Appendix A Existing Record Drawings

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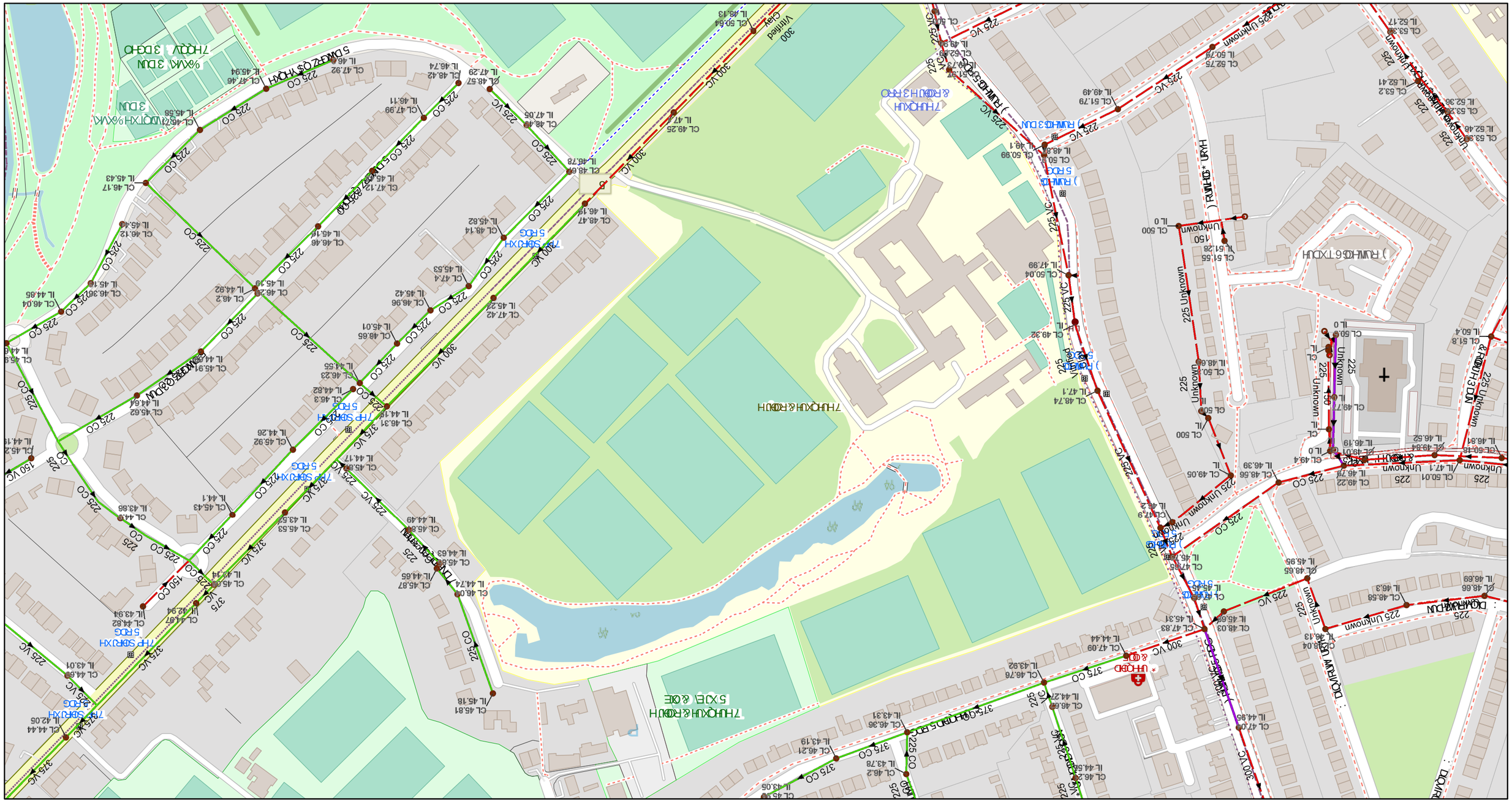

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2YHUIORZ
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PL
NP

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)DFHERRN ,QF DQG LWV DIILOLDWHV
FRQWULEXWRUV 0DS OD\HU E\ (VUL

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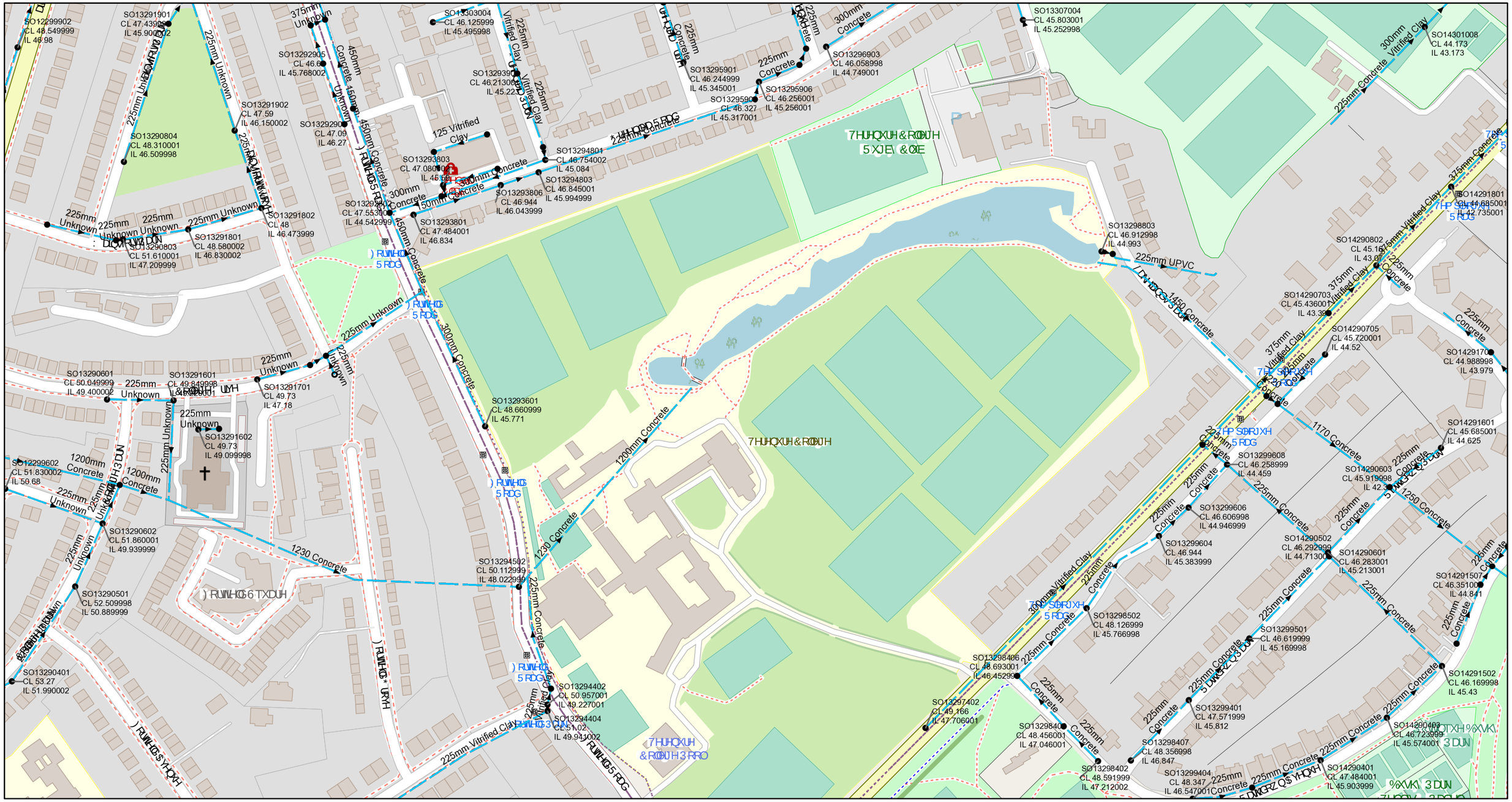

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PL

NP

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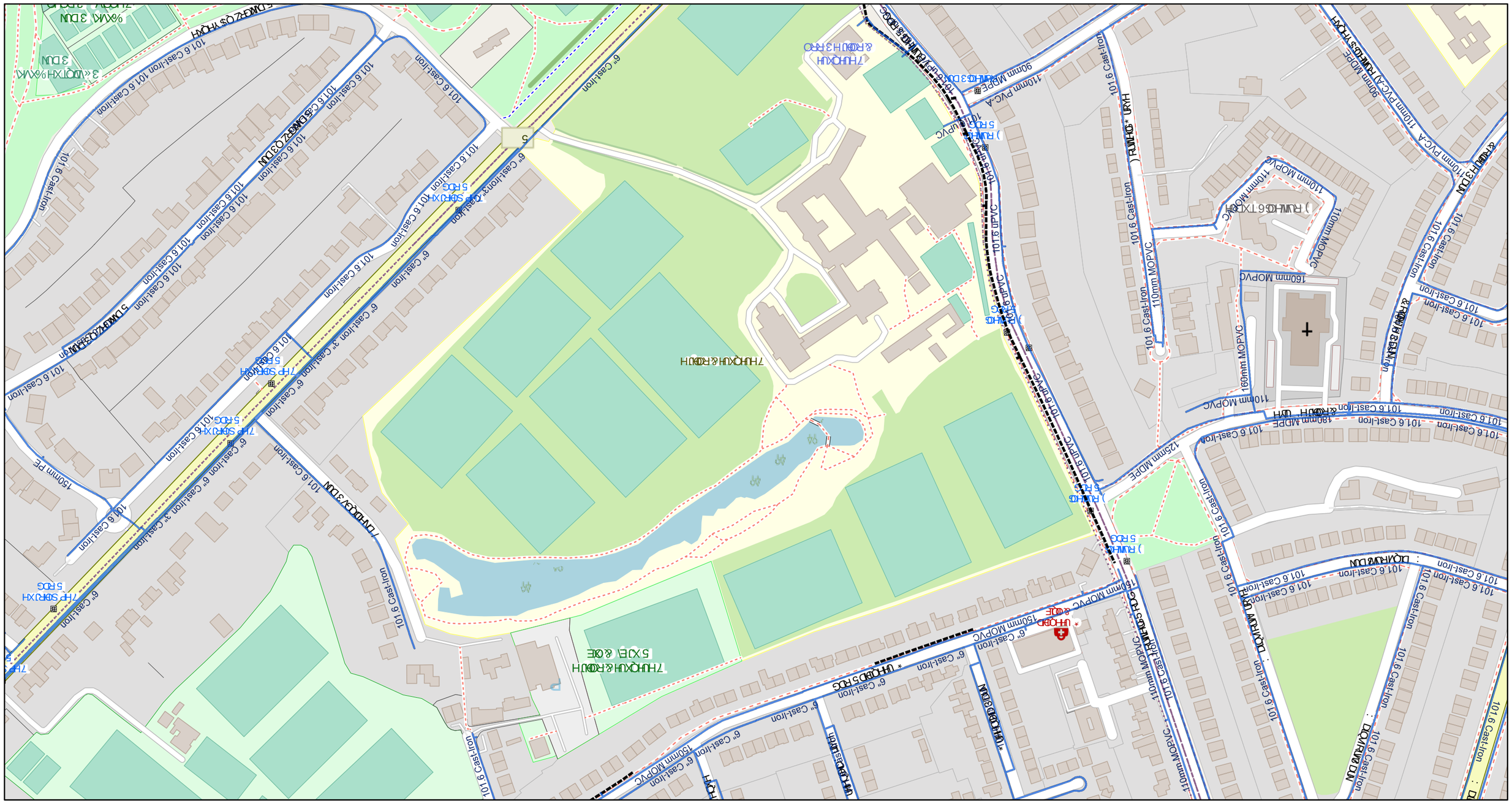
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1
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51700 51800 51900 52000 52100 52200 52300 52400 52500 52600 52700 52800 52900 53000 53100 53200 53300 53400 53500 53600 53700 53800 53900 54000 54100 54200 54300 54400 54500 54600 54700 54800 54900 55000 55100 55200 55300 55400 55500 55600 55700 55800 55900 56000 56100 56200 56300 56400 56500 56600 56700 56800 56900 57000 57100 57200 57300 57400 57500 57600 57700 57800 57900 58000 58100 58200 58300 58400 58500 58600 58700 58800 58900 59000 59100 59200 59300 59400 59500 59600 59700 59800 59900 60000 60100 60200 60300 60400 60500 60600 60700 60800 60900 61000 61100 61200 61300 61400 61500 61600 61700 61800 61900 62000 62100 62200 62300 62400 62500 62600 62700 62800 62900 63000 63100 63200 63300 63400 63500 63600 63700 63800 63900 64000 64100 64200 64300 64400 64500 64600 64700 64800 64900 65000 65100 65200 65300 65400 65500 65600 65700 65800 65900 66000 66100 66200 66300 66400 66500 66600 66700 66800 66900 67000 67100 67200 67300 67400 67500 67600 67700 67800 67900 68000 68100 68200 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Appendix B Qbar Calculation Report

Mean Annual Flood Flow Rate Equation for Greenfield Catchments IH124

(Based on Institute of Hydrology report No. 124)

Project title: **Fortfield Road, Terenure**

Project no.: **222102**

Designed: **D Moreton** Date: **31/07/2024**

(Complete figures in **blue** only)

$Q\ Bar = 0.00108 \times Area^{0.89} \times SAAR^{1.17} \times Soil^{2.17}$

Where			Units
Q Bar	=	Mean Annual Peak Flow	m^3/s
Area	=	Catchment area	km^2
SAAR	=	Standard Annual Average Rainfall	mm
Soil	=	Soil Index	-

Area description: Residential Development, Fortfield Road, Terenure

Soil characteristics: Soil type (See Table 1) **4** (Clayey, poorly drained)

=> Soil index = 0.45 **Refer to Geotechnical Investigation Report in Appendix E of the Engineering Planning Report**

Area = 0.5 km^2 (**24680** m^2)

SAAR = 773 mm

Q Bar = 0.247 m^3/s

= 246.69 l/s

or

= 4.93 l/s/ha

Table 1

Soil	WRAP	Runoff	Soil value	Soil Characteristics
1	Very high	Very low	0.15	Sandy, well drained
2	High	Low	0.3	Intermediate soils (sandy)
3	Moderate	Moderate	0.4	Intermediate soils (silty)
4	Low	High	0.45	Clayey, poorly drained
5	Very low	Very high	0.5	Steel, rocky areas

Where developments are smaller than 50 ha, the analysis for determining the peak greenfield discharge rate should use 50 ha in the formula and linearly interpolate the flow rate value based on the ratio of the development to 50 ha.(Ref: Interim Code of Practice for Sustainable Drainage Systems)

Refer to SAAR value obtained from Met Éireann data noted in Appendix C of the Engineering Planning Report

Linear Interpolation of Q Bar based on ratio of development to 50 ha

Peak greenfield discharge rate, Q_{Bar} = 12.18 l/s

Growth Curve

Region: Greater Dublin

Growth curves are adopted from "Comment on Estimation of Greenfield Runoff Rates" - A.M.Crawley & C.Cunnane - National Hydrology Seminar 2003 where possible.

Return Period Q_{t1}: 1 year
Growth Factor for Q_{t1}: 0.85
Allowable Discharge for 1 year return period: 10.35 l/s

Discharge rate equal to 1 year greenfield site peak runoff rate or 2l/s/ha, whichever is the greater. Site critical duration storm to be used to assess attenuation storage volume.(Ref: Greater Dublin Strategic Drainage Study)

Return Period Q_{t2}: 5 year
Growth Factor for Q_{t2}: 1.4
Allowable Discharge for 5 year return period: 17.05 l/s

Return Period Q_{t3}: 25 year
Growth Factor for Q_{t3}: 2.05
Allowable Discharge for 25 year return period: 24.96 l/s

Return Period Q_{t4}: 100 year
Growth Factor for Q_{t4}: 2.61
Allowable Discharge for 100 year return period: 31.78 l/s

Discharge rate equal to 1 in 100 year critical duration storm to be used to assess attenuation storage volume.(Ref: Greater Dublin Strategic Drainage Study)

Appendix C Met Eireann Rainfall Data

Met Eireann
Return Period Rainfall Depths for sliding Durations
Irish Grid: Easting: 313402, Northing: 229770,

	Interval		Years									
DURATION	6months,	1year,	2,	3,	4,	5,	10,	20,	30,	50,	75,	100,	120,
5 mins	2.7,	3.9,	4.6,	5.6,	6.4,	6.9,	8.7,	10.8,	12.2,	14.3,	16.1,	17.5,	18.4,
10 mins	3.8,	5.5,	6.4,	7.9,	8.9,	9.6,	12.2,	15.1,	17.1,	19.9,	22.4,	24.3,	25.7,
15 mins	4.5,	6.5,	7.6,	9.3,	10.4,	11.3,	14.3,	17.8,	20.1,	23.4,	26.3,	28.6,	30.2,
30 mins	5.9,	8.4,	9.8,	11.9,	13.4,	14.5,	18.1,	22.3,	25.1,	29.1,	32.6,	35.4,	37.3,
1 hours	7.8,	11.0,	12.7,	15.4,	17.1,	18.5,	23.0,	28.1,	31.5,	36.2,	40.5,	43.8,	46.0,
2 hours	10.3,	14.4,	16.5,	19.8,	21.9,	23.6,	29.1,	35.3,	39.4,	45.1,	50.2,	54.1,	56.8,
3 hours	12.1,	16.8,	19.2,	22.9,	25.4,	27.3,	33.5,	40.4,	45.0,	51.3,	56.9,	61.3,	64.2,
4 hours	13.6,	18.7,	21.4,	25.4,	28.1,	30.2,	36.9,	44.5,	49.4,	56.2,	62.3,	66.9,	70.0,
6 hours	16.0,	21.9,	24.9,	29.5,	32.5,	34.9,	42.4,	50.8,	56.3,	63.9,	70.6,	75.8,	79.2,
9 hours	18.9,	25.5,	29.0,	34.2,	37.6,	40.3,	48.7,	58.1,	64.2,	72.7,	80.1,	85.8,	89.6,
12 hours	21.2,	28.5,	32.4,	38.0,	41.7,	44.6,	53.8,	63.9,	70.5,	79.6,	87.6,	93.7,	97.7,
18 hours	24.9,	33.3,	37.7,	44.0,	48.2,	51.5,	61.8,	73.1,	80.4,	90.5,	99.3,	106.0,	110.5,
24 hours	28.0,	37.2,	42.0,	48.9,	53.5,	57.0,	68.2,	80.4,	88.3,	99.1,	108.6,	115.8,	120.6,
2 days	34.9,	45.3,	50.5,	58.1,	63.1,	66.8,	78.7,	91.5,	99.7,	110.8,	120.5,	127.7,	132.6,
3 days	40.7,	52.0,	57.7,	65.9,	71.2,	75.2,	87.8,	101.2,	109.7,	121.3,	131.2,	138.7,	143.6,
4 days	45.9,	58.0,	64.1,	72.8,	78.4,	82.6,	95.8,	109.9,	118.7,	130.7,	140.9,	148.6,	153.7,
6 days	55.2,	68.8,	75.6,	85.1,	91.3,	95.9,	110.2,	125.3,	134.8,	147.5,	158.3,	166.4,	171.8,
8 days	63.6,	78.5,	85.8,	96.2,	102.8,	107.7,	123.1,	139.1,	149.1,	162.5,	173.8,	182.3,	187.9,
10 days	71.4,	87.5,	95.4,	106.4,	113.4,	118.7,	134.9,	151.8,	162.2,	176.2,	188.1,	196.9,	202.7,
12 days	78.9,	96.0,	104.3,	116.0,	123.4,	129.0,	146.0,	163.6,	174.6,	189.1,	201.4,	210.6,	216.6,
16 days	92.9,	112.0,	121.2,	134.0,	142.1,	148.1,	166.6,	185.7,	197.4,	213.0,	226.1,	235.9,	242.2,
20 days	106.2,	127.0,	136.9,	150.8,	159.5,	166.0,	185.8,	206.1,	218.5,	235.1,	248.9,	259.2,	265.9,
25 days	122.0,	144.8,	155.6,	170.6,	180.0,	187.0,	208.3,	230.0,	243.3,	260.8,	275.5,	286.3,	293.4,

NOTES:
These values are derived from a Depth Duration Frequency (DDF) Model update 2023
For details refer to:
'Mateus C., and Coonan, B. 2023. Estimation of point rainfall frequencies in Ireland. Technical Note No. 68. Met Eireann',
Available for download at:
http://hdl.handle.net/2262/102417

The below figures are used in the Causeway Flow hydraulic modelling described in Section 2 of the Engineering Planning Report.

m5-60 =18.5
R = m5-60minutes / m5-2days = 18.5 / 66.8 = 0.277
SAAR = 773mm

Appendix D Uisce Éireann Pre-Connection Enquiry Confirmation of Feasibility Letter

CONFIRMATION OF FEASIBILITY

Uisce Éireann
Bosca OP 448
Oifig Sheachadta na
Cathrach Theas
Cathair Chorcaí

Uisce Éireann
PO Box 448
South City
Delivery Office
Cork City

www.water.ie

Paul Casey

Punch Consulting
Carnegie House
Library Road
Dun Laoghaire
Dublin
A94C7W7

20 February 2024

Our Ref: CDS24000255 Pre-Connection Enquiry
Lands at, Fortfield Road, Terenure, Dublin

Dear Applicant/Agent,

We have completed the review of the Pre-Connection Enquiry.

Uisce Éireann has reviewed the pre-connection enquiry in relation to a Water & Wastewater connection for a Housing Development of 295 unit(s) at Lands at, Fortfield Road, Terenure, Dublin, (the **Development)**.

Based upon the details provided we can advise the following regarding connecting to the networks;

- **Water Connection** - Feasible without infrastructure upgrade by Uisce Éireann
- **Wastewater Connection** - Feasible Subject to upgrades

- In order to accommodate the proposed connection, upgrade of the existing 225mm VC sewer on Fortfield Road to a 300mm ID sewer for approximately 60m, will be required. The Developer will be required to fund the upgrade works. The fee will be calculated at a connection application stage.

This letter does not constitute an offer, in whole or in part, to provide a connection to any Uisce Éireann infrastructure. Before the Development can be connected to our network(s) you must submit a connection application and be granted and sign a connection agreement with Uisce Éireann.

As the network capacity changes constantly, this review is only valid at the time of its completion. As soon as planning permission has been granted for the Development, a completed connection application should be submitted. The connection application is available at www.water.ie/connections/get-connected/

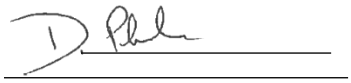
Where can you find more information?

- **Section A -** What is important to know?
- **Section B -** Details of Uisce Éireann's Network(s)

This letter is issued to provide information about the current feasibility of the proposed connection(s) to Uisce Éireann's network(s). This is not a connection offer and capacity in Uisce Éireann's network(s) may only be secured by entering into a connection agreement with Uisce Éireann.

For any further information, visit **www.water.ie/connections**, **email newconnections@water.ie** or contact 1800 278 278**.**

Yours sincerely,



Dermot Phelan
Connections Delivery Manager

Section A - What is important to know?

What is important to know?	Why is this important?
Do you need a contract to connect?	• Yes, a contract is required to connect. This letter does not constitute a contract or an offer in whole or in part to provide a connection to Uisce Éireann's network(s). • Before the Development can connect to Uisce Éireann's network(s), you must submit a connection application and be granted and sign a connection agreement with Uisce Éireann.
When should I submit a Connection Application?	• A connection application should only be submitted after planning permission has been granted.
Where can I find information on connection charges?	• Uisce Éireann connection charges can be found at: https://www.water.ie/connections/information/charges/
Who will carry out the connection work?	• All works to Uisce Éireann's network(s), including works in the public space, must be carried out by Uisce Éireann*. *Where a Developer has been granted specific permission and has been issued a connection offer for Self-Lay in the Public Road/Area, they may complete the relevant connection works
Fire flow Requirements	• The Confirmation of Feasibility does not extend to fire flow requirements for the Development. Fire flow requirements are a matter for the Developer to determine. • **What to do?** - Contact the relevant Local Fire Authority
Plan for disposal of storm water	• The Confirmation of Feasibility does not extend to the management or disposal of storm water or ground waters. • **What to do?** - Contact the relevant Local Authority to discuss the management or disposal of proposed storm water or ground water discharges.
Where do I find details of Uisce Éireann's network(s)?	• Requests for maps showing Uisce Éireann's network(s) can be submitted to: datarequests@water.ie

What are the design requirements for the connection(s)?	• The design and construction of the Water & Wastewater pipes and related infrastructure to be installed in this Development shall comply with ***the Uisce Éireann Connections and Developer Services Standard Details and Codes of Practice,*** available at www.water.ie/connections
Trade Effluent Licensing	• Any person discharging trade effluent** to a sewer, must have a Trade Effluent Licence issued pursuant to section 16 of the Local Government (Water Pollution) Act, 1977 (as amended). • More information and an application form for a Trade Effluent License can be found at the following link: https://www.water.ie/business/trade-effluent/about/ **trade effluent is defined in the Local Government (Water Pollution) Act, 1977 (as amended)

Section B – Details of Uisce Éireann's Network(s)

The map included below outlines the current Uisce Éireann infrastructure adjacent the Development: To access Uisce Éireann Maps email datarequests@water.ie

Reproduced from the Ordnance Survey of Ireland by Permission of the Government. License No. 3-3-34

Note: The information provided on the included maps as to the position of Uisce Éireann's underground network(s) is provided as a general guide only. The information is based on the best available information provided by each Local Authority in Ireland to Uisce Éireann.

Whilst every care has been taken in respect of the information on Uisce Éireann's network(s), Uisce Éireann assumes no responsibility for and gives no guarantees, undertakings or warranties concerning the accuracy, completeness or up to date nature of the information provided, nor does it accept any liability whatsoever arising from or out of any errors or omissions. This information should not be solely relied upon in the event of excavations or any other works being carried out in the vicinity of Uisce Éireann's underground network(s). The onus is on the parties carrying out excavations or any other works to ensure the exact location of Uisce Éireann's underground network(s) is identified prior to excavations or any other works being carried out. Service connection pipes are not generally shown but their presence should be anticipated.

Appendix E IGSL Limited Geotechnical Investigation Report

IGSL Limited

Punch Consulting Engineers

Fortfield Road, Terenure

Geotechnical Report

Report No. 24013

May 2022

Report

M7 Business Park
Naas
Co. Kildare
Ireland

T: +353 (45) 846176
E: info @igsl.ie
W: www.igsl.ie

Project: Fortfield Road, Terenure

Project No. 24013

Revision	**Date**	**Title**		
Rev 0	31/05/2022	Ground Investigation Report		
	Copies	Document Format	Prepared By	Reviewed By
		PDF	Brian Green Chartered Engineer	David Green Chartered Engineer
	To	Punch Consulting Engineers		
Revision	**Date**	**Title**		
Rev 1				
	Copies	Document Format	Prepared By	Reviewed By
			David Green Chartered Engineer	Brian Green Chartered Engineer
	To			
Revision	**Date**	**Title**		
	Copies	Document Format	Prepared By	Reviewed By
	To			
Revision	**Date**	**Title**		
	Copies	Document Format	Prepared By	Reviewed By
	To			

TABLE OF CONTENTS

FOREWORD

The following conditions and notes on the geotechnical site investigation procedures should be read in conjunction with this report.

Standards

The ground investigation works for this project have been carried out by IGSL in accordance with Eurocode 7 - Part 2: Ground Investigation & Testing (EN 1997-2:2007). This has been used together with complementary documents such as BS 5930 (1999), BS 1377 (Parts 1 to 9) and Engineers Ireland Specification & Related Documents for Ground Investigation in Ireland (2006). A new National Annex for use in the Republic of Ireland is currently in circulation for comment and will be adopted in the near future. In the meantime, the following Irish (IS) and European Standards or Norms are referenced:

- IS EN 1997-2 Eurocode 7: 2007 – Geotechnical Design – Part 2: Ground Investigation & Testing
- IS EN ISO 22475-1:2006 Geotechnical Investigation and Sampling – Sampling Methods & Groundwater Measurements
- IS EN ISO 14688-1:2002 Geotechnical Investigation and Testing – Identification and Classification of Soil, Part 1: Identification and Description
- IS EN ISO 14688-2:2004 Geotechnical Investigation and Testing – Identification and Classification of Soil, Part 2: Classification Principles
- IS EN ISO 14689-1:2004 Geotechnical Investigation and Testing - Identification & Classification of Rock, Part 1: Identification & Description

Reporting

Recommendations made and opinions expressed in this report are based on the strata observed in the exploratory holes, together with the results of in-situ and laboratory tests. No responsibility can be held by IGSL Ltd for ground conditions between exploratory hole locations.

The engineering logs provide ground profiles and configuration of strata relevant to the investigation depths achieved and caution should be taken when extrapolating between exploratory points. No liability is accepted for ground conditions extraneous to the investigation points.

This report has been prepared for Punch Consulting Engineers and the information should not be used without prior written permission. The recommendations developed in this report specifically relate to the proposed development. IGSL Ltd accepts no responsibility or liability for this document being used other than for the purposes for which it was intended.

In-Situ Testing

Standard penetration tests were conducted strictly in accordance with Section 4.6 of IS EN 1997-2:2007. The SPT equipment (hammer energy test) has been calibrated in accordance with EN ISO 22476-3:2005 and the Energy Ratio (E_r). A calibration certificate is available upon request. The E_r is defined as the ratio of the actual energy E_{meas} (measured energy during calibration) delivered to the drive weight assembly into the drive rod below the anvil, to the theoretical energy (E_{theor}) as calculated from the drive weight assembly. The measured number of blows (N) reported on the engineering logs are uncorrected. In sands, the energy losses due to rod length and the effect of the overburden pressure should be taken into account (see IS EN ISO 22476-3:2005).

Groundwater
The depth of entry of any influx of groundwater is recorded during the course of boring operations. However, the normal rate of boring does not usually permit the recording of an equilibrium level for any one water strike. Where possible drilling is suspended for a period of twenty minutes to monitor the subsequent rise in water level. Groundwater conditions observed in the borings or pits are those appertaining to the period of investigation. It should be noted however, that groundwater levels are subject to diurnal, seasonal and climatic variations and can also be affected by drainage conditions, tidal variations etc.

Engineering Logging
Soil and rock identification has been based on the examination of the samples recovered and conforms with IS EN ISO 14688-1:2002 and IS EN ISO 14689-1:2004. Rock weathering classification conforms to IS EN ISO 14689-1:2003 while discontinuities (bedding planes, joints, cleavages, faults etc) are classified in accordance with 4.3.3 of IS EN ISO 14689-1:2003. Rock mechanical indices (TCR, SCR, RQD) are defined in accordance with IS EN ISO 22475-1:2006.

Retention of Samples
Samples shall be retained for a period of 60 days following approval of the final factual report, as detailed in the Scope of Works.

1.0 Introduction

It is proposed to develop a site in Fortfield Road, Terenure. The site lies to the rear of existing houses in Greenlea Road.

An investigation of ground conditions was undertaken to ascertain the soil stratification and condition.

Fieldwork for this investigation entailed the following:

- Boreholes were constructed in 6 locations, using light cable tool techniques.
- Rotary techniques were employed at each borehole location to ascertain the presence, depth, composition and condition of bedrock to the scheduled depths.
- Trial pits were excavated in 4 locations to permit close examination and sampling of the upper soils.
- Infiltration tests were performed in 4 locations to assess the suitability of the sub-soils for soakaway purposes

This report presents an assessment of the ground conditions with respect to the proposed development.

2.0 Ground Conditions

2.1 Boreholes

Boreholes were constructed in the locations indicated on the site plan enclosed in Appendix 8, while the descriptions and depths of the various soils encountered are shown on the boring records enclosed in Appendix 1. Also shown on these records are the depths at which samples were recovered, the results of in-situ Standard Penetration Tests, and the groundwater conditions observed during the course of boring operations. The ground conditions are summarised in Table 1.

Location	Soft/firm brown sandy gravelly clay	Stiff dark brown sandy gravelly clay	Dense grey - black sandy clayey gravel	Stiff/very stiff black sandy gravelly clay
BH01	0.00 to 2.50	2.50 to 3.60	3.60 to 6.10	
BH02	0.00 to 1.50	1.50 to 3.50		3.50 to 4.20
BH03	0.00 to 2.50	2.50 to 5.90		
BH04	0.00 to 2.50	2.50 to 4.20		4.20 to 5.80
BH05	0.00 to 2.50	2.50 to 3.80		3.80 to 5.30
BH06	0.00 to 1.50	1.50 to 4.50		4.50 to 6.40

Table 1

All six boreholes encountered brown sandy gravelly clay in a soft or soft to firm condition, present to depths ranging from 1.5 metres (BH02 and BH06) to 2.5 metres (remaining boreholes). In all locations these deposits were underlain by stiff dark brown sandy gravelly clay. While BH03 was terminated in this material at a depth of 5.9 metres, BH04, BH05 and BH06 recorded a transition to black sandy gravelly clay in a stiff to very stiff condition. In BH01, the black deposits were coarser, classifying as sandy clayey gravel.

While a slow ingress of water was observed at a depth of 3.6 metres in BH05, all other holes remained dry.

2.2 Rotary Drilling and Coring

Rotary techniques were employed at each borehole location to ascertain the depth, composition and condition of bedrock. Open hole "Symmetrix" drilling techniques were used to penetrate the overburden soils, identifying the soil type from the flush returns. On the first indications of bedrock, coring techniques were employed.

The records include a detailed description of the bedrock including the rock structure, strength, and degree of weathering. In accordance with BS 5930: 2015, the records include the total core recovery (TCR), solid core recovery (SCR) and the rock quality designation (RQD). Also shown graphically is the fracture spacing.

Standard Penetration Tests (SPTs) were undertaken within overburden and also within completely weathered bedrock.

The bedrock was identified as dark grey medium strong to very strong fine grained, medium to thinly bedded Limestone. Total core recovery was 100% while solid core recovery was variable. At the end of drilling, water was present in the coreholes at depths ranging from 2.9 metres to 8.2 metres. However, these depths do not represent the standing water levels. The standpipe readings in Table 3 provide a more accurate indication of the groundwater profile.

Location	Depth of open hole drilling	Weathered Rock	Rock Coring	Standpipe (SP)	Ground water depth (m bgl)
RC01	11.00		11.0 to 14.5	SP	2.90
RC02	8.00	7.8 to 8.0	8.0 to 11.0	SP	3.20
RC03	7.50	7.2 to 7.5	7.5 to 12.5		5.20
RC04	7.50	7.1 to 7.5	7.5 to 13.5		3.20
RC05	9.00	8.55 to 9.00	9.0 to 14.0	SP	8.20
RC06	9.00	8.70 to 9.0	9.0 to 14.0	SP	3.80

Table 2

Standpipe	Standpipe Depth	Depth to water (m bgl)	
	(m bgl)	27/04/2022	09/05/2022
BH/RC 01	14.5	1.7	1.9
BH/RC02	8.0	2.1	2.1
BH/RC05	9.0	1.3	1.2
BH/RC06	14.0	2.2	2.0

Table 3

2.3 Trial Pits

Trial pits were excavated in four locations to facilitate close examination of the upper soils. The trial pit records are enclosed in Appendix 3.

While the soils encountered in the trial pits were described as sandy gravelly clays, there were notable variations in the soil condition.

TP01 encountered brown sandy gravelly clay in a soft to firm condition to a depth of 1.1 metres where it became firm. The soil was described as firm to stiff from 2.4 metres to the excavated depth of 3.0 metres.

TP02 encountered firm grey-brown sandy gravelly clay from 0.7 metres to 2.4 metres where the soil condition was described as stiff to very stiff.

The condition of the soil in TP03 was described as firm to a depth of 1.5 metres where it became firm to stiff. The condition of the soil in TP04 was described as firm to a depth of 2.0 metres. Water ingress below this depth resulted in water-softened spoil, belying its true in-situ condition, which was through to be firm / stiff. Water ingress at 2.0 and 2.8 metres resulted in instability of the pit sides.

2.4 Infiltration Test

The infiltration tests were performed in accordance with BRE Digest 365 ‘Soakaway Design’.

To obtain a measure of the infiltration rate of the sub-soils, water is poured into the test pit, and records taken of the fall in water level against time. This procedure is repeated twice more to ensure saturation of the sub-soils. Normally the results for the final stage of testing, following the saturation periods, are used for soakaway design purposes. The infiltration rate is the volume of water dispersed per unit exposed area per unit of time, and is generally expressed as metres/minute or metres/second.

In tests SA01 and SA03 there was no measurable fall in water level over the test period of 60 minutes.

In tests SA02 and SA04 very slow infiltration rates were recorded

3.0 Laboratory Testing (Geotechnical)

3.1 Particle Size Distributions

Grading curves were obtained for selected samples. The results show that the samples were well-graded, with fines values ranging from 6% to 34%. For practical reasons cobbles and boulders were omitted from the test specimens.

3.2 Index Properties

The results of plastic and liquid limit tests were used to classify the sub-soils. The majority of results fell within the CL zone of the plasticity chart.

3.3 Chemical analysis

The results of chemical testing showed low concentrations of soluble sulphates.

3.4 Rock Testing

3.4.1 Uniaxial Compression Tests

Uniaxial compression tests were performed on intact lengths of rock, in accordance with ASTM standards. The specimens are prepared as right circular cylinders with a length to diameter ratio of 2.0 to 2.5, and the ends are saw cut and ground to eliminate irregularities. The load is applied through a hydraulic ram and the compressive strength is defined as the load at failure divided by the cross-sectional area.

The specimens recorded UCS values of 60MPa to 89MPa, classifying the rock strength as strong.

3.4.2 Point Load Tests

The Point Load Index Test provides a rapid, and accurate, strength index from rock fragments unlike the Uniaxial Compression test (UCS) which requires careful preparation of intact lengths of core. The test specimen is compressed between two cones loaded from a hydraulic hand pump. The core fails due to the tensile forces over the diametral area between the points. The strength at failure is expressed as the point load index Is. For purposes of comparison the Is values are corrected to give the equivalent strength for a 50 mm diameter specimen. This is the I_{s50} value. From research by several workers relationships have been formulated, relating the Is values to UCS.

The results of the point load tests were mostly in the range 3 to 6 MPA, equating to UCS values ranging from 60 to 120 MPa, thereby classifying the rock strength as strong to very strong.

4.0 Laboratory Testing (Environmental)

Environmental testing was scheduled on selected soil samples in order to screen for inherent contamination and to assess their suitability for disposal to an inert landfill.

Samples were tested in accordance with the RILTA Suite, which is used to determine the suitability of soils for disposal to a landfill. The RILTA suite includes Heavy Metals, Polycyclic Aromatic Hydrocarbons (PAH), TPH-CWG, BTEX, PCB and Total Organic Carbon (TOC) carried out on dry soil samples. Also included are leachate analyses, whereby leachate is generated in accordance with CEN 10:1 specification and this is tested for the presence of recognised contaminants including Heavy Metals, Dissolved Organic Carbon (DOC) and Total Dissolved Solids (TDS). An Asbestos Screen is also included in the RILTA Suite.

5.0 Discussion

The investigation revealed layers of sandy gravelly clay which have the appearance of glacial till. The stiff to very stiff black deposits in which some of the boreholes were terminated are typical of basal till, known locally as Black Boulder Clay. The overlying material has a dark brown coloration, indicative of weathering. The near-surface soils have been subjected to more intense weathering, resulting in a significant loss of strength.

By the use of rotary drilling and coring techniques, intact limestone bedrock was encountered at depths ranging from 7.5 metres to 11.0 metres.

5.1 Structural Foundations

The borehole findings suggest that the heavily weathered soils are present to depths ranging from 1.5 metres to 2.5 metres. The variable condition, and limited bearing resistance of these deposits is also reflected in the trial pit findings.

These factors would tend to preclude the use of the upper soils for founding purposes.

The underlying stiff dark brown gravelly clay is relatively incompressible, and will support foundation pressures of approximately 150 kN/m^2. However, the depth to these deposits will necessitate the use of trench fill techniques to anticipated depths of between 1.5 and 2.5 m BGL. Monitoring of excavations will be important to ensure that the stiff gravelly clay is reached. A major consideration will be the effect of groundwater ingress on trench stability (see Section 5.2).

While the very stiff black gravelly clay will support pressures of 200kN/m2 to 250kN/m^2, the depth to this material would tend to preclude direct construction of foundations.

To obtain a more accurate resistance profile consideration can be given to dynamic probing when the exact location of each structure has been established. In addition, trial excavations would be beneficial in assessing the practicality of using trench-fill techniques.

Where excavation to the depth of competent soil is deemed impractical or uneconomical, the alternative is to found the structure on piles, supported by the stiff gravelly clay or underlying bedrock.

Where piles are taken to bedrock, the designers should be cognisant of the variations in bedrock condition and structure.

5.2 Groundwater and Trench Stability

While temporary excavations within gravelly clay soils could be expected to remain stable in the short-term, any water ingress is likely to cause some instability (as evident in trial pit TP04).

Provision should therefore be made for trench control measures as required. The initial standpipe readings as shown in Table 3 indicate that the depth to water can rise to 1.2 metres below existing ground level.

It is strongly recommended that regular monitoring of standpipes remains ongoing until construction commences. Readings should also be taken after periods of heavy rainfall to determine the effect of prolonged precipitation on the groundwater table.

5.3 Infiltration

The field tests showed no fall, or little fall, in water level. It is likely, therefore, that design of a soakaway system will be impractical. It will, therefore, be necessary to discharge storm water to an existing surface water system, using attenuation techniques to regulate the flow.

5.4 Chemical Attack on Buried Concrete

The results of Sulphate and pH testing showed very low Sulphate (maximum of 0.047 g/l $SO_4$and near-neutral pH levels (8.8 to 9.20).

With reference to Table C1 of BRE Special Digest 1: 2005, the level of Sulphate suggests a design Sulphate Class of DS-1. Assuming a static groundwater table, an ACEC (Aggressive Chemical Environment for Concrete) Classification of AC-1s is applicable, since the pH levels are greater than 5.5.

In terms of concrete to I.S. EN 206-1:2013, the chemical testing demonstrates that concrete could be manufactured to Class XA1.

5.5 Disposal of Excavated Soils to Landfill

The results of the RILTA Suite have been used by O'Callaghan Moran to carry out a full Waste Characterisation Assessment (WCA) of any soils destined for landfill. This assessment determines whether or not the soils are hazardous in advance of being dispatched to landfill.

The WCA also provides recommendations as to the appropriate waste receptors (landfills) for the tested soils.

Appendix 1 Borehole Records

GEOTECHNICAL BORING RECORD

REPORT NUMBER 24013

CONTRACT	Fortfield Road, Terenure, Dublin 6	**BOREHOLE NO.**	**BH01**
		SHEET	Sheet 1 of 1
CO-ORDINATES	713,282.32 E 729,796.37 N	**RIG TYPE**	Dando 2000
		BOREHOLE DIAMETER (mm)	200
GROUND LEVEL (m AOD)	47.46	**BOREHOLE DEPTH (m)**	6.10
		DATE COMMENCED	14/04/2022
		DATE COMPLETED	14/04/2022
CLIENT	Lioncor	**SPT HAMMER REF. NO.**	
		BORED BY	W.Cahill
ENGINEER	Punch C.E	**ENERGY RATIO (%)**	
		PROCESSED BY	F.C

Depth (m)	Description	Legend	Elevation	Depth (m)	Samples: Ref. Number	Sample Type	Depth (m)	Recovery	Field Test Results	Standpipe Details
0	Soft to firm dark brown sandy SILT/CLAY with occasional fine gravel									
1					AA175560	B	1.00		N = 11 (2, 3, 3, 2, 3, 3)	
2					AA175561	B	2.00		N = 7 (3, 3, 2, 2, 1, 2)	
			44.96	2.50						
	Stiff dark brown sandy gravelly CLAY									
3					AA175562	B	3.00		N = 16 (4, 4, 3, 4, 5, 4)	
			43.86	3.60						
4	Medium dense to dense grey/black fine to coarse sandy silty/clayey GRAVEL				AA175563	B	4.00		N = 30 (4, 5, 5, 7, 8, 10)	
5					AA175564	B	5.00		N = 28 (5, 6, 6, 6, 7, 9)	
			41.36	6.10					N = 50/150 mm (7, 8, 17, 33)	
6	Obstruction End of Borehole at 6.10 m									
7										
8										
9										

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
4.5	4.8	1	
6	6.1	1.5	

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
					No water strike

GROUNDWATER PROGRESS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

REMARKS 1hr Erecting Covid 19 Dafe Working Area . CAT scanned location and hand dug inspection pit were carried out .

Sample Legend
D - Small Disturbed (tub)
B - Bulk Disturbed
LB - Large Bulk Disturbed
Env - Environmental Sample (Jar + Vial + Tub)
UT - Undisturbed 100mm Diameter Sample
P - Undisturbed Piston Sample
W - Water Sample

IGSL BH LOG 24101.GPJ IGSL.GDT 1/6/22

GEOTECHNICAL BORING RECORD

REPORT NUMBER 24013

CONTRACT	Fortfield Road, Terenure, Dublin 6	**BOREHOLE NO.**	**BH02**
		SHEET	Sheet 1 of 1
CO-ORDINATES	713,311.17 E 729,739.05 N	**RIG TYPE**	Dando 2000
		BOREHOLE DIAMETER (mm)	200
GROUND LEVEL (m AOD)	48.11	**BOREHOLE DEPTH (m)**	4.20
		DATE COMMENCED	13/04/2022
		DATE COMPLETED	13/04/2022
CLIENT	Lioncor	**SPT HAMMER REF. NO.**	
ENGINEER	Punch C.E	**ENERGY RATIO (%)**	
		BORED BY	W.Cahill
		PROCESSED BY	F.C

Depth (m)	Description	Legend	Elevation	Depth (m)	Samples: Ref. Number	Sample Type	Depth (m)	Recovery	Field Test Results	Standpipe Details
0	Soft dark brown sandy SILT/CLAY		47.31	0.80						
1	Firm dark brown/grey sandy SILT/CLAY with occasional gravel		46.61	1.50	AA175549	B	1.00		N = 10 (2, 2, 3, 2, 3, 2)	
2	Stiff dark brown/grey sandy gravelly CLAY				AA175550	B	2.00		N = 31 (4, 6, 6, 8, 8, 9)	
3			44.61	3.50	AA175551	B	3.00		N = 33 (5, 6, 6, 7, 9, 11)	
4	Stiff to very stiff black sandy gravelly silty CLAY with occasional cobbles and small boulders		43.91	4.20	AA175552	B	4.00		N = 50/150 mm (10, 15, 24, 26)	
5	Obstruction End of Borehole at 4.20 m									
6										
7										
8										
9										

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
2.2	2.6	1	
4	4.2	1.5	

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
					No water strike

GROUNDWATER PROGRESS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

REMARKS 1hr Erecting Covid 19 Dafe Working Area . CAT scanned location and hand dug inspection pit were carried out .

Sample Legend
D - Small Disturbed (tub)
B - Bulk Disturbed
LB - Large Bulk Disturbed
Env - Environmental Sample (Jar + Vial + Tub)
UT - Undisturbed 100mm Diameter Sample
P - Undisturbed Piston Sample
W - Water Sample

IGSL BH LOG 24101.GPJ IGSL.GDT 1/6/22

GEOTECHNICAL BORING RECORD

REPORT NUMBER 24013

CONTRACT	Fortfield Road, Terenure, Dublin 6	**BOREHOLE NO.**	**BH03**
		SHEET	Sheet 1 of 1
CO-ORDINATES	713,341.17 E 729,824.72 N	**RIG TYPE**	Dando 2000
		BOREHOLE DIAMETER (mm)	200
GROUND LEVEL (m AOD)	47.26	**BOREHOLE DEPTH (m)**	4.00
		DATE COMMENCED	13/04/2022
		DATE COMPLETED	13/04/2022
CLIENT	Lioncor	**SPT HAMMER REF. NO.**	
		BORED BY	W.Cahill
ENGINEER	Punch C.E	**ENERGY RATIO (%)**	
		PROCESSED BY	F.C

Depth (m)	Description	Legend	Elevation	Depth (m)	Samples: Ref. Number	Sample Type	Depth (m)	Recovery	Field Test Results	Standpipe Details
0	Soft dark brown sandy SILT/CLAY with occasional gravel									
1					AA175553	B	1.00		N = 6 (1, 2, 1, 2, 2, 1)	
2					AA175554	B	2.00		N = 7 (2, 2, 1, 2, 2, 2)	
			44.76	2.50						
3	Stiff to very stiff dark brown sandy silty gravelly CLAY with occasional cobbles and small boulders				AA175555	B	3.00		N = 35 (4, 9, 11, 11, 1, 12)	
4					AA175556	B	4.00		N = 50/150 mm (22, 3, 39, 11)	
5					AA175557	B	5.00		N = 33 (8, 7, 6, 7, 10, 10)	
			41.36	5.90						
6	Obstruction End of Borehole at 4.00 m								N = 52/75 mm (25, 52)	
7										
8										
9										

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
3.8	4	1	
5.7	5.9	1.5	

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
					No water strike

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

GROUNDWATER PROGRESS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

REMARKS 1hr Erecting Covid 19 Dafe Working Area . CAT scanned location and hand dug inspection pit were carried out .

Sample Legend
D - Small Disturbed (tub)
B - Bulk Disturbed
LB - Large Bulk Disturbed
Env - Environmental Sample (Jar + Vial + Tub)
UT - Undisturbed 100mm Diameter Sample
P - Undisturbed Piston Sample
W - Water Sample

IGSL BH LOG 24101.GPJ IGSL.GDT 1/6/22

GEOTECHNICAL BORING RECORD

REPORT NUMBER 24013

CONTRACT	Fortfield Road, Terenure, Dublin 6	**BOREHOLE NO.**	**BH04**
		SHEET	Sheet 1 of 1
CO-ORDINATES	713,379.39 E 729,771.58 N	**RIG TYPE**	Dando 2000
		BOREHOLE DIAMETER (mm)	200
GROUND LEVEL (m AOD)	47.71	**BOREHOLE DEPTH (m)**	5.80
		DATE COMMENCED	14/04/2022
		DATE COMPLETED	14/04/2022
CLIENT	Lioncor	**SPT HAMMER REF. NO.**	
		BORED BY	W.Cahill
ENGINEER	Punch C.E	**ENERGY RATIO (%)**	
		PROCESSED BY	F.C

Depth (m)	Description	Legend	Elevation	Depth (m)	Samples: Ref. Number	Sample Type	Depth (m)	Recovery	Field Test Results	Standpipe Details
0	Dark brown sandy SILT/CLAY		47.21	0.50						
1	Soft light brown sandy SILT/CLAY with occasional gravel				AA175565	B	1.00		N = 7 (2, 2, 2, 1, 2, 2)	
2					AA175566	B	2.00		N = 7 (1, 2, 2, 1, 2, 2)	
			45.21	2.50						
3	Stiff dark brown sandy gravelly silty CLAY with occasional cobbles				AA175567	B	3.00		N = 20 (3, 4, 4, 5, 5, 6)	
4					AA175568	B	4.00		N = 49 (8, 10, 10, 11, 13, 15)	
			43.51	4.20						
5	Stiff to very stiff black very gravelly sandy CLAY with some cobbles and occasional small boulders				AA175569	B	5.00		N = 50/150 mm (10, 17, 23, 27)	
			41.91	5.80					N = 250/75 mm (25, 250)	
6	Obstruction End of Borehole at 5.80 m									
7										
8										
9										

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
4.4	4.8	1	
5.6	5.8	1.5	

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
					No water strike

GROUNDWATER PROGRESS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

REMARKS 1hr Erecting Covid 19 Dafe Working Area . CAT scanned location and hand dug inspection pit were carried out .

Sample Legend
D - Small Disturbed (tub)
B - Bulk Disturbed
LB - Large Bulk Disturbed
Env - Environmental Sample (Jar + Vial + Tub)
UT - Undisturbed 100mm Diameter Sample
P - Undisturbed Piston Sample
W - Water Sample

IGSL BH LOG 24101.GPJ IGSL.GDT 1/6/22

GEOTECHNICAL BORING RECORD

REPORT NUMBER 24013

CONTRACT	Fortfield Road, Terenure, Dublin 6	**BOREHOLE NO.**	**BH05**
		SHEET	Sheet 1 of 1
CO-ORDINATES	713,395.71 E 729,859.58 N	**RIG TYPE**	Dando 2000
		BOREHOLE DIAMETER (mm)	200
GROUND LEVEL (m AOD)	47.05	**BOREHOLE DEPTH (m)**	5.30
		DATE COMMENCED	19/04/2022
		DATE COMPLETED	19/04/2022
CLIENT	Lioncor	**SPT HAMMER REF. NO.**	
ENGINEER	Punch C.E	**ENERGY RATIO (%)**	
		BORED BY	W.Cahill
		PROCESSED BY	F.C

Depth (m)	Description	Legend	Elevation	Depth (m)	Samples: Ref. Number	Sample Type	Depth (m)	Recovery	Field Test Results	Standpipe Details
0	TOPSOIL		46.85	0.20						
	Mottled brown sandy SILT/CLAY with occasional gravel		46.25	0.80						
1	Soft to firm dark brown sandy SILT/CLAY with some gravel and occasional cobbles				AA175570	B	1.00		N = 5 (2, 2, 1, 1, 2, 1)	
2					AA175571	B	2.00		N = 10 (2, 2, 3, 2, 2, 3)	
			44.55	2.50						
	Stiff dark brown sandy gravelly silty CLAY with occasional cobbles									
3					AA175572	B	3.00		N = 19 (3, 3, 4, 4, 5, 6)	
			43.25	3.80						
4	Very stiff grey/black sandy very gravelly CLAY with some cobbles and occasional small bouldersa				AA175573	B	4.00		N = 44/75 mm (23, 2, 44)	
5					AA175574	B	5.00		N = 40 (5, 6, 8, 11, 9, 12)	
			41.75	5.30						
	Obstruction End of Borehole at 5.30 m									
6										
7										
8										
9										

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
3.9	4.1	1	
5.2	5.3	1.5	

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
3.60	3.60	3.90	3.00	20	Slow

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

GROUNDWATER PROGRESS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

REMARKS 1hr Erecting Covid 19 Dafe Working Area . CAT scanned location and hand dug inspection pit were carried out .

Sample Legend
D - Small Disturbed (tub)
B - Bulk Disturbed
LB - Large Bulk Disturbed
Env - Environmental Sample (Jar + Vial + Tub)
UT - Undisturbed 100mm Diameter Sample
P - Undisturbed Piston Sample
W - Water Sample

IGSL BH LOG 24101.GPJ IGSL.GDT 1/6/22

GEOTECHNICAL BORING RECORD

REPORT NUMBER 24013

CONTRACT	Fortfield Road, Terenure, Dublin 6	**BOREHOLE NO.**	**BH06**
		SHEET	Sheet 1 of 1
CO-ORDINATES	713,413.31 E 729,808.88 N	**RIG TYPE**	Dando 2000
		BOREHOLE DIAMETER (mm)	200
GROUND LEVEL (m AOD)	47.49	**BOREHOLE DEPTH (m)**	6.40
		DATE COMMENCED	19/04/2022
		DATE COMPLETED	19/04/2022
CLIENT	Lioncor	**SPT HAMMER REF. NO.**	
ENGINEER	Punch C.E	**ENERGY RATIO (%)**	
		BORED BY	W.Cahill
		PROCESSED BY	F.C

Depth (m)	Description	Legend	Elevation	Depth (m)	Samples: Ref. Number	Sample Type	Depth (m)	Recovery	Field Test Results	Standpipe Details
0	TOPSOIL		47.19	0.30						
	Light brown sandy SILT/CLAY with occasional fine gravel		46.79	0.70						
1	Firm dark brown sandy SILT/CLAY with some gravel and occasional cobbles		45.99	1.50	AA171709	B	1.00		N = 12 (2, 2, 3, 2, 3, 4)	
2	Stiff dark brown sandy gravelly silty CLAY with occasional cobbles				AA171710	B	2.00		N = 24 (4, 3, 5, 6, 6, 7)	
3			44.09	3.40	AA171711	B	3.00		N = 32 (8, 7, 5, 8, 10, 9)	
4	Stiff to very stiff dark brown sandy silty gravelly CLAY with occasional cobbles		42.99	4.50	AA171712	B	4.00		N = 40 (10, 14, 11, 11, 8, 10)	
5	Very stiff to hard grey/black sandy gravelly CLAY with some cobbles and occasional small boulders				AA171713	B	5.00		N = 75 (10, 17, 18, 21, 11, 25)	
6			41.09	6.40	AA171714	B	6.00		N = 75/225 mm (16, 17, 32, 18, 25)	
7	Obstruction End of Borehole at 6.40 m									
8										
9										

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
3.6	3.8	0.5	
4.3	4.5	1	
6.2	6.4	1.5	

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
					No water strike

GROUNDWATER PROGRESS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

REMARKS 1hr Erecting Covid 19 Dafe Working Area . CAT scanned location and hand dug inspection pit were carried out .

Sample Legend
D - Small Disturbed (tub)
B - Bulk Disturbed
LB - Large Bulk Disturbed
Env - Environmental Sample (Jar + Vial + Tub)
UT - Undisturbed 100mm Diameter Sample
P - Undisturbed Piston Sample
W - Water Sample

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Appendix 2 Rotary Corehole Records

RC01 Box 1 of 2 – 11.00-14.00m

RC01 Box 2 of 2 – 14.00-14.50m

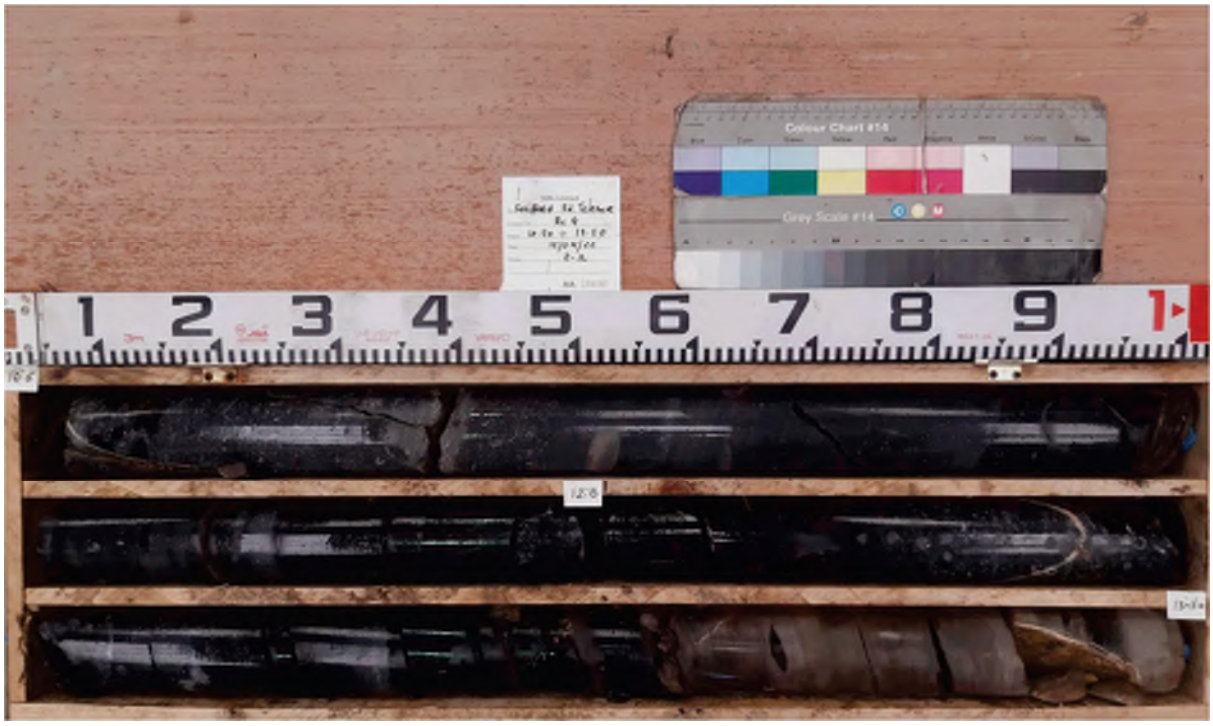
RC02 Box 1 of 1 – 8.00-11.00m

RC03 Box 1 of 2 – 7.50-10.50m

RC03 Box 2 of 2 – 10.50-12.50m

RC04 Box 1 of 2 – 7.50-10.50m

RC04 Box 2 of 2 – 10.50-13.50m



RC05 Box 1 of 2 – 9.00-12.00m

RC05 Box 2 of 2 – 12.00-14.00m

RC06 Box 1 of 2 – 9.00-12.00m

RC06 Box 2 of 2 – 12.00-14.00m

Appendix 3 Trial Pit Records

TRIAL PIT RECORD

REPORT NUMBER 24013

CONTRACT	Fortfield Road, Terenure, Dublin 6	**TRIAL PIT NO.**	**TP01**
		SHEET	Sheet 1 of 1
LOGGED BY	I.Reder	**CO-ORDINATES**	713,307.94 E 729,845.19 N
		DATE STARTED	14/04/2022
		DATE COMPLETED	14/04/2022
CLIENT	Lioncor	**GROUND LEVEL (m)**	47.18
ENGINEER	Punch C.E	**EXCAVATION METHOD**	JCB

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0 TOPSOIL		0.30	46.88						
Soft to firm, brown, slightly sandy slightly gravelly CLAY					AA163096	B	0.70		
1.0 Firm greyish brown, slightly sandy gravelly CLAY with high subangular to subrounded cobbles and boulders content		1.10	46.08						
					AA163097	B	1.70		
2.0				1 (Seepage)					
Firm to stiff, greyish brown, slightly sandy gravelly CLAY with high subangular to subrounded cobbles and low boulders content		2.40	44.78						
					AA163098	B	2.70		
3.0 End of Trial Pit at 3.00m		3.00	44.18						
4.0									

Groundwater Conditions
Seepage flow at 2.1m

Stability
TP stable

General Remarks

TRIAL PIT RECORD

REPORT NUMBER 24013

CONTRACT	Fortfield Road, Terenure, Dublin 6	**TRIAL PIT NO.**	**TP02**
		SHEET	Sheet 1 of 1
LOGGED BY	I.Reder	**CO-ORDINATES**	713,364.94 E 729,870.23 N
		DATE STARTED	14/04/2022
		DATE COMPLETED	14/04/2022
CLIENT	Lioncor	**GROUND LEVEL (m)**	46.97
ENGINEER	Punch C.E	**EXCAVATION METHOD**	JCB

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0 TOPSOIL									
Soft to firm, brown, slightly sandu slightly gravelly CLAY		0.40	46.57						
Firm, greyish brown, slightly sandy gravelly CLAY with high subangular to subrounded cobbles and boulders content		0.70	46.27		AA163099	B	1.00		
1.0									
2.0					AA163100	B	2.00		
Stiff to very stiff, grey, slightly sandy gravelly CLAY with high subangular to subrounded cobbles and boulders content		2.40	44.57						
3.0 End of Trial Pit at 3.00m		3.00	43.97		AA173101	B	3.00		
4.0									

Groundwater Conditions
TP dry

Stability
TP stable

General Remarks

TRIAL PIT RECORD

REPORT NUMBER 24013

CONTRACT	Fortfield Road, Terenure, Dublin 6	**TRIAL PIT NO.**	**TP03**
		SHEET	Sheet 1 of 1
LOGGED BY	I.Reder	**CO-ORDINATES**	713,385.67 E 729,826.60 N
		DATE STARTED	14/04/2022
		DATE COMPLETED	14/04/2022
CLIENT	Lioncor	**GROUND LEVEL (m)**	47.28
ENGINEER	Punch C.E	**EXCAVATION METHOD**	JCB

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0 TOPSOIL									
Firm, brown, slightly sandy slightly gravelly CLAY		0.30	46.98						
Firm greyish brown, slightly sandy gravelly CLAY with high subangular to subrounded cobbles content		0.50	46.78		AA173103	B	0.80		
1.0									
Firm to stiff, greyish brown, slightly sandy gravelly CLAY with high subangular to subrounded cobbles and boulders content		1.50	45.78		AA173104	B	1.80		
2.0									
TP terminated due to many big boulders End of Trial Pit at 2.40m		2.40	44.88						
3.0									
4.0									

Groundwater Conditions
TP dry

Stability
TP stable

General Remarks
TP terminated at 2.4m due to big boulders

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TRIAL PIT RECORD

REPORT NUMBER 24013

CONTRACT	Fortfield Road, Terenure, Dublin 6	**TRIAL PIT NO.**	**TP04**
		SHEET	Sheet 1 of 1
LOGGED BY	I.Reder	**CO-ORDINATES**	
		DATE STARTED	14/04/2022
		DATE COMPLETED	14/04/2022
CLIENT	Lioncor	**GROUND LEVEL (m)**	
ENGINEER	Punch C.E	**EXCAVATION METHOD**	JCB

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0 TOPSOIL									
Firm, brown, slightly sandy slightly gravelly CLAY		0.30			AA173106	B	0.50		
Firm, greyish brown, slightly sandy very gravelly CLAY with high subangular cobbles low boulders and sandy gravel lenses content		0.70			AA173107	B	1.50		
1.0				1 (Seepage)					
2.0 Firm to stiff greyish brown, sandy very gravelly CLAY with high subangular to subrounded cobbles and medium boulders content		2.00			AA173108	B	2.50		
				2 (Slow)					
3.0 End of Trial Pit at 3.00m		3.00							
4.0									

Groundwater Conditions
Seepage flow at 2.0m; slow water flow at 2.8m

Stability
TP unstable from 2.0m

General Remarks

Appendix 4 Infiltration Test Results

Soakaway Design f -value from field tests

IGSL

Contract: Fortfield Road, terenure, Dublin Contract No.

Test No. SA1

Engineer PUNCH

Date: 14/04/2022

Summary of ground conditions

from	to	Description	Ground water
0.00	0.30	TOPSOIL	
0.30	0.80	Soft to firm, brown, slightly sandy slightly gravelly CLAY	
0.80	1.50	Firm to stiff, greyish brown, slightly sandy gravelly CLAY with some	DRY
		subangular cobbles	

Notes: Sample taken at 1.0m Ref.No AA163095

Field Data

Depth to Water (m)	Elapsed Time (min)
0.800	0.00
0.800	1.00
0.800	2.00
0.800	3.00
0.800	4.00
0.800	5.00
0.800	6.00
0.800	7.00
0.800	8.00
0.800	9.00
0.800	10.00
0.800	12.00
0.800	14.00
0.800	16.00
0.800	18.00
0.800	20.00
0.800	25.00
0.800	30.00
0.800	40.00
0.800	50.00
0.800	60.00

Field Test

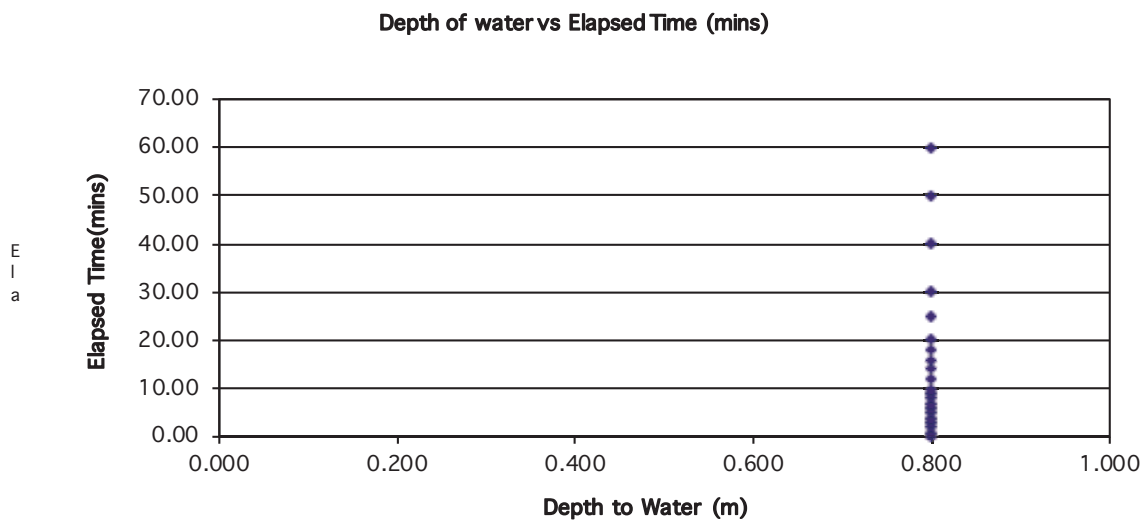
Depth of Pit (D)	1.50	m
Width of Pit (B)	0.50	m
Length of Pit (L)	2.00	m
Initial depth to Water =	0.80	m
Final depth to water =	0.80	m
Elapsed time (mins)=	60.00	
Top of permeable soil		m
Base of permeable soil		m

No Water Movement

Base area=	1	m2
*Av. side area of permeable stratum over test period=	3.5	m2
Total Exposed area =	4.5	m2

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

f= 0 m/min or 0 m/sec



Soakaway Design f -value from field tests

IGSL

Contract: Fortfield Road, terenure, Dublin Contract No.

Test No. SA2

Engineer PUNCH

Date: 14/04/2022

Summary of ground conditions

from	to	Description	Ground water
0.00	0.30	TOPSOIL	Moderate water at 1.35m
0.30	0.70	Firm, brown, sandy gravelly CLAY	
0.70	1.50	Dense, grey, slightly clayey sandy fine to coarse GRAVEL (very wet)	

Notes: Sample taken at 1.0m Ref.No AA173102

Field Data

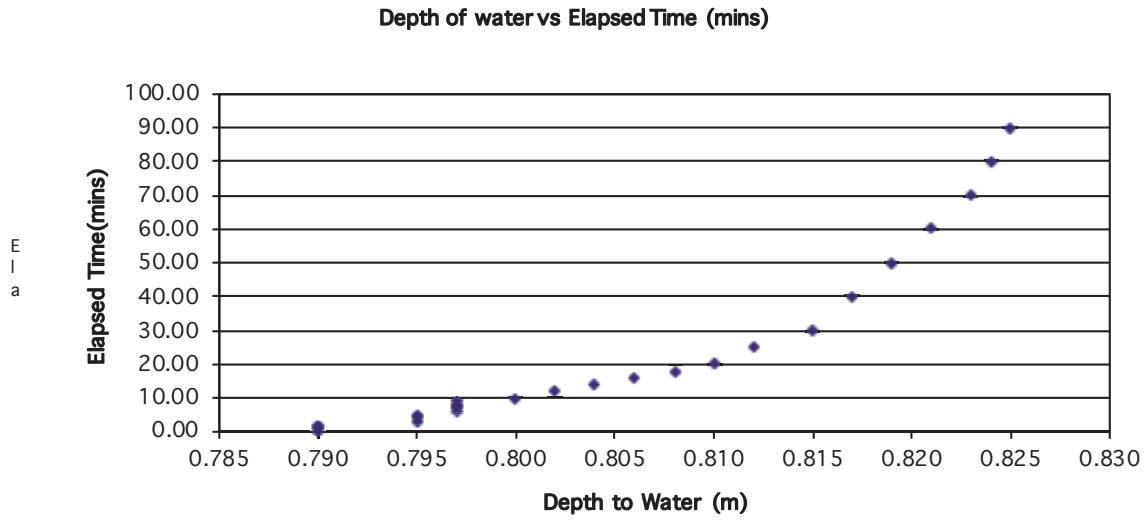
Depth to Water (m)	Elapsed Time (min)
0.790	0.00
0.790	1.00
0.790	2.00
0.795	3.00
0.795	4.00
0.795	5.00
0.797	6.00
0.797	7.00
0.797	8.00
0.797	9.00
0.800	10.00
0.802	12.00
0.804	14.00
0.806	16.00
0.808	18.00
0.810	20.00
0.812	25.00
0.815	30.00
0.817	40.00
0.819	50.00
0.821	60.00
0.823	70.00
0.824	80.00
0.825	90.00

Field Test

Depth of Pit (D)	1.50	m
Width of Pit (B)	0.50	m
Length of Pit (L)	2.00	m
Initial depth to Water =	0.79	m
Final depth to water =	0.825	m
Elapsed time (mins)=	90.00	
Top of permeable soil		m
Base of permeable soil		m
Base area=	1	m2
*Av. side area of permeable stratum over test period=	3.4625	m2
Total Exposed area =	4.4625	m2

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

f= 8.7E-05 m/min or 1.45243E-06 m/sec



Soakaway Design f -value from field tests

IGSL

Contract: Fortfield Road, terenure, Dublin Contract No.

Test No. SA3

Engineer PUNCH

Date: 14/04/2022

Summary of ground conditions

from	to	Description	Ground water
0.00	0.25	TOPSOIL	
0.25	0.50	MADE GROUND (grey sandy gravelly clay, red brick pieces, cobbles)	
0.50	0.70	Firm, brown, slightly sandy slightly gravelly CLAY	Dry
0.70	1.50	Firm to stiff, greyish brown, slightly sandy gravelly CLAY with many	
		subangular cobbles	

Notes: Sample taken at 1.0m Ref.No AA173109

Field Data

Depth to Water (m)	Elapsed Time (min)
0.800	0.00
0.800	1.00
0.800	2.00
0.800	3.00
0.800	4.00
0.800	5.00
0.800	6.00
0.800	7.00
0.800	8.00
0.800	9.00
0.800	10.00
0.800	12.00
0.800	14.00
0.800	16.00
0.800	18.00
0.800	20.00
0.800	25.00
0.800	30.00
0.800	40.00
0.800	50.00
0.800	60.00

Field Test

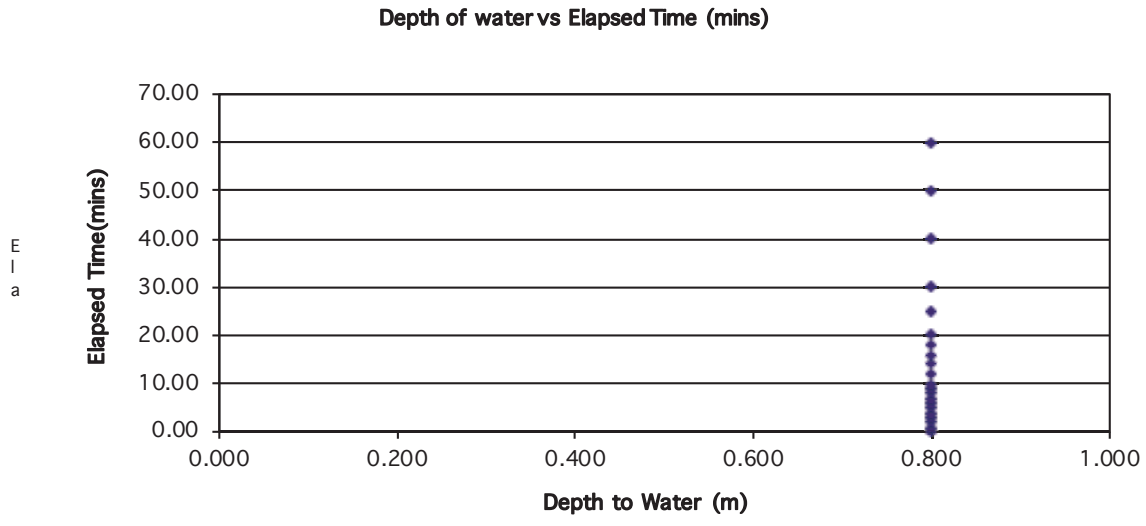
Depth of Pit (D)	1.50	m
Width of Pit (B)	0.50	m
Length of Pit (L)	2.00	m
Initial depth to Water =	0.80	m
Final depth to water =	0.80	m
Elapsed time (mins)=	60.00	
Top of permeable soil		m
Base of permeable soil		m

No Water movement

Base area=	1	m2
*Av. side area of permeable stratum over test period=	3.5	m2
Total Exposed area =	4.5	m2

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

f= 0 m/min or 0 m/sec



Soakaway Design f -value from field tests

IGSL

Contract: Fortfield Road, terenure, Dublin Contract No.

Test No. SA4

Engineer PUNCH

Date: 14/04/2022

Summary of ground conditions

from	to	Description	Ground water
0.00	0.35	TOPSOIL	
0.35	0.50	Firm, brown, slightly sandy slightly gravelly CLAY	
0.50	0.80	Firm, greyish brown, sandy gravelly CLAY with occasional cobbles and	Dry
		sandy gravel lenses	
0.80	1.50	Fimr to stiff, greyish brown, sandy gravelly CLAY with cobbles	

Notes: Sample taken at 1.0m Ref.No AA173105

Field Data

Depth to Water (m)	Elapsed Time (min)
0.840	0.00
0.840	1.00
0.840	2.00
0.840	3.00
0.840	4.00
0.840	5.00
0.840	6.00
0.840	7.00
0.845	8.00
0.845	9.00
0.845	10.00
0.845	12.00
0.845	14.00
0.845	16.00
0.845	18.00
0.845	20.00
0.845	25.00
0.845	30.00
0.845	40.00
0.845	50.00
0.845	60.00

Field Test

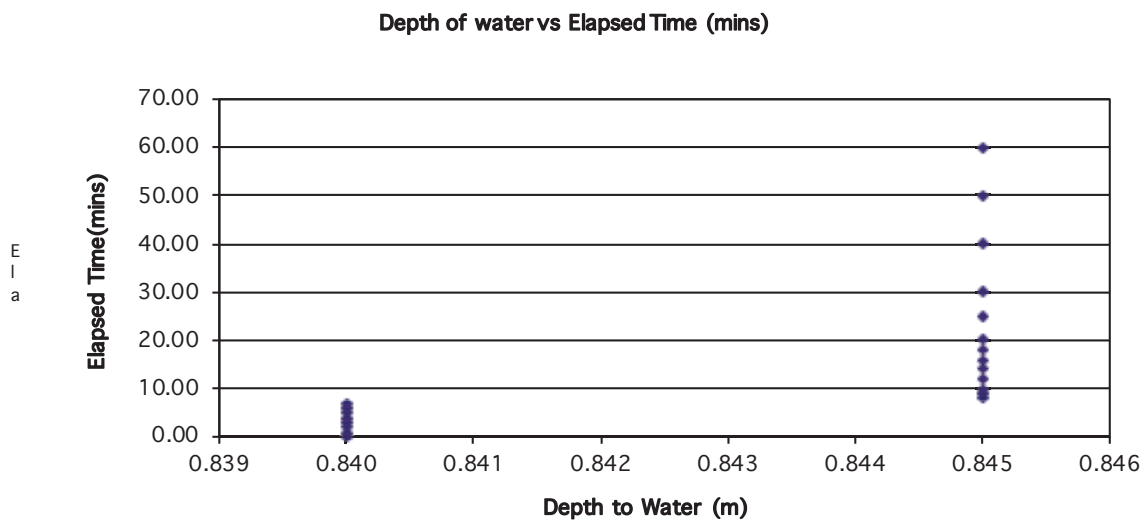
Depth of Pit (D)	1.50	m
Width of Pit (B)	0.50	m
Length of Pit (L)	2.00	m
Initial depth to Water =	0.84	m
Final depth to water =	0.845	m
Elapsed time (mins)=	60.00	
Top of permeable soil		m
Base of permeable soil		m

Water movement stop at 0.845m

Base area=	1	m2
*Av. side area of permeable stratum over test period=	3.2875	m2
Total Exposed area =	4.2875	m2

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

f= 1.9E-05 m/min or 3.23939E-07 m/sec



Appendix 5 Ground Water Monitoring

Standpipe	Standpipe Depth	Depth to water (m bgl)	
	(m bgl)	27/04/2022	09/05/2022
BH/RC 01	14.5	1.7	1.9
BH/RC02	8.0	2.1	2.1
BH/RC05	9.0	1.3	1.2
BH/RC06	14.0	2.2	2.0

Appendix 6 Laboratory Test Results (Geotechnical)

IGSL Ltd
Materials Laboratory
Unit J5, M7 Business Park
Newhall, Naas
Co. Kildare
045 846176

Test Report

Determination of Moisture Content, Liquid & Plastic Limits

Tested in accordance with BS1377:Part 2:1990, clauses 3.2, 4.3, 4.4 & 5.3**

Report No. **R133964** Contract No. 24013 Contract Name: Fortfield Road , Terenure , Dublin 6

Customer Punch C.E

Samples Received: 03/05/22 Date Tested: Various

BH/TP*	Sample No.	Depth* (m)	Lab. Ref	Sample Type*	Moisture Content %	Liquid Limit %	Plastic Limit %	Plasticity Index	% <425µm	Preparation	Liquid Limit Clause	Classification (BS5930)	Description
BH01	AA175561	2.0	A22/2475	B	12	31	17	14	47	WS	4.4	C L	Brown sandy gravelly CLAY
BH01	AA175564	5.0	A22/2476	B	8.7		NP	NP		WS	4.4		Brown silty, sandy, GRAVEL
BH02	AA175551	3.0	A22/2477	B	12	30	16	14	45	WS	4.4	C L	Brown sandy gravelly CLAY
BH03	AA175554	2.0	A22/2479	B	12	37	18	19	46	WS	4.4	C I	Brown sandy gravelly CLAY
BH03	AA175556	4.0	A22/2480	B	8.1	31	17	14	38	WS	4.4	C L	Brown clayey, very sandy, GRAVEL with many cobbles
BH04	AA175567	3.0	A22/2481	B	12	34	16	18	73	WS	4.4	C L	Brown sandy gravelly CLAY
BH04	AA175569	5.0	A22/2482	B	13	36	16	20	55	WS	4.4	C I	Brown sandy gravelly CLAY
BH05	AA175572	3.0	A22/2483	B	14	34	15	19	49	WS	4.4	C L	Grey sandy gravelly CLAY
BH05	AA175574	5.0	A22/2484	B	11	31	14	17	55	WS	4.4	C L	Grey slightly sandy, gravelly, CLAY
BH06	AA171710	2.0	A22/2485	B	14	27	13	14	52	WS	4.4	C L	Brown sandy gravelly CLAY
BH06	AA171713	5.0	A22/2486	B	10	29	13	16	52	WS	4.4	C L	Grey slightly sandy, gravelly, CLAY with some cobbles
TP01	AA163098	2.7	A22/2487	B	11	31	14	17	53	WS	4.4	C L	Brown sandy gravelly CLAY
TP02	AA173101	3.0	A22/2488	B	9.4	29	15	14	58	WS	4.4	C L	Brown slightly sandy, gravelly, CLAY with some cobbles
TP04	AA173108	2.5	A22/2489	B	12	27	15	12	51	WS	4.4	C L	Brown sandy gravel CLAY

Preparation: WS - Wet sieved
AR - As received
NP - Non plastic

Liquid Limit Clause: 4.3 Cone Penetrometer definitive method
4.4 Cone Penetrometer one point method

Sample Type: B - Bulk Disturbed
U - Undisturbed

Remarks:
Results relate only to the specimen tested,in as received condition unless otherwise noted.
NOTE: **These clauses have been superceded by EN 17892-1 and EN17892-12.
Opinions and interpretations are outside the scope of accreditation. * denotes Customer supplied information.

IGSL Ltd Materials Laboratory

Persons authorized to approve reports
H Byrne (Laboratory Manager)

Approved by	Date	Page
H Byrne	17/05/22	1 of 1

TEST REPORT
Determination of Particle Size Distribution
Tested in accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5**
(note: Sedimentation stage not accredited)

ISO 17025 INAB ACCREDITED TESTING DETAILED IN SCOPE REG NO. 133T

particle size	% passing	
75	100	COBBLES
63	100	
50	100	GRAVEL
37.5	87	
28	77	
20	67	
14	59	
10	49	
6.3	38	
5	34	
3.35	29	
2	21	
1.18	14	SAND
0.6	9	
0.425	8	
0.3	7	
0.15	6	
0.063	6	SILT/CLAY

Contract No. 24013 Report No. R134012
Contract Name : Fortfield Avenue , Terenure , Dublin 6
BH/TP* : BH01
Sample No.* AA175564 Lab. Sample No. A22/2476
Sample Type: B
Depth* (m) 5.00 Customer: Punch C.E
Date Received 03/05/2022 Date Testing started 11/05/2022
Description: Brown silty, sandy, GRAVEL

Remarks Note: **Clause 9.2 and Clause 9.5 of BS1377:Part 2:1990 have been superseded by ISO17892-4:2 Sample size did not meet the requirements of BS1377

Results relate only to the specimen tested in as received condition unless otherwise noted. * denotes Customer supplied information. Opinions and interpretations are outside the scope of accreditation.
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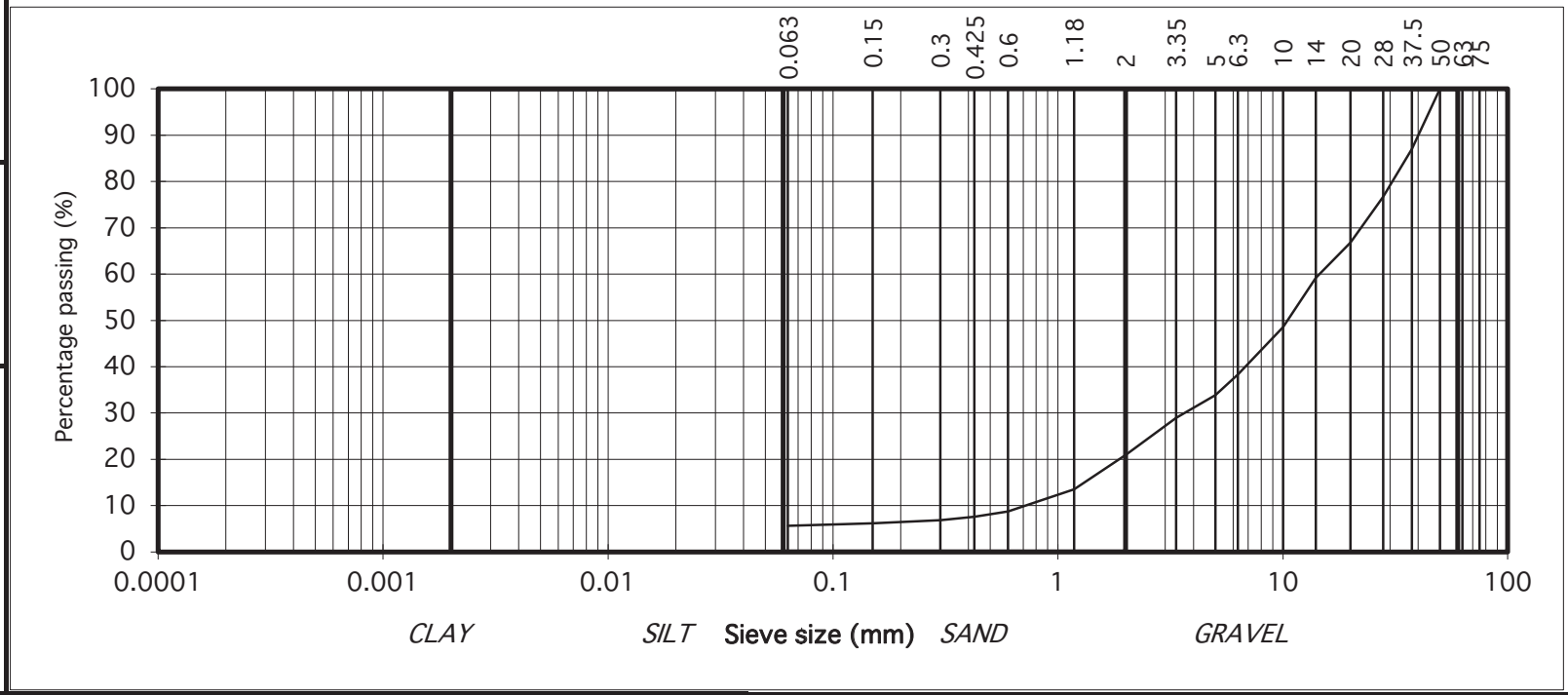

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H Byrne	18/05/22	1 of 1

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

TEST REPORT
Determination of Particle Size Distribution
Tested in accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5**
(note: Sedimentation stage not accredited)

ISO 17025 INAB ACCREDITED TESTING DETAILED IN SCOPE REG NO. 133T

particle size	% passing	
75	100	COBBLES
63	84	
50	84	GRAVEL
37.5	84	
28	82	
20	77	
14	72	
10	66	
6.3	60	
5	58	
3.35	55	
2	50	
1.18	47	SAND
0.6	42	
0.425	40	
0.3	38	
0.15	34	
0.063	30	SILT/CLAY
0.037	25	
0.027	23	
0.017	20	
0.010	18	
0.007	15	
0.005	14	
0.002	11	

Contract No. 24013 Report No. R134013
Contract Name : Fortfield Avenue , Terenure , Dublin 6
BH/TP* : BH02
Sample No.* AA175552 Lab. Sample No. A22/2478
Sample Type: B
Depth* (m) 4.00 Customer: Punch C.E
Date Received 03/05/2022 Date Testing started 11/05/2022
Description: Brown slightly sandy, gravelly, SILT/CLAY with some cobbles

Remarks Note: **Clause 9.2 and Clause 9.5 of BS1377:Part 2:1990 have been superseded by ISO17892-4:2 Sample size did not meet the requirements of BS1377

Results relate only to the specimen tested in as received condition unless otherwise noted. * denotes Customer supplied information. Opinions and interpretations are outside the scope of accreditation.
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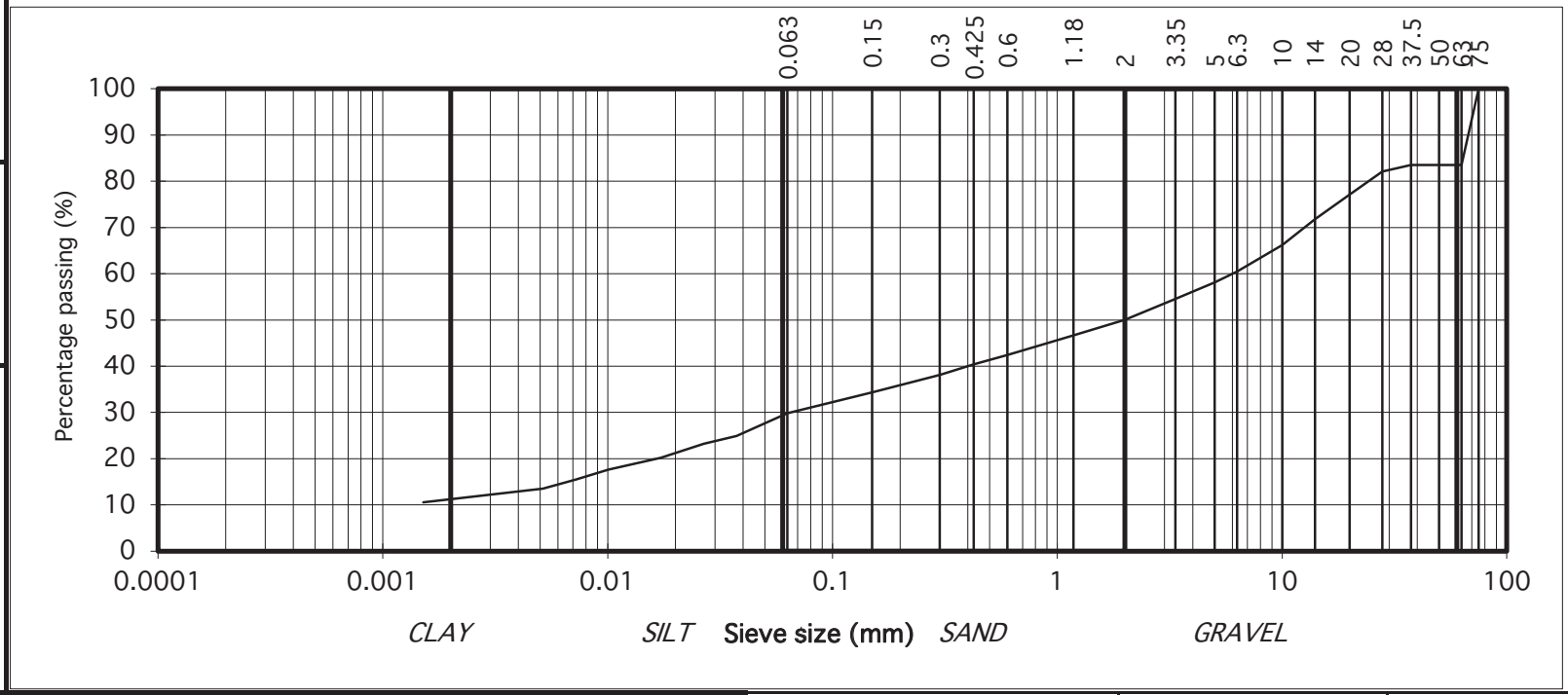

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Approved by:	Date:	Page no:
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Persons authorised to approve report: J Barrett (Quality Manager) H Byrne (Laboratory Manager)

TEST REPORT
Determination of Particle Size Distribution
Tested in accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5**
(note: Sedimentation stage not accredited)

ISO 17025 INAB ACCREDITED TESTING DETAILED IN SCOPE REG NO. 133T

particle size	% passing	
75	77	COBBLES
63	77	
50	66	GRAVEL
37.5	60	
28	59	
20	58	
14	55	
10	53	
6.3	49	
5	47	
3.35	46	
2	42	
1.18	38	SAND
0.6	32	
0.425	30	
0.3	28	
0.15	24	
0.063	19	SILT/CLAY

Contract No. 24013 Report No. R134014
Contract Name : Fortfield Avenue , Terenure , Dublin 6
BH/TP* : BH03
Sample No.* AA175556 Lab. Sample No. A22/2480
Sample Type: B
Depth* (m) 4.00 Customer: Punch C.E
Date Received 03/05/2022 Date Testing started 11/05/2022
Description: Brown clayey, very sandy, GRAVEL with many cobbles

Remarks Note: **Clause 9.2 and Clause 9.5 of BS1377:Part 2:1990 have been superseded by ISO17892-4:2 Sample size did not meet the requirements of BS1377

Results relate only to the specimen tested in as received condition unless otherwise noted. * denotes Customer supplied information. Opinions and interpretations are outside the scope of accreditation.
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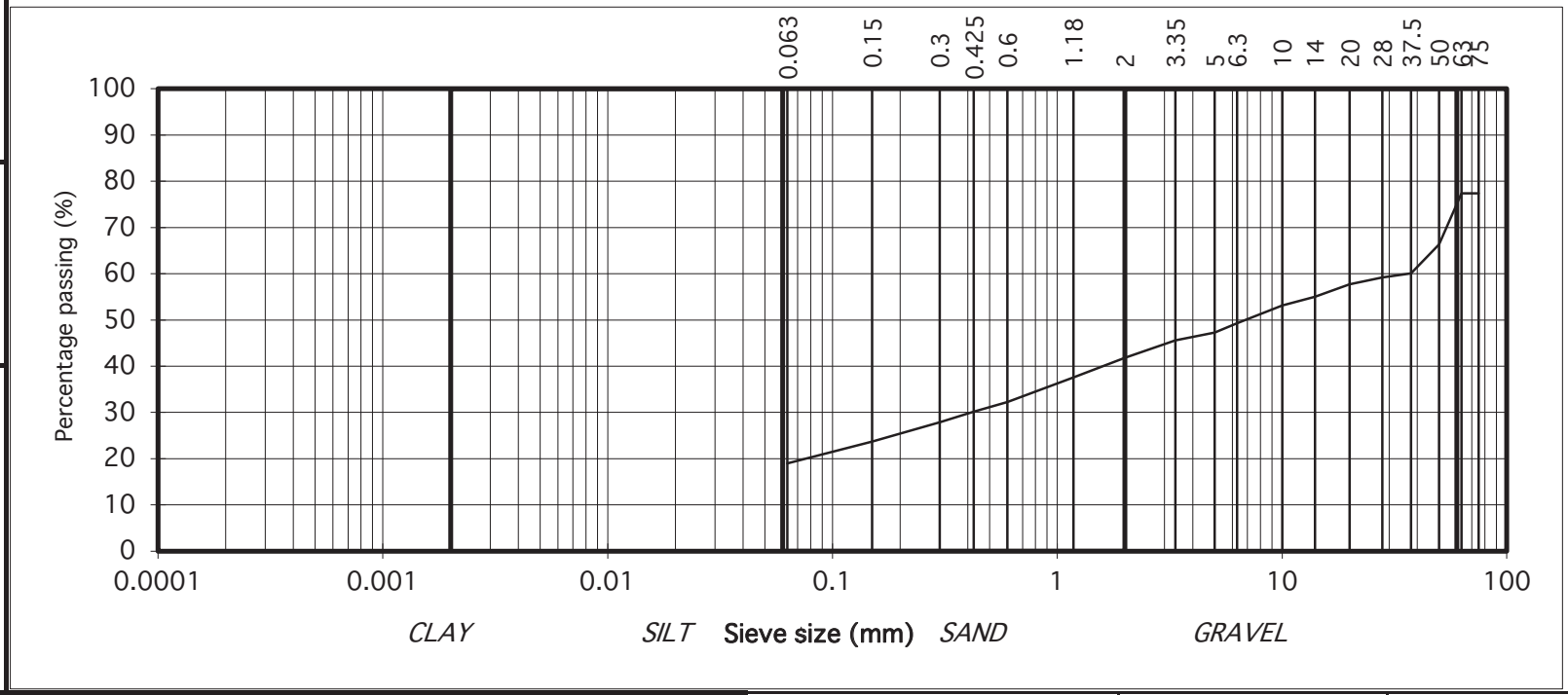

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Persons authorised to approve report: J Barrett (Quality Manager) H Byrne (Laboratory Manager)

TEST REPORT
Determination of Particle Size Distribution
Tested in accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5**
(note: Sedimentation stage not accredited)

ISO 17025 INAB ACCREDITED TESTING DETAILED IN SCOPE REG NO. 133T

particle size	% passing	
75	100	COBBLES
63	100	
50	87	GRAVEL
37.5	82	
28	75	
20	73	
14	68	
10	65	
6.3	61	
5	60	
3.35	56	
2	52	
1.18	49	SAND
0.6	44	
0.425	42	
0.3	40	
0.15	36	
0.063	33	SILT/CLAY
0.038	27	
0.027	24	
0.017	21	
0.010	18	
0.007	17	
0.005	15	
0.002	13	

Contract No. 24013 Report No. R134015
Contract Name : Fortfield Avenue , Terenure , Dublin 6
BH/TP* : BH05
Sample No.* AA175574 Lab. Sample No. A22/2484
Sample Type: B
Depth* (m) 5.00 Customer: Punch C.E
Date Received 03/05/2022 Date Testing started 11/05/2022
Description: Grey slightly sandy, gravelly, CLAY

Remarks Note: **Clause 9.2 and Clause 9.5 of BS1377:Part 2:1990 have been superseded by ISO17892-4:2 Sample size did not meet the requirements of BS1377

Results relate only to the specimen tested in as received condition unless otherwise noted. * denotes Customer supplied information. Opinions and interpretations are outside the scope of accreditation.
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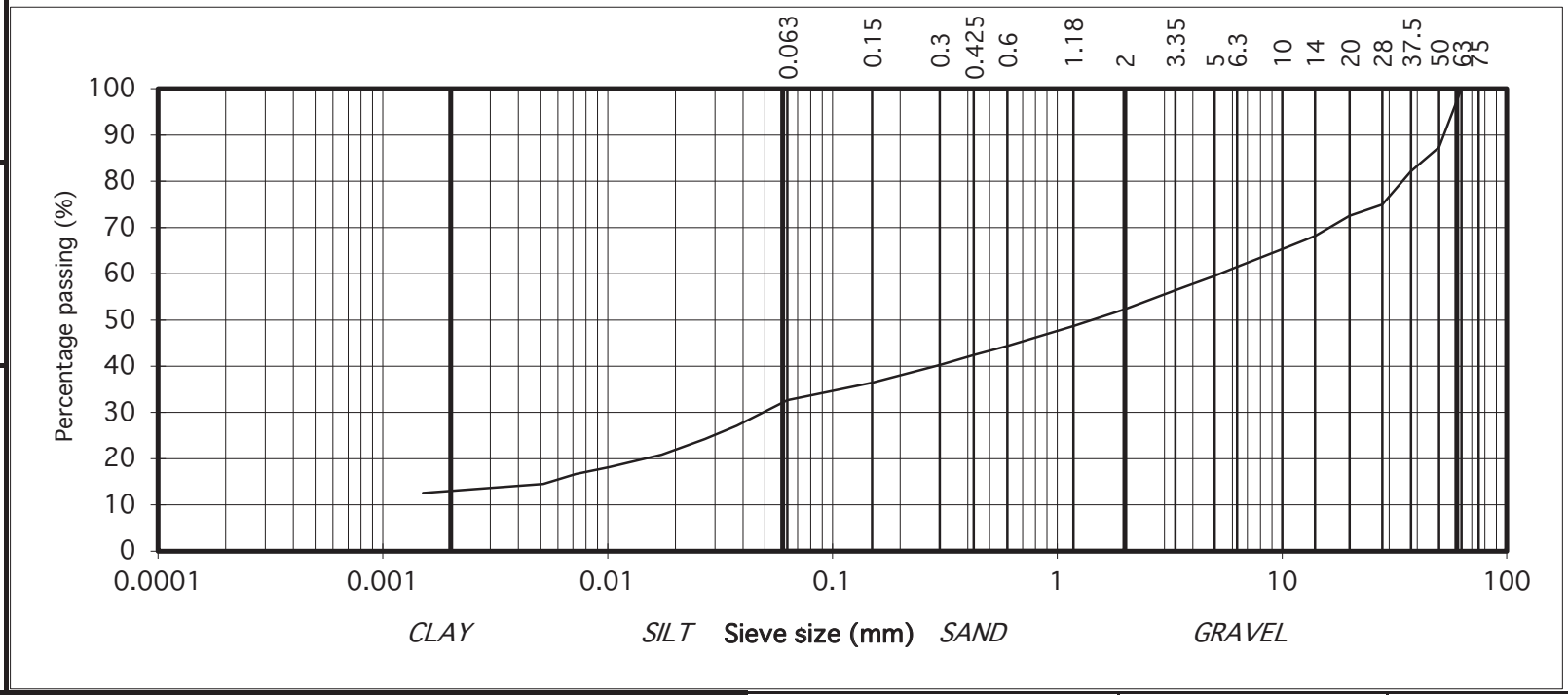

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Persons authorised to approve report: J Barrett (Quality Manager) H Byrne (Laboratory Manager)

TEST REPORT
Determination of Particle Size Distribution
Tested in accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5**
(note: Sedimentation stage not accredited)

ISO 17025 INAB ACCREDITED TESTING DETAILED IN SCOPE REG NO. 133T

particle size	% passing	
75	100	COBBLES
63	84	
50	84	GRAVEL
37.5	76	
28	76	
20	73	
14	70	
10	67	
6.3	63	
5	61	
3.35	59	
2	54	
1.18	51	SAND
0.6	46	
0.425	44	
0.3	42	
0.15	38	
0.063	33	SILT/CLAY
0.037	30	
0.027	27	
0.017	23	
0.010	19	
0.007	16	
0.005	14	
0.002	10	

Contract No. 24013 Report No. R134016
Contract Name : Fortfield Avenue , Terenure , Dublin 6
BH/TP* : BH06
Sample No.* AA171713 Lab. Sample No. A22/2486
Sample Type: B
Depth* (m) 5.00 Customer: Punch C.E
Date Received 03/05/2022 Date Testing started 11/05/2022
Description: Grey slightly sandy, gravelly, CLAY with some cobbles

Remarks Note: **Clause 9.2 and Clause 9.5 of BS1377:Part 2:1990 have been superseded by ISO17892-4:2 Sample size did not meet the requirements of BS1377

Results relate only to the specimen tested in as received condition unless otherwise noted. * denotes Customer supplied information. Opinions and interpretations are outside the scope of accreditation.
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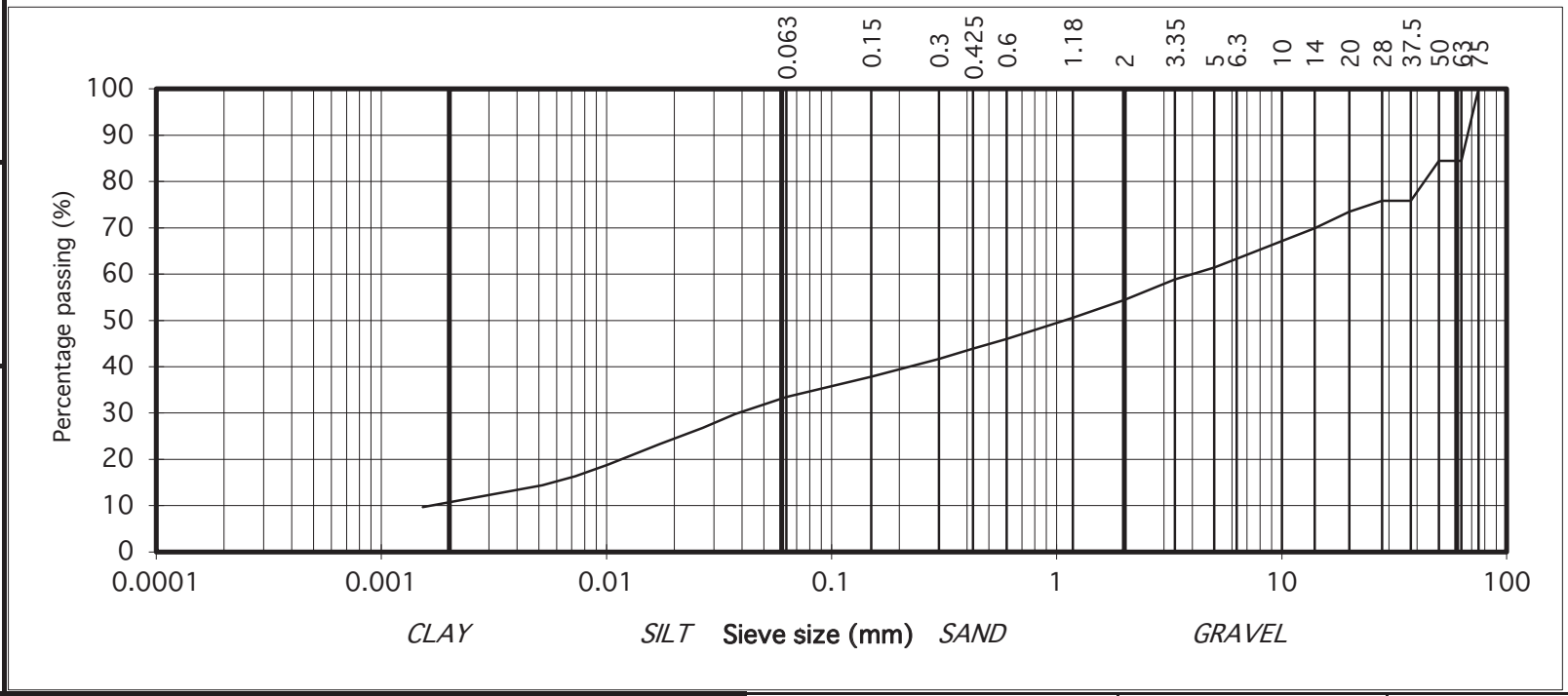

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TEST REPORT
Determination of Particle Size Distribution
Tested in accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5**
(note: Sedimentation stage not accredited)

ISO 17025 INAB ACCREDITED TESTING DETAILED IN SCOPE REG NO. 133T

particle size	% passing	
75	100	COBBLES
63	87	
50	87	GRAVEL
37.5	82	
28	79	
20	75	
14	71	
10	67	
6.3	63	
5	61	
3.35	57	
2	53	
1.18	50	SAND
0.6	46	
0.425	44	
0.3	41	
0.15	37	
0.063	34	SILT/CLAY
0.037	30	
0.027	27	
0.017	24	
0.010	21	
0.007	18	
0.005	16	
0.002	12	

Contract No. 24013 Report No. R133965
Contract Name : Fortfield Avenue , Terenure , Dublin 6
BH/TP* : TP02
Sample No.* AA173101 Lab. Sample No. A22/2488
Sample Type: B
Depth* (m) 3.00 Customer: Punch C.E
Date Received 03/05/2022 Date Testing started 03/05/2022
Description: Brown slightly sandy, gravelly, CLAY with some cobbles

Remarks Note: **Clause 9.2 and Clause 9.5 of BS1377:Part 2:1990 have been superseded by ISO17892-4:2 Sample size did not meet the requirements of BS1377

Results relate only to the specimen tested in as received condition unless otherwise noted. * denotes Customer supplied information. Opinions and interpretations are outside the scope of accreditation.
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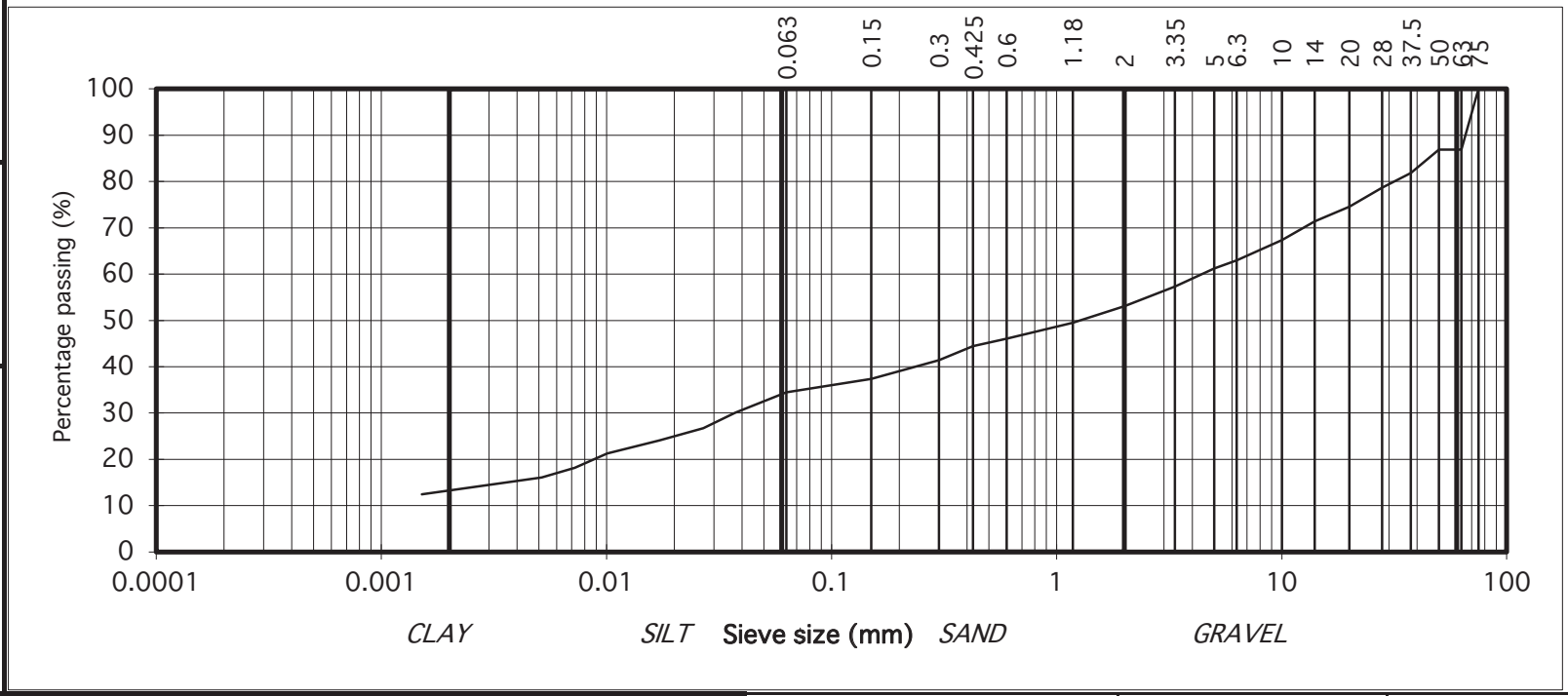

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Approved by:	Date:	Page no:
H Byrne	18/05/22	1 of 1

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

(Diametrial) POINT LOAD STRENGTH INDEX TEST DATA

Contract: Fortfield Road, Terenure, Dublin 6
Contract no. 24013
Date of test: 06/05/2022

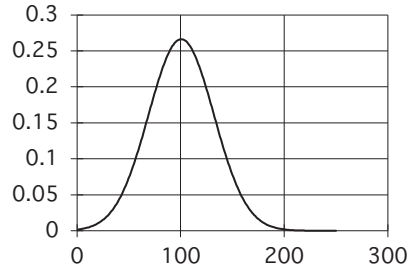
Sample Type: Core

RC No.	Depth m	D (Diameter) mm	P (failure load) kN	F	Is (index strength) Mpa	Is(50) (index strength) Mpa	*UCS MPa	Type	Orienation
RC01	11.10	78	30.0	1.222	4.93	6.02	120	d	//
	11.30	78	34.0	1.222	5.59	6.83	137	d	//
	11.90	78	28.0	1.222	4.60	5.62	112	d	//
	13.40	78	16.0	1.222	2.63	3.21	64	d	//
	14.10	78	10.0	1.222	1.64	2.01	40	d	//
RC02	8.30	78	21.0	1.222	3.45	4.22	84	d	//
	9.40	78	29.0	1.222	4.77	5.82	116	d	//
	9.55	78	24.0	1.222	3.94	4.82	96	d	//
	9.70	78	26.0	1.222	4.27	5.22	104	d	//
	9.90	78	30.0	1.222	4.93	6.02	120	d	//
RC03	8.00	78	8.0	1.222	1.31	1.61	32	d	//
	8.90	78	27.0	1.222	4.44	5.42	108	d	//
	9.30	78	30.0	1.222	4.93	6.02	120	d	//
	10.60	78	28.0	1.222	4.60	5.62	112	d	//
	11.90	78	29.0	1.222	4.77	5.82	116	d	//
RC04	8.40	78	24.0	1.222	3.94	4.82	96	d	//
	8.90	78	26.0	1.222	4.27	5.22	104	d	//
	9.40	78	28.0	1.222	4.60	5.62	112	d	//
	11.10	78	32.0	1.222	5.26	6.42	128	d	//
	11.20	78	36.0	1.222	5.92	7.23	145	d	//
	13.10	78	10.0	1.222	1.64	2.01	40	d	//

Statistical Summary Data	Is(50)	UCS*
Number of Samples Tested	21	21
Minimum	1.61	32
Average	5.03	101
Maximum	7.23	145
Standard Dev.	1.57	31
Upper 95% Confidence Limit	8.11	162.28
Lower 95% Confidence Limit	1.94	38.88

Comments:
*UCS taken as k x Point Load Is(50): k= 20

*UCS Normal Distribution Curve



Abbreviations

i	irregular
a	axial
b	block
d	diametral

approx. orientation to planes of weakness/bedding

U	unknown
P	perpendicular
//	parallel

(Diametrial) POINT LOAD STRENGTH INDEX TEST DATA

Contract: Fortfield Road, Terenure, Dublin 6
Contract no. 24013
Date of test: 06/05/2022

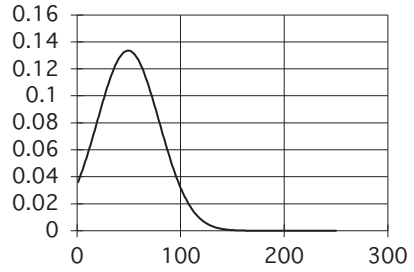
Sample Type: Core

RC No.	Depth m	D (Diameter) mm	P (failure load) kN	F	Is (index strength) Mpa	Is(50) (index strength) Mpa	*UCS MPa	Type	Orienation
RC05	9.90	78	23.0	1.222	3.78	4.62	92	d	//
	10.90	78	6.0	1.222	0.99	1.20	24	d	//
	11.40	78	14.0	1.222	2.30	2.81	56	d	//
	12.50	78	4.0	1.222	0.66	0.80	16	d	//
	12.60	78	4.0	1.222	0.66	0.80	16	d	//
RC06	9.70	78	21.0	1.222	3.45	4.22	84	d	//
	10.30	78	16.0	1.222	2.63	3.21	64	d	//
	12.20	78	19.0	1.222	3.12	3.81	76	d	//
	12.70	78	4.0	1.222	0.66	0.80	16	d	//
	13.30	78	12.0	1.222	1.97	2.41	48	d	//

Statistical Summary Data	Is(50)	UCS*
Number of Samples Tested	10	10
Minimum	0.80	16
Average	2.47	49
Maximum	4.62	92
Standard Dev.	1.49	30
Upper 95% Confidence Limit	5.40	107.94
Lower 95% Confidence Limit	-0.46	-9.16

Comments:
*UCS taken as k x Point Load Is(50): k= 20

*UCS Normal Distribution Curve



Abbreviations	
i	irregular
a	axial
b	block
d	diametral

approx. orientation to planes of weakness/bedding

U	unknown
P	perpendicular
//	parallel

Uniaxial Compression Test Report Sheet

I.G.S.L.

Sample Identification

Contract Name:	Fortfield Road, Terenure, Dublin 6
Job Number:	24013
Hole No:	RC03
Depth (m):	11.40m

Sample Description

Colour:	Dark blueish grey
Grain size:	Fine-grained
Weathering Grade:	Fresh
Rock Type:	LIMESTONE

Weathering Grade Criteria

I. Fresh:	Unchanged from original state
II. Slightly weathered:	Slight discolouration, slight weakening
III. Moderately weathered:	Considerable weakening, penetrative discolouration
IV. Highly weathered:	Considerable weakening, penetrative discolouration, breaks in hand

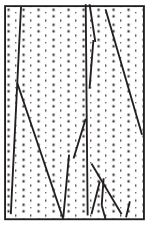
Sample Measurements

Length	204	
Diameter (Ø)	78.1	mm

Testing

Load Rate	4.3	kN/min
Load at Failure (P)	428	kN

Sketch of Failure Surfaces



Strength Calculations

Uniaxial Compressive Strength $= \dfrac{428000}{4788.19385}$

$= \dfrac{1000 \times P}{\prod \times (Ø/2)^2}$

$=$ 89.34 (Mpa)

Bulk Density $=$ 2.65 (Mg/m^3)

Notes:

Uniaxial Compression Test Report Sheet

I.G.S.L.

Sample Identification

Contract Name:	Fortfield Road, Terenure, Dublin 6
Job Number:	24013
Hole No:	RC04
Depth (m):	12.40m

Sample Description

Colour:	Dark blueish grey
Grain size:	Fine-grained
Weathering Grade:	Fresh
Rock Type:	LIMESTONE

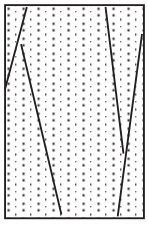
Weathering Grade Criteria

I. Fresh:	Unchanged from original state
II. Slightly weathered:	Slight discolouration, slight weakening
III. Moderately weathered:	Considerable weakening, penetrative discolouration
IV. Highly weathered:	Considerable weakening, penetrative discolouration, breaks in hand

Sample Measurements

Length	199	
Diameter (Ø)	78	mm

Sketch of Failure Surfaces



Testing

Load Rate	4.3	kN/min
Load at Failure (P)	416	kN

Strength Calculations

Uniaxial Compressive Strength $= \dfrac{416000}{4775.94}$

$= \dfrac{1000 \times P}{\prod \times (Ø/2)^2}$

$=$ 87.06 (Mpa)

Bulk Density $=$ 2.66 (Mg/m^3)

Notes:

Uniaxial Compression Test Report Sheet

I.G.S.L.

Sample Identification

Contract Name:	Fortfield Road, Terenure, Dublin 6
Job Number:	24013
Hole No:	RC05
Depth (m):	11.80m

Sample Description

Colour:	Pale blueish grey
Grain size:	Fine-grained
Weathering Grade:	Fresh
Rock Type:	LIMESTONE

Weathering Grade Criteria

I. Fresh:	Unchanged from original state
II. Slightly weathered:	Slight discolouration, slight weakening
III. Moderately weathered:	Considerable weakening, penetrative discolouration
IV. Highly weathered:	Considerable weakening, penetrative discolouration, breaks in hand

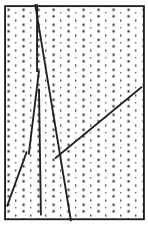
Sample Measurements

Length	202	
Diameter (Ø)	78.1	mm

Testing

Load Rate	4.3	kN/min
Load at Failure (P)	289	kN

Sketch of Failure Surfaces



Strength Calculations

Uniaxial Compressive Strength $= \dfrac{289000}{4788.19385}$

$= \dfrac{1000 \times P}{\prod \times (Ø/2)^2}$

$=$ 60.33 (Mpa)

Bulk Density $=$ 2.64 (Mg/m^3)

Notes:

Appendix 7 Laboratory Test Results (Environmental)

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

Final Report

Report No.:	22-16335-1
Initial Date of Issue:	11-May-2022
Client	IGSL
Client Address:	M7 Business Park Naas County Kildare Ireland
Contact(s):	John Clancy
Project	24013 Fortfield Rd Terenure (Punch)

Quotation No.:	Q20-19951	**Date Received:**	04-May-2022
Order No.:		**Date Instructed:**	04-May-2022
No. of Samples:	7		
Turnaround (Wkdays):	7	**Results Due:**	12-May-2022
Date Approved:	11-May-2022		

Approved By:

Details: Stuart Henderson, Technical Manager

Results - Leachate

Project: 24013 Fortfield Rd Terenure (Punch)

Client: IGSL				**Chemtest Job No.:**		22-16335	22-16335	22-16335	22-16335	22-16335	22-16335	22-16335
Quotation No.: Q20-19951				**Chemtest Sample ID.:**		1421621	1421622	1421623	1421624	1421625	1421626	1421627
Order No.:				Client Sample Ref.:		AA175560	AA175553	AA175566	AA163096	AA163099	AA173103	AA173106
				Sample Location:		BH01	BH03	BH04	TP01	TP02	TP03	TP04
				Sample Type:		SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
				Top Depth (m):		1.0	1.0	2.0	0.70	1.0	0.80	0.50
Determinand	**Accred.**	**SOP**	**Type**	**Units**	**LOD**							
pH	U	1010	10:1		N/A	8.4	8.5	8.6	8.5	8.5	8.5	8.5
Ammonium	U	1220	10:1	mg/l	0.050	0.12	0.055	0.098	0.10	0.078	0.081	< 0.050
Ammonium	N	1220	10:1	mg/kg	0.10	1.4	0.64	1.2	1.2	0.92	0.95	0.57
Boron (Dissolved)	U	1455	10:1	mg/kg	0.01	< 0.01	< 0.01	0.12	0.12	< 0.01	0.12	0.13
Benzo[j]fluoranthene	N	1800	10:1	µg/l	0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010

Results - Soil

Project: 24013 Fortfield Rd Terenure (Punch)

Client: IGSL				**Chemtest Job No.:**	22-16335	22-16335	22-16335	22-16335	22-16335	22-16335	22-16335
Quotation No.: Q20-19951				**Chemtest Sample ID.:**	1421621	1421622	1421623	1421624	1421625	1421626	1421627
Order No.:				Client Sample Ref.:	AA175560	AA175553	AA175566	AA163096	AA163099	AA173103	AA173106
				Sample Location:	BH01	BH03	BH04	TP01	TP02	TP03	TP04
				Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
				Top Depth (m):	1.0	1.0	2.0	0.70	1.0	0.80	0.50
				Asbestos Lab:	DURHAM	DURHAM	DURHAM	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	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected
Moisture	N	2030	%	0.020	12	15	11	19	12	13	13
Boron (Hot Water Soluble)	U	2120	mg/kg	0.40	[A] 0.44	[A] 1.9	[A] 0.43	[A] 23	[A] 0.65	[A] 3.8	[A] 2.0
Sulphur (Elemental)	U	2180	mg/kg	1.0	[A] < 1.0	[A] 2.8	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] 1.7
Cyanide (Total)	U	2300	mg/kg	0.50	[A] < 0.50	[A] < 0.50	[A] < 0.50	[A] < 0.50	[A] < 0.50	[A] < 0.50	[A] < 0.50
Sulphide (Easily Liberatable)	N	2325	mg/kg	0.50	[A] 12	[A] 4.2	[A] 13	[A] 2.4	[A] 16	[A] 9.4	[A] 4.7
Sulphate (Acid Soluble)	U	2430	%	0.010	[A] 0.016	[A] 0.026	[A] < 0.010	[A] 0.055	[A] 0.017	[A] 0.032	[A] 0.026
Arsenic	U	2455	mg/kg	0.5	9.8	7.3	9.3	22	9.4	9.5	7.0
Barium	U	2455	mg/kg	0	50	33	53	140	71	38	37
Cadmium	U	2455	mg/kg	0.10	1.6	0.55	1.6	2.4	1.5	1.4	0.58
Chromium	U	2455	mg/kg	0.5	14	12	16	25	13	13	15
Molybdenum	U	2455	mg/kg	0.5	2.5	0.8	2.7	3.7	2.7	2.2	0.9
Antimony	N	2455	mg/kg	2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Copper	U	2455	mg/kg	0.50	25	10	25	26	25	21	11
Mercury	U	2455	mg/kg	0.05	0.06	0.06	0.05	0.09	0.05	0.05	< 0.05
Nickel	U	2455	mg/kg	0.50	37	15	43	56	37	31	16
Lead	U	2455	mg/kg	0.50	15	15	17	26	14	15	12
Selenium	U	2455	mg/kg	0.25	1.3	0.97	1.5	2.4	1.5	1.2	1.1
Zinc	U	2455	mg/kg	0.50	64	51	79	95	72	69	50
Chromium (Trivalent)	N	2490	mg/kg	1.0	14	12	16	25	13	13	15
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Mineral Oil (TPH Calculation)	N	2670	mg/kg	10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Aliphatic TPH >C8-C10	U	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Aliphatic TPH >C10-C12	U	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Aliphatic TPH >C12-C16	U	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Aliphatic TPH >C16-C21	U	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Aliphatic TPH >C21-C35	U	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Total Aliphatic Hydrocarbons	N	2680	mg/kg	5.0	[A] < 5.0	[A] < 5.0	[A] < 5.0	[A] < 5.0	[A] < 5.0	[A] < 5.0	[A] < 5.0
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Aromatic TPH >C7-C8	N	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Aromatic TPH >C8-C10	U	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Aromatic TPH >C10-C12	U	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Aromatic TPH >C12-C16	U	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Aromatic TPH >C16-C21	U	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0

Results - Soil

Project: 24013 Fortfield Rd Terenure (Punch)

Client: IGSL					**Chemtest Job No.:**	22-16335	22-16335	22-16335	22-16335	22-16335	22-16335
Quotation No.: Q20-19951					**Chemtest Sample ID.:**	1421621	1421622	1421623	1421624	1421625	1421626	1421627
Order No.:					Client Sample Ref.:	AA175560	AA175553	AA175566	AA163096	AA163099	AA173103	AA173106
					Sample Location:	BH01	BH03	BH04	TP01	TP02	TP03	TP04
					Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
					Top Depth (m):	1.0	1.0	2.0	0.70	1.0	0.80	0.50
					Asbestos Lab:	DURHAM	DURHAM	DURHAM	DURHAM	DURHAM	DURHAM	DURHAM
Determinand	**Accred.**	**SOP**	**Units**	**LOD**								
Aromatic TPH >C21-C35	U	2680	mg/kg	1.0		[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0		[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Total Aromatic Hydrocarbons	N	2680	mg/kg	5.0		[A] < 5.0	[A] < 5.0	[A] < 5.0	[A] < 5.0	[A] < 5.0	[A] < 5.0	[A] < 5.0
Total Petroleum Hydrocarbons	N	2680	mg/kg	10.0		[A] < 10	[A] < 10	[A] < 10	[A] < 10	[A] < 10	[A] < 10	[A] < 10
Benzene	U	2760	µg/kg	1.0		[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Toluene	U	2760	µg/kg	1.0		[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Ethylbenzene	U	2760	µg/kg	1.0		[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
m & p-Xylene	U	2760	µg/kg	1.0		[A] 3.2	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
o-Xylene	U	2760	µg/kg	1.0		[A] 2.1	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Methyl Tert-Butyl Ether	U	2760	µg/kg	1.0		[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Naphthalene	N	2800	mg/kg	0.010		[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010
Acenaphthylene	N	2800	mg/kg	0.010		[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010
Acenaphthene	N	2800	mg/kg	0.010		[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010
Fluorene	N	2800	mg/kg	0.010		[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010
Phenanthrene	N	2800	mg/kg	0.010		[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010
Anthracene	N	2800	mg/kg	0.010		[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010
Fluoranthene	N	2800	mg/kg	0.010		[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010
Pyrene	N	2800	mg/kg	0.010		[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010
Benzo[a]anthracene	N	2800	mg/kg	0.010		[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010
Chrysene	N	2800	mg/kg	0.010		[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010
Benzo[b]fluoranthene	N	2800	mg/kg	0.010		[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010
Benzo[k]fluoranthene	N	2800	mg/kg	0.010		[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010
Benzo[a]pyrene	N	2800	mg/kg	0.010		[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010
Indeno(1,2,3-c,d)Pyrene	N	2800	mg/kg	0.010		[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010
Dibenz(a,h)Anthracene	N	2800	mg/kg	0.010		[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010
Benzo[g,h,i]perylene	N	2800	mg/kg	0.010		[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010
Coronene	N	2800	mg/kg	0.010		[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010
Total Of 17 PAH's	N	2800	mg/kg	0.20		[A] < 0.20	[A] < 0.20	[A] < 0.20	[A] < 0.20	[A] < 0.20	[A] < 0.20	[A] < 0.20
PCB 28	N	2815	mg/kg	0.0010		[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010
PCB 52	N	2815	mg/kg	0.0010		[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010
PCB 90+101	N	2815	mg/kg	0.0010		[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010
PCB 118	N	2815	mg/kg	0.0010		[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010
PCB 153	N	2815	mg/kg	0.0010		[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010
PCB 138	N	2815	mg/kg	0.0010		[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010
PCB 180	N	2815	mg/kg	0.0010		[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010
Total PCBs (7 congeners)	N	2815	mg/kg	0.0010		[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010
Total Phenols	U	2920	mg/kg	0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10

Results - Single Stage WAC

Project: 24013 Fortfield Rd Terenure (Punch)

					Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	22-16335						
Chemtest Sample ID:	1421621						
Sample Ref:	AA175560						
Sample ID:							
Sample Location:	BH01						
Top Depth(m):	1.0						
Bottom Depth(m):							
Sampling Date:							
Determinand	**SOP**	**Accred.**	**Units**		**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Total Organic Carbon	2625	U	%	[A] 0.46	3	5	6
Loss On Ignition	2610	U	%	2.7	--	--	10
Total BTEX	2760	U	mg/kg	[A] < 0.010	6	--	--
Total PCBs (7 congeners)	2815	N	mg/kg	[A] < 0.0010	1	--	--
TPH Total WAC	2670	U	mg/kg	[A] < 10	500	--	--
Total Of 17 PAH's	2800	N	mg/kg	[A] < 0.20	100	--	--
pH	2010	U		9.1	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.016	--	To evaluate	To evaluate
Eluate Analysis			**10:1 Eluate mg/l**	**10:1 Eluate mg/kg**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1455	U	< 0.0002	< 0.0002	0.5	2	25
Barium	1455	U	< 0.005	< 0.0005	20	100	300
Cadmium	1455	U	< 0.00011	< 0.00011	0.04	1	5
Chromium	1455	U	0.0007	0.0065	0.5	10	70
Copper	1455	U	0.0010	0.010	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.0080	0.080	0.5	10	30
Nickel	1455	U	0.0005	0.0052	0.4	10	40
Lead	1455	U	< 0.0005	< 0.0005	0.5	10	50
Antimony	1455	U	< 0.0005	< 0.0005	0.06	0.7	5
Selenium	1455	U	< 0.0005	< 0.0005	0.1	0.5	7
Zinc	1455	U	< 0.003	< 0.003	4	50	200
Chloride	1220	U	< 1.0	< 10	800	15000	25000
Fluoride	1220	U	0.37	3.7	10	150	500
Sulphate	1220	U	< 1.0	< 10	1000	20000	50000
Total Dissolved Solids	1020	N	72	710	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	6.0	60	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	12

Waste Acceptance Criteria

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

Results - Single Stage WAC

Project: 24013 Fortfield Rd Terenure (Punch)

					Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	22-16335						
Chemtest Sample ID:	1421622						
Sample Ref:	AA175553						
Sample ID:							
Sample Location:	BH03						
Top Depth(m):	1.0						
Bottom Depth(m):							
Sampling Date:							
Determinand	**SOP**	**Accred.**	**Units**		**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Total Organic Carbon	2625	U	%	[A] 0.93	3	5	6
Loss On Ignition	2610	U	%	3.4	--	--	10
Total BTEX	2760	U	mg/kg	[A] < 0.010	6	--	--
Total PCBs (7 congeners)	2815	N	mg/kg	[A] < 0.0010	1	--	--
TPH Total WAC	2670	U	mg/kg	[A] < 10	500	--	--
Total Of 17 PAH's	2800	N	mg/kg	[A] < 0.20	100	--	--
pH	2010	U		8.8	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.017	--	To evaluate	To evaluate
Eluate Analysis			**10:1 Eluate mg/l**	**10:1 Eluate mg/kg**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1455	U	0.0006	0.0064	0.5	2	25
Barium	1455	U	< 0.005	< 0.0005	20	100	300
Cadmium	1455	U	< 0.00011	< 0.00011	0.04	1	5
Chromium	1455	U	0.0008	0.0078	0.5	10	70
Copper	1455	U	0.0021	0.021	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.0031	0.031	0.5	10	30
Nickel	1455	U	0.0009	0.0089	0.4	10	40
Lead	1455	U	0.0006	0.0055	0.5	10	50
Antimony	1455	U	< 0.0005	< 0.0005	0.06	0.7	5
Selenium	1455	U	< 0.0005	< 0.0005	0.1	0.5	7
Zinc	1455	U	< 0.003	< 0.003	4	50	200
Chloride	1220	U	1.0	10	800	15000	25000
Fluoride	1220	U	0.36	3.6	10	150	500
Sulphate	1220	U	< 1.0	< 10	1000	20000	50000
Total Dissolved Solids	1020	N	59	580	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	4.9	< 50	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	15

Waste Acceptance Criteria

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

Results - Single Stage WAC

Project: 24013 Fortfield Rd Terenure (Punch)

					Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	22-16335						
Chemtest Sample ID:	1421623						
Sample Ref:	AA175566						
Sample ID:							
Sample Location:	BH04						
Top Depth(m):	2.0						
Bottom Depth(m):							
Sampling Date:							
Determinand	**SOP**	**Accred.**	**Units**		**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Total Organic Carbon	2625	U	%	[A] 0.47	3	5	6
Loss On Ignition	2610	U	%	2.1	--	--	10
Total BTEX	2760	U	mg/kg	[A] < 0.010	6	--	--
Total PCBs (7 congeners)	2815	N	mg/kg	[A] < 0.0010	1	--	--
TPH Total WAC	2670	U	mg/kg	[A] < 10	500	--	--
Total Of 17 PAH's	2800	N	mg/kg	[A] < 0.20	100	--	--
pH	2010	U		8.9	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.0060	--	To evaluate	To evaluate
Eluate Analysis			**10:1 Eluate mg/l**	**10:1 Eluate mg/kg**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1455	U	< 0.0002	< 0.0002	0.5	2	25
Barium	1455	U	< 0.005	< 0.0005	20	100	300
Cadmium	1455	U	< 0.00011	< 0.00011	0.04	1	5
Chromium	1455	U	0.0005	0.0052	0.5	10	70
Copper	1455	U	0.0007	0.0073	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.010	0.10	0.5	10	30
Nickel	1455	U	< 0.0005	< 0.0005	0.4	10	40
Lead	1455	U	< 0.0005	< 0.0005	0.5	10	50
Antimony	1455	U	< 0.0005	< 0.0005	0.06	0.7	5
Selenium	1455	U	< 0.0005	< 0.0005	0.1	0.5	7
Zinc	1455	U	< 0.003	< 0.003	4	50	200
Chloride	1220	U	< 1.0	< 10	800	15000	25000
Fluoride	1220	U	0.25	2.5	10	150	500
Sulphate	1220	U	< 1.0	< 10	1000	20000	50000
Total Dissolved Solids	1020	N	59	580	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	2.6	< 50	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	11

Waste Acceptance Criteria

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

Results - Single Stage WAC

Project: 24013 Fortfield Rd Terenure (Punch)

					Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	22-16335						
Chemtest Sample ID:	1421624						
Sample Ref:	AA163096						
Sample ID:							
Sample Location:	TP01						
Top Depth(m):	0.70						
Bottom Depth(m):							
Sampling Date:							
Determinand	**SOP**	**Accred.**	**Units**		**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Total Organic Carbon	2625	U	%	[A] 0.85	3	5	6
Loss On Ignition	2610	U	%	3.8	--	--	10
Total BTEX	2760	U	mg/kg	[A] < 0.010	6	--	--
Total PCBs (7 congeners)	2815	N	mg/kg	[A] < 0.0010	1	--	--
TPH Total WAC	2670	U	mg/kg	[A] < 10	500	--	--
Total Of 17 PAH's	2800	N	mg/kg	[A] < 0.20	100	--	--
pH	2010	U		8.6	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.0080	--	To evaluate	To evaluate
Eluate Analysis			**10:1 Eluate mg/l**	**10:1 Eluate mg/kg**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1455	U	< 0.0002	< 0.0002	0.5	2	25
Barium	1455	U	< 0.005	< 0.0005	20	100	300
Cadmium	1455	U	< 0.00011	< 0.00011	0.04	1	5
Chromium	1455	U	0.0005	0.0053	0.5	10	70
Copper	1455	U	0.0011	0.012	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.0023	0.023	0.5	10	30
Nickel	1455	U	0.0005	0.0054	0.4	10	40
Lead	1455	U	< 0.0005	< 0.0005	0.5	10	50
Antimony	1455	U	< 0.0005	< 0.0005	0.06	0.7	5
Selenium	1455	U	< 0.0005	< 0.0005	0.1	0.5	7
Zinc	1455	U	< 0.003	< 0.003	4	50	200
Chloride	1220	U	< 1.0	< 10	800	15000	25000
Fluoride	1220	U	0.58	5.8	10	150	500
Sulphate	1220	U	< 1.0	< 10	1000	20000	50000
Total Dissolved Solids	1020	N	72	710	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	4.6	< 50	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	19

Waste Acceptance Criteria

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

Results - Single Stage WAC

Project: 24013 Fortfield Rd Terenure (Punch)

					Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	22-16335						
Chemtest Sample ID:	1421625						
Sample Ref:	AA163099						
Sample ID:							
Sample Location:	TP02						
Top Depth(m):	1.0						
Bottom Depth(m):							
Sampling Date:							
Determinand	**SOP**	**Accred.**	**Units**		**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Total Organic Carbon	2625	U	%	[A] 0.44	3	5	6
Loss On Ignition	2610	U	%	2.7	--	--	10
Total BTEX	2760	U	mg/kg	[A] < 0.010	6	--	--
Total PCBs (7 congeners)	2815	N	mg/kg	[A] < 0.0010	1	--	--
TPH Total WAC	2670	U	mg/kg	[A] < 10	500	--	--
Total Of 17 PAH's	2800	N	mg/kg	[A] < 0.20	100	--	--
pH	2010	U		9.0	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.010	--	To evaluate	To evaluate
Eluate Analysis			**10:1 Eluate mg/l**	**10:1 Eluate mg/kg**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1455	U	< 0.0002	< 0.0002	0.5	2	25
Barium	1455	U	< 0.005	< 0.0005	20	100	300
Cadmium	1455	U	< 0.00011	< 0.00011	0.04	1	5
Chromium	1455	U	0.0006	0.0057	0.5	10	70
Copper	1455	U	0.0008	0.0082	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.0052	0.052	0.5	10	30
Nickel	1455	U	< 0.0005	< 0.0005	0.4	10	40
Lead	1455	U	< 0.0005	< 0.0005	0.5	10	50
Antimony	1455	U	< 0.0005	< 0.0005	0.06	0.7	5
Selenium	1455	U	< 0.0005	< 0.0005	0.1	0.5	7
Zinc	1455	U	< 0.003	< 0.003	4	50	200
Chloride	1220	U	< 1.0	< 10	800	15000	25000
Fluoride	1220	U	0.35	3.5	10	150	500
Sulphate	1220	U	< 1.0	< 10	1000	20000	50000
Total Dissolved Solids	1020	N	59	580	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	3.8	< 50	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	12

Waste Acceptance Criteria

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

Results - Single Stage WAC

Project: 24013 Fortfield Rd Terenure (Punch)

					Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	22-16335						
Chemtest Sample ID:	1421626						
Sample Ref:	AA173103						
Sample ID:							
Sample Location:	TP03						
Top Depth(m):	0.80						
Bottom Depth(m):							
Sampling Date:							
Determinand	**SOP**	**Accred.**	**Units**		**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Total Organic Carbon	2625	U	%	[A] 0.54	3	5	6
Loss On Ignition	2610	U	%	3.3	--	--	10
Total BTEX	2760	U	mg/kg	[A] < 0.010	6	--	--
Total PCBs (7 congeners)	2815	N	mg/kg	[A] < 0.0010	1	--	--
TPH Total WAC	2670	U	mg/kg	[A] < 10	500	--	--
Total Of 17 PAH's	2800	N	mg/kg	[A] < 0.20	100	--	--
pH	2010	U		8.8	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.022	--	To evaluate	To evaluate
Eluate Analysis			**10:1 Eluate mg/l**	**10:1 Eluate mg/kg**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1455	U	< 0.0002	< 0.0002	0.5	2	25
Barium	1455	U	< 0.005	< 0.0005	20	100	300
Cadmium	1455	U	< 0.00011	< 0.00011	0.04	1	5
Chromium	1455	U	0.0006	0.0056	0.5	10	70
Copper	1455	U	0.0011	0.011	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.0064	0.064	0.5	10	30
Nickel	1455	U	< 0.0005	< 0.0005	0.4	10	40
Lead	1455	U	< 0.0005	< 0.0005	0.5	10	50
Antimony	1455	U	< 0.0005	< 0.0005	0.06	0.7	5
Selenium	1455	U	< 0.0005	< 0.0005	0.1	0.5	7
Zinc	1455	U	< 0.003	< 0.003	4	50	200
Chloride	1220	U	< 1.0	< 10	800	15000	25000
Fluoride	1220	U	0.36	3.6	10	150	500
Sulphate	1220	U	< 1.0	< 10	1000	20000	50000
Total Dissolved Solids	1020	N	65	650	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	6.0	60	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	13

Waste Acceptance Criteria

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

Results - Single Stage WAC

Project: 24013 Fortfield Rd Terenure (Punch)

					Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	22-16335						
Chemtest Sample ID:	1421627						
Sample Ref:	AA173106						
Sample ID:							
Sample Location:	TP04						
Top Depth(m):	0.50						
Bottom Depth(m):							
Sampling Date:							
Determinand	**SOP**	**Accred.**	**Units**		**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Total Organic Carbon	2625	U	%	[A] 0.74	3	5	6
Loss On Ignition	2610	U	%	3.1	--	--	10
Total BTEX	2760	U	mg/kg	[A] < 0.010	6	--	--
Total PCBs (7 congeners)	2815	N	mg/kg	[A] < 0.0010	1	--	--
TPH Total WAC	2670	U	mg/kg	[A] < 10	500	--	--
Total Of 17 PAH's	2800	N	mg/kg	[A] < 0.20	100	--	--
pH	2010	U		8.8	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.019	--	To evaluate	To evaluate
Eluate Analysis			**10:1 Eluate mg/l**	**10:1 Eluate mg/kg**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1455	U	0.0006	0.0064	0.5	2	25
Barium	1455	U	< 0.005	< 0.0005	20	100	300
Cadmium	1455	U	< 0.00011	< 0.00011	0.04	1	5
Chromium	1455	U	0.0009	0.0087	0.5	10	70
Copper	1455	U	0.0017	0.017	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.0026	0.026	0.5	10	30
Nickel	1455	U	0.0008	0.0085	0.4	10	40
Lead	1455	U	0.0005	0.0050	0.5	10	50
Antimony	1455	U	< 0.0005	< 0.0005	0.06	0.7	5
Selenium	1455	U	< 0.0005	< 0.0005	0.1	0.5	7
Zinc	1455	U	< 0.003	< 0.003	4	50	200
Chloride	1220	U	< 1.0	< 10	800	15000	25000
Fluoride	1220	U	0.47	4.7	10	150	500
Sulphate	1220	U	< 1.0	< 10	1000	20000	50000
Total Dissolved Solids	1020	N	78	780	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	5.2	52	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	13

Waste Acceptance Criteria

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

Deviations

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

Sample:	Sample Ref:	Sample ID:	Sample Location:	Sampled Date:	Deviation Code(s):	Containers Received:
1421621	AA175560		BH01		A	Amber Glass 250ml
1421621	AA175560		BH01		A	Plastic Tub 500g
1421622	AA175553		BH03		A	Amber Glass 250ml
1421622	AA175553		BH03		A	Plastic Tub 500g
1421623	AA175566		BH04		A	Amber Glass 250ml
1421623	AA175566		BH04		A	Plastic Tub 500g
1421624	AA163096		TP01		A	Amber Glass 250ml
1421624	AA163096		TP01		A	Plastic Tub 500g
1421625	AA163099		TP02		A	Amber Glass 250ml
1421625	AA163099		TP02		A	Plastic Tub 500g
1421626	AA173103		TP03		A	Amber Glass 250ml
1421626	AA173103		TP03		A	Plastic Tub 500g
1421627	AA173106		TP04		A	Amber Glass 250ml
1421627	AA173106		TP04		A	Plastic Tub 500g

Test Methods

SOP	Title	Parameters included	Method summary
1010	pH Value of Waters	pH	pH Meter
1020	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Conductivity Meter
1220	Anions, Alkalinity & Ammonium in Waters	Fluoride; Chloride; Nitrite; Nitrate; Total; Oxidisable Nitrogen (TON); Sulfate; Phosphate; Alkalinity; Ammonium	Automated colorimetric analysis using 'Aquakem 600' Discrete Analyser.
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
1800	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Waters 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	Pentane extraction / GCMS detection
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
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES
2180	Sulphur (Elemental) in Soils by HPLC	Sulphur	Dichloromethane extraction / HPLC with UV detection
2192	Asbestos	Asbestos	Polarised light microscopy / Gravimetry
2300	Cyanides & Thiocyanate in Soils	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Allkaline extraction followed by colorimetric determination using Automated Flow Injection Analyser.
2325	Sulphide in Soils	Sulphide	Steam distillation with sulphuric acid / analysis by 'Aquakem 600' Discrete Analyser, using N,N–dimethyl-p-phenylenediamine.
2430	Total Sulphate in soils	Total Sulphate	Acid digestion followed by determination of sulphate in extract by ICP-OES.
2490	Hexavalent Chromium in Soils	Chromium [VI]	Soil extracts are prepared by extracting dried and ground soil samples into boiling water. Chromium [VI] is determined by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazide.
2610	Loss on Ignition	loss on ignition (LOI)	Determination of the proportion by mass that is lost from a soil by ignition at 550°C.
2625	Total Organic Carbon in Soils	Total organic Carbon (TOC)	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2670	Total Petroleum Hydrocarbons (TPH) in Soils by GC-FID	TPH (C6–C40); optional carbon banding, e.g. 3-band – GRO, DRO & LRO*TPH C8–C40	Dichloromethane extraction / GC-FID

Test Methods

SOP	Title	Parameters included	Method summary
2680	TPH A/A Split	Aliphatics: >C5–C6, >C6–C8,>C8–C10, >C10–C12, >C12–C16, >C16–C21, >C21–C35, >C35– C44Aromatics: >C5–C7, >C7–C8, >C8– C10, >C10–C12, >C12–C16, >C16– C21, >C21– C35, >C35– C44	Dichloromethane extraction / GCxGC FID detection
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
2920	Phenols in Soils by HPLC	Phenolic compounds including Resorcinol, Phenol, Methylphenols, Dimethylphenols, 1-Naphthol and TrimethylphenolsNote: chlorophenols are excluded.	60:40 methanol/water mixture extraction, followed by HPLC determination using electrochemical detection.
640	Characterisation of Waste (Leaching C10)	Waste material including soil, sludges and granular waste	ComplianceTest for Leaching of Granular Waste Material and Sludge

Report Information

Key

U	UKAS accredited
M	MCERTS and UKAS accredited
N	Unaccredited
S	This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
SN	This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
T	This analysis has been subcontracted to an unaccredited laboratory
I/S	Insufficient Sample
U/S	Unsuitable Sample
N/E	not evaluated
<	"less than"
>	"greater than"
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.:	22-17076-1		
Initial Date of Issue:	18-May-2022		
Client	IGSL		
Client Address:	M7 Business Park Naas County Kildare Ireland		
Contact(s):	John Clancy		
Project	24013 Fortfield Road Terenure (Punch)		
Quotation No.:	Q20-19951	**Date Received:**	10-May-2022
Order No.:		**Date Instructed:**	10-May-2022
No. of Samples:	6		
Turnaround (Wkdays):	7	**Results Due:**	18-May-2022
Date Approved:	18-May-2022		

Approved By:

Details: Stuart Henderson, Technical Manager

Results - Leachate

Project: 24013 Fortfield Road Terenure (Punch)

Client: IGSL				**Chemtest Job No.:**		22-17076	22-17076
Quotation No.: Q20-19951				**Chemtest Sample ID.:**		1424873	1424874
				Client Sample ID.:		AA175571	AA171709
				Sample Location:		BH05	BH06
				Sample Type:		SOIL	SOIL
				Top Depth (m):		2.0	1.0
Determinand	**Accred.**	**SOP**	**Type**	**Units**	**LOD**		
pH	U	1010	10:1		N/A	8.4	8.7
Ammonium	U	1220	10:1	mg/l	0.050	0.18	0.59
Ammonium	N	1220	10:1	mg/kg	0.10	2.1	7.5
Boron (Dissolved)	U	1455	10:1	mg/kg	0.01	< 0.01	< 0.01
Benzo[j]fluoranthene	N	1800	10:1	µg/l	0.010	< 0.010	< 0.010

Results - Soil

Project: 24013 Fortfield Road Terenure (Punch)

Client: IGSL				**Chemtest Job No.:**	22-17076	22-17076	22-17076	22-17076	22-17076	22-17076
Quotation No.: Q20-19951				**Chemtest Sample ID.:**	1424870	1424871	1424872	1424873	1424874	1424875
				Client Sample ID.:	AA175561	AA175554	AA175567	AA175571	AA171709	AA171710
				Sample Location:	BH01	BH03	BH04	BH05	BH06	BH06
				Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
				Top Depth (m):	2.0	2.0	3.0	2.0	1.0	2.0
				Asbestos Lab:				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	
Moisture	N	2030	%	0.020	11	11	13	11	16	9.7
pH (2.5:1)	N	2010		4.0	[A] 8.8	[A] 9.4	[A] 9.0			[A] 9.2
Boron (Hot Water Soluble)	U	2120	mg/kg	0.40				[A] < 0.40	[A] < 0.40	
Magnesium (Water Soluble)	N	2120	g/l	0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010			[A] < 0.010
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010	[A] 0.012	[A] 0.047	[A] 0.022			[A] 0.013
Total Sulphur	U	2175	%	0.010	[A] 0.025	[A] 0.023	[A] 0.046			[A] 0.026
Sulphur (Elemental)	U	2180	mg/kg	1.0				[A] < 1.0	[A] < 1.0	
Chloride (Water Soluble)	U	2220	g/l	0.010	[A] < 0.010	[A] < 0.010	[A] 0.014			[A] 0.023
Nitrate (Water Soluble)	N	2220	g/l	0.010	< 0.010	< 0.010	< 0.010			< 0.010
Cyanide (Total)	U	2300	mg/kg	0.50				[A] < 0.50	[A] < 0.50	
Sulphide (Easily Liberatable)	N	2325	mg/kg	0.50				[A] 18	[A] 24	
Ammonium (Water Soluble)	U	2220	g/l	0.01	< 0.01	< 0.01	< 0.01			< 0.01
Sulphate (Acid Soluble)	U	2430	%	0.010	[A] < 0.010	[A] 0.014	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010
Arsenic	U	2455	mg/kg	0.5				1.4	1.7	
Barium	U	2455	mg/kg	0				8	12	
Cadmium	U	2455	mg/kg	0.10				0.21	0.27	
Chromium	U	2455	mg/kg	0.5				1.9	1.9	
Molybdenum	U	2455	mg/kg	0.5				< 0.5	< 0.5	
Antimony	N	2455	mg/kg	2.0				< 2.0	< 2.0	
Copper	U	2455	mg/kg	0.50				3.2	3.4	
Mercury	U	2455	mg/kg	0.05				< 0.05	< 0.05	
Nickel	U	2455	mg/kg	0.50				4.2	5.5	
Lead	U	2455	mg/kg	0.50				2.9	2.3	
Selenium	U	2455	mg/kg	0.25				0.25	< 0.25	
Zinc	U	2455	mg/kg	0.50				11	9.1	
Chromium (Trivalent)	N	2490	mg/kg	1.0				1.9	1.9	
Chromium (Hexavalent)	N	2490	mg/kg	0.50				< 0.50	< 0.50	
Mineral Oil (TPH Calculation)	N	2670	mg/kg	10				< 10	< 10	
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0				[A] < 1.0	[A] < 1.0	
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0				[A] < 1.0	[A] < 1.0	
Aliphatic TPH >C8-C10	U	2680	mg/kg	1.0				[A] < 1.0	[A] < 1.0	
Aliphatic TPH >C10-C12	U	2680	mg/kg	1.0				[A] < 1.0	[A] < 1.0	
Aliphatic TPH >C12-C16	U	2680	mg/kg	1.0				[A] < 1.0	[A] < 1.0	
Aliphatic TPH >C16-C21	U	2680	mg/kg	1.0				[A] < 1.0	[A] < 1.0	
Aliphatic TPH >C21-C35	U	2680	mg/kg	1.0				[A] < 1.0	[A] < 1.0	
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0				[A] < 1.0	[A] < 1.0	

Results - Soil

Project: 24013 Fortfield Road Terenure (Punch)

Client: IGSL				**Chemtest Job No.:**	22-17076	22-17076	22-17076	22-17076	22-17076	22-17076
Quotation No.: Q20-19951				**Chemtest Sample ID.:**	1424870	1424871	1424872	1424873	1424874	1424875
				Client Sample ID.:	AA175561	AA175554	AA175567	AA175571	AA171709	AA171710
				Sample Location:	BH01	BH03	BH04	BH05	BH06	BH06
				Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
				Top Depth (m):	2.0	2.0	3.0	2.0	1.0	2.0
				Asbestos Lab:				DURHAM	DURHAM	
Determinand	**Accred.**	**SOP**	**Units**	**LOD**						
Total Aliphatic Hydrocarbons	N	2680	mg/kg	5.0				[A] < 5.0	[A] < 5.0	
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0				[A] < 1.0	[A] < 1.0	
Aromatic TPH >C7-C8	N	2680	mg/kg	1.0				[A] < 1.0	[A] < 1.0	
Aromatic TPH >C8-C10	U	2680	mg/kg	1.0				[A] < 1.0	[A] < 1.0	
Aromatic TPH >C10-C12	U	2680	mg/kg	1.0				[A] < 1.0	[A] < 1.0	
Aromatic TPH >C12-C16	U	2680	mg/kg	1.0				[A] < 1.0	[A] < 1.0	
Aromatic TPH >C16-C21	U	2680	mg/kg	1.0				[A] < 1.0	[A] < 1.0	
Aromatic TPH >C21-C35	U	2680	mg/kg	1.0				[A] < 1.0	[A] < 1.0	
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0				[A] < 1.0	[A] < 1.0	
Total Aromatic Hydrocarbons	N	2680	mg/kg	5.0				[A] < 5.0	[A] < 5.0	
Total Petroleum Hydrocarbons	N	2680	mg/kg	10.0				[A] < 10	[A] < 10	
Benzene	U	2760	µg/kg	1.0				[A] < 1.0	[A] < 1.0	
Toluene	U	2760	µg/kg	1.0				[A] < 1.0	[A] < 1.0	
Ethylbenzene	U	2760	µg/kg	1.0				[A] < 1.0	[A] < 1.0	
m & p-Xylene	U	2760	µg/kg	1.0				[A] < 1.0	[A] < 1.0	
o-Xylene	U	2760	µg/kg	1.0				[A] < 1.0	[A] < 1.0	
Methyl Tert-Butyl Ether	U	2760	µg/kg	1.0				[A] < 1.0	[A] < 1.0	
Naphthalene	N	2800	mg/kg	0.010				[A] < 0.010	[A] < 0.010	
Acenaphthylene	N	2800	mg/kg	0.010				[A] < 0.010	[A] < 0.010	
Acenaphthene	N	2800	mg/kg	0.010				[A] < 0.010	[A] < 0.010	
Fluorene	N	2800	mg/kg	0.010				[A] < 0.010	[A] < 0.010	
Phenanthrene	N	2800	mg/kg	0.010				[A] < 0.010	[A] < 0.010	
Anthracene	N	2800	mg/kg	0.010				[A] < 0.010	[A] < 0.010	
Fluoranthene	N	2800	mg/kg	0.010				[A] < 0.010	[A] < 0.010	
Pyrene	N	2800	mg/kg	0.010				[A] < 0.010	[A] < 0.010	
Benzo[a]anthracene	N	2800	mg/kg	0.010				[A] < 0.010	[A] < 0.010	
Chrysene	N	2800	mg/kg	0.010				[A] < 0.010	[A] < 0.010	
Benzo[b]fluoranthene	N	2800	mg/kg	0.010				[A] < 0.010	[A] < 0.010	
Benzo[k]fluoranthene	N	2800	mg/kg	0.010				[A] < 0.010	[A] < 0.010	
Benzo[a]pyrene	N	2800	mg/kg	0.010				[A] < 0.010	[A] < 0.010	
Indeno(1,2,3-c,d)Pyrene	N	2800	mg/kg	0.010				[A] < 0.010	[A] < 0.010	
Dibenz(a,h)Anthracene	N	2800	mg/kg	0.010				[A] < 0.010	[A] < 0.010	
Benzo[g,h,i]perylene	N	2800	mg/kg	0.010				[A] < 0.010	[A] < 0.010	
Coronene	N	2800	mg/kg	0.010				[A] < 0.010	[A] < 0.010	
Total Of 17 PAH's	N	2800	mg/kg	0.20				[A] < 0.20	[A] < 0.20	
PCB 28	N	2815	mg/kg	0.0010				[A] < 0.0010	[A] < 0.0010	
PCB 52	N	2815	mg/kg	0.0010				[A] < 0.0010	[A] < 0.0010	
PCB 90+101	N	2815	mg/kg	0.0010				[A] < 0.0010	[A] < 0.0010	
PCB 118	N	2815	mg/kg	0.0010				[A] < 0.0010	[A] < 0.0010	

Results - Soil

Project: 24013 Fortfield Road Terenure (Punch)

Client: IGSL			**Chemtest Job No.:**		22-17076	22-17076	22-17076	22-17076	22-17076	22-17076
Quotation No.: Q20-19951			**Chemtest Sample ID.:**		1424870	1424871	1424872	1424873	1424874	1424875
			Client Sample ID.:		AA175561	AA175554	AA175567	AA175571	AA171709	AA171710
			Sample Location:		BH01	BH03	BH04	BH05	BH06	BH06
			Sample Type:		SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
			Top Depth (m):		2.0	2.0	3.0	2.0	1.0	2.0
			Asbestos Lab:					DURHAM	DURHAM	
Determinand	**Accred.**	**SOP**	**Units**	**LOD**						
PCB 153	N	2815	mg/kg	0.0010				[A] < 0.0010	[A] < 0.0010	
PCB 138	N	2815	mg/kg	0.0010				[A] < 0.0010	[A] < 0.0010	
PCB 180	N	2815	mg/kg	0.0010				[A] < 0.0010	[A] < 0.0010	
Total PCBs (7 congeners)	N	2815	mg/kg	0.0010				[A] < 0.0010	[A] < 0.0010	
Total Phenols	U	2920	mg/kg	0.10				< 0.10	< 0.10	

Results - Single Stage WAC

Project: 24013 Fortfield Road Terenure (Punch)

					Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	22-17076						
Chemtest Sample ID:	1424873						
Sample Ref:							
Sample ID:	AA175571						
Sample Location:	BH05						
Top Depth(m):	2.0						
Bottom Depth(m):							
Sampling Date:							
Determinand	**SOP**	**Accred.**	**Units**		**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Total Organic Carbon	2625	U	%	[A] 0.33	3	5	6
Loss On Ignition	2610	U	%	5.6	--	--	10
Total BTEX	2760	U	mg/kg	[A] < 0.010	6	--	--
Total PCBs (7 congeners)	2815	N	mg/kg	[A] < 0.0010	1	--	--
TPH Total WAC	2670	U	mg/kg	[A] < 10	500	--	--
Total Of 17 PAH's	2800	N	mg/kg	[A] < 0.20	100	--	--
pH	2010	U		8.8	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.0070	--	To evaluate	To evaluate
Eluate Analysis			**10:1 Eluate mg/l**	**10:1 Eluate mg/kg**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1455	U	< 0.0002	< 0.0002	0.5	2	25
Barium	1455	U	< 0.005	< 0.0005	20	100	300
Cadmium	1455	U	< 0.00011	< 0.00011	0.04	1	5
Chromium	1455	U	0.0012	0.013	0.5	10	70
Copper	1455	U	0.0010	0.0095	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.0079	0.079	0.5	10	30
Nickel	1455	U	< 0.0005	< 0.0005	0.4	10	40
Lead	1455	U	< 0.0005	< 0.0005	0.5	10	50
Antimony	1455	U	< 0.0005	< 0.0005	0.06	0.7	5
Selenium	1455	U	< 0.0005	< 0.0005	0.1	0.5	7
Zinc	1455	U	0.004	0.036	4	50	200
Chloride	1220	U	< 1.0	< 10	800	15000	25000
Fluoride	1220	U	0.24	2.4	10	150	500
Sulphate	1220	U	< 1.0	< 10	1000	20000	50000
Total Dissolved Solids	1020	N	59	580	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	9.9	99	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	11

Waste Acceptance Criteria

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

Results - Single Stage WAC

Project: 24013 Fortfield Road Terenure (Punch)

					Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	22-17076						
Chemtest Sample ID:	1424874						
Sample Ref:							
Sample ID:	AA171709						
Sample Location:	BH06						
Top Depth(m):	1.0						
Bottom Depth(m):							
Sampling Date:							
Determinand	**SOP**	**Accred.**	**Units**		**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Total Organic Carbon	2625	U	%	[A] 0.42	3	5	6
Loss On Ignition	2610	U	%	2.9	--	--	10
Total BTEX	2760	U	mg/kg	[A] < 0.010	6	--	--
Total PCBs (7 congeners)	2815	N	mg/kg	[A] < 0.0010	1	--	--
TPH Total WAC	2670	U	mg/kg	[A] < 10	500	--	--
Total Of 17 PAH's	2800	N	mg/kg	[A] < 0.20	100	--	--
pH	2010	U		8.6	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.015	--	To evaluate	To evaluate
Eluate Analysis			**10:1 Eluate mg/l**	**10:1 Eluate mg/kg**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1455	U	< 0.0002	< 0.0002	0.5	2	25
Barium	1455	U	< 0.005	< 0.0005	20	100	300
Cadmium	1455	U	< 0.00011	< 0.00011	0.04	1	5
Chromium	1455	U	0.0007	0.0069	0.5	10	70
Copper	1455	U	0.0011	0.011	2	50	100
Mercury	1455	U	< 0.00005	< 0.00005	0.01	0.2	2
Molybdenum	1455	U	0.0077	0.077	0.5	10	30
Nickel	1455	U	< 0.0005	< 0.0005	0.4	10	40
Lead	1455	U	< 0.0005	< 0.0005	0.5	10	50
Antimony	1455	U	< 0.0005	< 0.0005	0.06	0.7	5
Selenium	1455	U	< 0.0005	< 0.0005	0.1	0.5	7
Zinc	1455	U	< 0.003	< 0.003	4	50	200
Chloride	1220	U	< 1.0	< 10	800	15000	25000
Fluoride	1220	U	0.41	4.1	10	150	500
Sulphate	1220	U	< 1.0	< 10	1000	20000	50000
Total Dissolved Solids	1020	N	59	580	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	6.5	65	500	800	1000

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

Waste Acceptance Criteria

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

Deviations

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

Sample:	Sample Ref:	Sample ID:	Sample Location:	Sampled Date:	Deviation Code(s):	Containers Received:
1424870		AA175561	BH01		A	Amber Glass 250ml
1424870		AA175561	BH01		A	Plastic Tub 500g
1424871		AA175554	BH03		A	Amber Glass 250ml
1424871		AA175554	BH03		A	Plastic Tub 500g
1424872		AA175567	BH04		A	Amber Glass 250ml
1424872		AA175567	BH04		A	Plastic Tub 500g
1424873		AA175571	BH05		A	Amber Glass 250ml
1424873		AA175571	BH05		A	Plastic Tub 500g
1424874		AA171709	BH06		A	Amber Glass 250ml
1424874		AA171709	BH06		A	Plastic Tub 500g
1424875		AA171710	BH06		A	Amber Glass 250ml
1424875		AA171710	BH06		A	Plastic Tub 500g

Test Methods

SOP	Title	Parameters included	Method summary
1010	pH Value of Waters	pH	pH Meter
1020	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Conductivity Meter
1220	Anions, Alkalinity & Ammonium in Waters	Fluoride; Chloride; Nitrite; Nitrate; Total; Oxidisable Nitrogen (TON); Sulfate; Phosphate; Alkalinity; Ammonium	Automated colorimetric analysis using 'Aquakem 600' Discrete Analyser.
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
1800	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Waters 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	Pentane extraction / GCMS detection
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
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES
2175	Total Sulphur in Soils	Total Sulphur	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2180	Sulphur (Elemental) in Soils by HPLC	Sulphur	Dichloromethane extraction / HPLC with UV detection
2192	Asbestos	Asbestos	Polarised light microscopy / Gravimetry
2220	Water soluble Chloride in Soils	Chloride	Aqueous extraction and measurememrnt by 'Aquakem 600' Discrete Analyser using ferric nitrate / mercuric thiocyanate.
2300	Cyanides & Thiocyanate in Soils	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Allkaline extraction followed by colorimetric determination using Automated Flow Injection Analyser.
2325	Sulphide in Soils	Sulphide	Steam distillation with sulphuric acid / analysis by 'Aquakem 600' Discrete Analyser, using N,N–dimethyl-p-phenylenediamine.
2430	Total Sulphate in soils	Total Sulphate	Acid digestion followed by determination of sulphate in extract by ICP-OES.
2490	Hexavalent Chromium in Soils	Chromium [VI]	Soil extracts are prepared by extracting dried and ground soil samples into boiling water. Chromium [VI] is determined by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazide.
2610	Loss on Ignition	loss on ignition (LOI)	Determination of the proportion by mass that is lost from a soil by ignition at 550°C.
2625	Total Organic Carbon in Soils	Total organic Carbon (TOC)	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.

Test Methods

SOP	Title	Parameters included	Method summary
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
2680	TPH A/A Split	Aliphatics: >C5–C6, >C6–C8,>C8–C10, >C10–C12, >C12–C16, >C16–C21, >C21–C35, >C35– C44Aromatics: >C5–C7, >C7–C8, >C8– C10, >C10–C12, >C12–C16, >C16– C21, >C21– C35, >C35– C44	Dichloromethane extraction / GCxGC FID detection
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
2920	Phenols in Soils by HPLC	Phenolic compounds including Resorcinol, Phenol, Methylphenols, Dimethylphenols, 1-Naphthol and TrimethylphenolsNote: chlorophenols are excluded.	60:40 methanol/water mixture extraction, followed by HPLC determination using electrochemical detection.
640	Characterisation of Waste (Leaching C10)	Waste material including soil, sludges and granular waste	ComplianceTest for Leaching of Granular Waste Material and Sludge

Report Information

Key

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

Appendix 8 Site Plan

ExpertGPS

24013 Fortfield Road, Terenure

25 0 25 50 75 100 125 150 175 200 225 250 m

Scale: 1 : 1400.

MN

1°58'