Our Ref: JMS/Rp/P21161 + attachments (*.pdf)

16th March, 2022

Messrs. Hutch O'Malley Consulting Engineers
The Railway Station,
Attyflin,
Patrickswell,
Co. Limerick,
V94 A8N2.

Re: Raheen Housing Development, Raheen, Co. Limerick, Site Investigation, Interpretative Report

Introduction

In July 2021, Priority Geotechnical (PGL) were requested by Hutch O'Malley Consulting Engineers, on behalf of their Client; Mr. Garry Lawlor to undertake a site investigation for a proposed Housing Development at Raheen, Co. Limerick.

Scope

The scope of the site investigation, which was specified by Hutch O'Malley Consulting Engineers as tendered, comprised of the following:

- 03Nr. Boreholes;
- 12Nr Slit trenches;
- 04Nr. Infiltration tests;
- *In-situ* SPT tests;
- All associated sampling;
- Laboratory testing and
- Associated reporting.

The final works as completed are outlined hereafter.

Objectives

The site investigation in so far as the scope allowed, was to assess the ground and groundwater conditions in order to inform the engineering design solutions for the proposed development. This report presents the factual data and interpretation of same with regard to the site investigation for the proposed Housing Development at Raheen, Co. Limerick. This report should be read in conjunction with the exploratory and laboratory test data accompanying this report.

Site Works

This investigation was carried out between the 07th and 28th July, 2021 under the supervision of PGL, Engineering Geologist(s) in accordance with the contract specification: 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). Details of the plant and equipment used are detailed on the relevant exploratory records, attached.

Cable Percussion Boreholes

Ten (10) cable percussion boreholes were bored to depths 1.0m below existing ground level (bgl) to 3.5m bgl using PGL's Dando 2000 and 200mm diameter casing. The records accompany this report and are discussed herein.

Location	Final Depth (m bgl)	Date Start (dd/mm/yyyy)
BH01	1.0	27/07/2021
BH01A	1.1	27/07/2021
BH02	2.5	26/07/2021
BH03	3.5	26/07/2021
BH04	2.8	27/07/2021
BH05	2.5	28/07/2021
BH06	3.2	23/07/2021
BH07	1.8	28/07/2021
BH08	2.2	23/07/2021
BH09	1.5	27/07/2021

Location	Depth Top (m bgl)	Depth Base (m bgl)	Duration (hh:mm)	Tool
BH01	0.90	1.00	01:00	Chisel
BH01A	1.00	1.10	01:00	Chisel.
BH02	2.40	2.50	01:00	Chisel.
BH03	3.35	3.50	01:00	Chisel.
BH04	2.70	2.80	01:00	Chisel
BH05	2.40	2.50	01:00	Chisel.
BH06	3.10	3.20	01:00	Chisel.
BH07	1.70	1.80	01:00	Chisel.
BH08	2.00	2.20	01:00	Chisel.
BH09	1.40	1.50	01:00	Chisel

Rotary Boreholes

Three (03) rotary boreholes were advanced to depths 5.0m bgl to 12.70m bgl using PGL's Soilmech PSM rig and 131mm diameter casing with 76mm core barrell. The records accompany this report and are discussed herein.

Location	Final Depth (m bgl)	Date Start (dd/mm/yyyy)
RC01	6.0	15/07/2021
RC02	5.0	16/07/2021
RC03	12.7	15/07/2021

Slit Trenches

A total of thirteen (13) slit trenches were excavated to depths 2.3m bgl to 4.0m bgl using a 16t tracked excavator. The exploratory records and associated cross sections accompany this report.

Location	Final Depth (m bgl)	Date Start (dd/mm/yyyy)
ST01	3.5	07/07/2021
ST02	4.0	07/07/2021
ST03	2.9	08/07/2021
ST03A	2.3	09/07/2021
ST04	3.5	08/07/2021
ST08	4.0	13/07/2021
ST08A	2.5	15/07/2021
ST09	4.0	13/07/2021
ST09A	3.0	15/07/2021
ST10	3.5	14/07/2021
ST10A	3.2	15/07/2021
ST11	3.5	15/07/2021
ST12	2.4	09/07/2021

Infiltration Trenches

Four (4) infiltration trenches were excavated to 2.0m bgl using a 16t tracked excavator. The exploratory records accompany this report and discussed herein.

Location	Final Depth (m bgl)	Date Start (dd/mm/yyyy)
IT01	2.0	12/07/2021
IT02	2.0	12/07/2021
IT03	2.0	12/07/2021
IT04	2.0	12/07/2021

In situ testing

Standard penetration test

Thirty one (31) number Standard penetration tests, N values, were carried out in the cable percussion and rotary boreholes using the 60^{o} solid cone (CPT) 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. Test refusal where the test cone did not progress the full 300mm, in four 75mm test intervals are presented as the numerical value 50. The data is presented on the exploratory logs and discussed herein.

BRE 365 Soakaway

Three (03) infiltration/ soakaway tests were undertaken during the period of investigation and completed in general accordance with BRE Digest 365, Soakaway Design (2003/ 2007). Water level was monitored over a period of 870 to 1210 minutes of observation. The test data are attached herein.

Sampling

A total of sixty nine (69) bulk disturbed samples (B), thirty six (36) small disturbed samples (D) 8.7lin.m of core and twenty (20) environmental samples (ENV) 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 exploratory locations were set out subject to work space restrictions and available access. The 'as built' exploration were subsequently survey using a Trimble GPS Unit to the Irish Transverse Mercator of co-ordinates and levels to OD Malin. Locations are shown below and presented on the exploratory location layout and plans; P21161-SI-A and P21161-SI-01 and P21161-SI-02, accompanying this report.

Location	Easting	Northing	Ground Level (mOD)	Final Depth (m bgl)	Date Start (dd/mm/yyyy)
BH01	554476.78	654377.75	6.86	1.00	27/07/2021
BH01A	554476.78	654377.75	6.86	1.10	27/07/2021
BH02	554504.81	654502.48	5.52	2.50	26/07/2021
BH03	554543.63	654618.13	4.17	3.50	26/07/2021
BH04	554678.98	654615.18	5.73	2.80	27/07/2021
BH05	554638.79	654516.88	5.29	2.50	28/07/2021
BH06	554639.24	654404.72	5.47	3.20	23/07/2021
BH07	554749.40	654390.03	5.58	1.80	28/07/2021
BH08	554756.49	654455.46	5.60	2.20	23/07/2021
BH09	554775.42	654535.36	8.46	1.50	27/07/2021
IT01	554539.78	654628.70	3.97	2.00	12/07/2021
IT02	554483.42	654344.35	6.76	2.00	12/07/2021
IT03	554575.94	654387.27	7.33	2.00	12/07/2021
IT04	554587.51	654667.38	4.55	2.00	12/07/2021
RC01	554643.17	654645.78	4.25	6.00	15/07/2021
RC02	554747.36	654586.26	8.99	5.00	16/07/2021
RC03	554696.76	654392.71	5.67	12.70	15/07/2021

Location	Easting	Northing	Ground Level (mOD)	Final Depth (m bgl)	Date Start (dd/mm/yyyy)
ST01	554529.20	654347.80	7.50	3.50	07/07/2021
ST02	554531.80	654380.30	8.34	4.00	07/07/2021
ST03	554534.60	654404.30	8.57	2.90	08/07/2021
ST03A	554488.00	654437.90	8.53	2.30	09/07/2021
ST04	554544.00	654419.30	8.57	3.50	08/07/2021
ST08	554627.00	654651.00	4.00	4.00	13/07/2021
ST08A	554554.90	654694.30	4.71	2.50	15/07/2021
ST09	554633.90	654660.10	3.63	4.00	13/07/2021
ST09A	554554.50	654699.10	8.74	3.00	15/07/2021
ST10	554636.40	654678.30	5.02	3.50	14/07/2021
ST10A	554554.60	654704.50	4.76	3.20	15/07/2021
ST11	554633.60	654692.20	5.22	3.50	15/07/2021
ST12	554464.00	654470.30	5.68	2.40	09/07/2021

Laboratory Testing

Laboratory testing was scheduled by PGL on behalf of Hutch O'Malley Consulting Engineers and carried out 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. Specialist chemical testing was undertaken by Eurofins Chemtest Ltd. (UK) on behalf of PGL. The laboratory data accompanies this report and was summarised as follows;

SUMMARY OF LABORATORY TESTING

Type	Quantity Nr.	Remarks
Natural Moisture Content	19	7% to 33%
Atterberg Limits	07	Liquid Limit, LL 17% to 53%
		Plastic Limit, PL 10% to 32%
		Plasticity Index, PI 7 to 21
Particle Size Distribution	13	04Nr. hydrometer analysis on fine soils
California bearing ratio (CBR)	05	BH02 0.0m, BH03 0.0m, BH08 0.0m, IT01 0.25m & IT03 0.2m. **CBR**0.8% to **CBR**7.2%
pH	06	8.5 to 8.9
Sulphate (water soluble as SO_4)	06	<0.010g/l
Sulphate (acid soluble)	06	<0.010%
Organic matter	06	1.5% to 11%

Type	Quantity Nr.	Remarks
Environmental analysis, Waste acceptance criteria (WAC)	11	See attached results
Asbestos screening and identification	04	See attached results
Point Load I_{S50}	06	0.9MPa to 9.7MPa

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 details of the ground conditions encountered are provided for on the attached exploratory records. 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.

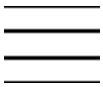
Groundwater conditions observed in the excavations are those appertaining to the period of the investigation. Groundwater levels may be subject to diurnal, seasonal and climatic variations and can also be affected by drainage conditions, tidal variations etc. It should be noted that the borehole casing and the duration over which an excavation remains open may not permit the recording of equilibrium groundwater levels for any one groundwater water strike for volume flows in stiff glacial deposits. The groundwater regime should be assessed from standpipe well installations, where available. A single (1) groundwater monitoring standpipe was installed at RC03, the remaining exploratory locations were backfilled with gravel, bentonite and arisings.

No groundwater was recorded during the period of works.

SUMMARY OF BACKFILL

 GRAVEL Backfill to installation/ borehole

 ARISINGS Backfill

 uPVC slotted pipe

 BENTONITE Backfill to installation/ borehole

SUMMARY OF STANDPIPE INSTALLATIONS

Location	Depth Top (m bgl)	Depth Base (m bgl)	Pipe
RC03	0.0	3.0	Plain
	3.0	12.7	Slotted

Geotechnical Review

The following geotechnical review provides an overview of the ground conditions identified within the site along with the general characterisation of the deposits encountered. The following sections should be read in conjunction with the exploratory records.

Desk Study - Published Geology

The Geological Survey of Ireland, 1:100,000 mapping (Sheet 17) indicated that the geology of the area was characterised by Visean Limestone (VIS described as undifferentiated Limestone). Vocanistic intrusions, V, Basalt B were identified 1.7km SW of the site. Teagasc sub-soil mapping indicated the superficial deposits were characterised by glacial till derived from Limestones and Made ground. Historical ground investigation indicated stiff to hard gravelly clay soils with numerous boulders extending from ground level (ANCO site, 1980); Investigations undertaken in 1992 identified bedrock at depth 2.5m to 7.0m deep within Raheen Industrial Estate, in the general vicinity.

Ground model

The ground model was such that Topsoil where encountered was described as dark brown, organic, slightly sandy gravelly CLAY being 100mm to 250mm thick. Within slit trench excavations, Made ground deposits described as soft to stiff, slightly sandy slightly CLAY/SILT and clayey sandy GRAVEL with Cobble and Boulder content(s) were encountered to a depth 2.2m below existing ground level (bgl) to 3.8m bgl. Below this natural deposits of organic CLAY was described to 4.0m bgl. Elsewhere, natural

deposits of soft to stiff, red brown, slightly sandy slightly gravely CLAY/ SILT were described to depths 1.00m bgl to 2.80m bgl. Localised deposits of medium dense, silty sandy GRAVEL with cobble content were also noted within boreholes. LIMESTIONE was encountered at variable depths 2.00m bgl to 10.00m bgl within the site.

No groundwater was encountered during the period of fieldworks.

Geotechnical risk register

The following non-exhaustive particular geotechnical risks were identified:

- Made ground, 2.2m bgl to 3.8m bgl within slit trench excavations;
- Poorly defined groundwater conditions;
- Variable bedrock depths 2.0m bgl to 10.0m bgl and associated differential movement and
- Organic deposits (medium organic content 10% to 11%) and high plasticity deposits (MH).

The site was characterized as geotechnical category GC-1.

> *Category 1 contains only small and simple structures with maximum design column load 250kN and maximum design wall load of 100kN, retaining walls and excavation which does not exceed the 2m and small excavations for pipes and drainage (Orr and Farrell, 1999).*

Characteristic properties

The Made Ground deposits were characterised by intermediate plasticity (CI/ MI), moisture contents 22% to 25%; grading analysis indicated 36% to 55% Gravel fraction; 11% to 24% Sand fraction and 12% to 29% Clay fraction with 7% to 27% (low to high) Cobble contents.

The upper SILT deposits were characterised by high plasticity (MH), moisture contents 20% to 33%; grading analysis indicated 3% to 19% Gravel fraction; 13% to 14% Sand fraction and 67% to 84% Silt fraction.

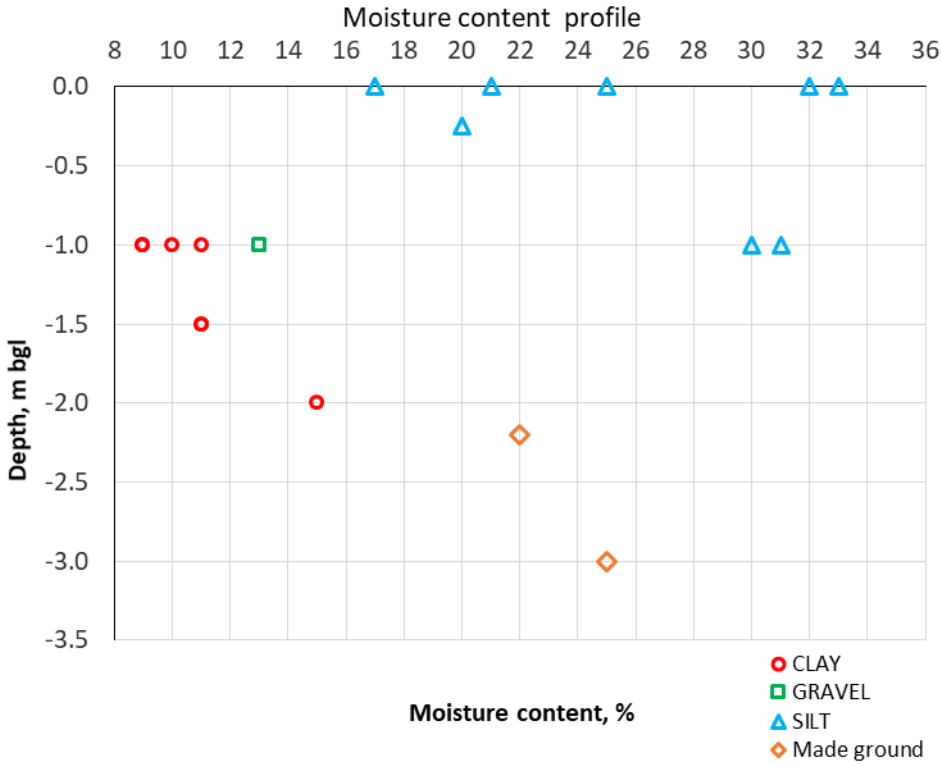
The mixed glacial deposits were characterised by low plasticity (CL), moisture contents 23% to 41%; grading analysis indicated 23% to 41% Gravel fraction; 15% to 31% Sand fraction and 16% to 34% Clay fraction with 6% to 46% (low to high) Cobble contents.

Tactile assessment during excavations described ‘soft’ to ‘stiff’ Made Ground deposits; with undrained shear strengths within the range <40kPa to 150kPa expected (BS5930, 1999). The SILT deposits were described as ‘firm’ with shear strengths of 40kPa to 75kPa expected (BS5930, 1999). The natural mixed glacial CLAY deposits were assessed by tactile methods and described as ‘soft’ to ‘stiff’ with shear strengths of <40kPa to 150kPa expected (BS5930, 1999).

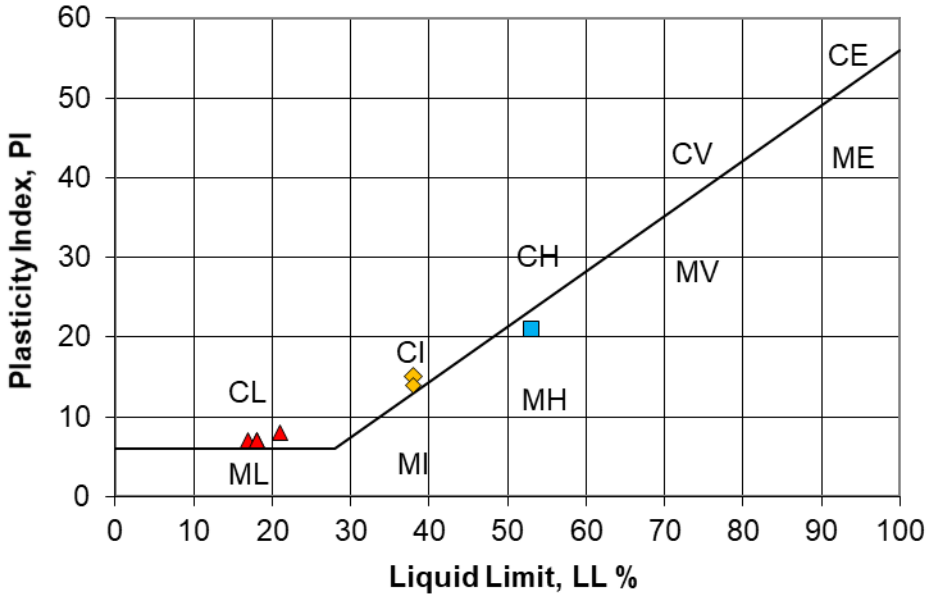
The ratio of natural moisture content, *w* to plastic limit, PL; *w*/PL for the Made Ground deposits was 0.92 to 1.04, (C504 Engineering in glacial tills), describing ‘stiff’ deposits; with undrained shear strengths within the range 75kPa to 150kPa expected (BS5930, 1999).

The ratio of natural moisture content, *w* to plastic limit, PL; *w*/PL for the upper SILT deposits was 0.71 to 1.04, (C504 Engineering in glacial tills), describing ‘stiff’ deposits; with undrained shear strengths within the range 75kPa to 150kPa expected (BS5930, 1999).

The ratio of natural moisture content, *w* to plastic limit, PL; *w*/PL for the mixed glacial deposits was 0.70 to 1.10, (C504 Engineering in glacial tills), describing ‘firm’ to ‘stiff’ deposits; with undrained shear strengths within the range 40kPa to 150kPa expected (BS5930, 1999).



Summary of plasticity data



Undrained shear strength can be assessed as follows: a factor f_1 of 5.5 is provided for median PI 8) where:

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

A characteristic N_{SPT} value 19 is recommended resulting in an undrained shear strength of the order 105kPa describing 'stiff' CLAY deposits (BS5930, 1999) below 1.5m bgl.

For the natural CLAY deposits plasticity data (PI 8) indicated an angle of friction, $\phi = 35^o$ (C504) and for the following approximations:

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

Noting BS8004; 2015 4.3.1.4.8 provided for friction as follows:

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

Elastic modulus, E is assessed such that;

E (kPa) = Cu (kPa) x 600; for the low plasticity (CL) deposits (Stroud, 1997).

An Elastic Modulus of 63MPa is expected of the 'stiff' CLAY deposits.

Soil Unit Weight(s) were assessed as follows:

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

Unit weight are characterized as follows:

'Stiff' CLAY deposits 19.65kPa

The friction, ϕ for the granular deposits can be assessed based on equivalent N_{SPT} where:

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

Based on a characteristic N_{SPT} =15 an angle of friction $\phi = 28^o$ was determined.

Soil Unit Weight(s) were assessed as follows:

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

Unit weight are characterized as follows:
Medium dense' GRAVEL deposits 18.25kPa

No further comment has been made on the upper SILT layer where there is an absence of in-situ data.

The rock mass characterization has been established using the Rock Quality Designation, (RQD, Deere, 1964), Rock Mass Rating (RMR) using the Geo-mechanics System (Bieniawski, 1989) and Geologic Strength Index (GSI, Hoek and Brown 1997, 2002). A review of the rock properties, strength (I_{P50} 0.9MPa to 7.3MPa), Rock Quality Designation (RQD 20% - 96%; typically <25% were indicative of poor quality rockmass Farmer, 1983/ C181), fracture spacing (10mm to 490mm) and condition (slightly to moderately weathered, rough closely spaced, some clay infill) and groundwater (assumed 'wet'). The rock mass rating, RMR was given as 48 to 57 indicated Class III, fair bedrock. An angle of friction of 30^o to 34^o with cohesion 250kPa to 295kPa is proposed for the CIII, slightly weathered, strong, LIMESTONE.

Location	RMR	Class		ϕ, ^{o}	Cohesion, kPa
RC01	48	III	Fair	30	250
RC02	57	III	Fair	34	295
RC03	56	III	Fair	34	265

UCS (MPa) = I_{S50} (MPa) x 22 (ISRM, 1985).

Foundations

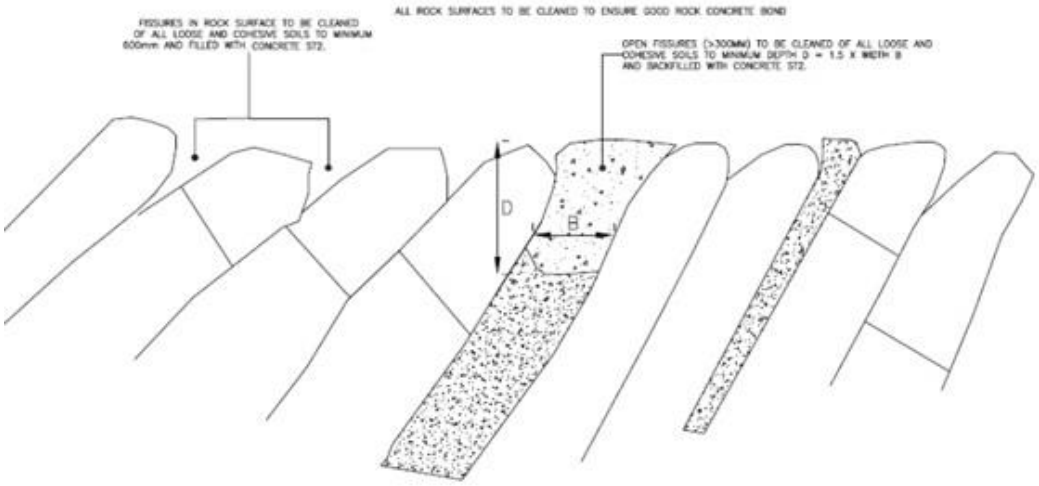
The following foundation recommendations have been made in the absence of construction details.

It is not recommended to found in the upper Made ground deposits (MI) where variability is expected nor in the high plasticity (MH) SILT deposits with medium organic content, where some unquantified degree of compressibility is expected.

Where shallow bedrock is encountered during construction foundations are expected to be within the shallow LIMESTONE bedrock. (BS8004, Code of practice for foundations, 1986) identified a presumed bearing value of 2,000 kN/m^2 (kPa) for non-weathered sedimentary rockmass. In accordance with *Figure 1 — Allowable bearing pressures for square pad foundations bearing on rock (for settlement not exceeding 0.5 % of foundation width*) this should be reduced to a value of 250MPa for an assumed Group 3, fractured rock mass. The depth to foundations in bedrock can be expected to be variable. A summary of bedrock depths is presented as follows;

Location	Ground Level (Elv (mOD)	Depth to bedrock (m bgl)	Depth to bedrock (mOD)
RC01	4.25	2.8	7.05
RC02	8.99	2.0	10.99
RC03	5.67	9.8	15.47

At foundation level, any irregularity or infill in the rock mass be broken back/ cleared out to competent rock and backfilled with concrete.



Where bedrock is at greater depths founding may be within the ‘stiff’ slightly sandy gravelly CLAY deposits. Depth to bedrock generally increases from north to south of the site. A presumed allowable bearing pressure of 150kNm^{-2} (kPa) - 300kPa is expected for the ‘stiff’ CLAY deposits (BS8004, Code of practice for foundations, 1986, Table 1). A presumed allowable bearing value, PBV for the assumed ‘medium dense’ GRAVEL deposits of >250kN/m^2 (kPa) (BS8004, Code of practice for foundations, 1986, Table 1) below a depth 1.5m bgl.

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,
	Strong limestones and strong sandstones	4 000	40	
	Schists and slates	3 000	30	
	Strong shales, strong mudstones and strong siltstones	2 000	20	
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.

A suitable bearing strata is generally identified below 1.5m bgl in the low plasticity gravelly CLAY deposits. Strip foundation in the 'firm' to 'stiff' CLAY deposits are recommended.

The following empirical relationship is provided for the initial assessment of allowable bearing capacity;

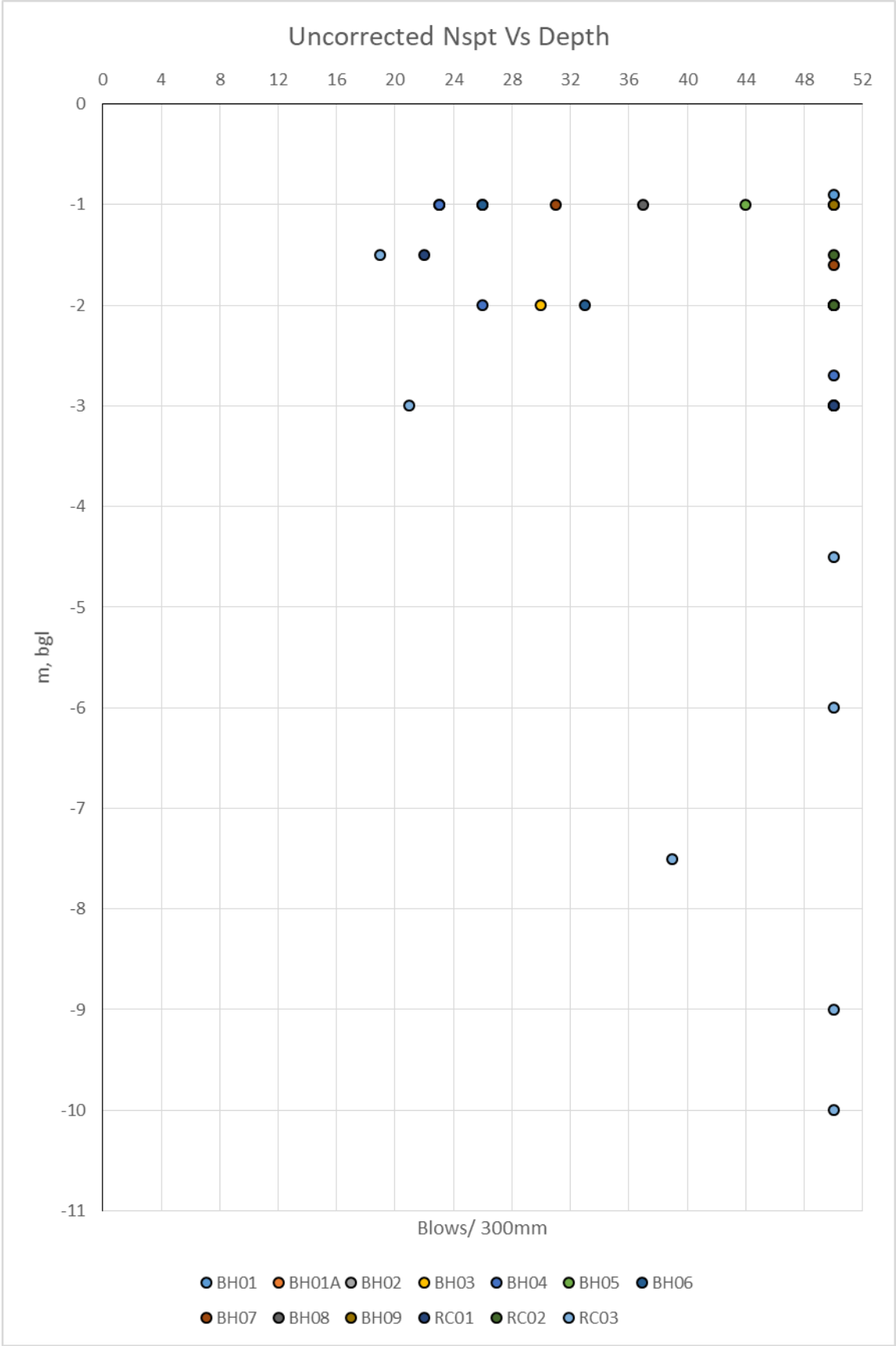
$$Qall\ (kPa) = N_{SPT} \times 10 \text{ (Terzaghi and Peck, 1967)}$$

for settlement up to a maximum of 25mm.

With a characteristic N_{SPT} 19, a maximum allowable bearing resistance of 150kPa is considered.

Taking a characteristic undrained shear strength 104kPa, allowing for a partial factor of safety 1.4, an ultimate bearing pressure of 381kPa is expected of the 'stiff' deposits bearing capacity factor N_c = 5.14, Skempton, 1951) below a depth 1.5m bgl.

It is recommended to undertake plate loading tests to fully assess settlement and confirm the design allowable bearing capacity.


Uncorrected Nspt Vs Depth
0
4
8
12
16
20
24
28
32
36
40
44
48
52
0
-1
-2
-3
-4
-5
-6
-7
-8
-9
-10
-11
m, bgl
Blows/ 300mm
BH01
BH01A
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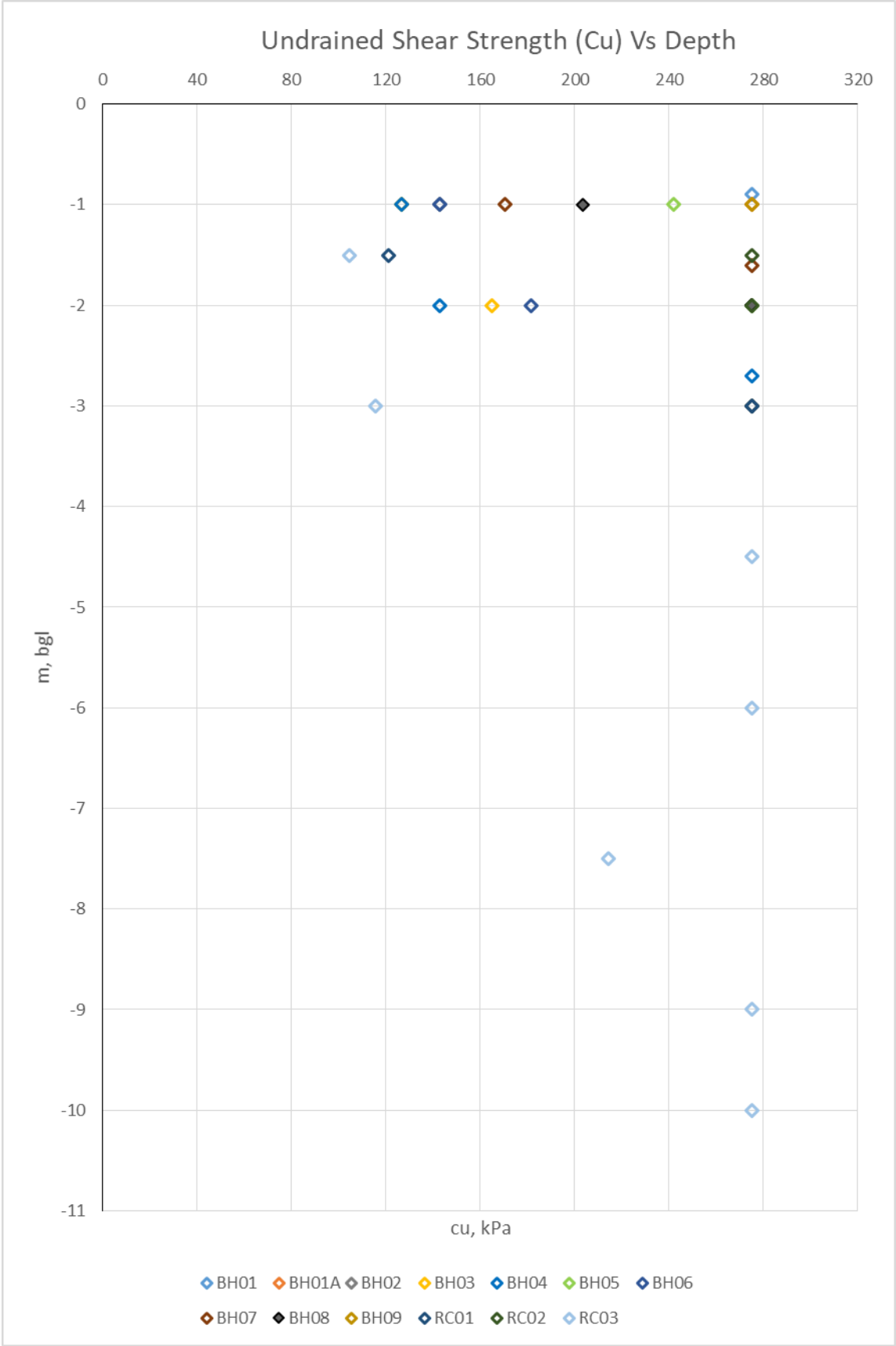
RC01
RC02
RC03


Undrained Shear Strength (Cu) Vs Depth
0
40
80
120
160
200
240
280
320
0
-1
-2
-3
-4
-5
-6
-7
-8
-9
-10
-11
m, bgl
cu, kPa
BH01
BH01A
BH02
BH03
BH04
BH05
BH06
BH07
BH08
BH09
RC01
RC02
RC03

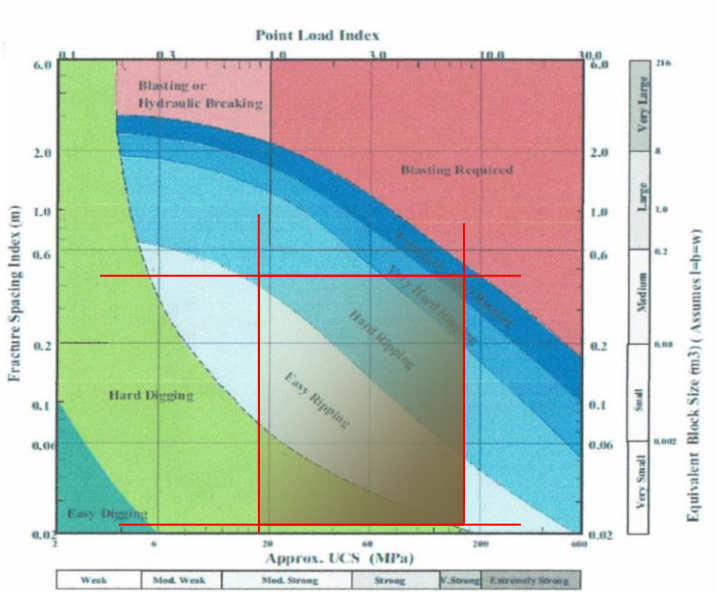
Infill dynamic probing shall be considered when the site is cleared and the housing layout available to assess the depth of CLAY deposits and further assess bearing.

Excavations

Excavation in the mixed glacial deposits shall be by means of hydraulic excavator. The stability of the excavations with a 16t tracked excavator, were described as very poor to good with no groundwater encountered.

Location	Depth Base (m bgl)	Pit Stability
IT01	2.00	Moderate.
IT02	2.00	Moderate.
IT03	2.00	Moderate.
IT04	2.00	Moderate.
ST01	3.50	Good.
ST02	4.00	Poor.
ST03	2.90	Poor.
ST03A	2.30	Poor.
ST04	3.40	Poor
ST08	4.00	Poor.
ST08A	2.50	Poor.
ST09	4.00	Very poor.
ST09A	3.00	Poor.
ST10	3.50	Poor.
ST10A	3.20	Moderate.
ST11	3.50	Poor.
ST12	2.40	Poor.

Excavation in the rockmass is expected to be by means of easy to very hard ripping and hydraulic breaking, where required.



Hardstanding

CBR was determined by laboratory methods resulting in values CBR0.5% to CBR7.2%. Capping where required shall be 220mm to 600mm thick and a sub-base thickness of 150mm is recommended for pavement construction in accordance with Tii DMRB Vol 7 Pt 2A, TD25-26/1- Figure 4.1.

CBR ref	CBR, %	Capping thickness (mm)	Sub-base thickness (mm)
BH02 0.0m	7.2	220	150
BH03 0.0m	0.5	600	150
BH08 0.0m	0.8	600	150
IT01 0.25m	1.9	600	150
IT03 0.2m	1.2	300	150

Groundwater

Infiltration viability may be given full consideration where an infiltration coefficient of magnitude 10^{-5} ms^{-1} or greater exists (SUDS Manual C753, 2015). Suitability for the construction of a soakaway to control surface (storm) water will be dependent on the area to be drained and the size of the proposed soakaway or available plan area for the soakaway.

Particle size d_{10} was measured as 0.001mm; indicative of a permeability of the order 1 x $10^{-8}ms^{-1}$.

An infiltration coefficient of 1.24 x $10^{-6}ms^{-1}$ to 2.32 x $10^{-6}ms^{-1}$ was measured at soakaway locations.

CBR ref	Depth (m bgl)	Infiltration coefficient (x $10^{-6}ms^{-1}$)
IT01	2.0	2.14
IT02	2.0	1.31
IT03	2.0	2.32
IT04	2.0	1.24

It is recommended that the groundwater regime be assessed form the standpipe installation (RC03) to confirm groundwater levels and complete the ground model.

Chemical

Based on the data; pH (8.5 to 8.9) and sulphate (<0.010g/l; <0.010%) a design class DS-1 is provided in accordance with BRE digest for concrete in aggressive ground within the deposits tested. Medium organic contents (10% to 11%) was noted potentially effecting water volumes within concrete design. There are no apparent special requirements with regard to concrete design.

Sample location	IT03	ST10A	BH08	BH02	BH03	BH04
Depth (m bgl)	1.00	3.00	1.00	1.00	1.00	1.00
Moisture	8.5%	18%	22%	10%	8.2%	22%
pH	8.8	8.5	8.5	8.8	8.9	8.5
Sulphate (2:1 Water Soluble) as SO4	< 0.010 g/l	< 0.010 g/l	< 0.010 g/l	< 0.010 g/l	< 0.010 g/l	< 0.010 g/l
Sulphate (Acid Soluble)	< 0.010%	< 0.010%	< 0.010%	< 0.010%	< 0.010%	< 0.010%
Organic Matter	11%	1.5%	2.2%	11%	10%	1.0%

Should there be 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,**

James McSweeney BSc
Engineering Geologist

No responsibility or liability can be held by PGL for ground conditions between or extraneous to 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.

The interpretation of the current data set may be subject to change where additional data becomes available.

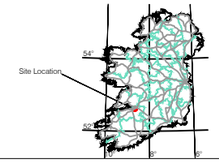
This report has been prepared for the Client and their Representative as outline, herein. The information should not be used without their prior written permission. PGL accepts no responsibility or liability for this document being used other than for the purposes for which it was intended.

SI-02

SI-01

ST10A DATUM
ST08A DATUM
ST11 DATUM
ST10 DATUM
ST09 DATUM
ST08 DATUM
ST03A DATUM
ST04 DATUM
ST03 DATUM
ST02 DATUM
ST01 DATUM
IT04
IT01
IT03
IT02
RC01
RC02
RC03
BH01
BH02
BH03
BH04
BH05
BH06
BH07
BH08
BH09

Priority Geotechnical Site



JOB NAME:

Raheen Housing

Sheet Title:

EXPLORATORY LOCATION LAYOUT

JOB NUMBER:

P21161

DRAWING NUMBER:

P21161-SI-A

DRAWN BY:

G.C.

DATE:

20/07/2021

SCALE:

1:2500 ON A3

APPROVED:

GH

REVISION:

D01

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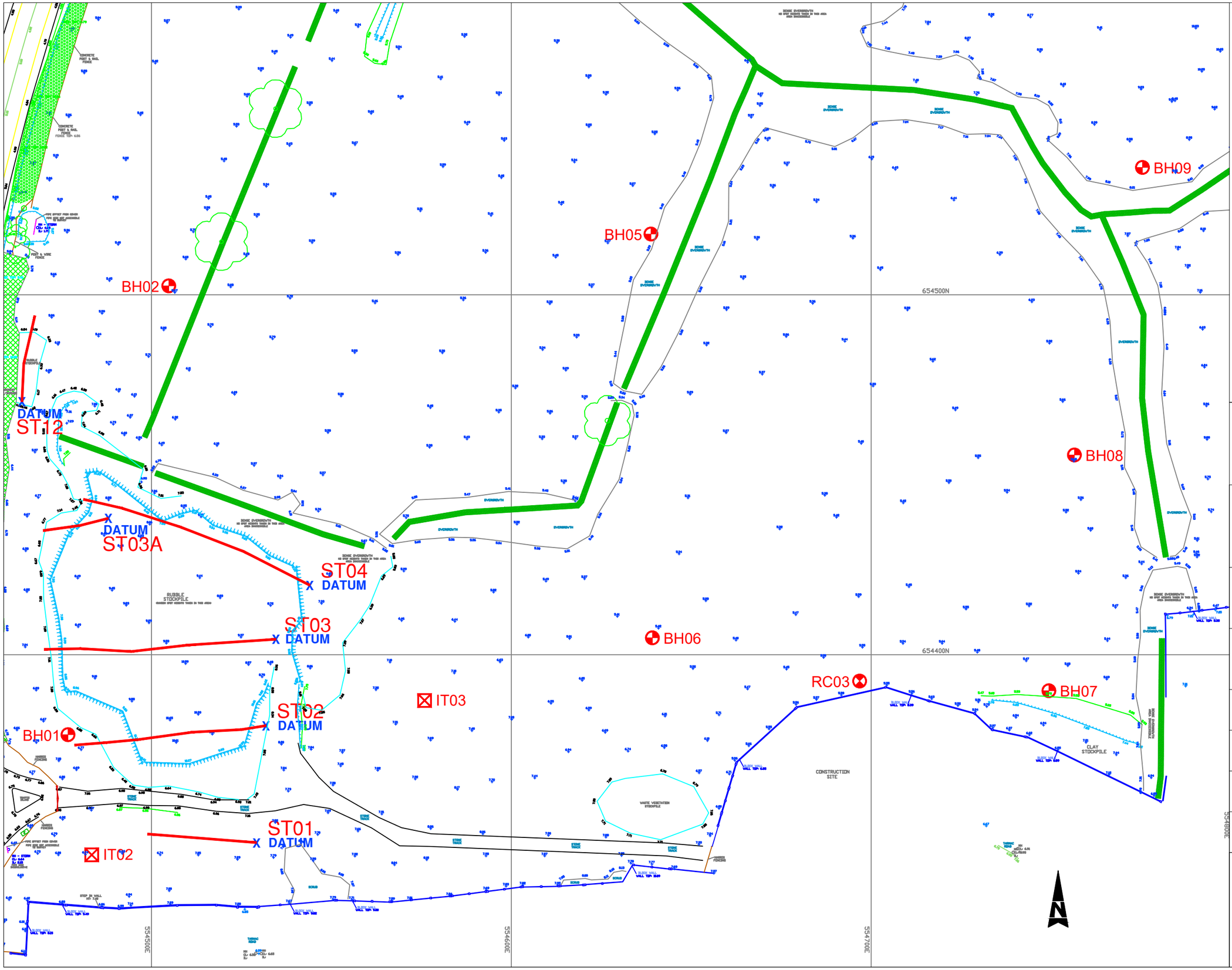

KEY:

- ST00 DATUM — Denotes Slit Trench and Datum location
- IT00 — Denotes Infiltration Test location
- BH00 — Denotes Borehole location
- RC00 — Denotes Rotary Core location

JOB NAME:

Raheen Housing

Sheet Title:

EXPLORATORY LOCATION PLAN

JOB NUMBER:

P21161

DRAWING NUMBER:

P21161-SI-01

DRAWN BY:

G.C.

DATE:

20/07/2021

SCALE:	APPROVED:
1:1000 ON A3	GH

REVISION:

D01

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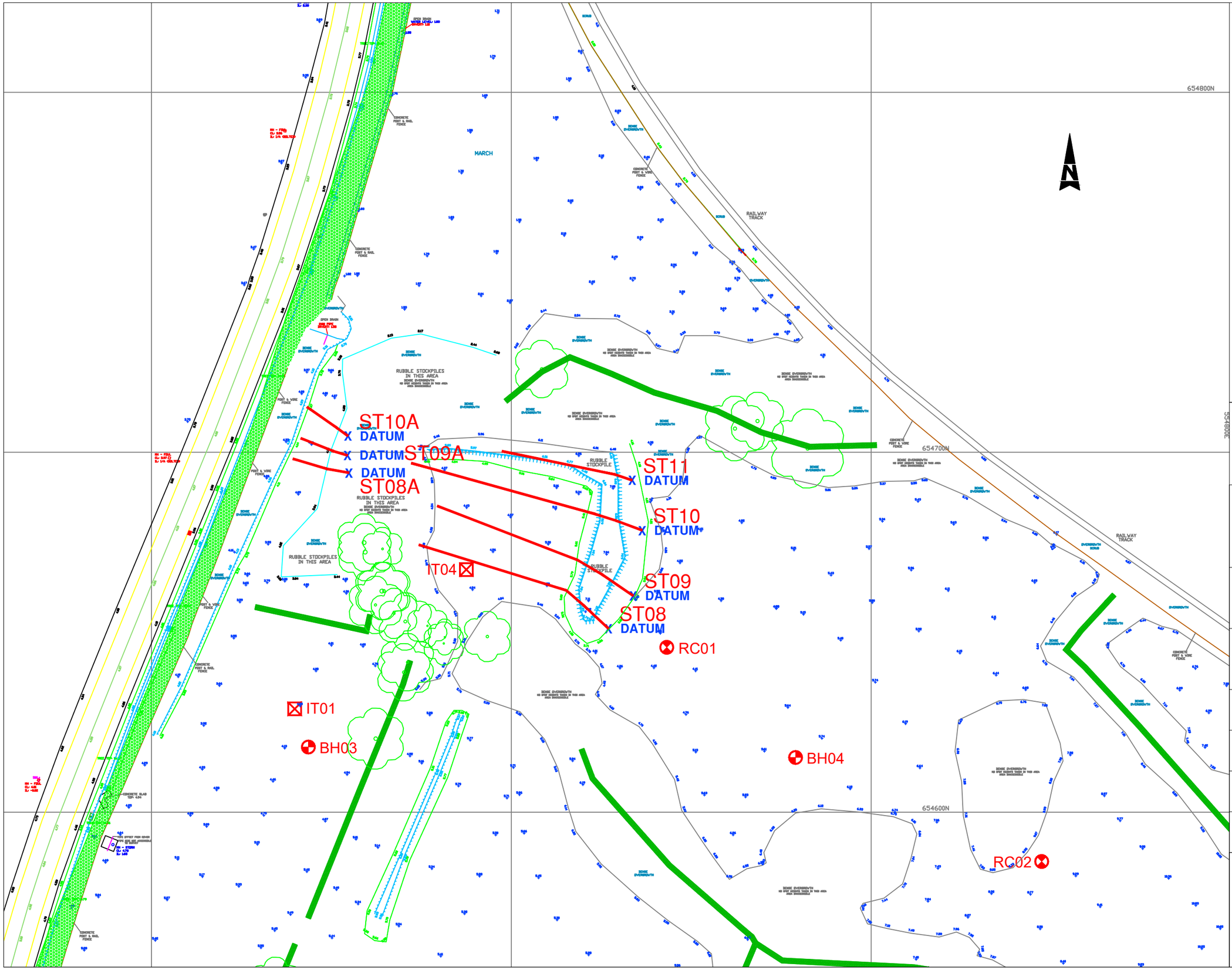

KEY:

ST00 DATUM — Denotes Slit Trench and Datum location

IT00 — Denotes Infiltration Test location

BH00 — Denotes Borehole location

RC00 — Denotes Rotary Core location

JOB NAME:

Raheen Housing

Sheet Title:

EXPLORATORY LOCATION PLAN

JOB NUMBER:

P21161

DRAWING NUMBER:

P21161-SI-02

DRAWN BY:

G.C.

DATE:

20/07/2021

SCALE:

1:1000 ON A3

APPROVED:

GH

REVISION:

D01

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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

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

Project Name:	Raheen Housing Development	**Project No.** P21161	**Co-ords:**	554477E - 654378N	**Hole Type** CP
Location:	Raheen, Co.Limerick		**Level:**	6.86 m OD	**Scale** 1:50
Client:	Gary Lawlor		**Date:**	27/07/2021 - 27/07/2021	

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 sandy gravelly CLAY with high cobble content. Sand is fine to coarse. Gravel is fine to coarse, sub-angular. Cobbles are 63mm to 160mm dia, sub-angular.
		0.90	SPT (C)	50 (25 for 75mm/50 for 0mm)	1.00	5.86		End of Borehole at 1.000m

1 2 3 4 5 6 7 8 9

Groundwater:

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

Hole Information:

Depth (m bgl)	Hole Dia (mm)	Casing Dia (mm)
1.00	200	200

Equipment: Dando 2000

Chiselling Details:

Top (m)	Base (m)	Duration (hh:mm)	Tool
0.90	1.00	01:00	Chisel

Remarks:

Borehole terminated at 1.00m bgl, obstruction. See also BH01A.

Shift Data:

GW (m bgl)	Shift	Depth (m bgl)	Remarks
	27/07/2021 08:00	0.00	Start of shift.
Dry	27/07/2021 18:00	1.00	End of borehole.

pgl priority geotechnical	**Priority Geotechnical Ltd.** **Tel: 021 4631600** **Fax: 021 4638690** **www.prioritygeotechnical.ie**	**Drilled By** PC **Logged By** CS	Borehole No. **BH01A** Sheet 1 of 1

Project Name:	Raheen Housing Development	**Project No.** P21161	**Co-ords:**	554477E - 654378N	**Hole Type** CP
Location:	Raheen, Co.Limerick		**Level:**	6.86 m OD	**Scale** 1:50
Client:	Gary Lawlor		**Date:**	27/07/2021 - 27/07/2021	

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, very silty sandy GRAVEL with high cobble content. Sand is fine to coarse. Gravel is fine to coarse, sub-angular to sub-rounded. Cobbles are 63mm to 140mm dia, sub-angular, Limestone lithology.
		1.00	SPT (C)	50 (25 for 0mm/50 for 0mm)	1.10	5.76		End of Borehole at 1.100m

1 2 3 4 5 6 7 8 9

Groundwater:

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

Hole Information:

Depth (m bgl)	Hole Dia (mm)	Casing Dia (mm)
1.10	200	200

Equipment: Dando 2000

Chiselling Details:

Top (m)	Base (m)	Duration (hh:mm)	Tool
1.00	1.10	01:00	Chisel.

Remarks:

Borehole terminated at 1.10m bgl, obstruction.

Shift Data:

GW (m bgl)	Shift	Depth (m bgl)	Remarks
	27/07/2021 08:00	0.00	Start of shift.
	27/07/2021 18:00	1.10	End of shift.

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Drilled By	Borehole No.
PC	**BH02**
Logged By	Sheet 1 of 1
CS	

Project Name:	Raheen Housing Development	**Project No.** P21161	**Co-ords:**	554505E - 654502N	**Hole Type** CP
Location:	Raheen, Co.Limerick		**Level:**	5.52 m OD	**Scale** 1:50
Client:	Gary Lawlor		**Date:**	26/07/2021 - 26/07/2021	

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 red, slightly sandy gravelly SILT. Sand is fine to coarse. Gravel is fine to coarse, sub-angular to sub-rounded.
		1.00 - 2.00	B		1.00	4.52		
		1.00	SPT (C)	N=26 (5,5/6,6,7,7)				Medium dense to dense, brown red, very clayey very sandy GRAVEL with medium cobble content. Sand is fine to coarse. Gravel is fine to coarse, sub-angular to sub-rounded, Limestone lithology. Cobbles are 63mm to 200mm dia, sub-angular, Limestone lithology.
		2.00	SPT (C)	54 (6,8/54 for 150mm)				
					2.50	3.02		End of Borehole at 2.500m

1 2 3 4 5 6 7 8 9

Groundwater:

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

Hole Information:

Depth (m bgl)	Hole Dia (mm)	Casing Dia (mm)
2.50	200	200

Equipment: Dando 2000

Chiselling Details:

Top (m)	Base (m)	Duration (hh:mm)	Tool
2.40	2.50	01:00	Chisel.

Remarks:

Borehole terminated at 2.50m bgl, obstruction.

Shift Data:

GW (m bgl)	Shift	Depth (m bgl)	Remarks
	26/07/2021 08:00	0.00	Start of shift.
	26/07/2021 18:00	2.50	End of shift.

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Project Name:	Raheen Housing Development	**Project No.** P21161	**Co-ords:**	554544E - 654618N	**Hole Type** CP
Location:	Raheen, Co.Limerick		**Level:**	4.17 m OD	**Scale** 1:50
Client:	Gary Lawlor		**Date:**	26/07/2021 - 26/07/2021	

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 red, slightly sandy gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is fine to coarse, sub-angular to sub-rounded, Limestone lithology. Cobbles are 63mm to 120mm dia, sub-angular to sub-rounded, Limestone lithology.
		1.00 - 2.00 1.00	B SPT (C)	N=23 (3,4/5,5,6,7)	1.00	3.17		Stiff, light brown, slightly sandy gravelly CLAY with medium cobble content. Sand is fine to coarse. Gravel is fine to coarse, sub-angular to sub-rounded, Limestone lithology. Cobbles are 63mm to 120mm dia, sub-angular to sub-rounded, Limestone lithology.
		2.00 - 3.00 2.00	B SPT (C)	N=30 (7,8/7,7,8,8)	2.00	2.17		Medium dense to dense, brown black, very clayey very sandy GRAVEL with high 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	SPT (C)	15 (10,11/15 for 75mm)				
					3.50	0.67		End of Borehole at 3.500m

Groundwater:

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

Hole Information:

Depth (m bgl)	Hole Dia (mm)	Casing Dia (mm)
3.50	200	200

Equipment: Dando 2000

Chiselling Details:

Top (m)	Base (m)	Duration (hh:mm)	Tool
3.35	3.50	01:00	Chisel.

Remarks:

Borehole terminated at 3.50m bgl, obstruction.

Shift Data:

GW (m bgl)	Shift	Depth (m bgl)	Remarks
	26/07/2021 08:00	0.00	Start of shift.
Dry	26/07/2021 18:00	3.50	End of borehole.

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Drilled By	Borehole No.
PC	**BH04**
Logged By	Sheet 1 of 1
CS	

Project Name:	Raheen Housing Development	**Project No.** P21161	**Co-ords:**	554679E - 654615N	**Hole Type** CP
Location:	Raheen, Co.Limerick		**Level:**	5.73 m OD	**Scale** 1:50
Client:	Gary Lawlor		**Date:**	27/07/2021 - 27/07/2021	

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 red, slightly sandy CLAY. Sand is fine to coarse.
		1.00 - 2.00 1.00	B SPT (C)	N=23 (4,5/5,6,6,6)	1.00	4.73		Stiff, brown red, slightly sandy SILT. Sand is fine to coarse. Gravel is fine to coarse, sub-angular. Cobbles are 63mm dia, sub-rounded, Limestone lithology.
		2.00 - 2.60 2.00	B SPT (C)	N=26 (5,6/6,7,6,7)	2.00	3.73		Stiff, brown red, slightly sandy gravelly CLAY with high cobble content. Sand is fine to coarse. Gravel is fine to coarse, sub-angular to sub-rounded. cobbles are 63mm to 120mm diam sub-angular to sub-rounded, Limestone lithology.
		2.70	SPT (C)	50 (25 for 0mm/50 for 0mm)	2.80	2.93		End of Borehole at 2.800m

Groundwater:

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

Hole Information:

Depth (m bgl)	Hole Dia (mm)	Casing Dia (mm)
2.80	200	200

Equipment: Dando 2000

Chiselling Details:

Top (m)	Base (m)	Duration (hh:mm)	Tool
2.70	2.80	01:00	Chisel

Remarks:

Borehole terminated at 2.80m bgl, obstruction.

Shift Data:

GW (m bgl)	Shift	Depth (m bgl)	Remarks
	27/07/2021 08:00	0.00	Start of shift.
Dry	27/07/2021 18:00	2.80	End of borehole.

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Project Name:	Raheen Housing Development	**Project No.** P21161	**Co-ords:**	554639E - 654517N	**Hole Type** CP
Location:	Raheen, Co.Limerick		**Level:**	5.29 m OD	**Scale** 1:50
Client:	Gary Lawlor		**Date:**	28/07/2021 - 28/07/2021	

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, brown, slightly sandy gravelly CLAY with medium cobble content and low boulder content. Sand is fine to coarse. Gravel is fine to coarse, sub-angular to sub-rounded. Cobbles are 63mm to 180mm dia, sub-angular, Limestone lithology. Boulders are 200mm dia, sub-angular, Limestone lithology.
		1.00 - 2.00 1.00	B SPT (C)	N=44 (8,9/10,10,11,13)				
		2.00	SPT (C)	50 (11,12/50 for 0mm)				
					2.50	2.79		End of Borehole at 2.500m

Groundwater:

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

Hole Information:

Depth (m bgl)	Hole Dia (mm)	Casing Dia (mm)
2.50	200	200

Equipment: Dando 2000

Chiselling Details:

Top (m)	Base (m)	Duration (hh:mm)	Tool
2.40	2.50	01:00	Chisel.

Remarks:

Borehole terminated at 2.50m bgl, obstructin.

Shift Data:

GW (m bgl)	Shift	Depth (m bgl)	Remarks
	28/07/2021 08:00	0.00	Start of shift.
Dry	28/07/2021 18:00	2.50	End of borehole.

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Drilled By	Borehole No.
PC	**BH06**
Logged By	Sheet 1 of 1
CS	

Project Name:	Raheen Housing Development	**Project No.** P21161	**Co-ords:**	554639E - 654405N	**Hole Type** CP
Location:	Raheen, Co.Limerick		**Level:**	5.47 m OD	**Scale** 1:50
Client:	Gary Lawlor		**Date:**	23/07/2021 - 23/07/2021	

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 sandy gravelly CLAY. Sand is fine to coarse. Gravel is fine to coarse, sub-angular. Roots present.
		1.00 - 2.00 1.00	B SPT (C)	N=26 (5,6/6,7,7,6)	1.00	4.47		Stiff, brown mottled grey, slightly sandy gravelly CLAY with medium cobble content. Sand is fine to coarse. Gravel is fine to coarse, sub-angular to sub-rounded. Cobbles are 63mm to 80mm dia, sub-angular to sub-rounded, Limestone lithology.
		2.00 - 3.00 2.00	B SPT (C)	N=33 (7,8/8,7,9,9)				
		3.00	SPT (C)	50 (8,10/50 for 75mm)				
					3.20	2.27		End of Borehole at 3.200m

1 2 3 4 5 6 7 8 9

Groundwater:

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

Hole Information:

Depth (m bgl)	Hole Dia (mm)	Casing Dia (mm)
3.20	200	200

Equipment: Dando 2000

Chiselling Details:

Top (m)	Base (m)	Duration (hh:mm)	Tool
3.10	3.20	01:00	Chisel.

Remarks:

Borehole terminated at 3.20m bgl, obstruction.

Shift Data:

GW (m bgl)	Shift	Depth (m bgl)	Remarks
	23/07/2021 08:00	0.00	Start of shift.
Dry	24/07/2021 18:00	3.20	End of shift.

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Drilled By	Borehole No.
PC	**BH07**
Logged By	Sheet 1 of 1
CS	

Project Name:	Raheen Housing Development	**Project No.** P21161	**Co-ords:**	554749E - 654390N	**Hole Type** CP
Location:	Raheen, Co.Limerick		**Level:**	5.58 m OD	**Scale** 1:50
Client:	Gary Lawlor		**Date:**	28/07/2021 - 28/07/2021	

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 sandy gravelly SILT with medium cobble content. Sand is fine to coarse. Gravel is fine to coarse, sub-angular to sub-rounded. Cobbles are 63mm to 110mm dia, sub-rounded, Limestone lithology.
		1.00 - 1.60 1.00	B SPT (C)	N=31 (4,5/6,6,9,10)	1.00	4.58		Stiff, brown, slightly sandy gravelly CLAY with medium cobble content. Sand is fine to coarse. Gravel is fine to coarse, sub-angular to sub-rounded. Cobbles are 63mm to 110mm dia, sub-rounded, Limestone lithology.
		1.60	SPT (C)	50 (25 for 75mm/50 for 0mm)	1.80	3.78		End of Borehole at 1.800m

Groundwater:

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

Hole Information:

Depth (m bgl)	Hole Dia (mm)	Casing Dia (mm)
1.80	200	200

Equipment: Dando 2000

Chiselling Details:

Top (m)	Base (m)	Duration (hh:mm)	Tool
1.70	1.80	01:00	Chisel.

Remarks:

Borehole terminated at 1.80m bgl, obstruction.

Shift Data:

GW (m bgl)	Shift	Depth (m bgl)	Remarks
	28/07/2021 08:00	0.00	Start of shift.
Dry	28/07/2021 18:00	1.80	End of shift.

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

Project Name:	Raheen Housing Development	**Project No.** P21161	**Co-ords:**	554756E - 654455N	**Hole Type** CP
Location:	Raheen, Co.Limerick		**Level:**	5.60 m OD	**Scale** 1:50
Client:	Gary Lawlor		**Date:**	23/07/2021 - 26/07/2021	

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, red brown, slightly sandy gravelly SILT with low cobble content. Sand is fine to coarse. Gravel is fine to coarse, sub-angular to sub-rounded. Cobbles are 63mm to 83mm dia, sub-angular to sub-rounded, Limestone lithology.
		1.00 - 2.00	B					
		1.00	SPT (C)	N=37 (8,8/9,9,10,9)				
		2.00	SPT (C)	50 (25 for 5mm/50 for 0mm)	2.20	3.40		End of Borehole at 2.200m

Groundwater:

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

Hole Information:

Depth (m bgl)	Hole Dia (mm)	Casing Dia (mm)
2.20	200	200

Equipment: Dando 2000

Chiselling Details:

Top (m)	Base (m)	Duration (hh:mm)	Tool
2.00	2.20	01:00	Chisel.

Remarks:

Borehole terminated at 2.20m bgl, obstruction.

Shift Data:

GW (m bgl)	Shift	Depth (m bgl)	Remarks
	23/07/2021 08:00	0.00	Start of shift.
Dry	23/07/2021 18:00	1.00	End of shift.
Dry	26/07/2021 08:00	1.00	Start of shift.
Dry	26/07/2021 18:00	2.20	End of borehole.

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Drilled By	Borehole No.
PC	**BH09**
Logged By	Sheet 1 of 1
CS	

Project Name:	Raheen Housing Development	**Project No.** P21161	**Co-ords:**	554775E - 654535N	**Hole Type** CP
Location:	Raheen, Co.Limerick		**Level:**	8.46 m OD	**Scale** 1:50
Client:	Gary Lawlor		**Date:**	27/07/2021 - 27/07/2021	

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, 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 dia, sub-angular to sub-rounded.
		1.00 - 1.40	B					
		1.00	SPT (C)	61 (8,10/61 for 225mm)	1.50	6.96		End of Borehole at 1.500m

Groundwater:

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

Hole Information:

Depth (m bgl)	Hole Dia (mm)	Casing Dia (mm)
1.50	200	200

Equipment: Dando 2000

Chiselling Details:

Top (m)	Base (m)	Duration (hh:mm)	Tool
1.40	1.50	01:00	Chisel

Remarks:

Borehole terminated at 1.50m bgl, obstruction.

Shift Data:

GW (m bgl)	Shift	Depth (m bgl)	Remarks
	27/07/2021 08:00	0.00	Start of shift.
	27/07/2021 18:00	1.50	End of shift.

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Project Name:	Raheen Housing Development	**Project No.** P21161	**Co-ords:**	554643E - 654646N	**Hole Type** RC
Location:	Raheen, Co.Limerick		**Level:**	4.25 m OD	**Scale** 1:50
Client:	Gary Lawlor		**Dates:**	15/07/2021 15/07/2021	

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=22 (6,5/6,5,5,6) (C)								Open hole boring. Driller described: Stiff, Clay.
							2.80	1.45		
		~~50 (25 for~~ 0mm/50 for 0mm) (C)					3.00	1.25		Open hole boring. Driller described: Rock. Assumed Limestone lithology.
		3.00 - 4.50	20mm 370mm 120mm	81	75	57	10/m			Lithology: Strong, grey, fossiliferous LIMESTONE. Becoming darker in colour and coarser grained at 5.0m bgl. Weathering: Slightly to moderately weathered. Clay infill seen on fractures. Fractures: Two sets identified. Set 1 has a dip of 90 degrees, an undulating rough fracture surface and are closely spaced.
		4.50 - 6.00	35mm 180mm 60mm 20mm 210mm 100mm	95	80	20	8/m 14/m			
							6.00	-1.75		End of Borehole at 6.000m

Groundwater:

Struck (m bgl)	Level (m bgl)	After (min)	Sealed	Comment
				None encountered.

Hole Information:

Hole Depth (m bgl)	Hole Dia (mm)	Casing Dia (mm)
6.00	76	131

Equipment:	Soilmec PSM.
Method:	Compressed air mist.

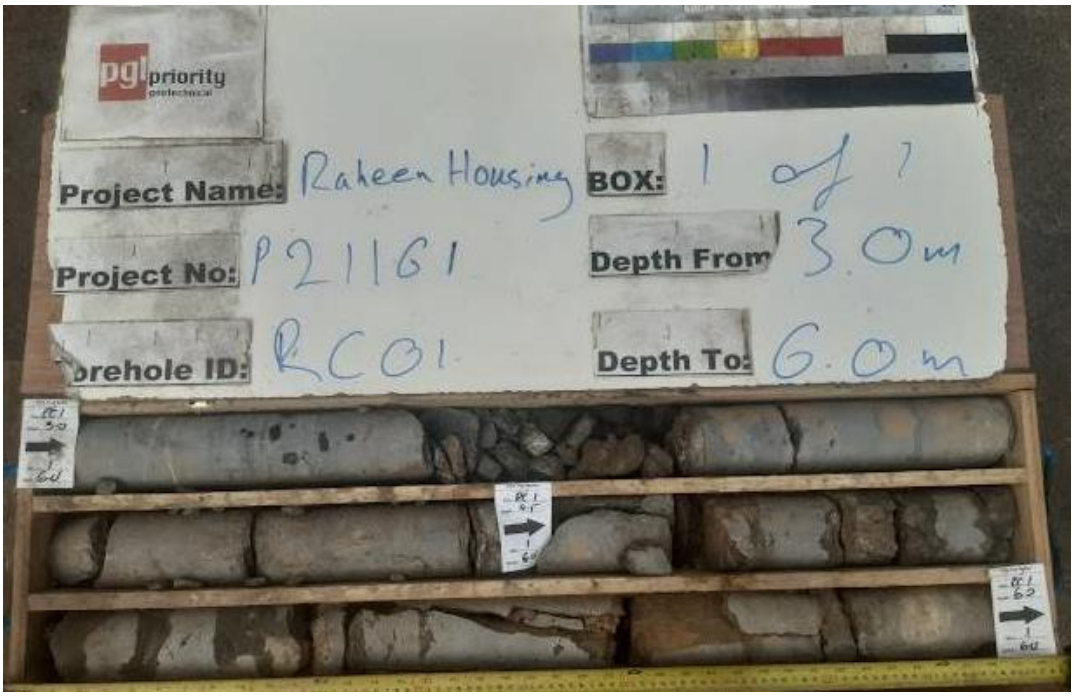
Remarks:

Borehole terminated at 6.00m bgl, required depth.

Shift Data:

Groundwater (m bgl)	Shift	Hole Depth (m bgl)	Remarks
Dry	15/07/2021 08:00	0.00	Star of shift.
	15/07/2021 18:00	6.00	End of borehole.

Photographic Record



Number:	**RC01**	**Project**	Raheen Housing	
		Project No	P21161	
		Engineer	Hutch O`Malley Consulting	

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	Logged By: MF.	Sheet 1 of 1

Project Name:	Raheen Housing Development	**Project No.** P21161	**Co-ords:**	554747E - 654586N	**Hole Type** RC
Location:	Raheen, Co.Limerick		**Level:**	8.99 m OD	**Scale** 1:50
Client:	Gary Lawlor		**Dates:**	16/07/2021	16/07/2021

Well	Water Strike (m)	Depth (m)	Type /Fs (min, max, avg)	Coring (%) TCR	SCR	RQD	Depth (m) / Fl (/m)	Level (mOD)	Legend	Stratum Description
							0.40	8.59		Open hole boring. Driller described: Sandy Clay
										Open hole boring. Driller described: Clay with boulder content.
		50 (18 for 75mm/50 for 0mm) (C)								
		~~50 (25 for~~ 0mm/50 for 0mm) (C)					2.00	6.99		
		2.00 - 3.50	10mm 135mm 40mm	100	93	33	11/m			Lithology: Medium strong, dark grey, fossiliferous LIMESTONE. Weathering: Slightly weathered with minor clay infill. Fractures: One set identified. Fracture has a dip of 90 degrees, an undulating rough fracture surface and close spacing.
		3.50 - 5.00	20mm 150mm 55mm	100	95	69	11/m			Details: Calcite vein seen at 4.5m bgl. Fossils are crinoids.
			20mm 490mm 400mm				10/m			
							5.00	3.99		End of Borehole at 5.000m

Groundwater:

Struck (m bgl)	Level (m bgl)	After (min)	Sealed	Comment
				None encountered.

Hole Information:

Hole Depth (m bgl)	Hole Dia (mm)	Casing Dia (mm)
5.00	76	131

Equipment: Soilmec PSM.

Method: Compressed air mist.

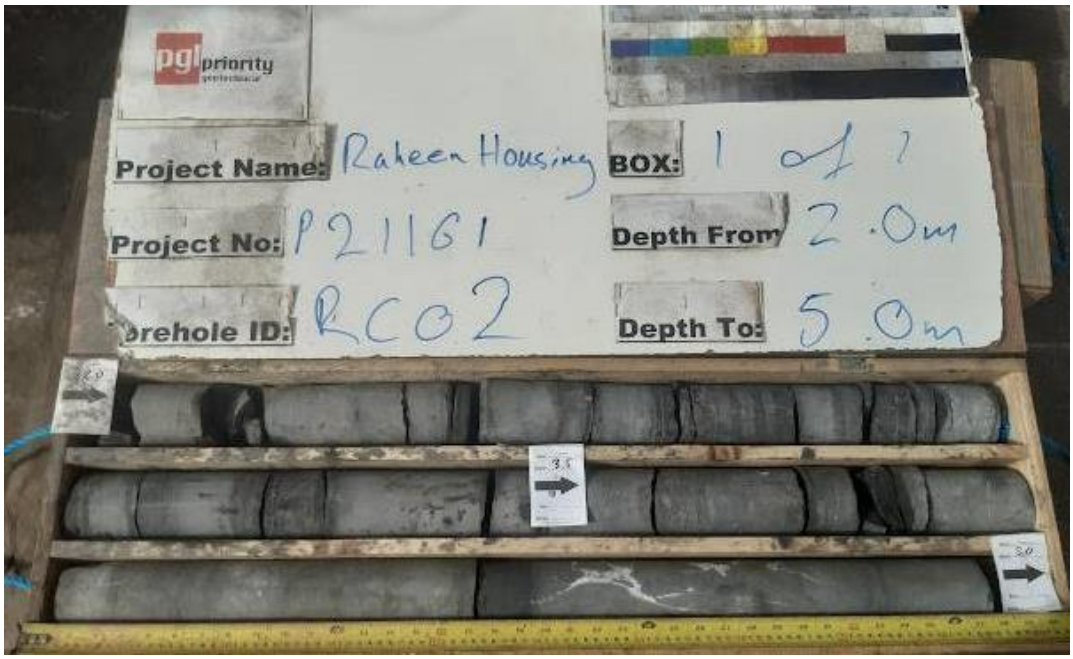
Remarks:

Borehole terminated at 5.00m bgl, required depth.

Shift Data:

Groundwater (m bgl)	Shift	Hole Depth (m bgl)	Remarks
Dry	16/07/2021 08:00	0.00	Start of shift.
	16/07/2021 18:00	5.00	End of borehole.

Photographic Record



Number:	**RC02**	**Project**	Raheen Housing	
		Project No	P21161	
		Engineer	Hutch O`Malley Consulting	

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Project Name:	Raheen Housing Development	**Project No.** P21161	**Co-ords:**	554697E - 654393N	**Hole Type** RC
Location:	Raheen, Co.Limerick		**Level:**	5.67 m OD	**Scale** 1:50
Client:	Gary Lawlor		**Dates:**	15/07/2021	15/07/2021

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=19 (3,3/3,6,6,4) (C)					2.30	3.37		
		N=21 (3,4/5,5,6,5) (C)								Open hole boring. Driller described: Medium dense, clayey sandy GRAVEL
	▼	25 (10,19/25 for 60mm) (C)					4.30	1.37		Open hole boring. Driller described: Stiff, Clay with boulder content.
		50 (48 for 145mm/50 for 0mm) (C)								
		N=39 (8,10/8,8,11,12) (C)								

1 2 3 4 5 6 7 8 9

Groundwater:

Struck (m bgl)	Level (m bgl)	After (min)	Sealed	Comment
4.50				See shift data.

Hole Information:

Hole Depth (m bgl)	Hole Dia (mm)	Casing Dia (mm)
12.70	76	131

Equipment: Soilmec PSM.

Method: Compressed air mist.

Remarks:

Borehole terminated at 12.70m bgl, required depth. 50mm dia. standpipe installed. Response zone from 3.00m to 12.70m bgl.

Shift Data:

Groundwater (m bgl)	Shift	Hole Depth (m bgl)	Remarks
	15/07/2021 08:00	0.00	Start of borehole.
4.5	15/07/2021 18:00	12.70	End of borehole.

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Project Name:	Raheen Housing Development	**Project No.** P21161	**Co-ords:**	554697E - 654393N	**Hole Type** RC
Location:	Raheen, Co.Limerick		**Level:**	5.67 m OD	**Scale** 1:50
Client:	Gary Lawlor		**Dates:**	15/07/2021	15/07/2021

Well	Water Strike (m)	Depth (m)	Type /Fs (min, max, avg)	Coring (%) TCR	SCR	RQD	Depth (m) / FI (/m)	Level (mOD)	Legend	Stratum Description
		50 (48 for 85mm/50 for 0mm) (C)								Open hole boring. Driller described: Stiff, Clay with boulder content.
							9.80	-4.13		
		~~50 (25 for~~ 0mm/50 for 0mm) (C)					10.00	-4.33		Open hole boring. Driller described: Rock. Assumed Limestone lithology.
		10.00 - 11.30	40mm 350mm 100mm	100	100	70	5/m			Lithology: Medium strong, dark grey, fossiliferous LIMESTONE. Weathering: Slightly weathered with minor clay infill. Fractures: One fracture set identified. Set one has a dip of 90 degrees, an undulating rough fracture surface and close spacing.
		11.30 - 12.70	40mm 390mm 120mm	100	100	96	5/m			
			10mm 280mm 200mm				4/m			
							12.70	-7.03		End of Borehole at 12.700m

10 11 12 13 14 15 16 17 18

Groundwater:

Struck (m bgl)	Level (m bgl)	After (min)	Sealed	Comment
4.50				See shift data.

Hole Information:

Hole Depth (m bgl)	Hole Dia (mm)	Casing Dia (mm)
12.70	76	131

Equipment: Soilmec PSM.

Method: Compressed air mist.

Remarks:

Borehole terminated at 12.70m bgl, required depth. 50mm dia. standpipe installed. Response zone from 3.00m to 12.70m bgl.

Shift Data:

Groundwater (m bgl)	Shift	Hole Depth (m bgl)	Remarks
	15/07/2021 08:00	0.00	Start of borehole.
4.5	15/07/2021 18:00	12.70	End of borehole.

Photographic Record

Number:	**RC03**	**Project** **Project No** **Engineer**	Raheen Housing P21161 Hutch O`Malley Consulting	

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Trial Pit No
IT01
Sheet 1 of 1

Project Name: Raheen Housing Development	**Project No.** P21161	**Co-ords:** 554540E - 654629N **Level:** 3.97m OD	**Date** 12/07/2021
Location: Raheen, Co.Limerick		**Dimensions (m):** 1.70 x 0.90 **Depth:** 2.00m BGL	**Scale** 1:25
Client: Gary Lawlor			**Logged** RD

Water Strike & Backfill	Samples & In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m OD)	Legend	Stratum Description
							(TOPSOIL) Soft, dark brown, organic slightly sandy CLAY. Sand is fine to medium.
	0.25 - 0.60	B		0.25	3.72		
	0.25 - 0.60	D					Firm, red brown, slightly gravelly CLAY with low cobble content and low boulder content. Gravel is fine to coarse, angular to sub-rounded, Limestone lithology. Cobbles are 63mm to 200mm dia, sub-angular to rounded, Boulders are 200mm to 280mm dia, sub-angular, Limestone lithology.
				0.60	3.37		Soft to stiff, light brown, slightly sandy gravelly CLAY with high cobble content and medium boulder content. Sand is fine to coarse. Gravel is fine to coarse, sub-angular to rounded, Limestone lithology. Cobbles are 63mm to 200mm dia, sub-angular to rounded with a limestone lithology. Boulders are 200mm to 480mm dia, sub-rounded, Limestone lithology.
	1.00 - 2.00	B					
	1.50 - 2.00	D					
				2.00	1.97		End of Pit at 2.000m

1
2
3
4
5

Stability: Moderate.
Plant: 16T track machine.
Backfill: Arising.

Groundwater: none encountered.

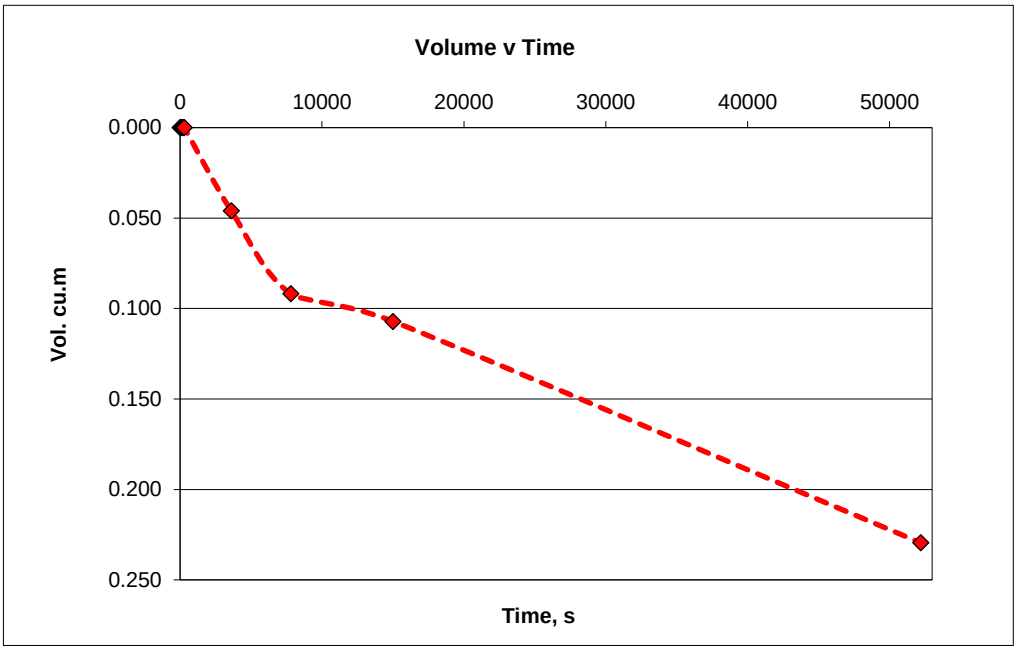
Remarks: Trial pit terminated at 2.00m bgl, required depth.

P21161	Raheen Housing Development	IT01	12/07/2021

l, m	**1.70**	b, m	**0.90**	d, m	**2.00**
l_base, m	**1.70**			d_eff, m	**1.15**
l_eff, m	**1.70**				

Time, min	Measure, m bgl	Time, sec	Depth water, m	Fall, m	Volume
0	0.85	0	1.15	0.00	0.000
1	0.85	60	1.15	0.00	0.000
2	0.85	120	1.15	0.00	0.000
3	0.85	180	1.15	0.00	0.000
4	0.85	240	1.15	0.00	0.000
5	0.85	300	1.15	0.00	0.000
60	0.88	3600	1.12	0.03	0.046
130	0.91	7800	1.09	0.06	0.092
250	0.92	15000	1.08	0.07	0.107
870	1.00	52200	1.00	0.15	0.230

Area	1.53 m^2	$V_{p75\text{-}25\ theory}$	volume	0.87975	m^3
50% Area_eff, a_{p50}	4.52 m^2	$V_{p\ 75\ -\ 25\ actual}$	volume	0.11475	m^3
50% Area_act, a_{p50}	1.785 m^2	$t_{p\ 75\text{-}\ 25\ actual}$	time	30066	s
		Infiltration Coefficient	*f*	2.14E-06	ms^-1



NOTES:
See IT01 for detailed soil description

Photographic Record

Number:	**IT01**	**Project** Raheen Housing **Project No** P21161 **Engineer** Hutch O`Malley Consulting	

Photographic Record

Number:	**IT01**	**Project** Raheen Housing **Project No** P21161 **Engineer** Hutch O`Malley Consulting	

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Trial Pit No
IT02
Sheet 1 of 1

Project Name: Raheen Housing Development	**Project No.** P21161	**Co-ords:** 554483E - 654344N **Level:** 6.76m OD	**Date** 12/07/2021
Location: Raheen, Co.Limerick		**Dimensions (m):** 2.00 x 0.90 **Depth:** 2.00m BGL	**Scale** 1:25
Client: Gary Lawlor			**Logged** RD

Water Strike & Backfill	Samples & In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m OD)	Legend	Stratum Description
				0.20	6.56		(TOPSOIL) Brown to light brown, organic gravelly CLAY with medium boulder content and metal inclusions Gravel is fine to coarse, sub-rounded to rounded. Boulders are 200mm ro 400mm dia, sub-angular with Limestone lithology.
	1.00 - 2.00	B					Stiff, grey brown, slightly sandy gravelly CLAY with high cobble content and high boulder content. Sand is fine to coarse. Gravel is fine to coarse, sub-angular to rounded, Limestone lithology. Cobbles are angular to rounded with Limestone lithology. Boulders are 200mm to 600mm dia, sub-angular to sub-rounded, Limestone lithology.
	1.50 - 2.00	D					
				2.00	4.76		End of Pit at 2.000m

1
2
3
4
5

Stability: Moderate.
Plant: 16T Track machine.
Backfill: Arisings.

Groundwater: None encountered.

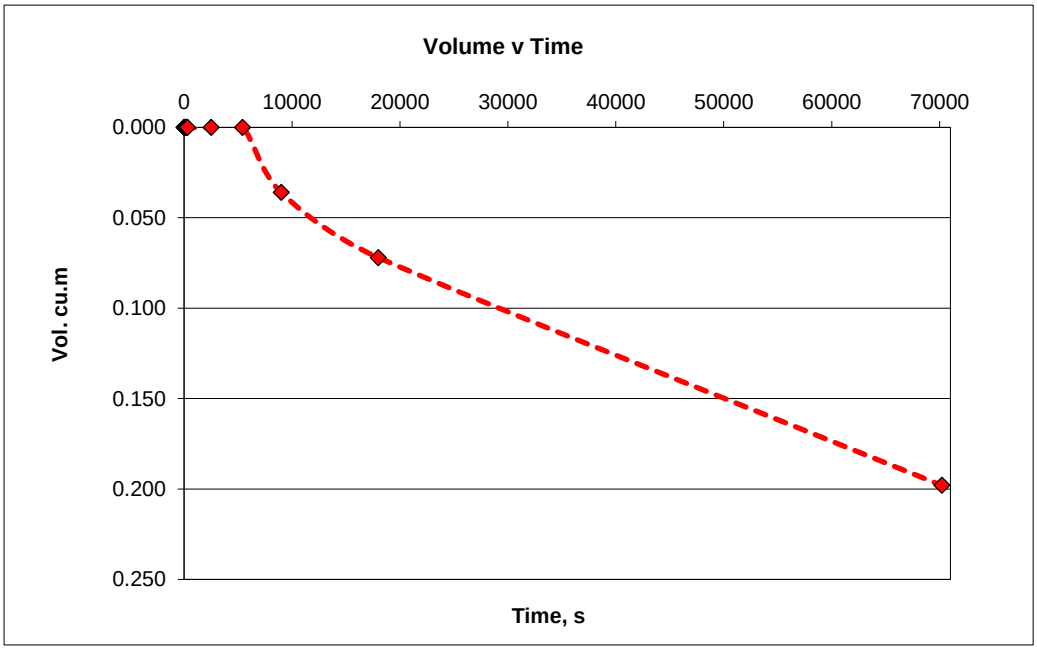
Remarks: Trial pit terminated at 2.00m bgl, required depth.

P21161	Raheen Housing Development	IT02	12/07/2021

l, m	**2.00**	b, m	**0.90**	d, m	**2.00**
l_base, m	**2.00**			d_eff, m	**1.35**
l_eff, m	**2.00**				

Time, min	Measure, m bgl	Time, sec	Depth water, m	Fall, m	Volume
0	0.65	0	1.35	0.00	0.000
1	0.65	60	1.35	0.00	0.000
2	0.65	120	1.35	0.00	0.000
3	0.65	180	1.35	0.00	0.000
4	0.65	240	1.35	0.00	0.000
5	0.65	300	1.35	0.00	0.000
42	0.65	2520	1.35	0.00	0.000
90	0.65	5400	1.35	0.00	0.000
150	0.67	9000	1.33	0.02	0.036
300	0.69	18000	1.31	0.04	0.072
1170	0.76	70200	1.24	0.11	0.198

Area	1.8	m^2	$V_{p75\text{-}25\ theory}$	volume	1.215	m^3
50% Area_eff, a_{p50}	5.715	m^2	$V_{p\ 75\ -\ 25\ actual}$	volume	0.099	m^3
50% Area_act, a_{p50}	2.02	m^2	$t_{p\ 75\text{-}\ 25\ actual}$	time	37422	s
			Infiltration Coefficient	*f*	1.31E-06	ms^-1



NOTES:
See IT02 for detailed soil description

Photographic Record

Number:	**IT02**	**Project** Raheen Housing **Project No** P21161 **Engineer** Hutch O`Malley Consulting	

Photographic Record

Number:	**IT02**	**Project** Raheen Housing **Project No** P21161 **Engineer** Hutch O`Malley Consulting	

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Trial Pit No
IT03
Sheet 1 of 1

Project Name: Raheen Housing Development	**Project No.** P21161	**Co-ords:** 554576E - 654387N **Level:** 7.33m OD	**Date** 12/07/2021
Location: Raheen, Co.Limerick		**Dimensions (m):** 2.30 x 0.90 **Depth:** 2.00m BGL	**Scale** 1:25
Client: Gary Lawlor			**Logged** EK

Water Strike & Backfill	Samples & In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m OD)	Legend	Stratum Description
	0.20 - 0.60 0.20 - 0.60	B D		0.20	7.13		(TOPSOIL) Soft, dark brown, organic slightly sandy CLAY.
				0.60	6.73		Firm, red brown, organic, slightly sandy slightly gravelly CLAY with low cobble content and medium boulder content. Sand is fine to coarse. Gravel is fine to coarse, rounded to sub-rounded.
	1.00 - 2.00 1.00 - 2.00	B D					Very soft, light brown, slightly sandy gravelly CLAY with low cobble content and low boulder content. Sand is fine to coarse. Gravel is fine to coarse, rounded to sub-angular limestone. Cobbles are rounded to sub-rounded, Limestone lithology. Boulders are sub-rounded, Limestone lithology, 200-400mm dia.
				2.00	5.33		End of Pit at 2.000m

1
2
3
4
5

Stability: Moderate.
Plant: 16T Track machine
Backfill: Arisings.

Groundwater: None encountered.

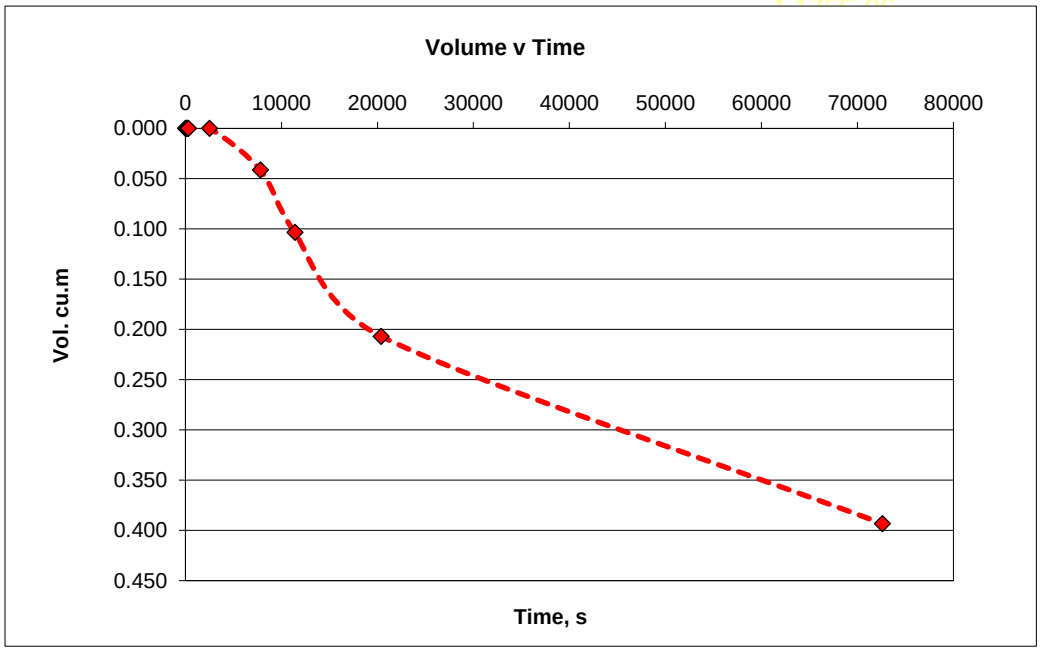
Remarks: Trial pit terminated at 2.00m bgl, required depth.

P21161	Raheen Housing Development	IT03	12/07/2021

l, m	**2.30**	b, m	**0.90**	d, m	**2.00**
l_base, m	**2.30**			d_eff, m	**0.90**
l_eff, m	**2.30**				

Time, min	Measure, m bgl	Time, sec	Depth water, m	Fall, m	Volume
0	1.10	0	0.90	0.00	0.000
1	1.10	60	0.90	0.00	0.000
2	1.10	120	0.90	0.00	0.000
3	1.10	180	0.90	0.00	0.000
4	1.10	240	0.90	0.00	0.000
5	1.10	300	0.90	0.00	0.000
42	1.10	2520	0.90	0.00	0.000
130	1.12	7800	0.88	0.02	0.041
190	1.15	11400	0.85	0.05	0.104
340	1.20	20400	0.80	0.10	0.207
1210	1.29	72600	0.71	0.19	0.393

Area	2.07	m^2	$V_{p75\text{-}25\ theory}$	volume	0.9315	m^3
50% Area_eff, a_{p50}	4.95	m^2	$V_{p\ 75\ -\ 25\ actual}$	volume	0.19665	m^3
50% Area_act, a_{p50}	2.507	m^2	$t_{p\ 75\text{-}\ 25\ actual}$	time	33822	s
			Infiltration Coefficient	*f*	2.32E-06	ms^-1



NOTES:
See IT03 for detailed soil description

Photographic Record

Number:	**IT03**	**Project** Raheen Housing **Project No** P21161 **Engineer** Hutch O`Malley Consulting	

Photographic Record

Number:	**IT03**	**Project** Raheen Housing **Project No** P21161 **Engineer** Hutch O`Malley Consulting	

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Trial Pit No
IT04
Sheet 1 of 1

Project Name: Raheen Housing Development	**Project No.** P21161	**Co-ords:** 554588E - 654667N **Level:** 4.55m OD	**Date** 12/07/2021
Location: Raheen, Co.Limerick		**Dimensions (m):** 1.80 x 0.90 **Depth:** 2.00m BGL	**Scale** 1:25
Client: Gary Lawlor			**Logged** RD

Water Strike & Backfill	Samples & In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m OD)	Legend	Stratum Description
				0.10	4.45		(TOPSOIL) Brown, organic, gravelly CLAY with low cobble content. Gravel is fine to coarse, rounded to sub-angular, Limestone. Cobbles are rounded to sub-angular, Limestone lithology.
	1.00 - 2.00	B					Very soft, light brown, slightly sandy, gravelly CLAY with medium cobble content and medium boulder content. Sand is fine to coarse. Gravel is fine to coarse, rounded to sub-angular limestone. Cobbles are rounded to sub-angular, Limestone lithology. Boulders are rounded to sub-angular, Limestone lithology, 200-500mm dia.
	1.50 - 2.00	D					
				2.00	2.55		End of Pit at 2.000m

1
2
3
4
5

Stability: Moderate.
Plant: 16T Track machine
Backfill: Arisings.

Groundwater: None encountered.

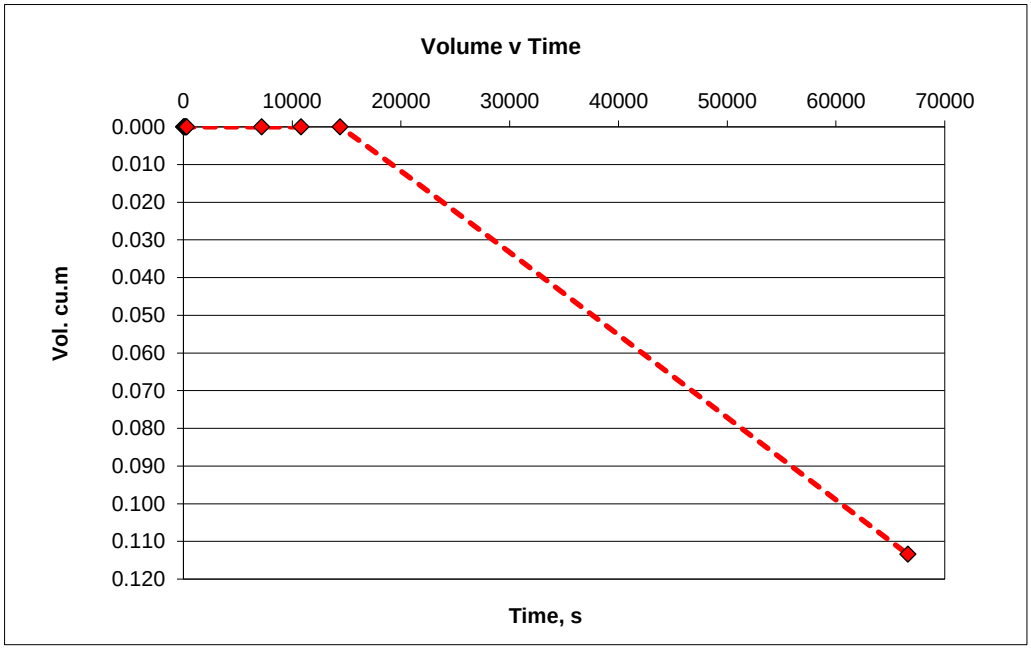
Remarks: Trial pit terminated at 2.00m bgl, required depth reached.

P21161	Raheen Housing Development	IT04	12/07/2021

l, m	**1.80**	b, m	**0.90**	d, m	**2.00**
l_base, m	**1.80**			d_eff, m	**1.05**
l_eff, m	**1.80**				

Time, min	Measure, m bgl	Time, sec	Depth water, m	Fall, m	Volume
0	0.95	0	1.05	0.00	0.000
1	0.95	60	1.05	0.00	0.000
2	0.95	120	1.05	0.00	0.000
3	0.95	180	1.05	0.00	0.000
4	0.95	240	1.05	0.00	0.000
5	0.95	300	1.05	0.00	0.000
120	0.95	7200	1.05	0.00	0.000
180	0.95	10800	1.05	0.00	0.000
240	0.95	14400	1.05	0.00	0.000
1110	1.02	66600	0.98	0.07	0.113

Area	1.62 m^2	$V_{p75\text{-}25\ theory}$	volume	0.8505	m^3
50% Area_eff, a_{p50}	4.455 m^2	$V_{p\ 75\ -\ 25\ actual}$	volume	0.0567	m^3
50% Area_act, a_{p50}	1.746 m^2	$t_{p\ 75\text{-}\ 25\ actual}$	time	26100	s
		Infiltration Coefficient	*f*	1.24E-06	ms^-1



NOTES:
See IT04 for detailed soil description

Photographic Record

Number:	**IT04**	**Project** Raheen Housing **Project No** P21161 **Engineer** Hutch O`Malley Consulting	

Photographic Record

Number:	**IT04**	**Project** Raheen Housing **Project No** P21161 **Engineer** Hutch O`Malley Consulting	

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Trial Pit No
ST01
Sheet 1 of 1

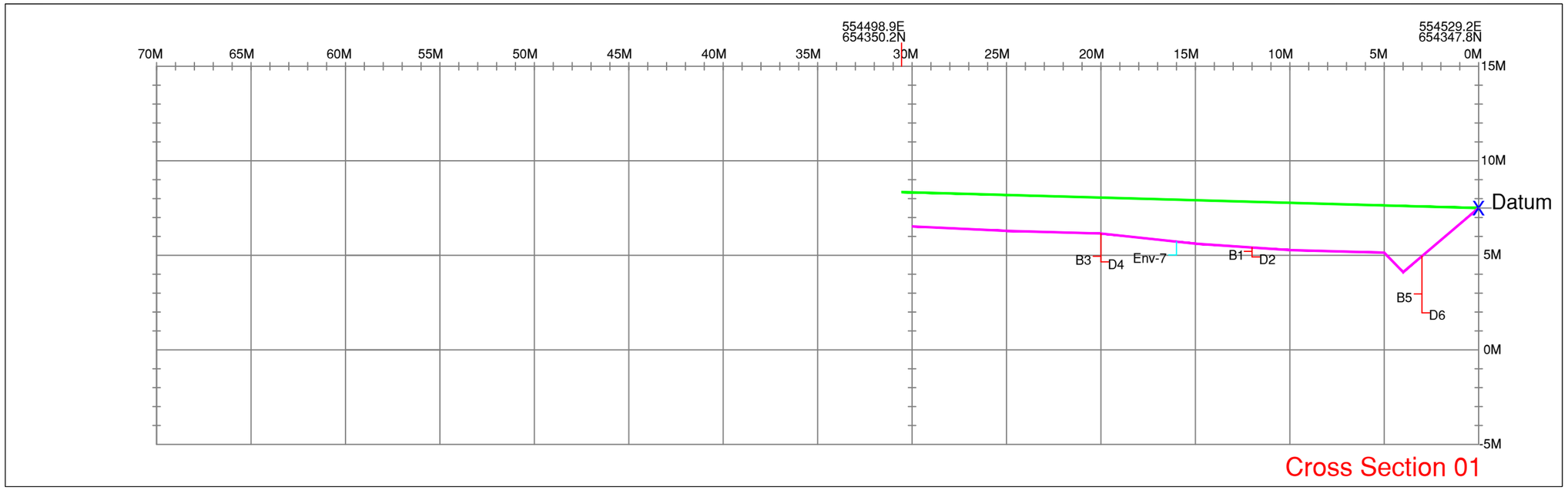
Project Name: Raheen Housing Development	**Project No.** P21161	**Co-ords:** 554529E - 654348N **Level:** 7.50m OD	**Date** 07/07/2021
Location: Raheen, Co.Limerick		**Dimensions (m):** 30.00 x 2.00 **Depth:** 3.50m BGL	**Scale** 1:25
Client: Gary Lawlor			**Logged** RD

Water Strike & Backfill	Samples & In Situ Testing			Depth (m)	Level (m OD)	Legend	Stratum Description
	Depth (m)	Type	Results				
	0.20 - 1.20	B		0.20	7.30		(TOPSOIL) Soft, dark brown mottled orange, organic slightly sandy slightly gravelly CLAY with low boulder content. Sand is fine to coarse. Gravel is fine to coarse, sub-angular to rounded, Limestone lithology.
	0.50 - 1.00	D					Soft, light brown, sandy slightly gravelly CLAY with low cobble content and low boulder content. Sand is fine to coarse. Gravel is fine to coarse, sub-angular to rounded, Limestone lithology. Cobbles are sub-angular to rounded, Limestone lithology. Boulders range in dia up to 700mm, are sub-rounded to rounded, Limestone lithology.
	0.70 - 1.00	ENV					
	1.20 - 2.00	B					
	1.50 - 2.00	D					
	2.00 - 3.00	B		2.00	5.50		Firm, light brown, slightly sandy gravelly CLAY with medium cobble content and high boulder content. Sand is fine to coarse. Gravel is fine to coarse, sub-angular to rounded, Limestone lithology. Cobbles are sub-angular to rounded and consist of limestone clasts. Boulders range in dia greater than 1m, are sub-angular to rounded, Limestone lithology.
	3.00 - 3.50	D					
				3.50	4.00		End of Pit at 3.500m

Stability: Good.
Plant: 16T track machine.
Backfill: Arisings.

Groundwater: None encountered.

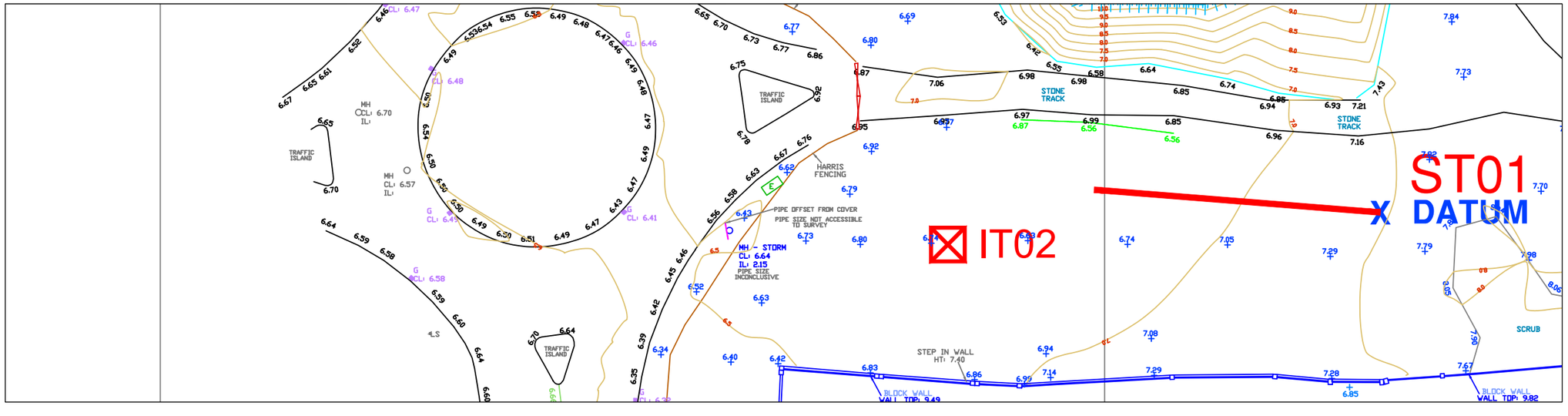
Remarks: Slit trench terminated at 3.50m bgl. Refer to DWG P21161 ST01 for cross sectional detail.



SLIT TRENCH SECTION, 1:200 ON A3

Legend

- Ground Profile Pre Works
- Ground Post Backfill Profile
- Bulk (Large) Sample B
- Bulk (Small disturbed) Sample D
- Environmental Sample Env-



SLIT TRENCH LOCATION PLAN, 1:500 ON A3

SLIT TRENCH NUMBER:
ST01

JOB NAME:
Raheen Housing

JOB NUMBER:
P21161

DRAWING NUMBER:
P21161-ST01

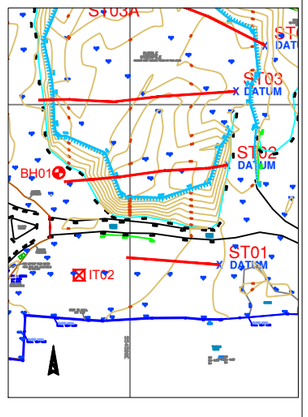
DATUM COORDINATES:
EASTING: 554529.2
NORTHING: 654347.8
LEVEL: 7.501mAOD

KEY:
DATUM: X

SLIT TRENCH DIMENSIONS:
LENGTH: 30.39m
WIDTH: 0.60m
DEPTH: 0.00m

STRATA SHOWN ON DETAILED LOG

DRAWN BY:		DATE:
Gary Curtin		20/07/2021
LOGGED BY:		DATE:
R.D.		07/07/2021
SCALE:	APPROVED:	REVISION:
AS STATED	GH	D01



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Photographic Record

Number:	**ST01**	**Project**	Raheen Housing	
		Project No	P21161	
		Engineer	Hutch O`Malley Consulting	

Photographic Record

Number:	**ST01**	**Project**	Raheen Housing
		Project No	P21161
		Engineer	Hutch O`Malley Consulting

Photographic Record

Number:	**ST01**	**Project**	Raheen Housing	
		Project No	P21161	
		Engineer	Hutch O`Malley Consulting	

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Trial Pit No
ST02
Sheet 1 of 1

Project Name: Raheen Housing Development	**Project No.** P21161	**Co-ords:** 554532E - 654380N **Level:** 8.34m OD	**Date** 07/07/2021
Location: Raheen, Co.Limerick		**Dimensions (m):** 54.00 × 2.10 **Depth:** 4.00m BGL	**Scale** 1:25
Client: Gary Lawlor			**Logged** RD

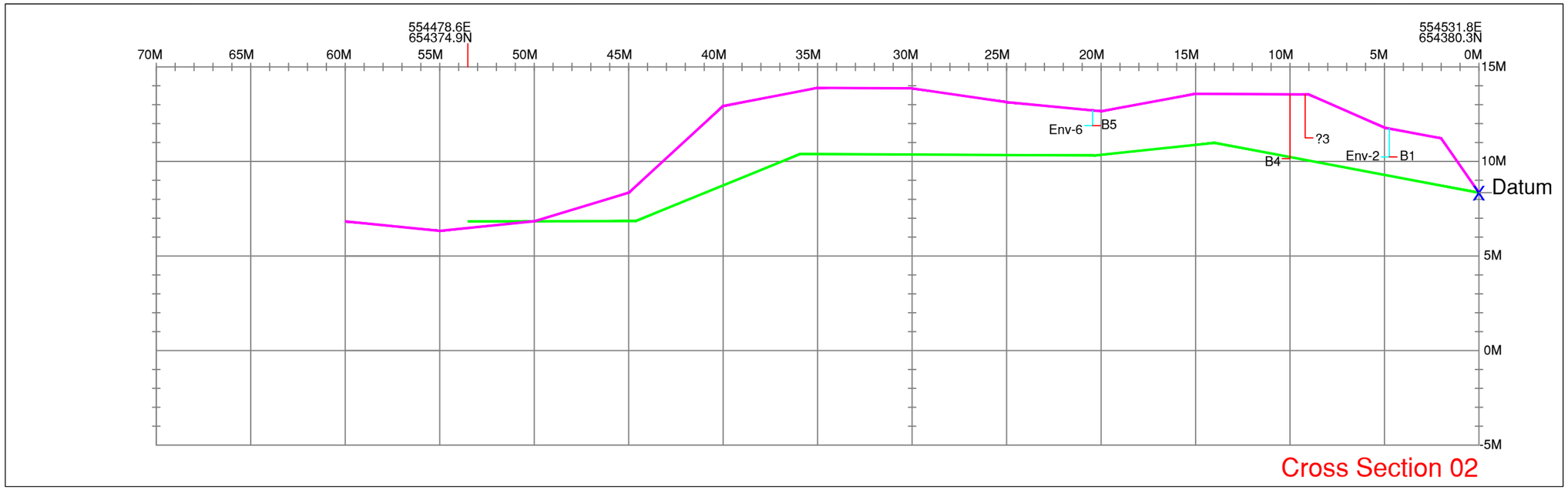
Water Strike & Backfill	Samples & In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m OD)	Legend	Stratum Description
	0.50 - 1.00	B					(MADE GROUND) Brown, slightly sandy slightly gravelly SILT with medium cobble content and medium boulder content. Strata contains old piping, rubbish, timber, metal, bricks, plastics, bitumen and a suspected asbestos tile was found. Sand is fine to coarse. Gravel is fine to coarse, sub-angular to rounded and consists of various lithologies. Cobbles are sub-rounded to rounded and consist of various lithologies. Boulders range greater than 1m in dia, are sub-rounded to rounded and consists of various lithologies.
	0.80 - 1.00	ENV					
	1.00 - 2.00	B					
	1.50 - 1.70	ENV					
	3.40 - 3.50	B					
				3.80	4.54		Light brown, slightly sandy gravelly CLAY with medium cobble content and high boulder content. Sand is fine to coarse. Gravel is fine to coarse, angular to sub-rounded, Limestone lithology. Cobbles are are sub-angular to rounded, Limestone lithology. Boulders range in dia greater than 1m, are angular to sub-rounded, Limestone lithology.
				4.00	4.34		End of Pit at 4.000m

1 2 3 4 5

Stability: Poor.
Plant: 16T track machine.
Backfill: Arisings.

Groundwater: None encountered.

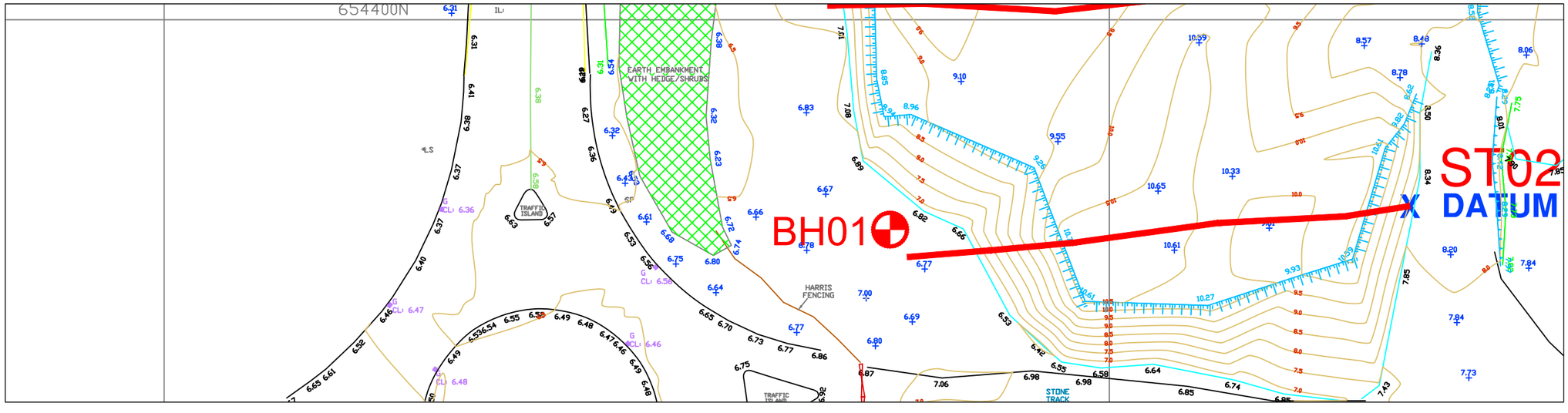
Remarks: Slit trench terminated at 4.00m bgl. Refer to DWG P21161 ST02 for cross sectional detail.



SLIT TRENCH SECTION, 1:200 ON A3

Legend

Ground Profile Pre Works	
Ground Post Backfill Profile	
Bulk (Large) Sample	B
Bulk (Small disturbed) Sample	D
Environmental Sample	Env-



SLIT TRENCH LOCATION PLAN, 1:500 ON A3

SLIT TRENCH NUMBER:
ST02

JOB NAME:
Raheen Housing

JOB NUMBER:
P21161

DRAWING NUMBER:
P21161-ST02

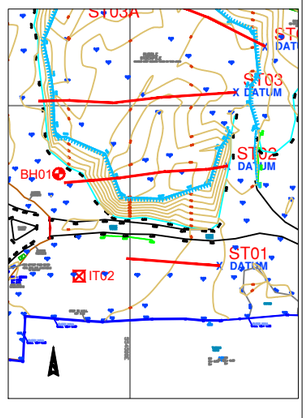
DATUM COORDINATES:
EASTING: 554531.8
NORTHING: 654380.3
LEVEL: 8.344mAOD

KEY:
DATUM: X

SLIT TRENCH DIMENSIONS:
LENGTH: 53.51m
WIDTH: 0.60m
DEPTH: 0.00m

STRATA SHOWN ON DETAILED LOG

DRAWN BY:		DATE:
Gary Curtin		20/07/2021
LOGGED BY:		DATE:
R.D.		07/07/2021
SCALE:	APPROVED:	REVISION:
AS STATED	GH	D01



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Photographic Record

Number:	**ST02**	**Project** Raheen Housing **Project No** P21161 **Engineer** Hutch O`Malley Consulting	

Photographic Record

Number:	**ST02**	**Project** Raheen Housing **Project No** P21161 **Engineer** Hutch O`Malley Consulting	

Photographic Record

Number:	**ST02**	**Project**	Raheen Housing	
		Project No	P21161	
		Engineer	Hutch O`Malley Consulting	

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Trial Pit No
ST03
Sheet 1 of 1

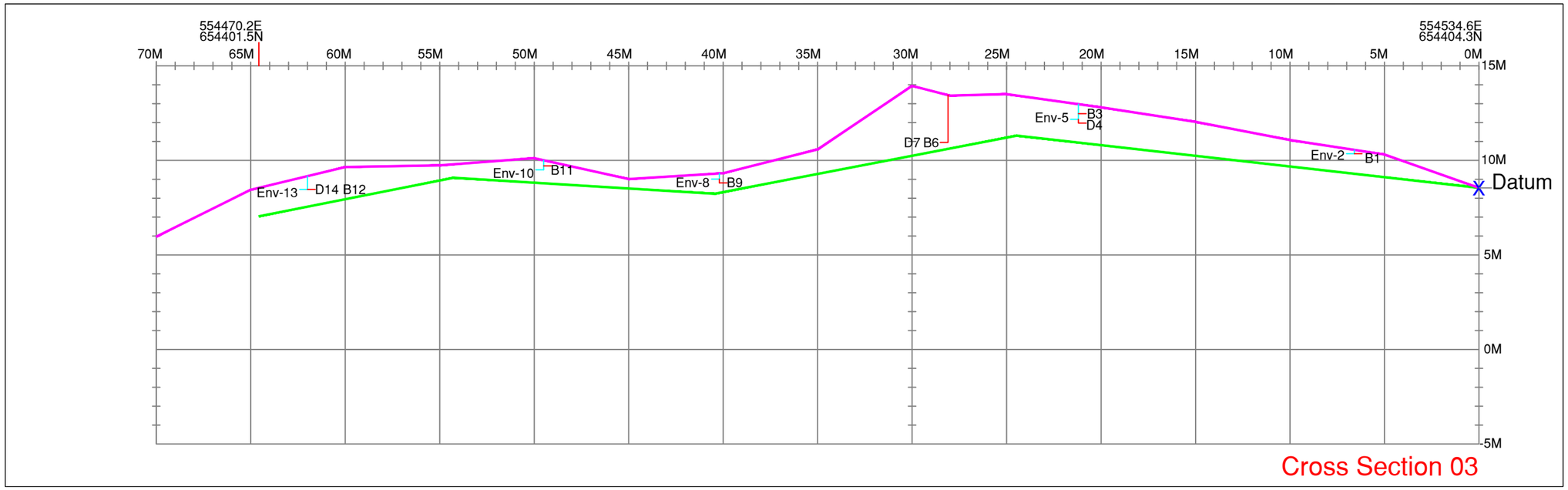
Project Name: Raheen Housing Development	**Project No.** P21161	**Co-ords:** 554535E - 654404N **Level:** 8.56m OD	**Date** 08/07/2021
Location: Raheen, Co.Limerick		**Dimensions (m):** 65.00 × 2.10	**Scale** 1:25
Client: Gary Lawlor		**Depth:** 2.90m BGL	**Logged** RD.

Water Strike & Backfill	Samples & In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m OD)	Legend	Stratum Description
	0.20 - 0.50	B		0.20	8.36		(TOPSOIL) Dark brown, organic, slightly sandy gravelly CLAY with low boulder content and low boulder content. Sand is fine to coarse and sub-angular to rounded. Cobbles are angular to rounded and consist of various lithologies. Boulders range in dia up to 500mm, are angular to sub-rounded and consist of various lithologies.
	0.20 - 0.50	ENV					
	0.30 - 0.70	ENV					
	0.30 - 1.30	B					
	0.50 - 1.00	B					
	0.50 - 1.00	ENV					
	0.50 - 1.50	B					
	0.70 - 1.00	ENV					
	0.70 - 1.60	B					
	0.80 - 1.00	ENV					
	1.00 - 1.50	D					(MADE GROUND) Multiple strata seen that vary in depth along trench. Strata 1: Grey, sandy GRAVEL with a medium cobble content, fabric, brick and bitumen. Sand is fine to coarse. Gravel is fine to coarse, angular to sub-rounded, Limestone lithology. Cobbles are angular to sub-rounded, Limestone lithology.
	1.00 - 1.50	D					
	2.30 - 2.50	D					Strata 2: Soft, light brown, slightly gravelly CLAY with high cobble content, high boulder content, concrete and bitumen. Gravel is fine to coarse, angular to sub-rounded and consist of various lithologies. Cobbles are angular to sub-rounded and consist of various lithologies. Boulders range in dia up to greater than 1m, are angular to sub-rounded and consist of various lithologies. Strata 3: Brown, slightly sandy slightly gravelly SILT with medium cobble content, low boulder content and minor amounts of general fill. Sand is fine to coarse. Gravel is fine to coarse, sub-angular to rounded and consist of various lithologies. Cobbles are sub-angular to rounded and consist of various lithologies. Boulders range in dia up to 500mm, are sub-rounded to rounded and consist of various lithologies.
	2.50 - 2.80	B					
				2.70	5.86		Strata 4: Grey, light brown, slightly clayey gravelly SAND with high cobble content, low boulder content, piping, fragmented brick and concrete. Sand is fine to coarse. Gravel is fine to coarse, angular to sub-rounded, Limestone lithology. Cobbles are sub-angular to sub-rounded and consist of various lithologies. Boulders range in dia up to 400mm and are sub-rounded to rounded.
				2.90	5.66		Strata 5: Brown black, slight sandy gravelly CLAY with medium cobble content, high boulder content, high amounts of fill including concrete, rubbish, timber, brick, styrofoam, general waste and construction waste. Red brown black, occasional organics, slightly sandy CLAY. Sand is fine to coarse. End of Pit at 2.900m

Stability: Poor.
Plant: 16T track machine.
Backfill: Arisings.

Groundwater: None encountered.

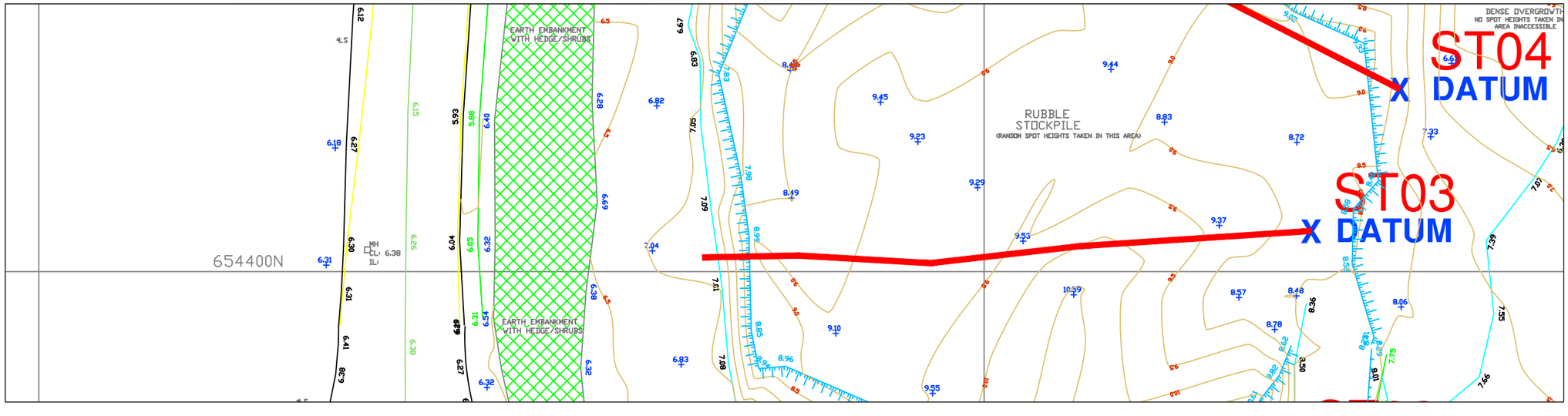
Remarks: Slit trench terminated at 2.90m bgl. Refer to DWG P21161 ST03 for cross sectional detail.



SLIT TRENCH SECTION, 1:200 ON A3

Legend

Ground Profile Pre Works	
Ground Post Backfill Profile	
Bulk (Large) Sample	B
Bulk (Small disturbed) Sample	D
Environmental Sample	Env-



SLIT TRENCH LOCATION PLAN, 1:500 ON A3

SLIT TRENCH NUMBER:
ST03

JOB NAME:
Raheen Housing

JOB NUMBER:
P21161

DRAWING NUMBER:
P21161-ST03

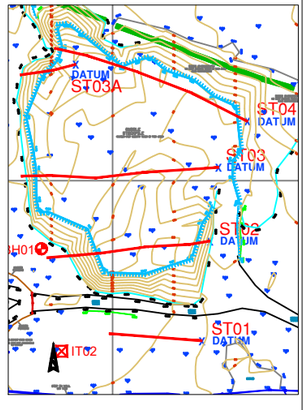
DATUM COORDINATES:
EASTING: 554534.6
NORTHING: 654404.3
LEVEL: 8.565mAOD

KEY:
DATUM: X

SLIT TRENCH DIMENSIONS:
LENGTH: 64.57m
WIDTH: 0.60m
DEPTH: 0.00m

STRATA SHOWN ON DETAILED LOG

DRAWN BY:		DATE:
Gary Curtin		20/07/2021
LOGGED BY:		DATE:
R.D.		08/07/2021
SCALE:	APPROVED:	REVISION:
AS STATED	GH	D01



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Photographic Record

Number:	**ST03**	**Project** Raheen Housing **Project No** P21161 **Engineer** Hutch O`Malley Consulting	

Photographic Record

Number:	**ST03**	**Project**	Raheen Housing	
		Project No	P21161	
		Engineer	Hutch O`Malley Consulting	

Photographic Record

Number:	**ST03**	**Project**	Raheen Housing	
		Project No	P21161	
		Engineer	Hutch O`Malley Consulting	

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Trial Pit No
ST03A
Sheet 1 of 1

Project Name: Raheen Housing Development	**Project No.** P21161	**Co-ords:** 554488E - 654438N **Level:** 8.52m OD	**Date** 09/07/2021
Location: Raheen, Co.Limerick		**Dimensions (m):** 18.00 × 2.10	**Scale** 1:25
Client: Gary Lawlor		**Depth:** 2.30m BGL	**Logged** RD

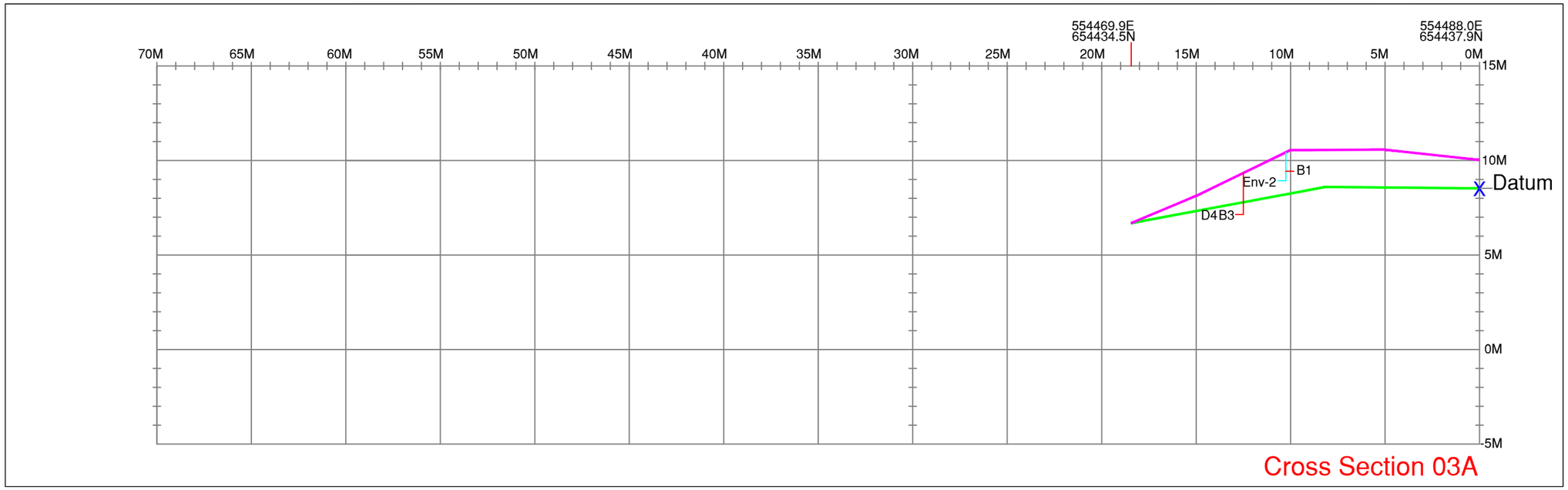
Water Strike & Backfill	Samples & In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m OD)	Legend	Stratum Description
	1.00 - 2.00	B					(MADE GROUND) Light brown, clayey GRAVEL with high cobble content, high boulder content, timber, concrete, metal and bricks. Gravel is fine to coarse, angular to sub-rounded and consist of various lithologies. Cobbles are angular to sub-rounded and consist of various lithologies. Boulders range greater than 1m in dia, are sub-angular to sub-rounded, Limestone lithology.
	1.50 - 1.80	ENV					
	2.20 - 2.30	B		2.20 2.30	6.32 6.22		Firm, red brown, slightly sandy gravelly SILT with high cobble content and high boulder content. Sand is fine to coarse. Gravel is fine to coarse, angular to sub-rounded and consist of limestone clasts. Cobbles are angular to sub-rounded and consist of limestone clasts. Boulders range in dia up to 800mm, are angular to sub-rounded and consist of limestone clasts. End of Pit at 2.300m

1
2
3
4
5

Stability: Poor.
Plant: 16T track machine.
Backfill: Arisings.

Groundwater: None encountered.

Remarks: Slit trench terminated at 2.30m bgl. Refer to DWG P21161 ST03a for cross sectional detail.

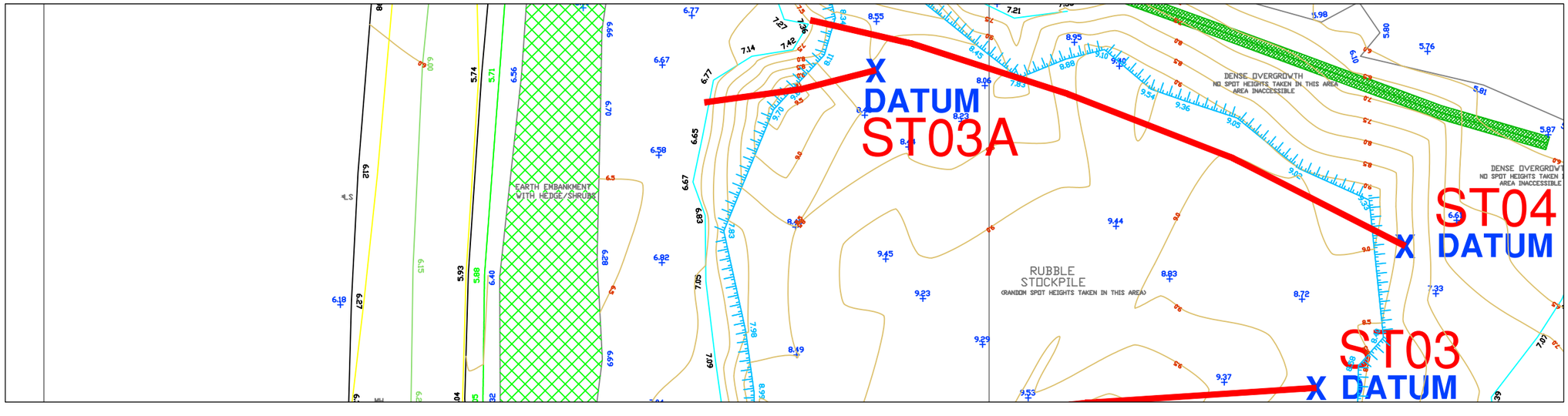


Cross Section 03A

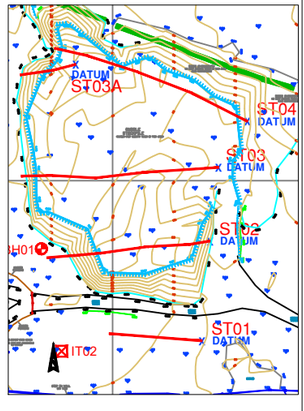
SLIT TRENCH SECTION, 1:200 ON A3

Legend

- Ground Profile Pre Works
- Ground Post Backfill Profile
- Bulk (Large) Sample — B
- Bulk (Small disturbed) Sample — D
- Environmental Sample — Env-



SLIT TRENCH LOCATION PLAN, 1:500 ON A3



SLIT TRENCH NUMBER:
ST03A

JOB NAME:
Raheen Housing

JOB NUMBER:
P21161

DRAWING NUMBER:
P21161-ST03A

DATUM COORDINATES:
EASTING: 554488.0
NORTHING: 654437.9
LEVEL: 8.525mAOD

KEY:
DATUM: X

SLIT TRENCH DIMENSIONS:
LENGTH: 18.44m
WIDTH: 0.60m
DEPTH: 0.00m

STRATA SHOWN ON DETAILED LOG

DRAWN BY:		DATE:
Gary Curtin		20/07/2021
LOGGED BY:		DATE:
R.D.		09/07/2021
SCALE:	APPROVED:	REVISION:
AS STATED	GH	D01

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Photographic Record

Number:	**ST03A**	**Project** Raheen Housing **Project No** P21161 **Engineer** Hutch O`Malley Consulting	

Photographic Record

Number:	**ST03A**	**Project**	Raheen Housing	
		Project No	P21161	
		Engineer	Hutch O`Malley Consulting	

Photographic Record

Number:	**ST03A**	**Project**	Raheen Housing	
		Project No	P21161	
		Engineer	Hutch O`Malley Consulting	

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Trial Pit No
ST04
Sheet 1 of 1

Project Name: Raheen Housing Development	**Project No.** P21161	**Co-ords:** 554544E - 654419N **Level:** 8.57m OD	**Date** 08/07/2021
Location: Raheen, Co.Limerick		**Dimensions (m):** 63.00 × 2.10	**Scale** 1:25
Client: Gary Lawlor		**Depth:** 3.50m BGL	**Logged** RD

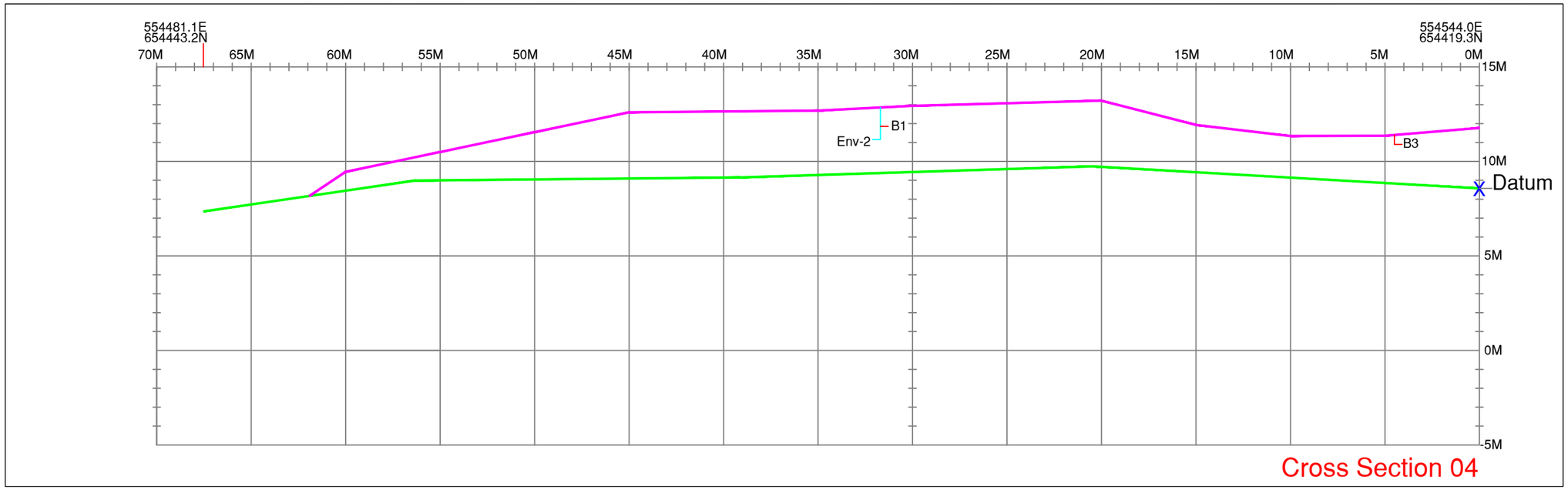
Water Strike & Backfill	Samples & In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m OD)	Legend	Stratum Description
	0.50 - 1.00	B					(MADE GROUND) 4 different strata of Made Ground. Strata 1: Grey, gravelly SAND with high cobble content and medium boulder content. Sand is fine to coarse. Gravel is fine to coarse, angular to sub-rounded. Cobbles are 63mm to 200mm dia, angular to sub-rounded with a varied lithology. Boulders are 200mm to over 1000mm dia, angular to sub-angular with a varied lithology. Large bitumen boulders found.
	1.00 - 2.00	B					Strata 2: Light brown, gravelly CLAY with high cobble content and high boulder content. Gravel is fine to coarse, angular to sub-angular with a varied lithology. Cobbles are 63mm to 200mm dia, angular to sub-angular. Boulders range in dia greater than 1m, are angular to sub-angular and consist of limestone clasts.
	1.70 - 2.20	ENV					Strata 3: light brown, clayey GRAVEL with a high cobble content, a high boulder content, plastic, timber and concrete. Gravel is fine to coarse, angular to sub-angular and consist of various lithologies. Cobbles are angular to sub-angular and consist of various lithologies. Boulders range in dia up to 800mm, are sub-angular to sub-rounded and consist of limestone clasts. Strata 4: Grey, SAND with high cobble content, high boulder content, concrete and occasional plastics. Sand is fine to coarse. Cobbles are angular to sub-angular and consist of various lithologies. Boulders range in dia up to 900mm, are sub-angular, Limestone lithology.
				3.40	5.17		Firm, red brown, slightly sandy CLAY. Sand is fine to medium.
				3.50	5.07		End of Pit at 3.500m

1 2 3 4 5

Stability: Poor
Plant: 16T track machine.
Backfill: Arisings.

Groundwater: None encountered.

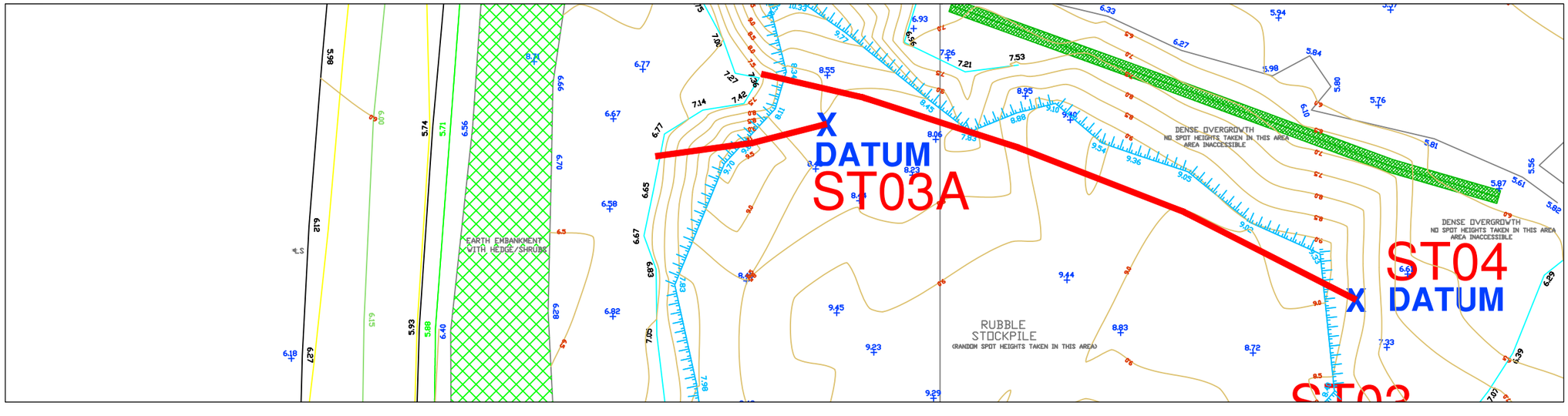
Remarks: Slit trench terminated at 3.50m bgl. Refer to DWG P21161 ST04 for cross sectional detail.



SLIT TRENCH SECTION, 1:200 ON A3

Legend

Ground Profile Pre Works	
Ground Post Backfill Profile	
Bulk (Large) Sample	B
Bulk (Small disturbed) Sample	D
Environmental Sample	Env-



SLIT TRENCH LOCATION PLAN, 1:500 ON A3

SLIT TRENCH NUMBER:
ST04

JOB NAME:
Raheen Housing

JOB NUMBER:
P21161

DRAWING NUMBER:
P21161-ST04

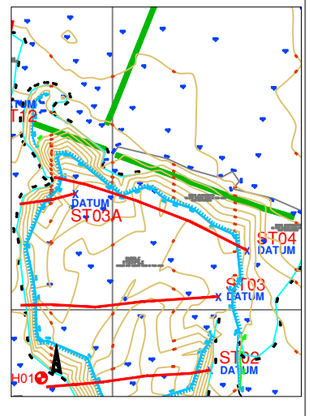
DATUM COORDINATES:
EASTING: 554544.0
NORTHING: 654419.3
LEVEL: 8.571mAOD

KEY:
DATUM: X

SLIT TRENCH DIMENSIONS:
LENGTH: 67.53m
WIDTH: 0.60m
DEPTH: 0.00m

STRATA SHOWN ON DETAILED LOG

DRAWN BY:		DATE:
Gary Curtin		20/07/2021
LOGGED BY:		DATE:
R.D.		08/07/2021
SCALE:	APPROVED:	REVISION:
AS STATED	GH	D01



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Photographic Record

Number:	**ST04**	**Project**	Raheen Housing	
		Project No	P21161	
		Engineer	Hutch O`Malley Consulting	

Photographic Record

Number:	**ST04**	**Project**	Raheen Housing	
		Project No	P21161	
		Engineer	Hutch O`Malley Consulting	

Photographic Record

Number:	**ST04**	**Project**	Raheen Housing	
		Project No	P21161	
		Engineer	Hutch O`Malley Consulting	

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Trial Pit No
ST08
Sheet 1 of 1

Project Name: Raheen Housing Development	**Project No.** P21161	**Co-ords:** 554627E - 654651N **Level:** 4.00m OD	**Date** 13/07/2021
Location: Raheen, Co.Limerick		**Dimensions (m):** 60.00 x 2.10 **Depth:** 4.00m BGL	**Scale** 1:25
Client: Gary Lawlor			**Logged** RD.

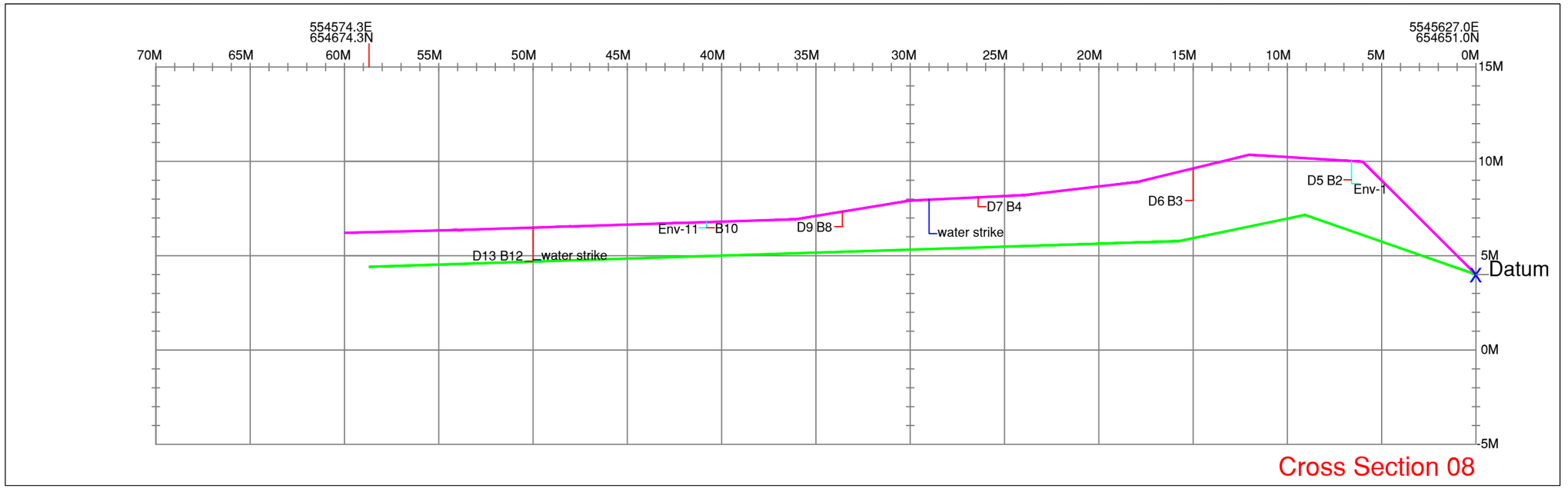
Water Strike & Backfill	Samples & In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m OD)	Legend	Stratum Description
				0.10	3.90		(TOPSOIL) Dark brown, organic gravelly CLAY with high cobble content and low boulder content. Gravel is fine to coarse, sub-angular to rounded and consist of various lithologies. Cobbles are angular to sub-rounded and consist of various lithologies. Boulders range in dia up to 600mm, are angular to sub-angular, Limestone lithology.
	0.30 - 0.80	B					(MADE GROUND) 5 different strata of MG seen.
	0.50 - 1.00	B					Strata 1: Firm, light brown, slightly sandy gravelly CLAY with high cobble content, medium boulder content, concrete, timber, wrapping and wiring. Sand is fine to coarse. Gravel is fine to coarse, angular to sub-rounded and consist of various lithologies. Cobbles are angular to sub-angular, Limestone lithology. Boulders range in dia up to 600mm are sub-angular, Limestone lithology.
	0.50 - 1.00	D					
	0.80 - 1.50	B					
	0.80 - 1.50	D					
	1.00 - 1.50	B					
	1.00 - 1.50	D					
	1.20 - 1.50	ENV					
▼	1.70 - 2.20	B					Strata 2: Firm, red brown slightly sandy slightly gravelly CLAY with high cobble content, low boulder content, concrete and rubbish. Sand is fine to coarse. Gravel is fine to coarse, angular to sub-rounded and consists of various lithologies. Cobbles are angular to rounded and consist of various lithologies. Boulders range in dia up to 700mm, are sub-angular to sub-rounded, Limestone lithology.
▼	1.70 - 2.20	D					
	1.80 - 2.00	B					
	1.80 - 2.00	D					
							Strata 3: Soft, black, slightly sandy slightly gravelly CLAY with timber, olfactory senses indicate hydrocarbon contamination. Sand is fine to coarse. Gravel is fine to coarse, angular to sub-angular and consist of various lithologies.
							Strata 4: Stiff, grey brown orange, gravelly CLAY with high cobble content, medium boulder content, bricks, timber and plastic. Gravel is fine to coarse, angular to sub-rounded and consists of various lithologies. Cobbles are angular to rounded and consist of various lithologies. Boulders range in dia up to 700mm, are angular to sub-rounded, Limestone lithology.
							Strata 5: Grey brown, slightly gravelly sandy CLAY with medium cobble content and medium boulder content. Sand is fine to coarse. Gravel is fine to coarse, angular to rounded and consists of various lithologies. Cobbles are angular to rounded and consist of various lithologies. Boulders range in dia up to 600mm, are sub-angular to sub-rounded, Limestone lithology.
				3.80	0.20		Soft, black, organic CLAY.
				4.00	0.00		End of Pit at 4.000m

1 2 3 4 5

Stability: Poor.
Plant: 16T track machine.
Backfill: Arisings.

Groundwater: 1.80m: Slow rate of flow seen 29m from datum of trench.

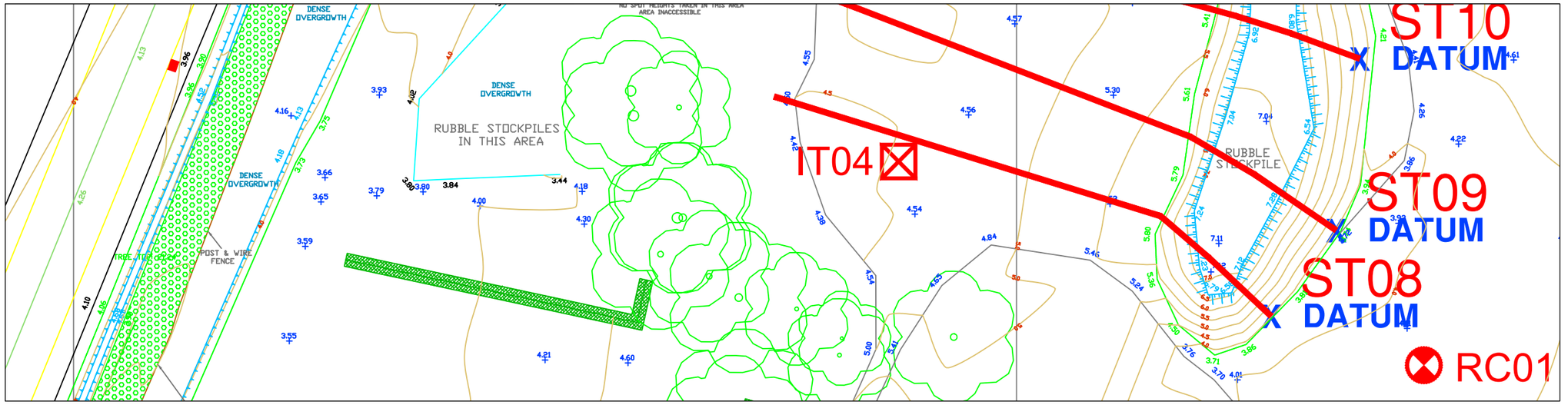
Remarks: Slit trench terminated at 4.00m bgl. Refer to DWG P21161 ST08 for cross sectional detail.



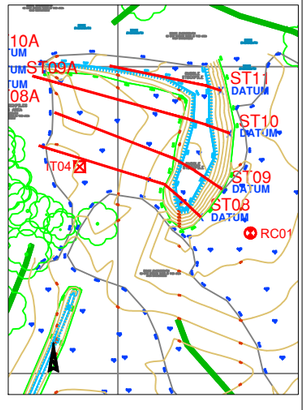
SLIT TRENCH SECTION, 1:200 ON A3

Legend

Ground Profile Pre Works	
Ground Post Backfill Profile	
Bulk (Large) Sample	B
Bulk (Small disturbed) Sample	D
Environmental Sample	Env-



SLIT TRENCH LOCATION PLAN, 1:500 ON A3



SLIT TRENCH NUMBER:
ST08

JOB NAME:
Raheen Housing

JOB NUMBER:
P21161

DRAWING NUMBER:
P21161-ST08

DATUM COORDINATES:
EASTING: 554627.0
NORTHING: 654651.0
LEVEL: 4.000mAOD

KEY:
DATUM: X

SLIT TRENCH DIMENSIONS:
LENGTH: 58.70m
WIDTH: 0.60m
DEPTH: 0.00m

STRATA SHOWN ON DETAILED LOG

DRAWN BY:	DATE:
Gary Curtin	20/07/2021
LOGGED BY:	DATE:
R.D.	12/07/2021

SCALE:	APPROVED:	REVISION:
AS STATED	GH	D01

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Photographic Record

Number:	**ST08**	**Project**	Raheen Housing	
		Project No	P21161	
		Engineer	Hutch O`Malley Consulting	

Photographic Record

Number:	**ST08**	**Project**	Raheen Housing	
		Project No	P21161	
		Engineer	Hutch O`Malley Consulting	

Photographic Record

Number:	**ST08**	**Project**	Raheen Housing	
		Project No	P21161	
		Engineer	Hutch O`Malley Consulting	

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Trial Pit No
ST08A
Sheet 1 of 1

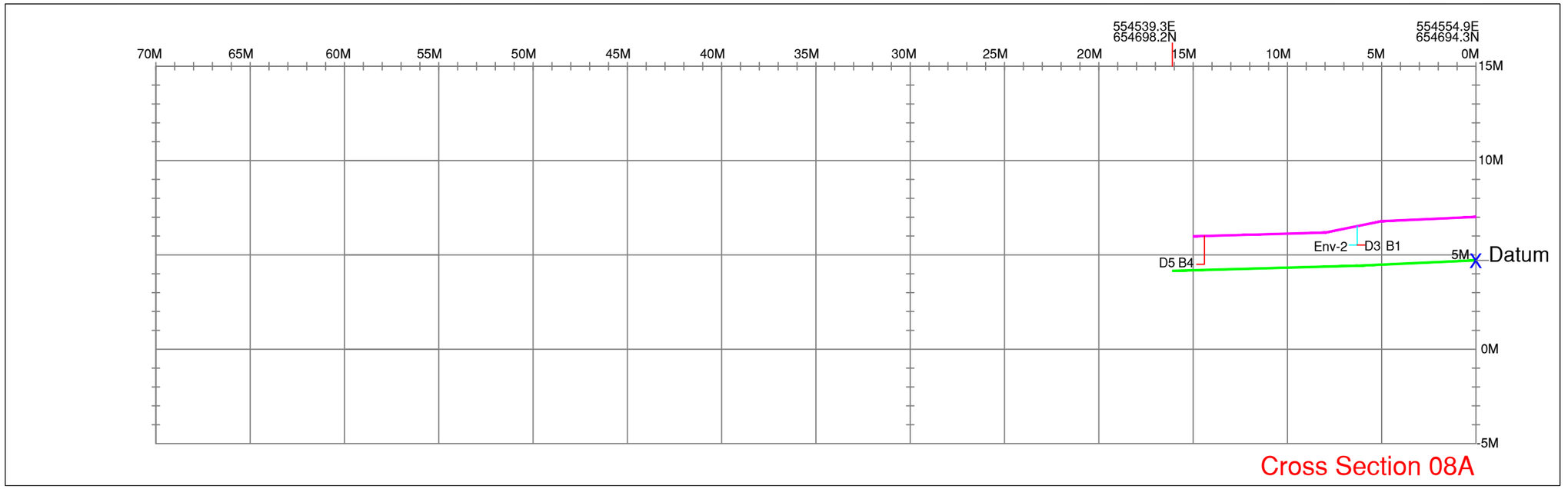
Project Name: Raheen Housing Development	**Project No.** P21161	**Co-ords:** 554555E - 654694N **Level:** 4.71m OD	**Date** 15/07/2021
Location: Raheen, Co.Limerick		**Dimensions (m):** 15.00 x 2.50 **Depth:** 2.50m BGL	**Scale** 1:25
Client: Gary Lawlor			**Logged** RD.

Water Strike & Backfill	Samples & In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m OD)	Legend	Stratum Description
	1.00 - 2.00 1.00 - 2.00 1.00 - 2.00	B D ENV					(MADE GROUND) Soft to stiff, light brown grey, slightly sandy gravelly CLAY with medium cobble content, medium boulder content and occasional plastic, concrete and brick. Sand is fine to coarse. Gravel is fine to coarse, angular to sub-rounded and consists of various lithologies. Cobbles are angular to sub-angular and consist of various lithologies. Boulders range in dia up to 700mm, are sub-angular to sub-rounded and consist of various lithologies.
	1.50 - 1.60 1.50 - 1.60	B D					
				2.30	2.41		Soft, black, organic CLAY.
				2.50	2.21		End of Pit at 2.500m

Stability: Poor.
Plant: 16T track machine.
Backfill: Arisings.

Groundwater: None encountered.

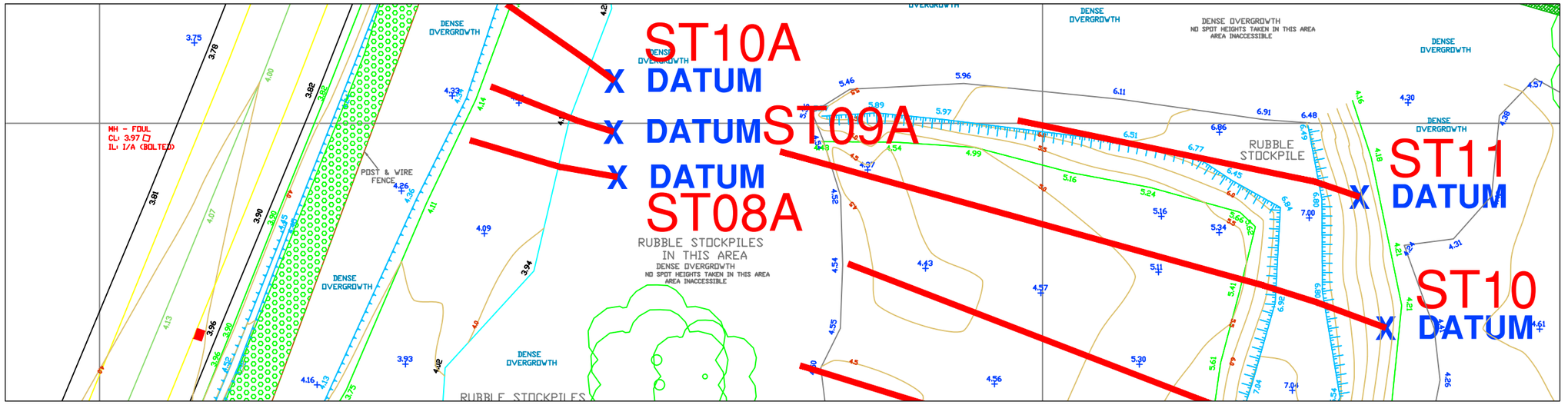
Remarks: Slit trench terminated at 2.50m bgl. Refer to DWG P21161 ST08A for cross sectional detail.



SLIT TRENCH SECTION, 1:200 ON A3

Legend

Ground Profile Pre Works	
Ground Post Backfill Profile	
Bulk (Large) Sample	B
Bulk (Small disturbed) Sample	D
Environmental Sample	Env-



SLIT TRENCH LOCATION PLAN, 1:500 ON A3

SLIT TRENCH NUMBER:
ST08A

JOB NAME:
Raheen Housing

JOB NUMBER:
P21161

DRAWING NUMBER:
P21161-ST08A

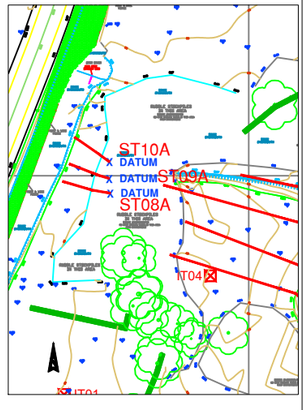
DATUM COORDINATES:
EASTING: 554554.9
NORTHING: 654694.3
LEVEL: 4.711mAOD

KEY:
DATUM: X

SLIT TRENCH DIMENSIONS:
LENGTH: 16.10m
WIDTH: 0.60m
DEPTH: 0.00m

STRATA SHOWN ON DETAILED LOG

DRAWN BY: Gary Curtin		DATE: 20/07/2021
LOGGED BY: R.D.		DATE: 15/07/2021
SCALE: AS STATED	APPROVED: GH	REVISION: D01



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Photographic Record

Number:	**ST08A**	**Project** Raheen Housing **Project No** P21161 **Engineer** Hutch O`Malley Consulting	

Photographic Record

Number:	**ST08A**	**Project** Raheen Housing **Project No** P21161 **Engineer** Hutch O`Malley Consulting	

Photographic Record

Number:	**ST08A**	**Project**	Raheen Housing	
		Project No	P21161	
		Engineer	Hutch O`Malley Consulting	

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Trial Pit No
ST09
Sheet 1 of 1

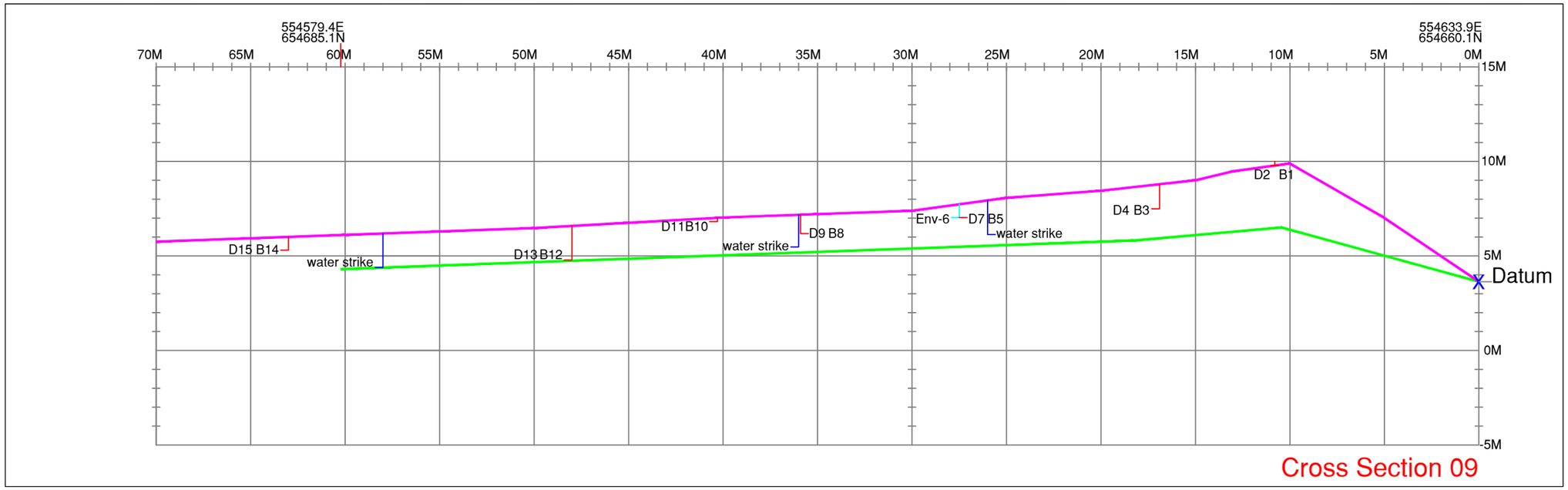
Project Name: Raheen Housing Development	**Project No.** P21161	**Co-ords:** 554634E - 654660N **Level:** 3.63m OD	**Date** 13/07/2021
Location: Raheen, Co.Limerick		**Dimensions (m):** 70.00 x 2.10	**Scale** 1:25
Client: Gary Lawlor		**Depth:** 4.00m BGL	**Logged** RD.

Water Strike & Backfill	Samples & In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m OD)	Legend	Stratum Description
	0.00 - 1.00	B					(MADE GROUND) Four different strata of Made Ground.
	0.00 - 1.00	D					
	0.20 - 1.20	B					Strata 1: Stiff, brown, orange yellow, slightly sandy gravelly CLAY with high cobble content, medium boulder content, plastic, concrete, metal, brick and timber. Sand is fine to coarse. Gravel is fine to coarse, angular to rounded and consists of various lithologies. Cobbles are angular to rounded and consists of various lithologies. Boulders range in dia up to 800mm, are sub-angular to sub-rounded and consist of various lithologies.
	0.20 - 1.20	D					
	0.70 - 1.20	B					
	0.70 - 1.20	D					
	0.70 - 1.20	ENV					
	0.70 - 1.50	B					Strata 2: Soft, grey brown, slightly gravelly sandy CLAY with medium cobble content, medium boulder content, timber, piping and scaffolding. Sand is fine to coarse. Gravel is fine to coarse, angular to rounded and consists of various lithologies. Cobbles are angular to sub-rounded and consist of various lithologies. Boulders range in dia up to 700mm, are sub-angular to sub-rounded and consist of various lithologies.
	0.70 - 1.50	D					
	1.00 - 2.00	B					
	1.00 - 2.00	D					
	1.30 - 2.30	B					
	1.30 - 2.30	D					
▼	1.80 - 2.00	B					Strata 3: Soft to stiff, light brown, slightly sandy gravelly CLAY with medium cobble content, medium boulder content, plastic, concrete, rope, metal, fabric, rubbish, timber and bricks. Sand is fine to coarse. Gravel is fine to coarse, angular to rounded and consists of various lithologies. Cobbles are angular to sub-rounded and consist of various lithologies. Boulders range in dia up to 700mm, are sub-angular to sub-rounded and consist of limestone clasts.
▼	1.80 - 2.00	D					
				3.80	-0.17		Soft, black, organic, CLAY.
				4.00	-0.37		Strata 4: Soft, black, slightly sandy slightly gravelly CLAY with timber, olfactory senses indicate hydrocarbon contamination. Sand is fine to coarse. Gravel is fine to coarse, angular to sub-angular and consist of various lithologies.
							End of Pit at 4.000m

Stability: Very poor.
Plant: 16T track machine.
Backfill: Arisings.

Groundwater: 1.80m: Slow rate of flow seen 26m along trench.

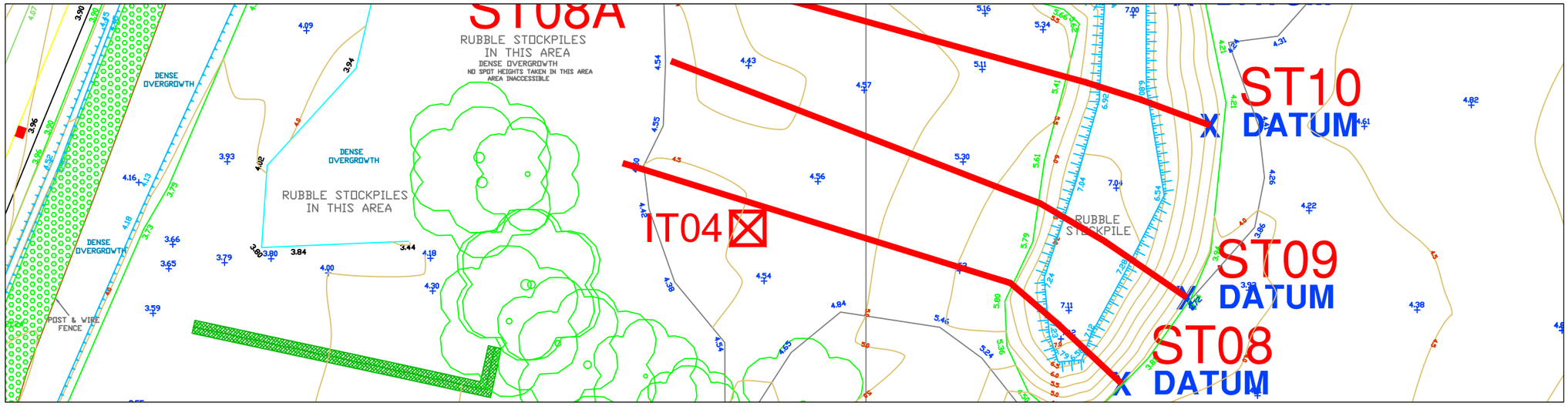
Remarks: Slit trench terminated at 4.00m bgl. Refer to DWG P21161 ST09 for cross sectional detail.



SLIT TRENCH SECTION, 1:200 ON A3

Legend

Ground Profile Pre Works	
Ground Post Backfill Profile	
Bulk (Large) Sample	B
Bulk (Small disturbed) Sample	D
Environmental Sample	Env-



SLIT TRENCH LOCATION PLAN, 1:500 ON A3

SLIT TRENCH NUMBER:
ST09

JOB NAME:
Raheen Housing

JOB NUMBER:
P21161

DRAWING NUMBER:
P21161-ST09

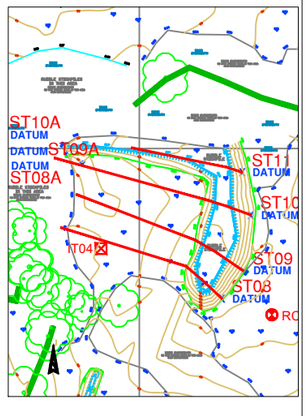
DATUM COORDINATES:
EASTING: 554633.9
NORTHING: 654660.1
LEVEL: 3.632mAOD

KEY:
DATUM: X

SLIT TRENCH DIMENSIONS:
LENGTH: 60.23m
WIDTH: 0.60m
DEPTH: 0.00m

STRATA SHOWN ON DETAILED LOG

DRAWN BY:		DATE:
Gary Curtin		20/07/2021
LOGGED BY:		DATE:
R.D.		13/07/2021
SCALE:	APPROVED:	REVISION:
AS STATED	GH	D01



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Photographic Record

Number:	**ST09**	**Project**	Raheen Housing	
		Project No	P21161	
		Engineer	Hutch O`Malley Consulting	

Photographic Record

Number:	**ST09**	**Project**	Raheen Housing	
		Project No	P21161	
		Engineer	Hutch O`Malley Consulting	

Photographic Record

Number:	**ST09**	**Project**	Raheen Housing	
		Project No	P21161	
		Engineer	Hutch O`Malley Consulting	

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Trial Pit No
ST09A
Sheet 1 of 1

Project Name: Raheen Housing Development	**Project No.** P21161	**Co-ords:** 554554E - 654699N **Level:** 8.74m OD	**Date** 15/07/2021
Location: Raheen, Co.Limerick	**Dimensions (m):** 15.00 × 2.50		**Scale** 1:25
Client: Gary Lawlor	**Depth:** 3.00m BGL		**Logged** RD.

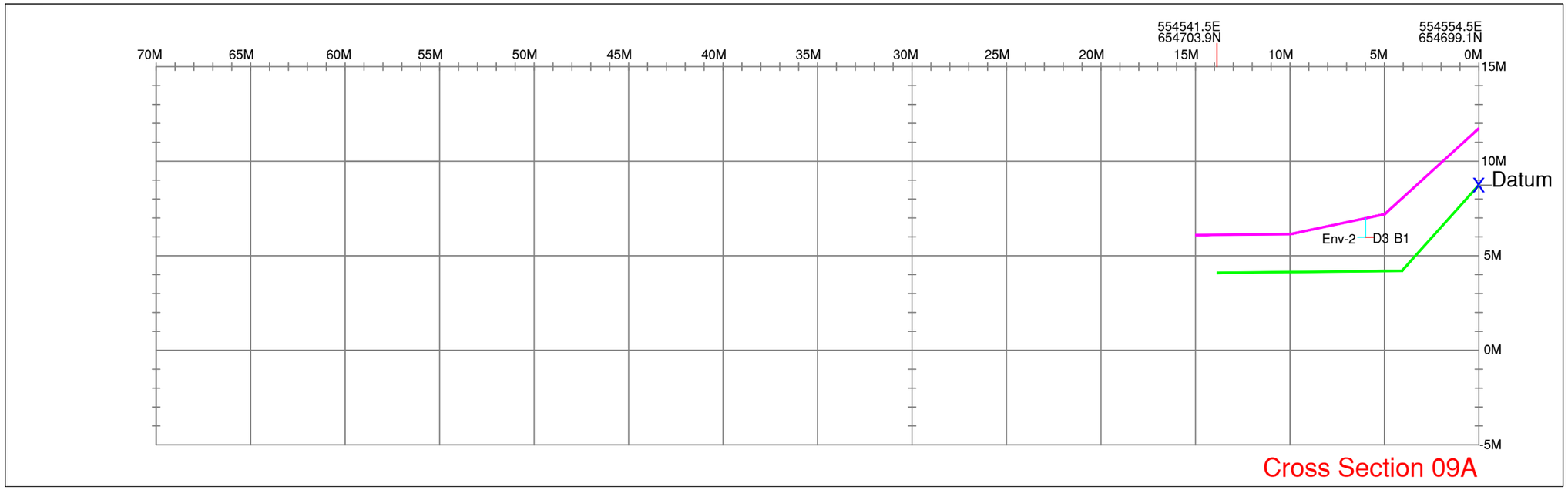
Water Strike & Backfill	Samples & In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m OD)	Legend	Stratum Description
	1.00 - 2.00 1.00 - 2.00 1.00 - 2.00	B D ENV					(MADE GROUND) Soft to stiff, light brown, grey, slightly sandy gravelly CLAY with medium cobble content, medium boulder content and occasional plastic, concrete and brick. Sand is fine to coarse. Gravel is fine to coarse, angular to sub-rounded and consists of various lithologies. Cobbles are angular to sub-angular and consist of various lithologies. Boulders range in dia up to 700mm, are sub-angular to sub-rounded and consist of various lithologies.
				2.80	5.94		Soft, black organic, CLAY.
				3.00	5.74		End of Pit at 3.000m

1
2
3
4
5

Stability: Poor.
Plant: 16T track machine.
Backfill: Arisings.

Groundwater: None encountered.

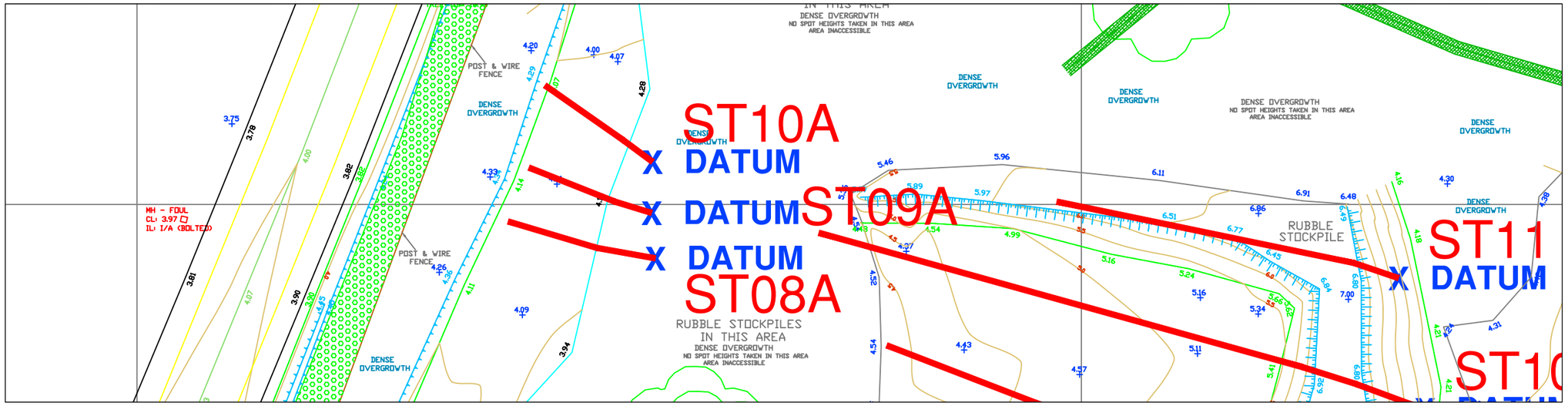
Remarks: Slit trench terminated at 3.00m bgl. Refer to DWG P21161 ST09A for cross sectional detail.



SLIT TRENCH SECTION, 1:200 ON A3

Legend

Ground Profile Pre Works	
Ground Post Backfill Profile	
Bulk (Large) Sample	B
Bulk (Small disturbed) Sample	D
Environmental Sample	Env-



SLIT TRENCH LOCATION PLAN, 1:500 ON A3

SLIT TRENCH NUMBER:
ST09A

JOB NAME:
Raheen Housing

JOB NUMBER:
P21161

DRAWING NUMBER:
P21161-ST09A

DATUM COORDINATES:

EASTING:	554554.5
NORTHING:	654699.1
LEVEL:	8.738mAOD

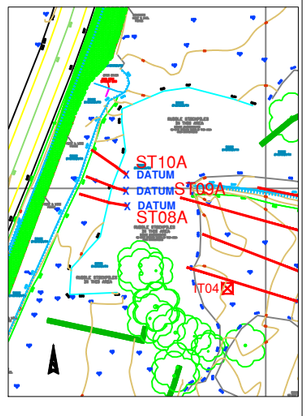
KEY:
DATUM: X

SLIT TRENCH DIMENSIONS:

LENGTH:	13.86m
WIDTH:	0.60m
DEPTH:	0.00m

STRATA SHOWN ON DETAILED LOG

DRAWN BY: Gary Curtin		DATE: 20/07/2021
LOGGED BY: R.D.		DATE: 15/07/2021
SCALE: AS STATED	APPROVED: GH	REVISION: D01



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Photographic Record

Number:	**ST09A**	**Project** Raheen Housing **Project No** P21161 **Engineer** Hutch O`Malley Consulting	

Photographic Record

Number:	**ST09A**	**Project**	Raheen Housing	
		Project No	P21161	
		Engineer	Hutch O`Malley Consulting	

Photographic Record

Number:	**ST09A**	**Project**	Raheen Housing	
		Project No	P21161	
		Engineer	Hutch O`Malley Consulting	

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Trial Pit No
ST10
Sheet 1 of 1

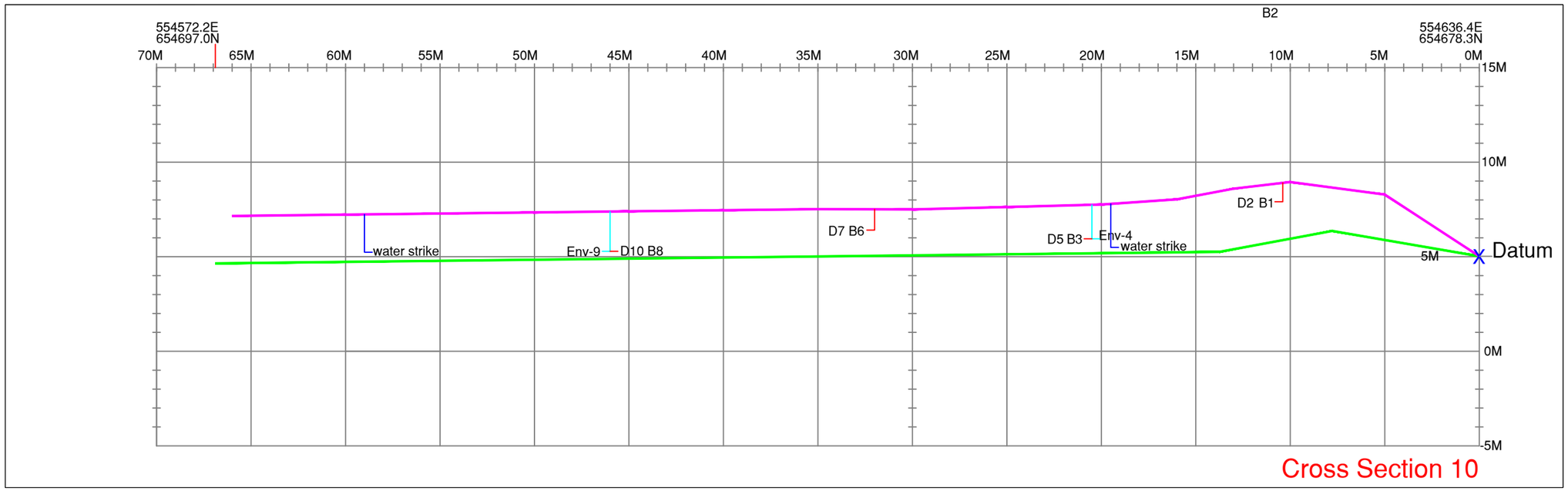
Project Name: Raheen Housing Development	**Project No.** P21161	**Co-ords:** 554636E - 654678N **Level:** 5.02m OD	**Date** 14/07/2021
Location: Raheen, Co.Limerick		**Dimensions (m):** 75.00 x 2.50	**Scale** 1:25
Client: Gary Lawlor		**Depth:** 3.50m BGL	**Logged** RD.

Water Strike & Backfill	Samples & In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m OD)	Legend	Stratum Description
							(MADE GROUND) Three strata of Made Ground. Strata 1: Brown, slightly sandy slightly gravelly SILT. Sand is fine to coarse. Gravel is fine to coarse, sub-angular to sub-rounded and consists of various lithologies. Strata 2: Soft, grey light brown orange black slightly sandy gravelly CLAY with medium cobble content, medium boulder content, metal, concrete and plastic. Sand is fine to coarse. Gravel is fine to coarse, angular to rounded and consists of various lithologies. Cobbles are angular to rounded, Limestone lithology.. Boulders range in dia up to 800mm, are sub-angular to sub-rounded, Limestone lithology. Strata 3: Soft, black, slightly sandy slightly gravelly CLAY, olfactory senses indicate hydrocarbon contamination. Sand is fine to coarse. Gravel is fine to coarse, angular to sub-rounded and consist of various lithologies.
	1.00 - 2.00	B					
	1.00 - 2.00	D					
	1.10 - 1.60	B					
	1.10 - 1.60	D					
	1.20 - 1.50	ENV					
	1.80 - 2.30	B					
	1.80 - 2.30	D					
▼	2.10 - 2.50	B					
	2.10 - 2.50	D					
▼	2.10 - 2.50	ENV					
				3.30	1.72		Soft, black, organic, CLAY
				3.50	1.52		End of Pit at 3.500m

Stability: Poor.
Plant: 16T track machine.
Backfill: Arisings.

Groundwater: 2.30m: Trickle rate of flow seen 19.5m along trench.

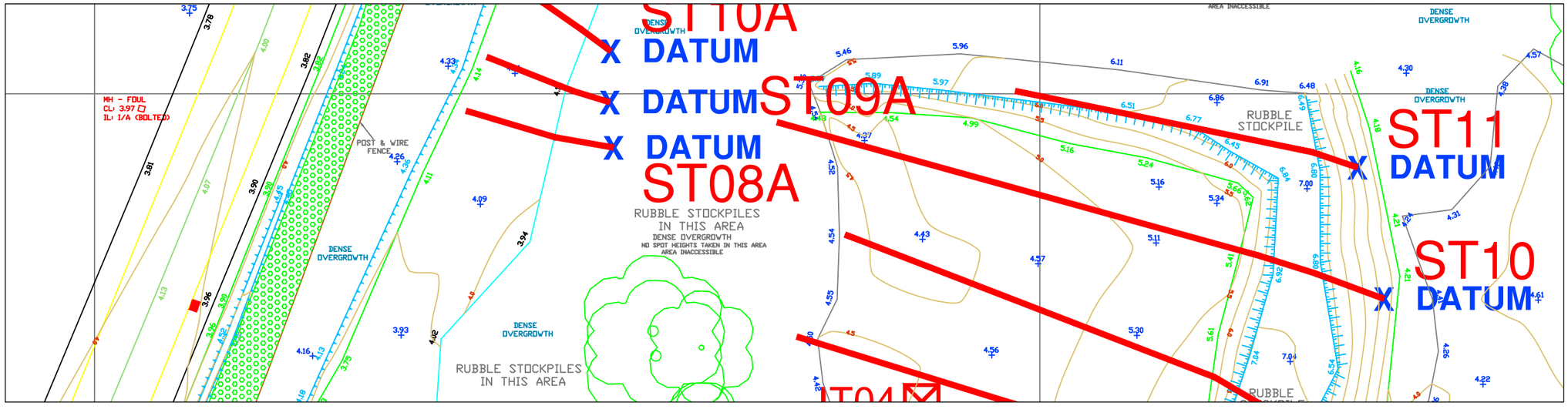
Remarks: Slit trench terminated at 3.50m bgl. Refer to DWG P21161 ST10 for cross sectional detail.



SLIT TRENCH SECTION, 1:200 ON A3

Legend

Ground Profile Pre Works	
Ground Post Backfill Profile	
Bulk (Large) Sample	B
Bulk (Small disturbed) Sample	D
Environmental Sample	Env-



SLIT TRENCH LOCATION PLAN, 1:500 ON A3

SLIT TRENCH NUMBER:
ST10

JOB NAME:
Raheen Housing

JOB NUMBER:
P21161

DRAWING NUMBER:
P21161-ST10

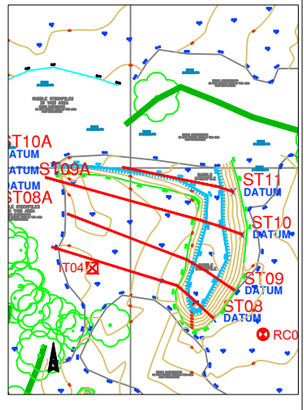
DATUM COORDINATES:
EASTING: 554636.4
NORTHING: 654678.3
LEVEL: 5.023mAOD

KEY:
DATUM: X

SLIT TRENCH DIMENSIONS:
LENGTH: 66.89m
WIDTH: 0.60m
DEPTH: 0.00m

STRATA SHOWN ON DETAILED LOG

DRAWN BY: Gary Curtin		DATE: 20/07/2021
LOGGED BY: R.D.		DATE: 14/07/2021
SCALE: AS STATED	APPROVED: GH	REVISION: D01



pgl priority geotechnical

Photographic Record

Number:	**ST10**	**Project**	Raheen Housing
		Project No	P21161
		Engineer	Hutch O`Malley Consulting

Photographic Record

Number:	**ST10**	**Project**	Raheen Housing	
		Project No	P21161	
		Engineer	Hutch O`Malley Consulting	

Photographic Record

Number:	**ST10**	**Project**	Raheen Housing	
		Project No	P21161	
		Engineer	Hutch O`Malley Consulting	

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Trial Pit No
ST10A
Sheet 1 of 1

Project Name: Raheen Housing Development	**Project No.** P21161	**Co-ords:** 554555E - 654704N **Level:** 4.76m OD	**Date** 15/07/2021
Location: Raheen, Co.Limerick		**Dimensions (m):** 10.00 × 2.10	**Scale** 1:25
Client: Gary Lawlor		**Depth:** 3.20m BGL	**Logged** RD.

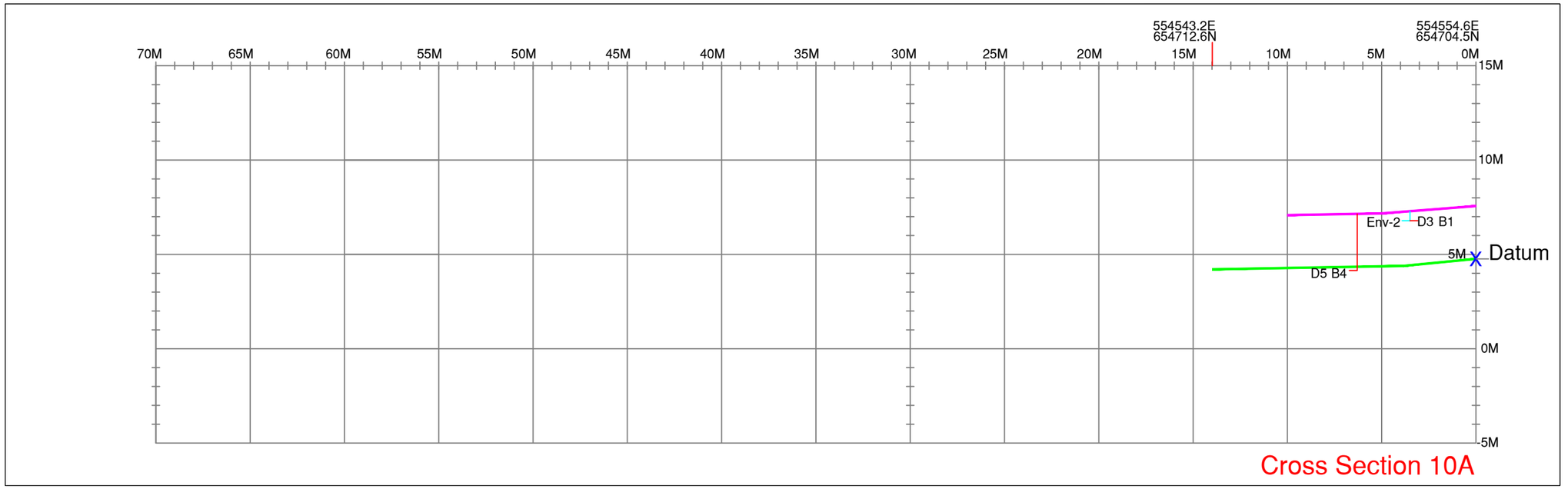
Water Strike & Backfill	Samples & In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m OD)	Legend	Stratum Description
	0.50 - 1.50 0.50 - 1.50 0.50 - 1.50	B D ENV					(MADE GROUND) Firm, light brown, slightly sandy gravelly CLAY with medium cobble content and medium boulder content. Very little signs of made ground however the sediment is consistent with that seen in other trenches. Sand is fine to coarse. Gravel is fine to coarse, angular to sub-rounded, Limestone lithology. Cobbles are sub-angular to sub-rounded and consists of limestone clasts. Boulders range in dia up to 600mm, are sub-angular, Limestone lithology.
				2.80	1.96		Soft, black, organic CLAY.
	3.00 - 3.20 3.00 - 3.20	B D		3.00	1.76		Firm, brown mottled grey, organic CLAY.
				3.20	1.56		End of Pit at 3.200m

1 2 3 4 5

Stability: Moderate.
Plant: 16T track machine.
Backfill: Arisings.

Groundwater: 2.60mTrickle rate of flow seen 6m along the trench.

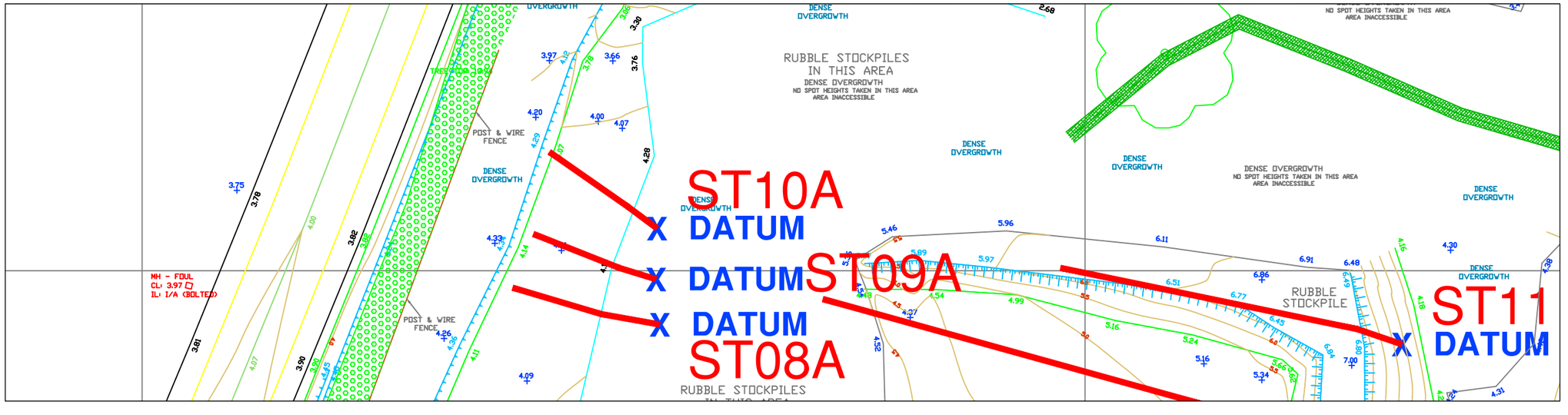
Remarks: Slit trench terminated at 3.20m bgl. Refer to DWG P21161 ST10A for cross sectional detail.



SLIT TRENCH SECTION, 1:200 ON A3

Legend

Ground Profile Pre Works	
Ground Post Backfill Profile	
Bulk (Large) Sample	B
Bulk (Small disturbed) Sample	D
Environmental Sample	Env-



SLIT TRENCH LOCATION PLAN, 1:500 ON A3

SLIT TRENCH NUMBER:
ST10A

JOB NAME:
Raheen Housing

JOB NUMBER:
P21161

DRAWING NUMBER:
P21161-ST10A

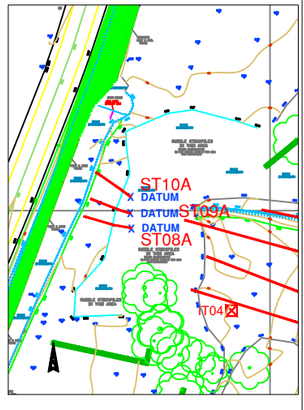
DATUM COORDINATES:
EASTING: 554554.6
NORTHING: 654704.5
LEVEL: 4.763mAOD

KEY:
DATUM: X

SLIT TRENCH DIMENSIONS:
LENGTH: 13.98m
WIDTH: 0.60m
DEPTH: 0.00m

STRATA SHOWN ON DETAILED LOG

DRAWN BY:		DATE:
Gary Curtin		20/07/2021
LOGGED BY:		DATE:
R.D.		15/07/2021
SCALE:	APPROVED:	REVISION:
AS STATED	GH	D01



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Photographic Record

Number:	**ST10A**	**Project** Raheen Housing **Project No** P21161 **Engineer** Hutch O`Malley Consulting	

Photographic Record

Number:	**ST10A**	**Project**	Raheen Housing	
		Project No	P21161	
		Engineer	Hutch O`Malley Consulting	

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Trial Pit No
ST11
Sheet 1 of 1

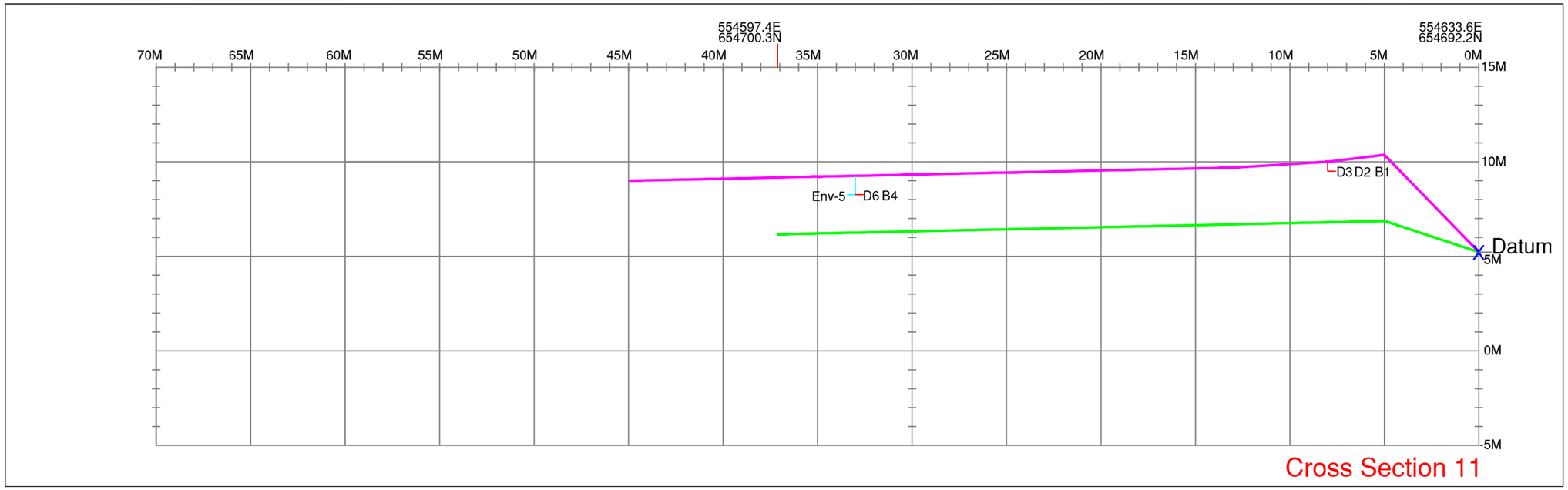
Project Name: Raheen Housing Development	**Project No.** P21161	**Co-ords:** 554634E - 654692N **Level:** 5.22m OD	**Date** 15/07/2021
Location: Raheen, Co.Limerick		**Dimensions (m):** 45.00 × 2.50 **Depth:** 3.50m BGL	**Scale** 1:25
Client: Gary Lawlor			**Logged** RD.

Water Strike & Backfill	Samples & In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m OD)	Legend	Stratum Description
	0.50 - 1.50 0.50 - 1.50 0.50 - 1.50	B D ENV					(MADE GROUND) Brown grey orange, slightly sandy gravelly CLAY with medium cobble content, medium boulder content, occasional metal, timber, rags, concrete and plastic. Sand is fine to coarse. Gravel is fine to coarse, angular to sub-rounded and consists of various lithologies. Cobbles are angular to sub-rounded and consist of limestone clasts. Boulders range in dia up to 700mm, are sub-angular to sub-rounded, Limestone lithology.
	1.00 - 2.00 1.00 - 2.00	B D					
				3.30	1.92		Soft, black organic CLAY.
				3.50	1.72		End of Pit at 3.500m

Stability: Poor.
Plant: 16T track machine.
Backfill: Arisings.

Groundwater: None encountered.

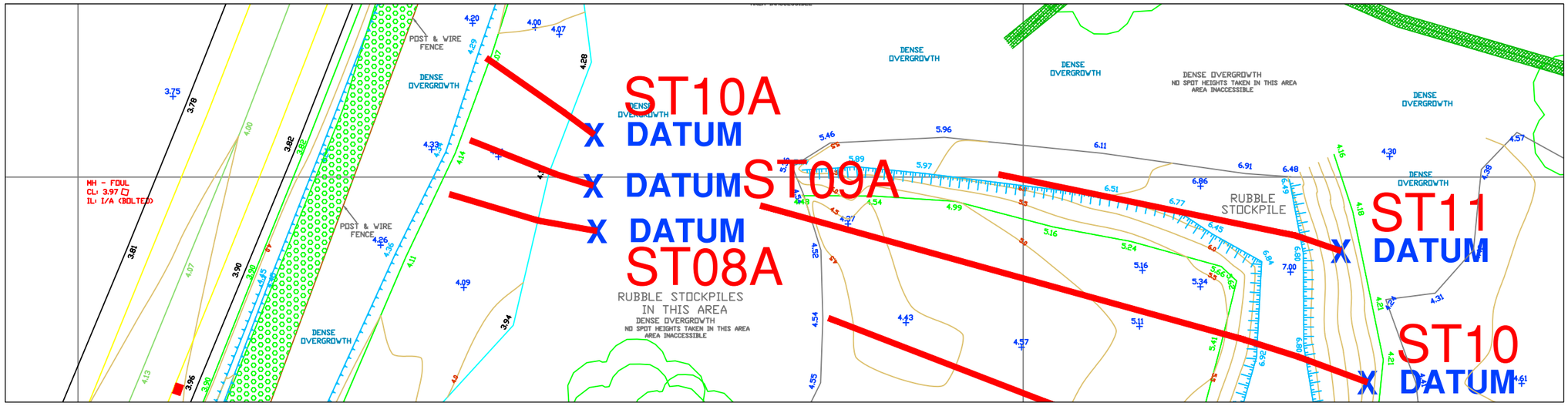
Remarks: Slit trench terminated at 3.50m bgl. Refer to DWG P21161 ST11 for cross sectional detail.



SLIT TRENCH SECTION, 1:200 ON A3

Legend

Ground Profile Pre Works	
Ground Post Backfill Profile	
Bulk (Large) Sample	B
Bulk (Small disturbed) Sample	D
Environmental Sample	Env-



SLIT TRENCH LOCATION PLAN, 1:500 ON A3

SLIT TRENCH NUMBER:
ST11

JOB NAME:
Raheen Housing

JOB NUMBER:
P21161

DRAWING NUMBER:
P21161-ST11

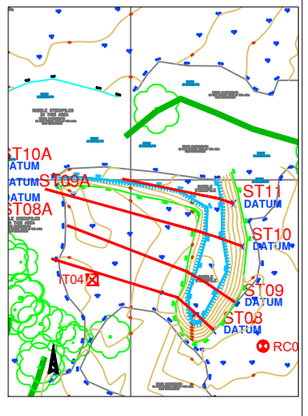
DATUM COORDINATES:
EASTING: 554633.6
NORTHING: 654692.2
LEVEL: 5.221mAOD

KEY:
DATUM: X

SLIT TRENCH DIMENSIONS:
LENGTH: 37.12m
WIDTH: 0.60m
DEPTH: 0.00m

STRATA SHOWN ON DETAILED LOG

DRAWN BY:		DATE:
Gary Curtin		20/07/2021
LOGGED BY:		DATE:
R.D.		14-15/07/2021
SCALE:	APPROVED:	REVISION:
AS STATED	GH	D01



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Photographic Record

Number:	**ST11**	**Project**	Raheen Housing	
		Project No	P21161	
		Engineer	Hutch O`Malley Consulting	

Photographic Record

Number:	**ST11**	**Project**	Raheen Housing	
		Project No	P21161	
		Engineer	Hutch O`Malley Consulting	

Photographic Record

Number:	**ST11**	**Project**	Raheen Housing	
		Project No	P21161	
		Engineer	Hutch O`Malley Consulting	

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Trial Pit No
ST12
Sheet 1 of 1

Project Name: Raheen Housing Development	**Project No.** P21161	**Co-ords:** 554464E - 654470N **Level:** 5.68m OD	**Date** 09/07/2021
Location: Raheen, Co.Limerick		**Dimensions (m):** 20.00 × 2.50	**Scale** 1:25
Client: Gary Lawlor		**Depth:** 2.40m BGL	**Logged** RD.

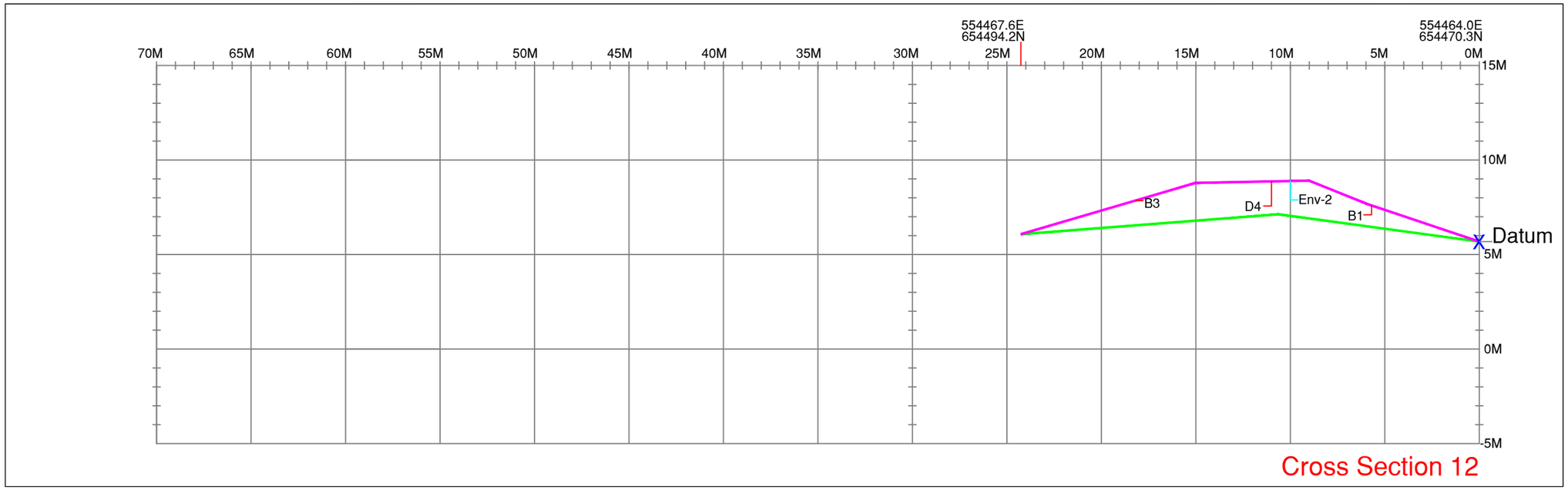
Water Strike & Backfill	Samples & In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m OD)	Legend	Stratum Description
	0.00 - 0.50	B					(MADE GROUND) Brown, gravelly SILT with high cobble content, high boulder content, rubbish, plastic, concrete, corrugated iron and multiple large bitumen boulders. Gravel is fine to coarse, angular to sub-rounded and consist of various lithologies. Cobbles are angular to sub-angular and consist of various lithologies. Boulders range in dia greater than 1m, are angular to sub-angular and consist of various lithologies.
	0.50 - 1.50	B					
	1.00 - 1.20	ENV					
	1.30 - 1.50	D					
				2.20	3.48		Firm, light brown, slightly sandy gravelly CLAY with high cobble content and medium boulder content. Sand is fine to coarse. Gravel is fine to coarse, angular to sub-angular, Limestone lithology. Cobbles are sub-angular to sub-rounded and consists of Limestone clasts. Boulders range in dia up to 800mm, are sub-angular, Limestone lithology.
				2.40	3.28		End of Pit at 2.400m

1 2 3 4 5

Stability: Poor.
Plant: 16T track machine.
Backfill: Arisings.

Groundwater: None encountered.

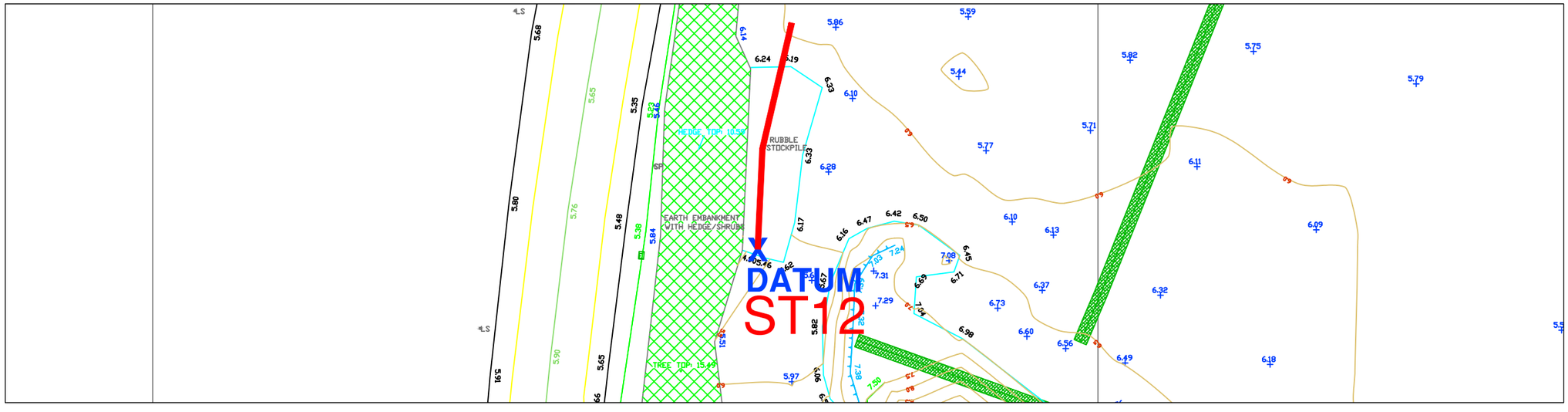
Remarks: Slit trench terminated at 2.40m bgl. Refer to DWG P21161 ST12 for cross sectional detail.



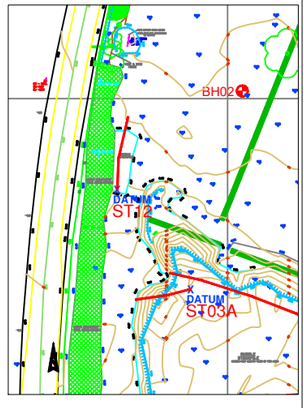
SLIT TRENCH SECTION, 1:200 ON A3

Legend

Ground Profile Pre Works	
Ground Post Backfill Profile	
Bulk (Large) Sample	B
Bulk (Small disturbed) Sample	D
Environmental Sample	Env-



SLIT TRENCH LOCATION PLAN, 1:500 ON A3



SLIT TRENCH NUMBER:
ST12

JOB NAME:
Raheen Housing

JOB NUMBER:
P21161

DRAWING NUMBER:
P21161-ST12

DATUM COORDINATES:
EASTING: 554464.0
NORTHING: 654470.3
LEVEL: 5.682mAOD

KEY:
DATUM: X

SLIT TRENCH DIMENSIONS:
LENGTH: 24.26m
WIDTH: 0.60m
DEPTH: 0.00m

STRATA SHOWN ON DETAILED LOG

DRAWN BY:		DATE:
Gary Curtin		20/07/2021
LOGGED BY:		DATE:
R.D.		09/07/2021
SCALE:	APPROVED:	REVISION:
AS STATED	GH	D01

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Photographic Record

Number:	**ST12**	**Project** Raheen Housing **Project No** P21161 **Engineer** Hutch O`Malley Consulting	

Photographic Record

Number:	**ST12**	**Project**	Raheen Housing	
		Project No	P21161	
		Engineer	Hutch O`Malley Consulting	

Photographic Record

Number:	**ST12**	**Project**	Raheen Housing	
		Project No	P21161	
		Engineer	Hutch O`Malley 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	**Raheen Housing Development**	**P21161**

Hole ID	Sample Ref	Depth (m)	Sample Type	Sample Description	MC	LL	PL	PI	% Pass 425
BH02	1	0	B	Slightly sandy gravelly SILT	25				
BH02	2	1	B	Very clayey very sandy GRAVEL with high cobble content	13				
BH03	2	1	B	Slightly sandy gravelly CLAY with high cobble content	11	21	13	8	60.2
BH04	1	0	B	Slightly sandy SILT	21				
BH04	2	1	B	Slightly sandy SILT	31	53	32	21	99.8
BH04	3	2	B	Slightly sandy gravelly CLAY	15				
BH06	1	0	B	Slightly sandy gravelly SILT	33				
BH07	1	0	B	Slightly sandy gravelly SILT	17				
BH08	2	1	B	Slightly sandy slightly gravelly SILT	30				
BH09	1	0	B	Slightly sandy slightly gravelly SILT	32				
IT01	2	0.25	D	Slightly gravelly SILT	20				
IT01	3	1	B	Slightly sandy gravelly CLAY with medium cobble content	9	18	11	7	61.5
IT01	4	1.5	D	Slightly sandy gravelly CLAY	11				
IT02	1	1	B	Slightly sandy gravelly CLAY	9	17	10	7	58.4
IT02	2	1.5	D	Slightly sandy gravelly CLAY	7				
IT03	3	1	B	Slightly sandy slightly gravelly CLAY with low cobble content		18	11	7	65.5
IT03	4	1	D	Slightly sandy slightly gravelly CLAY with low cobble content	10				
IT04	2	1.5	D	Slightly sandy gravelly CLAY	11				
ST02	5	0.5	B	Slightly sandy gravelly SILT with low cobble content		38	23	15	63.8
ST03A	3	2.2	B	Slightly sandy gravelly SILT with medium cobble content	22	38	24	14	58

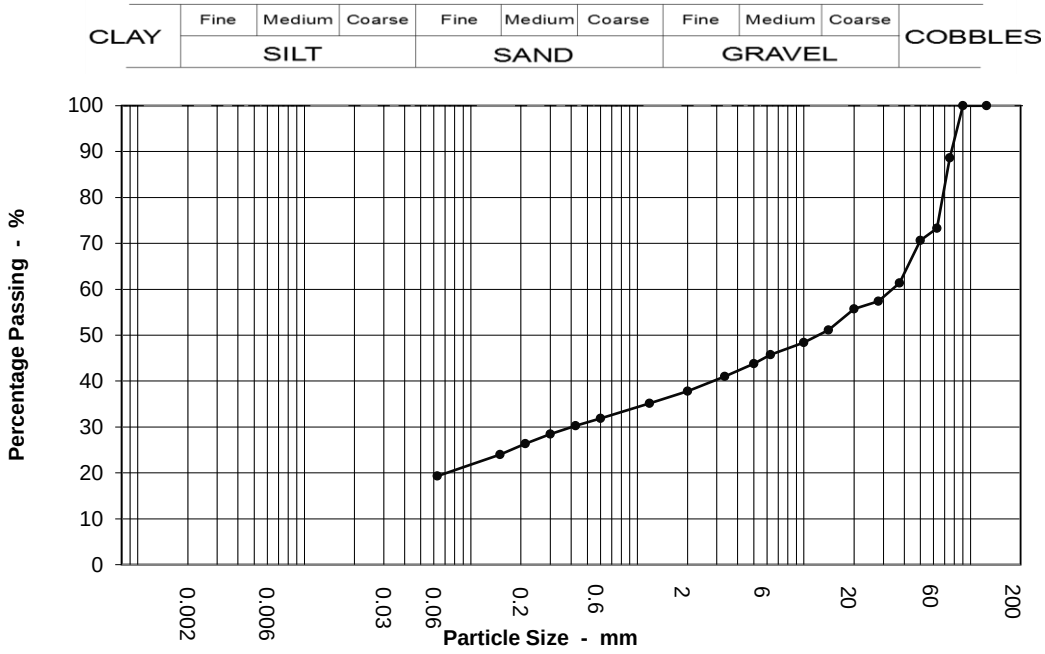
	Natural Moisture Content/Atterberg Limits Summary BS 1377 : Part 2 : 1990 : Clause 3	Job Ref
Location	**Raheen Housing Development**	**P21161**

Hole ID	Sample Ref	Depth (m)	Sample Type	Sample Description	MC	LL	PL	PI	% Pass 425
ST10A	5	3	D	Slightly sandy gravelly SILT	25				

PARTICLE SIZE DISTRIBUTION

BS 1377 : Part 2 : 1990 : Clause 9

		Job Ref	**P21161**
		Borehole / Pit No	BH01A
Location	**Raheen Housing Development**	Sample No	1
		Depth	0.00 m
Soil Description	Very silty very sandy GRAVEL with high cobble content	Sample type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	89		
63	73		
50	71		
37.5	61		
28	57		
20	56		
14	51		
10	48		
6.3	46		
5	44		
3.35	41		
2	38		
1.18	35		
0.6	32		
0.425	30		
0.3	28		
0.212	26		
0.15	24		
0.063	19		

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

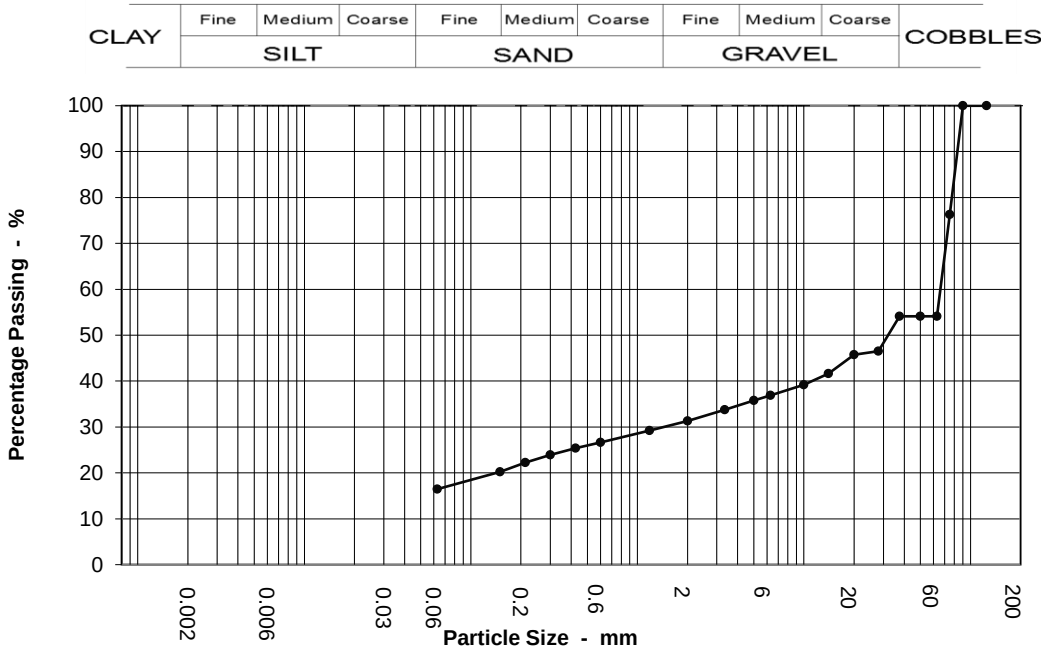
Sample Proportions	
Cobbles	27.0
Gravel	36.0
Sand	18.0
Silt & Clay	19.0

Grading Analysis	
D100	90.00
D60	33.90
D10	
Uniformity Coefficient	

PARTICLE SIZE DISTRIBUTION

BS 1377 : Part 2 : 1990 : Clause 9

		Job Ref	**P21161**
		Borehole / Pit No	BH02
Location	**Raheen Housing Development**	Sample No	2
		Depth	1.00 m
Soil Description	Very clayey very sandy GRAVEL with high cobble content	Sample type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	76		
63	54		
50	54		
37.5	54		
28	46		
20	46		
14	42		
10	39		
6.3	37		
5	36		
3.35	34		
2	31		
1.18	29		
0.6	27		
0.425	25		
0.3	24		
0.212	22		
0.15	20		
0.063	16		

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

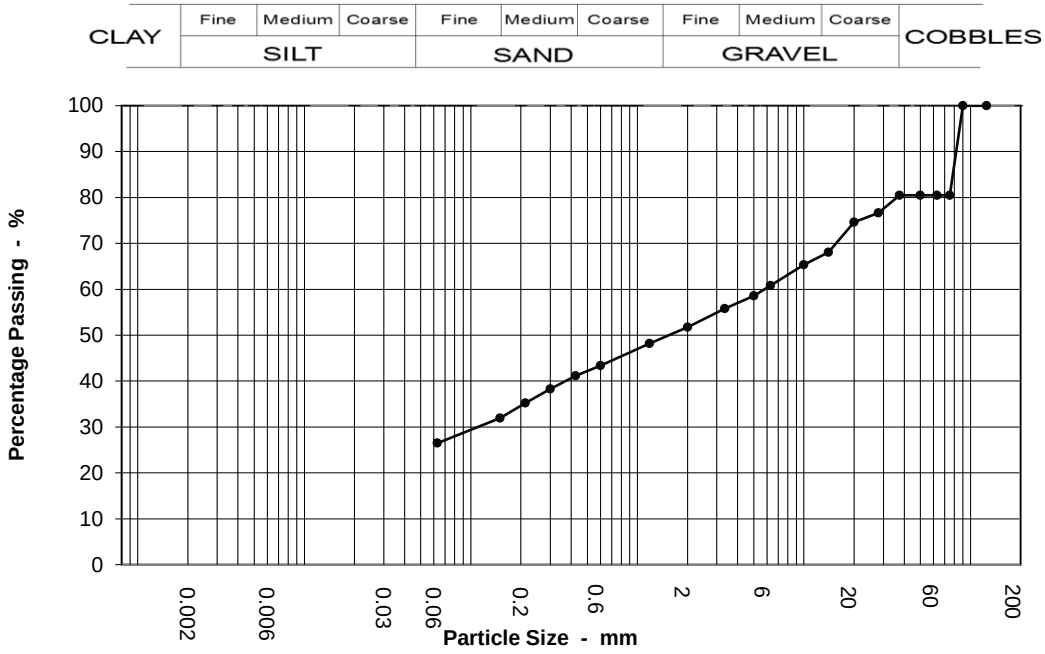
Sample Proportions	
Cobbles	46.0
Gravel	23.0
Sand	15.0
Silt & Clay	16.0

Grading Analysis	
D100	90.00
D60	66.00
D10	
Uniformity Coefficient	

PARTICLE SIZE DISTRIBUTION

BS 1377 : Part 2 : 1990 : Clause 9

		Job Ref	**P21161**
		Borehole / Pit No	BH03
Location	**Raheen Housing Development**	Sample No	2
		Depth	1.00 m
Soil Description	Slightly sandy gravelly CLAY with high cobble content	Sample type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	80		
63	80		
50	80		
37.5	80		
28	77		
20	75		
14	68		
10	65		
6.3	61		
5	59		
3.35	56		
2	52		
1.18	48		
0.6	43		
0.425	41		
0.3	38		
0.212	35		
0.15	32		
0.063	26		

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

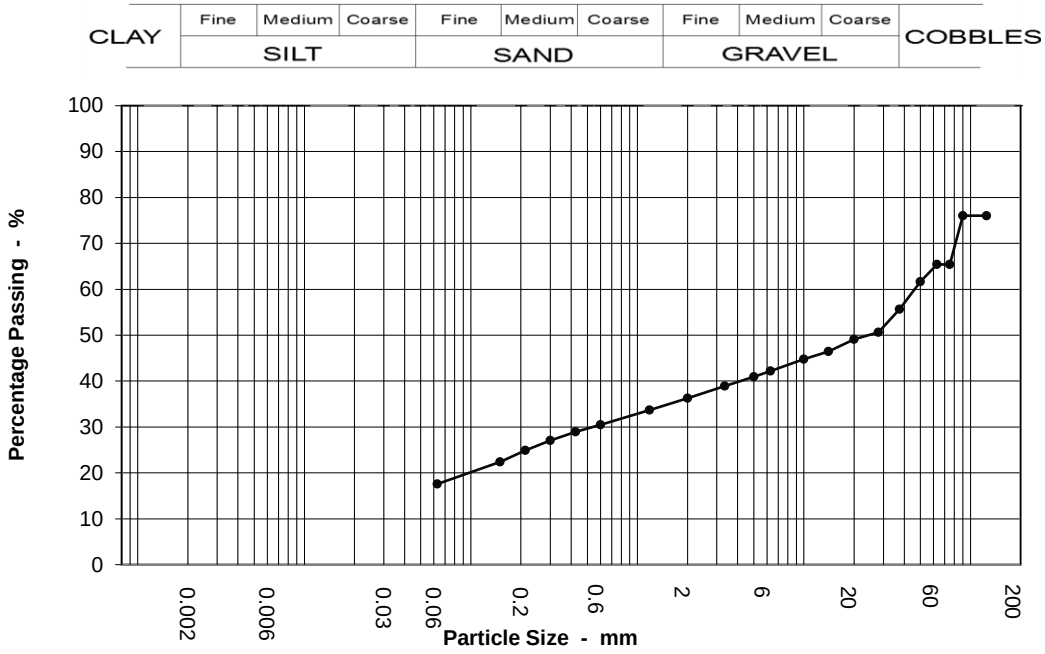
Sample Proportions	
Cobbles	20.0
Gravel	29.0
Sand	25.0
Silt & Clay	26.0

Grading Analysis	
D100	90.00
D60	5.79
D10	
Uniformity Coefficient	

PARTICLE SIZE DISTRIBUTION

BS 1377 : Part 2 : 1990 : Clause 9

		Job Ref	**P21161**
		Borehole / Pit No	BH03
Location	**Raheen Housing Development**	Sample No	3
		Depth	2.00 m
Soil Description	Very clayey very sandy GRAVEL with high cobble content	Sample type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	76		
90	76		
75	65		
63	65		
50	62		
37.5	56		
28	51		
20	49		
14	46		
10	45		
6.3	42		
5	41		
3.35	39		
2	36		
1.18	34		
0.6	30		
0.425	29		
0.3	27		
0.212	25		
0.15	22		
0.063	18		

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

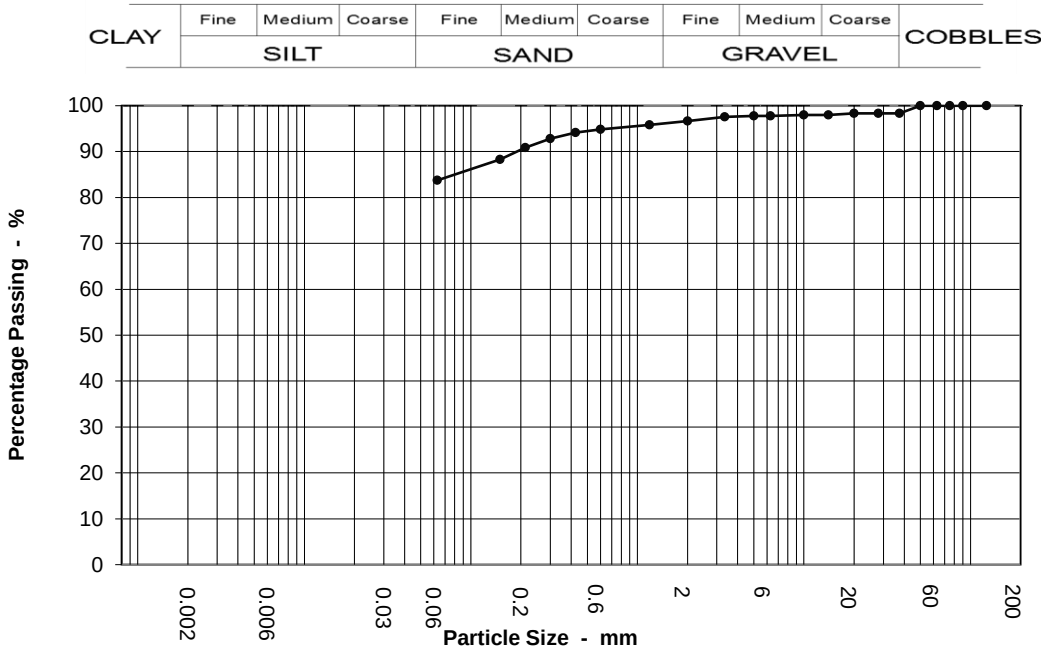
Sample Proportions	
Cobbles	35.0
Gravel	29.0
Sand	19.0
Silt & Clay	18.0

Grading Analysis	
D100	
D60	46.20
D10	
Uniformity Coefficient	

PARTICLE SIZE DISTRIBUTION

BS 1377 : Part 2 : 1990 : Clause 9

		Job Ref	**P21161**
		Borehole / Pit No	BH04
Location	**Raheen Housing Development**	Sample No	2
		Depth	1.00 m
Soil Description	Slightly 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	98		
28	98		
20	98		
14	98		
10	98		
6.3	98		
5	98		
3.35	98		
2	97		
1.18	96		
0.6	95		
0.425	94		
0.3	93		
0.212	91		
0.15	88		
0.063	84		

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

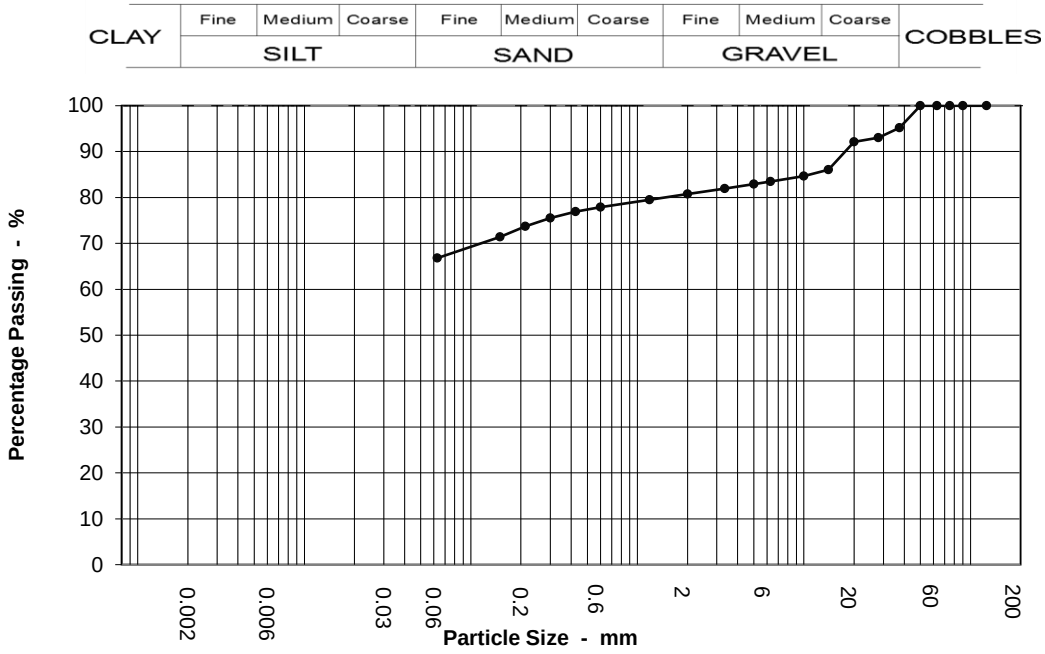
Sample Proportions	
Cobbles	0.0
Gravel	3.0
Sand	13.0
Silt & Clay	84.0

Grading Analysis	
D100	50.00
D60	
D10	
Uniformity Coefficient	

PARTICLE SIZE DISTRIBUTION

BS 1377 : Part 2 : 1990 : Clause 9

		Job Ref	**P21161**
		Borehole / Pit No	BH08
Location	**Raheen Housing Development**	Sample No	2
		Depth	1.00 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	95		
28	93		
20	92		
14	86		
10	85		
6.3	83		
5	83		
3.35	82		
2	81		
1.18	80		
0.6	78		
0.425	77		
0.3	76		
0.212	74		
0.15	71		
0.063	67		

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

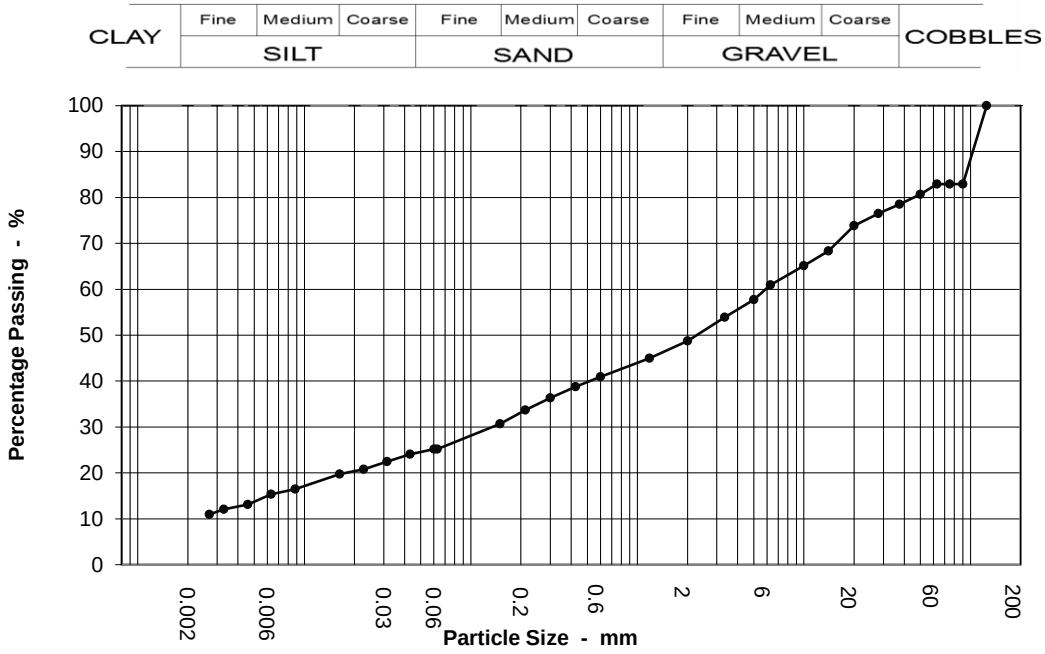
Sample Proportions	
Cobbles	0.0
Gravel	19.0
Sand	14.0
Silt & Clay	67.0

Grading Analysis	
D100	50.00
D60	
D10	
Uniformity Coefficient	

PARTICLE SIZE DISTRIBUTION

BS 1377 : Part 2 : 1990 : Clause 9

		Job Ref	**P21161**
		Borehole / Pit No	IT01
Location	**Raheen Housing Development**	Sample No	3
		Depth	1.00 m
Soil Description	Slightly sandy gravelly CLAY with medium cobble content	Sample type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.060	25
90	83	0.043	24
75	83	0.031	22
63	83	0.023	21
50	81	0.016	20
37.5	79	0.009	16
28	76	0.006	15
20	74	0.005	13
14	68	0.003	12
10	65	0.003	11
6.3	61	0.001	8
5	58		
3.35	54		
2	49		
1.18	45		
0.6	41		
0.425	39		
0.3	36		
0.212	34		
0.15	31		
0.063	25		

Test Method	
BS 1377 : Part 2 : 1990	
Sieving	Clause 9.5
Sedimentation	Clause 9.5

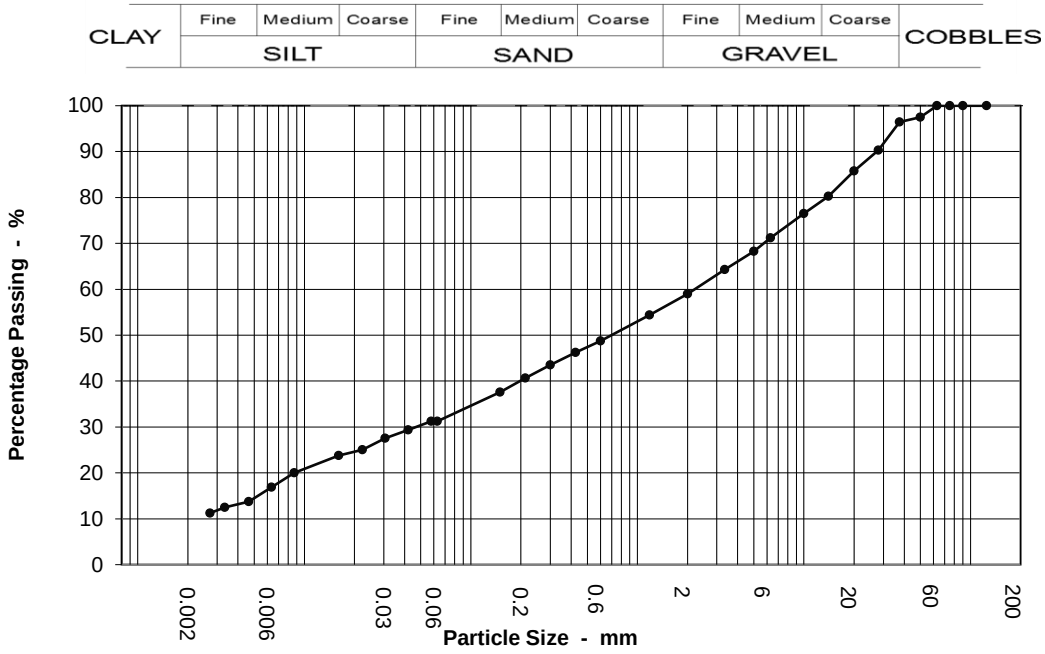
Sample Proportions	
Cobbles	17.0
Gravel	34.0
Sand	24.0
Silt	16.0
Clay	10.0

Grading Analysis	
D100	125.00
D60	5.88
D10	0.00
Uniformity Coefficient	2700.00

PARTICLE SIZE DISTRIBUTION

BS 1377 : Part 2 : 1990 : Clause 9

		Job Ref	**P21161**
		Borehole / Pit No	IT02
Location	**Raheen Housing Development**	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	0.058	31
90	100	0.042	29
75	100	0.031	28
63	100	0.022	25
50	97	0.016	24
37.5	96	0.009	20
28	90	0.006	17
20	86	0.005	14
14	80	0.003	13
10	77	0.003	11
6.3	71	0.001	9
5	68		
3.35	64		
2	59		
1.18	54		
0.6	49		
0.425	46		
0.3	44		
0.212	41		
0.15	38		
0.063	31		

Test Method	
BS 1377 : Part 2 : 1990	
Sieving	Clause 9.5
Sedimentation	Clause 9.5

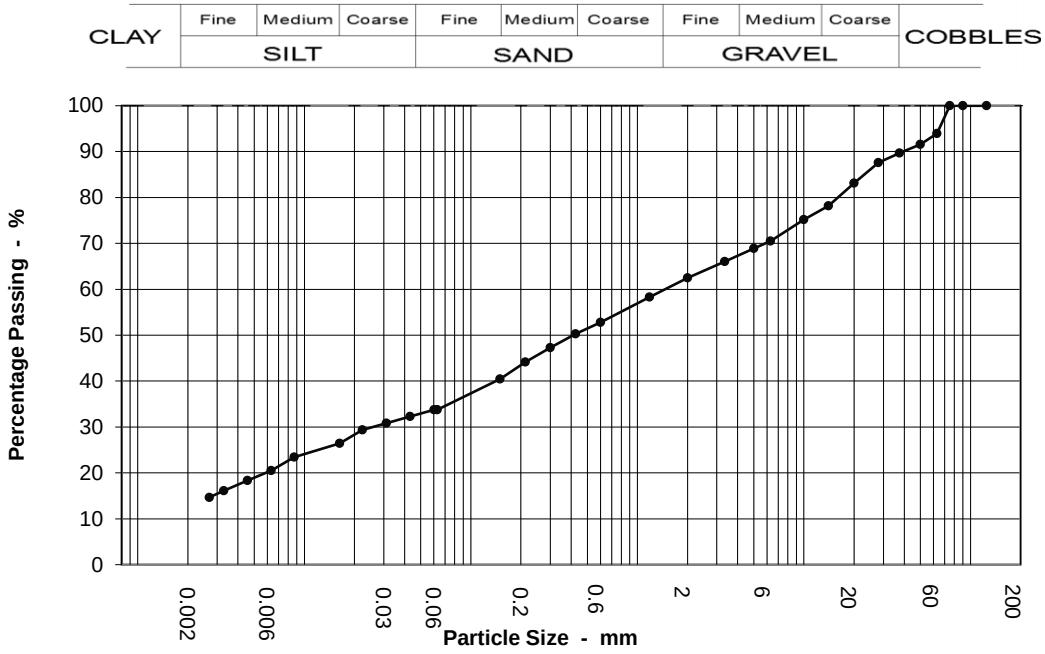
Sample Proportions	
Cobbles	0.0
Gravel	41.0
Sand	28.0
Silt	21.0
Clay	10.0

Grading Analysis	
D100	63.00
D60	2.21
D10	0.00
Uniformity Coefficient	1100.00

PARTICLE SIZE DISTRIBUTION

BS 1377 : Part 2 : 1990 : Clause 9

		Job Ref	**P21161**
		Borehole / Pit No	IT03
Location	**Raheen Housing Development**	Sample No	3
		Depth	1.00 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	0.060	34
90	100	0.043	32
75	100	0.031	31
63	94	0.022	29
50	92	0.016	26
37.5	90	0.009	23
28	88	0.006	21
20	83	0.005	18
14	78	0.003	16
10	75	0.003	15
6.3	70	0.001	11
5	69		
3.35	66		
2	63		
1.18	58		
0.6	53		
0.425	50		
0.3	47		
0.212	44		
0.15	40		
0.063	34		

Test Method	
BS 1377 : Part 2 : 1990	
Sieving	Clause 9.5
Sedimentation	Clause 9.5

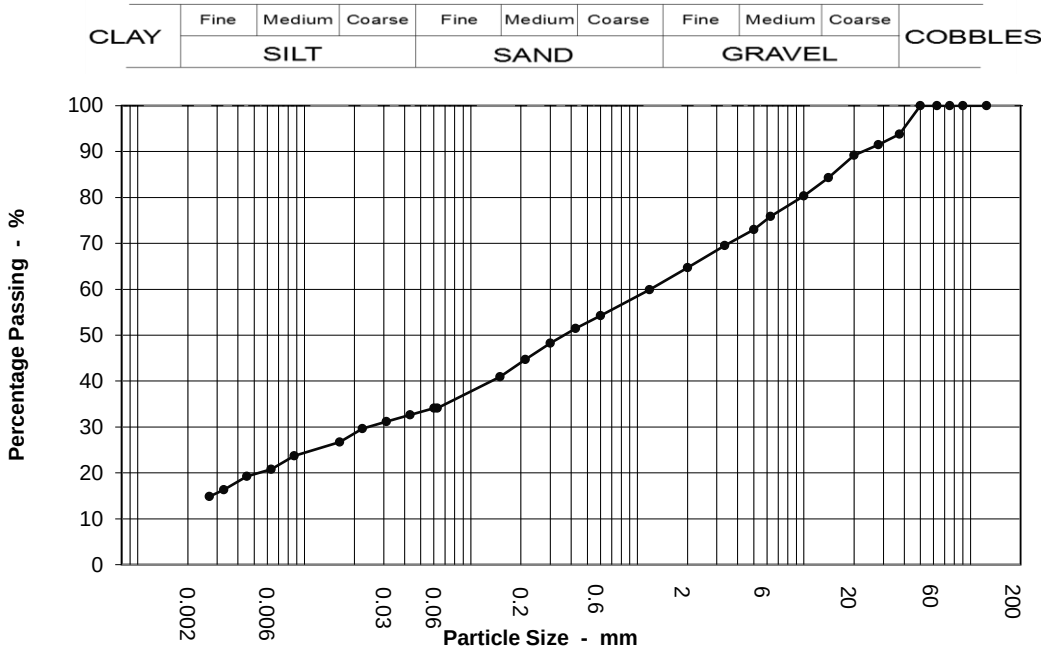
Sample Proportions	
Cobbles	6.0
Gravel	31.0
Sand	29.0
Silt	21.0
Clay	13.0

Grading Analysis	
D100	75.00
D60	1.46
D10	
Uniformity Coefficient	

PARTICLE SIZE DISTRIBUTION

BS 1377 : Part 2 : 1990 : Clause 9

		Job Ref	**P21161**
		Borehole / Pit No	IT04
Location	**Raheen Housing Development**	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	0.060	34
90	100	0.043	33
75	100	0.031	31
63	100	0.022	30
50	100	0.016	27
37.5	94	0.009	24
28	91	0.006	21
20	89	0.005	19
14	84	0.003	16
10	80	0.003	15
6.3	76	0.001	12
5	73		
3.35	70		
2	65		
1.18	60		
0.6	54		
0.425	51		
0.3	48		
0.212	45		
0.15	41		
0.063	34		

Test Method	
BS 1377 : Part 2 : 1990	
Sieving	Clause 9.5
Sedimentation	Clause 9.5

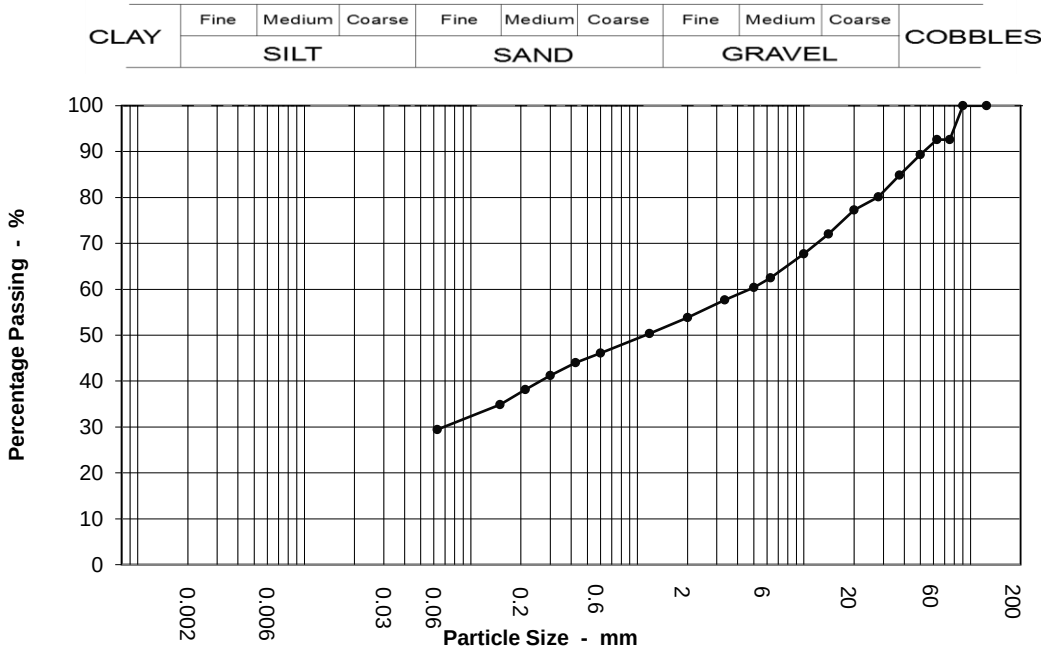
Sample Proportions	
Cobbles	0.0
Gravel	35.0
Sand	31.0
Silt	21.0
Clay	13.0

Grading Analysis	
D100	50.00
D60	1.19
D10	
Uniformity Coefficient	

PARTICLE SIZE DISTRIBUTION

BS 1377 : Part 2 : 1990 : Clause 9

		Job Ref	**P21161**
		Borehole / Pit No	ST02
Location	**Raheen Housing Development**	Sample No	5
		Depth	0.50 m
Soil Description	Slightly sandy gravelly SILT 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	89		
37.5	85		
28	80		
20	77		
14	72		
10	68		
6.3	62		
5	60		
3.35	58		
2	54		
1.18	50		
0.6	46		
0.425	44		
0.3	41		
0.212	38		
0.15	35		
0.063	29		

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

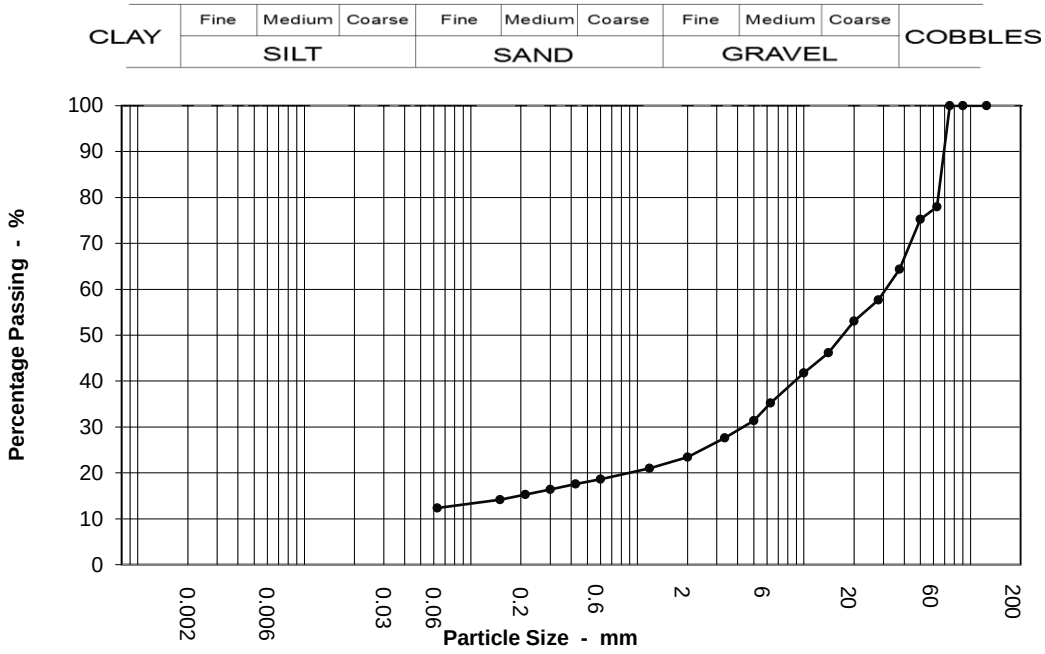
Sample Proportions	
Cobbles	7.0
Gravel	39.0
Sand	24.0
Silt & Clay	29.0

Grading Analysis	
D100	90.00
D60	4.70
D10	
Uniformity Coefficient	

PARTICLE SIZE DISTRIBUTION

BS 1377 : Part 2 : 1990 : Clause 9

		Job Ref	**P21161**
		Borehole / Pit No	ST03A
Location	**Raheen Housing Development**	Sample No	1
		Depth	1.00 m
Soil Description	Silty 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	75		
37.5	64		
28	58		
20	53		
14	46		
10	42		
6.3	35		
5	31		
3.35	28		
2	23		
1.18	21		
0.6	19		
0.425	18		
0.3	16		
0.212	15		
0.15	14		
0.063	12		

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

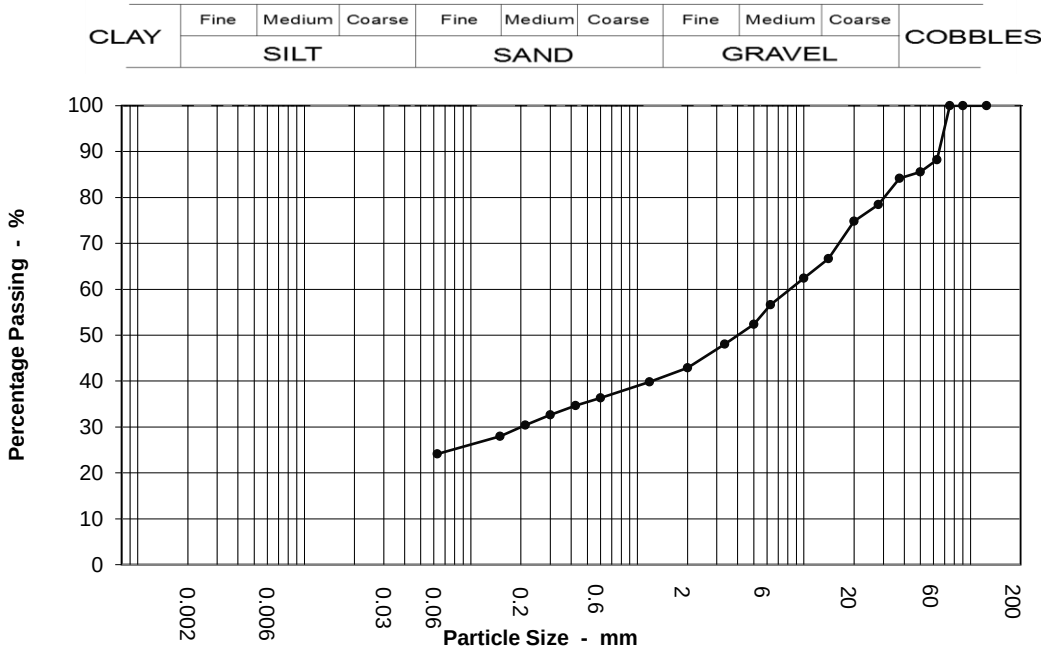
Sample Proportions	
Cobbles	22.0
Gravel	55.0
Sand	11.0
Silt & Clay	12.0

Grading Analysis	
D100	75.00
D60	31.00
D10	
Uniformity Coefficient	

PARTICLE SIZE DISTRIBUTION

BS 1377 : Part 2 : 1990 : Clause 9

		Job Ref	**P21161**
		Borehole / Pit No	ST03A
Location	**Raheen Housing Development**	Sample No	3
		Depth	2.20 m
Soil Description	Slightly sandy gravelly SILT with medium cobble content	Sample type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	88		
50	86		
37.5	84		
28	78		
20	75		
14	67		
10	62		
6.3	57		
5	52		
3.35	48		
2	43		
1.18	40		
0.6	36		
0.425	35		
0.3	33		
0.212	30		
0.15	28		
0.063	24		

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

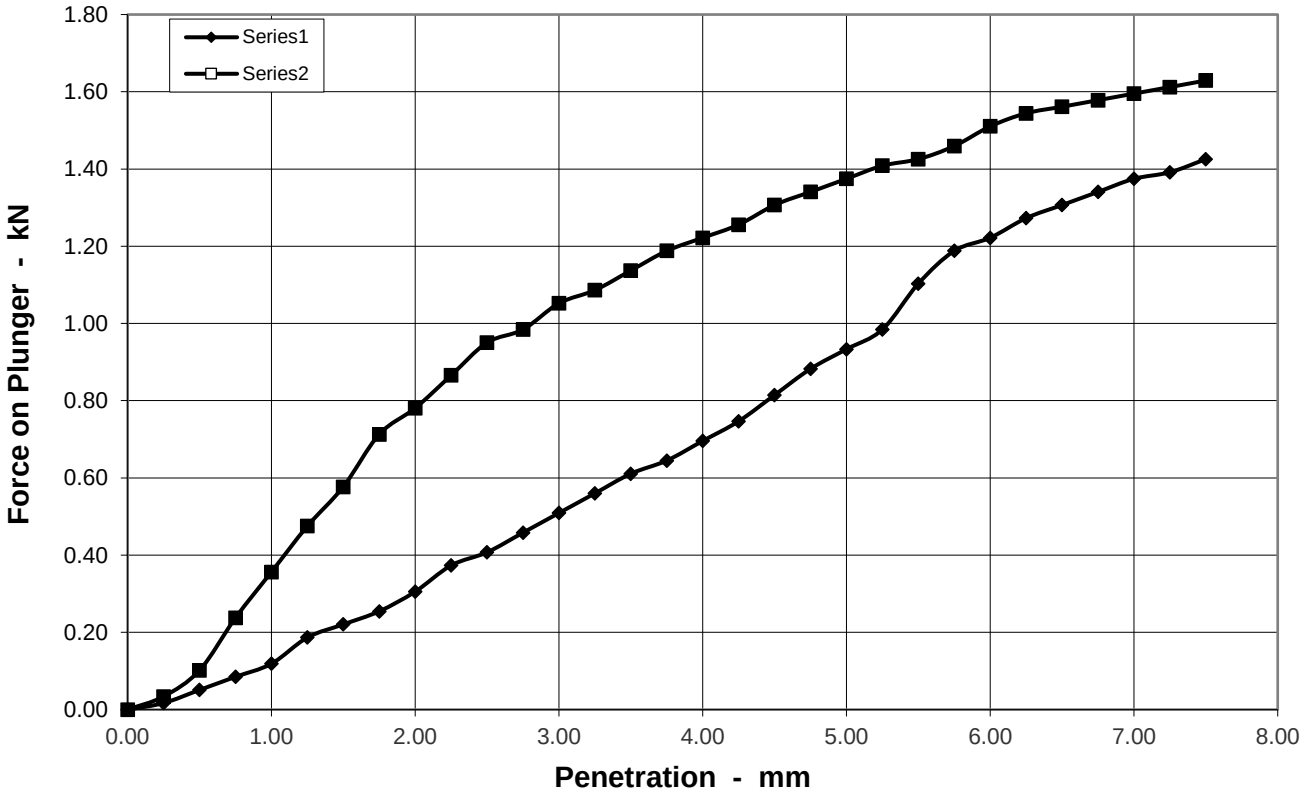
Sample Proportions	
Cobbles	12.0
Gravel	45.0
Sand	19.0
Silt & Clay	24.0

Grading Analysis	
D100	75.00
D60	8.27
D10	
Uniformity Coefficient	

CALIFORNIA BEARING RATIO

BS 13377 : Part 4 : 1990 Clause 7.4

		Job Ref	**P21161**
		Borehole / Pit No	BH02
Site Name	**Raheen Housing Development**	Sample No	1
		Depth	0 m
Soil Description	Slightly sandy gravelly SILT		



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

Sample Conditions		
Natural Moisture Content	%	25.0
Moisture Content - TOP	%	24.7
Moisture Content - BASE	%	22.8
Bulk Density	Mg/m³	1.95
Dry Density	Mg/m³	1.56

Test Conditions		
Sample Retained on 20 mm sieve	%	0.5
Seating Load - TOP	N	
Seating Load - BASE	N	
Surcharge	kg	8

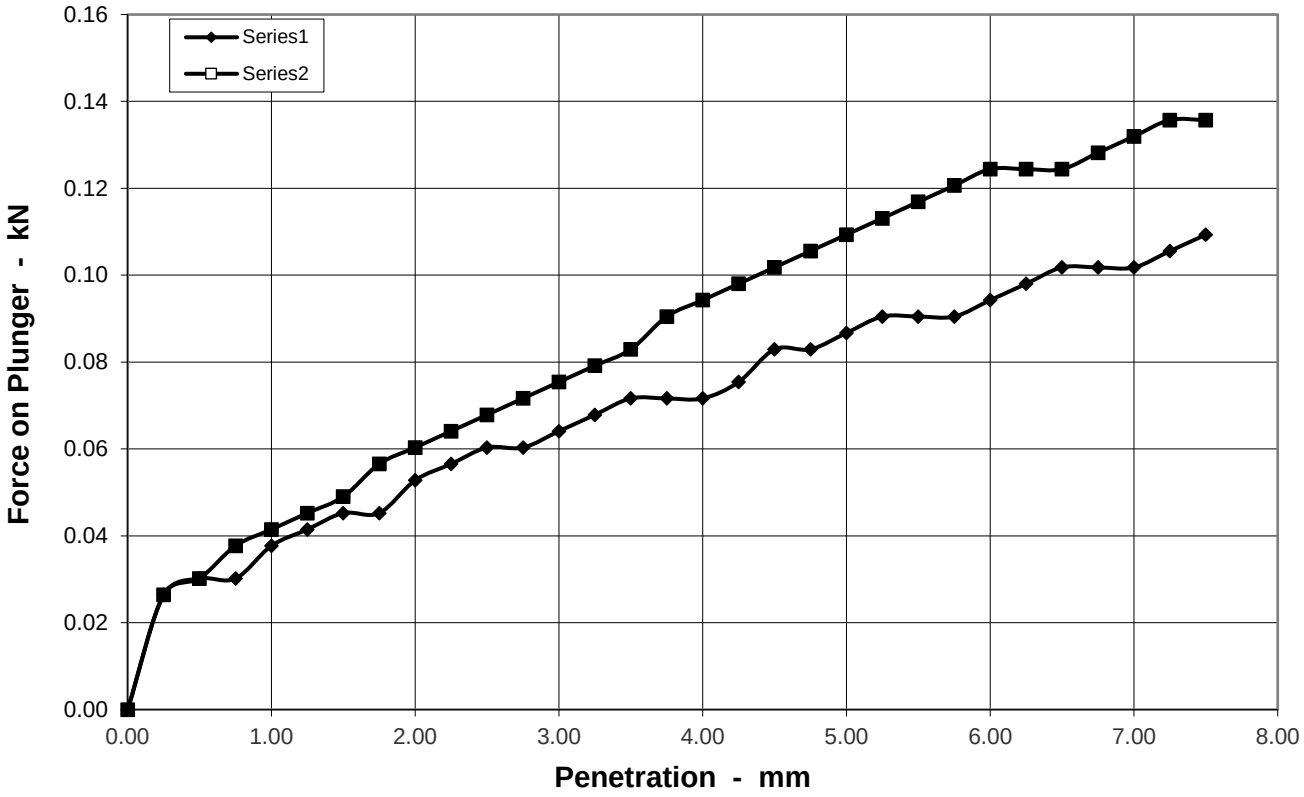
Penetration mm	CBR Values %	
	TOP	BASE
2.5	3.1	7.2
5	4.7	6.9
Accepted CBR	**4.7**	**7.2**

			Remarks

CALIFORNIA BEARING RATIO

BS 13377 : Part 4 : 1990 Clause 7.4

		Job Ref	**P21161**
		Borehole / Pit No	BH03
Site Name	**Raheen Housing Development**	Sample No	1
		Depth	0 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	%	18.0
Moisture Content - TOP	%	17.8
Moisture Content - BASE	%	16.8
Bulk Density	Mg/m³	2.16
Dry Density	Mg/m³	1.83

Test Conditions		
Sample Retained on 20 mm sieve	%	11.3
Seating Load - TOP	N	
Seating Load - BASE	N	
Surcharge	kg	8

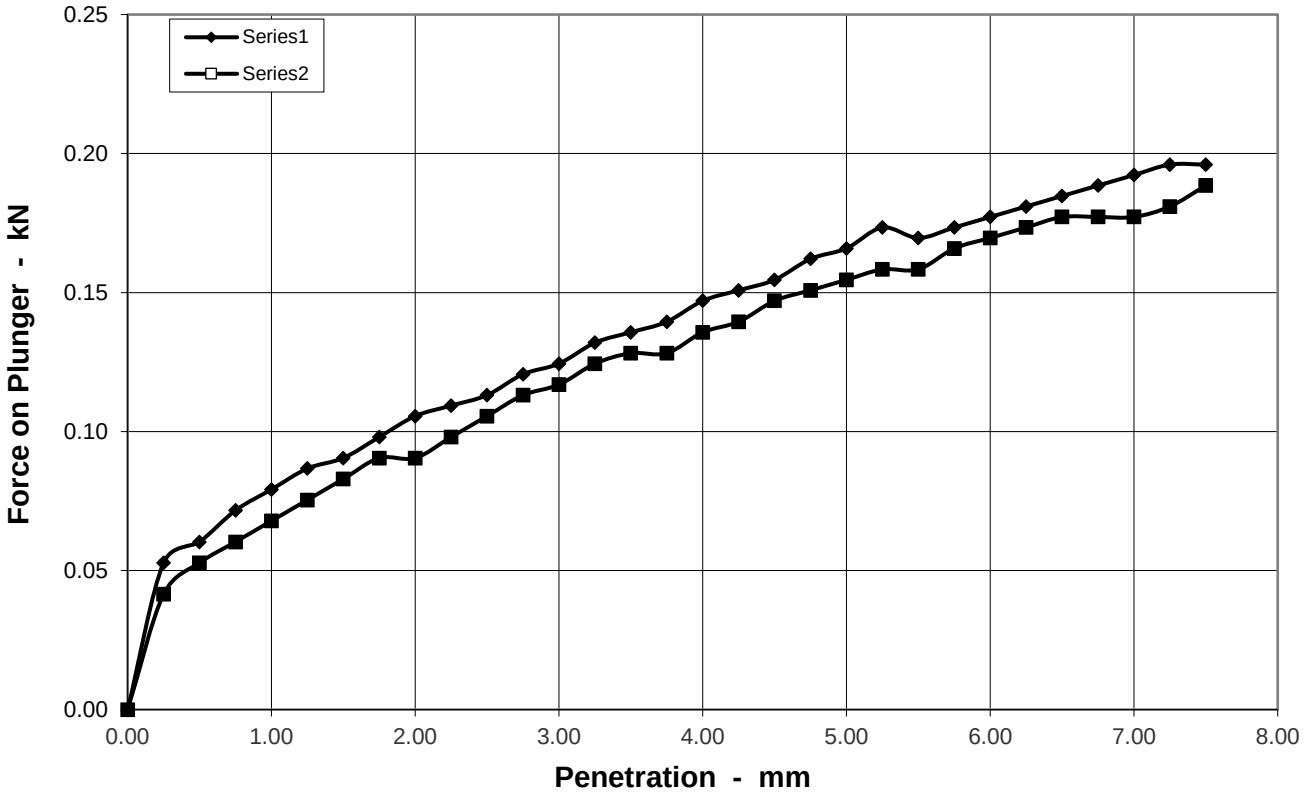
Penetration mm	CBR Values %	
	TOP	BASE
2.5	0.5	0.5
5	0.4	0.5
Accepted CBR	**0.5**	**0.5**

			Remarks	

CALIFORNIA BEARING RATIO

BS 13377 : Part 4 : 1990 Clause 7.4

		Job Ref	**P21161**
		Borehole / Pit No	BH08
Site Name	**Raheen Housing Development**	Sample No	1
		Depth	0 m
Soil Description	Very sandy very 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	%	37.0
Moisture Content - TOP	%	37.1
Moisture Content - BASE	%	36.3
Bulk Density	Mg/m³	1.85
Dry Density	Mg/m³	1.35

Test Conditions		
Sample Retained on 20 mm sieve	%	3.0
Seating Load - TOP	N	
Seating Load - BASE	N	
Surcharge	kg	8

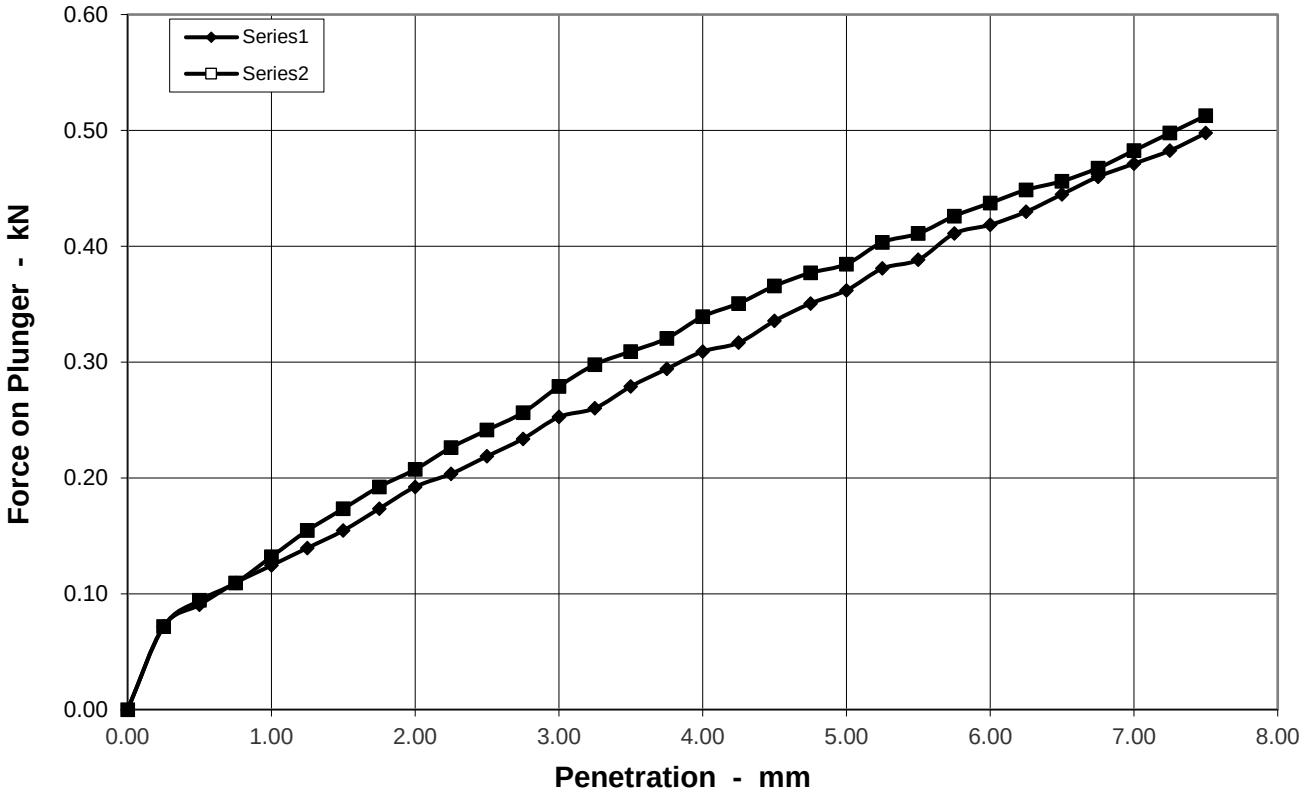
Penetration mm	CBR Values %	
	TOP	BASE
2.5	0.9	0.8
5	0.8	0.8
Accepted CBR	**0.9**	**0.8**

			Remarks	

CALIFORNIA BEARING RATIO

BS 13377 : Part 4 : 1990 Clause 7.4

		Job Ref	**P21161**
		Borehole / Pit No	IT01
Site Name	**Raheen Housing Development**	Sample No	1
		Depth	0.25 m
Soil Description	Slightly gravelly SILT		



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

Sample Conditions		
Natural Moisture Content	%	26.0
Moisture Content - TOP	%	25.8
Moisture Content - BASE	%	24.6
Bulk Density	Mg/m³	1.96
Dry Density	Mg/m³	1.55

Test Conditions		
Sample Retained on 20 mm sieve	%	2.4
Seating Load - TOP	N	
Seating Load - BASE	N	
Surcharge	kg	8

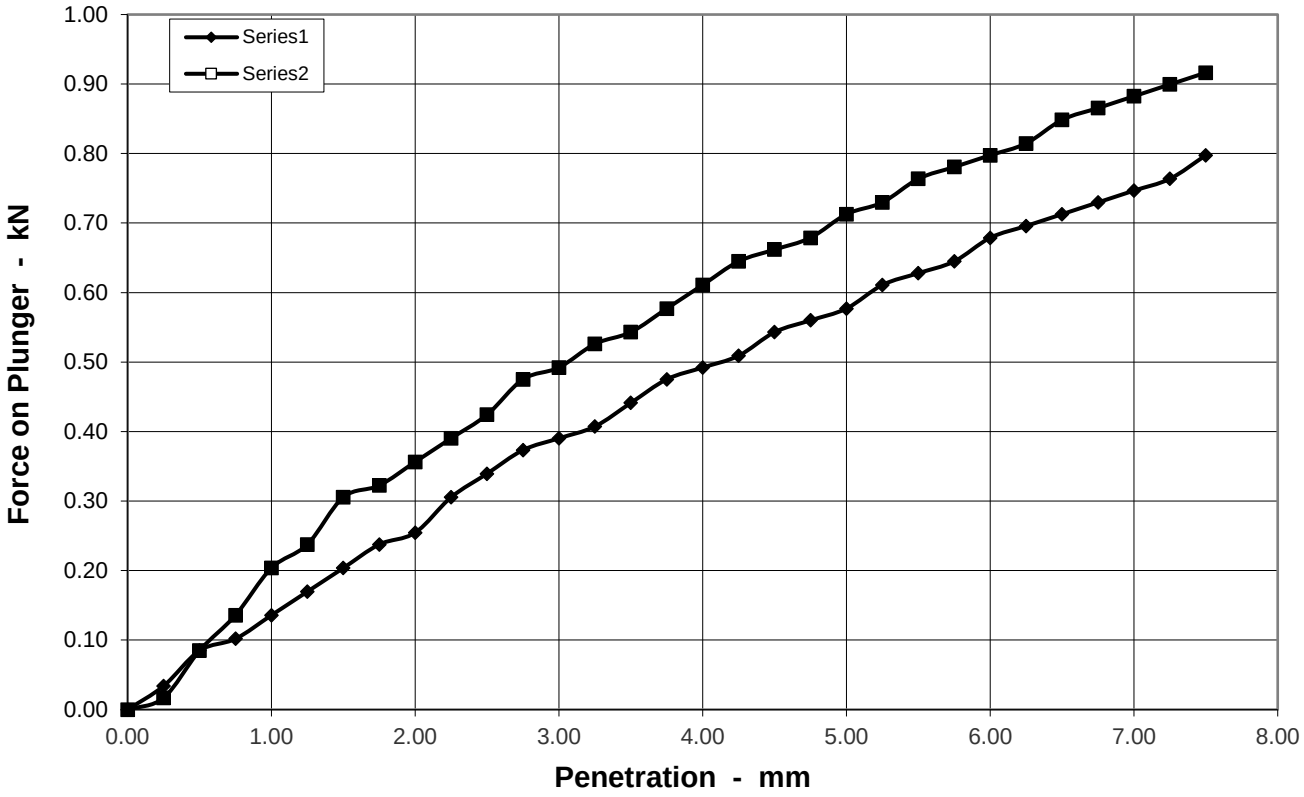
Penetration mm	CBR Values %	
	TOP	BASE
2.5	1.7	1.8
5	1.8	1.9
Accepted CBR	**1.8**	**1.9**

			Remarks	

CALIFORNIA BEARING RATIO

BS 13377 : Part 4 : 1990 Clause 7.4

		Job Ref	**P21161**
		Borehole / Pit No	IT03
Site Name	**Raheen Housing Development**	Sample No	1
		Depth	0.2 m
Soil Description	Slightly sandy slightly 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	%	28.0
Moisture Content - TOP	%	27.6
Moisture Content - BASE	%	27.2
Bulk Density	Mg/m³	1.94
Dry Density	Mg/m³	1.52

Test Conditions		
Sample Retained on 20 mm sieve	%	7.8
Seating Load - TOP	N	
Seating Load - BASE	N	
Surcharge	kg	8

Penetration mm	CBR Values %	
	TOP	BASE
2.5	2.6	3.2
5	2.9	3.6
Accepted CBR	**2.9**	**3.6**

			Remarks

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

Final Report

Report No.:	21-38438-1		
Initial Date of Issue:	09-Nov-2021		
Client	Priority Geotechnical Ltd		
Client Address:	Unit 12 Owenacurra Business Park Midleton County Cork Ireland		
Contact(s):	Colette Kelly		
Project	P21161 Raheen Housing		
Quotation No.:		**Date Received:**	03-Nov-2021
Order No.:	13888	**Date Instructed:**	03-Nov-2021
No. of Samples:	6		
Turnaround (Wkdays):	5	**Results Due:**	09-Nov-2021
Date Approved:	09-Nov-2021		
Approved By:			
Details:	Glynn Harvey, Technical Manager		

Results - Soil

Project: P21161 Raheen Housing

Client: Priority Geotechnical Ltd		**Chemtest Job No.:**			21-38438	21-38438	21-38438	21-38438	21-38438	21-38438
Quotation No.:		**Chemtest Sample ID.:**			1312114	1312115	1312116	1312117	1312118	1312119
			Sample Location:		IT03	ST10A	BH08	BH02	BH03	BH04
			Sample Type:		SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
			Top Depth (m):		1.00	3.00	1.00	1.00	1.00	1.00
			Date Sampled:		29-Oct-2021	29-Oct-2021	29-Oct-2021	29-Oct-2021	29-Oct-2021	29-Oct-2021
Determinand	**Accred.**	**SOP**	**Units**	**LOD**						
Moisture	N	2030	%	0.020	8.5	18	22	10	8.2	22
pH	U	2010		4.0	8.8	8.5	8.5	8.8	8.9	8.5
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
Sulphate (Acid Soluble)	U	2430	%	0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Organic Matter	U	2625	%	0.40	11	1.5	2.2	11	10	1.0

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
2430	Total Sulphate in soils	Total Sulphate	Acid digestion followed by determination of sulphate in extract by ICP-OES.
2625	Total Organic Carbon in Soils	Total organic Carbon (TOC)	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.

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

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

Final Report

Report No.:	21-34359-1		
Initial Date of Issue:	06-Oct-2021		
Client	Priority Geotechnical Ltd		
Client Address:	Unit 12 Owenacurra Business Park Midleton County Cork Ireland		
Contact(s):	Colette Kelly		
Project	P21161 Raheen Housing		
Quotation No.:		**Date Received:**	04-Oct-2021
Order No.:	13888	**Date Instructed:**	04-Oct-2021
No. of Samples:	4		
Turnaround (Wkdays):	5	**Results Due:**	08-Oct-2021
Date Approved:	06-Oct-2021		

Approved By:

Details: Glynn Harvey, Technical Manager

Results - Soil

Project: P21161 Raheen Housing

Client: Priority Geotechnical Ltd			**Chemtest Job No.:**		21-34359	21-34359	21-34359	21-34359
Quotation No.:			**Chemtest Sample ID.:**		1291258	1291259	1291260	1291261
			Sample Location:		ST02	ST08	ST10	ST11
			Sample Type:		SOIL	SOIL	SOIL	SOIL
			Top Depth (m):		0.50	0.50	1.80	1.00
			Date Sampled:		07-Jul-2021	13-Jul-2021	14-Jul-2021	15-Jul-2021
			Asbestos Lab:		DURHAM	DURHAM	DURHAM	DURHAM
Determinand	**Accred.**	**SOP**	**Units**	**LOD**				
ACM Type	U	2192		N/A	-	-	-	-
Asbestos Identification	U	2192		N/A	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected

Test Methods

SOP	Title	Parameters included	Method summary
2192	Asbestos	Asbestos	Polarised light microscopy / Gravimetry

Report Information

Key

U	UKAS accredited
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N	Unaccredited
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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

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

Final Report

Report No.:	21-25420-1
Initial Date of Issue:	02-Aug-2021
Client	Priority Geotechnical Ltd
Client Address:	Unit 12 Owenacurra Business Park Midleton County Cork Ireland
Contact(s):	Colette Kelly
Project	P21161 Raheen Housing

Quotation No.:		**Date Received:**	23-Jul-2021
Order No.:	13888	**Date Instructed:**	23-Jul-2021
No. of Samples:	5		
Turnaround (Wkdays):	7	**Results Due:**	02-Aug-2021
Date Approved:	02-Aug-2021		

Approved By:

Details: Glynn Harvey, Technical Manager

Results - Soil

Project: P21161 Raheen Housing

Client: Priority Geotechnical Ltd			**Chemtest Job No.:**		21-25420	21-25420	21-25420	21-25420	21-25420
Quotation No.:			**Chemtest Sample ID.:**		1246607	1246608	1246609	1246610	1246611
			Sample Location:		ST08	ST09	ST10	ST11	ST09A
			Sample Type:		SOIL	SOIL	SOIL	SOIL	SOIL
			Top Depth (m):		1.20	0.70	2.10	0.50	1.00
			Bottom Depth (m):		1.50	1.20	2.50	1.80	2.00
			Date Sampled:		12-Jul-2021	13-Jul-2021	14-Jul-2021	14-Jul-2021	15-Jul-2021
Determinand	**Accred.**	**SOP**	**Units**	**LOD**					
Moisture	N	2030	%	0.020	14	12	30	9.5	7.6

Results - 2 Stage WAC

Project: P21161 Raheen Housing

							Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	21-25420								
Chemtest Sample ID:	1246607								
Sample Ref:							**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Sample ID:									
Sample Location:	ST08								
Top Depth(m):	1.20								
Bottom Depth(m):	1.50								
Sampling Date:	12-Jul-2021								
Determinand	**SOP**	**Accred.**	**Units**						
Total Organic Carbon	2625	M	%			0.50	3	5	6
Loss On Ignition	2610	M	%			2.8	--	--	10
Total BTEX	2760	M	mg/kg			< 0.010	6	--	--
Total PCBs (7 Congeners)	2815	M	mg/kg			< 0.10	1	--	--
TPH Total WAC	2670	M	mg/kg			< 10	500	--	--
Total (Of 17) PAH's	2800	N	mg/kg			< 2.0	100	--	--
pH	2010	M				8.7	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg			0.0050	--	To evaluate	To evaluate
Eluate Analysis			**2:1 mg/l**	**8:1 mg/l**	**2:1 mg/kg**	**Cumulative mg/kg 10:1**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1455	U	0.0016	0.0009	0.0032	0.0095	0.5	2	25
Barium	1455	U	0.009	< 0.005	0.018	0.0061	20	100	300
Cadmium	1455	U	< 0.00011	< 0.00011	< 0.00011	< 0.00011	0.04	1	5
Chromium	1455	U	< 0.0005	< 0.0005	< 0.0005	< 0.0005	0.5	10	70
Copper	1455	U	0.0028	0.0010	0.0055	0.0019	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.0040	0.0048	0.0079	0.048	0.5	10	30
Nickel	1455	U	0.0007	< 0.0005	0.0013	< 0.0005	0.4	10	40
Lead	1455	U	< 0.0005	< 0.0005	< 0.0005	< 0.0005	0.5	10	50
Antimony	1455	U	< 0.0005	< 0.0005	< 0.0005	< 0.0005	0.06	0.7	5
Selenium	1455	U	0.0006	< 0.0005	0.0012	< 0.0005	0.1	0.5	7
Zinc	1455	U	< 0.003	< 0.003	< 0.003	< 0.003	4	50	200
Chloride	1220	U	3.2	< 1.0	< 10	< 10	800	15000	25000
Fluoride	1220	U	0.39	0.40	< 1.0	4.0	10	150	500
Sulphate	1220	U	23	4.1	45	53	1000	20000	50000
Total Dissolved Solids	1020	N	330	230	640	2300	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.030	< 0.30	< 0.50	1	-	-
Dissolved Organic Carbon	1610	U	9.1	17	< 50	160	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.175
Moisture (%)	14

Leachate Test Information	
Leachant volume 1st extract/l	0.322
Leachant volume 2nd extract/l	1.400
Eluant recovered from 1st extract/l	0.116

Waste Acceptance Criteria

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

Results - 2 Stage WAC

Project: P21161 Raheen Housing

							Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	21-25420								
Chemtest Sample ID:	1246608								
Sample Ref:							**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Sample ID:									
Sample Location:	ST09								
Top Depth(m):	0.70								
Bottom Depth(m):	1.20								
Sampling Date:	13-Jul-2021								
Determinand	**SOP**	**Accred.**	**Units**						
Total Organic Carbon	2625	M	%			0.40	3	5	6
Loss On Ignition	2610	M	%			2.1	--	--	10
Total BTEX	2760	M	mg/kg			< 0.010	6	--	--
Total PCBs (7 Congeners)	2815	M	mg/kg			< 0.10	1	--	--
TPH Total WAC	2670	M	mg/kg			< 10	500	--	--
Total (Of 17) PAH's	2800	N	mg/kg			< 2.0	100	--	--
pH	2010	M				8.5	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg			0.0050	--	To evaluate	To evaluate
Eluate Analysis			**2:1 mg/l**	**8:1 mg/l**	**2:1 mg/kg**	**Cumulative mg/kg 10:1**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1455	U	0.0023	0.0015	0.0045	0.016	0.5	2	25
Barium	1455	U	0.019	< 0.005	0.038	0.022	20	100	300
Cadmium	1455	U	< 0.00011	< 0.00011	< 0.00011	< 0.00011	0.04	1	5
Chromium	1455	U	< 0.0005	< 0.0005	< 0.0005	< 0.0005	0.5	10	70
Copper	1455	U	0.0013	< 0.0005	0.0026	0.0015	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.051	0.011	0.10	0.16	0.5	10	30
Nickel	1455	U	0.0009	0.0005	0.0018	0.0057	0.4	10	40
Lead	1455	U	< 0.0005	< 0.0005	< 0.0005	< 0.0005	0.5	10	50
Antimony	1455	U	0.0027	0.0015	0.0054	0.016	0.06	0.7	5
Selenium	1455	U	0.0009	< 0.0005	0.0017	0.0010	0.1	0.5	7
Zinc	1455	U	< 0.003	< 0.003	< 0.003	< 0.003	4	50	200
Chloride	1220	U	11	2.0	22	30	800	15000	25000
Fluoride	1220	U	0.23	0.18	< 1.0	1.9	10	150	500
Sulphate	1220	U	91	17	180	260	1000	20000	50000
Total Dissolved Solids	1020	N	300	78	590	1000	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.030	< 0.30	< 0.50	1	-	-
Dissolved Organic Carbon	1610	U	8.2	9.7	< 50	95	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.175
Moisture (%)	12

Leachate Test Information	
Leachant volume 1st extract/l	0.326
Leachant volume 2nd extract/l	1.400
Eluant recovered from 1st extract/l	0.201

Waste Acceptance Criteria

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

Results - 2 Stage WAC

Project: P21161 Raheen Housing

							Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	21-25420								
Chemtest Sample ID:	1246609								
Sample Ref:							**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Sample ID:									
Sample Location:	ST10								
Top Depth(m):	2.10								
Bottom Depth(m):	2.50								
Sampling Date:	14-Jul-2021								
Determinand	**SOP**	**Accred.**	**Units**						
Total Organic Carbon	2625	M	%			2.6	3	5	6
Loss On Ignition	2610	M	%			7.1	--	--	10
Total BTEX	2760	M	mg/kg			< 0.010	6	--	--
Total PCBs (7 Congeners)	2815	M	mg/kg			< 0.10	1	--	--
TPH Total WAC	2670	M	mg/kg			< 10	500	--	--
Total (Of 17) PAH's	2800	N	mg/kg			2.3	100	--	--
pH	2010	M				8.3	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg			0.0040	--	To evaluate	To evaluate
Eluate Analysis			**2:1 mg/l**	**8:1 mg/l**	**2:1 mg/kg**	**Cumulative mg/kg 10:1**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1455	U	0.0013	0.0008	0.0025	0.0086	0.5	2	25
Barium	1455	U	0.023	0.006	0.043	0.072	20	100	300
Cadmium	1455	U	< 0.00011	< 0.00011	< 0.00011	< 0.00011	0.04	1	5
Chromium	1455	U	< 0.0005	< 0.0005	< 0.0005	< 0.0005	0.5	10	70
Copper	1455	U	0.0019	0.0017	0.0036	0.0018	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.0081	0.0047	0.015	0.050	0.5	10	30
Nickel	1455	U	0.0013	0.0042	0.0024	0.039	0.4	10	40
Lead	1455	U	< 0.0005	< 0.0005	< 0.0005	< 0.0005	0.5	10	50
Antimony	1455	U	0.0016	0.0007	0.0030	0.0078	0.06	0.7	5
Selenium	1455	U	0.0007	< 0.0005	0.0012	0.0006	0.1	0.5	7
Zinc	1455	U	< 0.003	< 0.003	< 0.003	< 0.003	4	50	200
Chloride	1220	U	4.7	1.1	< 10	14	800	15000	25000
Fluoride	1220	U	0.21	0.20	< 1.0	2.0	10	150	500
Sulphate	1220	U	70	13	130	180	1000	20000	50000
Total Dissolved Solids	1020	N	280	120	520	1400	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.030	< 0.30	< 0.50	1	-	-
Dissolved Organic Carbon	1610	U	8.5	18	< 50	170	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.175
Moisture (%)	30

Leachate Test Information	
Leachant volume 1st extract/l	0.276
Leachant volume 2nd extract/l	1.400
Eluant recovered from 1st extract/l	0.160

Waste Acceptance Criteria

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

Results - 2 Stage WAC

Project: P21161 Raheen Housing

							Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	21-25420								
Chemtest Sample ID:	1246610								
Sample Ref:							**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Sample ID:									
Sample Location:	ST11								
Top Depth(m):	0.50								
Bottom Depth(m):	1.80								
Sampling Date:	14-Jul-2021								
Determinand	**SOP**	**Accred.**	**Units**						
Total Organic Carbon	2625	M	%			0.40	3	5	6
Loss On Ignition	2610	M	%			1.9	--	--	10
Total BTEX	2760	M	mg/kg			< 0.010	6	--	--
Total PCBs (7 Congeners)	2815	M	mg/kg			< 0.10	1	--	--
TPH Total WAC	2670	M	mg/kg			< 10	500	--	--
Total (Of 17) PAH's	2800	N	mg/kg			< 2.0	100	--	--
pH	2010	M				8.7	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg			0.0050	--	To evaluate	To evaluate
Eluate Analysis			**2:1 mg/l**	**8:1 mg/l**	**2:1 mg/kg**	**Cumulative mg/kg 10:1**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1455	U	0.0005	0.0003	0.0009	0.0031	0.5	2	25
Barium	1455	U	0.007	< 0.005	0.014	0.0075	20	100	300
Cadmium	1455	U	< 0.00011	< 0.00011	< 0.00011	< 0.00011	0.04	1	5
Chromium	1455	U	< 0.0005	< 0.0005	< 0.0005	< 0.0005	0.5	10	70
Copper	1455	U	0.0011	< 0.0005	0.0021	0.0012	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.0060	0.0039	0.012	0.041	0.5	10	30
Nickel	1455	U	< 0.0005	< 0.0005	< 0.0005	< 0.0005	0.4	10	40
Lead	1455	U	< 0.0005	< 0.0005	< 0.0005	< 0.0005	0.5	10	50
Antimony	1455	U	< 0.0005	< 0.0005	< 0.0005	< 0.0005	0.06	0.7	5
Selenium	1455	U	< 0.0005	< 0.0005	< 0.0005	< 0.0005	0.1	0.5	7
Zinc	1455	U	< 0.003	< 0.003	< 0.003	< 0.003	4	50	200
Chloride	1220	U	9.3	1.1	19	20	800	15000	25000
Fluoride	1220	U	0.26	0.19	< 1.0	2.0	10	150	500
Sulphate	1220	U	6.4	1.1	13	17	1000	20000	50000
Total Dissolved Solids	1020	N	120	58	250	650	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.030	< 0.30	< 0.50	1	-	-
Dissolved Organic Carbon	1610	U	4.2	9.3	< 50	87	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.175
Moisture (%)	9.5

Leachate Test Information	
Leachant volume 1st extract/l	0.332
Leachant volume 2nd extract/l	1.400
Eluant recovered from 1st extract/l	0.193

Waste Acceptance Criteria

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

Results - 2 Stage WAC

Project: P21161 Raheen Housing

							Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	21-25420								
Chemtest Sample ID:	1246611								
Sample Ref:									
Sample ID:									
Sample Location:	ST09A								
Top Depth(m):	1.00								
Bottom Depth(m):	2.00								
Sampling Date:	15-Jul-2021								
Determinand	**SOP**	**Accred.**	**Units**				**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Total Organic Carbon	2625	M	%			0.40	3	5	6
Loss On Ignition	2610	M	%			1.4	--	--	10
Total BTEX	2760	M	mg/kg			< 0.010	6	--	--
Total PCBs (7 Congeners)	2815	M	mg/kg			< 0.10	1	--	--
TPH Total WAC	2670	M	mg/kg			< 10	500	--	--
Total (Of 17) PAH's	2800	N	mg/kg			< 2.0	100	--	--
pH	2010	M				8.6	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg			0.0030	--	To evaluate	To evaluate
Eluate Analysis			**2:1 mg/l**	**8:1 mg/l**	**2:1 mg/kg**	**Cumulative mg/kg 10:1**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1455	U	0.0019	0.0007	0.0037	0.0086	0.5	2	25
Barium	1455	U	0.008	< 0.005	0.016	0.0091	20	100	300
Cadmium	1455	U	< 0.00011	< 0.00011	< 0.00011	< 0.00011	0.04	1	5
Chromium	1455	U	< 0.0005	< 0.0005	< 0.0005	< 0.0005	0.5	10	70
Copper	1455	U	0.0020	0.0008	0.0039	0.0021	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.0045	0.0033	0.0089	0.034	0.5	10	30
Nickel	1455	U	< 0.0005	< 0.0005	< 0.0005	< 0.0005	0.4	10	40
Lead	1455	U	< 0.0005	< 0.0005	< 0.0005	< 0.0005	0.5	10	50
Antimony	1455	U	< 0.0005	< 0.0005	< 0.0005	< 0.0005	0.06	0.7	5
Selenium	1455	U	< 0.0005	< 0.0005	< 0.0005	< 0.0005	0.1	0.5	7
Zinc	1455	U	< 0.003	< 0.003	< 0.003	< 0.003	4	50	200
Chloride	1220	U	5.3	< 1.0	11	< 10	800	15000	25000
Fluoride	1220	U	0.22	0.15	< 1.0	1.6	10	150	500
Sulphate	1220	U	4.8	< 1.0	< 10	< 10	1000	20000	50000
Total Dissolved Solids	1020	N	130	61	260	690	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.030	< 0.30	< 0.50	1	-	-
Dissolved Organic Carbon	1610	U	4.7	14	< 50	130	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.175
Moisture (%)	7.6

Leachate Test Information	
Leachant volume 1st extract/l	0.336
Leachant volume 2nd extract/l	1.400
Eluant recovered from 1st extract/l	0.193

Waste Acceptance Criteria

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

Test Methods

SOP	Title	Parameters included	Method summary
1020	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Conductivity Meter
1220	Anions, Alkalinity & Ammonium in Waters	Fluoride; Chloride; Nitrite; Nitrate; Total; Oxidisable Nitrogen (TON); Sulfate; Phosphate; Alkalinity; Ammonium	Automated colorimetric analysis using 'Aquakem 600' Discrete Analyser.
1455	Metals in Waters by ICP-MS	Metals, including: Antimony; Arsenic; Barium; Beryllium; Boron; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Tin; Vanadium; Zinc	Filtration of samples followed by direct determination by inductively coupled plasma mass spectrometry (ICP-MS).
1610	Total/Dissolved Organic Carbon in Waters	Organic Carbon	TOC Analyser using Catalytic Oxidation
1920	Phenols in Waters by HPLC	Phenolic compounds including: Phenol, Cresols, Xylenols, Trimethylphenols Note: Chlorophenols are excluded.	Determination by High Performance Liquid Chromatography (HPLC) using electrochemical detection.
2010	pH Value of Soils	pH	pH Meter
2015	Acid Neutralisation Capacity	Acid Reserve	Titration
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.
2040	Soil Description(Requirement of MCERTS)	Soil description	As received soil is described based upon BS5930
2610	Loss on Ignition	loss on ignition (LOI)	Determination of the proportion by mass that is lost from a soil by ignition at 550°C.
2625	Total Organic Carbon in Soils	Total organic Carbon (TOC)	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2670	Total Petroleum Hydrocarbons (TPH) in Soils by GC-FID	TPH (C6–C40); optional carbon banding, e.g. 3-band – GRO, DRO & LRO*TPH C8–C40	Dichloromethane extraction / GC-FID
2760	Volatile Organic Compounds (VOCs) in Soils by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics.(cf. USEPA Method 8260)*please refer to UKAS schedule	Automated headspace gas chromatographic (GC) analysis of a soil sample, as received, with mass spectrometric (MS) detection of volatile organic compounds.
2800	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-MS	Acenaphthene*; Acenaphthylene; Anthracene*; Benzo[a]Anthracene*; Benzo[a]Pyrene*; Benzo[b]Fluoranthene*; Benzo[ghi]Perylene*; Benzo[k]Fluoranthene; Chrysene*; Dibenz[ah]Anthracene; Fluoranthene*; Fluorene*; Indeno[123cd]Pyrene*; Naphthalene*; Phenanthrene*; Pyrene*	Dichloromethane extraction / GC-MS
2815	Polychlorinated Biphenyls (PCB) ICES7Congeners in Soils by GC-MS	ICES7 PCB congeners	Acetone/Hexane extraction / GC-MS
640	Characterisation of Waste (Leaching C10)	Waste material including soil, sludges and granular waste	ComplianceTest for Leaching of Granular Waste Material and Sludge
650	Characterisation of Waste (Leaching WAC)	Waste material including soil, sludges and granular waste	ComplianceTest for Leaching of Granular Waste Material and Sludge

Report Information

Key

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

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

Final Report

Report No.:	21-24924-1
Initial Date of Issue:	28-Jul-2021
Client	Priority Geotechnical Ltd
Client Address:	Unit 12 Owenacurra Business Park Midleton County Cork Ireland
Contact(s):	Colette Kelly
Project	P21161 Raheen Housing

Quotation No.:		**Date Received:**	20-Jul-2021
Order No.:	13888	**Date Instructed:**	21-Jul-2021
No. of Samples:	5		
Turnaround (Wkdays):	7	**Results Due:**	29-Jul-2021
Date Approved:	28-Jul-2021		

Approved By:

Details: Glynn Harvey, Technical Manager

Results - 2 Stage WAC

Project: P21161 Raheen Housing

							Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	21-24924								
Chemtest Sample ID:	1244188								
Sample Ref:							**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Sample ID:									
Sample Location:	ST02								
Top Depth(m):	0.80								
Bottom Depth(m):									
Sampling Date:	07-Jul-2021								
Determinand	**SOP**	**Accred.**	**Units**						
Total Organic Carbon	2625	M	%			1.1	3	5	6
Loss On Ignition	2610	M	%			3.6	--	--	10
Total BTEX	2760	M	mg/kg			< 0.010	6	--	--
Total PCBs (7 Congeners)	2815	M	mg/kg			< 0.10	1	--	--
TPH Total WAC	2670	M	mg/kg			< 10	500	--	--
Total (Of 17) PAH's	2700	N	mg/kg			< 2.0	100	--	--
pH	2010	M				8.4	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg			< 0.0020	--	To evaluate	To evaluate
Eluate Analysis			**2:1 mg/l**	**8:1 mg/l**	**2:1 mg/kg**	**Cumulative mg/kg 10:1**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1455	U	0.0021	0.0014	0.0041	0.014	0.5	2	25
Barium	1455	U	0.035	0.013	0.070	0.15	20	100	300
Cadmium	1455	U	< 0.00011	< 0.00011	< 0.00011	< 0.00011	0.04	1	5
Chromium	1455	U	0.0013	0.0017	0.0026	0.017	0.5	10	70
Copper	1455	U	0.0043	0.0029	0.0085	0.0035	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.015	0.013	0.030	0.13	0.5	10	30
Nickel	1455	U	0.0018	0.0016	0.0036	0.016	0.4	10	40
Lead	1455	U	< 0.0005	< 0.0005	< 0.0005	< 0.0005	0.5	10	50
Antimony	1455	U	0.0010	0.0008	0.0019	0.0077	0.06	0.7	5
Selenium	1455	U	0.0006	0.0007	0.0012	0.0066	0.1	0.5	7
Zinc	1455	U	0.004	0.009	0.009	0.089	4	50	200
Chloride	1220	U	5.0	3.8	< 10	39	800	15000	25000
Fluoride	1220	U	0.26	0.25	< 1.0	2.5	10	150	500
Sulphate	1220	U	81	20	160	250	1000	20000	50000
Total Dissolved Solids	1020	N	320	180	630	1900	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.030	< 0.30	< 0.50	1	-	-
Dissolved Organic Carbon	1610	U	36	7.7	72	100	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.175
Moisture (%)	11

Leachate Test Information	
Leachant volume 1st extract/l	0.329
Leachant volume 2nd extract/l	1.400
Eluant recovered from 1st extract/l	0.142

Waste Acceptance Criteria

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

Results - 2 Stage WAC

Project: P21161 Raheen Housing

							Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	21-24924								
Chemtest Sample ID:	1244189								
Sample Ref:							**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Sample ID:									
Sample Location:	ST02								
Top Depth(m):	1.50								
Bottom Depth(m):									
Sampling Date:	07-Jul-2021								
Determinand	**SOP**	**Accred.**	**Units**						
Total Organic Carbon	2625	M	%			2.4	3	5	6
Loss On Ignition	2610	M	%			7.2	--	--	10
Total BTEX	2760	M	mg/kg			< 0.010	6	--	--
Total PCBs (7 Congeners)	2815	M	mg/kg			< 0.10	1	--	--
TPH Total WAC	2670	M	mg/kg			< 10	500	--	--
Total (Of 17) PAH's	2700	N	mg/kg			< 2.0	100	--	--
pH	2010	M				8.6	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg			0.0090	--	To evaluate	To evaluate
Eluate Analysis			**2:1 mg/l**	**8:1 mg/l**	**2:1 mg/kg**	**Cumulative mg/kg 10:1**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1455	U	0.0014	0.0011	0.0028	0.011	0.5	2	25
Barium	1455	U	0.013	0.008	0.026	0.086	20	100	300
Cadmium	1455	U	< 0.00011	< 0.00011	< 0.00011	< 0.00011	0.04	1	5
Chromium	1455	U	0.0006	0.0006	0.0012	0.0057	0.5	10	70
Copper	1455	U	0.0070	0.0031	0.014	0.0049	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.014	0.0089	0.027	0.092	0.5	10	30
Nickel	1455	U	0.0013	0.0006	0.0027	0.0069	0.4	10	40
Lead	1455	U	< 0.0005	< 0.0005	< 0.0005	< 0.0005	0.5	10	50
Antimony	1455	U	0.0009	< 0.0005	0.0019	0.0007	0.06	0.7	5
Selenium	1455	U	0.0009	< 0.0005	0.0018	0.0006	0.1	0.5	7
Zinc	1455	U	0.004	< 0.003	0.008	0.003	4	50	200
Chloride	1220	U	3.1	< 1.0	< 10	< 10	800	15000	25000
Fluoride	1220	U	0.35	0.24	< 1.0	2.5	10	150	500
Sulphate	1220	U	17	< 1.0	34	12	1000	20000	50000
Total Dissolved Solids	1020	N	210	150	410	1500	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.030	< 0.30	< 0.50	1	-	-
Dissolved Organic Carbon	1610	U	43	17	86	190	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.175
Moisture (%)	8.5

Leachate Test Information	
Leachant volume 1st extract/l	0.334
Leachant volume 2nd extract/l	1.400
Eluant recovered from 1st extract/l	0.122

Waste Acceptance Criteria

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

Results - 2 Stage WAC

Project: P21161 Raheen Housing

							Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	21-24924								
Chemtest Sample ID:	1244190								
Sample Ref:	ENV8						**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Sample ID:									
Sample Location:	ST03								
Top Depth(m):	0.30								
Bottom Depth(m):	0.70								
Sampling Date:	08-Jul-2021								
Determinand	**SOP**	**Accred.**	**Units**						
Total Organic Carbon	2625	M	%			0.83	3	5	6
Loss On Ignition	2610	M	%			2.6	--	--	10
Total BTEX	2760	M	mg/kg			< 0.010	6	--	--
Total PCBs (7 Congeners)	2815	M	mg/kg			< 0.10	1	--	--
TPH Total WAC	2670	M	mg/kg			< 10	500	--	--
Total (Of 17) PAH's	2700	N	mg/kg			7.7	100	--	--
pH	2010	M				8.8	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg			0.0090	--	To evaluate	To evaluate
Eluate Analysis			**2:1 mg/l**	**8:1 mg/l**	**2:1 mg/kg**	**Cumulative mg/kg 10:1**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1455	U	0.0004	0.0005	0.0008	0.0052	0.5	2	25
Barium	1455	U	< 0.005	< 0.005	< 0.0005	< 0.0005	20	100	300
Cadmium	1455	U	< 0.00011	< 0.00011	< 0.00011	< 0.00011	0.04	1	5
Chromium	1455	U	0.0006	< 0.0005	0.0013	0.0011	0.5	10	70
Copper	1455	U	0.0015	< 0.0005	0.0030	0.0024	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.0098	0.0077	0.020	0.080	0.5	10	30
Nickel	1455	U	< 0.0005	< 0.0005	< 0.0005	< 0.0005	0.4	10	40
Lead	1455	U	< 0.0005	< 0.0005	< 0.0005	< 0.0005	0.5	10	50
Antimony	1455	U	0.0007	< 0.0005	0.0013	0.0011	0.06	0.7	5
Selenium	1455	U	< 0.0005	< 0.0005	< 0.0005	< 0.0005	0.1	0.5	7
Zinc	1455	U	0.003	< 0.003	0.006	0.005	4	50	200
Chloride	1220	U	8.8	2.5	18	35	800	15000	25000
Fluoride	1220	U	0.20	0.17	< 1.0	1.7	10	150	500
Sulphate	1220	U	10	4.4	20	53	1000	20000	50000
Total Dissolved Solids	1020	N	120	65	230	740	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.030	< 0.30	< 0.50	1	-	-
Dissolved Organic Carbon	1610	U	15	3.8	< 50	56	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.175
Moisture (%)	6.3

Leachate Test Information	
Leachant volume 1st extract/l	0.338
Leachant volume 2nd extract/l	1.400
Eluant recovered from 1st extract/l	0.287

Waste Acceptance Criteria

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

Results - 2 Stage WAC

Project: P21161 Raheen Housing

							Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	21-24924								
Chemtest Sample ID:	1244191								
Sample Ref:	ENV13						**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Sample ID:									
Sample Location:	ST03								
Top Depth(m):	0.70								
Bottom Depth(m):	1.00								
Sampling Date:	08-Jul-2021								
Determinand	**SOP**	**Accred.**	**Units**						
Total Organic Carbon	2625	M	%			0.90	3	5	6
Loss On Ignition	2610	M	%			3.8	--	--	10
Total BTEX	2760	M	mg/kg			< 0.010	6	--	--
Total PCBs (7 Congeners)	2815	M	mg/kg			< 0.10	1	--	--
TPH Total WAC	2670	M	mg/kg			< 10	500	--	--
Total (Of 17) PAH's	2700	N	mg/kg			< 2.0	100	--	--
pH	2010	M				8.7	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg			0.0050	--	To evaluate	To evaluate
Eluate Analysis			**2:1 mg/l**	**8:1 mg/l**	**2:1 mg/kg**	**Cumulative mg/kg 10:1**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1455	U	0.0012	0.0011	0.0024	0.011	0.5	2	25
Barium	1455	U	0.012	< 0.005	0.023	0.012	20	100	300
Cadmium	1455	U	< 0.00011	< 0.00011	< 0.00011	< 0.00011	0.04	1	5
Chromium	1455	U	0.0039	0.0011	0.0078	0.014	0.5	10	70
Copper	1455	U	0.0033	0.0014	0.0065	0.0032	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.013	0.0068	0.025	0.074	0.5	10	30
Nickel	1455	U	0.0008	< 0.0005	0.0017	0.0008	0.4	10	40
Lead	1455	U	< 0.0005	< 0.0005	< 0.0005	< 0.0005	0.5	10	50
Antimony	1455	U	0.0008	< 0.0005	0.0016	0.0008	0.06	0.7	5
Selenium	1455	U	< 0.0005	< 0.0005	< 0.0005	< 0.0005	0.1	0.5	7
Zinc	1455	U	0.005	< 0.003	0.011	0.005	4	50	200
Chloride	1220	U	5.4	1.7	11	21	800	15000	25000
Fluoride	1220	U	0.39	0.23	< 1.0	2.5	10	150	500
Sulphate	1220	U	91	18	180	250	1000	20000	50000
Total Dissolved Solids	1020	N	210	100	410	1100	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.030	< 0.30	< 0.50	1	-	-
Dissolved Organic Carbon	1610	U	17	11	< 50	120	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.175
Moisture (%)	12

Leachate Test Information	
Leachant volume 1st extract/l	0.326
Leachant volume 2nd extract/l	1.400
Eluant recovered from 1st extract/l	0.173

Waste Acceptance Criteria

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

Results - 2 Stage WAC

Project: P21161 Raheen Housing

							Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	21-24924								
Chemtest Sample ID:	1244192								
Sample Ref:	ENV2						**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Sample ID:									
Sample Location:	ST04								
Top Depth(m):	1.70								
Bottom Depth(m):	2.20								
Sampling Date:	08-Jul-2021								
Determinand	**SOP**	**Accred.**	**Units**						
Total Organic Carbon	2625	M	%			0.82	3	5	6
Loss On Ignition	2610	M	%			2.1	--	--	10
Total BTEX	2760	M	mg/kg			< 0.010	6	--	--
Total PCBs (7 Congeners)	2815	M	mg/kg			< 0.10	1	--	--
TPH Total WAC	2670	M	mg/kg			< 10	500	--	--
Total (Of 17) PAH's	2700	N	mg/kg			< 2.0	100	--	--
pH	2010	M				9.3	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg			0.015	--	To evaluate	To evaluate
Eluate Analysis			**2:1 mg/l**	**8:1 mg/l**	**2:1 mg/kg**	**Cumulative mg/kg 10:1**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1455	U	0.0008	0.0010	0.0015	0.0098	0.5	2	25
Barium	1455	U	< 0.005	< 0.005	< 0.0005	< 0.0005	20	100	300
Cadmium	1455	U	< 0.00011	< 0.00011	< 0.00011	< 0.00011	0.04	1	5
Chromium	1455	U	0.0022	0.0008	0.0043	0.0095	0.5	10	70
Copper	1455	U	0.0012	0.0006	0.0023	0.0016	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.0083	0.0046	0.017	0.052	0.5	10	30
Nickel	1455	U	< 0.0005	< 0.0005	< 0.0005	< 0.0005	0.4	10	40
Lead	1455	U	< 0.0005	< 0.0005	< 0.0005	< 0.0005	0.5	10	50
Antimony	1455	U	0.0009	< 0.0005	0.0019	0.0013	0.06	0.7	5
Selenium	1455	U	0.0011	< 0.0005	0.0021	0.0015	0.1	0.5	7
Zinc	1455	U	< 0.003	< 0.003	< 0.003	< 0.003	4	50	200
Chloride	1220	U	9.2	1.6	18	27	800	15000	25000
Fluoride	1220	U	0.35	0.27	< 1.0	2.8	10	150	500
Sulphate	1220	U	34	6.5	68	100	1000	20000	50000
Total Dissolved Solids	1020	N	98	49	200	560	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.030	< 0.30	< 0.50	1	-	-
Dissolved Organic Carbon	1610	U	8.3	4.4	< 50	< 50	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.175
Moisture (%)	6.5

Leachate Test Information	
Leachant volume 1st extract/l	0.338
Leachant volume 2nd extract/l	1.400
Eluant recovered from 1st extract/l	0.244

Waste Acceptance Criteria

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

Test Methods

SOP	Title	Parameters included	Method summary
1020	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Conductivity Meter
1220	Anions, Alkalinity & Ammonium in Waters	Fluoride; Chloride; Nitrite; Nitrate; Total; Oxidisable Nitrogen (TON); Sulfate; Phosphate; Alkalinity; Ammonium	Automated colorimetric analysis using 'Aquakem 600' Discrete Analyser.
1455	Metals in Waters by ICP-MS	Metals, including: Antimony; Arsenic; Barium; Beryllium; Boron; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Tin; Vanadium; Zinc	Filtration of samples followed by direct determination by inductively coupled plasma mass spectrometry (ICP-MS).
1610	Total/Dissolved Organic Carbon in Waters	Organic Carbon	TOC Analyser using Catalytic Oxidation
1920	Phenols in Waters by HPLC	Phenolic compounds including: Phenol, Cresols, Xylenols, Trimethylphenols Note: Chlorophenols are excluded.	Determination by High Performance Liquid Chromatography (HPLC) using electrochemical detection.
2010	pH Value of Soils	pH	pH Meter
2015	Acid Neutralisation Capacity	Acid Reserve	Titration
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.
2040	Soil Description(Requirement of MCERTS)	Soil description	As received soil is described based upon BS5930
2610	Loss on Ignition	loss on ignition (LOI)	Determination of the proportion by mass that is lost from a soil by ignition at 550°C.
2625	Total Organic Carbon in Soils	Total organic Carbon (TOC)	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2670	Total Petroleum Hydrocarbons (TPH) in Soils by GC-FID	TPH (C6–C40); optional carbon banding, e.g. 3-band – GRO, DRO & LRO*TPH C8–C40	Dichloromethane extraction / GC-FID
2700	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-FID	Acenaphthene; Acenaphthylene; Anthracene; Benzo[a]Anthracene; Benzo[a]Pyrene; Benzo[b]Fluoranthene; Benzo[ghi]Perylene; Benzo[k]Fluoranthene; Chrysene; Dibenz[ah]Anthracene; Fluoranthene; Fluorene; Indeno[123cd]Pyrene; Naphthalene; Phenanthrene; Pyrene	Dichloromethane extraction / GC-FID (GC-FID detection is non-selective and can be subject to interference from co-eluting compounds)
2760	Volatile Organic Compounds (VOCs) in Soils by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics.(cf. USEPA Method 8260)*please refer to UKAS schedule	Automated headspace gas chromatographic (GC) analysis of a soil sample, as received, with mass spectrometric (MS) detection of volatile organic compounds.
2815	Polychlorinated Biphenyls (PCB) ICES7Congeners in Soils by GC-MS	ICES7 PCB congeners	Acetone/Hexane extraction / GC-MS
640	Characterisation of Waste (Leaching C10)	Waste material including soil, sludges and granular waste	ComplianceTest for Leaching of Granular Waste Material and Sludge
650	Characterisation of Waste (Leaching WAC)	Waste material including soil, sludges and granular waste	ComplianceTest for Leaching of Granular Waste Material and Sludge

Report Information

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<	"less than"
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Uncertainty of measurement for the determinands tested are available upon request
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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

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

Final Report

Report No.:	21-24671-1
Initial Date of Issue:	26-Jul-2021
Client	Priority Geotechnical Ltd
Client Address:	Unit 12 Owenacurra Business Park Midleton County Cork Ireland
Contact(s):	Colette Kelly
Project	P21161 Raheen Housing

Quotation No.:		**Date Received:**	19-Jul-2021
Order No.:	13888	**Date Instructed:**	19-Jul-2021
No. of Samples:	1		
Turnaround (Wkdays):	7	**Results Due:**	27-Jul-2021
Date Approved:	26-Jul-2021		

Approved By:

Details: Glynn Harvey, Technical Manager

Results - 2 Stage WAC

Project: P21161 Raheen Housing

							Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	21-24671								
Chemtest Sample ID:	1242721								
Sample Ref:									
Sample ID:									
Sample Location:	ST12								
Top Depth(m):	1.5								
Bottom Depth(m):	1.8								
Sampling Date:	09-Jul-2021								
Determinand	**SOP**	**Accred.**	**Units**				**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Total Organic Carbon	2625	M	%			< 0.20	3	5	6
Loss On Ignition	2610	M	%			1.2	--	--	10
Total BTEX	2760	M	mg/kg			< 0.010	6	--	--
Total PCBs (7 Congeners)	2815	M	mg/kg			< 0.10	1	--	--
TPH Total WAC	2670	M	mg/kg			< 10	500	--	--
Total (Of 17) PAH's	2700	N	mg/kg			< 2.0	100	--	--
pH	2010	M				8.7	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg			0.16	--	To evaluate	To evaluate
Eluate Analysis			**2:1 mg/l**	**8:1 mg/l**	**2:1 mg/kg**	**Cumulative mg/kg 10:1**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1455	U	0.0006	0.0005	0.0012	0.0048	0.5	2	25
Barium	1455	U	0.008	< 0.005	0.014	0.0066	20	100	300
Cadmium	1455	U	< 0.00011	< 0.00011	< 0.00011	< 0.00011	0.04	1	5
Chromium	1455	U	0.0010	< 0.0005	0.0019	0.0009	0.5	10	70
Copper	1455	U	0.0015	0.0008	0.0029	0.0013	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.0093	0.0063	0.018	0.065	0.5	10	30
Nickel	1455	U	< 0.0005	< 0.0005	< 0.0005	< 0.0005	0.4	10	40
Lead	1455	U	< 0.0005	< 0.0005	< 0.0005	< 0.0005	0.5	10	50
Antimony	1455	U	< 0.0005	< 0.0005	< 0.0005	< 0.0005	0.06	0.7	5
Selenium	1455	U	0.0006	< 0.0005	0.0011	< 0.0005	0.1	0.5	7
Zinc	1455	U	0.004	< 0.003	0.008	0.004	4	50	200
Chloride	1220	U	6.3	< 1.0	12	< 10	800	15000	25000
Fluoride	1220	U	0.34	0.19	< 1.0	2.0	10	150	500
Sulphate	1220	U	13	3.0	25	38	1000	20000	50000
Total Dissolved Solids	1020	N	130	54	250	600	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.030	< 0.30	< 0.50	1	-	-
Dissolved Organic Carbon	1610	U	17	3.4	< 50	< 50	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.175
Moisture (%)	27

Leachate Test Information	
Leachant volume 1st extract/l	0.284
Leachant volume 2nd extract/l	1.400
Eluant recovered from 1st extract/l	0.152

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customerservices@chemtest.com

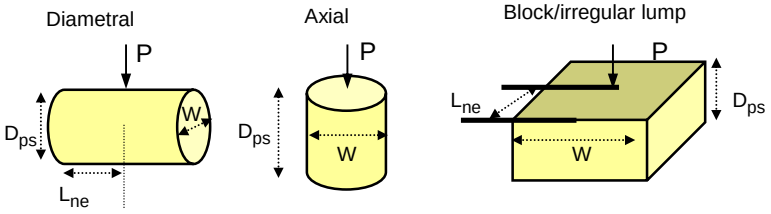
Point Load Strength Index Tests
Summary of Results

Project No.: P21161

Project Name: Raheen Housing Development

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	I_s MPa	$I_{s(50)}$ MPa	
RC01	4.15	RC	C			LIMESTONE	D	U	YES	70.0	75.0	75.0	62.0	10.3	68.2	2.2	2.5	Undulated Rough
RC01	5.15	RC	C			LIMESTONE	D	U	YES	110.0	75.0	75.0	39.0	20.7	54.1	7.1	7.3	Undulated Rough
RC02	3.35	RC	C			LIMESTONE	D	U	YES	80.0	75.0	75.0	65.0	19.5	69.8	4.0	4.7	Undulated Rough
RC03	3.70	RC	C			LIMESTONE	D	U	YES	70.0	75.0	75.0	43.0	29.5	56.8	9.1	9.7	Undulated Rough
RC03	10.45	RC	C			LIMESTONE	D	U	YES	70.0	75.0	75.0	62.0	3.6	68.2	0.8	0.9	Undulated Rough
RC03	12.13	RC	C			LIMESTONE	D	U	YES	90.0	75.0	75.0	54.0	20.6	63.6	5.1	5.7	Undulated 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: 25/11/2021

Approved By: Cilla

Table 1

sheet 1