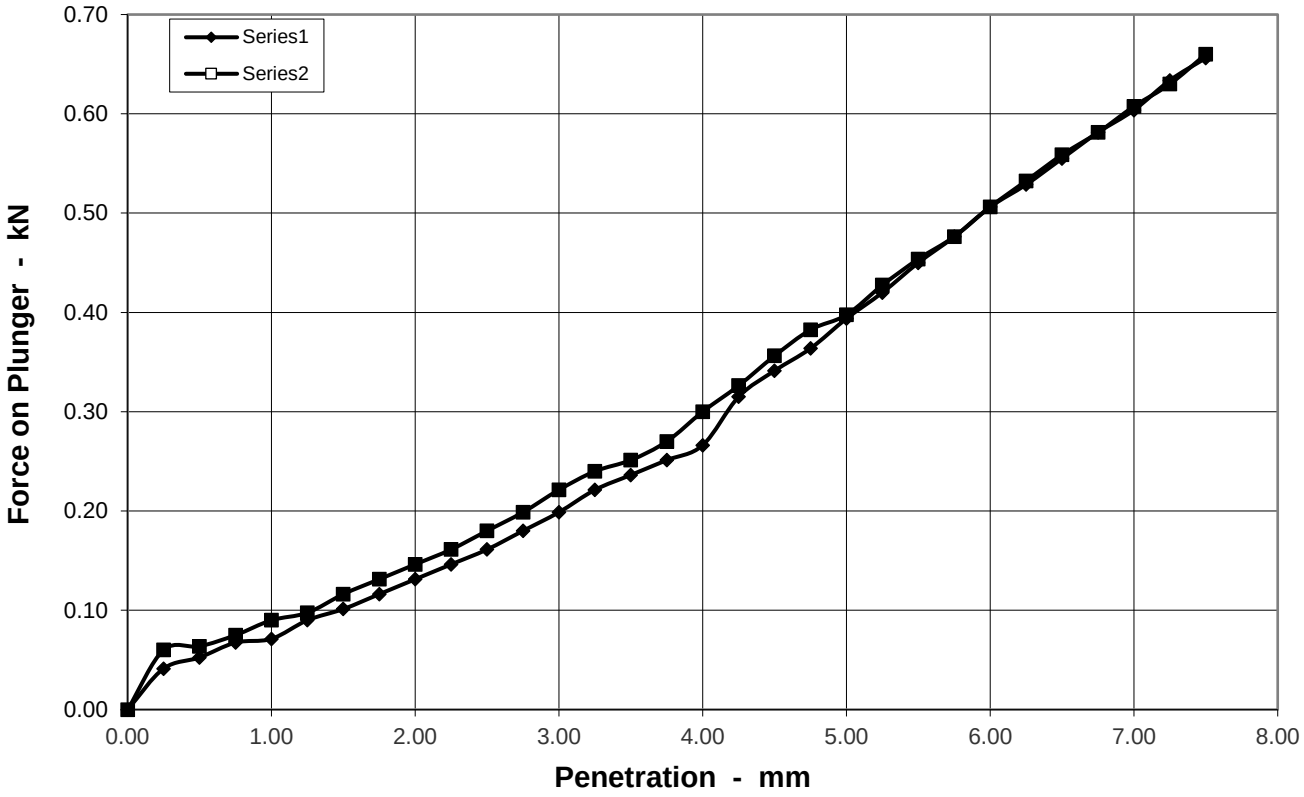
Penetration mm	CBR Values %	
	TOP	BASE
2.5	0.4	0.4
5	0.5	0.4
Accepted CBR	**0.5**	**0.4**

			Remarks	

CALIFORNIA BEARING RATIO

BS 13377 : Part 4 : 1990 Clause 7.4

		Job Ref	**P19013**
		Borehole / Pit No	TP01
Site Name	**Indaver**	Sample No	1
		Depth	0.5 m
Soil Description	Slightly sandy slightly gravelly SILT		



Preparation	Method of Compation		
	Hammer type		2.5kg Rammer
	Soaking Period	days	
	Amount of Swell	mm	

Sample Conditions		
Natural Moisture Content	%	18.0
Moisture Content - TOP	%	14.6
Moisture Content - BASE	%	14.4
Bulk Density	Mg/m³	2.18
Dry Density	Mg/m³	1.84

Test Conditions		
Sample Retained on 20 mm sieve	%	3.6
Seating Load - TOP	N	
Seating Load - BASE	N	
Surcharge	kg	8

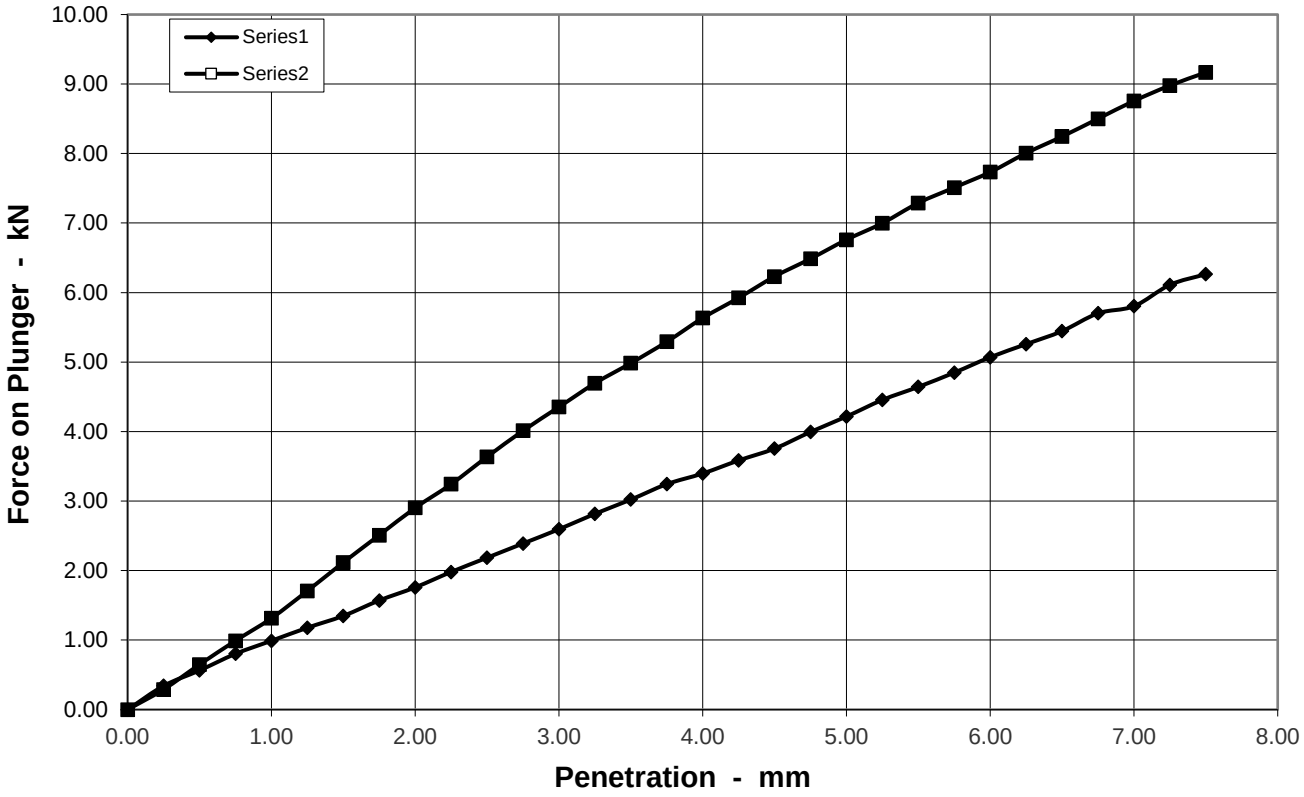
Penetration mm	CBR Values %	
	TOP	BASE
2.5	1.2	1.4
5	2.0	2.0
Accepted CBR	**2.0**	**2.0**

			Remarks	

CALIFORNIA BEARING RATIO

BS 13377 : Part 4 : 1990 Clause 7.4

		Job Ref	**P19013**
		Borehole / Pit No	TP01
Site Name	**Indaver**	Sample No	1
		Depth	0.5 m
Soil Description	Slightly sandy slightly gravelly SILT		



Preparation	Method of Compation		
	Hammer type		2.5kg Rammer
	Soaking Period	days	
	Amount of Swell	mm	

Sample Conditions		
Natural Moisture Content	%	18.0
Moisture Content - TOP	%	11.5
Moisture Content - BASE	%	11.8
Bulk Density	Mg/m³	2.16
Dry Density	Mg/m³	1.83

Test Conditions		
Sample Retained on 20 mm sieve	%	3.6
Seating Load - TOP	N	
Seating Load - BASE	N	
Surcharge	kg	8

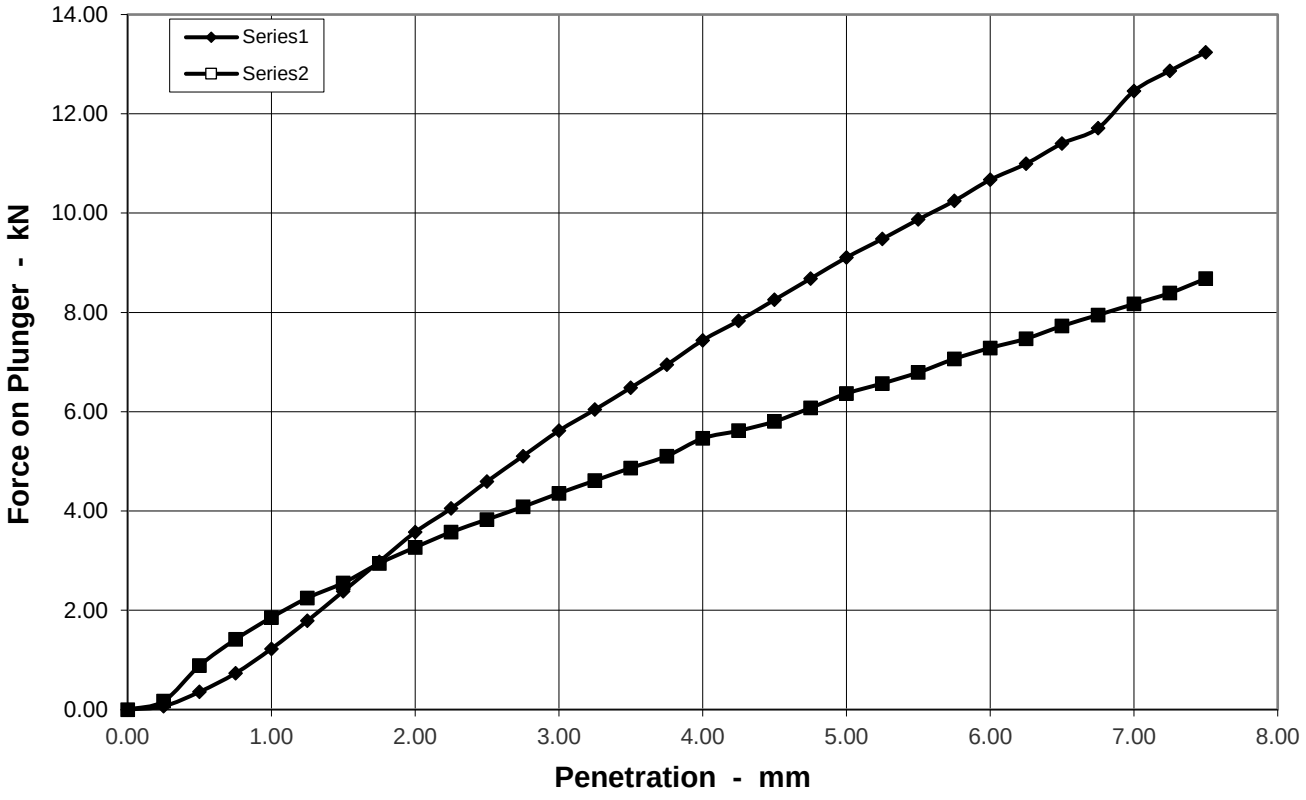
Penetration mm	CBR Values %	
	TOP	BASE
2.5	16.6	27.5
5	21.1	33.8
Accepted CBR	**21.1**	**33.8**

			Remarks	

CALIFORNIA BEARING RATIO

BS 13377 : Part 4 : 1990 Clause 7.4

		Job Ref	**P19013**
		Borehole / Pit No	TP01
Site Name	**Indaver**	Sample No	1
		Depth	0.5 m
Soil Description	Slightly sandy slightly gravelly SILT		



Preparation	Method of Compation		
	Hammer type		2.5kg Rammer
	Soaking Period	days	
	Amount of Swell	mm	

Sample Conditions		
Natural Moisture Content	%	18.0
Moisture Content - TOP	%	8.8
Moisture Content - BASE	%	9.6
Bulk Density	Mg/m³	2.09
Dry Density	Mg/m³	1.77

Test Conditions		
Sample Retained on 20 mm sieve	%	3.6
Seating Load - TOP	N	
Seating Load - BASE	N	
Surcharge	kg	8

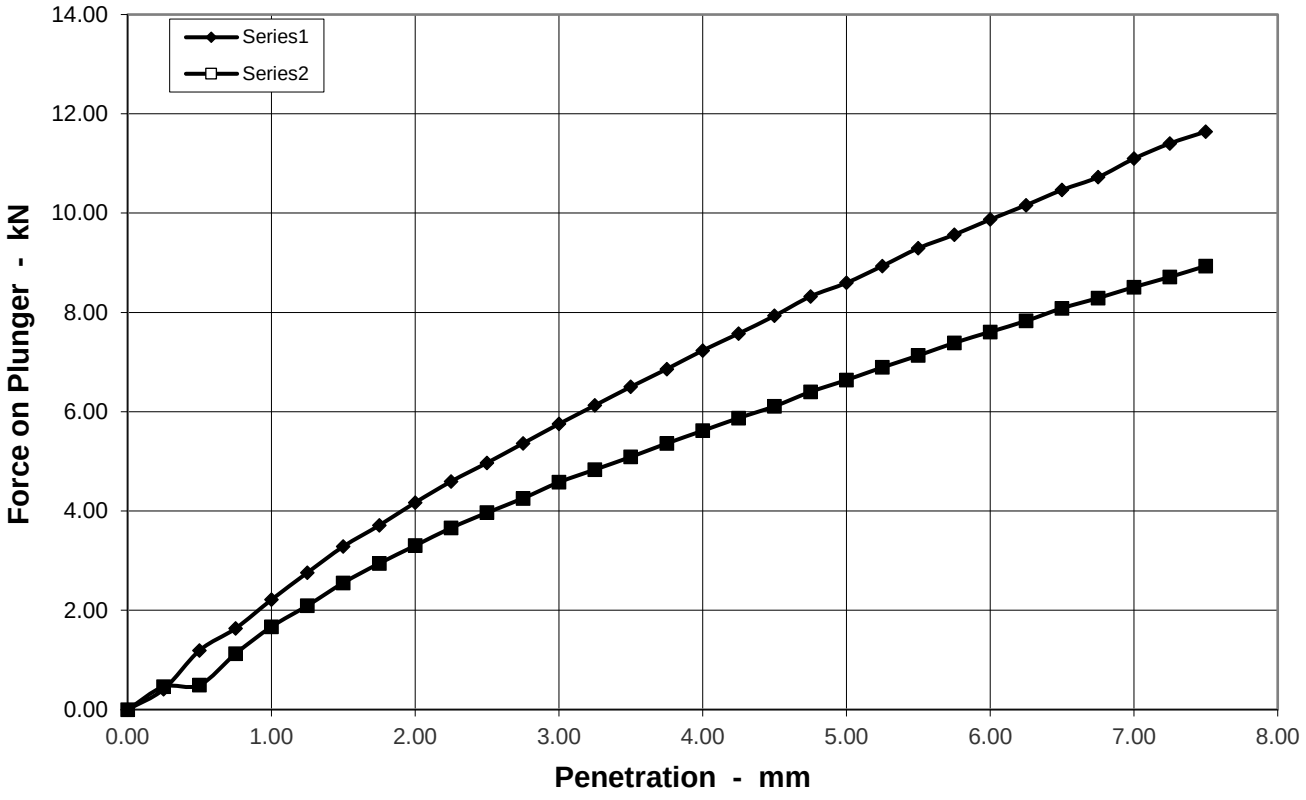
Penetration mm	CBR Values %	
	TOP	BASE
2.5	34.8	29.0
5	45.5	31.8
Accepted CBR	**45.5**	**31.8**

			Remarks	

CALIFORNIA BEARING RATIO

BS 13377 : Part 4 : 1990 Clause 7.4

		Job Ref	**P19013**
		Borehole / Pit No	TP01
Site Name	**Indaver**	Sample No	1
		Depth	0.5 m
Soil Description	Slightly sandy slightly gravelly SILT		



Preparation	Method of Compation		
	Hammer type		2.5kg Rammer
	Soaking Period	days	
	Amount of Swell	mm	

Sample Conditions		
Natural Moisture Content	%	18.0
Moisture Content - TOP	%	6.5
Moisture Content - BASE	%	6.6
Bulk Density	Mg/m³	1.99
Dry Density	Mg/m³	1.69

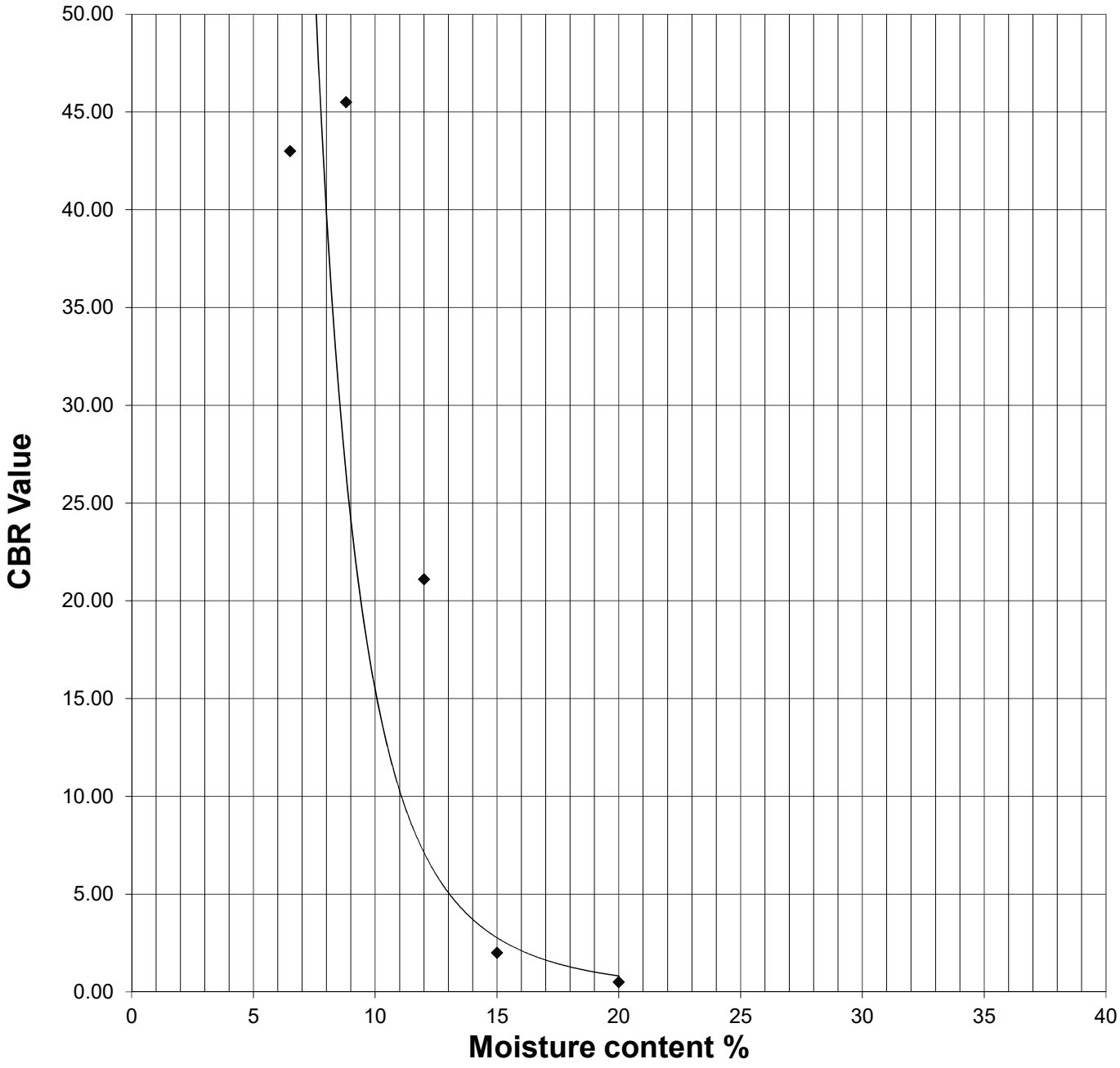
Test Conditions		
Sample Retained on 20 mm sieve	%	3.6
Seating Load - TOP	N	
Seating Load - BASE	N	
Surcharge	kg	8

Penetration mm	CBR Values %	
	TOP	BASE
2.5	37.7	30.0
5	43.0	33.2
Accepted CBR	**43.0**	**33.2**

			Remarks

pgl priority geotechnical	**CALIFORNIA BEARING RATIO RELATIONSHIP** **BS 1377 : Part 4 : 1990 Clause 5**	**Job Ref**	**P19013**
		Borehole / Pit No	TP01
Location	Indaver	Sample No	1
Soil Description	Slightly sandy slightly gravelly SILT	Sample Type	B
		Depth	0.50 m

CBR/ Moisture Content Relationship

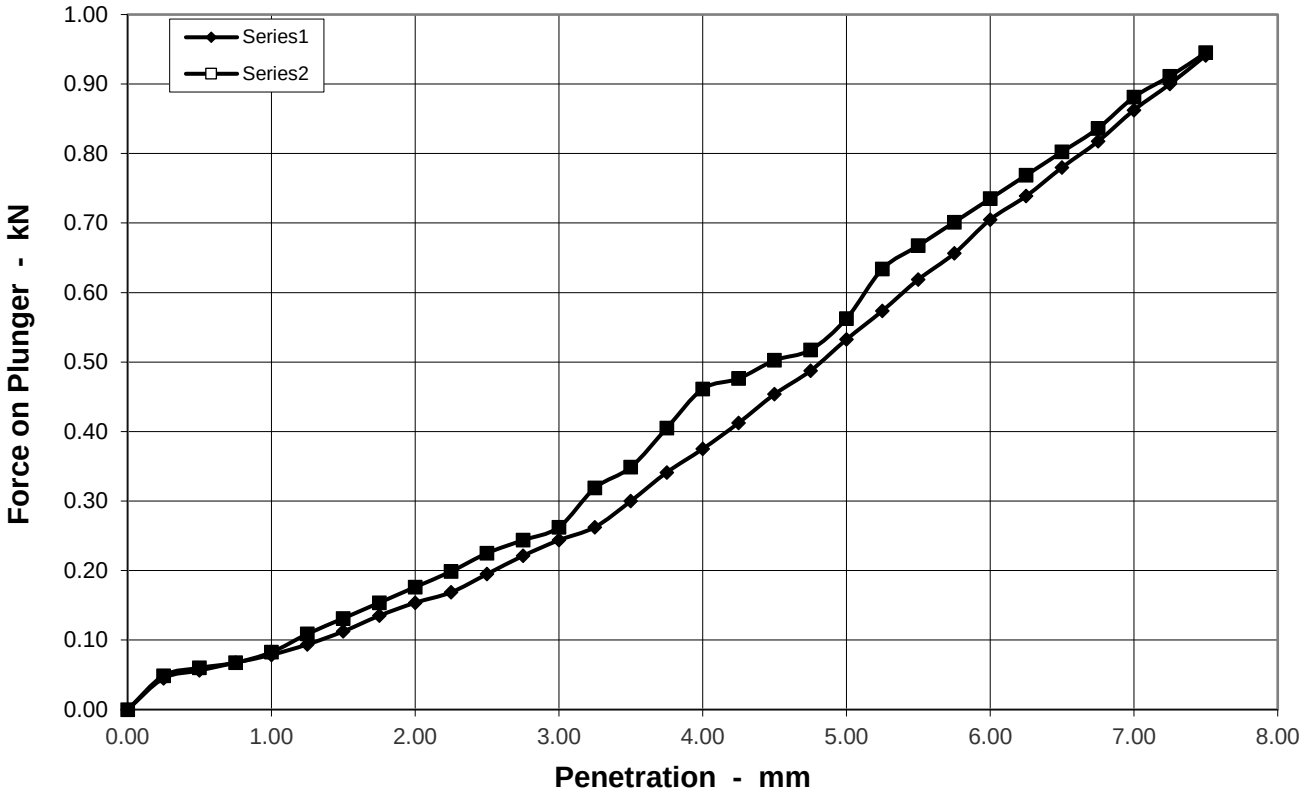


Operator	Checked	Approved	

CALIFORNIA BEARING RATIO

BS 13377 : Part 4 : 1990 Clause 7.4

		Job Ref	**P19013**
		Borehole / Pit No	TP07
Site Name	**Indaver**	Sample No	1
		Depth	0.5 m
Soil Description	Slightly sandy gravelly CLAY with low cobble content		



Preparation	Method of Compation		
	Hammer type		2.5kg Rammer
	Soaking Period	days	
	Amount of Swell	mm	

Sample Conditions		
Natural Moisture Content	%	13.0
Moisture Content - TOP	%	13.5
Moisture Content - BASE	%	12.7
Bulk Density	Mg/m³	2.22
Dry Density	Mg/m³	1.96

Test Conditions		
Sample Retained on 20 mm sieve	%	19.9
Seating Load - TOP	N	
Seating Load - BASE	N	
Surcharge	kg	8

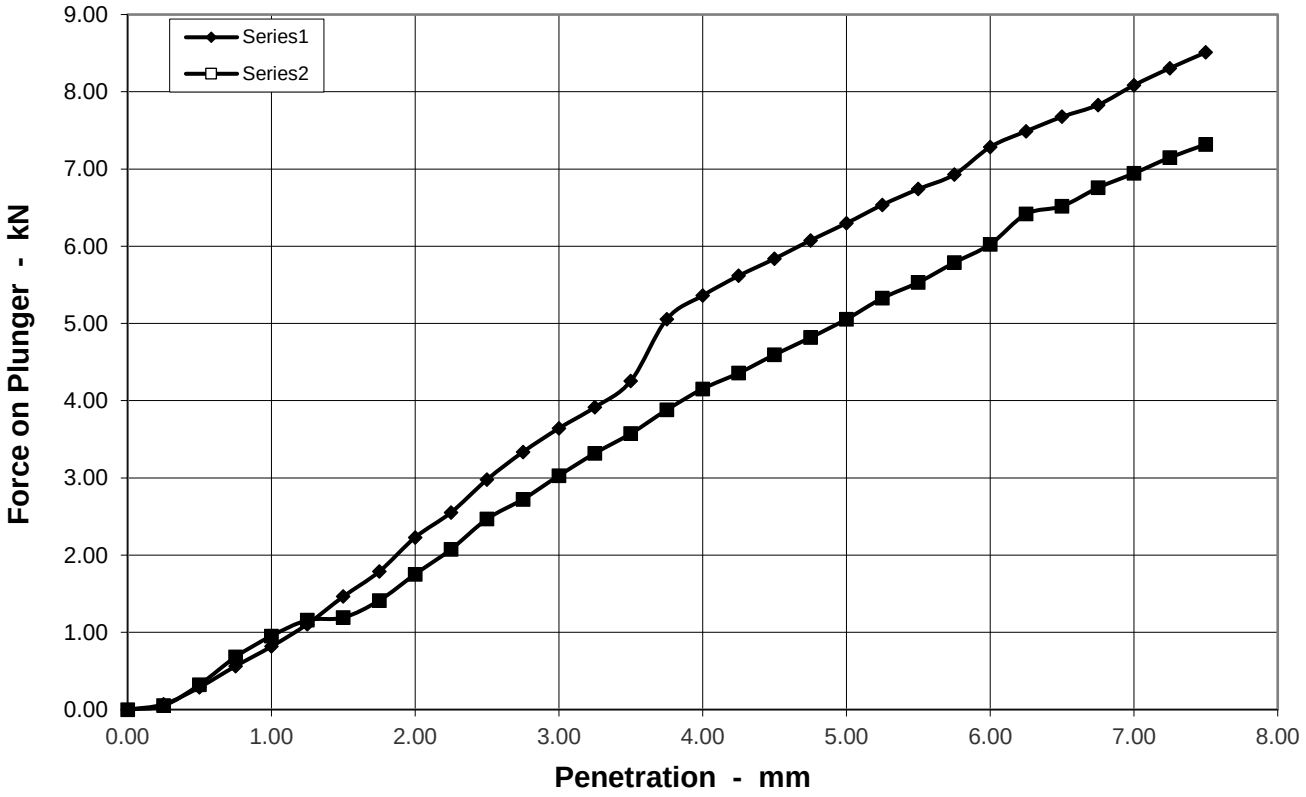
Penetration mm	CBR Values %	
	TOP	BASE
2.5	1.5	1.7
5	2.7	2.8
Accepted CBR	**2.7**	**2.8**

			Remarks	

CALIFORNIA BEARING RATIO

BS 13377 : Part 4 : 1990 Clause 7.4

		Job Ref	**P19013**
		Borehole / Pit No	TP07
Site Name	**Indaver**	Sample No	1
		Depth	0.5 m
Soil Description	Slightly sandy gravelly CLAY with low cobble content		



Preparation	Method of Compation	
	Hammer type	2.5kg Rammer
	Soaking Period days	
	Amount of Swell mm	

Sample Conditions		
Natural Moisture Content	%	13.0
Moisture Content - TOP	%	10.7
Moisture Content - BASE	%	10.1
Bulk Density	Mg/m³	2.20
Dry Density	Mg/m³	1.94

Test Conditions		
Sample Retained on 20 mm sieve	%	19.9
Seating Load - TOP	N	
Seating Load - BASE	N	
Surcharge	kg	8

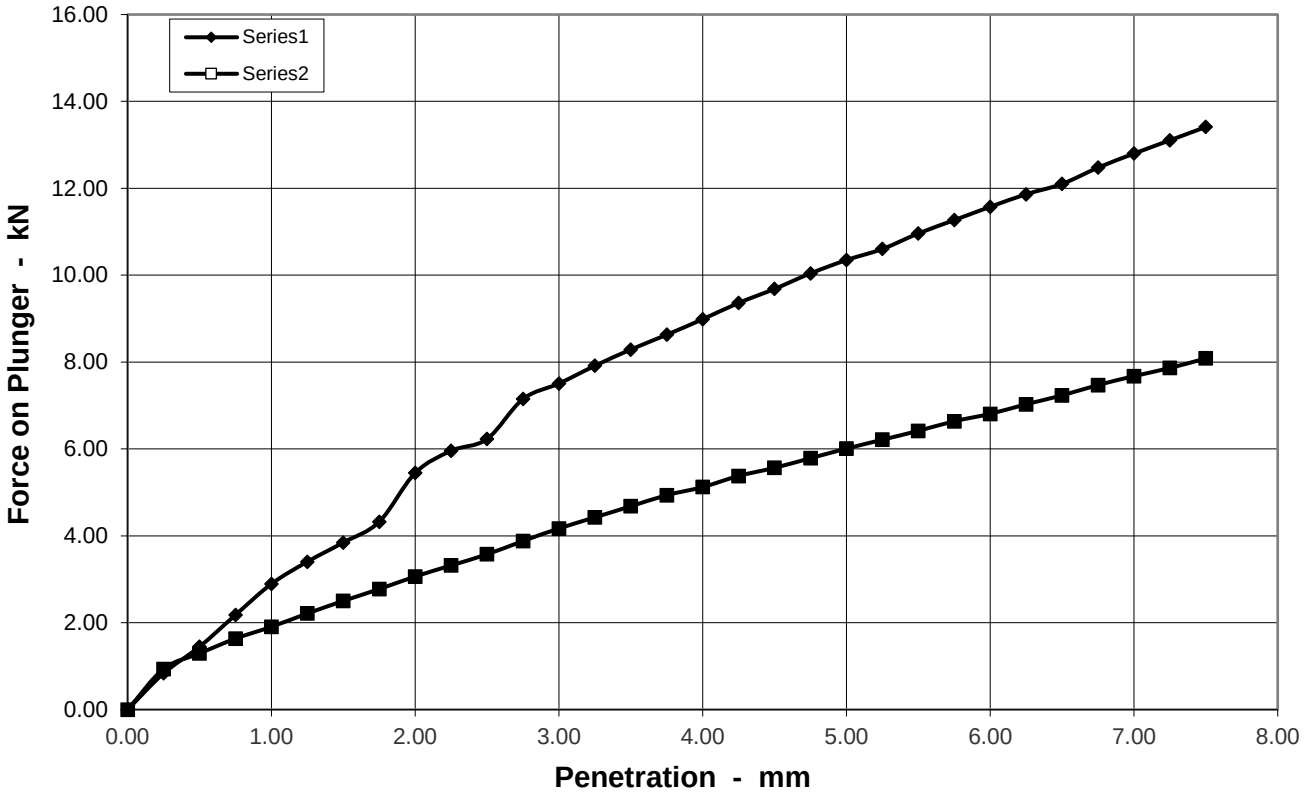
Penetration mm	CBR Values %	
	TOP	BASE
2.5	22.6	18.7
5	31.5	25.3
Accepted CBR	**31.5**	**25.3**

			Remarks

CALIFORNIA BEARING RATIO

BS 13377 : Part 4 : 1990 Clause 7.4

		Job Ref	**P19013**
		Borehole / Pit No	TP07
Site Name	**Indaver**	Sample No	1
		Depth	0.5 m
Soil Description	Slightly sandy gravelly CLAY with low cobble content		



Preparation	Method of Compation		
	Hammer type		2.5kg Rammer
	Soaking Period	days	
	Amount of Swell	mm	

Sample Conditions		
Natural Moisture Content	%	13.0
Moisture Content - TOP	%	7.4
Moisture Content - BASE	%	7.2
Bulk Density	Mg/m³	2.05
Dry Density	Mg/m³	1.81

Test Conditions		
Sample Retained on 20 mm sieve	%	19.9
Seating Load - TOP	N	
Seating Load - BASE	N	
Surcharge	kg	8

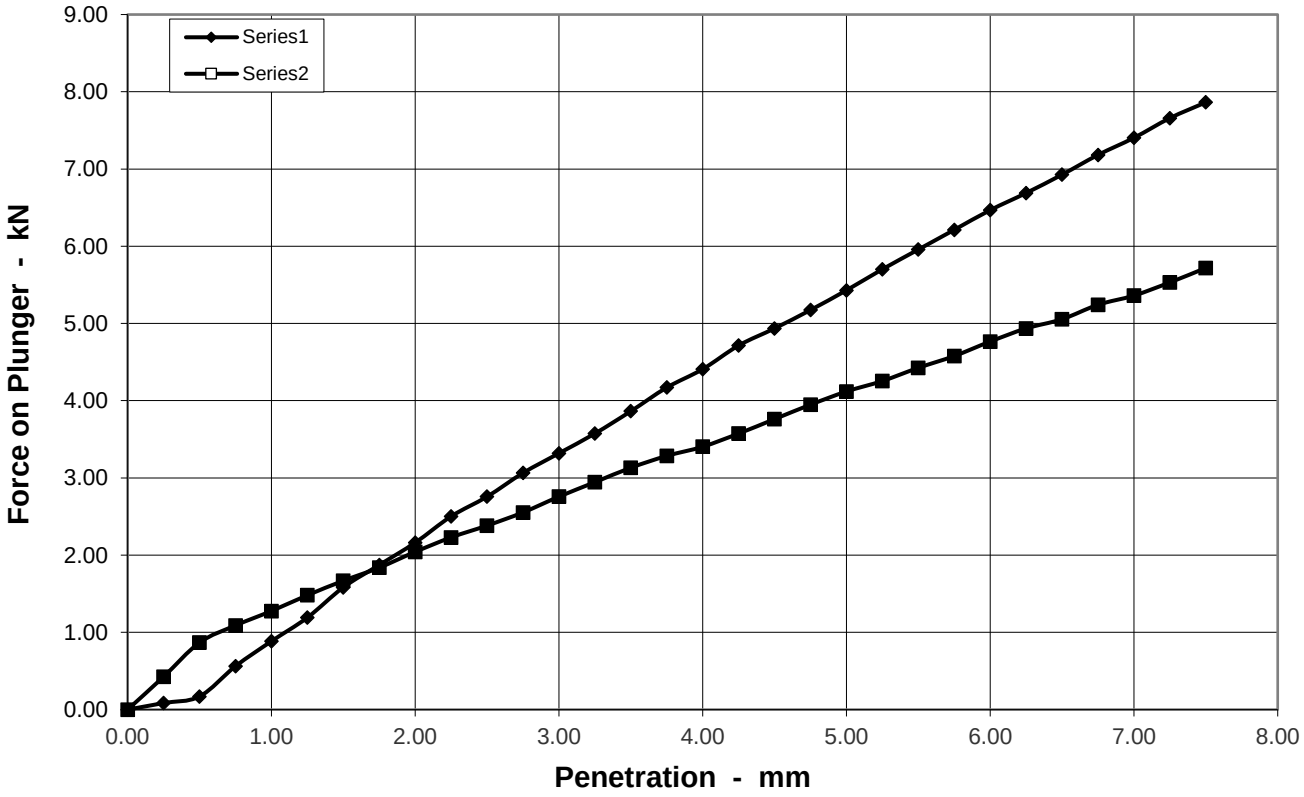
Penetration mm	CBR Values %	
	TOP	BASE
2.5	47.2	27.1
5	51.7	30.0
Accepted CBR	**51.7**	**30.0**

			Remarks	

CALIFORNIA BEARING RATIO

BS 13377 : Part 4 : 1990 Clause 7.4

		Job Ref	**P19013**
		Borehole / Pit No	TP07
Site Name	**Indaver**	Sample No	1
		Depth	0.5 m
Soil Description	Slightly sandy gravelly CLAY with low cobble content		



Preparation	Method of Compation		
	Hammer type		2.5kg Rammer
	Soaking Period	days	
	Amount of Swell	mm	

Sample Conditions		
Natural Moisture Content	%	13.0
Moisture Content - TOP	%	9.6
Moisture Content - BASE	%	9.1
Bulk Density	Mg/m³	2.17
Dry Density	Mg/m³	1.91

Test Conditions		
Sample Retained on 20 mm sieve	%	19.9
Seating Load - TOP	N	
Seating Load - BASE	N	
Surcharge	kg	8

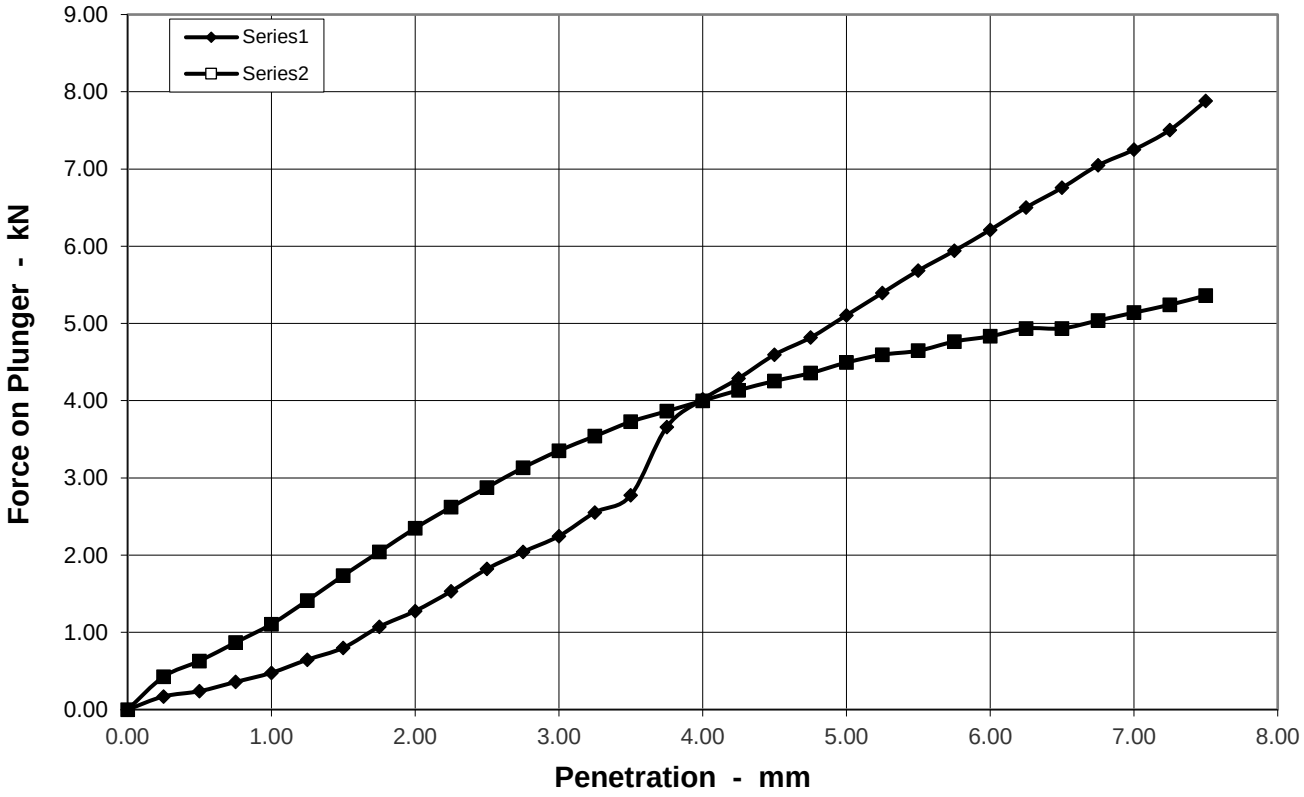
Penetration mm	CBR Values %	
	TOP	BASE
2.5	20.9	18.1
5	27.1	20.6
Accepted CBR	**27.1**	**20.6**

			Remarks	

CALIFORNIA BEARING RATIO

BS 13377 : Part 4 : 1990 Clause 7.4

		Job Ref	**P19013**
		Borehole / Pit No	TP07
Site Name	**Indaver**	Sample No	1
		Depth	0.5 m
Soil Description	Slightly sandy gravelly CLAY with low cobble content		



Preparation	Method of Compation		
	Hammer type		2.5kg Rammer
	Soaking Period	days	
	Amount of Swell	mm	

Sample Conditions		
Natural Moisture Content	%	13.0
Moisture Content - TOP	%	10.1
Moisture Content - BASE	%	10.7
Bulk Density	Mg/m³	2.22
Dry Density	Mg/m³	1.96

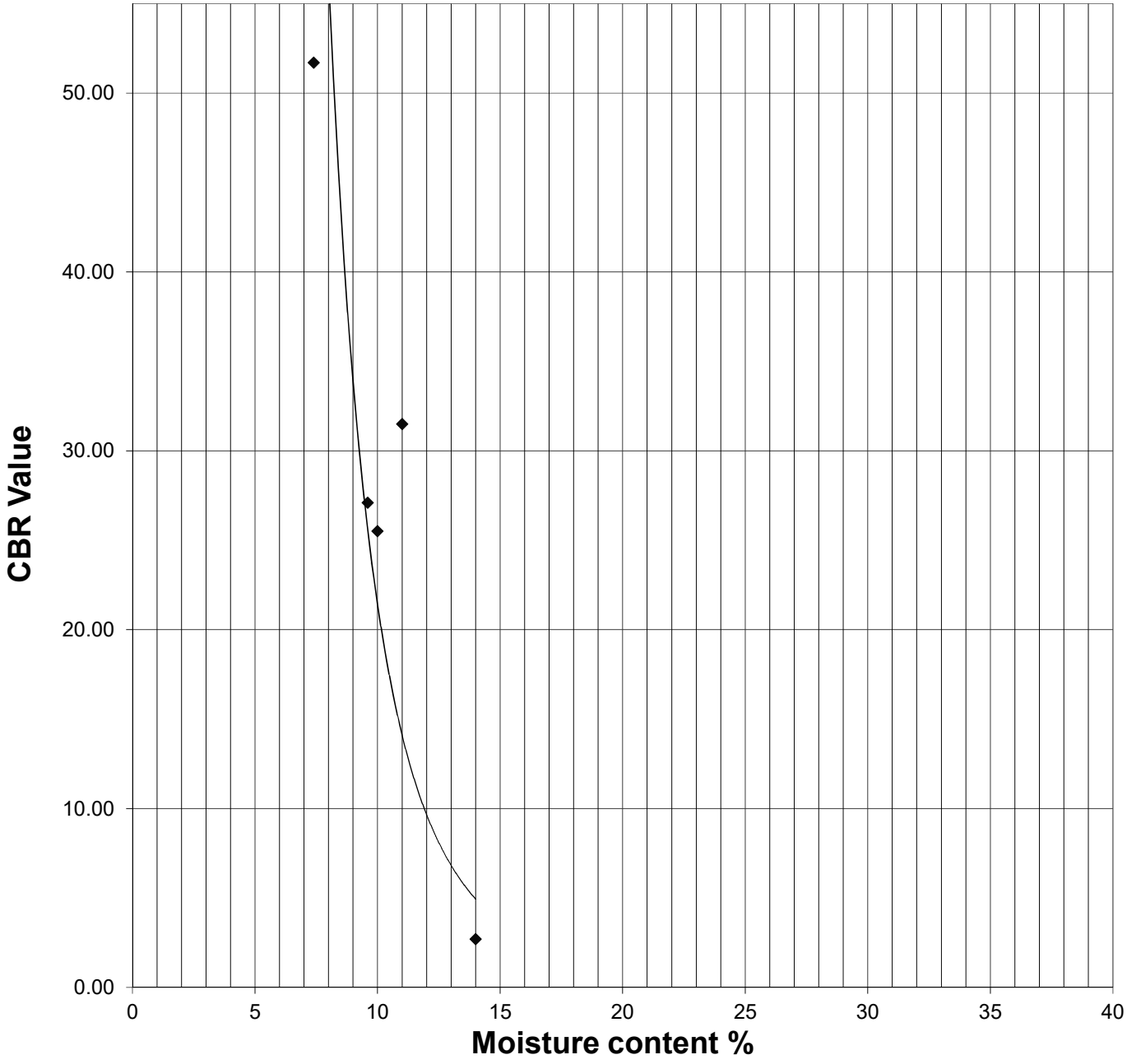
Test Conditions		
Sample Retained on 20 mm sieve	%	19.9
Seating Load - TOP	N	
Seating Load - BASE	N	
Surcharge	kg	8

Penetration mm	CBR Values %	
	TOP	BASE
2.5	13.8	21.8
5	25.5	22.5
Accepted CBR	**25.5**	**22.5**

Remarks

pgl priority geotechnical	**CALIFORNIA BEARING RATIO RELATIONSHIP** **BS 1377 : Part 4 : 1990 Clause 5**	**Job Ref**	**P19013**
		Borehole / Pit No	TP07
Location	Indaver	Sample No	1
Soil Description	Slightly sandy gravelly CLAY with low cobble content	Sample Type	B
		Depth	0.50 m

CBR/ Moisture Content Relationship

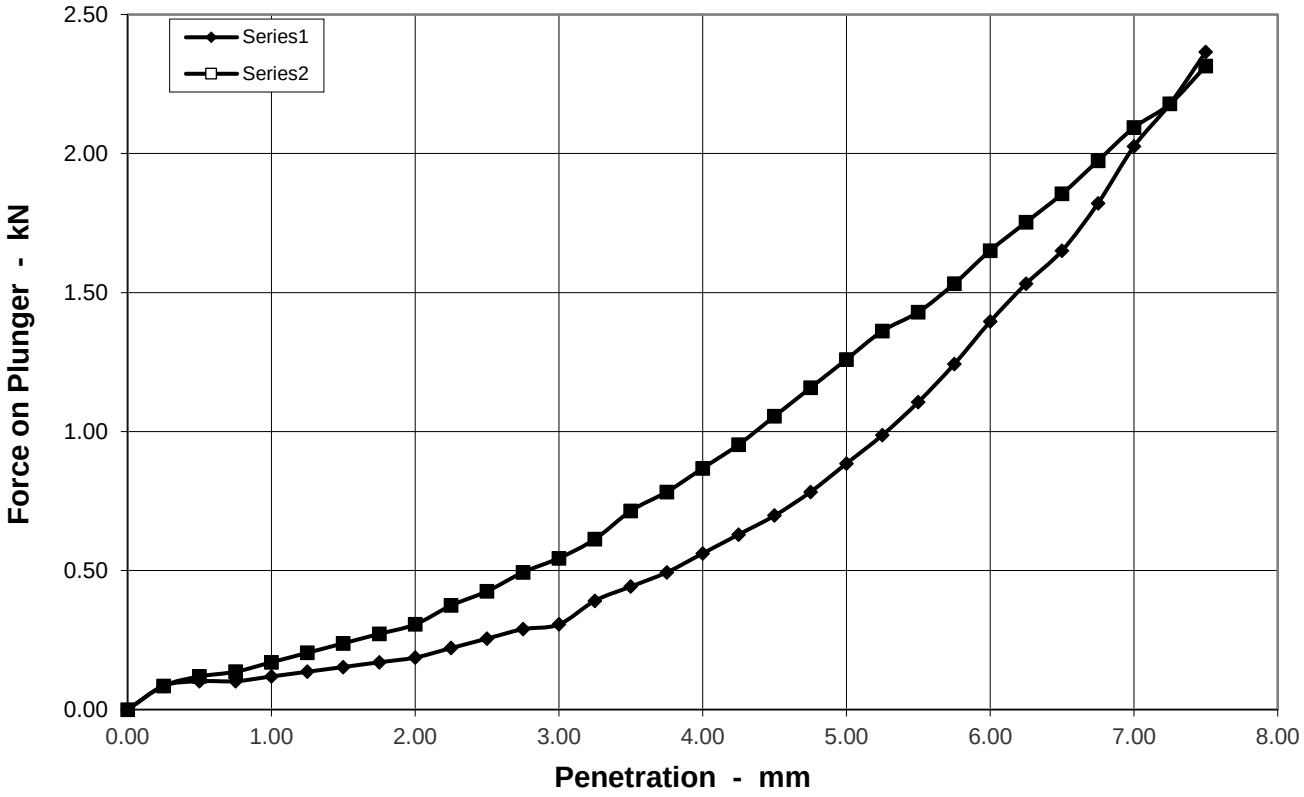


Operator	Checked	Approved	

CALIFORNIA BEARING RATIO

BS 13377 : Part 4 : 1990 Clause 7.4

		Job Ref	**P19013**
		Borehole / Pit No	TP07
Site Name	**Indaver**	Sample No	4
		Depth	3 m
Soil Description	Slightly sandy gravelly CLAY		



Preparation	Method of Compation		
	Hammer type		2.5kg Rammer
	Soaking Period	days	
	Amount of Swell	mm	

Sample Conditions		
Natural Moisture Content	%	11.0
Moisture Content - TOP	%	12.3
Moisture Content - BASE	%	11.7
Bulk Density	Mg/m³	2.26
Dry Density	Mg/m³	2.03

Test Conditions		
Sample Retained on 20 mm sieve	%	9.6
Seating Load - TOP	N	
Seating Load - BASE	N	
Surcharge	kg	8

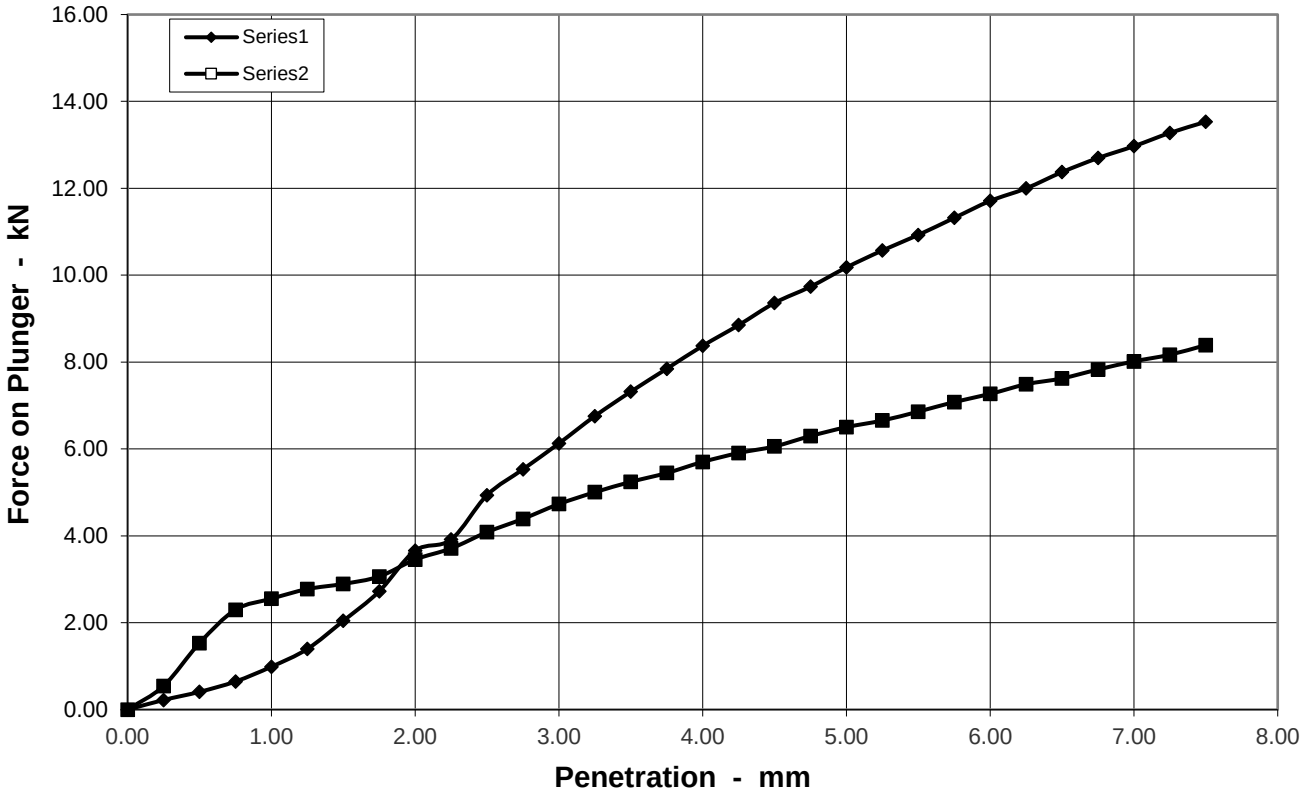
Penetration mm	CBR Values %	
	TOP	BASE
2.5	1.9	3.2
5	4.4	6.3
Accepted CBR	**4.4**	**6.3**

			Remarks	

CALIFORNIA BEARING RATIO

BS 13377 : Part 4 : 1990 Clause 7.4

		Job Ref	**P19013**
		Borehole / Pit No	TP07
Site Name	**Indaver**	Sample No	4
		Depth	3 m
Soil Description	Slightly sandy gravelly CLAY		



Preparation	Method of Compation		
	Hammer type		2.5kg Rammer
	Soaking Period	days	
	Amount of Swell	mm	

Sample Conditions		
Natural Moisture Content	%	11.0
Moisture Content - TOP	%	8.5
Moisture Content - BASE	%	8.1
Bulk Density	Mg/m³	2.17
Dry Density	Mg/m³	1.95

Test Conditions		
Sample Retained on 20 mm sieve	%	9.6
Seating Load - TOP	N	
Seating Load - BASE	N	
Surcharge	kg	8

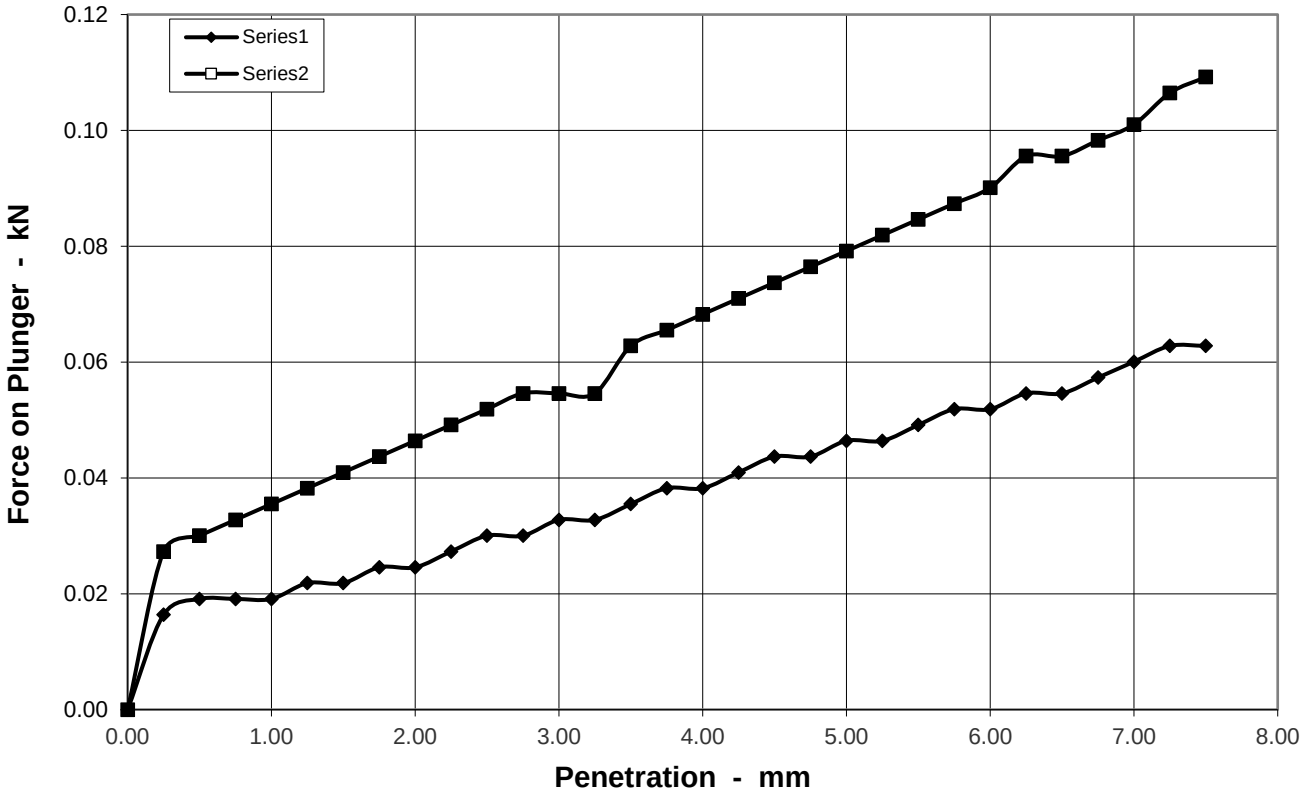
Penetration mm	CBR Values %	
	TOP	BASE
2.5	37.4	30.9
5	50.9	32.5
Accepted CBR	**50.9**	**32.5**

			Remarks	

CALIFORNIA BEARING RATIO

BS 13377 : Part 4 : 1990 Clause 7.4

		Job Ref	**P19013**
		Borehole / Pit No	TP07
Site Name	**Indaver**	Sample No	4
		Depth	3 m
Soil Description	Slightly sandy gravelly CLAY		



Preparation	Method of Compation		
	Hammer type		2.5kg Rammer
	Soaking Period	days	
	Amount of Swell	mm	

Sample Conditions		
Natural Moisture Content	%	11.0
Moisture Content - TOP	%	17.4
Moisture Content - BASE	%	13.8
Bulk Density	Mg/m³	2.23
Dry Density	Mg/m³	2.01

Test Conditions		
Sample Retained on 20 mm sieve	%	9.6
Seating Load - TOP	N	
Seating Load - BASE	N	
Surcharge	kg	8

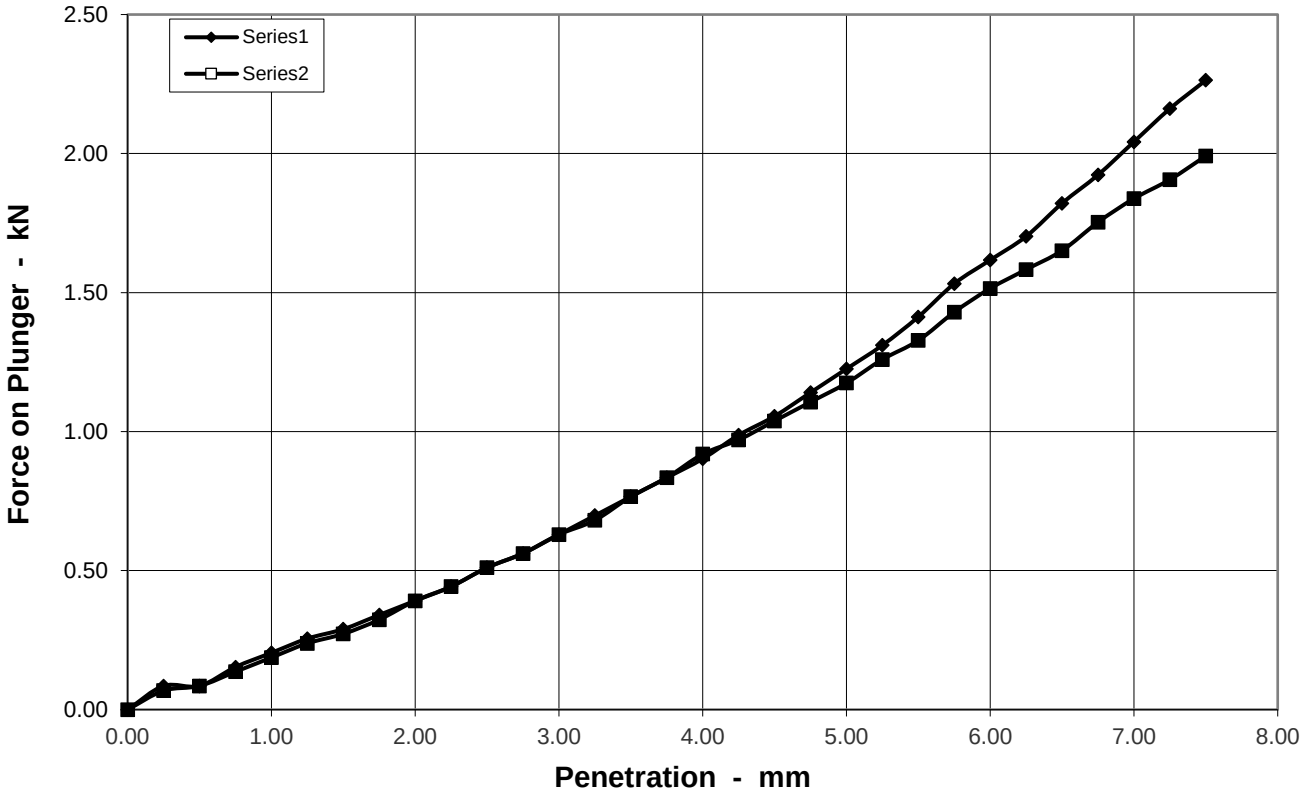
Penetration mm	CBR Values %	
	TOP	BASE
2.5	0.2	0.4
5	0.2	0.4
Accepted CBR	**0.2**	**0.4**

			Remarks	

CALIFORNIA BEARING RATIO

BS 13377 : Part 4 : 1990 Clause 7.4

		Job Ref	**P19013**
		Borehole / Pit No	TP07
Site Name	**Indaver**	Sample No	4
		Depth	3 m
Soil Description	Slightly sandy gravelly CLAY		



Preparation	Method of Compation		
	Hammer type		2.5kg Rammer
	Soaking Period	days	
	Amount of Swell	mm	

Sample Conditions		
Natural Moisture Content	%	11.0
Moisture Content - TOP	%	11.5
Moisture Content - BASE	%	10.3
Bulk Density	Mg/m³	2.23
Dry Density	Mg/m³	2.01

Test Conditions		
Sample Retained on 20 mm sieve	%	9.6
Seating Load - TOP	N	
Seating Load - BASE	N	
Surcharge	kg	8

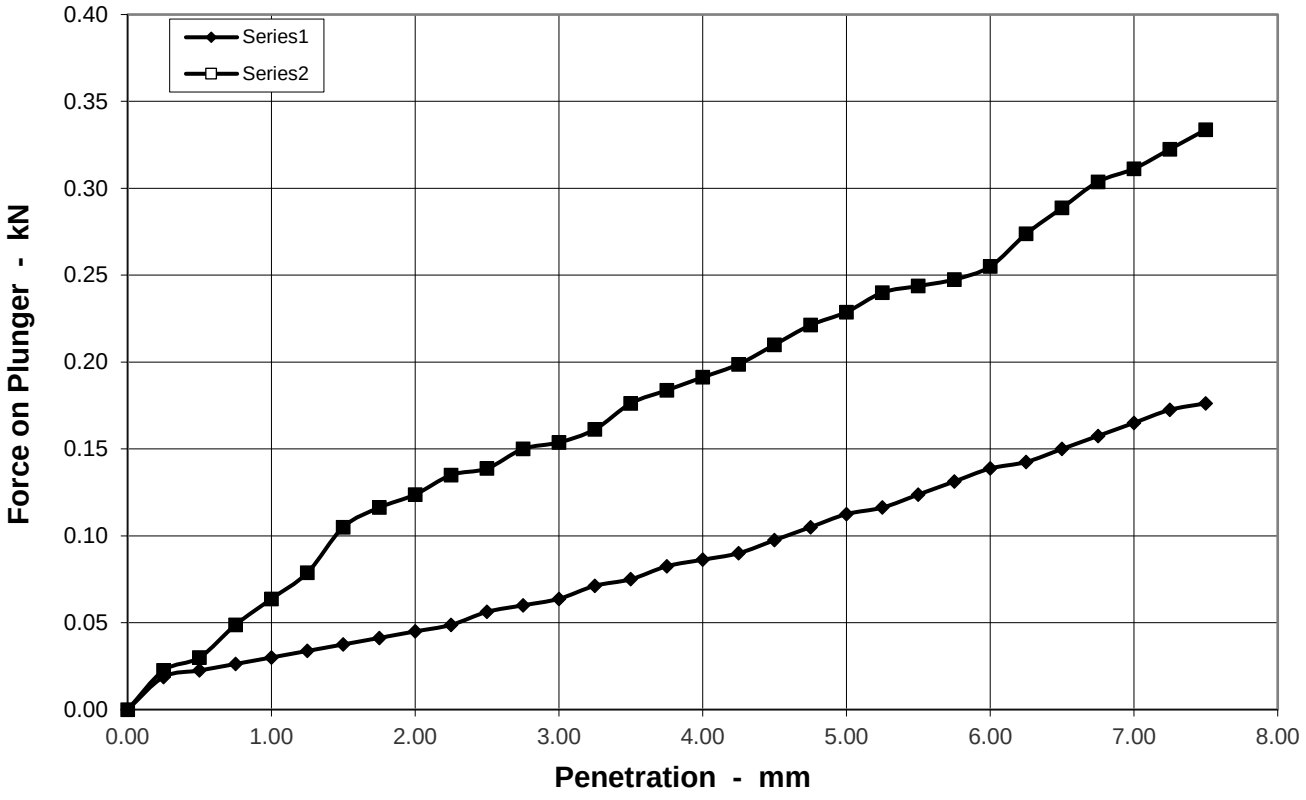
Penetration mm	CBR Values %	
	TOP	BASE
2.5	3.9	3.9
5	6.1	5.9
Accepted CBR	**6.1**	**5.9**

			Remarks	

CALIFORNIA BEARING RATIO

BS 13377 : Part 4 : 1990 Clause 7.4

		Job Ref	**P19013**
		Borehole / Pit No	TP07
Site Name	**Indaver**	Sample No	4
		Depth	3 m
Soil Description	Slightly sandy gravelly CLAY		



Preparation	Method of Compation		
	Hammer type		2.5kg Rammer
	Soaking Period	days	
	Amount of Swell	mm	

Sample Conditions		
Natural Moisture Content	%	11.0
Moisture Content - TOP	%	14.2
Moisture Content - BASE	%	13.2
Bulk Density	Mg/m³	2.25
Dry Density	Mg/m³	2.03

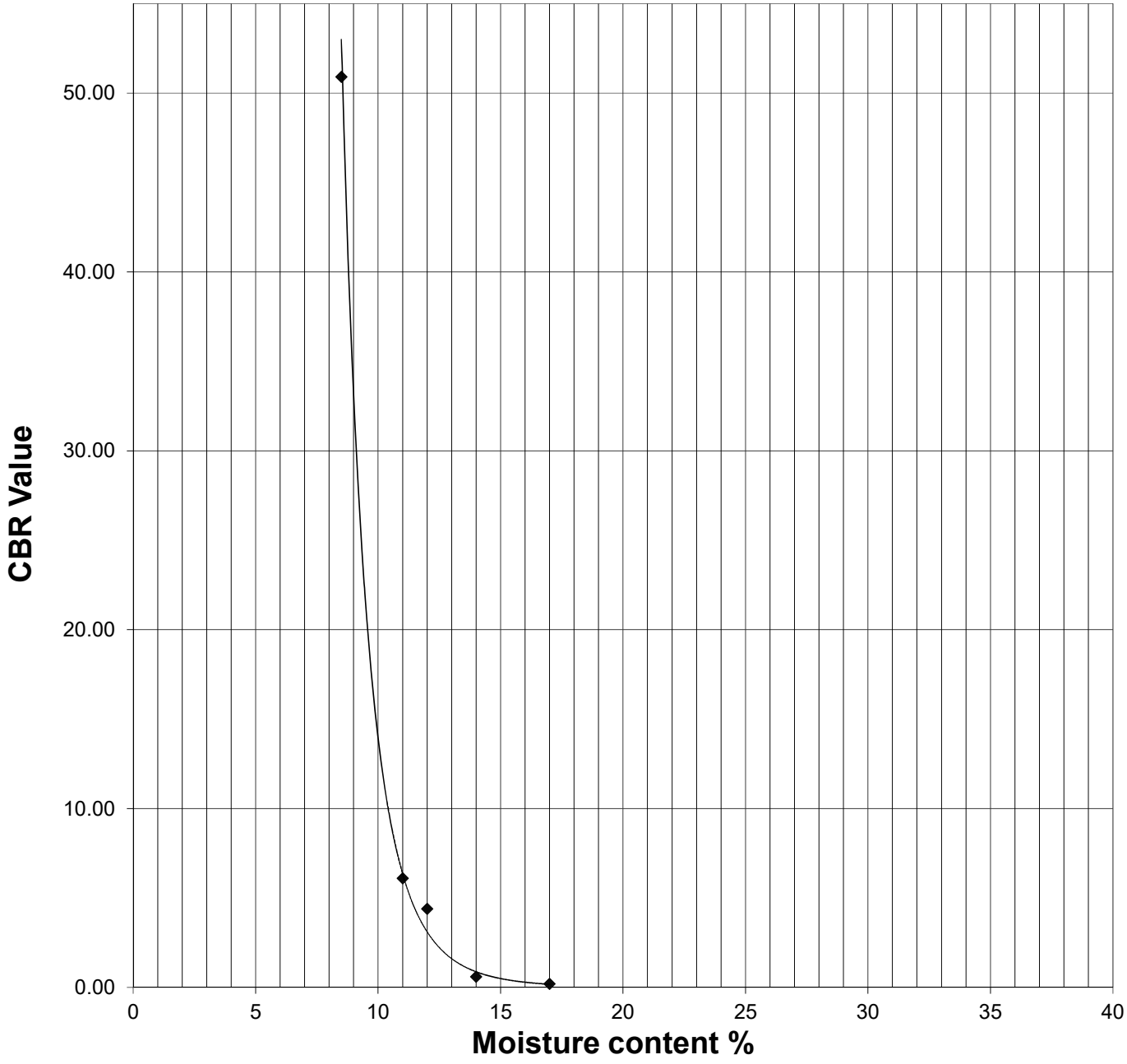
Test Conditions		
Sample Retained on 20 mm sieve	%	9.6
Seating Load - TOP	N	
Seating Load - BASE	N	
Surcharge	kg	8

Penetration mm	CBR Values %	
	TOP	BASE
2.5	0.4	1.1
5	0.6	1.1
Accepted CBR	**0.6**	**1.1**

			Remarks	

pgl priority geotechnical	**CALIFORNIA BEARING RATIO RELATIONSHIP** **BS 1377 : Part 4 : 1990 Clause 5**	**Job Ref**	**P19013**
		Borehole / Pit No	TP07
Location	Indaver	Sample No	4
Soil Description	Slightly sandy gravelly CLAY	Sample Type	B
		Depth	3.00 m

CBR/ Moisture Content Relationship

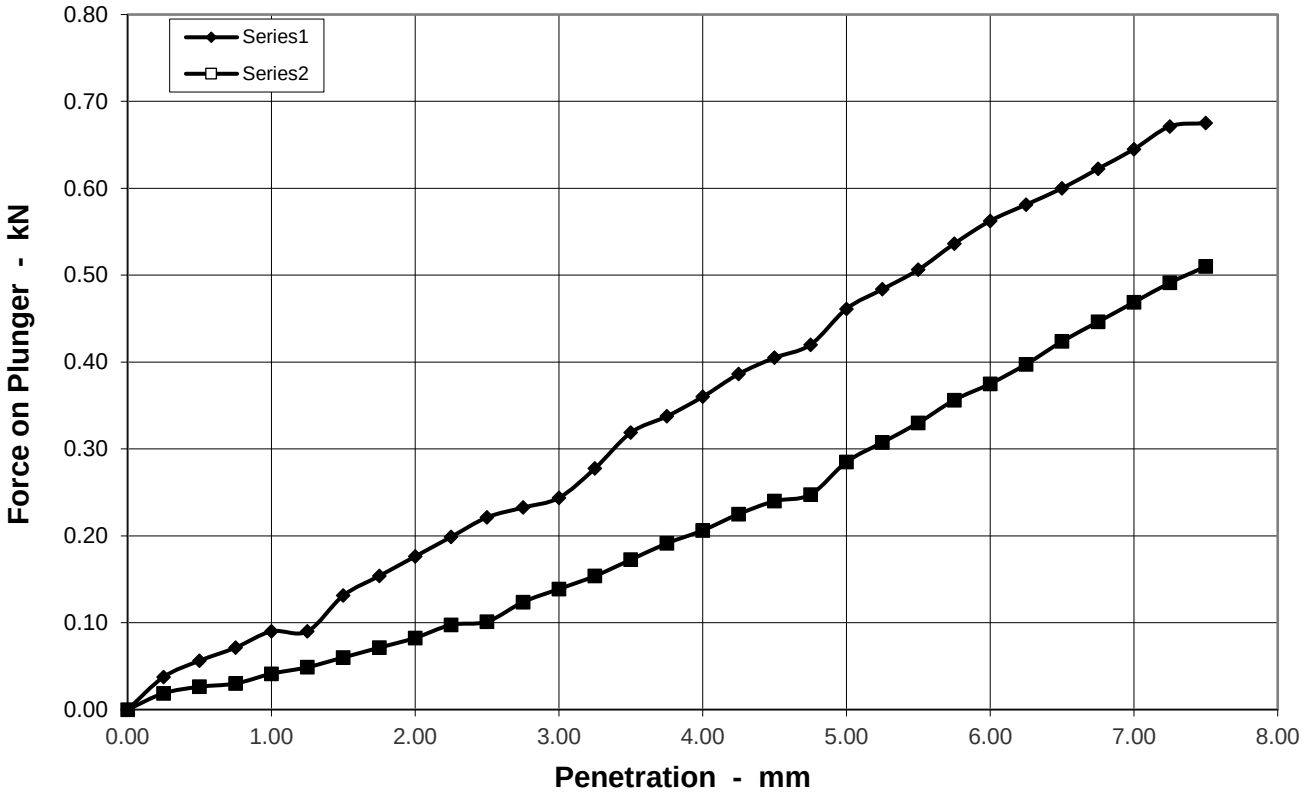


Operator	Checked	Approved	

CALIFORNIA BEARING RATIO

BS 13377 : Part 4 : 1990 Clause 7.4

		Job Ref	**P19013**
		Borehole / Pit No	TP14
Site Name	**Indaver**	Sample No	2
		Depth	2 m
Soil Description	Slightly sandy gravelly CLAY		



Preparation	Method of Compation		
	Hammer type		2.5kg Rammer
	Soaking Period	days	
	Amount of Swell	mm	

Sample Conditions		
Natural Moisture Content	%	13.0
Moisture Content - TOP	%	13.4
Moisture Content - BASE	%	12.9
Bulk Density	Mg/m³	2.25
Dry Density	Mg/m³	1.99

Test Conditions		
Sample Retained on 20 mm sieve	%	17.4
Seating Load - TOP	N	
Seating Load - BASE	N	
Surcharge	kg	8

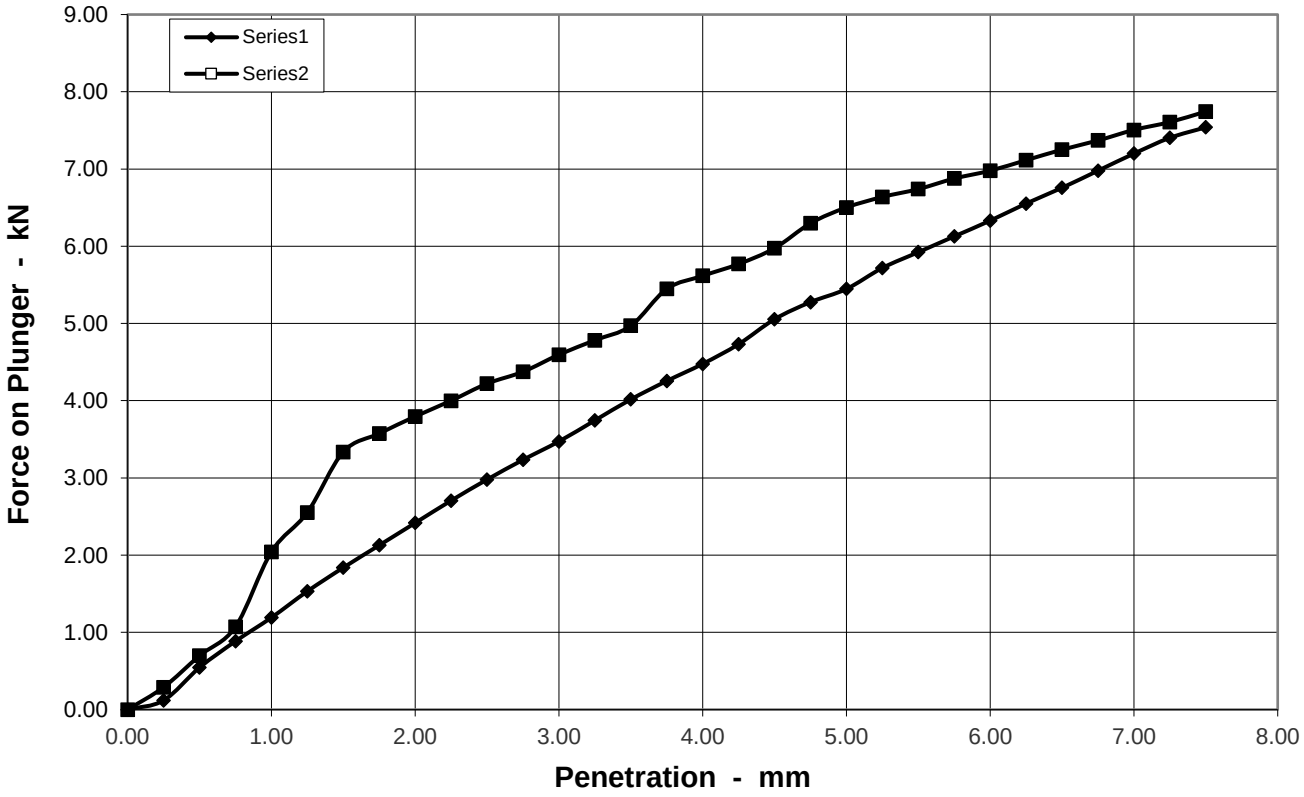
Penetration mm	CBR Values %	
	TOP	BASE
2.5	1.7	0.8
5	2.3	1.4
Accepted CBR	**2.3**	**1.4**

			Remarks

CALIFORNIA BEARING RATIO

BS 13377 : Part 4 : 1990 Clause 7.4

		Job Ref	**P19013**
		Borehole / Pit No	TP14
Site Name	**Indaver**	Sample No	2
		Depth	2 m
Soil Description	Slightly sandy gravelly CLAY		



Preparation	Method of Compation		
	Hammer type		2.5kg Rammer
	Soaking Period	days	
	Amount of Swell	mm	

Sample Conditions		
Natural Moisture Content	%	13.0
Moisture Content - TOP	%	10.7
Moisture Content - BASE	%	9.9
Bulk Density	Mg/m³	2.19
Dry Density	Mg/m³	1.93

Test Conditions		
Sample Retained on 20 mm sieve	%	17.4
Seating Load - TOP	N	
Seating Load - BASE	N	
Surcharge	kg	8

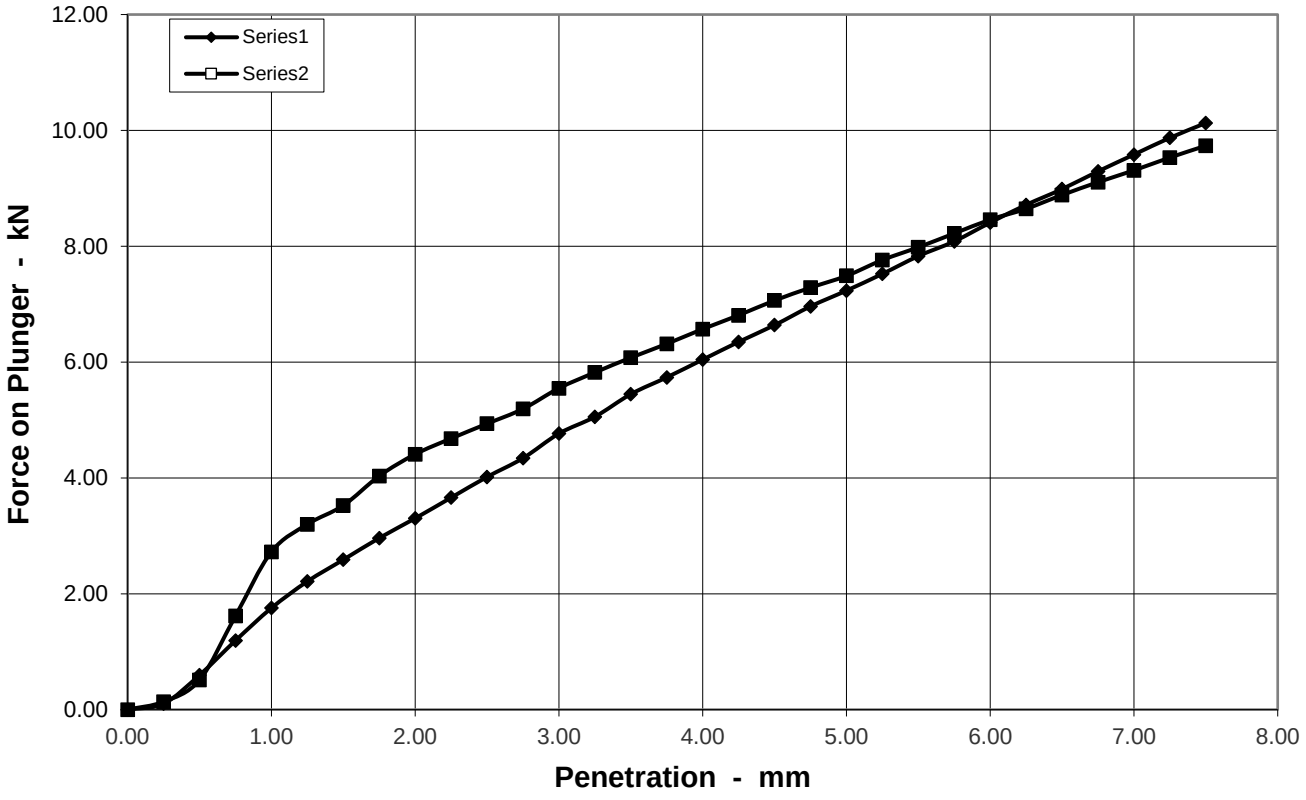
Penetration mm	CBR Values %	
	TOP	BASE
2.5	22.6	32.0
5	27.2	32.5
Accepted CBR	**27.2**	**32.5**

			Remarks	

CALIFORNIA BEARING RATIO

BS 13377 : Part 4 : 1990 Clause 7.4

		Job Ref	**P19013**
		Borehole / Pit No	TP14
Site Name	**Indaver**	Sample No	2
		Depth	2 m
Soil Description	Slightly sandy gravelly CLAY		



Preparation	Method of Compation		
	Hammer type		2.5kg Rammer
	Soaking Period	days	
	Amount of Swell	mm	

Sample Conditions		
Natural Moisture Content	%	13.0
Moisture Content - TOP	%	6.6
Moisture Content - BASE	%	6.6
Bulk Density	Mg/m³	2.02
Dry Density	Mg/m³	1.78

Test Conditions		
Sample Retained on 20 mm sieve	%	17.4
Seating Load - TOP	N	
Seating Load - BASE	N	
Surcharge	kg	8

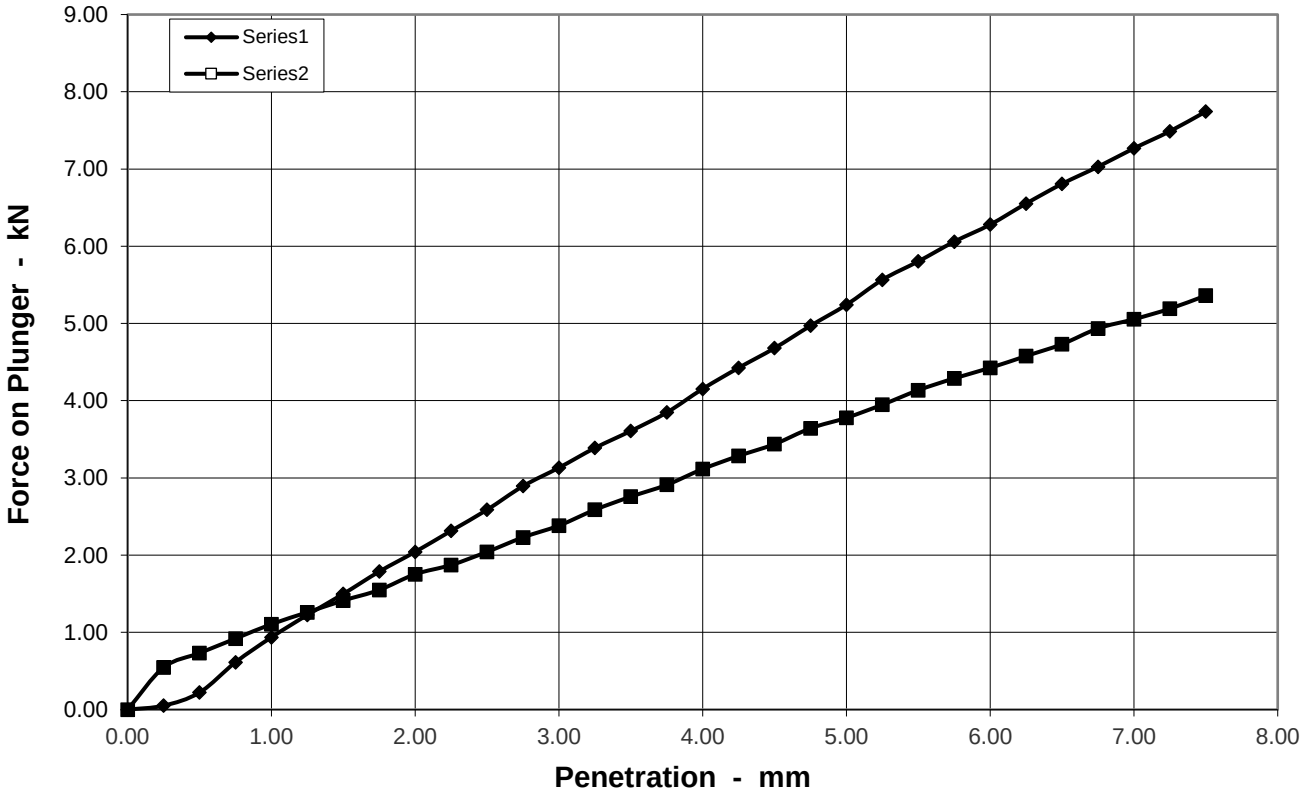
Penetration mm	CBR Values %	
	TOP	BASE
2.5	30.4	37.4
5	36.2	37.4
Accepted CBR	**36.2**	**37.4**

			Remarks

CALIFORNIA BEARING RATIO

BS 13377 : Part 4 : 1990 Clause 7.4

		Job Ref	**P19013**
		Borehole / Pit No	TP14
Site Name	**Indaver**	Sample No	2
		Depth	2 m
Soil Description	Slightly sandy gravelly CLAY		



Preparation	Method of Compation		
	Hammer type		2.5kg Rammer
	Soaking Period	days	
	Amount of Swell	mm	

Sample Conditions		
Natural Moisture Content	%	13.0
Moisture Content - TOP	%	9.5
Moisture Content - BASE	%	8.9
Bulk Density	Mg/m³	2.16
Dry Density	Mg/m³	1.90

Test Conditions		
Sample Retained on 20 mm sieve	%	17.4
Seating Load - TOP	N	
Seating Load - BASE	N	
Surcharge	kg	8

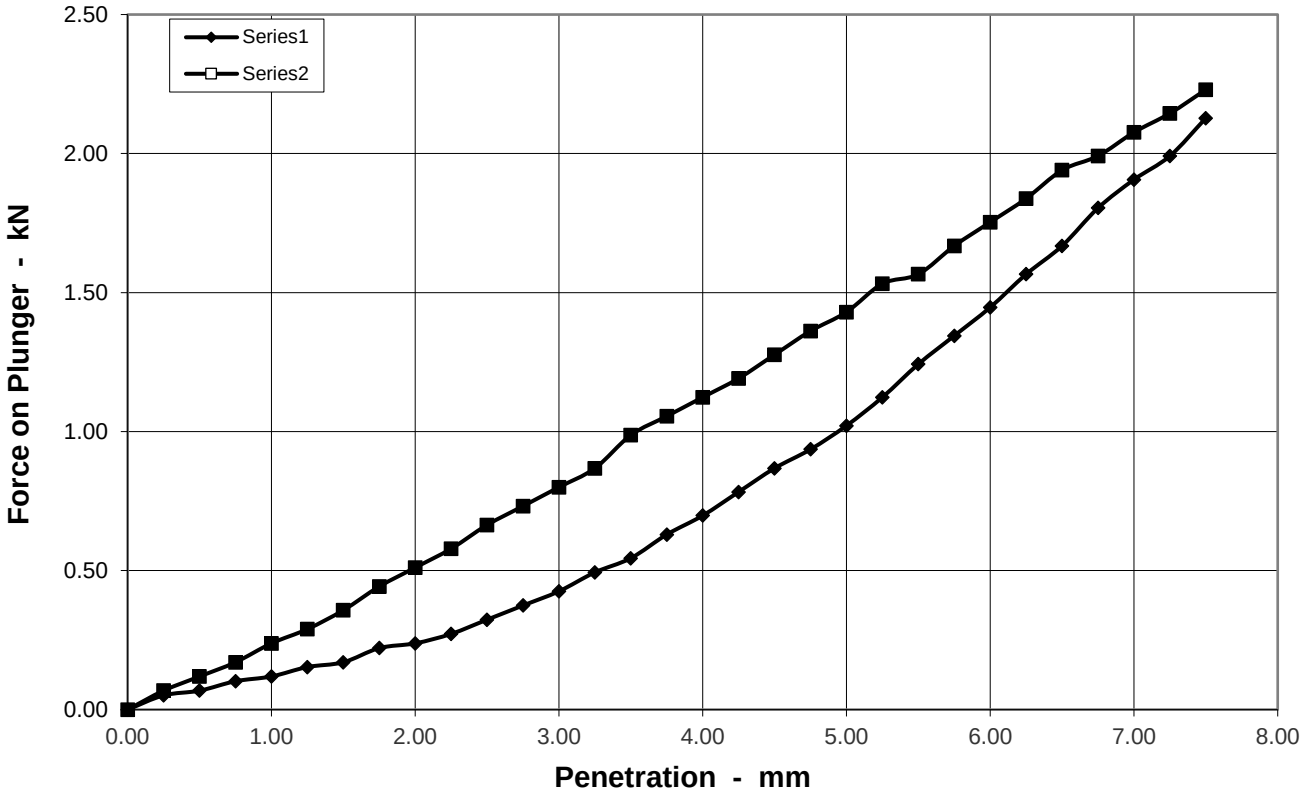
Penetration mm	CBR Values %	
	TOP	BASE
2.5	19.6	15.5
5	26.2	18.9
Accepted CBR	**26.2**	**18.9**

			Remarks	

CALIFORNIA BEARING RATIO

BS 13377 : Part 4 : 1990 Clause 7.4

		Job Ref	**P19013**
		Borehole / Pit No	TP14
Site Name	**Indaver**	Sample No	2
		Depth	2 m
Soil Description	Slightly sandy gravelly CLAY		



Preparation	Method of Compation		
	Hammer type		2.5kg Rammer
	Soaking Period	days	
	Amount of Swell	mm	

Sample Conditions		
Natural Moisture Content	%	13.0
Moisture Content - TOP	%	11.0
Moisture Content - BASE	%	10.9
Bulk Density	Mg/m³	2.22
Dry Density	Mg/m³	1.96

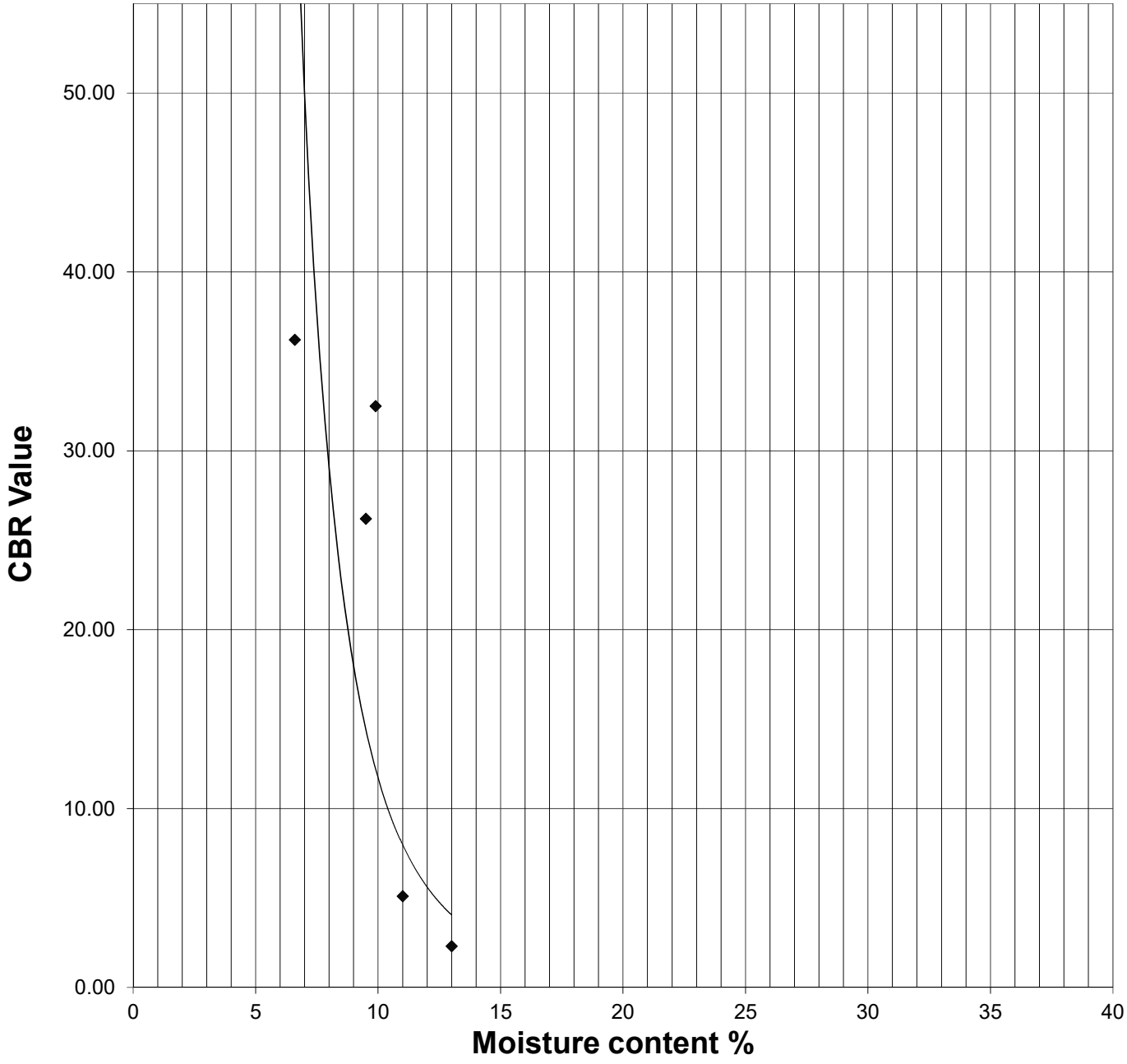
Test Conditions		
Sample Retained on 20 mm sieve	%	17.4
Seating Load - TOP	N	
Seating Load - BASE	N	
Surcharge	kg	8

Penetration mm	CBR Values %	
	TOP	BASE
2.5	2.4	5.0
5	5.1	7.1
Accepted CBR	**5.1**	**7.1**

			Remarks

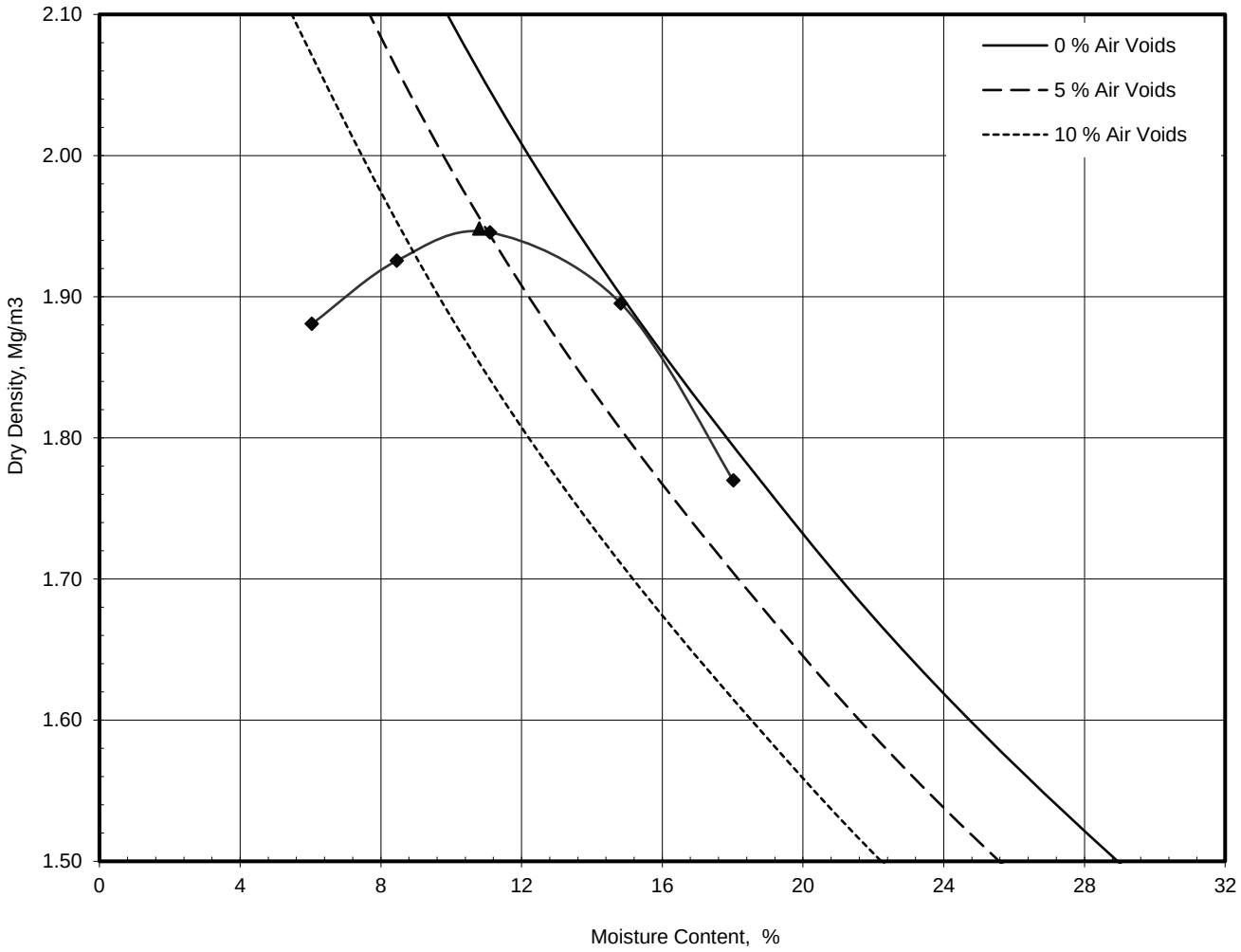
pgl priority geotechnical	**CALIFORNIA BEARING RATIO RELATIONSHIP** **BS 1377 : Part 4 : 1990 Clause 5**	**Job Ref**	**P19013**
		Borehole / Pit No	TP14
Location	Indaver	Sample No	2
Soil Description	Slightly sandy gravelly CLAY	Sample Type	B
		Depth	2.00 m

CBR/ Moisture Content Relationship



Operator	Checked	Approved	

	Dry Density / Moisture Content Relationship Light Compaction			Job Ref	P19013
				Borehole / Pit No	TP01
Location	Indaver			Sample No	1
Soil Description	Slightly sandy slightly gravelly SILT			Depth	0.50 m
				Sample Type	B
Test Method	BS1377:Part 4:1990, clause 3.4, 2.5kg rammer			Keylab ID	PGL12019031377
				Compaction Test Reference/No.	



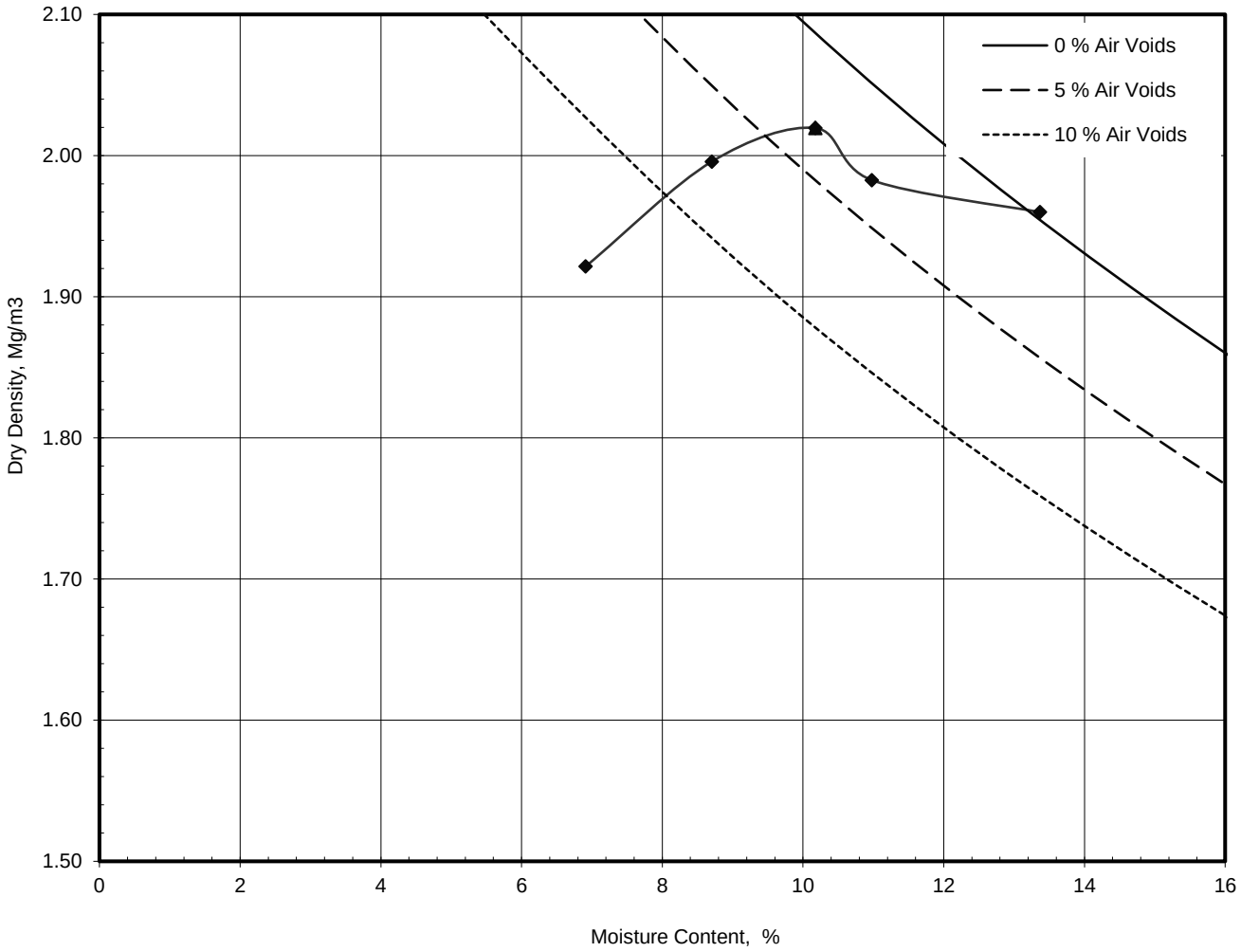
Preparation		Material used was natural
Mould Type		CBR
Samples Used		Single sample tested
Material Retained on 37.5 mm Sieve	%	1
Material Retained on 20.0 mm Sieve	%	4
Particle Density - Assumed	Mg/m³	2.65

Maximum Dry Density	Mg/m³	**1.90**

Optimum Moisture Content	%	**10.8**
Natural Mositure Content	**%**	**18.02**

Operator	Checked	Approved	Remarks	Fig
		Cilla		Sheet 1 of 1

	Dry Density / Moisture Content Relationship Light Compaction			Job Ref	P19013
				Borehole / Pit No	TP07
Location	Indaver			Sample No	1
Soil Description	Slightly sandy gravelly CLAY with low cobble content			Depth	0.50 m
				Sample Type	B
Test Method	BS1377:Part 4:1990, clause 3.4, 2.5kg rammer			Keylab ID	PGL12019031397
				Compaction Test Reference/No.	



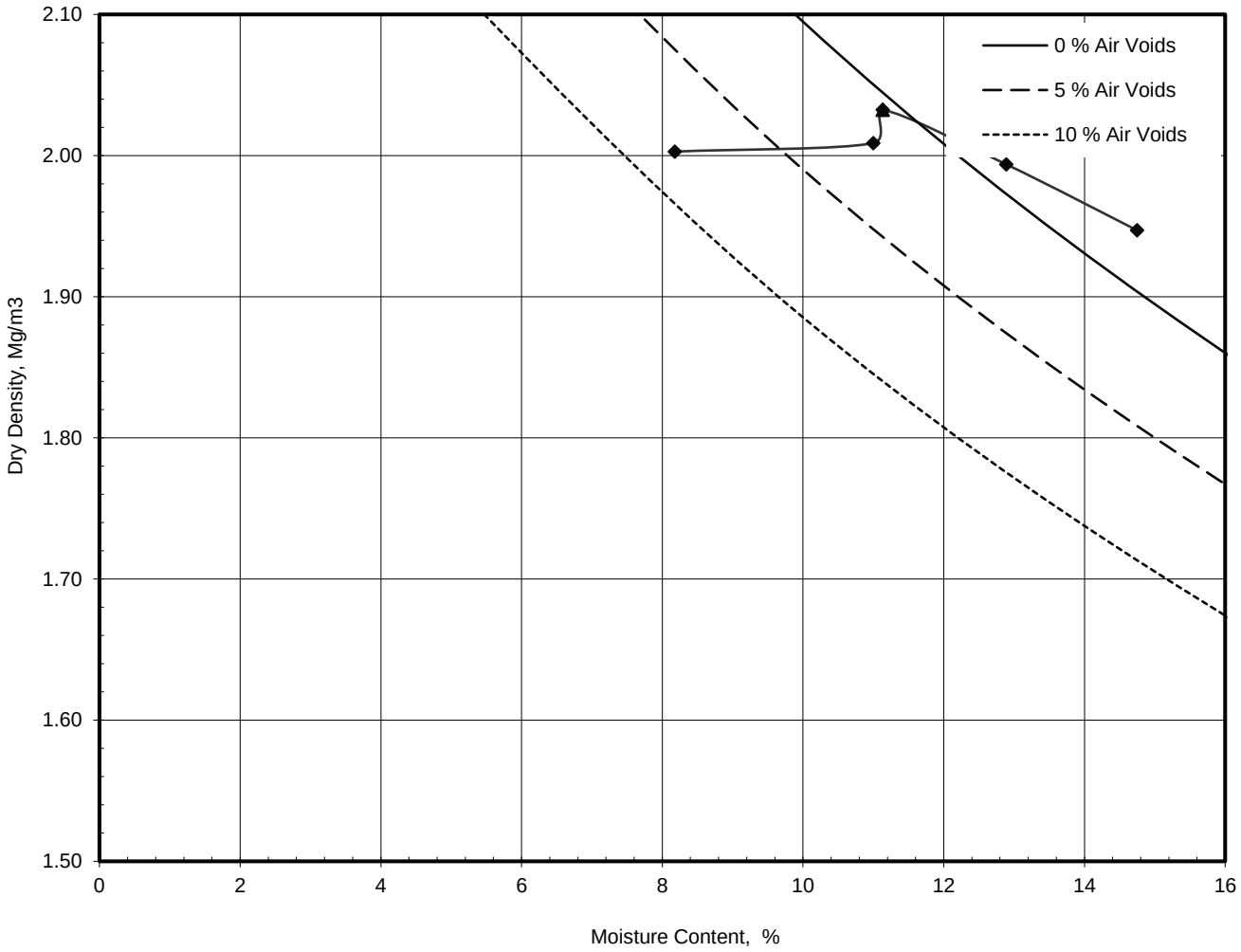
Preparation		Material used was natural
Mould Type		CBR
Samples Used		Single sample tested
Material Retained on 37.5 mm Sieve	%	12
Material Retained on 20.0 mm Sieve	%	20
Particle Density -	Mg/m³	2.65

Maximum Dry Density	Mg/m³	**2.00**

Optimum Moisture Content	%	**10.2**
Natural Mositure Content	**%**	**13.37**

Operator	Checked	Approved	Remarks	**Fig**
		Cilla		Sheet 1 of 1

	Dry Density / Moisture Content Relationship Light Compaction			Job Ref	P19013
				Borehole / Pit No	TP07
Location	**Indaver**			Sample No	4
Soil Description	Slightly sandy gravelly CLAY			Depth	3.00 m
				Sample Type	B
Test Method	BS1377:Part 4:1990, clause 3.4, 2.5kg rammer			Keylab ID	PGL120190313100
				Compaction Test Reference/No.	



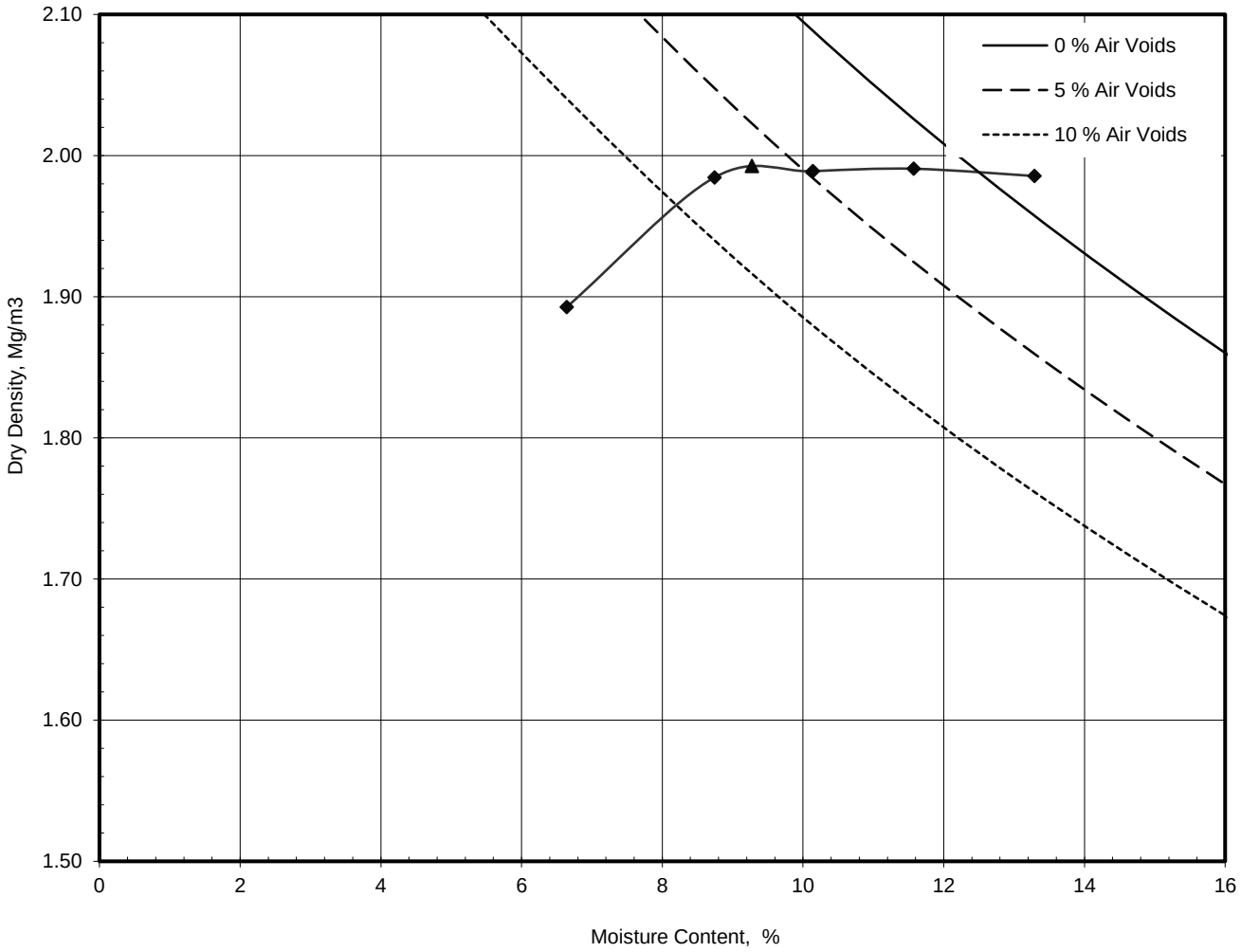
Preparation		Material used was natural
Mould Type		CBR
Samples Used		Single sample tested
Material Retained on 37.5 mm Sieve	%	3
Material Retained on 20.0 mm Sieve	%	10
Particle Density -	Mg/m³	2.65

Maximum Dry Density	Mg/m³	**2.00**

Optimum Moisture Content	%	**11.1**
Natural Mositure Content	**%**	**11.13**

Operator	Checked	Approved	Remarks	Fig
		Cilla		Sheet 1 of 1

	Dry Density / Moisture Content Relationship Light Compaction			Job Ref	P19013
				Borehole / Pit No	TP14
Location	Indaver			Sample No	2
Soil Description	Slightly sandy gravelly CLAY			Depth	2.00 m
				Sample Type	B
Test Method	BS1377:Part 4:1990, clause 3.4, 2.5kg rammer			Keylab ID	PGL120190313127
				Compaction Test Reference/No.	



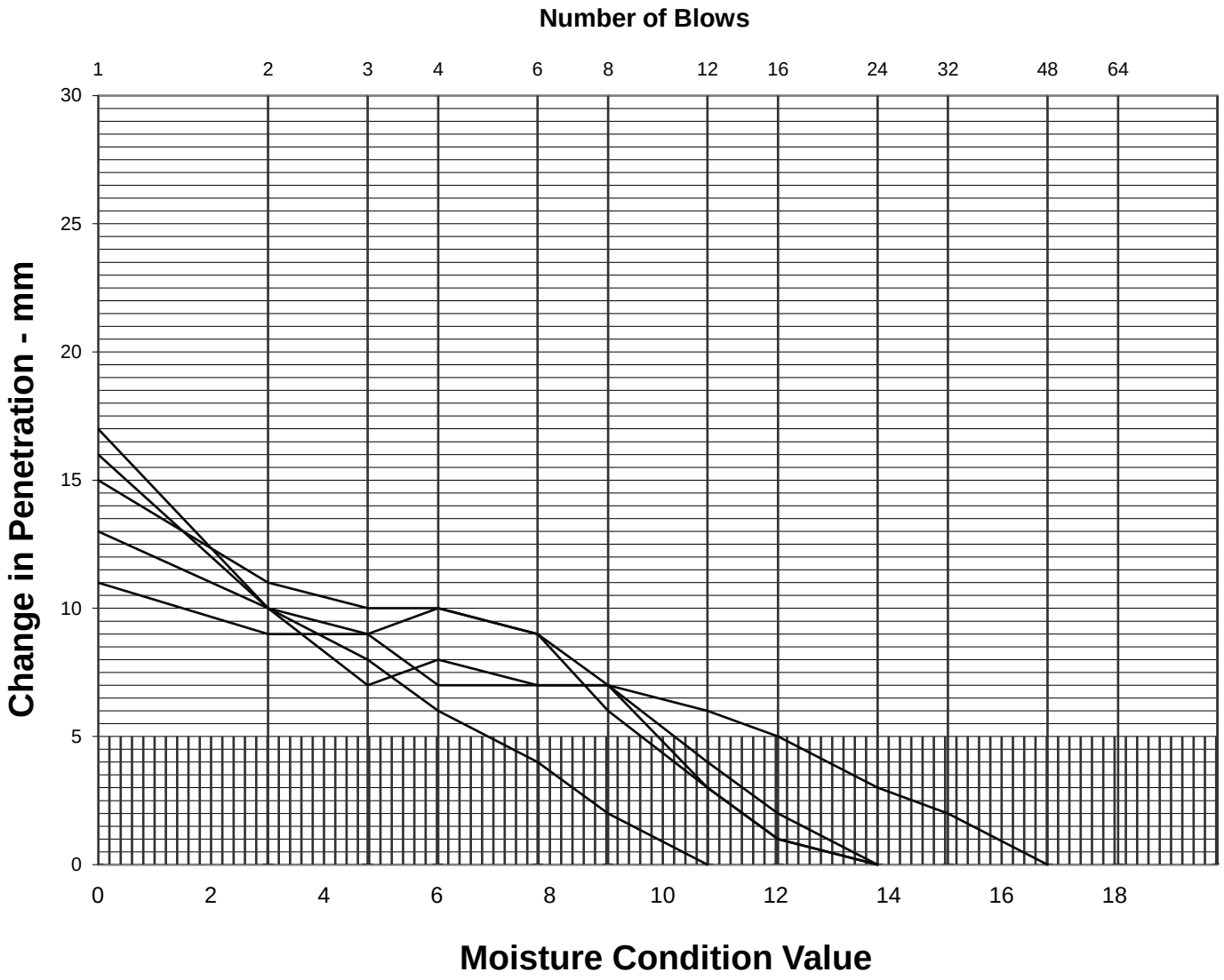
Preparation		-2146826273
Mould Type		CBR
Samples Used		
Material Retained on 37.5 mm Sieve	%	9
Material Retained on 20.0 mm Sieve	%	17
Particle Density - Assumed	Mg/m³	2.65

Maximum Dry Density	Mg/m³	**2.00**

Optimum Moisture Content	%	**9.3**
Natural Mositure Content	**%**	**13.29**

Operator	Checked	Approved	Remarks	Fig
		Cilla		Sheet 1 of 1

pgl priority geotechnical	**Moisture Condition Value** **BS 1377 : Part 4 : 1990 Clause 5**	**Job Ref**	**P19013**
		Borehole / Pit No	TP07
Location	Indaver	Sample No	1
Soil Description	Slightly sandy gravelly CLAY with low cobble content	Sample Type	B
		Depth	0.50 m

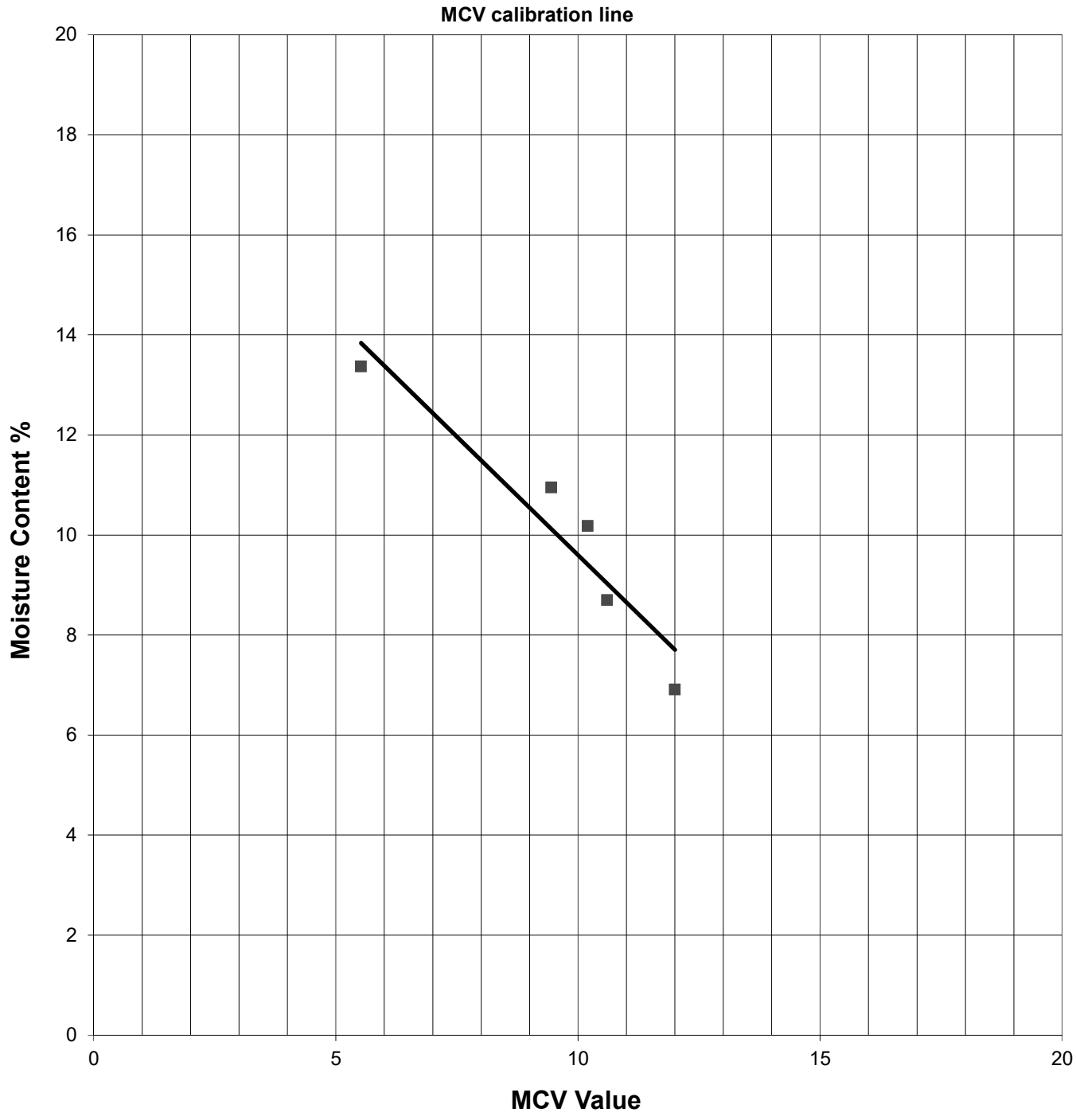


Specimen No		1	2	3	4	5	6
Moisture Condition Value		5.5	9.4	12.0	10.6	10.2	
Moisture Content	%	13.37	10.95	6.91	8.70	10.18	
Bulk density after compaction	Mg/m³	2.19	2.19	2.12	2.17	2.25	
Dry density after compaction	Mg/m³	1.93	1.97	1.98	2.00	2.04	
Hand vane strength	kPa						
Method of determining MCV		Steeptest fit line	Steeptest fit line	Steeptest fit line	Steeptest fit line	Steeptest fit line	
Mass retained on 20mm sieve	%	19.9					

MCV Relationship Graph

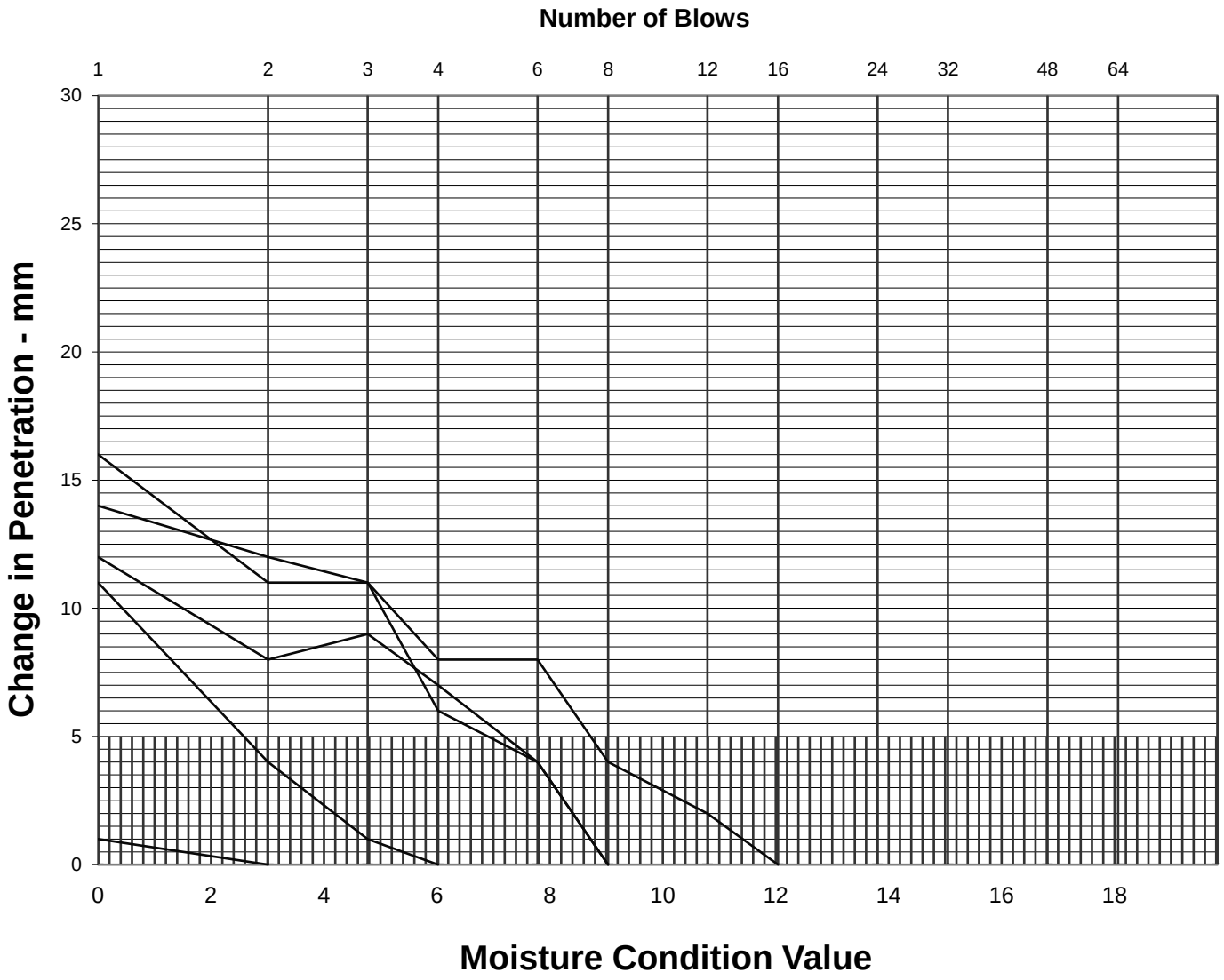
BS 1377 : Part 4 : 1990 Clause 5

		Job Ref	**P19013**
		Borehole / Pit No	TP07
Location	Indaver	Sample No	1
Soil Description	Slightly sandy gravelly CLAY with low cobble	Sample Type	B
		Depth	0.50 m



Operator	Checked	Approved	Remarks Single sample / Separate batches tested

pgl priority geotechnical	**Moisture Condition Value** **BS 1377 : Part 4 : 1990 Clause 5**	**Job Ref**	**P19013**
		Borehole / Pit No	TP07
Location	Indaver	Sample No	4
Soil Description	Slightly sandy gravelly CLAY	Sample Type	B
		Depth	3.00 m

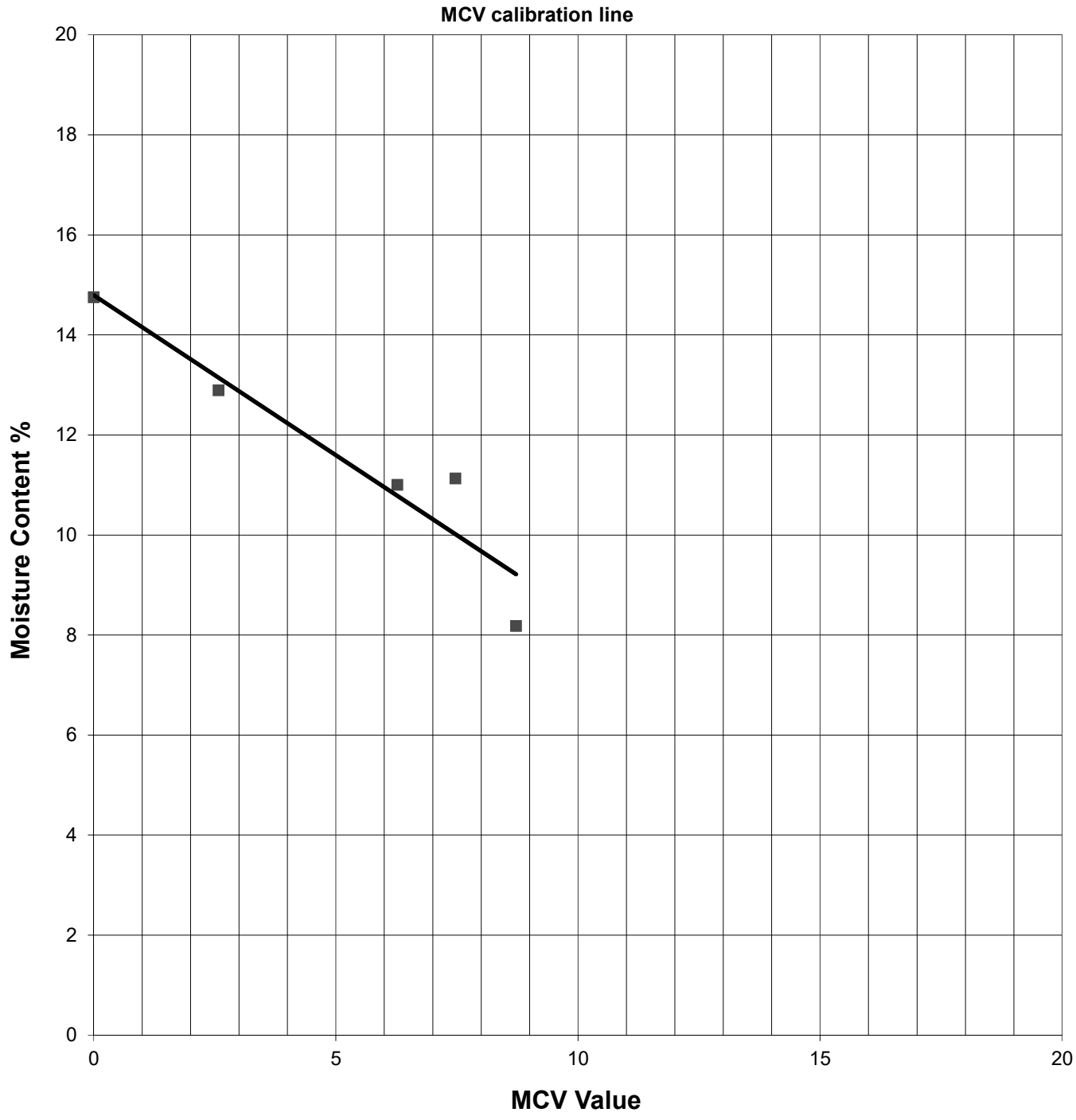


Specimen No		1	2	3	4	5	6
Moisture Condition Value		7.5	8.7	0.0	6.3	2.6	
Moisture Content	%	11.13	8.18	14.75	11.00	12.89	
Bulk density after compaction	Mg/m³	2.10	2.14	2.19	2.25	2.25	
Dry density after compaction	Mg/m³	1.89	1.98	1.91	2.03	1.99	
Hand vane strength	kPa						
Method of determining MCV		Steeptest fit line	Steeptest fit line	Steeptest fit line	Steeptest fit line	Steeptest fit line	
Mass retained on 20mm sieve	%	9.6					

MCV Relationship Graph

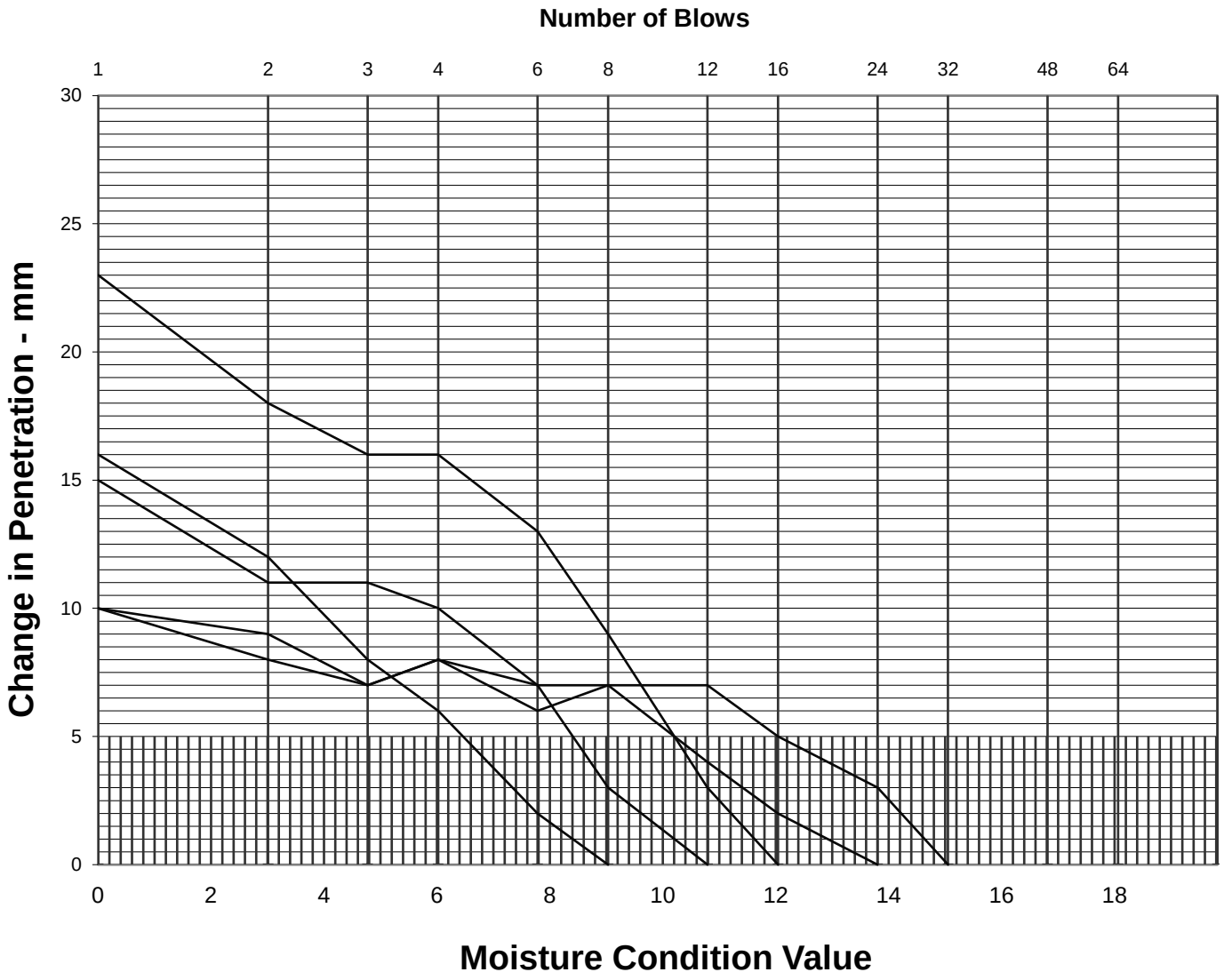
BS 1377 : Part 4 : 1990 Clause 5

		Job Ref	**P19013**
		Borehole / Pit No	TP07
Location	Indaver	Sample No	3
Soil Description	Slightly sandy gravelly CLAY	Sample Type	B
		Depth	3.00 m



Operator	Checked	Approved	Remarks Single sample / Separate batches tested

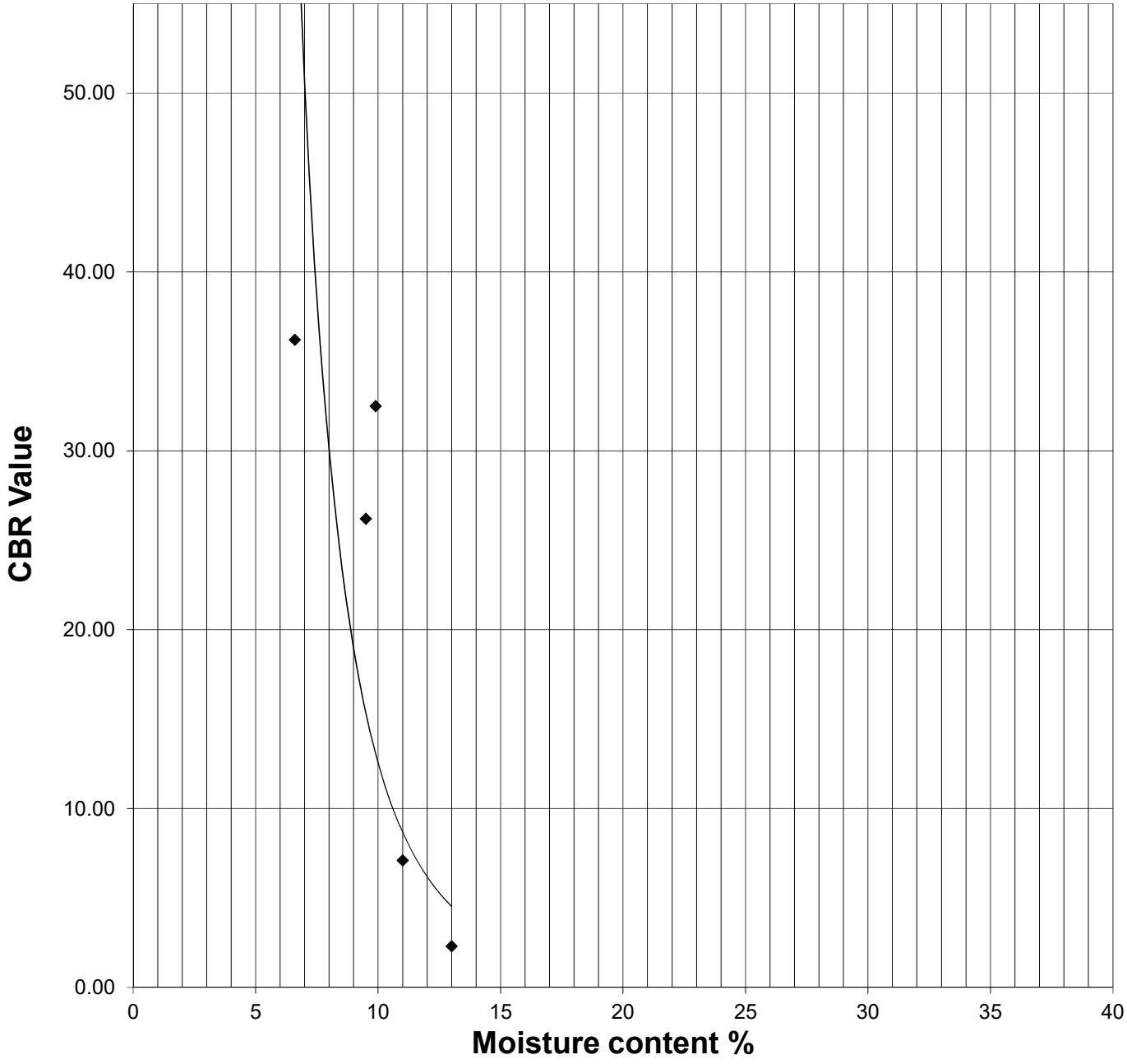
pgl priority geotechnical	**Moisture Condition Value** **BS 1377 : Part 4 : 1990 Clause 5**	**Job Ref**	**P19013**
		Borehole / Pit No	TP14
Location	Indaver	Sample No	2
Soil Description	Slightly sandy gravelly CLAY	Sample Type	B
		Depth	2.00 m



Specimen No		1	2	3	4	5	6
Moisture Condition Value		6.1	10.2	13.0	10.2	8.4	
Moisture Content	%	13.29	10.14	6.64	8.74	11.57	
Bulk density after compaction	Mg/m³	2.25	2.05	2.12	2.17	2.25	
Dry density after compaction	Mg/m³	1.99	1.86	1.99	2.00	2.02	
Hand vane strength	kPa						
Method of determining MCV		Steeptest fit line	Steeptest fit line	Steeptest fit line	Steeptest fit line	Steeptest fit line	
Mass retained on 20mm sieve	%	17.4					

pgl priority geotechnical	**CALIFORNIA BEARING RATIO RELATIONSHIP** **BS 1377 : Part 4 : 1990 Clause 5**	**Job Ref**	**P19013**
		Borehole / Pit No	TP14
Location	Indaver	Sample No	3
Soil Description	Slightly sandy gravelly CLAY	Sample Type	B
		Depth	2.00 m

CBR/ Moisture Content Relationship



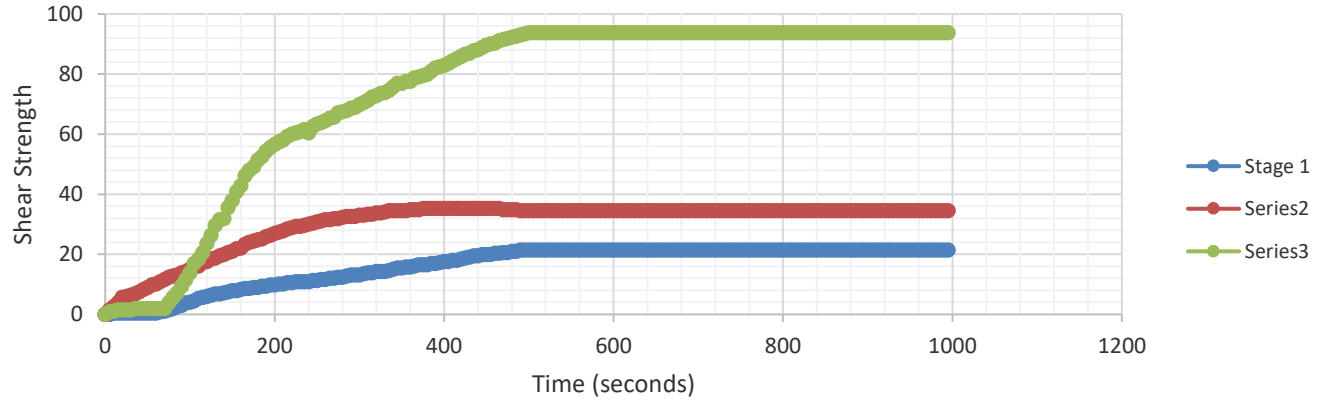
Operator	Checked	Approved	

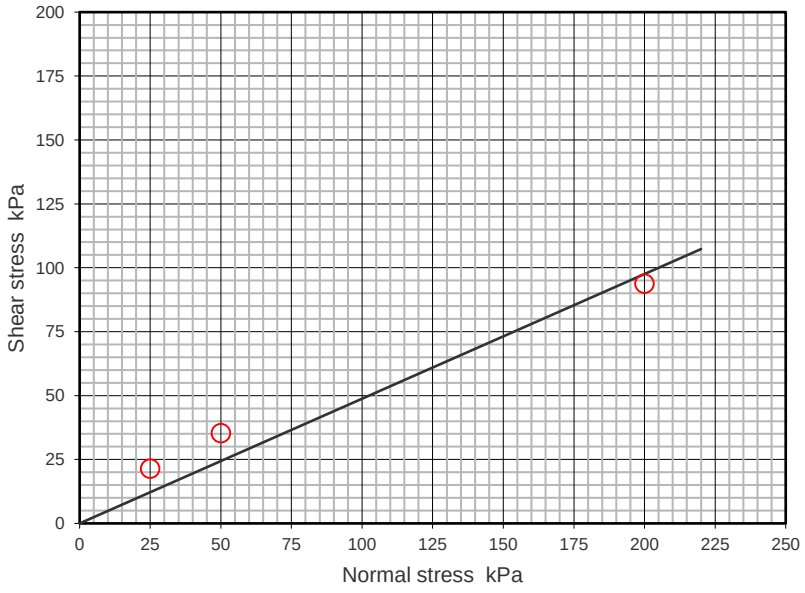
	Determination of shear strength using the Small Direct Shearbox Apparatus	Job Ref	P19013
		Borehole/Pit No.	TP10
Site Name	Indaver	Sample No	1
Soil Description	Gravelly very silty SAND	Depth m	0.5
		Sample Type	B
Test Method	BS1377 : Part 7 : 1990, clause 4	KeyLAB ID	PGL120190313110

Preparation Details

Specimen Details

		Test No.	1	2	3				
Initial	Height								mm
	Bulk Density		2.23	2.21	2.11				Mg/m³
	Moisture Content		19.0	19.0	19.0				%
	Dry density		1.87	1.86	1.77				Mg/m³
	Voids ratio		0.417	0.425	0.497				
	Degree of Saturation		121	118	101				%
Consolidation	Consolidation / Normal Stress applied		**25**	**50**	**200**				kPa
	Change in height during consolidation*								mm
	Voids ratio after consolidation								
After test	Final Moisture content		15.2	14.0	14.1				





Shear Strength Parameters

Peak strength, (o)		Regression	Manual
c '	kPa	[13]	0
Ø '	degrees	[22.0]	26

Residual strength, (x)			
c 'R	kPa	[0.0]	-
Ø 'R	degrees	[ ]	-

Remarks :

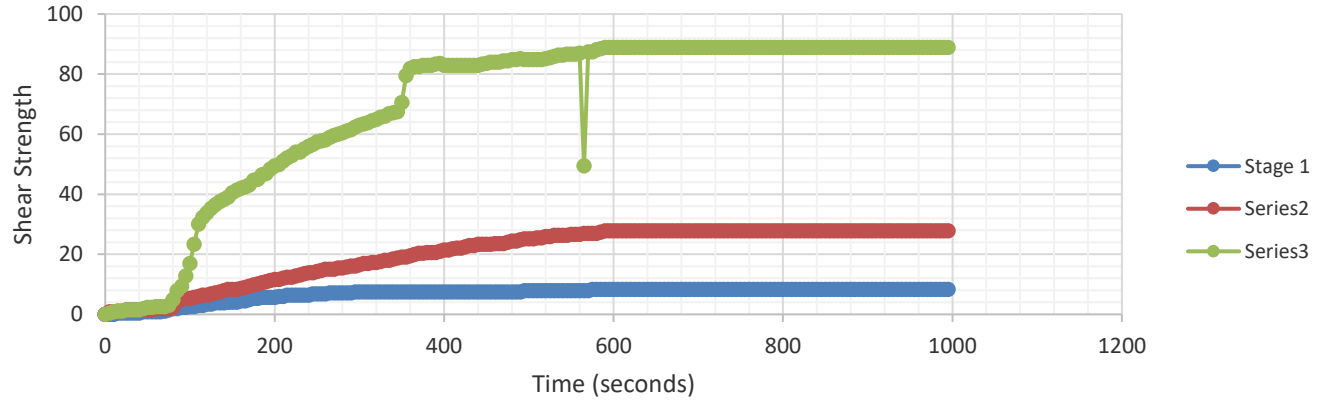
Lab Sheet Reference :		Date printed	Fig No.
		24/05/2019 14:20	1
			sheet 1 of 2

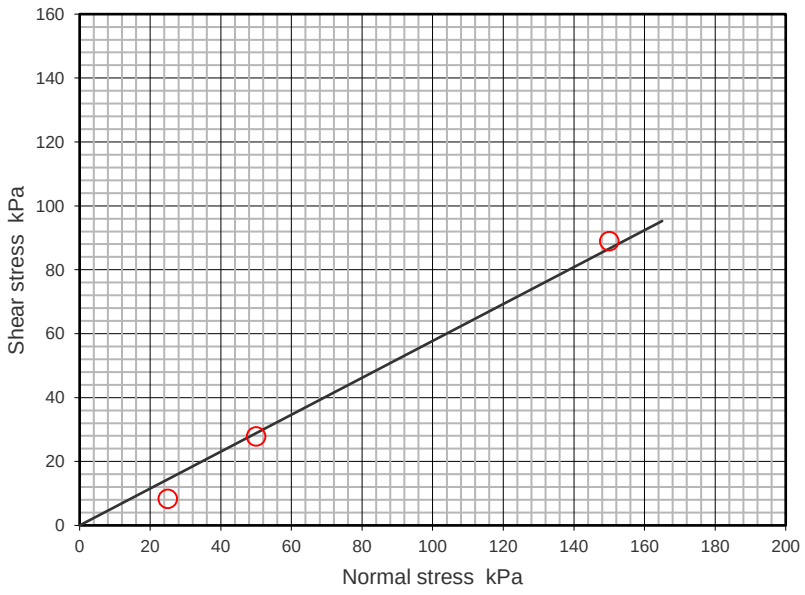
	Determination of shear strength using the Small Direct Shearbox Apparatus	Job Ref	P19013
		Borehole/Pit No.	TP12
Site Name	Indaver	Sample No	2
Soil Description	Slightly sandy gravelly SILT	Depth m	1
		Sample Type	B
Test Method	BS1377 : Part 7 : 1990, clause 4	KeyLAB ID	PGL120190313118

Preparation Details

Specimen Details

		Test No.	1	2	3				
Initial	Height								mm
	Bulk Density		2.15	2.15	2.21				Mg/m³
	Moisture Content		20.5	20.5	20.5				%
	Dry density		1.78	1.78	1.83				Mg/m³
	Voids ratio		0.489	0.489	0.448				
	Degree of Saturation		111	111	121				%
Consolidation	Consolidation / Normal Stress applied		**25**	**50**	**150**				kPa
	Change in height during consolidation*								mm
	Voids ratio after consolidation								
After test	Final Moisture content		18.9	17.7	16.3				





Shear Strength Parameters

Peak strength, (o)		Regression	Manual
c '	kPa	[-6.0]	0
Ø '	degrees	[32.5]	30

Residual strength, (x)			
c 'R	kPa	[0.0]	-
Ø 'R	degrees	[ ]	-

Remarks :

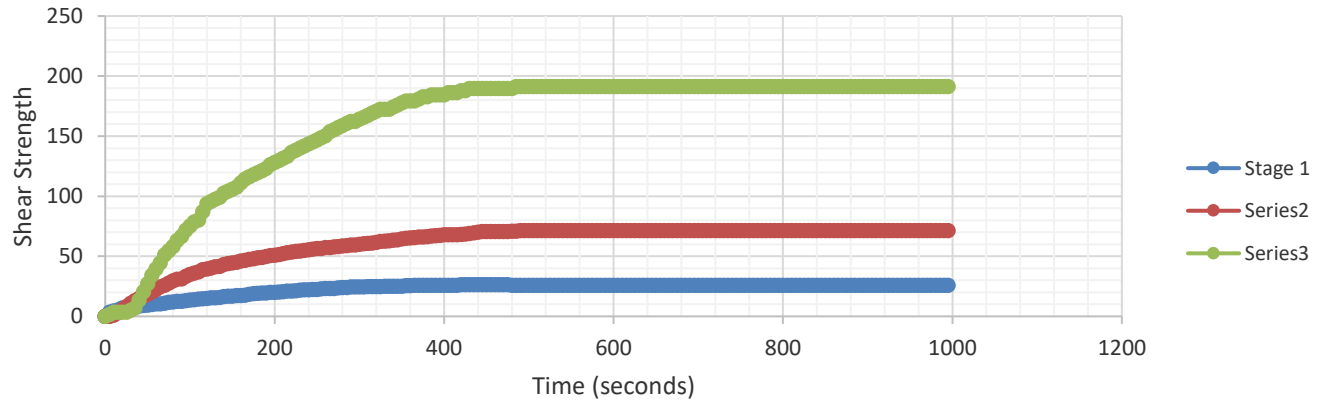
Lab Sheet Reference :		Date printed	Fig No.
		24/05/2019 14:20	1

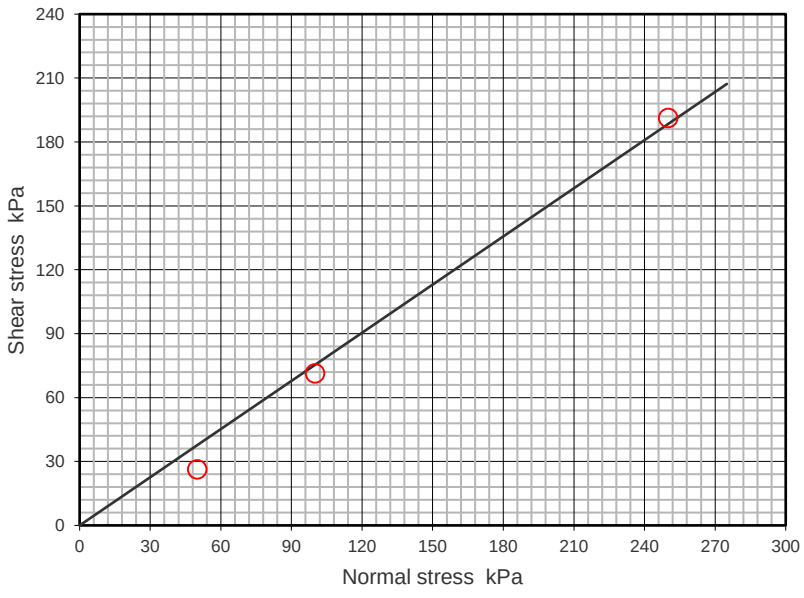
	Determination of shear strength using the Small Direct Shearbox Apparatus	Job Ref	P19013
		Borehole/Pit No.	TP12
Site Name	Indaver	Sample No	3
Soil Description	Slightly sandy slightly gravelly SILT with low cobble content	Depth m	2.5
		Sample Type	B
Test Method	BS1377 : Part 7 : 1990, clause 4	KeyLAB ID	PGL120190313119

Preparation Details

Specimen Details

		Test No.	1	2	3				
Initial	Height								mm
	Bulk Density		2.11	2.15	2.17				Mg/m³
	Moisture Content		21.0	21.0	21.0				%
	Dry density		1.74	1.78	1.79				Mg/m³
	Voids ratio		0.523	0.489	0.480				
	Degree of Saturation		106	114	116				%
Consolidation	Consolidation / Normal Stress applied		**50**	**100**	**250**				kPa
	Change in height during consolidation*								mm
	Voids ratio after consolidation								
After test	Final Moisture content		16.3	16.0	14.0				





Shear Strength Parameters

Peak strength, (o)		Regression	Manual
c '	kPa	[-12.9]	0
Ø '	degrees	[39.5]	37

Residual strength, (x)

c 'R	kPa	[0.0]	-
Ø 'R	degrees	[ ]	-

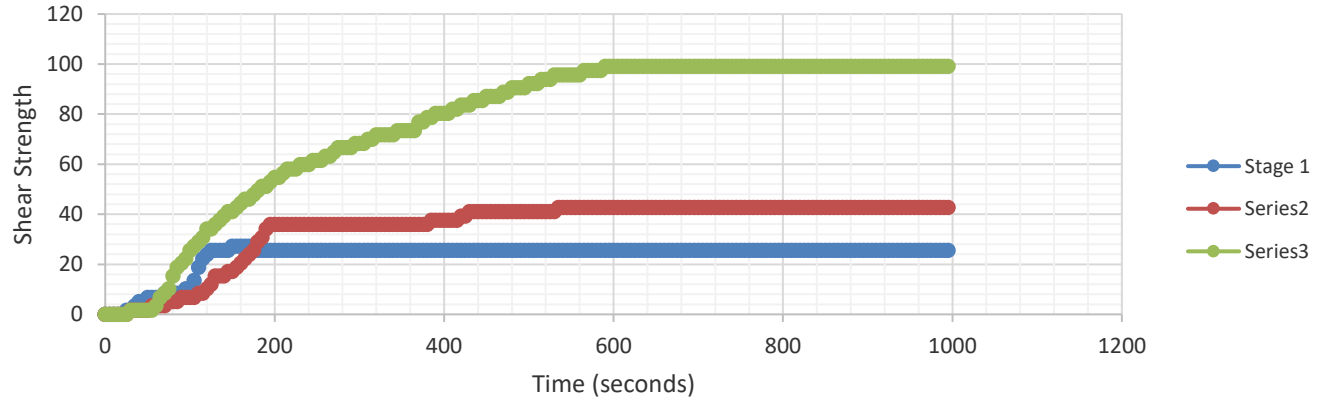
Remarks :

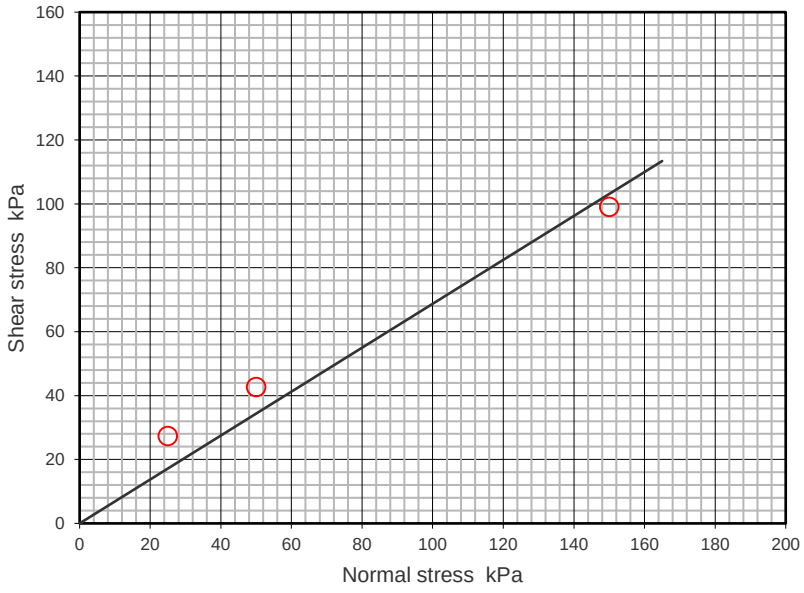
Lab Sheet Reference :		Date printed	Fig No. 1
		24/05/2019 14:20	sheet 1 of 2

	Determination of shear strength using the Small Direct Shearbox Apparatus	Job Ref	P19013
		Borehole/Pit No.	TP13
Site Name	Indaver	Sample No	2
Soil Description	Slightly gravelly sandy CLAY	Depth m	1.5
		Sample Type	B
Test Method	BS1377 : Part 7 : 1990, clause 4	KeyLAB ID	PGL120190313123

Preparation Details

Specimen Details	Test No.	**1**	**2**	**3**				
Initial	Height							mm
	Bulk Density	1.73	1.63	1.61				Mg/m³
	Moisture Content	13.4	13.4	13.4				%
	Dry density	1.53	1.44	1.42				Mg/m³
	Voids ratio	0.732	0.840	0.866				
	Degree of Saturation	49	42	41				%
Consolidation	Consolidation / Normal Stress applied	**25**	**50**	**150**				kPa
	Change in height during consolidation*							mm
	Voids ratio after consolidation							
After test	Final Moisture content	13.6	13.4	13.6				





Shear Strength Parameters

Peak strength, (o)		Regression	Manual
c '	kPa	[14]	0
Ø '	degrees	[29.5]	34.5

Residual strength, (x)			
c 'R	kPa	[0.0]	-
Ø 'R	degrees	[ ]	-

Remarks :

Lab Sheet Reference :		Date printed	Fig No. 1
		24/05/2019 14:20	sheet 1 of 2

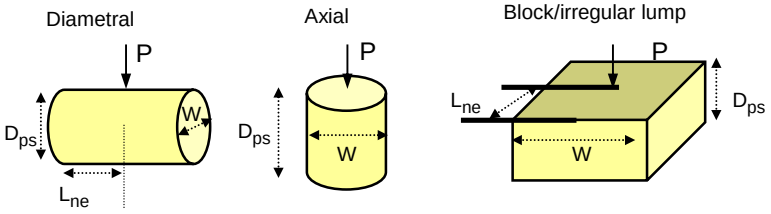
Point Load Strength Index Tests
Summary of Results

Project No.: P19013

Project Name: Indaver

Borehole No.	Sample			Specimen		Rock Type and Test condition	Test Type see ISRM		Failure Valid (Y/N)	Dimensions				Force P	Equivalent diameter, De	Point Load Strength Index		Remarks (including water content if measured)
	Depth m	Ref.	Type	Ref.	Depth m		Type (D, A, I, B)	Direction (L, P or U)		Lne mm	W mm	Dps mm	Dps' mm	kN	mm	Is MPa	Is(50) MPa	
RC01	6.60	RC	C			MUDSTONE	D	L	YES	72.0	76.0	20.0	11.0	5.6	28.9	6.7	5.2	Undulating Rough
RC01	8.20	RC	C			MUDSTONE	D	L	YES	85.0	76.0	76.0	66.0	0.8	70.8	0.2	0.2	Stepped Rough
RC02	5.60	RC	C			MUDSTONE	D	L	YES	94.0	76.0	76.0	69.0	2.2	72.4	0.4	0.5	Undulating Rough
RC02	7.05	RC	C			MUDSTONE	D	L	YES	130.0	76.0	76.0	55.0	3.7	64.7	0.9	1.0	Undulating Rough
RC03	4.70	RC	C			MUDSTONE	D	P	YES	115.0	76.0	76.0	61.0	11.7	68.1	2.5	2.9	Undulating Rough
RC03	8.35	RC	C			MUDSTONE	D	P	YES	90.0	76.0	76.0	46.0	7.3	59.1	2.1	2.3	Undulating Smooth
RC04	8.50	RC	C			MUDSTONE	D	L	YES	26.0	76.0	76.0	58.0	0.9	66.4	0.2	0.2	Stepped Rough
RC04	10.00	RC	C			MUDSTONE	D	P	YES	105.0	76.0	76.0	57.0	8.5	65.8	2.0	2.2	Stepped Rough
RC05	7.40	RC	C			MUDSTONE	D	P	YES	72.0	76.0	76.0	65.0	1.8	70.3	0.4	0.4	Undulating Smooth
RC05	11.40	RC	C			MUDSTONE	D	L	YES	110.0	76.0	76.0	68.0	4.5	71.9	0.9	1.0	Undulating Smooth
RC06	8.20	RC	C			MUDSTONE	D	L	YES	118.0	76.0	76.0	52.0	2.0	62.9	0.5	0.5	Smooth Undulating
RC06	11.50	RC	C			MUDSTONE	D	L	YES	80.0	76.0	76.0	47.0	3.0	59.8	0.8	0.9	Undulating Rough
RC07	12.50	RC	C			MUDSTONE	D	U	YES	25.0	76.0	76.0	67.0	0.5	71.4	0.1	0.1	Undulating Rough
RC07	13.25	RC	C			MUDSTONE	D	P	YES	100.0	76.0	76.0	64.0	3.9	69.7	0.8	0.9	Undulating Rough
RC08	8.80	RC	C			MUDSTONE	D	L	YES	68.0	76.0	76.0	48.0	3.8	60.4	1.0	1.1	Undulating Smooth
RC08	11.35	RC	C			MUDSTONE	D	L	YES	62.0	76.0	76.0	45.0	3.5	58.5	1.0	1.1	Undulating Rough
RC09	11.80	RC	C			MUDSTONE	D	P	YES	75.0	76.0	76.0	41.0	3.9	55.8	1.3	1.3	Undulating Rough
RC09	13.25	RC	C			MUDSTONE	D	L	YES	125.0	76.0	76.0	45.0	5.5	58.5	1.6	1.7	Undulating Rough
RC10	11.00	RC	C			MUDSTONE	D	L	YES	73.0	76.0	76.0	52.0	2.4	62.9	0.6	0.7	Undulating Rough
RC10	14.00	RC	C			MUDSTONE	D	L	YES	89.0	76.0	76.0	50.0	1.4	61.6	0.4	0.4	Undulating Rough

Test Type
D - Diametral, A - Axial, I - Irregular Lump, B - Block
Direction
L - parallel to planes of weakness
P - perpendicular to planes of weakness
U - unknown or random
Dimensions
Dps - Distance between platens (platen separation)
Dps' - at failure (see ISRM note 6)
Lne - Length from platens to nearest free end
W - Width of shortest dimension perpendicular to load, P



Test performed in accordance with ISRM Suggested Methods : 2007, unless noted otherwise
Detailed legend for test and dimensions, based on ISRM, is shown above.
Size factor, F = (De/50)0.45 for all tests.

Date Printed: 06/04/2019 00:00

Approved By: Cilla

Table: 1

sheet: 1

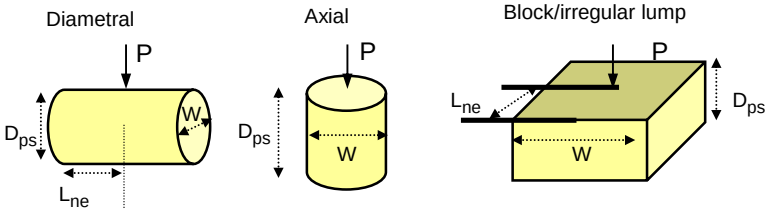
Point Load Strength Index Tests
Summary of Results

Project No.: P19013

Project Name: Indaver

Borehole No.	Sample			Specimen		Rock Type and Test condition	Test Type see ISRM		Failure Valid (Y/N)	Dimensions				Force P	Equivalent diameter, De	Point Load Strength Index		Remarks (including water content if measured)
	Depth	Ref.	Type	Ref.	Depth		Type (D, A, I, B)	Direction (L, P or U)		Lne	W	Dps	Dps'			Is	Is(50)	
	m				m					mm	mm	mm	mm	kN	mm	MPa	MPa	
RC11	11.20	RC	C			MUDSTONE	D	L	YES	89.0	76.0	76.0	61.0	2.5	68.1	0.5	0.6	Stepped Rough
RC11	13.50	RC	C			MUDSTONE	D	L	YES	71.0	76.0	76.0	46.0	5.3	59.1	1.5	1.6	Undulating Rough
TP02	4.00	4	B			SANDSTONE COBBLE	I	U	YES	70.0	85.0	50.0	40.0	23.5	65.8	5.4	6.1	Undulating Rough
TP03	3.70	4	B			SANDSTONE COBBLE	I	U	YES	50.0	80.0	55.0	28.0	3.6	53.4	1.3	1.3	Undulating Rough
TP04	0.50	1	B			SILTSTONE	I	P	YES	55.0	85.0	30.0	20.0	3.9	46.5	1.8	1.7	Undulating Rough
TP05	2.30	3	B			SANDSTONE COBBLE	I	U	YES	25.0	70.0	40.0	17.0	5.1	38.9	3.4	3.0	Undulating Rough
TP07	3.60	5	B			SILTSTONE	I	P	YES	40.0	50.0	30.0	25.0	2.7	39.9	1.7	1.5	Undulating Rough

Test Type
D - Diametral, A - Axial, I - Irregular Lump, B - Block
Direction
L - parallel to planes of weakness
P - perpendicular to planes of weakness
U - unknown or random
Dimensions
Dps - Distance between platens (platen separation)
Dps' - at failure (see ISRM note 6)
Lne - Length from platens to nearest free end
W - Width of shortest dimension perpendicular to load, P



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Detailed legend for test and dimensions, based on ISRM, is shown above.
Size factor, F = (De/50)0.45 for all tests.

Date Printed: 06/04/2019 00:00

Approved By: Cilla

Table: 1

sheet: 2

Chemtest
The right chemistry to deliver results
Chemtest Ltd.
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.com

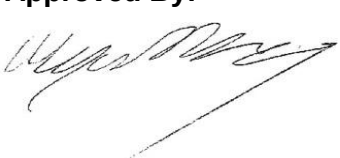
UKAS TESTING
2183

Final Report

Report No.:	19-14205-1
Initial Date of Issue:	07-May-2019
Client	Priority Geotechnical Ltd
Client Address:	Unit 12 Owenacurra Business Park Midleton County Cork Ireland
Contact(s):	Colette Kelly
Project	P19013 Indaver

Quotation No.:		**Date Received:**	26-Apr-2019
Order No.:	11734	**Date Instructed:**	26-Apr-2019
No. of Samples:	13		
Turnaround (Wkdays):	7	**Results Due:**	07-May-2019
Date Approved:	07-May-2019		

Approved By:



Details: Glynn Harvey, Laboratory Manager

Chemtest
The right chemistry to deliver results

Results - Soil

Project: P19013 Indaver

Client: Priority Geotechnical Ltd			**Chemtest Job No.:**		19-14205	19-14205	19-14205	19-14205	19-14205	19-14205	19-14205	19-14205	19-14205
Quotation No.:			**Chemtest Sample ID.:**		816599	816600	816601	816602	816603	816604	816605	816606	816607
			Sample Location:		TP06	TP11	TP03	TP02	TP02	TP10	TP15	TP10	TP04
			Sample Type:		SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
			Top Depth (m):		2.0	3.1	3.7	4.0	1.0	2.5	1.0	1.5	0.5
			Date Sampled:		24-Apr-2019	24-Apr-2019	24-Apr-2019	24-Apr-2019	24-Apr-2019	24-Apr-2019	24-Apr-2019	24-Apr-2019	24-Apr-2019
Determinand	**Accred.**	**SOP**	**Units**	**LOD**									
Moisture	N	2030	%	0.020	11	15	13	15	14	9.6	13	9.5	8.6
pH	U	2010		N/A	7.4	7.5	7.4	7.4	7.2	7.5	6.9	8.1	7.4
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010	< 0.010	< 0.010	0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Sulphate (Acid Soluble)	U	2430	%	0.010	< 0.010	< 0.010	< 0.010	< 0.010	0.013	< 0.010	< 0.010	< 0.010	< 0.010

Chemtest
The right chemistry to deliver results

Results - Soil

Project: P19013 Indaver

Client: Priority Geotechnical Ltd		**Chemtest Job No.:**			19-14205	19-14205	19-14205	19-14205
Quotation No.:		**Chemtest Sample ID.:**			816608	816609	816610	816611
			Sample Location:		TP07	TP07	TP12	TP07
			Sample Type:		SOIL	SOIL	SOIL	SOIL
			Top Depth (m):		3.0	0.5	2.5	3.6
			Date Sampled:		24-Apr-2019	24-Apr-2019	24-Apr-2019	24-Apr-2019
Determinand	**Accred.**	**SOP**	**Units**	**LOD**				
Moisture	N	2030	%	0.020	8.8	12	8.8	9.5
pH	U	2010		N/A	7.7	8.1	7.5	7.9
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010	< 0.010	< 0.010	< 0.010	< 0.010
Sulphate (Acid Soluble)	U	2430	%	0.010	< 0.010	< 0.010	< 0.010	< 0.010

Test Methods

SOP	Title	Parameters included	Method summary
2010	pH Value of Soils	pH	pH Meter
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
2430	Total Sulphate in soils	Total Sulphate	Acid digestion followed by determination of sulphate in extract by ICP-OES.

Chemtest
The right chemistry to deliver results

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