Our Ref: GH/Rp_INT/P21141 + attachments (*.pdf)

18th January, 2022

Messrs. Cronin Sutton Cotter
45 O'Connell Street
Limerick
V94 XE18

Re: Ballylanders, Housing Development, Co. Limerick, Site Investigation, Interpretative report.

Introduction

In June 2021, Priority Geotechnical (PGL) were requested by CS Consulting Group (CS) acting on behalf of Limerick City & County Council to undertake a site investigation for a proposed housing development at Church Glen, Ballylanders, Co. Limerick (CS job ref: L098L). The proposed development on the site will be 9Nr. housing units.

Objectives

This site investigation contract is required to assess subsoil conditions in order to inform the foundation design for the proposed development.

Scope

The scope of the site investigation, which was specified by CS, comprised of:

- 6Nr. Trial pit excavations;
- All associated sampling;
- 6Nr. Dynamic probes;
- Associated laboratory testing and
- Associated reporting.

The final site works as completed is outlined, herein. This geotechnical data report presents the fieldworks records with regard to the site investigation for the proposed housing development at Church Glen, Ballylanders, Co. Limerick. The report should be read in conjunction with the exploratory records, the photographic records and the laboratory test data accompanying this report.

Site Works

This investigation was carried out in accordance with Eurocode 7- Geotechnical Design Part 2, ground investigation and testing (BS EN 1997-2: 2007) and the relevant British Standards (BS 5930 (2015) Code of Practice for Site Investigation and BS 1377, Method of Tests for Soil for Civil Engineering Purposes, *in situ* Tests Parts 1 to 9).

The fieldworks were undertaken on the 10th and the 23rd June, 2021 under the supervision of PGL, Engineering Geologist(s). Details of the plant and equipment used are detailed on the relevant exploratory records, accompanying this report.

Trial Pits

Six (6) trial pits were excavated to depths 0.2m below existing ground level (bgl) to 4.2m bgl using a 12t tracked excavator. The exploratory logs accompany this report and are discussed herein.

Location	Depth, m bgl	Remarks	
		Groundwater	Stability
TP01	3.4	None encountered.	Moderate.
TP02	0.2	None encountered.	Moderate.
TP03	4.2	None encountered.	Moderate.
TP04	3.9	Small amount at base of pit 3.9m.	Moderate.
TP05	3.4	None encountered.	Moderate.
TP06	3.1	None encountered.	Moderate.

Dynamic probing

Six (6) dynamic probes were completed using PGL's Competitor dynamic probing (heavy) rig; 50kg drop weight, 500mm drop height in general accordance with Geotechnical Investigation and Testing, Part 2, Dynamic probing, BS EN ISO 22476-2:2005. The blows per 100mm ($N_{100\ H}$) were recorded to refusal being 25 blows without progress over 100mm. Dynamic probes were progressed to refusal at depths 1.0m to 3.3m bgl.

Location	Depth, m bgl
DP01	2.3
DP02	3.3
DP03	3.0
DP04	3.2
DP05	2.7
DP06	1.0

Sampling

A total of fifteen (15) bulk disturbed samples (B) and eight (8) small disturbed samples (D) were recovered from the exploratory holes in accordance with Geotechnical Investigation and Sampling – Sampling Methods and Groundwater Measurements (EN ISO 22475-1:2006).

Survey and Drawings

The ‘as built’ exploration locations were surveyed to the Ordinance Survey Irish Transverse Mercator system of co-ordinates (ITM) and elevations to Malin Head datum and shown on the relevant exploratory logs and the exploratory location plan accompanying this report.

Location	Easting	Northing	Elevation, mOD Malin	Depth, m bgl	Date dd/mm/yyyy
DP01	576559.379	624186.132	158.823	2.3	23/06/2021
DP02	576529.320	624188.603	156.548	3.3	23/06/2021
DP03	576522.006	624164.132	155.311	3.0	23/06/2021
DP04	576505.357	624198.505	155.297	3.2	23/06/2021
DP05	576510.386	624223.317	156.406	2.7	23/06/2021
DP06	576535.557	624238.692	158.686	1.0	23/06/2021
TP01	576555.902	624190.907	158.847	3.4	10/06/2021
TP02	576527.499	624192.524	156.503	3.5	10/06/2021
TP03	576520.064	624168.372	155.575	4.2	10/06/2021
TP04	576505.602	624204.097	155.537	3.9	10/06/2021
TP05	576511.596	624226.475	156.577	3.4	10/06/2021
TP06	576536.214	624242.053	158.913	3.1	10/06/2021

Laboratory Testing

Laboratory testing was scheduled by PGL on behalf of CS and carried out by PGL in accordance with BS1377 (1990), Methods of test for soils for civil engineering purposes. Chemical testing was carried out by Eurofins-Chemtest Ltd. (UK) on behalf of PGL. The laboratory data accompanies this report, is discussed herein and was summarised as follows;

SUMMARY OF LABORATORY TESTING

Type	Quantity, Nr.	Remarks
Natural Moisture Content	7	12% to 27%
Particle Size Distribution	3	No hydrometer analysis on fine soils
Atterberg Limits	1	Liquid Limit, LL 31%
		Plastic Limit, PL 19%
		Plasticity Index, PI 12
California bearing ratio, CBR	2	CBR4.9% and CBR8.2%
pH	3	7.2 to 7.8
Sulphate (2:1 water soluble) as SO_4	3	<0.010g/l to 0.013g/l
Total Sulphur	2	0.012% and 0.020%
Sulphate (acid soluble)	3	<0.010% to 0.014%

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.

Ground and Groundwater 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 (2015) 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.

Topsoil was encountered 200mm to 300mm. Topsoil overlay slightly sandy (slightly) gravelly CLAY with varied Cobble content to depths 1.05m below existing ground level (bgl to 1.9m bgl. Below this (slightly) sandy clayey GRAVEL with Cobble and Boulder content was encountered to depths between 3.1m bgl to 4.2m bgl. Trial pits and dynamic probes are assumed to have terminated on obstructions or hard strata. Bedrock was not proven.

Groundwater levels may be subject to diurnal, seasonal and climatic variations and can also be affected by drainage conditions, tidal variations etc. The duration trial pit excavations remain open may not be sufficient to allow for low volume flow to present. The groundwater regime should be assessed from standpipe well installations.

Groundwater was encountered during the period of fieldworks within the extent of the trial pit excavations at depths 3.9m bgl at the base of TP04. The exploratory locations were backfilled with their arisings.

 ARISINGS Backfill

Geotechnical review

The following geotechnical review provides an overview of the ground conditions encountered along with the characterisation of the deposits encountered. The following sections should be read in conjunction with the exploratory hole records accompanying this report.

Published Geology

*A search of the Geological Survey of Ireland, GSI data base (**gsi.ie**) and 1:100,000 mapping (Sheet 22) showed the area to be underlain by the Broad Haven Formation (BROA, rusty brown (tan) quartzitic Psammites). Bedrock outcropping was noted 470m NW of the site and 540m to the SE. A search of the GSI well database (GSI well ref: 1711NWW023) indicated a depth to bedrock 3.7m a distance 280m SE of the site and; (GSI well ref: 1711NWW100) indicated bedrock 2.4m to the north of the site. Teagasc subsoil mapping identified Glacial till derived from Devonian Sandstones and Limestone glaciofluvial Gravels.*

Ground model

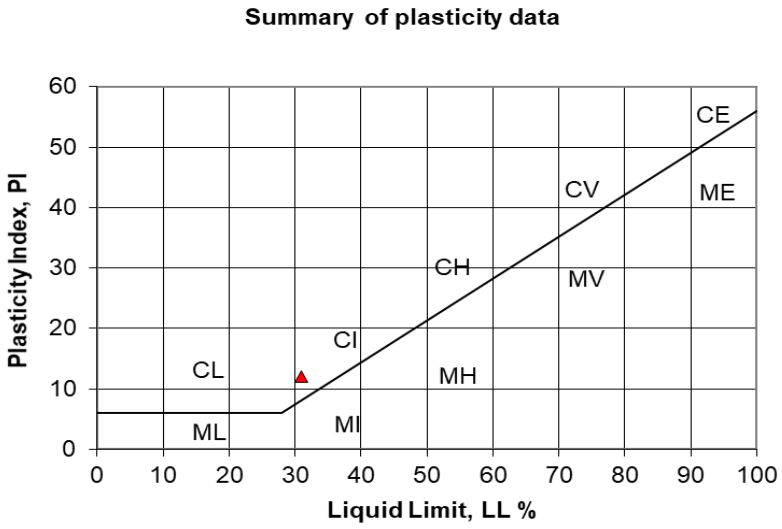
The current ground model was such that: Topsoil (N_{100H} 1- 4) was encountered 200mm to 300mm. Below this, soft (N_{100H} 0- 4) slightly sandy slightly gravelly CLAY deposits were encountered to depths 0.8m below existing ground level (bgl) to 1.4m bgl. The CLAY was stiff (N_{100H} 6 - 9) below 0.8m bgl to 1.9m bgl at TP03. The cohesive deposits were underlain by medium dense (N_{100H} 5- 15) (slightly) sandy clayey GRAVEL with Cobble and Boulder content to depths up to 4.2m bgl. Bedrock was not encountered, however the angular GRAVEL were indicative of weathered weak rockmass at depths where N_{100H} values exceeded 20; typically at the base of trial pit excavations. Local geology would indicate the trial pits terminated in hard strata being the weathered rockmass (Psammite).

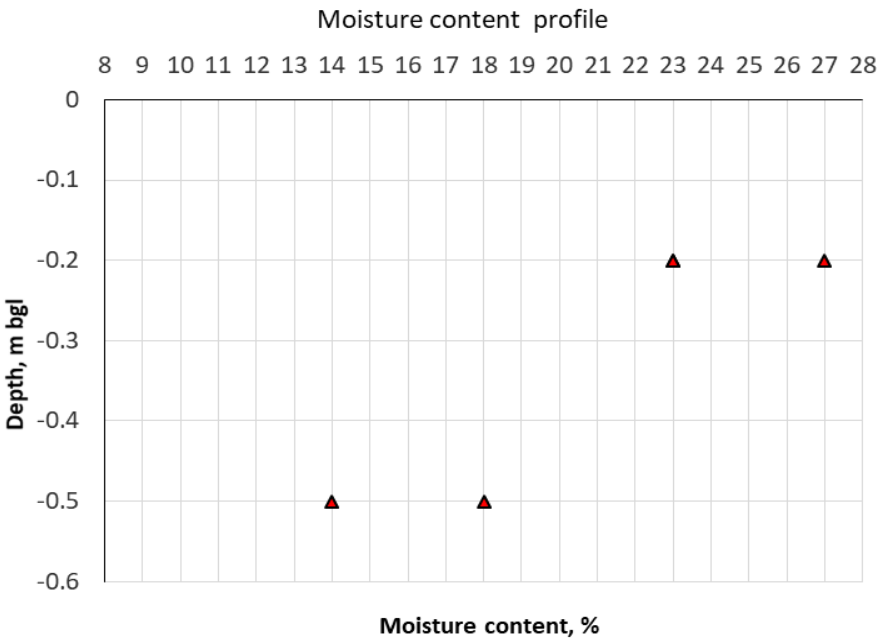
Groundwater was encountered during the period of fieldworks at depths 3.9m bgl assumed perched over the weathered rock mass. N100h data indicated possible groundwater influence 2.4m bg to 2.8m bgl

The site has been characterised as geotechnical category **GC-1**.

Characteristic properties

The shallow cohesive glacial deposits were characterised by low plasticity (CL) and by moisture contents 14% to 27%; grading analysis indicated 37% Gravel fraction (content); 30% Sand fraction and 33% Clay fraction.





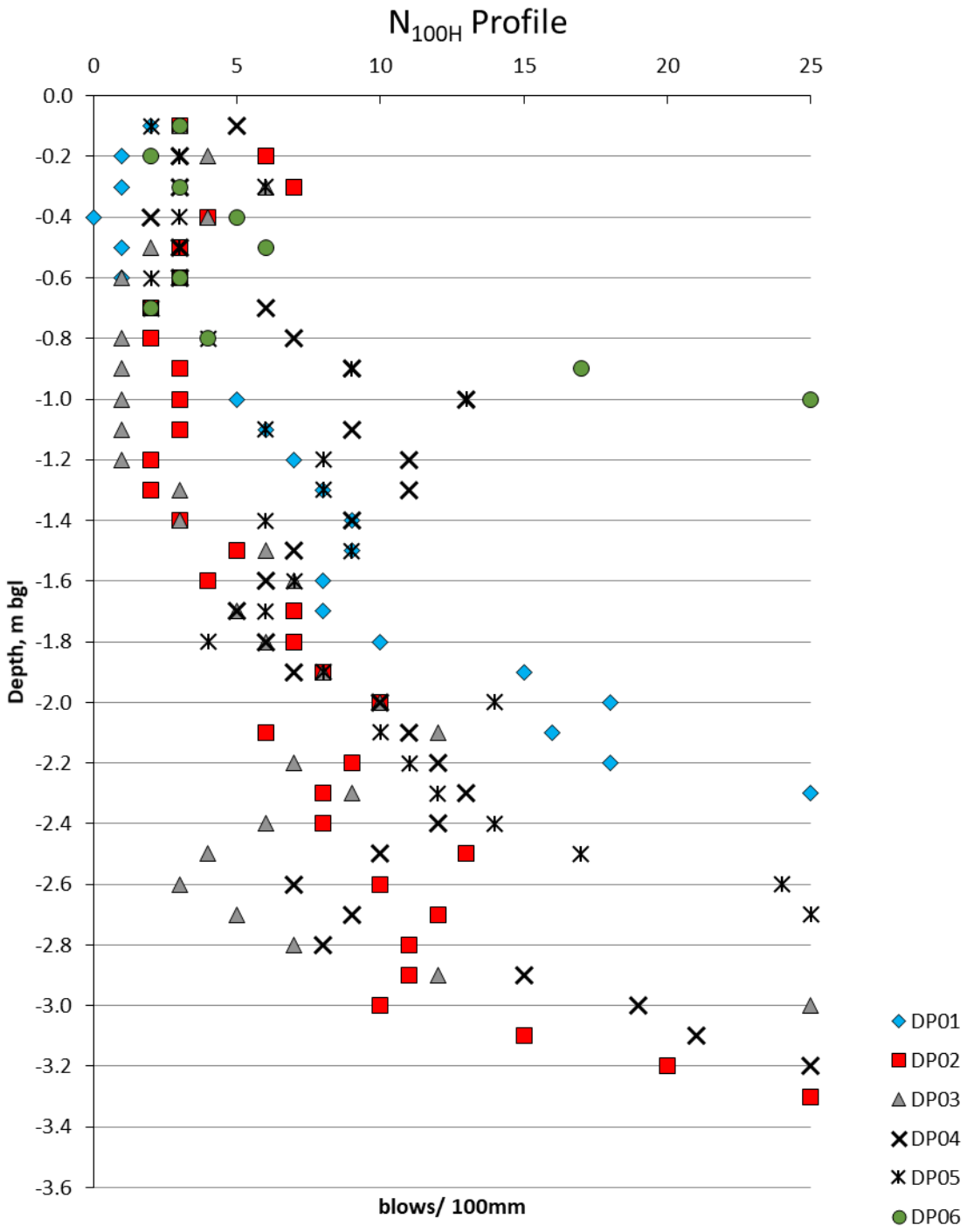
The mixed granular, glaciofluvial clayey sandy GRAVEL, were characterised by natural moisture contents 12% and 14%; with grading analysis indicating 73% and 89% Gravel fraction (content); 3% and 5% Sand fraction and 3% to 5% Clay fraction with varied Cobble contents (0% to 22%).

Tactile assessment described the CLAY as soft to firm, with undrained shear strengths 20kPa to 75kPa expected (BS5930, 1999). The ratio of natural moisture content, *w* to plastic limit, PL; *w*/PL was 0.74 to 1.42, describing soft to 'firm to stiff' CLAY deposits (C504 Engineering in glacial tills).

The $N_{100\ H}$ data was correlated to *in situ* equivalent standard penetration tests, N_{SPT} such that:

$N_{SPT} = N_{100\ H} + 3$; $N_{100\ H} < 4$;

$N_{SPT} = N_{100\ H} \times 2$; $N_{100\ H} > 4$.


N100H Profile
0
5
10
15
20
25
0.0
-0.2
-0.4
-0.6
-0.8
-1.0
-1.2
-1.4
-1.6
-1.8
-2.0
-2.2
-2.4
-2.6
-2.8
-3.0
-3.2
-3.4
-3.6
Depth, m bgl
blows/ 100mm
DP01
DP02
DP03
DP04
DP05
DP06

Undrained shear strength was assessed as follows: A factor f_1 of 5.5 is provided for the CLAY(CL) PI 12 where:

$$Cu\ (kPa) = (4.5 - 6)\ x\ N \quad (Stroud, 1974)$$

Undrained shear strengths of 17kPa to 55Pa (N_{SPT} 3 – 10) are expected of the CLAY deposits with a recommended design characteristic value of 28kPa (median undrained shear strength). The deposits typically below 1.0m bgl were such that undrained shear strengths of 44kPa to 99Pa (N_{SPT} 8 – 18) are expected of the CLAY deposits with a recommended design characteristic value of 77kPa (median undrained shear strength).

For the CLAY deposits plasticity data (PI 12) indicated an angle of friction, $\phi = 29^o$ to 32^o (C504, Engineering in glacial tills) and the following approximation:

$$\phi^o = 43 - 10Log_{10}\ PI\ (Ladd, 1977).$$

Noting BS8004; 2015 4.3.1.4.8 provided for friction as follows:

$$\phi'_{cv,k} = (42° - 12.5log_{10}\ IP)\ \ for\ 5\% \leq IP \leq 100\%$$

and BS 8004:2015 Table 2; PI 15 $\phi = 27^o + \varphi_{dil}$; $\varphi_{dil} = 0^o - 4^o$

Friction for the granular SAND and GRAVEL deposits was assessed where;

$$\phi^o = (12\ x\ N_{SPT})^{0.5} + 15.$$

Friction for the granular deposits, $\phi = 27^o - 36^o$; (N_{SPT} 6 – 38) with a median characteristic value of 29^o (N_{SPT} 18) recommended.

The soil unit weight(s) was given as:

Cohesive: $\gamma_{sat} = 16.8 + 0.15N$ (kPa, kN/m^3);

Granular: $\gamma_{sat} = 16.0 + 0.1N$ (kPa, kN/m^3)

The median unit weight has been adjusted for bulk density and dry density based on moisture content data as follows;

Depth, m bgl	Strata	Unit weight, kNm^{-3}	Moisture content, %	Bulk density, Mgm^{-3}	Dry density, Mgm^{-3}
0.2– 1.4	CLAY	17.55	14 - 27	1.79	1.41 - 1.57
0.7 – 1.9	CLAY	18.90	14	1.92	1.68
0.9 – 3.0	GRAVEL	17.80	12 - 14	1.81	1.56- 1.61

Elastic modulus was provided as follows:

E_{CLAY} (kPa) = Cu x 600 (Bowles, 1997)

E_{GR} (MPa) = N_{SPT} for Gravels/ Sands (Stroud, 1989)

Proposed characteristic values

$C_{u, CLAY}$ kPa	$C_{u, CLAY}$ kPa	E_{GR}, MPa	E_{CLAY}, MPa	E_{CLAY}, MPa	ϕ_{CLAY}^{o}	ϕ_{CLAY}^{o}	ϕ_{GR}^{o}	γ_{CLAY} kNm^{-2}	γ_{CLAY}, kNm^{-2}	γ_{GR}, kNm^{-2}
27	77	18	16	46	29	32	29	17.55	18.90	17.80

Foundations

It is recommended to found below the upper soft deposits in the medium dense clayey very sandy GRAVEL deposits.

Location	Depth to bearing strata (N_{100H} >5)	
	m bgl	mOD Malin
TP01/ DP01	1.1	157.747
TP02/ DP02	1.5	155.003
TP03/ DP03	1.4	154.175
TP04/ DP04	1.0	154.537
TP05/ DP05	1.1	155.477
TP06/ DP06	1.0	157.913

A suitable bearing strata is identified 1.0m bgl to 1.5m bgl within the medium dense clayey very sandy GRAVEL with characteristic friction, ϕ 29^{o}. The characteristic values were the median values within the depth of influence of shallow strip foundations, z_a 1.0m, B = 0.9m.

A presumed allowable bearing value (presumed bearing resistance) of 200kNm^{-2} (kPa) to 600kPa is expect of medium dense GRAVEL deposits (BS8004, Code of practice for foundations, 1986, Table 1); noting the 'Remarks' in relation to groundwater for granular deposits.

Table 1 — Presumed allowable bearing values under static loading

NOTE These values are for preliminary design purposes only, and may need alteration upwards or downwards. No addition has been made for the depth of embedment of the foundation (see 2.1.2.3.2 and 2.1.2.3.3).

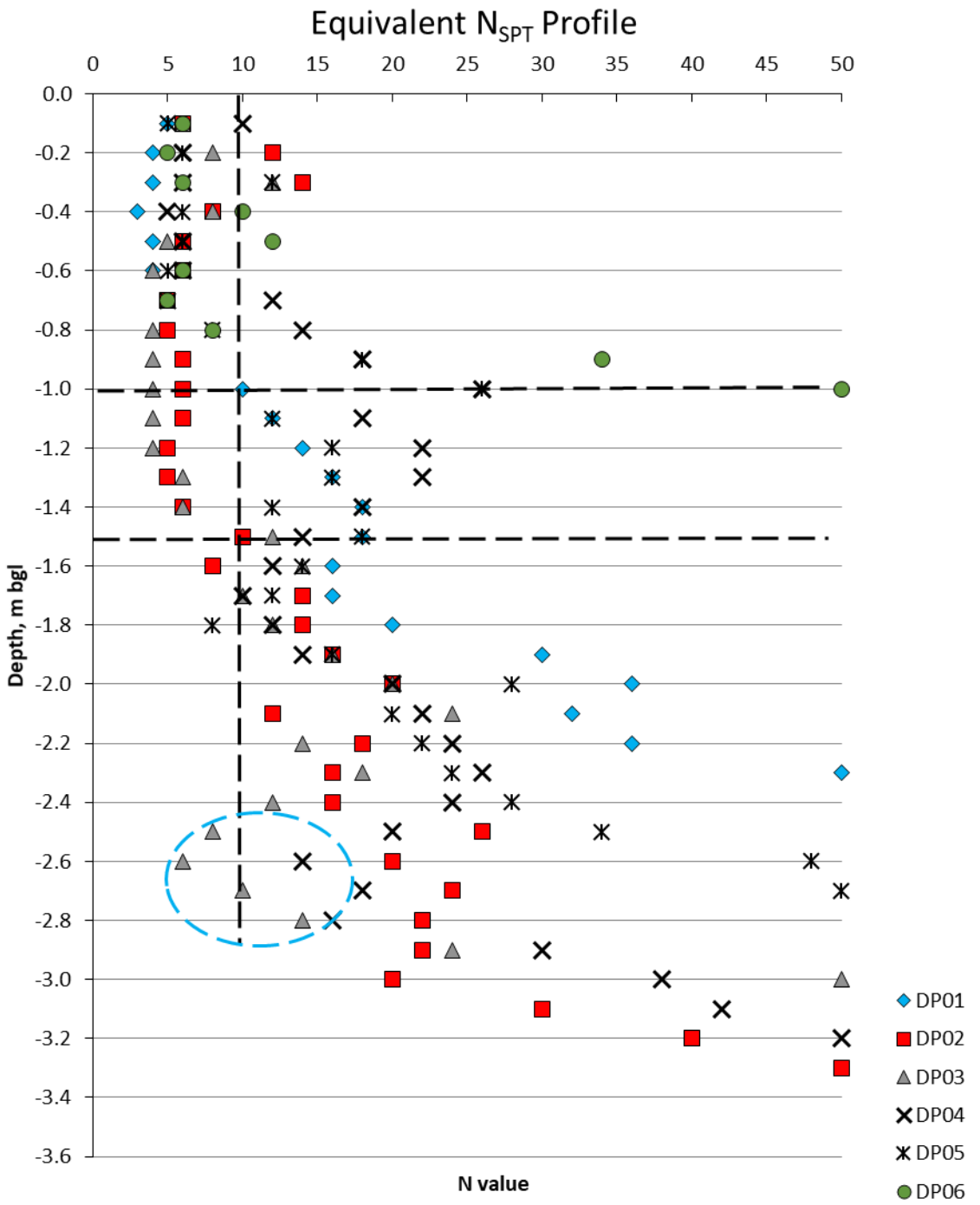
Category	Types of rocks and soils	Presumed allowable bearing value		Remarks
		kN/m^2 [a]	kgf/cm^2 [a] tonf/ft^2	
Rocks	Strong igneous and gneissic rocks in sound condition	10 000	100	These values are based on the assumption that the foundations are taken down to unweathered rock. For weak, weathered and broken rock,
		4 000	40	
	Strong limestones and strong sandstones	3 000	30	
	Schists and slates	2 000	20	
	Strong shales, strong mudstones and strong siltstones			
Non-cohesive soils	Dense gravel, or dense sand and gravel	> 600	> 6	Width of foundation not less than 1 m. Groundwater level assumed to be a depth not less than below the base of the foundation. For effect of relative density and groundwater level,
	Medium dense gravel, or medium dense sand and gravel	< 200 to 600	< 2 to 6	
	Loose gravel, or loose sand and gravel	< 200	< 2	
	Compact sand	> 300	> 3	
	Medium dense sand	100 to 300	1 to 3	
	Loose sand	< 100	< 1	
		Value depending on degree of looseness		
Cohesive soils	Very stiff boulder clays and hard clays	300 to 600	3 to 6	Group 3 is susceptible to long-term consolidation settlement (see 2.1.2.3.3). For consistencies of clays, see Table 5
	Stiff clays	150 to 300	1.5 to 3	
	Firm clays	75 to 150	0.75 to 1.5	
	Soft clays and silts	<75	<0.75	
	Very soft clays and silts	Not applicable		
Peat and organic soils		Not applicable		
Made ground or fill		Not applicable		

[a] 107.25 kN/m^2 = 1.094 kgf/cm^2 = 1 tonf/ft^2.

Taking the following empirical relationship for allowable bearing capacity;

Qall (kPa) = N_{SPT} x 10 (Terzaghi and Peck, 1967)

for settlement up to a maximum of 25mm.



Taking a design friction ϕ 27°, allowing for a partial factor of safety 1.25, an ultimate bearing resistance of 305kPa is expected for a 0.9m wide strip at a depth D = 1.2m bgl in granular deposits; having allowed for groundwater where granular behaviour is assumed to have characterised the deposits below this depth this may be reduced to 136kPa.

GRAVEL deposits have adequate resistance to shear failure.

Based on the median N_{SPT} (18) predicted settlements using a compression index I_C, of 2mm are expected for loading up to 100kPa for a strip foundation, B_{min} = 0.9m, having allowed for an adjustment for the strip geometry L/B.

A basic settlement assessment using coefficient of vertical displacement μ_0 and μ_1 for the proposed foundation geometries: B_{min} 0.9m; D 1.2m; H = 2.8m and characteristic Elastic moduli; E_{CLAY} = 39MPa. Predicted and adjusted (L/B and creep) settlements of 0.066mm/ kPa were determined; for a design loading 100kPa settlement of 7mm are expected having allowed for an adjustment for the strip geometry; L/B.

Predicted settlements were considered tolerable.

For a characteristic equivalent N_{SPT} > 10 below depths of at least 1.0m bgl in the medium dense GRAVEL deposits, an allowable bearing resistance up to 100kPa is recommended; for shallow strip foundations B_{min} = 0.9m.

> *It is recommended at construction stage to undertake plate loading tests to fully assess settlement and design bearing resistance where Elastic moduli, E have been assessed by empirical corrrelation rather than direct measurement within the suitable bearing strata and assess potential differential movement.*

A ground bearing floor slab is considered.

Groundwater

Groundwater was encountered; seasonal variations are expected below 2.4m bgl. Elevated or perched groundwater can be expected to impact soakaways and rates of infiltration within the site.

Hardstanding and pavement

Plasticity data, PI 12 suggested a design equilibrium California bearing ratio, CBR3.0% - CBR6.0% (DN-PAV-03021; TRRL 889, Road note 29 Black and Lister, 1979) in the CLAY. Laboratory measured re-compacted CBR value of CBR4.9% to CBR8.2% were measured.

Location	Test depth, m bgl	Strata	CBR_{lab}, %	Capping, mm (+150mm sub-base)
TP01	0.2	Slightly sandy slightly gravelly CLAY	4.8	250
TP02	0.2	Slightly sandy slightly gravelly CLAY	8.2	200

Undrained shear strength values based on N_{100H} data suggested a median CBR1.2% within the upper 1.0m (note DN-PAV-03021 3.23) this did not correlate with plasticity data and it is noted the CBR lab data moisture content were very high and a low CBR would be expected.

Provisionally a design California bearing ratio, CBR4.0% is recommended. Capping 250mm thick with 150mm sub base is required for hardstanding and pavement in accordance with Tii DMRB Vol 7 Pt 2A, TD25-26/1- Figure 4.1 in firm CLAY deposits. Subject to a review of the proposed FFL capping may need to be nominally increased where formation is identified 0.6m bgl. Over excavation of soft deposits can be expected.

Above 1.0m bgl a CBR1.9% is considered (note; DN-PAV-03021 3.23 min CBR2.5% else ground treatment; 3.28). Drainage shall be provided at least 0.6m below the underside of the formation (capping) to maintain equilibrium design CBR.

Chemical

Based on the data; pH (7.2 – 7.8) and sulphate (<0.010g/l – **0.013g/l**; 0.010% - **0.014%**) a design class DS-1 is provided in accordance with BRE digest for concrete in aggressive ground within the CLAY and GRAVEL deposits. Total Sulphur was <0.3%, the risk associated with pyrite is low in the weathered rockmass (Psammite; metamorphosed Sandstone). There are no special requirements with regard to concrete design.

Sample Location:		TP01	TP03	TP04
Top Depth (m bgl):		1.2	0.5	1.5
Moisture	%	10	11	7.6
pH	-	7.7	7.2	7.8
Sulphate as SO_4 (2:1 Water Soluble)	g/l	0.013	< 0.010	< 0.010
Sulphate (Acid Soluble)	%	< 0.010	0.014	< 0.010
Total Sulphur	%	0.020	-	0.012

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

Yours sincerely,
For **Priority Geotechnical,**

Greg Hayes BE MEngSc CEng MIEI
Geotechnical Specialist

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.

No account has been taken of potential subsidence or ground movement due to mineral extraction, mining works or karstification below or in proximity to the site, unless specifically addressed.

This report has been prepared for Employer and their Representative 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

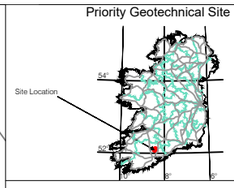
MEASURED PROPERTIES

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:

Ballylanders Housing

Sheet Title:

EXPLORATORY LOCATION LAYOUT

JOB NUMBER:

P21141

DRAWING NUMBER:

P21141-SI-A

DRAWN BY:

G.C.

DATE:

11/06/2021

SCALE:

1:2000 ON A3

APPROVED:

GH

REVISION:

D01

pgl priority geotechnical

SI-01

TP06 DP06
TP05 DP05
TP04 DP04
TP02 DP02
TP01 DP01
TP03 DP03
CHURCH GLEN

Statue
144.6
146.3
149.7
Star Terrace
St Mary's Church (Cath)
School
152.2
156.7
G S Station
10KV
Church (in Ruins)
Oliver Plunk Terrace
161.0
163.7
165.6
168.2
171.3
171.9
Spring
CF
FP
UND
N

TP06
DP06
TP05
DP05
TP04
DP04
TP02
DP02
TP01
DP01
TP03
DP03
CHURCH GLEN
N

KEY:

TP00 Denotes Trial Pit location

DP00 Denotes Dynamic Probe location

Coordinates shown on ITM.

TP01	576555.9	624190.9	158.847
TP02	576527.5	624192.5	156.503
TP03	576520.1	624168.4	155.575
TP04	576505.6	624204.1	155.537
TP05	576511.6	624226.5	156.577
TP06	576536.2	624242.1	158.913
DP01	576559.4	624186.1	158.823
DP02	576529.3	624188.6	156.548
DP03	576522	624164.1	155.311
DP04	576505.4	624198.5	155.297
DP05	576510.4	624223.3	156.406
DP06	576535.6	624238.7	158.686

JOB NAME:

Ballylanders Housing

Sheet Title:

LOCATION PLAN

JOB NUMBER:

P21141

DRAWING NUMBER:

P21141-SI-01

DRAWN BY:

G.C.

DATE:

11/06/2021

SCALE:

1:500 ON A3

APPROVED:

GH

REVISION:

D01

pgl priority geotechnical

Project Id:	P21141	Title:	Site Plan
Project Title:	Ballylanders Housing Site Investigation	Scale:	1:1000
Location:	Co. Limerick	Engineer:	CS Consulting Group
Client:	CS Consulting Group	Contractor:	PGL

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Legend Key

- Locations By Type - Empty
- Locations By Type - DP
- Locations By Type - TP

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Trial Pit No
TP01
Sheet 1 of 1

Project Name: Ballylanders Housing Site Investigation	**Project No.** P21141	**Co-ords:** 576556E - 624191N **Level:** 158.85m OD	**Date** 10/06/2021
Location: Co. Limerick		**Dimensions (m):** 3.50 x 0.90 **Depth:** 3.40m BGL	**Scale** 1:25
Client: CS Consulting Group			**Logged** OD

Water Strike & Backfill	Samples & In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m OD)	Legend	Stratum Description
	0.20 - 1.20 0.20 - 1.20	B D		0.20	158.65		(TOPSOIL)
							Soft, brown, slightly gravelly slightly sandy CLAY.
							CLAY firm below 1.0m.
	1.20 - 2.20	B		1.20	157.65		Medium dense light brown/orange sandy, clayey GRAVEL with high Cobble content. Gravel is fine to coarse, sub-angular to angular siltstone.
							Possible weathered rock. Rock becomes more competent from 2.2 to 3.4.
							GRAVEL dense below 2.0m.
	2.20 - 3.20	B					
				3.40	155.45		End of Pit at 3.400m

1 2 3 4 5

Stability: Moderate
Plant: 12T Track machine
Backfill: Arisings.

Groundwater: None encountered.

Remarks: Trial pit terminated at 3.4m bgl due to probable weathered bedrock reached.

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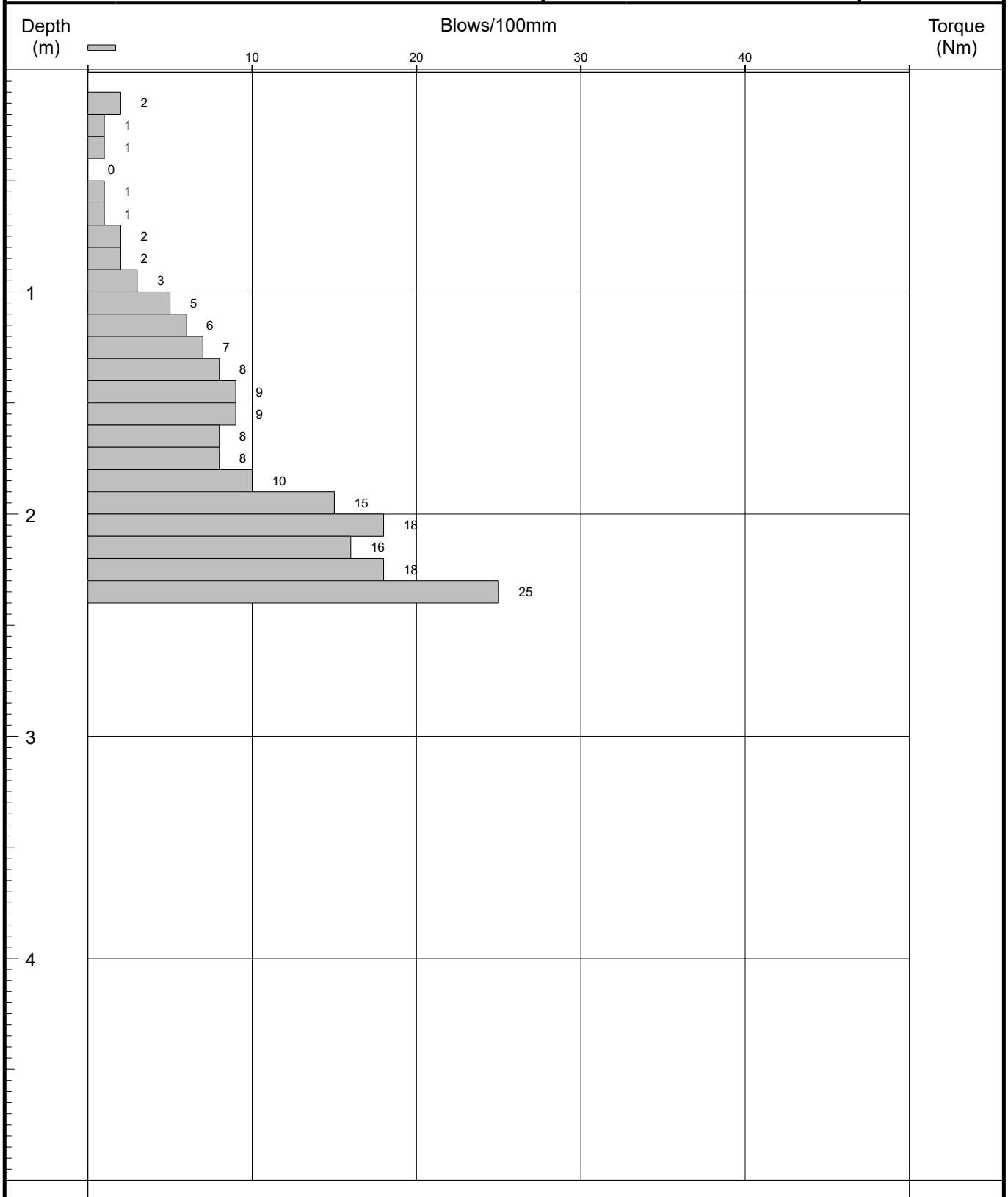
Project Name:	Ballylanders Housing Site Investigation	**Project No.** P21141	**Co-ords:**	576559E - 624186N	**Hole Type** DP
Location:	Co. Limerick		**Level:**	158.82m OD	**Scale** 1:25
Client:	CS Consulting Group		**Dates:**	23/06/2021	**Logged By** JOR



Remarks: Dynamic probe terminated at 2.30m bgl, refusal.		**Fall Height (mm):**	500	**Cone Base Dia. (mm):**	45
		Hammer Mass (Kg):	50.0	**Cone Angle (Deg):**	90
		Probe Type:	DPH	**Final Depth (m bgl):**	2.30

Photographic Record

Number:	**TP01**	**Project**	Ballylanders Housing	
		Project No	P21141	
		Engineer	CS Consulting	

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Trial Pit No
TP02
Sheet 1 of 1

Project Name: Ballylanders Housing Site Investigation	**Project No.** P21141	**Co-ords:** 576527E - 624193N **Level:** 156.50m OD	**Date** 10/06/2021
Location: Co. Limerick		**Dimensions (m):** 4.60 × 0.80	**Scale** 1:25
Client: CS Consulting Group		**Depth:** 3.50m BGL	**Logged** OD

Water Strike & Backfill	Samples & In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m OD)	Legend	Stratum Description
							(TOPSOIL)
	0.20 - 1.05 0.20 - 1.05	B D		0.20	156.30		Soft, brown, slightly gravelly, slightly sandy CLAY.
				1.05	155.45		Loose brown/orange, sandy, clayey, GRAVEL with high Cobble content and . low boulder content (250mm). Sand is fine to coarse. Gravel is fine to coarse, sub-angular to angular.
	1.50 - 2.50	B					*GRAVEL medium dense below 1.7m.*
							GRAVEL dense below 2.0m.
	2.50 - 3.50	B					
				3.50	153.00		End of Pit at 3.500m

1 2 3 4 5

Stability: Moderate.
Plant: 12T Track machine
Backfill:

Groundwater: None encountered.

Remarks: Trial pit terminated at 3.5m bgl due to hard digging on competent rock.

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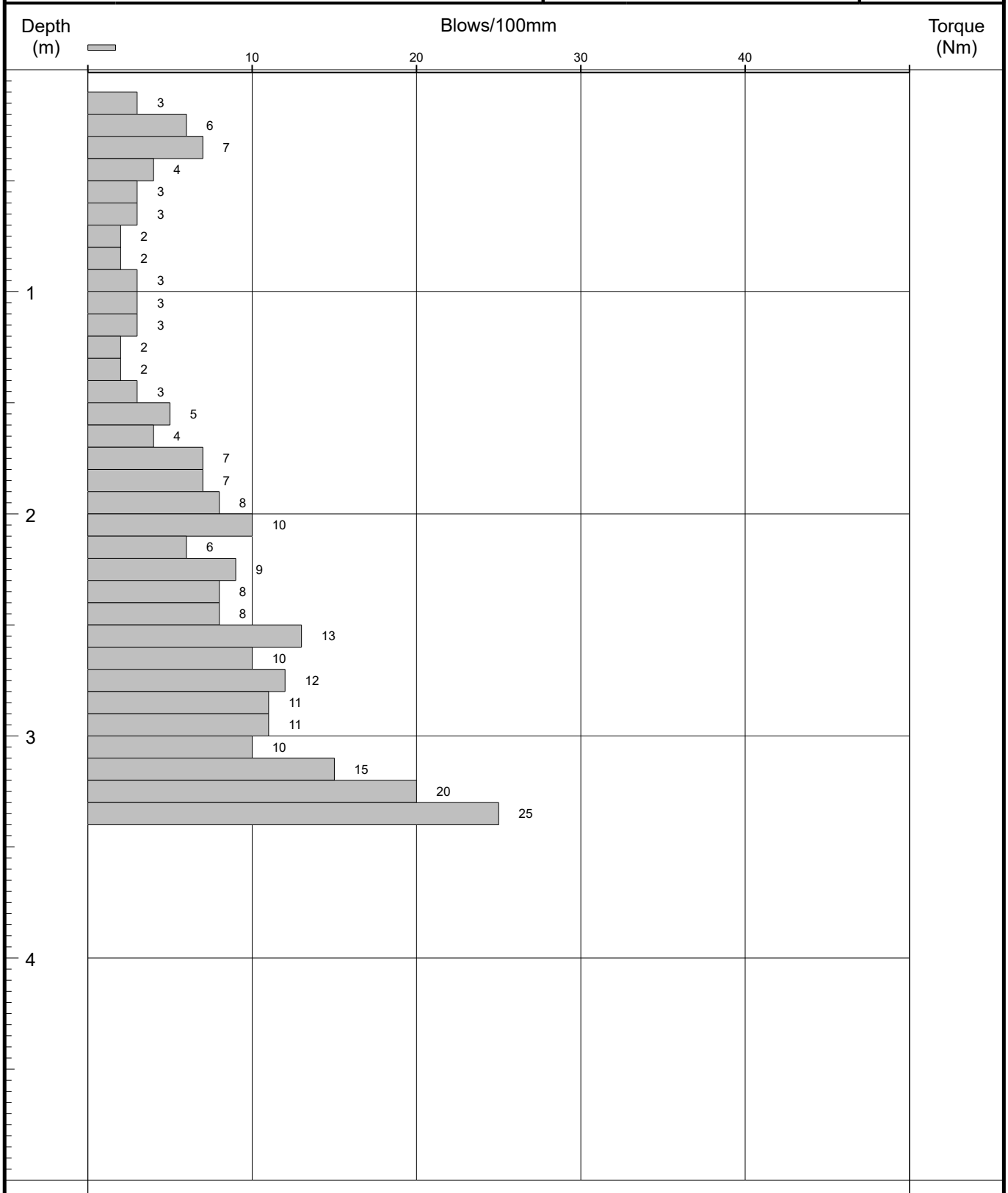
Project Name:	Ballylanders Housing Site Investigation	**Project No.** P21141	**Co-ords:**	576529E - 624189N	**Hole Type** DP
Location:	Co. Limerick		**Level:**	156.55m OD	**Scale** 1:25
Client:	CS Consulting Group		**Dates:**	23/06/2021	**Logged By** JOR



Remarks: Dynamic probe terminated at 3.30m bgl, refusal.		**Fall Height (mm):**	500	**Cone Base Dia. (mm):**	45
		Hammer Mass (Kg):	50.0	**Cone Angle (Deg):**	90
		Probe Type:	DPH	**Final Depth (m bgl):**	3.30

Photographic Record

Number:	**TP02**	**Project**	Ballylanders Housing	
		Project No	P21141	
		Engineer	CS Consulting	

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Trial Pit No
TP03
Sheet 1 of 1

Project Name: Ballylanders Housing Site Investigation	**Project No.** P21141	**Co-ords:** 576520E - 624168N **Level:** 155.57m OD	**Date** 10/06/2021
Location: Co. Limerick		**Dimensions (m):** 4.70 × 0.90	**Scale** 1:25
Client: CS Consulting Group		**Depth:** 4.20m BGL	**Logged** OD

Water Strike & Backfill	Samples & In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m OD)	Legend	Stratum Description
				0.20	155.38		(TOPSOIL) Soft-firm, brown, silty CLAY.
	0.50 - 1.50 0.50 - 1.50	B D					Soft, brown slightly sandy gravelly CLAY.
							CLAY becoming form below 1.6m.
				1.80	153.78		Medium dense grey/orange clayey, sandy GRAVEL with high Cobble content. Cobbles are sub-angular to rounded siltstone/sandstone. Gravel is fine to coarse and limestone to to sandstone
	2.00 - 3.00	B					
	3.00 - 4.00	D					
				4.20	151.38		End of Pit at 4.200m

1 2 3 4 5

Stability: Moderate/poor.
Plant: 12T Track machine
Backfill: Arisings.

Groundwater: None encountered.

Remarks: Trial pit terminated at 4.2m bgl due to hard digging on competent rock.

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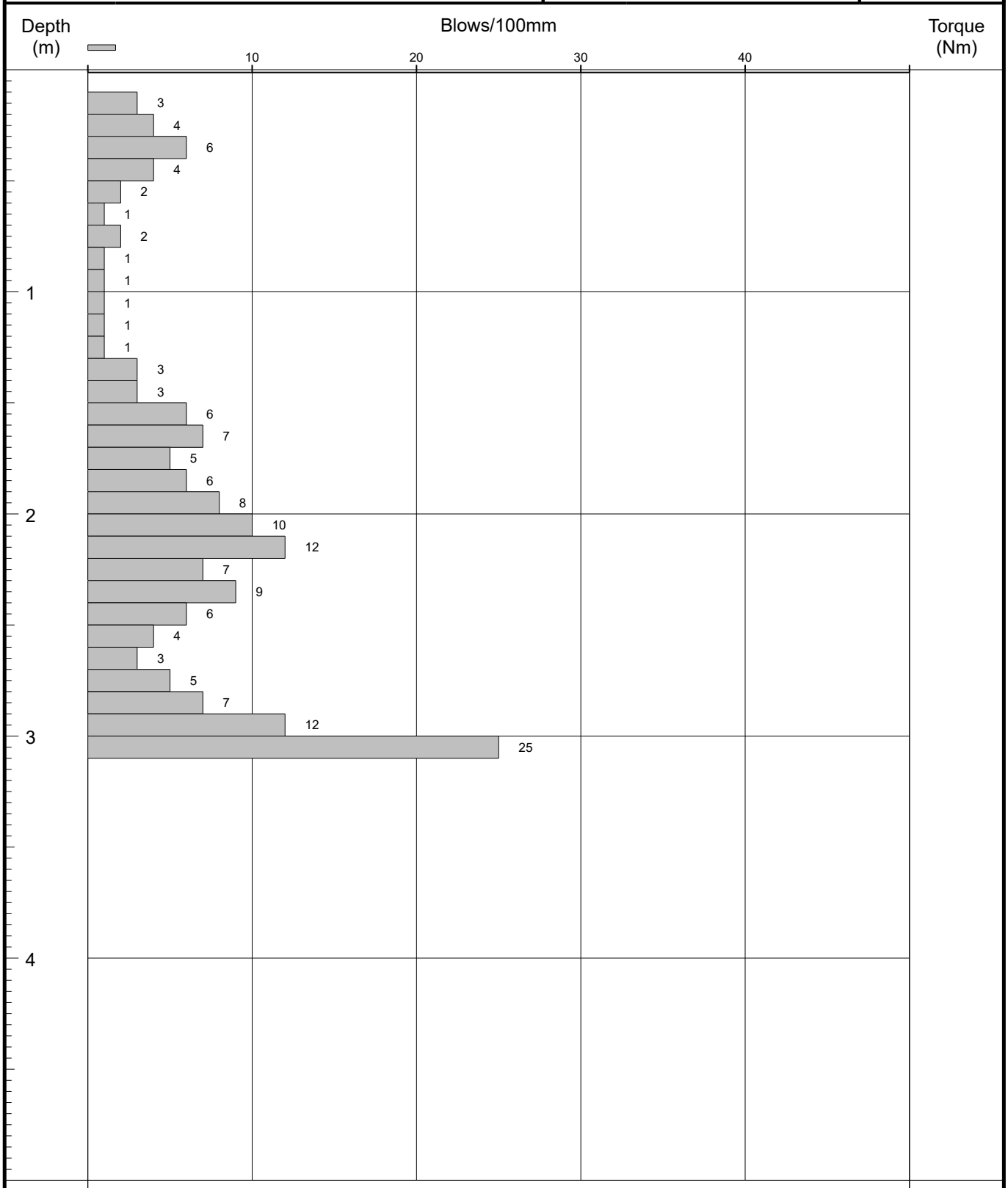
Project Name:	Ballylanders Housing Site Investigation	**Project No.** P21141	**Co-ords:**	576522E - 624164N	**Hole Type** DP
Location:	Co. Limerick		**Level:**	155.31m OD	**Scale** 1:25
Client:	CS Consulting Group		**Dates:**	23/06/2021	**Logged By** JOR



Remarks: Dynamic probe terminated at 3.00m bgl, refusal.		**Fall Height (mm):**	500	**Cone Base Dia. (mm):**	45
		Hammer Mass (Kg):	50.0	**Cone Angle (Deg):**	90
		Probe Type:	DPH	**Final Depth (m bgl):**	3.00

Photographic Record

Number:	**TP03**	**Project**	Ballylanders Housing	
		Project No	P21141	
		Engineer	CS Consulting	

Photographic Record

Number:	**TP03**	**Project**	Ballylanders Housing	
		Project No	P21141	
		Engineer	CS Consulting	

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Trial Pit No
TP04
Sheet 1 of 1

Project Name: Ballylanders Housing Site Investigation	**Project No.** P21141	**Co-ords:** 576506E - 624204N **Level:** 155.54m OD	**Date** 10/06/2021
Location: Co. Limerick		**Dimensions (m):** 4.80 × 0.90	**Scale** 1:25
Client: CS Consulting Group		**Depth:** 3.90m BGL	**Logged** OD

Water Strike & Backfill	Samples & In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m OD)	Legend	Stratum Description
				0.00	155.54		(TOPSOIL)
	0.20 - 1.20 0.20 - 1.20	B D		0.20	155.34		Soft-firm, brown, slightly sandy, slightly gravelly CLAY,. *CLAY firm below 0.6m.*
				1.30	154.24		Mottled orange, medium dense slightly sandy, clayey, gravelly COBBLES and BOULDERS. Sand is fine to coarse. Gravel is fine to coarse, sub-angular to angular. Cobbles and boulders are sub-angular to angular sandstone and siltstone, max diameter 300mm. *Possibly weathered weak bedrock below 1.3m.*
	1.50 - 2.50	B					
	2.50 - 3.50	B					
				3.90	151.64		End of Pit at 3.900m

1 2 3 4 5

Stability: Moderate.
Plant: 12T Track machine
Backfill: Arisings.

Groundwater: Small amount at base of pit 3.9m.

Remarks: Trial pit terminated at 3.9m bgl due to impassable rocks.

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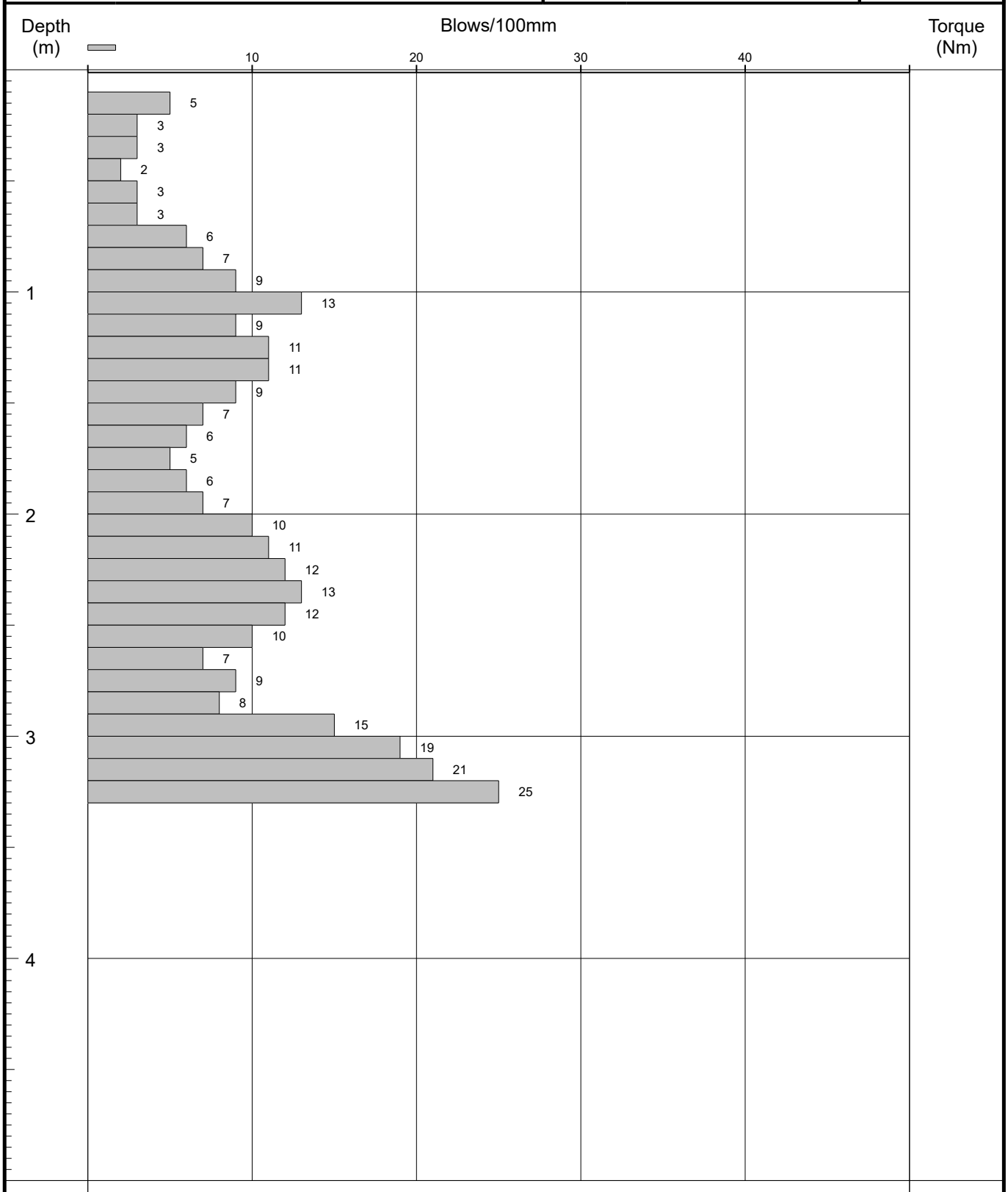
Project Name:	Ballylanders Housing Site Investigation	**Project No.** P21141	**Co-ords:**	576505E - 624199N	**Hole Type** DP
Location:	Co. Limerick		**Level:**	155.30m OD	**Scale** 1:25
Client:	CS Consulting Group		**Dates:**	23/06/2021	**Logged By** JOR



Remarks: Dynamic probe terminated at 3.20m bgl, refusal.		**Fall Height (mm):**	500	**Cone Base Dia. (mm):**	45
		Hammer Mass (Kg):	50.0	**Cone Angle (Deg):**	90
		Probe Type:	DPH	**Final Depth (m bgl):**	3.20

Photographic Record

Number:	**TP04**	**Project**	Ballylanders Housing	
		Project No	P21141	
		Engineer	CS Consulting	

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Trial Pit No
TP05
Sheet 1 of 1

Project Name: Ballylanders Housing Site Investigation	**Project No.** P21141	**Co-ords:** 576512E - 624226N **Level:** 156.58m OD	**Date** 10/06/2021
Location: Co. Limerick		**Dimensions (m):** 4.60 / 0.90	**Scale** 1:25
Client: CS Consulting Group		**Depth:** 3.40m BGL	**Logged** OD

Water Strike & Backfill	Samples & In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m OD)	Legend	Stratum Description
							(TOPSOIL) Soft-firm, dark brown, organic, gravelly SILT.
				0.30	156.28		
	0.50 - 1.50 0.50 - 1.50	B D					Soft-firm, brown, slightly sandy, slightly gravelly CLAY. Gravel is fine to coarse, sub-angular to sub-rounded.
							CLAY stiff below 1.0m
				1.90	154.68		
	2.00 - 3.00	D					Medium dense mottled orange, slightly sandy, clayey GRAVEL with Cobble and Boulder content. Sand is fine to coarse. Gravel is fine to coarse, sub-angular to angular. Cobbles and boulders are sub-angular to angular sandstone and siltstone, max diameter 300mm.
	3.00 - 3.90	B					
				3.40	153.18		End of Pit at 3.400m

1 2 3 4 5

Stability: Moderate.
Plant: 12T Track machine
Backfill: Arisings.

Groundwater: None encountered.

Remarks: Trial pit terminated at 3.4m bgl due to hard digging on more competent rock.

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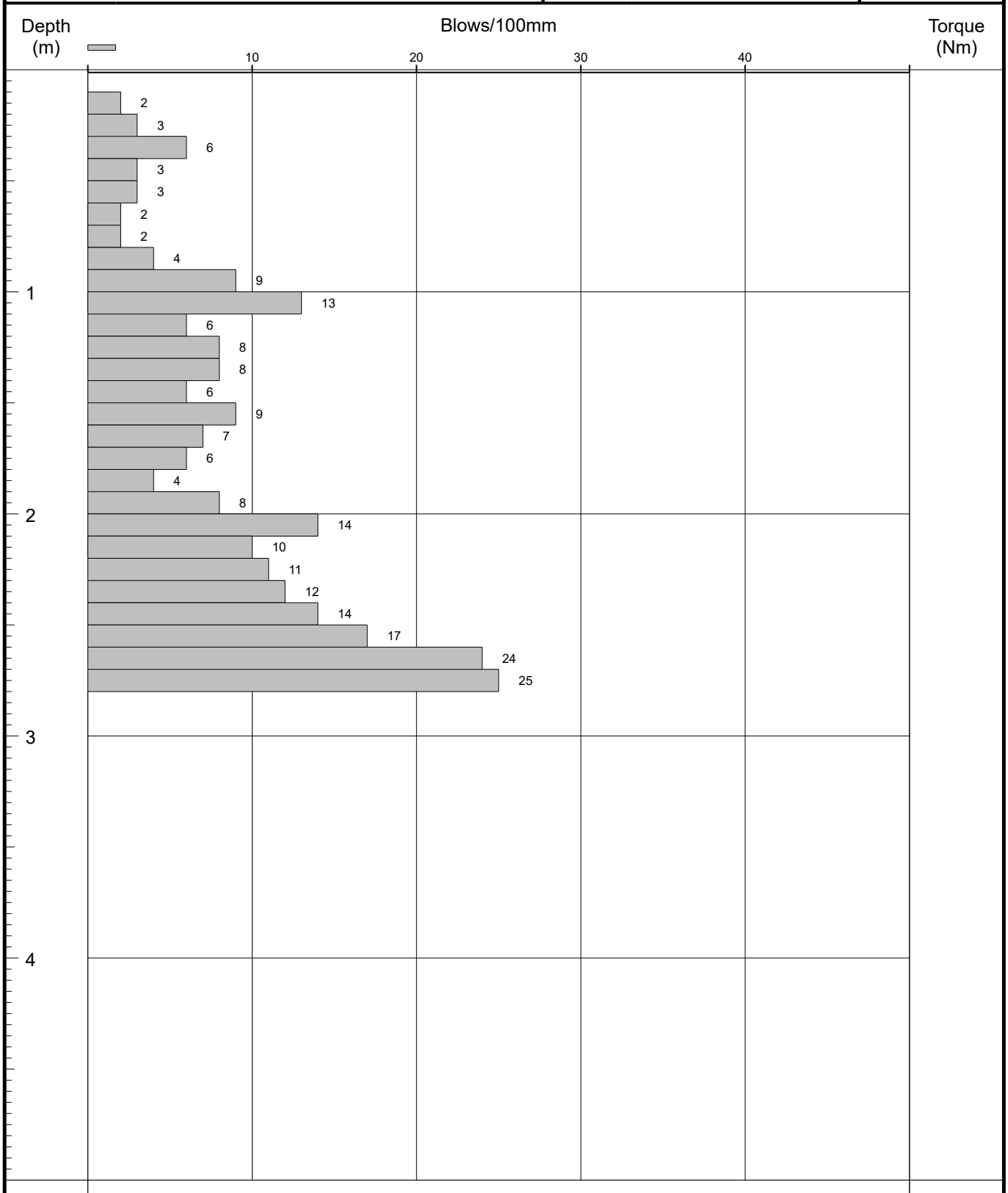
Project Name:	Ballylanders Housing Site Investigation	**Project No.** P21141	**Co-ords:**	576510E - 624223N	**Hole Type** DP
Location:	Co. Limerick		**Level:**	156.41m OD	**Scale** 1:25
Client:	CS Consulting Group		**Dates:**	23/06/2021	**Logged By** JOR



Remarks: Dynamic probe terminated at 2.70m bgl, refusal.		**Fall Height (mm):**	500	**Cone Base Dia. (mm):**	45
		Hammer Mass (Kg):	50.0	**Cone Angle (Deg):**	90
		Probe Type:	DPH	**Final Depth (m bgl):**	2.70

Photographic Record

Number:	**TP05**	**Project**	Ballylanders Housing	
		Project No	P21141	
		Engineer	CS Consulting	

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Trial Pit No
TP06
Sheet 1 of 1

Project Name: Ballylanders Housing Site Investigation	**Project No.** P21141	**Co-ords:** 576536E - 624242N **Level:** 158.91m OD	**Date** 10/06/2021
Location: Co. Limerick		**Dimensions (m):** 4.10 x 0.90 **Depth:** 3.10m BGL	**Scale** 1:25
Client: CS Consulting Group			**Logged** OD

Water Strike & Backfill	Samples & In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m OD)	Legend	Stratum Description
							(TOPSOIL) Dark brown, organic, SILT.
	0.20 - 0.80 0.20 - 0.80	B D		0.20	158.71		Soft-firm, slightly sandy, slightly gravelly CLAY. Sand is fine to coarse. Gravel is fine to coarse, angular to sub-angular. *Light brown 0.2m - 0.8m.* *CLAY firm below 0.5m.* *Grey 0.8m - 1.0m.* *Dark brown 1.0m - 1.4m.*
				1.40	157.51		Mottled orange, slightly sandy, clayey, GRAVEL with Cobble and Boulder content(s). Sand is fine to coarse. Gravel is fine to coarse, sub-angular to angular. Cobbles and boulders are sub-angular to angular sandstone and siltstone, max diameter 300mm.
	2.00 - 3.00	B					
				3.10	155.81		End of Pit at 3.100m

1 2 3 4 5

Stability: Moderate.
Plant: 12T Track machine
Backfill: Arisings.

Groundwater: None encountered.

Remarks: Trial pit terminated at 3.1m bgl due to hard digging on competent rock.

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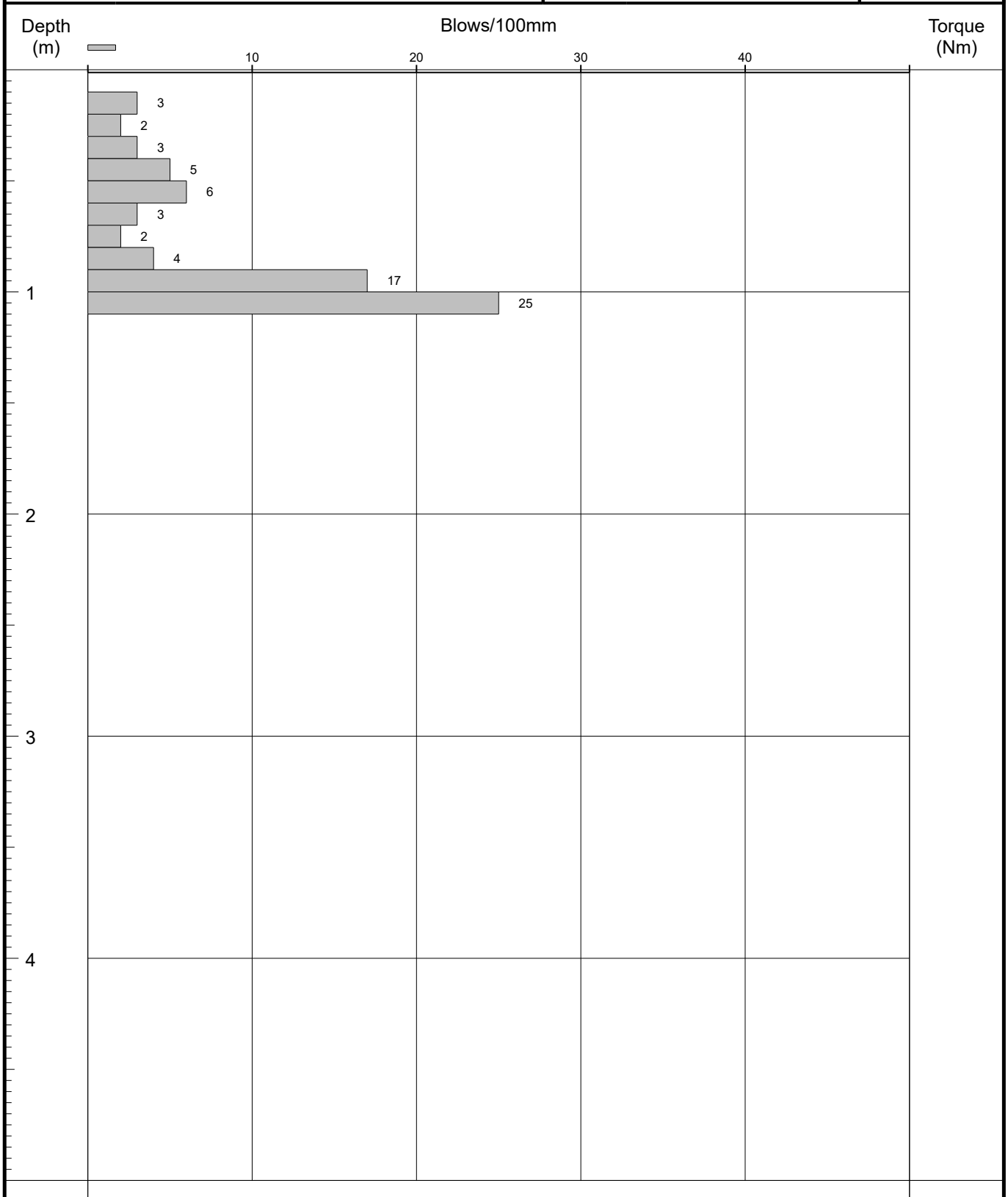
Project Name:	Ballylanders Housing Site Investigation	**Project No.** P21141	**Co-ords:**	576536E - 624239N	**Hole Type** DP
Location:	Co. Limerick		**Level:**	158.69m OD	**Scale** 1:25
Client:	CS Consulting Group		**Dates:**	23/06/2021	**Logged By** JOR



Remarks: Dynamic probe terminated at 1.00m bgl, refusal.		**Fall Height (mm):**	500	**Cone Base Dia. (mm):**	45
		Hammer Mass (Kg):	50.0	**Cone Angle (Deg):**	90
		Probe Type:	DPH	**Final Depth (m bgl):**	1.00

Photographic Record

Number:	**TP06**	**Project**	Ballylanders Housing	
		Project No	P21141	
		Engineer	CS Consulting	

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	

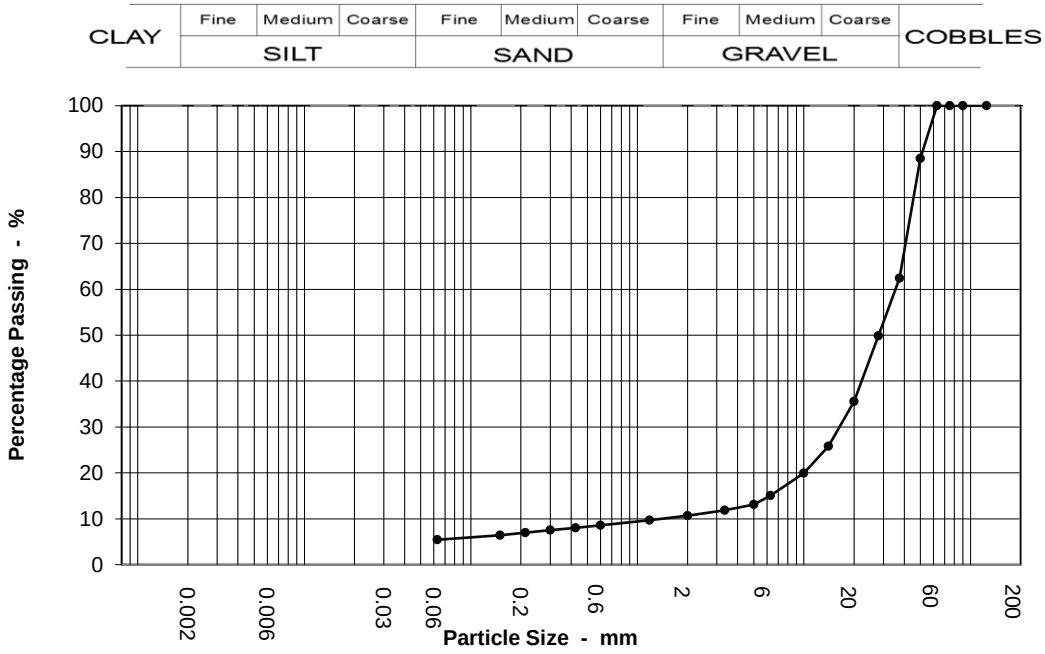
pgl priority geotechnical	**Natural Moisture Content/Atterberg Limits Summary** **BS 1377 : Part 2 : 1990 : Clause 3**	**Job Ref**
Location	**Ballylanders Housing Site Investigation**	**P21141**

Hole ID	Sample Ref	Depth (m)	Sample Type	Sample Description	MC	LL	PL	PI	% Pass 425
TP02	2	0.2	D	Slightly sandy slightly gravelly CLAY	23				
TP02	3	1.5	B	Clayey sandy GRAVEL	14				
TP02	4	2.5	B	Clayey sandy GRAVEL	12				
TP03	1	0.5	B	Slightly sandy gravelly CLAY		31	19	12	68.1
TP03	2	0.5	D	Slightly sandy gravelly CLAY	18				
TP04	2	0.2	D	Slightly sandy slightly gravelly CLAY	23				
TP05	2	0.5	D	Slightly sandy slightly gravelly CLAY	14				
TP06	1	0.2	B	Slightly sandy slightly gravelly CLAY	27				

PARTICLE SIZE DISTRIBUTION

BS 1377 : Part 2 : 1990 : Clause 9

		Job Ref	**P21141**
		Borehole / Pit No	TP01
Location	**Ballylanders Housing Site Investigation**	Sample No	3
		Depth	1.20 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	89		
37.5	62		
28	50		
20	36		
14	26		
10	20		
6.3	15		
5	13		
3.35	12		
2	11		
1.18	10		
0.6	9		
0.425	8		
0.3	8		
0.212	7		
0.15	6		
0.063	5		

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

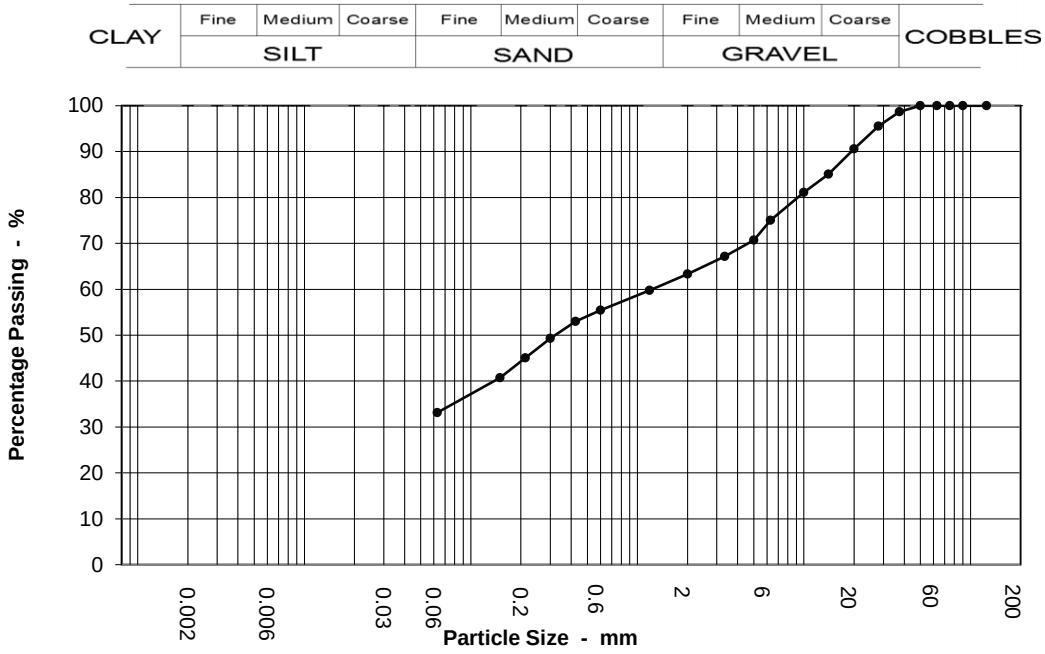
Sample Proportions	
Cobbles	0.0
Gravel	89.0
Sand	5.0
Silt & Clay	5.0

Grading Analysis	
D100	63.00
D60	35.50
D10	1.40
Uniformity Coefficient	25.00

PARTICLE SIZE DISTRIBUTION

BS 1377 : Part 2 : 1990 : Clause 9

		Job Ref	**P21141**
		Borehole / Pit No	TP03
Location	**Ballylanders Housing Site Investigation**	Sample No	1
		Depth	0.50 m
Soil Description	Slightly sandy gravelly CLAY	Sample type	B



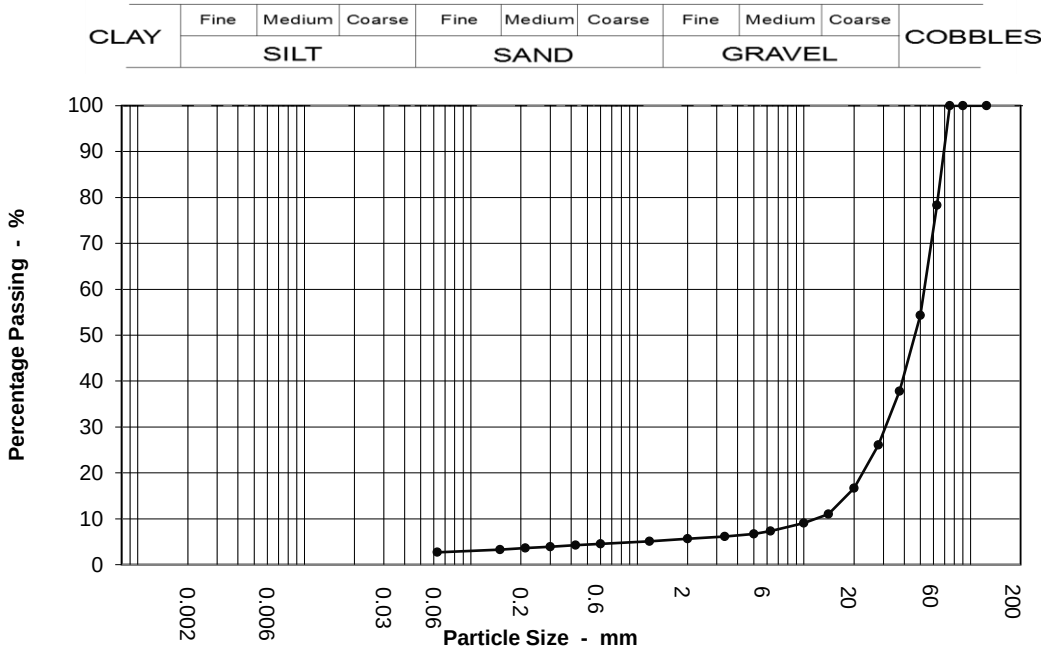
Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	99		
28	96		
20	91		
14	85		
10	81		
6.3	75		
5	71		
3.35	67		
2	63		
1.18	60		
0.6	55		
0.425	53		
0.3	49		
0.212	45		
0.15	41		
0.063	33		

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

Sample Proportions	
Cobbles	0.0
Gravel	37.0
Sand	30.0
Silt & Clay	33.0

Grading Analysis	
D100	50.00
D60	1.22
D10	
Uniformity Coefficient	

pgl priority geotechnical	**PARTICLE SIZE DISTRIBUTION** **BS 1377 : Part 2 : 1990 : Clause 9**	**Job Ref**	**P21141**
		Borehole / Pit No	TP03
Location	**Ballylanders Housing Site Investigation**	Sample No	3
		Depth	2.00 m
Soil Description	Clayey sandy GRAVEL with high cobble content	Sample type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	78		
50	54		
37.5	38		
28	26		
20	17		
14	11		
10	9		
6.3	7		
5	7		
3.35	6		
2	6		
1.18	5		
0.6	5		
0.425	4		
0.3	4		
0.212	4		
0.15	3		
0.063	3		

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

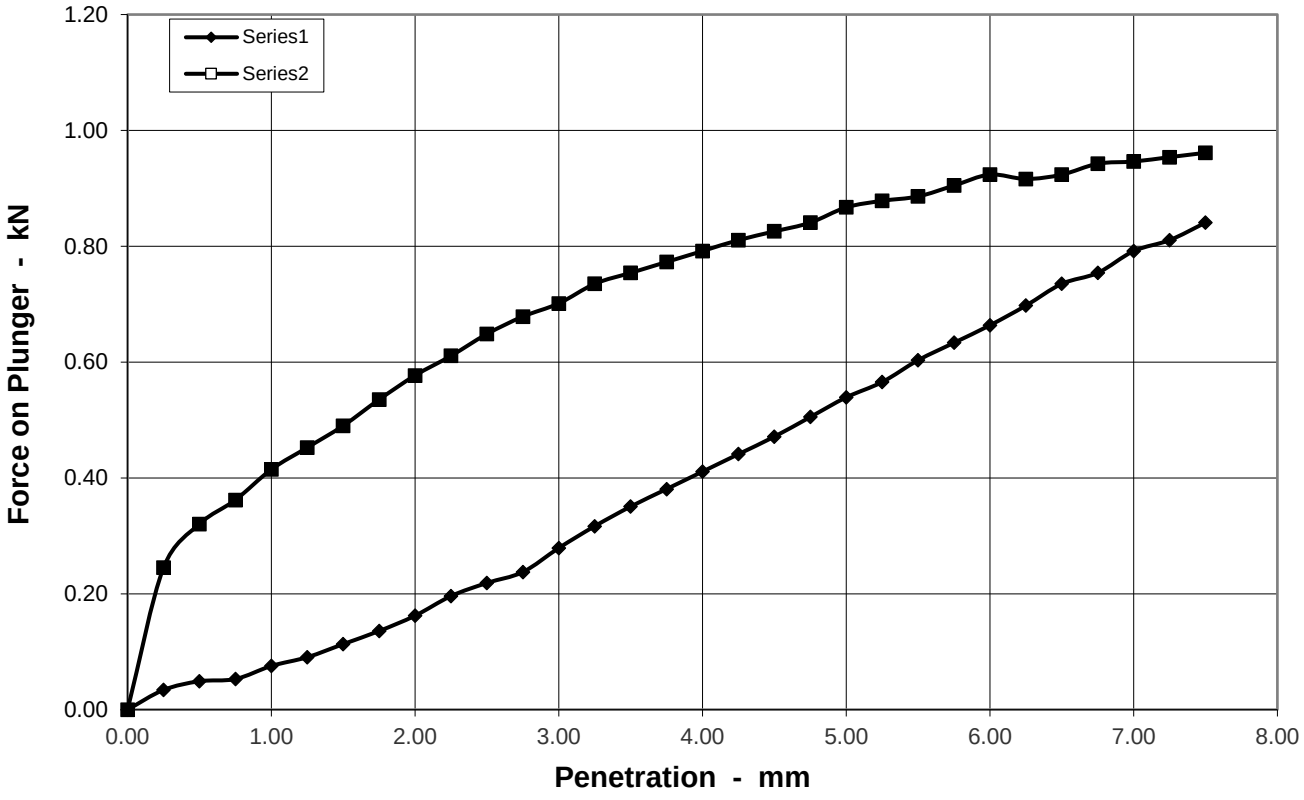
Sample Proportions	
Cobbles	22.0
Gravel	73.0
Sand	3.0
Silt & Clay	3.0

Grading Analysis	
D100	75.00
D60	52.80
D10	11.80
Uniformity Coefficient	4.50

CALIFORNIA BEARING RATIO

BS 13377 : Part 4 : 1990 Clause 7.4

		Job Ref	**P21141**
		Borehole / Pit No	TP01
Site Name	**Ballylanders Housing Site Investigation**	Sample No	1
		Depth	0.2 m
Soil Description	Slightly sandy slightly gravelly CLAY		



Preparation	Method of Compation		
	Hammer type		2.5kg Rammer
	Soaking Period	days	
	Amount of Swell	mm	

Sample Conditions		
Natural Moisture Content	%	32.0
Moisture Content - TOP	%	31.9
Moisture Content - BASE	%	27.6
Bulk Density	Mg/m³	1.78
Dry Density	Mg/m³	1.35

Test Conditions		
Sample Retained on 20 mm sieve	%	6.5
Seating Load - TOP	N	
Seating Load - BASE	N	
Surcharge	kg	8

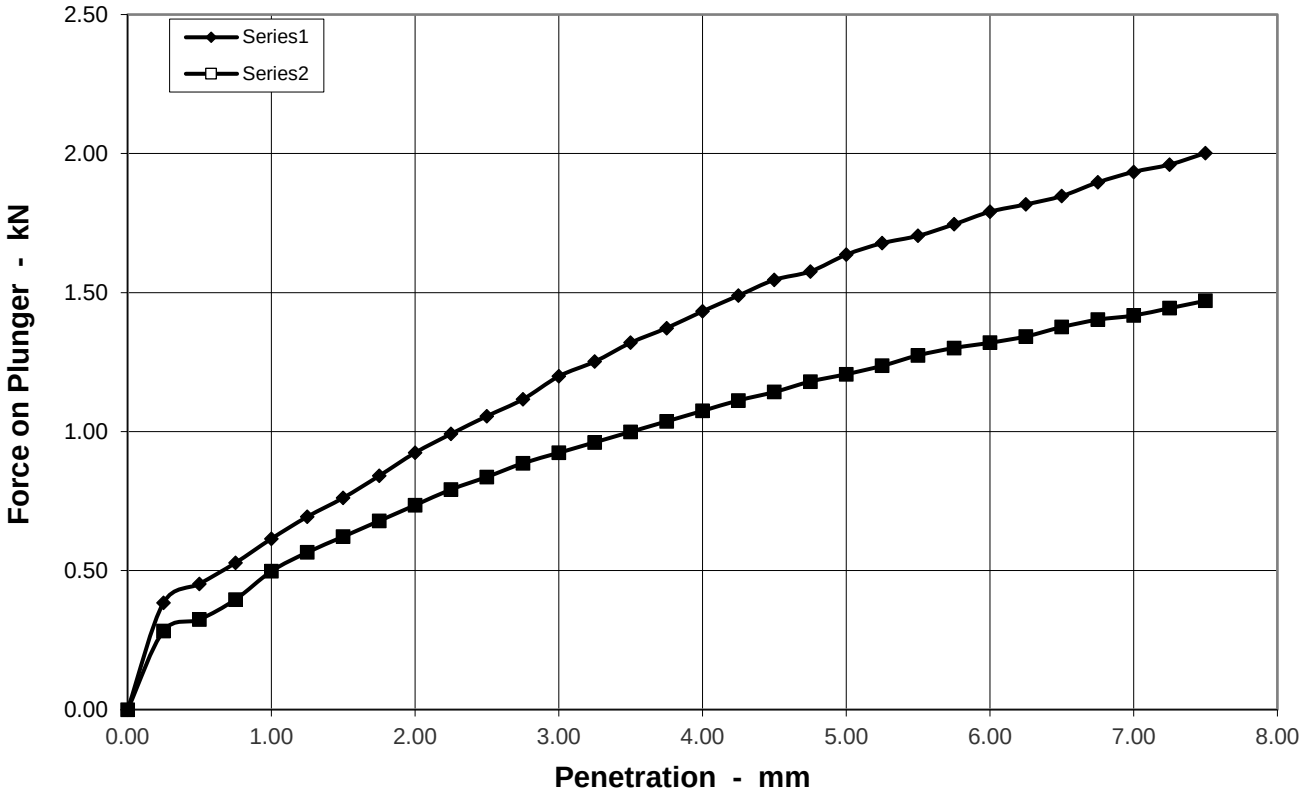
Penetration mm	CBR Values %	
	TOP	BASE
2.5	1.7	4.9
5	2.7	4.3
Accepted CBR	**2.7**	**4.9**

			Remarks

CALIFORNIA BEARING RATIO

BS 13377 : Part 4 : 1990 Clause 7.4

		Job Ref	**P21141**
		Borehole / Pit No	TP04
Site Name	**Ballylanders Housing Site Investigation**	Sample No	1
		Depth	0.2 m
Soil Description	Slightly sandy slightly gravelly CLAY		



Preparation	Method of Compation		
	Hammer type		2.5kg Rammer
	Soaking Period	days	
	Amount of Swell	mm	

Sample Conditions		
Natural Moisture Content	%	23.0
Moisture Content - TOP	%	22.7
Moisture Content - BASE	%	22.9
Bulk Density	Mg/m³	1.91
Dry Density	Mg/m³	1.55

Test Conditions		
Sample Retained on 20 mm sieve	%	5.1
Seating Load - TOP	N	
Seating Load - BASE	N	
Surcharge	kg	8

Penetration mm	CBR Values %	
	TOP	BASE
2.5	8.0	6.3
5	8.2	6.0
Accepted CBR	**8.2**	**6.3**

			Remarks	

Eurofins Chemtest Ltd
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.com

Final Report

Report No.:	21-27034-1		
Initial Date of Issue:	11-Aug-2021		
Client	Priority Geotechnical Ltd		
Client Address:	Unit 12 Owenacurra Business Park Midleton County Cork Ireland		
Contact(s):	Colette Kelly		
Project	P21141 Ballylanders		
Quotation No.:		**Date Received:**	05-Aug-2021
Order No.:	13948	**Date Instructed:**	05-Aug-2021
No. of Samples:	3		
Turnaround (Wkdays):	5	**Results Due:**	11-Aug-2021
Date Approved:	11-Aug-2021		
Approved By:			
Details:	Glynn Harvey, Technical Manager		

Results - Soil

Project: P21141 Ballylanders

Client: Priority Geotechnical Ltd			**Chemtest Job No.:**		21-27034	21-27034	21-27034
Quotation No.:			**Chemtest Sample ID.:**		1254651	1254652	1254653
			Sample Location:		TP01	TP03	TP04
			Sample Type:		SOIL	SOIL	SOIL
			Top Depth (m):		1.2	0.5	1.5
			Date Sampled:		03-Aug-2021	03-Aug-2021	03-Aug-2021
Determinand	**Accred.**	**SOP**	**Units**	**LOD**			
Moisture	N	2030	%	0.020	10	11	7.6
pH	U	2010		4.0	7.7	7.2	7.8
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010	0.013	< 0.010	< 0.010
Total Sulphur	U	2175	%	0.010	0.020		0.012
Sulphate (Acid Soluble)	U	2430	%	0.010	< 0.010	0.014	< 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.
2040	Soil Description(Requirement of MCERTS)	Soil description	As received soil is described based upon BS5930
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES
2175	Total Sulphur in Soils	Total Sulphur	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2430	Total Sulphate in soils	Total Sulphate	Acid digestion followed by determination of sulphate in extract by ICP-OES.

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"
SOP	Standard operating procedure
LOD	Limit of detection

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 30 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