

IGSL Limited

O'Flynn Group  
Arup

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**Liffey Park Technology Campus**

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Factual Ground Investigation Report

**Report No. 22150**

**February 2020**



# Report



M7 Business Park  
Naas  
Co. Kildare  
Ireland

T: +353 (45) 846176  
E: [info@igsl.ie](mailto:info@igsl.ie)  
W: [www.igsl.ie](http://www.igsl.ie)

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## 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 5930:2015 and BS 1377 (Parts 1 to 9) and the following European Norms:

- EN 1997-2 Eurocode 7: 2007 – Geotechnical Design – Part 2: Ground Investigation & Testing
- EN ISO 22475-1:2006 Geotechnical Investigation and Sampling – Sampling Methods & Groundwater Measurements
- EN ISO 14688-1:2018 Geotechnical Investigation and Testing – Identification and Classification of Soil, Part 1: Identification and Description
- EN ISO 14688-2:2018 Geotechnical Investigation and Testing – Identification and Classification of Soil, Part 2: Classification Principles
- EN ISO 14689-1:2018 Geotechnical Investigation and Testing - Identification & Classification of Rock, Part 1: Identification & Description

### Reporting

This report has been prepared for Arup and the information should not be used without prior written permission of either party. IGSL Ltd accepts no responsibility or liability for this document being used other than for the purposes for which it was intended. 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. Unless specifically stated, no account has been taken of possible subsidence due to mineral extraction, mining works or karstification below or close to the site.

### Boring Procedures

Unless otherwise stated, 'shell and auger' or cable percussive boring technique has been employed as defined by Section 6.3 of IS EN ISO 22475-1:2006. The boring operations, sampling and in-situ testing complies with the recommendations of IS EN 1997-2:2007 and BS 1377:1990 and EN ISO 22476-3:2005+A1:2011. The shell and auger boring technique allows for continuous sampling in clay and silt above the water table and sand and gravel below the water table (Table 2 of IS EN ISO 22475-1:2006).

It is highlighted that some disturbance and variations is unavoidable in particular ground (e.g. blowing sands, gravel / cobble dominant glacial deposits etc). Attention is drawn to this condition, whenever it is suspected. Where cobbles and boulders are recorded, no conclusion should be drawn concerning the size, presence, lithological nature, or numbers per unit volume of ground.

### Rotary Drilling Procedures

Rotary drilling methods are used to recover very heavily over-consolidated glacial till and bedrock samples in line with Section 3.5 of IS EN 1997-2:2007 and IS EN ISO 22475-1. Open hole drilling methods (odex or symmetrix) are utilized to advance the drillholes through granular dominant superficial deposits, with coring in hard ('cemented') fine grained or cohesive glacial deposits and bedrock.

### In-Situ Testing

Standard penetration tests are conducted by IGSL 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+A1:2011 and the Energy Ratio ( $E_r$ ) 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+A1:2011).

### Groundwater

The depth of entry of any influx of groundwater is recorded during the course of boring or drilling 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.

### Soil Sampling

Three categories of sampling methods are outlined in EN ISO 22475-1:2006. The categories are referenced A, B and C for any given ground conditions and are shown in Tables 1 and 2 of EN ISO 22475-1:2006. Reference should be made to EN 1997-2:2007 for guidelines on sample class and quality for strength and compressibility testing. Samples of quality classes 1 or 2 can only be obtained by using Category A sampling methods.

Where appropriate Class 1 thin wall undisturbed tube samples (UT100) are obtained in fine grained soils and strictly meet the requirements of EN 1997-2:2007 and EN ISO 22475-1:2006. Soil samples for laboratory tests are divided into five classes with respect to the soil properties that are assumed to remain unchanged during sampling, handling transport and storage. The minimum sample quality required for testing purposes to Eurocode 7 compatibility (EN 1997-2:2007) is shown in Table A.

**Table A – Details of Sample Quality Requirements**

EN 1997 Clause	Test	Minimum Sample Quality Class
5.5.3	Water Content	3
5.5.4	Bulk Density	2
5.5.5	Particle Density	N/S
5.5.6	Particle Size Analysis	N/S
5.5.7	Consistency Limits	4
5.5.8	Density Index	N/S
5.5.9	Soil Dispersivity	N/S
5.5.10	Frost Susceptibility	N/S
5.6.2	Organic Content	4
5.6.3	Carbonate Content	3
5.6.4	Sulphate Content	3
5.6.5	pH	3
5.6.6	Chloride Content	3
5.7	Strength Index	1
5.8	Strength Tests	1
5.9	Compressibility Tests	1
5.10	Compaction Tests	N/S
5.11	Permeability	2

N/S – not stated. Presume a representative sample of appropriate size.

Samples recovered from trial pits or trenches meet the requirements of IS EN ISO 22475-1. It is highlighted that unforeseen circumstances such as variations in geological strata may lead to lower quality sample classes being obtained.

### Engineering Logging

Soil and rock identification is based on the examination of the samples recovered and conforms with IS EN ISO 14688-1:2018 and IS EN ISO 14689-1:2018. Rock weathering classification conforms to IS EN ISO 14689-1:2018 while discontinuities (bedding planes, joints, cleavages, faults etc) are classified in accordance with 4.3.3 of IS EN ISO 14689-1:2018. Rock mechanical indices (TCR, SCR, RQD) are defined in accordance with IS EN ISO 22475-1:2006.

### Retention of Samples

After satisfactory completion of all the scheduled laboratory tests on any sample, the remaining material will be discarded. Unless a period of retention of samples is agreed, it is company policy to discard soil samples one month after submission of our final report.

## 1.0 Introduction and Objectives

It is proposed to construct a technology campus at Liffey Park, which is located approximately two kilometres south-west of Leixlip in Co. Kildare.

The site location is as shown on Figure 1 with the approximate site outline shown in red.

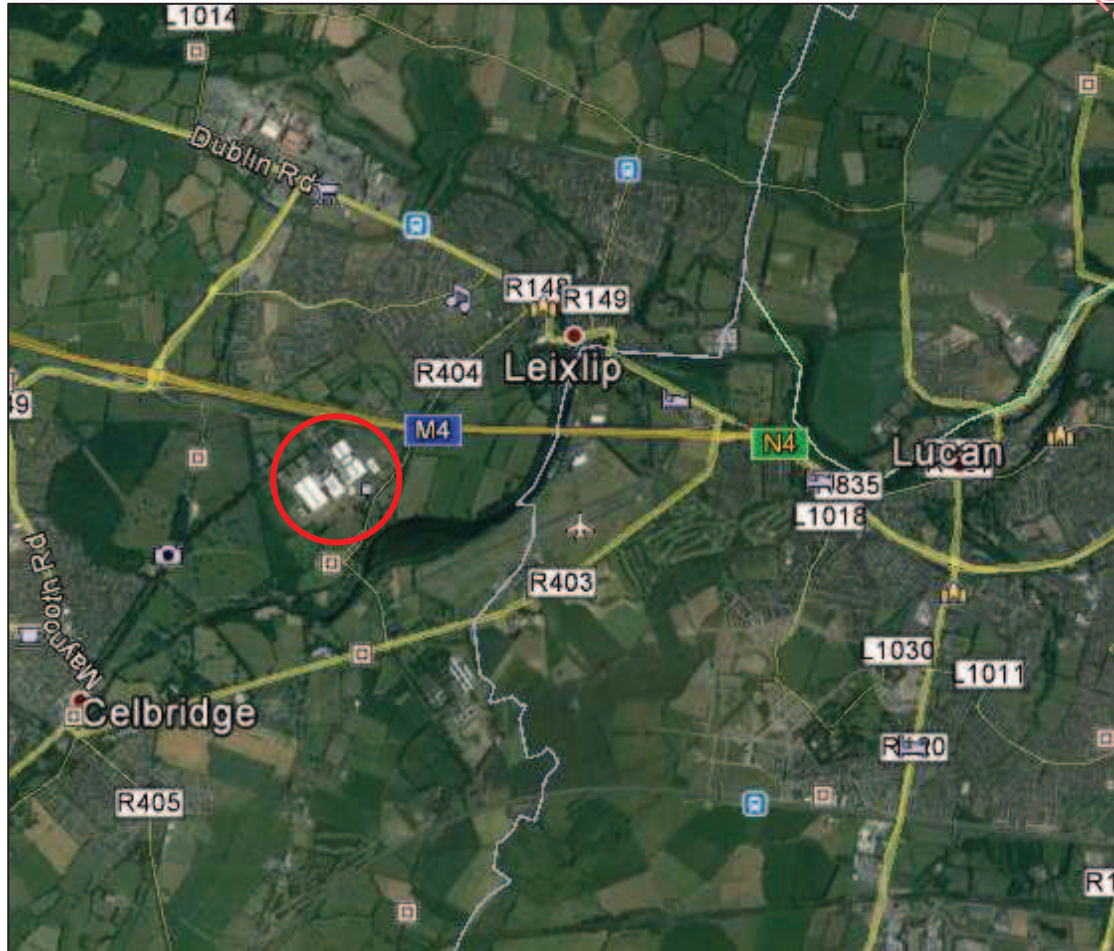


Figure 1 – Site Location (Base Mapping – Google Earth Professional)

IGSL Limited were appointed by Arup to conduct a ground investigation at the site. The objectives of the investigation were to ascertain the ground and groundwater conditions, and to produce a report which will assist in the geotechnical design of the new campus.

Fieldworks were undertaken during October to December 2019.

## 2.0 Scope of Works

The programme of exploratory works included the following:

- 7 no. cable percussive boreholes
- 4 no. rotary coreholes
- 15 no. mechanically excavated trial pits
- 4 no. infiltration tests
- 8 no. plate bearing tests
- 5 no. dynamic cone penetrometer (DCP) tests
- Groundwater monitoring at borehole locations
- A programme of geotechnical and chemical laboratory testing

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The exploratory hole locations are shown on the as-surveyed aerial plan in Appendix 11 of this report.

### 2.1 Cable Percussive Boreholes

Boreholes were constructed in seven locations (BH03, 05, 07, 08, 09, 10 and 11), using a Dando 2000 rig equipped with 200 mm casing.

A hand dug inspection pit was excavated at each location prior to commencing drilling works and the locations were scanned for services using a CAT detection tool.

During the course of boring, in-situ Standard Penetration Tests (SPT) were undertaken at regular intervals. Samples were also recovered to assist in the visual description of recovered soils and to provide specimens for laboratory testing.

Instances of groundwater ingress were recorded and monitored for a further 20 minutes to permit the water to rise.

The borehole records are presented in Appendix 1 of this report.

### 2.2 Rotary Coreholes

Geobor "S" rotary coring was undertaken in four locations (RC01, 04, 06 and 12) in order to recover high quality core samples of the overburden soils. Casing was installed to facilitate removal of the upper soils. Once installed, Geobor coring of overburden and the underlying bedrock was undertaken using a polymer gel flush to maximise recovery.

Cores of 102 mm diameter were recovered and placed securely in wooden storage boxes. The recovered core was inspected by a qualified engineering geologist and logged in detail at IGSL's laboratory. Records detailing the Total Core Recovery (TCR), Solid Core Recovery (SCR) and Rock Quality Designation (RQD) were produced. Core records also include a fracture log (spacing between successive core joints measured from the cores).



All cores were labelled and photographed for inclusion in the report. Photographs are presented digitally for ease of browsing and to permit close examination at high resolution.

Standpipes were installed in all coreholes to permit long term groundwater monitoring.

The corehole records and photographs are included in Appendix 2 of this report.

### **2.3 Trial Pits**

Trial pitting was performed at fifteen locations (TP01 to TP11 and TPSA01 to TPS04) using a wheeled JCB 8 tonne tracked excavator. The trial pits were logged and sampled by an IGSL geotechnical engineer in accordance with BS 5930 (1999+A2:2010).

Pit sidewalls were assessed in terms of their short term stability and any instances of groundwater ingress were recorded. Bulk soil samples were also recovered to provide specimens for laboratory testing.

The samples were placed in heavy duty polyethene bags and sealed before being transported to Naas for laboratory testing. For this project, environmental samples were obtained and placed in appropriate containers.

The trial pits were backfilled with the as-dug arisings and reinstated to the satisfaction of IGSL's site geotechnical engineer. The trial pit logs in Appendix 3 include descriptions of the soils encountered, groundwater conditions and stability of the pit sidewalls.

### **2.4 Infiltration Tests**

Infiltration tests were performed in four trial pits (TPSA01 to TPSA04) to assess the suitability of the sub-soils for the dispersion of run-off water through a soakaway system. Testing was 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. 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. Designs are based on the slowest infiltration rate, which is generally calculated from the final cycle.

The infiltration test records are included in Appendix 4.

### **2.5 Plate Bearing Tests**

Plate bearing tests were performed in eight trial pits to obtain an indication of the CBR value of the sub-soils. Each test is annotated with respect to the relevant pit (PT01, 03, PT04, PT05, PT06, PT07, PT09 and PT10). A 450 mm diameter plate was used, and tests were performed at depths of between 0.4 and 0.95 metres below existing ground level (m BGL).

Tests were performed in accordance with BS 1377 Part 9: 1990. "In-situ Tests". The incremental loading test (4.1.6.4.2) was used. The load was applied in five approximately equal increments. To measure recovery the load was removed in three increments. A second phase of loading and

unloading was performed to assess the benefits of further compaction. The settlement under each increment was measured against time until movement had effectively ceased and the results are presented as graphs of applied pressure against settlement.

Calculation of Modulus of Sub-grade Reaction (k) and CBR values are in accordance with NRA HD25-26/10 Volume7: Pavement Design and Maintenance.  $K_{762}$  is defined as the applied pressure divided by the displacement (1.25 mm) using a plate 762 mm in diameter. For other plate sizes, the Modulus of Sub-grade Reaction is determined using the appropriate conversion factor as shown on Figure 3.5 of HD25-26/1.

The plate bearing test records are presented in Appendix 5.

## 2.6 TRL Dynamic Cone Penetrometer

DCP testing was undertaken in five locations (PC01, 02, 03, 04A/B and PC05) in order to estimate the in-situ CBR values for the subgrade soils. Tests commenced on existing pavement construction (hardcore) at ground surface level.

The Dynamic Cone Penetrometer (DCP) apparatus was designed by TRL for the rapid in-situ measurement of the structural properties of existing road pavements. However, the apparatus is also widely used to obtain measurements of the CBR values of the sub-grade, particularly in granular soils which are too coarse for laboratory testing where the maximum particle size is limited to 20mm. The DCP-CBR relationship stipulated in TRRL Road Note 8 is based on publications by Kleyn and Van Heerden.

The results of each test are presented in terms of the DCP blow-count (mm/blow) against depth of penetration and the depth range for calculation purposes is generally related to a specific soil layer.

The DCP test records are included in Appendix 6. It is noted that the most onerous (weakest) depth range has generally been selected for the purpose of CBR calculation. However, alternative depth ranges can be selected and the equivalent CBR calculated using the equation provided on the record.

## 2.7 Groundwater Monitoring

Standpipes were installed in all coreholes in order to permit long term monitoring of groundwater levels. The site was re-visited post-fieldwork and readings taken of the groundwater levels in the standpipes. The standpipe installation details and groundwater monitoring results are presented in Appendix 7 and summarised on Table 1.

Location	Hole Depth (m BGL)	Top of Response Zone (m BGL)	Base of Response Zone (m BGL)	Groundwater Level (12/11/2019)	Groundwater Level (25/11/2019)
RC01	15.0	2.0	3.5	0.50	0.49
RC04	14.7	1.5	4.0	0.51	0.54
RC06	15.1	1.0	3.0	1.53	1.59
RC12	15.0	2.0	4.0	2.38	2.49

Table 1 – Summary of Groundwater Monitoring

## 2.8 As-Built Survey

On completion of fieldworks, the location (x,y) and elevation (z) of each exploratory location was determined by detailed survey using GPS Realtime Kinetic survey instrument.

The National Grid survey co-ordinates and ground levels related to Malin Head Datum are presented on the exploratory hole records and these were used to plot the as-built locations on the Site Plan in Appendix 11 of this report.

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### 3.0 Laboratory Testing

Laboratory test results are segregated and presented as follows:

- Appendix 8 – Geotechnical Laboratory Testing
- Appendix 9 – Rock Laboratory Testing
- Appendix 10 – Chemical and Environmental Testing

Geotechnical testing of soils comprised:

- Moisture Content
- Atterberg Limits (Plasticity Index)
- Particle Size Distribution (PSD)
- California Bearing Ratio (CBR)
- Moisture Condition Value (MCV)
- Dry Density / Moisture Content Relationship (Compaction Test)
- Triaxial Compression Test (Undrained Shear Strength)
- One dimensional Consolidation Test

Rock testing comprised:

- Moisture Content
- Atterberg Limits (Plasticity Index)
- Point Load Index
- Uniaxial Compression Test
- Sulphur / Sulphate Test Suite in accordance with EN 1744 (Nicholls Colton)

Chemical and environmental tests included:

- Sulphate and pH Analysis of soils (Chemtest Laboratory)
- Arup Test Suite A
- Arup Test Suite E

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#### 4.0 References

1. BS 5930:2015 Code of Practice for Site Investigations; British Standards Institute
2. Manual of Contract Documents for Highway Works, Volume 5, Section 3, Ground Investigation, Part 4: Specification
3. BRE Special Digest 1: 2005 – Concrete in aggressive ground
4. EN 1997-3; Eurocode 7: Geotechnical Design – Part 3: Design assisted by field testing; 1997
5. BS1377; British Standard Methods of Test for Soils for Civil Engineering Purposes; British Standards Institute; 1990.
6. BRE Digest 365, September 1991, British Research Establishment
7. Manual of Contract Documents for Road Works, Volume 1: Specification for Road Works (March 2007)
8. Manual of Soil Laboratory Testing, Volume 3; K.H. Head
9. ISRM – Suggested Methods for Determining Point Load Strength
10. ISRM – Suggested Methods for Determining the Uniaxial Compressive Strength and Deformability of Rock Materials
11. TRL Report 447- Sulfate specification for structural backfills
12. CIRIA C580
13. Specification for Roadworks Series 600 – Specification for Roadworks

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**Appendix 1**  
**Cable Percussive Boreholes**



# GEOTECHNICAL BORING RECORD

**REPORT NUMBER**

22150

<b>CONTRACT</b> Liffey Park Technology Campus				<b>BOREHOLE NO.</b> BH03	
<b>CO-ORDINATES</b> 698,560.26 E 734,688.40 N				<b>SHEET</b> Sheet 1 of 1	
<b>GROUND LEVEL (m AOD)</b> 54.24		<b>RIG TYPE</b> DANDO 2000		<b>DATE COMMENCED</b> 18/11/2019	
		<b>BOREHOLE DIAMETER (mm)</b>		<b>DATE COMPLETED</b> 18/11/2019	
		<b>BOREHOLE DEPTH (m)</b> 3.00			
<b>CLIENT ENGINEER</b> O' Flynn Group Arup			<b>SPT HAMMER REF. NO.</b>		<b>BORED BY</b> W.BUTLER
			<b>ENERGY RATIO (%)</b>		<b>PROCESSED BY</b> S.C

Depth (m)	Description	Legend	Elevation	Depth (m)	Samples				Field Test Results	Standpipe Details
					Ref. Number	Sample Type	Depth (m)	Recovery		
0	TOPSOIL		54.04	0.20						
	Soft brown sandy CLAY									
1	Soft grey/brown sandy SILT/CLAY with some fine gravel		53.04	1.20					N = 7 (2, 3, 3, 2, 1, 1)	
	Soft to firm dark brown gravelly CLAY		52.64	1.60						
2	Firm brown gravelly CLAY with some cobbles.		52.24	2.00					N = 7 (1, 0, 1, 1, 2, 3)	
	Stiff black sandy gravelly CLAY with some cobbles.		51.74	2.50						
3	Obstruction End of Borehole at 3.00 m		51.24	3.00					N = 60/150 mm (30, 40, 10, 50)	
4										
5										
6										

HARD STRATA BORING/CHISELLING				WATER STRIKE DETAILS					
From (m)	To (m)	Time (h)	Comments	Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
2.9	3	1							No water strike

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

<b>REMARKS</b> CAT scanned location and hand dug inspection pit carried out .	<b>Sample Legend</b> D - Small Disturbed (tub) B - Bulk Disturbed LB - Large Bulk Disturbed Env - Environmental Sample (Jar + Vial + Tub) UT - Undisturbed 100mm Diameter Sample P - Undisturbed Piston Sample W - Water Sample
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IGSL BH LOG 22150.GPJ IGSL.GDT 29/11/19



# GEOTECHNICAL BORING RECORD

**REPORT NUMBER**

**22150**

<b>CONTRACT</b> Liffey Park Technology Campus				<b>BOREHOLE NO.</b> BH05	
				<b>SHEET</b> Sheet 1 of 1	
<b>CO-ORDINATES</b> 699,017.14 E 734,408.45 N		<b>RIG TYPE</b> DANDO 2000		<b>DATE COMMENCED</b> 06/11/2019	
<b>GROUND LEVEL (m AOD)</b> 48.98		<b>BOREHOLE DIAMETER (mm)</b> 200		<b>DATE COMPLETED</b> 06/11/2019	
<b>CLIENT</b> O' Flynn Group		<b>SPT HAMMER REF. NO.</b>		<b>BORED BY</b> W.BUTLER	
<b>ENGINEER</b> Arup		<b>ENERGY RATIO (%)</b>		<b>PROCESSED BY</b> F.C	

Depth (m)	Description	Legend	Elevation	Depth (m)	Samples				Field Test Results	Standpipe Details
					Ref. Number	Sample Type	Depth (m)	Recovery		
0	TOPSOIL		48.78	0.20						
1	Soft to firm grey/brown sandy SILT/CLAY with some fine gravel				AA120053	B	1.00		N = 10 (2, 1, 2, 2, 3, 3)	
2	Very stiff brown gravelly CLAY with occasional cobbles		47.38	1.60						
2	Very stiff to hard black sandy gravelly CLAY with some cobbles		46.98	2.00	AA120054	B	2.00		N = 50/150 mm (4, 4, 16, 34)	
3	Obstruction End of Borehole at 2.90 m		46.08	2.90	AA120055	B	2.90		N = 50/75 mm (25, 50)	
4										
5										
6										

HARD STRATA BORING/CHISELLING				WATER STRIKE DETAILS					
From (m)	To (m)	Time (h)	Comments	Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
2.5	2.6	0.75							No water strike
2.8	2.9	2							

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

<b>REMARKS</b> CAT scanned location and hand dug inspection pit carried out .	<b>Sample Legend</b> 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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# GEOTECHNICAL BORING RECORD

**REPORT NUMBER**

**22150**

**CONTRACT** Liffey Park Technology Campus

**BOREHOLE NO.** BH07

**SHEET** Sheet 1 of 1

**CO-ORDINATES** 698,891.78 E  
734,856.93 N  
**GROUND LEVEL (m AOD)** 49.87

**RIG TYPE** DANDO 2000  
**BOREHOLE DIAMETER (mm)** 200  
**BOREHOLE DEPTH (m)** 1.70

**DATE COMMENCED** 11/11/2019  
**DATE COMPLETED** 11/11/2019

**CLIENT ENGINEER** O' Flynn Group  
Arup

**SPT HAMMER REF. NO.**  
**ENERGY RATIO (%)**

**BORED BY** W.BUTLER  
**PROCESSED BY** F.C

Depth (m)	Description	Legend	Elevation	Depth (m)	Samples				Field Test Results	Standpipe Details
					Ref. Number	Sample Type	Depth (m)	Recovery		
0	MADE GROUND consisting of reinforced CONCRETE MADE GROUND (Comprised of angular stone fill)		49.67	0.20						
1	Dense angular COBBLES and boulders		48.67	1.20	AA120062	B	1.00		N = 50/225 mm (13, 15, 19, 17, 14)	
	Obstruction End of Borehole at 1.70 m		48.17	1.70	AA120063	B	1.50			N = 50/75 mm (25, 50)
2										
3										
4										
5										
6										

HARD STRATA BORING/CHISELLING				WATER STRIKE DETAILS					
From (m)	To (m)	Time (h)	Comments	Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
1.3	1.4	0.5							No water strike
1.5	1.7	1.5							
INSTALLATION DETAILS				GROUNDWATER PROGRESS					
Date	Tip Depth	RZ Top	RZ Base	Type	Date	Hole Depth	Casing Depth	Depth to Water	Comments

**REMARKS** CAT scanned location and hand dug inspection pit carried out .

**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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# GEOTECHNICAL BORING RECORD

**REPORT NUMBER**

**22150**

**CONTRACT** Liffey Park Technology Campus

**BOREHOLE NO.** BH08

**SHEET** Sheet 1 of 1

**CO-ORDINATES** 699,021.02 E  
734,847.88 N  
**GROUND LEVEL (m AOD)** 49.56

**RIG TYPE** DANDO 2000  
**BOREHOLE DIAMETER (mm)**  
**BOREHOLE DEPTH (m)** 3.90

**DATE COMMENCED** 13/11/2019  
**DATE COMPLETED** 13/11/2019

**CLIENT** O' Flynn Group  
**ENGINEER** Arup

**SPT HAMMER REF. NO.**  
**ENERGY RATIO (%)**

**BORED BY** W.BUTLER  
**PROCESSED BY** S.C

Depth (m)	Description	Legend	Elevation	Depth (m)	Samples				Field Test Results	Standpipe Details
					Ref. Number	Sample Type	Depth (m)	Recovery		
0	MADE GROUND consisting of reinforced CONCRETE MADE GROUND (Comprised of angular stone fill)		49.36	0.20						
1	Firm brown gravelly CLAY with some cobbles.		48.36	1.20	AA120067	B	0.50			
2	Stiff black sandy gravelly CLAY with some cobbles.		47.76	1.80	AA120068	B	1.00			
3					AA120069	B	2.00		N = 19 (2, 3, 4, 5, 4, 6)	
4	Obstruction End of Borehole at 3.90 m		45.66	3.90	AA120070	B	3.00		N = 34 (4, 10, 7, 3, 3, 21)	
5					AA120071	B	3.90		(39, 50)	
6										

HARD STRATA BORING/CHISELLING				WATER STRIKE DETAILS					
From (m)	To (m)	Time (h)	Comments	Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
3.9	3.9	1							No water strike
INSTALLATION DETAILS				GROUNDWATER PROGRESS					
Date	Tip Depth	RZ Top	RZ Base	Type	Date	Hole Depth	Casing Depth	Depth to Water	Comments

**REMARKS** CAT scanned location and hand dug inspection pit carried out .

**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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# GEOTECHNICAL BORING RECORD

**REPORT NUMBER**

**22150**

**CONTRACT** Liffey Park Technology Campus

**BOREHOLE NO.** BH09

**SHEET** Sheet 1 of 1

**CO-ORDINATES** 698,993.19 E  
734,894.47 N  
**GROUND LEVEL (m AOD)** 48.37

**RIG TYPE** DANDO 2000  
**BOREHOLE DIAMETER (mm)** 200  
**BOREHOLE DEPTH (m)** 3.10

**DATE COMMENCED** 12/11/2019  
**DATE COMPLETED** 12/11/2019

**CLIENT ENGINEER** O' Flynn Group  
Arup

**SPT HAMMER REF. NO.**  
**ENERGY RATIO (%)**

**BORED BY** W.BUTLER  
**PROCESSED BY** F.C

Depth (m)	Description	Legend	Elevation	Depth (m)	Samples				Field Test Results	Standpipe Details
					Ref. Number	Sample Type	Depth (m)	Recovery		
0	MADE GROUND consisting of reinforced CONCRETE MADE GROUND (Comprised of angular stone fill)		48.17	0.20						
1	Very stiff black very sandy gravelly CLAY with occasional angular cobbles		47.17	1.20	AA120064	B	1.00		N = 41 (7, 8, 10, 10, 9, 12)	
2	Dense slightly clayey gravelly angular COBBLES		46.57	1.80	AA120065	B	2.00		N = 51 (10, 9, 9, 12, 15, 15)	
3	Obstruction End of Borehole at 3.10 m		45.27	3.10	AA120066	B	3.00		N = 70/150 mm (14, 14, 20, 50)	
4										
5										
6										

HARD STRATA BORING/CHISELLING				WATER STRIKE DETAILS					
From (m)	To (m)	Time (h)	Comments	Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
2.9	3.1	2							No water strike
INSTALLATION DETAILS				GROUNDWATER PROGRESS					
Date	Tip Depth	RZ Top	RZ Base	Type	Date	Hole Depth	Casing Depth	Depth to Water	Comments
					12-11-19	3.10	Nil	1.30	End of drilling

**REMARKS** CAT scanned location and hand dug inspection pit 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 22150.GPJ IGSL.GDT 29/11/19



# GEOTECHNICAL BORING RECORD

**REPORT NUMBER**

22150

**CONTRACT** Liffey Park Technology Campus

**BOREHOLE NO.** BH10

**SHEET** Sheet 1 of 1

**CO-ORDINATES** 698,953.96 E  
734,939.44 N  
**GROUND LEVEL (m AOD)** 48.36

**RIG TYPE** DANDO 2000  
**BOREHOLE DIAMETER (mm)**  
**BOREHOLE DEPTH (m)** 1.40

**DATE COMMENCED** 15/11/2019  
**DATE COMPLETED** 15/11/2019

**CLIENT ENGINEER** O' Flynn Group  
Arup

**SPT HAMMER REF. NO.**  
**ENERGY RATIO (%)**

**BORED BY** W.BUTLER  
**PROCESSED BY** S.C

Depth (m)	Description	Legend	Elevation	Depth (m)	Samples				Field Test Results	Standpipe Details
					Ref. Number	Sample Type	Depth (m)	Recovery		
0	MADE GROUND consisting of reinforced CONCRETE MADE GROUND (Comprised of angular stone fill)	[Cross-hatch pattern]	48.16	0.20						
					AA120072	B	0.50			
					AA120073	B	0.90			
1	Dense angular COBBLES and boulders	[Circle pattern]	47.16	1.20						
			46.96	1.40	AA120074	B	1.40		(30)	
	Obstruction End of Borehole at 1.40 m									
2										
3										
4										
5										
6										

HARD STRATA BORING/CHISELLING				WATER STRIKE DETAILS					
From (m)	To (m)	Time (h)	Comments	Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
1.4	1.4	1							No water strike
INSTALLATION DETAILS				GROUNDWATER PROGRESS					
Date	Tip Depth	RZ Top	RZ Base	Type	Date	Hole Depth	Casing Depth	Depth to Water	Comments

**REMARKS** CAT scanned location and hand dug inspection pit carried out .

**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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# GEOTECHNICAL BORING RECORD

**REPORT NUMBER**

22150

<b>CONTRACT</b> Liffey Park Technology Campus				<b>BOREHOLE NO.</b> BH11	
				<b>SHEET</b> Sheet 1 of 1	
<b>CO-ORDINATES</b> 699,080.79 E 735,011.84 N		<b>RIG TYPE</b> DANDO 2000		<b>DATE COMMENCED</b> 08/11/2019	
<b>GROUND LEVEL (m AOD)</b> 49.69		<b>BOREHOLE DIAMETER (mm)</b> 200		<b>DATE COMPLETED</b> 09/11/2019	
<b>CLIENT ENGINEER</b> O' Flynn Group Arup		<b>SPT HAMMER REF. NO.</b>		<b>BORED BY</b> W.BUTLER	
		<b>ENERGY RATIO (%)</b>		<b>PROCESSED BY</b> F.C	

Depth (m)	Description	Legend	Elevation	Depth (m)	Samples				Field Test Results	Standpipe Details
					Ref. Number	Sample Type	Depth (m)	Recovery		
0	TARMACADAM MADE GROUND (Comprised of angular stone fill)		49.59	0.10						
1	Stiff to very stiff grey sandy SILT/CLAY with occasional fine gravel		48.49	1.20	AA120059	B	1.00			
2	Hard dark brown/black gravelly CLAY with angular cobbles		47.69	2.00	AA120060	B	2.00		N = 28 (2, 5, 6, 7, 7, 8)	
3					AA120061	B	3.00		N = 50/150 mm (8, 9, 34, 16)	
4	Obstruction End of Borehole at 3.50 m		46.19	3.50						

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

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

<b>REMARKS</b> CAT scanned location and hand dug inspection pit carried out .	<b>Sample Legend</b> D - Small Disturbed (tub) B - Bulk Disturbed LB - Large Bulk Disturbed Env - Environmental Sample (Jar + Vial + Tub) UT - Undisturbed 100mm Diameter Sample P - Undisturbed Piston Sample W - Water Sample
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IGSL BH LOG 22150.GPJ IGSL.GDT 29/11/19

RECEIVED: 18/07/2023

**Appendix 2**  
**Rotary Corehole Records**



# GEOTECHNICAL CORE LOG RECORD

**REPORT NUMBER**

**22150**

**CONTRACT** Liffey Park Technology Campus

**DRILL HOLE NO** RC01

**SHEET** Sheet 1 of 2

**CO-ORDINATES** 698,543.13 E  
735,084.51 N

**GROUND LEVEL (mOD)** 55.97

**RIG TYPE** Knebel  
**FLUSH** Air/Mist

**DATE DRILLED** 23/10/2019

**DATE LOGGED** 24/10/2019

**CLIENT ENGINEER** Arup

**INCLINATION (deg)** -90  
**CORE DIAMETER (mm)** 102

**DRILLED BY** Petersen

**LOGGED BY** D.O'Shea

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing Log (mm)	Non-intact Zone	Legend	Description	Depth (m)	Elevation	Standpipe Details	SPT (N Value)
0								SYMMETRIX DRILLING: No recovery, observed by driller as returns of firm TOPSOIL	0.30	55.67		
1								SYMMETRIX DRILLING: No recovery, observed by driller as returns of stiff light brown silty gravelly CLAY	1.10	54.87		
2								SYMMETRIX DRILLING: No recovery, observed by driller as returns of stiff to very stiff dark greyish brown silty gravelly CLAY with occasional cobbles	2.00	53.97		
2.00								Stiff, brown slightly sandy gravelly CLAY with occasional cobbles. Sand is fine. Gravel is angular to subrounded, fine to coarse of various lithologies, predominately limestone. Cobbles are subrounded of limestone.	2.30	53.67		
2.60		100	27	9					Stiff, very dark brown slightly sandy gravelly CLAY with occasional cobbles. Sand is fine. Gravel is angular to subrounded, fine to coarse of various lithologies, predominately limestone. Cobbles are subrounded of limestone.	2.60	53.37	
3								Very strong to medium strong, thickly to thinly bedded (to thinly laminated where fissile mudstone/shale), grey/dark grey/black, fine-grained, LIMESTONE (argillaceous limestone grading regularly (every approx 0.10-1.10m) into calci-siltite limestone with subordinate MUDSTONE, local stylolites, pyrite present), slightly weathered where intact, moderately weathered at fissile mudstone/shale zones at (2.78-2.89m, 4.04-4.07m, 4.51-4.56m, 4.63-4.64m, 5.38-5.40m, 6.13-6.15m, 6.64-6.66m, 7.50-7.56m, 8.41-8.54m, 9.52-9.53m, 9.72-9.73m, 10.42-10.46m, 10.63-10.71m, 11.58-11.59m, 12.18-12.19m, 12.45-12.47m & 12.61-12.66m). Many incipient fractures throughout.				
4									Discontinuities are medium to closely spaced, smooth to locally rough, planar to locally curvilinear. Apertures are tight to locally open, locally clay/gravel-filled (at 3.10-3.25m), locally slightly iron-oxide stained, locally calcite-veined (1-15mm thick). Dips are 10°-20° & very locally 70°.			
5												
6												
7												
8												
9												

**REMARKS**

Hole cased 0.00-2.00m.

**WATER STRIKE DETAILS**

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

**GROUNDWATER DETAILS**

**INSTALLATION DETAILS**

Date	Tip Depth	RZ Top	RZ Base	Type
24-10-19	3.50	2.00	3.50	50mm SP

Date	Hole Depth	Casing Depth	Depth to Water	Comments

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# GEOTECHNICAL CORE LOG RECORD

**REPORT NUMBER**

22150

**CONTRACT** Liffey Park Technology Campus

**DRILL HOLE NO** RC01

**SHEET** Sheet 2 of 2

**CO-ORDINATES** 698,543.13 E  
735,084.51 N

**GROUND LEVEL (mOD)** 55.97

**RIG TYPE** Knebel  
**FLUSH** Air/Mist

**DATE DRILLED** 23/10/2019

**DATE LOGGED** 24/10/2019

**CLIENT ENGINEER** Arup

**INCLINATION (deg)** -90  
**CORE DIAMETER (mm)** 102

**DRILLED BY** Petersen

**LOGGED BY** D.O'Shea

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing Log (mm)	Non-intact Zone	Legend	Description	Depth (m)	Elevation	Standpipe Details	SPT (N Value)	
10								<p>Very strong to medium strong, thickly to thinly bedded (to thinly laminated where fissile mudstone/shale), grey/dark grey/black, fine-grained, LIMESTONE (argillaceous limestone grading regularly (every approx 0.10-1.10m) into calci-siltite limestone with subordinate MUDSTONE, local stylolites, pyrite present), slightly weathered where intact, moderately weathered at fissile mudstone/shale zones at (2.78-2.89m, 4.04-4.07m, 4.51-4.56m, 4.63-4.64m, 5.38-5.40m, 6.13-6.15m, 6.64-6.66m, 7.50-7.56m, 8.41-8.54m, 9.52-9.53m, 9.72-9.73m, 10.42-10.46m, 10.63-10.71m, 11.58-11.59m, 12.18-12.19m, 12.45-12.47m &amp; 12.61-12.66m). Many incipient fractures throughout.</p> <p>Discontinuities are medium to closely spaced, smooth to locally rough, planar to locally curvilinear. Apertures are tight to locally open, locally clay/gravel-filled (at 3.10-3.25m), locally slightly iron-oxide stained, locally calcite-veined (1-15mm thick). Dips are 10°-20° &amp; very locally 70°. <i>(continued)</i></p>					
10.50													
11		100	78	59									
12													
12.00													
13		100	89	64									
13.50													
14		100	88	69									
15.00									15.00	40.97			
End of Borehole at 15.00 m													

**REMARKS**  
Hole cased 0.00-2.00m.

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

INSTALLATION DETAILS				
Date	Tip Depth	RZ Top	RZ Base	Type
24-10-19	3.50	2.00	3.50	50mm SP

GROUNDWATER DETAILS				
Date	Hole Depth	Casing Depth	Depth to Water	Comments

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# GEOTECHNICAL CORE LOG RECORD

**REPORT NUMBER**

**22150**

**CONTRACT** Liffey Park Technology Campus

**DRILL HOLE NO** **RC04**

**SHEET** Sheet 1 of 2

**CO-ORDINATES** 698,706.07 E  
734,331.35 N

**GROUND LEVEL (mOD)** 52.58

**RIG TYPE** Knebel  
**FLUSH** Air/Mist

**DATE DRILLED** 25/10/2019

**DATE LOGGED** 25/10/2019

**CLIENT ENGINEER** Arup

**INCLINATION (deg)** -90  
**CORE DIAMETER (mm)** 102

**DRILLED BY** Petersen

**LOGGED BY** D.O'Shea

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing Log (mm)	Non-intact Zone	Legend	Description	Depth (m)	Elevation	Standpipe Details	SPT (N Value)
0					0 250 500			SYMMETRIX DRILLING: No recovery, observed by driller as returns of light brown gravelly CLAY with cobbles				
1.80									1.80	50.78		
2	100	0	0					SYMMETRIX DRILLING: No recovery, observed by driller as returns of stiff dark greyish brown silty gravelly CLAY with occasional cobbles	2.30	50.28		
2.90								Stiff, brown slightly sandy gravelly CLAY with occasional cobbles. Sand is fine. Gravel is angular to subrounded, fine to coarse of various lithologies, predominantly limestone. Cobbles are subrounded of limestone.	2.90	49.68		
3	81	29	18					Probable weathered ROCK horizon - recovered as angular gravel of limestone with gravelly clay				
4									4.00	48.58		
4.50								Very strong to medium strong, thickly to thinly bedded (to thinly laminated where fissile mudstone/shale), grey/dark grey/black, fine-grained, LIMESTONE (argillaceous limestone grading regularly (every approx 0.10-1.10m) into calci-siltite limestone with subordinate MUDSTONE, local stylolites, pyrite present), slightly weathered where intact, moderately weathered at fissile mudstone/shale zones at (5.76-5.82m, 7.33-7.36m, 7.46-7.50m, 8.78-8.84m, 9.47-9.49m, 9.82-9.85m, 11.62-11.64m, 13.35-13.39m, 13.62-13.64m & 13.74-13.76m). Many incipient fractures throughout.				
5	100	97	75									
6								Discontinuities are medium to closely spaced, smooth to locally rough, planar to locally curvilinear. Apertures are tight to locally open, locally clay-smearing, locally slightly iron-oxide stained, locally calcite-veined (1-40mm thick). Dips are 10°-20° & very locally 70°.				
6.00												
7	100	82	67									
7.50												
8	100	83	75									
9												
9.00	100	81	61									

**REMARKS**

Hole cased 0.00-1.80m.

**WATER STRIKE DETAILS**

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

**GROUNDWATER DETAILS**

**INSTALLATION DETAILS**

Date	Tip Depth	RZ Top	RZ Base	Type	Date	Hole Depth	Casing Depth	Depth to Water	Comments
29-10-19	4.00	1.50	4.00	50mm SP					

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# GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER

22150

**CONTRACT** Liffey Park Technology Campus

**DRILL HOLE NO** RC04

**SHEET** Sheet 2 of 2

**CO-ORDINATES** 698,706.07 E  
734,331.35 N

**GROUND LEVEL (mOD)** 52.58

**RIG TYPE** Knebel  
**FLUSH** Air/Mist

**DATE DRILLED** 25/10/2019

**DATE LOGGED** 25/10/2019

**CLIENT ENGINEER** Arup

**INCLINATION (deg)** -90  
**CORE DIAMETER (mm)** 102

**DRILLED BY** Petersen

**LOGGED BY** D.O'Shea

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing Log (mm)	Non-intact Zone	Legend	Description	Depth (m)	Elevation	Standpipe Details	SPT (N Value)
10	10.50							<p>Very strong to medium strong, thickly to thinly bedded (to thinly laminated where fissile mudstone/shale), grey/dark grey/black, fine-grained, LIMESTONE (argillaceous limestone grading regularly (every approx 0.10-1.10m) into calci-siltite limestone with subordinate MUDSTONE, local stylolites, pyrite present), slightly weathered where intact, moderately weathered at fissile mudstone/shale zones at (5.76-5.82m, 7.33-7.36m, 7.46-7.50m, 8.78-8.84m, 9.47-9.49m, 9.82-9.85m, 11.62-11.64m, 13.35-13.39m, 13.62-13.64m &amp; 13.74-13.76m). Many incipient fractures throughout.</p> <p>Discontinuities are medium to closely spaced, smooth to locally rough, planar to locally curvilinear. Apertures are tight to locally open, locally clay-smearred, locally slightly iron-oxide stained, locally calcite-veined (1-40mm thick). Dips are 10°-20° &amp; very locally 70°. (continued)</p>				
11		100	91	69								
12		100	97	83								
13	13.10											
14		100	70	44								
14.70								End of Borehole at 14.70 m	14.70	37.88		

**REMARKS**  
Hole cased 0.00-1.80m.

**WATER STRIKE DETAILS**

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

**GROUNDWATER DETAILS**

**INSTALLATION DETAILS**

Date	Hole Depth	Casing Depth	Depth to Water	Comments
29-10-19	4.00	1.50	4.00	50mm SP

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# GEOTECHNICAL CORE LOG RECORD

**REPORT NUMBER**

**22150**

**CONTRACT** Liffey Park Technology Campus

**DRILL HOLE NO** **RC06**

**SHEET** Sheet 1 of 2

**CO-ORDINATES** 698,833.74 E  
734,821.43 N

**GROUND LEVEL (mOD)** 50.68

**RIG TYPE** Knebel  
**FLUSH** Air/Mist

**DATE DRILLED** 30/10/2019

**DATE LOGGED** 30/10/2019

**CLIENT ENGINEER** Arup

**INCLINATION (deg)** -90  
**CORE DIAMETER (mm)** 102

**DRILLED BY** Petersen

**LOGGED BY** D.O'Shea

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing Log (mm)	Non-intact Zone	Legend	Description	Depth (m)	Elevation	Standpipe Details	SPT (N Value)
0								<p>SYMMETRIX DRILLING: No recovery, observed by driller as returns of MADE GROUND consisting of reinforced concrete</p> <p>SYMMETRIX DRILLING: No recovery, observed by driller as returns of MADE GROUND consisting of gravel (Clause 804 material)</p> <p>SYMMETRIX DRILLING: No recovery, observed by driller as returns of MADE GROUND consisting of clayey gravel Driller notes Terram Membrane at 1.10m</p> <p>SYMMETRIX DRILLING: No recovery, observed by driller as returns of stiff to very stiff dark greyish brown silty gravelly CLAY with occasional cobbles</p> <p>Stiff, very dark brown slightly sandy gravelly CLAY. Sand is fine. Gravel is angular to subrounded, fine to coarse of various lithologies, predominantly limestone.</p> <p>Very strong to medium strong, thickly to thinly bedded (to thinly laminated where fissile mudstone/shale), grey/dark grey/black, fine-grained, LIMESTONE (argillaceous limestone grading regularly (every approx 0.10-1.20m) into calci-siltite limestone with subordinate MUDSTONE, local stylolites, pyrite present), slightly weathered where intact, moderately weathered at fissile mudstone/shale zones at (3.25-3.26m, 5.07-5.09m, 6.26-6.31m, 7.47-7.64m, 8.18-8.46m, 9.08-9.09m, 12.69-12.73m &amp; 14.58-14.59m). Many incipient fractures throughout.</p> <p>Discontinuities are medium to closely spaced, smooth to locally rough, planar to locally curvilinear. Apertures are tight to locally open, locally clay-smearred, locally slightly iron-oxide stained, locally calcite-veined (1-40mm thick). Dips are 10°-20° &amp; very locally 70°.</p>	0.20	50.48		
									0.70	49.98		
1	1.20								1.10	49.58		
									1.80	48.88		
2		100	28	28					2.30	48.38		
3	3.00											
		100	51	35								
4	4.50											
5		100	62	62								
6	6.00											
		100	50	45								
7	7.30											
8		100	74	74								
9	8.90											
		100	100	100								

**REMARKS**

Hole cased 0.00-1.80m.

**WATER STRIKE DETAILS**

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

**GROUNDWATER DETAILS**

**INSTALLATION DETAILS**

Date	Tip Depth	RZ Top	RZ Base	Type
30-10-19	3.00	1.00	3.00	50mm SP

Date	Hole Depth	Casing Depth	Depth to Water	Comments

IGSL RC Fl 10M 22150.GPJ IGSL\_GDT 6/12/19



# GEOTECHNICAL CORE LOG RECORD

**REPORT NUMBER**

**22150**

<b>CONTRACT</b> Liffey Park Technology Campus		<b>DRILL HOLE NO</b> <b>RC06</b>
<b>CO-ORDINATES</b> 698,833.74 E 734,821.43 N		<b>SHEET</b> Sheet 2 of 2
<b>GROUND LEVEL (mOD)</b> 50.68	<b>RIG TYPE</b> Knebel	<b>DATE DRILLED</b> 30/10/2019
<b>CLIENT ENGINEER</b> Arup	<b>FLUSH</b> Air/Mist	<b>DATE LOGGED</b> 30/10/2019
	<b>INCLINATION (deg)</b> -90	<b>DRILLED BY</b> Petersen
	<b>CORE DIAMETER (mm)</b> 102	<b>LOGGED BY</b> D.O'Shea

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing Log (mm)	Non-intact Zone	Legend	Description	Depth (m)	Elevation	Standpipe Details	SPT (N Value)	
10	10.50							<p>Very strong to medium strong, thickly to thinly bedded (to thinly laminated where fissile mudstone/shale), grey/dark grey/black, fine-grained, LIMESTONE (argillaceous limestone grading regularly (every approx 0.10-1.20m) into calci-siltite limestone with subordinate MUDSTONE, local stylolites, pyrite present), slightly weathered where intact, moderately weathered at fissile mudstone/shale zones at (3.25-3.26m, 5.07-5.09m, 6.26-6.31m, 7.47-7.64m, 8.18-8.46m, 9.08-9.09m, 12.69-12.73m &amp; 14.58-14.59m). Many incipient fractures throughout.</p> <p>Discontinuities are medium to closely spaced, smooth to locally rough, planar to locally curvilinear. Apertures are tight to locally open, locally clay-smeared, locally slightly iron-oxide stained, locally calcite-veined (1-40mm thick). Dips are 10°-20° &amp; very locally 70°. <i>(continued)</i></p>					
11		100	73	68									
12	12.10												
13		100	95	94									
14	13.50												
15	15.10	100	87	78				End of Borehole at 15.10 m	15.10	35.58			
16													
17													
18													
19													

<b>REMARKS</b> Hole cased 0.00-1.80m.					<b>WATER STRIKE DETAILS</b>					
					Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
										No water strike recorded
<b>INSTALLATION DETAILS</b>					<b>GROUNDWATER DETAILS</b>					
					Date	Hole Depth	Casing Depth	Depth to Water	Comments	
30-10-19	3.00	1.00	3.00	50mm SP						

IGSL RC Fl 10M 22150.GPJ IGSL\_GDT 6/12/19

REPEATED 18/10/2023



# GEOTECHNICAL CORE LOG RECORD

**REPORT NUMBER**

**22150**

**CONTRACT** Liffey Park Technology Campus

**DRILL HOLE NO** RC12

**SHEET** Sheet 1 of 2

**CO-ORDINATES** 699,251.23 E  
735,025.34 N

**GROUND LEVEL (mOD)** 49.45

**RIG TYPE** Knebel  
**FLUSH** Air/Mist

**DATE DRILLED** 21/10/2019

**DATE LOGGED** 23/10/2019

**CLIENT ENGINEER** Arup

**INCLINATION (deg)** -90  
**CORE DIAMETER (mm)** 102

**DRILLED BY** Petersen

**LOGGED BY** D.O'Shea

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing Log (mm)	Non-intact Zone	Legend	Description	Depth (m)	Elevation	Standpipe Details	SPT (N Value)
0								SYMMETRIX DRILLING: No recovery, observed by driller as returns of firm silty TOPSOIL	0.40	49.05		
1								SYMMETRIX DRILLING: No recovery, observed by driller as returns of firm to stiff brown silty gravelly CLAY with occasional cobbles	1.80	47.65		
2								SYMMETRIX DRILLING: No recovery, observed by driller as returns of stiff dark greyish brown silty gravelly CLAY with occasional cobbles	2.40	47.05		
2.50								SYMMETRIX DRILLING: No recovery, observed by driller as returns of weak weathered ROCK	2.50	46.95		
3.00	90	36	20					Very strong to medium strong, thickly to thinly bedded (to thinly laminated where fissile mudstone/shale), grey/dark grey/black, fine-grained, LIMESTONE (argillaceous limestone grading regularly (every approx 0.10-1.20m) into calci-siltite limestone with subordinate MUDSTONE, local stylolites, pyrite present), slightly weathered where intact, moderately weathered at fissile mudstone/shale zones at (3.76-3.83m, 4.64-4.68m, 5.03-5.03m, 5.11-5.25m, 8.85-8.8m, 9.67-9.70m & 14.07-14.14m). Many incipient fractures throughout.				
4	100	54	0					Discontinuities are medium to closely spaced, smooth to locally rough, planar to locally curvilinear. Apertures are tight to locally open, locally clay-smearred, locally slightly iron-oxide stained, locally calcite-veined (1-15mm thick). Dips are 10°-20° & very locally 70°.				
4.50												
5	100	29	29									
6												
6.00												
7	100	75	68									
7.50												
8	100	82	82									
9												
9.00	100	47	47									

**REMARKS**

Hole cased 0.00-2.50m.

**WATER STRIKE DETAILS**

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

**GROUNDWATER DETAILS**

**INSTALLATION DETAILS**

Date	Hole Depth	Casing Depth	Depth to Water	Comments
23-10-19	4.00	2.00	4.00	50mm SP

IGSL RC Fl 10M 22150.GPJ IGSL\_GDT 6/12/19



# GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER

22150

**CONTRACT** Liffey Park Technology Campus

**DRILL HOLE NO** RC12

**SHEET** Sheet 2 of 2

**CO-ORDINATES** 699,251.23 E  
735,025.34 N

**GROUND LEVEL (mOD)** 49.45

**RIG TYPE** Knebel  
**FLUSH** Air/Mist

**DATE DRILLED** 21/10/2019

**DATE LOGGED** 23/10/2019

**CLIENT ENGINEER** Arup

**INCLINATION (deg)** -90  
**CORE DIAMETER (mm)** 102

**DRILLED BY** Petersen

**LOGGED BY** D.O'Shea

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing Log (mm)	Non-intact Zone	Legend	Description	Depth (m)	Elevation	Standpipe Details	SPT (N Value)
10	10.50							<p>Very strong to medium strong, thickly to thinly bedded (to thinly laminated where fissile mudstone/shale), grey/dark grey/black, fine-grained, LIMESTONE (argillaceous limestone grading regularly (every approx 0.10-1.20m) into calci-siltite limestone with subordinate MUDSTONE, local stylolites, pyrite present), slightly weathered where intact, moderately weathered at fissile mudstone/shale zones at (3.76-3.83m, 4.64-4.68m, 5.03-5.03m, 5.11-5.25m, 8.85-8.8m, 9.67-9.70m &amp; 14.07-14.14m). Many incipient fractures throughout.</p> <p>Discontinuities are medium to closely spaced, smooth to locally rough, planar to locally curvilinear. Apertures are tight to locally open, locally clay-smear, locally slightly iron-oxide stained, locally calcite-veined (1-15mm thick). Dips are 10°-20° &amp; very locally 70°. (continued)</p>				
11		100	79	51								
12		100	98	98								
13	13.50											
14		100	65	65								
15	15.00							End of Borehole at 15.00 m	15.00	34.45		

**REMARKS**

Hole cased 0.00-2.50m.

**WATER STRIKE DETAILS**

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

**GROUNDWATER DETAILS**

**INSTALLATION DETAILS**

Date	Tip Depth	RZ Top	RZ Base	Type	Date	Hole Depth	Casing Depth	Depth to Water	Comments
23-10-19	4.00	2.00	4.00	50mm SP					

IGSL RC Fl 10M 22150.GPJ IGSL\_GDT 6/12/19

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**RC01 Box 1 of 9 – 2.00-3.10m**



**RC01 Box 2 of 9 – 3.10-4.40m**



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**RC01 Box 3 of 9 – 4.40-6.00m**



**RC01 Box 4 of 9 – 6.00-7.50m**





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**RC01 Box 5 of 9 – 7.50-9.00m**



**RC01 Box 6 of 9 – 9.00-10.50m**



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**RC01 Box 7 of 9 – 10.50-12.00m**



**RC01 Box 8 of 9 – 12.00-13.50m**



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**RC01 Box 9 of 9 – 13.50-15.00m**



**RC04 Box 1 of 9 – 1.80-2.90m**



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**RC04 Box 2 of 9 – 2.90-4.50m**



**RC04 Box 3 of 9 – 4.50-6.00m**



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**RC04 Box 4 of 9 – 6.00-7.50m**



**RC04 Box 5 of 9 – 7.50-9.00m**



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**RC04 Box 6 of 9 – 9.00-10.50m**

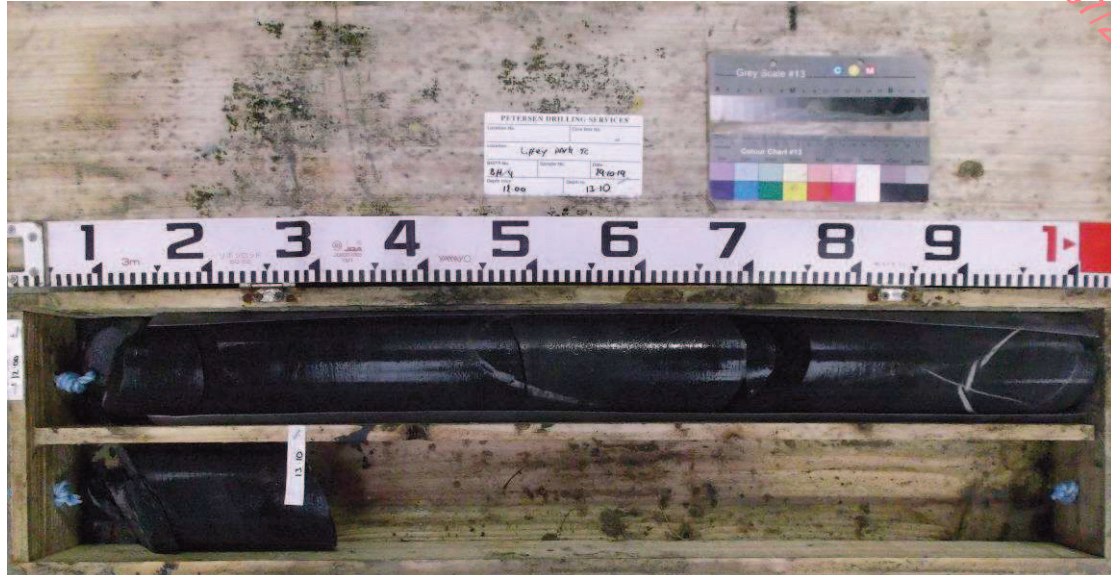


**RC04 Box 7 of 9 – 10.50-12.00m**



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**RC04 Box 8 of 9 – 12.00-13.10m**



**RC04 Box 9 of 9 – 13.10-14.70m**



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**RC06 Box 1 of 9 – 1.80-3.00m**



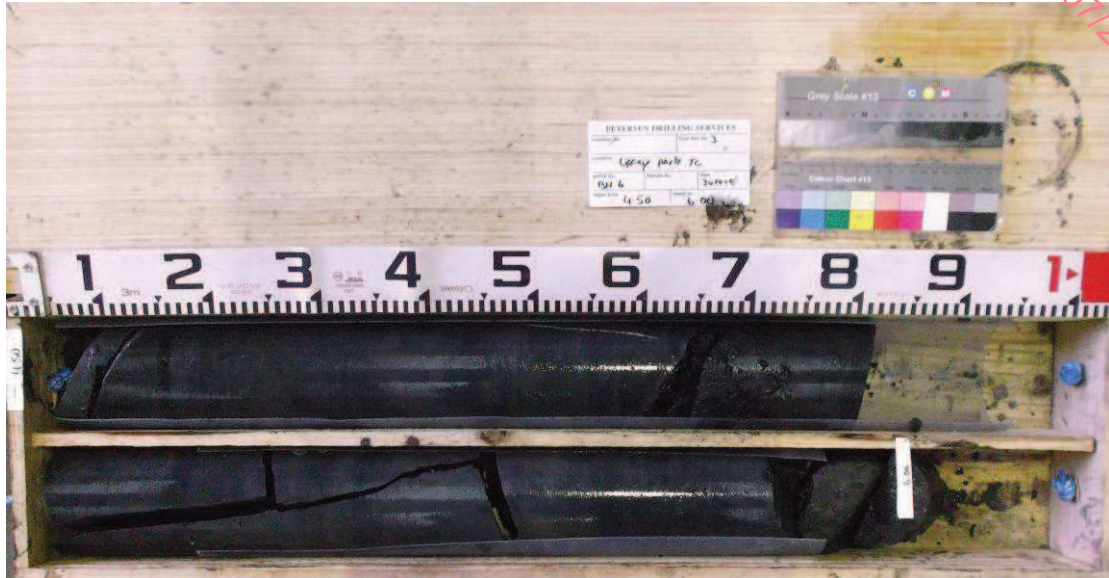
**RC06 Box 2 of 9 – 3.00-4.50m**



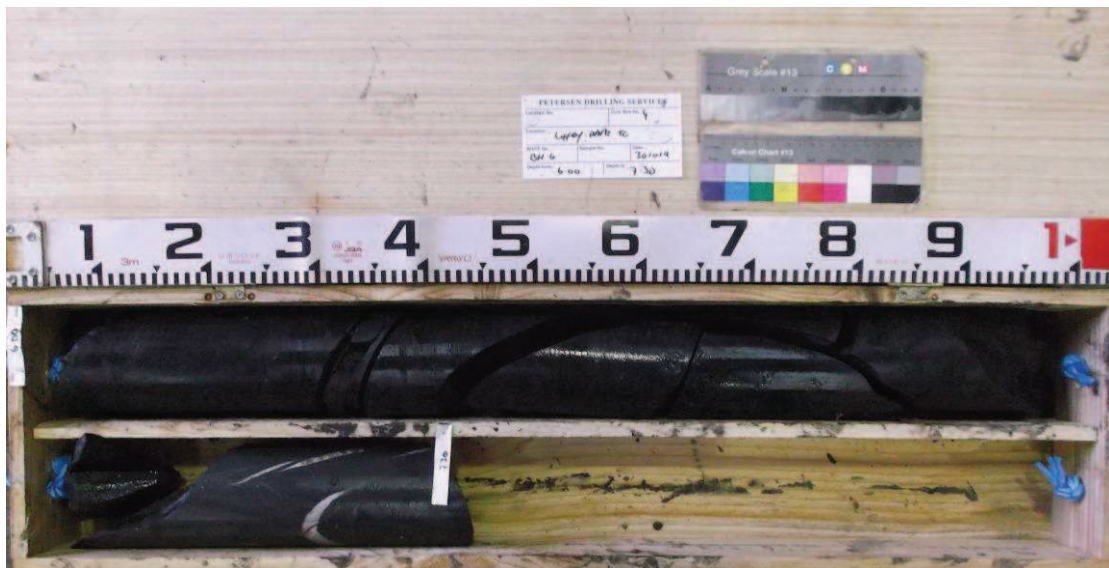


RECEIVED: 18/07/2023

**RC06 Box 3 of 9 – 4.50-6.00m**



**RC06 Box 4 of 9 – 6.00-7.30m**

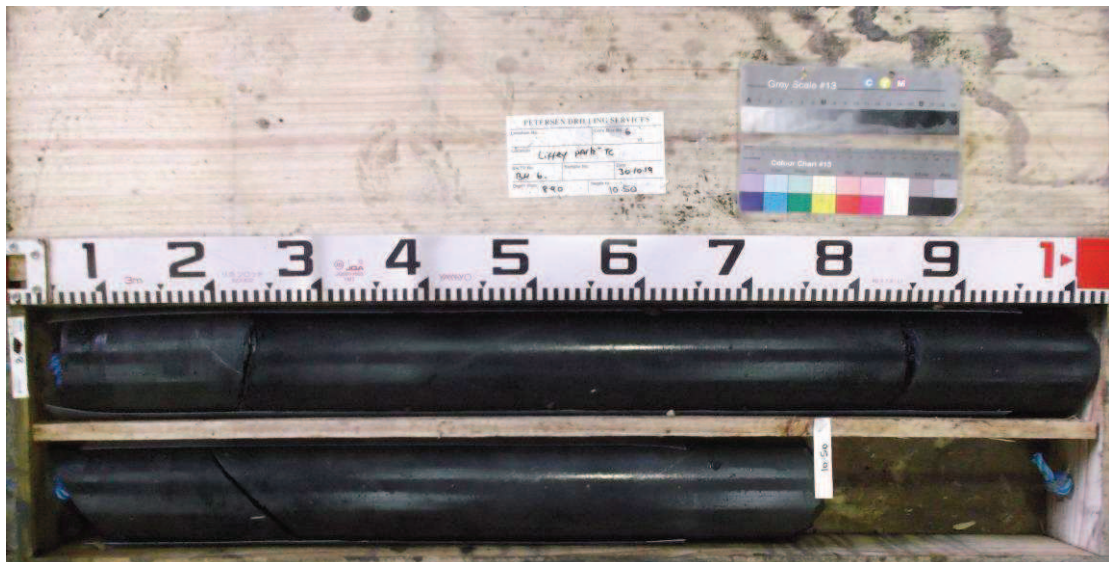


RECEIVED: 18/07/2023

**RC06 Box 5 of 9 – 7.30-8.90m**



**RC06 Box 6 of 9 – 8.90-10.50m**



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**RC06 Box 7 of 9 – 10.50-12.10m**



**RC06 Box 8 of 9 – 12.10-13.50m**



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**RC06 Box 9 of 9 – 13.50-15.10m**



**RC12 Box 1 of 8 – 1.80-3.00m**



RECEIVED: 13/07/2023

**RC12 Box 2 of 8 – 4.50-6.00m**



**RC12 Box 3 of 8 – 6.00-7.50m**

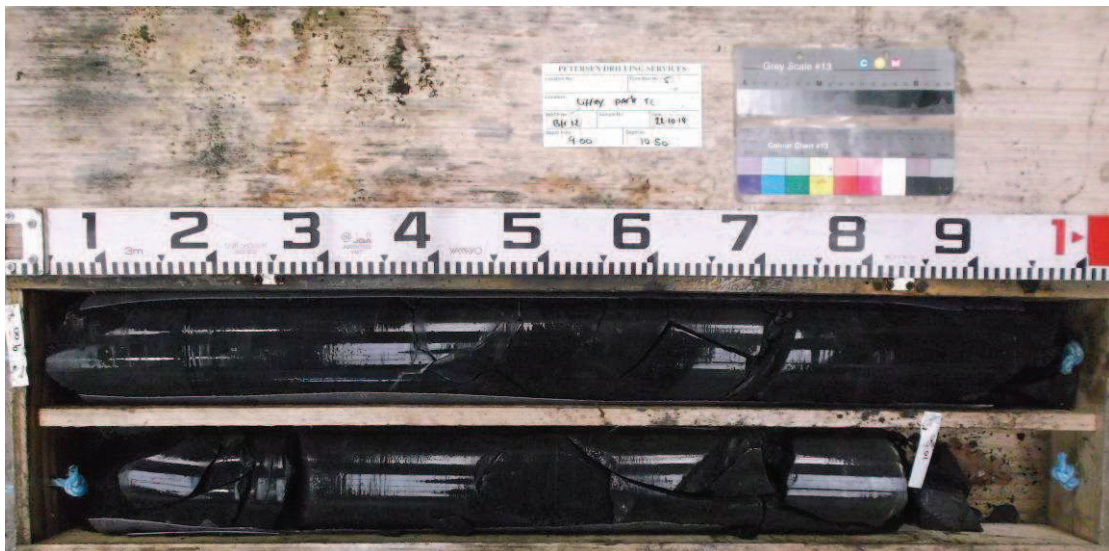


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**RC12 Box 4 of 8 – 7.50-9.00m**



**RC12 Box 5 of 8 – 9.00-10.50m**



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**RC12 Box 6 of 8 – 10.50-12.00m**



**RC12 Box 7 of 8 – 12.00-13.50m**



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**RC12 Box 8 of 8 – 13.50-15.00m**





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**Appendix 3**  
**Trial Pit Records**



# TRIAL PIT RECORD

**REPORT NUMBER**

**22150**

**CONTRACT** Liffey Park Technology Campus

**TRIAL PIT NO.** **TP01**

**SHEET** Sheet 1 of 1

**LOGGED BY** Victoria Lowe

**CO-ORDINATES** 698,862.77 E  
735,057.67 N

**DATE STARTED** 07/11/2019

**DATE COMPLETED** 07/11/2019

**CLIENT ENGINEER** O' Flynn Group  
Arup

**GROUND LEVEL (m)** 50.83

**EXCAVATION METHOD** JCB 8T

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples			Vane Test (KPa)	Hand Penetrometer (KPa)
						Sample Ref	Type	Depth		
0.0	<b>MADE GROUND: TARMACADAM</b>	[Cross-hatch pattern]								
	MADE GROUND comprised of medium dense black sandy clayey GRAVEL. Sand is medium to fine. Gravel is subangular to subrounded, fine to medium.	[Cross-hatch pattern]	0.10	50.73						
	MADE GROUND comprised of medium dense dark grey sandy GRAVEL. Sand is fine to medium. Gravel is subangular, fine to medium.	[Cross-hatch pattern]	0.40	50.43						
	Geomembrane	[Horizontal lines]	0.55	50.28		AA123646	B	0.50		
	Firm brown mottled grey sandy gravelly CLAY with a high cobble content. Sand is fine to medium. Gravel is subangular, fine to medium. Cobble is subrounded to subangular.	[Horizontal lines with circles]								
1.0	Geomembrane	[Horizontal lines]				AA123647	B	1.10		
	Firm grey mottled black slightly sandy very gravelly CLAY with a medium cobble content and a medium boulder content, with occasional very large boulders >600mm. Sand is fine to medium. Gravel is subangular, fine to coarse. Cobbles are rounded to angular. Boulders are rounded to subrounded.	[Horizontal lines with circles]	1.30	49.53						
	End of Trial Pit at 1.50m	[Horizontal lines]	1.50	49.33	↓ (Rapid)	AA123648	B	1.40		

**Groundwater Conditions**  
Fast inflow at 1.5mbgl

**Stability**  
Unstable at 1.4mbgl

**General Remarks**

REVISION: 18/07/2023



# TRIAL PIT RECORD

**REPORT NUMBER**

**22150**

<b>CONTRACT</b> Liffey Park Technology Campus		<b>TRIAL PIT NO.</b> <b>TP02</b>
<b>LOGGED BY</b> Victoria Lowe		<b>SHEET</b> Sheet 1 of 1
<b>CO-ORDINATES</b> 698,897.79 E 734,973.03 N		<b>DATE STARTED</b> 31/10/2019
<b>GROUND LEVEL (m)</b> 50.03		<b>DATE COMPLETED</b> 31/10/2019
<b>CLIENT ENGINEER</b> O' Flynn Group Arup	<b>EXCAVATION METHOD</b> JCB 8T	

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples			Vane Test (KPa)	Hand Penetrometer (KPa)
						Sample Ref	Type	Depth		
0.0	TOPSOIL: Brown slightly sandy clay with occasional roots and rootlets.									
	MADE GROUND comprised of medium dense black sandy clayey GRAVEL. Sand is medium to fine. Gravel is subangular to subrounded, fine to medium.		0.30	49.73		AA118621	Env	0.15		
	Firm to stiff dark brown mottled grey slightly sandy gravelly CLAY with a low cobble content and occasional boulders. Sand is fine to medium. Gravel is subrounded to subangular, fine to coarse. Cobbles are subrounded to subangular. Boulders are rounded to subrounded.		0.40	49.63						
	Stiff black slightly sandy gravelly CLAY with a high cobble and medium boulder content. Sand is fine to coarse. Gravel is subrounded to subangular, fine to coarse. Cobbles are subrounded to subangular. Boulders are rounded to subrounded.		0.55	49.48		AA118622 AA118623	B B	0.70 0.70		
1.0	End of Trial Pit at 1.70m		1.70	48.33		AA118624 AA118625	B B	1.70 1.70		
2.0										
3.0										

**Groundwater Conditions**  
Dry

**Stability**  
Stable

**General Remarks**

IGSL TP LOG 22150.GPJ IGSL GDT 25/11/19

REVISED: 18/07/2023



# TRIAL PIT RECORD

**REPORT NUMBER**

22150

<b>CONTRACT</b> Liffey Park Technology Campus		<b>TRIAL PIT NO.</b> TP03
<b>LOGGED BY</b> Sean Cunningham		<b>SHEET</b> Sheet 1 of 1
<b>CO-ORDINATES</b> 698,715.38 E 734,959.85 N		<b>DATE STARTED</b> 01/11/2019
<b>GROUND LEVEL (m)</b> 52.93		<b>DATE COMPLETED</b> 01/11/2019
<b>CLIENT ENGINEER</b> O' Flynn Group Arup	<b>EXCAVATION METHOD</b> JCB 8T	

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples			Vane Test (KPa)	Hand Penetrometer (KPa)
						Sample Ref	Type	Depth		
0.0	MADE GROUND: TARMACADAM	[Cross-hatch pattern]	0.10	52.83						
	MADE GROUND comprised of a compact light grey clayey sandy GRAVEL. Sand is fine to coarse. Gravel is subangular to subrounded, fine to medium. (Binding layer)	[Cross-hatch pattern]	0.25	52.68		AA108753	B	0.20		
	MADE GROUND comprised of medium dense black sandy clayey GRAVEL. Sand is medium to fine. Gravel is subangular to subrounded, fine to medium.	[Cross-hatch pattern]	0.50	52.43		AA108754	B	0.40		
	MADE GROUND comprised of coarse subrounded to rounded clayey GRAVEL.	[Cross-hatch pattern]	0.85	52.08		AA108755	B	0.70		
1.0	Firm to stiff greyish brown slightly sandy very gravelly CLAY with a high cobble and a medium boulder content and occasional large boulders. Sand is fine to medium. Gravel is subangular to subrounded, fine to coarse. Cobbles are subrounded to subangular. Boulders are rounded to subrounded. Liner grid	[Clay with boulders pattern]								
		[Clay with boulders pattern]				AA108756	B	1.50		
2.0		[Clay with boulders pattern]								
		[Clay with boulders pattern]				AA108757	B	2.30		
	End of Trial Pit at 2.50m	[Clay with boulders pattern]	2.50	50.43						
3.0										

**Groundwater Conditions**  
Dry

**Stability**  
Slightly unstable in made ground.

**General Remarks**

REF ID: A181072023



# TRIAL PIT RECORD

**REPORT NUMBER**

**22150**

**CONTRACT** Liffey Park Technology Campus

**TRIAL PIT NO.** **TP04**

**SHEET** Sheet 1 of 1

**LOGGED BY** Victoria Lowe

**CO-ORDINATES** 698,808.80 E  
734,863.89 N

**DATE STARTED** 07/11/2019

**DATE COMPLETED** 07/11/2019

**CLIENT ENGINEER** O' Flynn Group  
Arup

**GROUND LEVEL (m)** 51.56

**EXCAVATION METHOD** JCB 8T

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples			Vane Test (KPa)	Hand Penetrometer (KPa)
						Sample Ref	Type	Depth		
0.0	MADE GROUND: TARMACADAM		0.10	51.46						
	MADE GROUND comprised of medium dense black sandy clayey GRAVEL. Sand is medium to fine. Gravel is subangular to subrounded, fine to medium.		0.30	51.26		AA123642	B	0.20		
	Firm brown mottled grey sandy gravelly CLAY with a high cobble and a low boulder content. Sand is fine to medium. Gravel is subangular, fine to medium. Cobble is subrounded to subangular. Boulders are rounded to subrounded. Geomembrane		0.90	50.66		AA123643	B	0.70		
1.0	Firm grey mottled black slightly sandy very gravelly CLAY with a medium cobble content and a medium boulder content. Sand is fine to medium. Gravel is subangular, fine to coarse. Cobbles are rounded to angular. Boulders are rounded to subrounded.		1.60	49.96		AA123644	B	1.20		
	Stiff black sandy very gravelly CLAY with a high cobble and medium boulder content. Sand is fine to medium. Gravel is subangular, fine to coarse. Cobbles are rounded to angular. Boulders are rounded to subrounded.		1.80	49.76		AA123645	B	1.70		
2.0	End of Trial Pit at 1.80m									

**Groundwater Conditions**

Dry

**Stability**

Slightly unstable to 0.3m. Stable below

**General Remarks**

IGSL TP LOG 22150.GPJ IGSL GDT 25/11/19

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# TRIAL PIT RECORD

**REPORT NUMBER**

22150

<b>CONTRACT</b> Liffey Park Technology Campus		<b>TRIAL PIT NO.</b> TP05
<b>LOGGED BY</b> Sean Cunningham		<b>SHEET</b> Sheet 1 of 1
<b>CO-ORDINATES</b> 698,522.70 E 734,945.92 N		<b>DATE STARTED</b> 04/11/2019
<b>GROUND LEVEL (m)</b> 55.97		<b>DATE COMPLETED</b> 04/11/2019
<b>CLIENT ENGINEER</b> O' Flynn Group Arup	<b>EXCAVATION METHOD</b> JCB 8T	

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples			Vane Test (KPa)	Hand Penetrometer (KPa)
						Sample Ref	Type	Depth		
0.0	TOPSOIL: Brown slightly sandy clay with occasional roots and rootlets.									
	SUBSOIL: Brown sandy gravelly CLAY.		0.25	55.72						
	Firm to stiff brownish grey sandy very gravelly CLAY. Sand is fine to coarse. Gravel is subangular to subrounded, fine to medium.		0.60	55.37						
1.0						AA116285	B	1.10		
	Firm to stiff brownish grey sandy very gravelly CLAY with medium. Sand is fine to coarse. Gravel is subangular to subrounded, fine to medium.		1.70	54.27						
2.0					↓ (Seepage)	AA116286	B	2.20		
	End of Trial Pit at 2.60m		2.60	53.37						
3.0										

**Groundwater Conditions**  
Groundwater at 2.1mbgl

**Stability**  
Slightly unstable

**General Remarks**

REVISION: 18/07/2023



# TRIAL PIT RECORD

**REPORT NUMBER**

**22150**

<b>CONTRACT</b> Liffey Park Technology Campus		<b>TRIAL PIT NO.</b> <b>TP06</b>
<b>LOGGED BY</b> Victoria Lowe		<b>SHEET</b> Sheet 1 of 1
<b>CO-ORDINATES</b> 698,561.49 E 734,805.08 N		<b>DATE STARTED</b> 01/11/2019
<b>GROUND LEVEL (m)</b> 54.49		<b>DATE COMPLETED</b> 01/11/2019
<b>CLIENT ENGINEER</b> O' Flynn Group Arup	<b>EXCAVATION METHOD</b> JCB 8T	

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples			Vane Test (KPa)	Hand Penetrometer (KPa)
						Sample Ref	Type	Depth		
0.0	MADE GROUND comprised of loose grey sandy GRAVEL. Sand is medium to fine. Gravel is subangular to subrounded, fine to medium.		0.25	54.24		AA108758	B	0.20		
	MADE GROUND comprised of sandy GRAVEL. Sand is fine to coarse. Gravel is subangular to subrounded, fine to coarse.		0.55	53.94		AA108759	B	0.40		
	Firm light brown mottled grey sandy gravelly CLAY with a high cobble content. Sand is fine to medium. Gravel is subangular, fine to medium. Cobble is subrounded to subangular.		0.80			AA103760	B	0.80		
1.0			0.80			AA108760	B	0.80		
	Firm to stiff black slightly sandy gravelly CLAY with a high cobble and boulder content <350mm. Sand is fine to medium. Gravel is subangular, fine to medium. Cobble is subrounded to subangular. Boulders are rounded to subrounded.		1.40	53.09						
			1.70			AA103761	B	1.70		
2.0	End of Trial Pit at 1.90m		1.90	52.59		AA108761	B	1.70		

**Groundwater Conditions**  
Seepage in made ground

**Stability**  
Unstable in made ground. Stable below.

**General Remarks**

IGSL TP LOG 22150.GPJ IGSL.GDT 25/11/19

REF ID: A181072023



# TRIAL PIT RECORD

**REPORT NUMBER**

22150

**CONTRACT** Liffey Park Technology Campus

**TRIAL PIT NO.** TP07  
**SHEET** Sheet 1 of 1

**LOGGED BY** Sean Cunningham

**CO-ORDINATES** 698,495.70 E  
734,757.26 N

**DATE STARTED** 04/11/2019  
**DATE COMPLETED** 04/11/2019

**CLIENT ENGINEER** O' Flynn Group  
Arup

**GROUND LEVEL (m)** 54.55

**EXCAVATION METHOD** JCB 8T

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples			Vane Test (KPa)	Hand Penetrometer (KPa)
						Sample Ref	Type	Depth		
0.0	MADE GROUND comprised of medium dense black sandy clayey GRAVEL. Sand is medium to fine. Gravel is subangular to subrounded, fine to medium.	[Cross-hatch pattern]								
	MADE GROUND comprised of subrounded to rounded coarse GRAVEL.	[Dotted pattern]	0.30	54.25		AA116287	B	0.20		
	Firm brown mottled grey sandy gravelly CLAY with a high cobble and a low boulder content. Sand is fine to medium. Gravel is subangular, fine to medium. Cobble is subrounded to subangular. Boulders are rounded to subrounded.	[Horizontal dashes with circles]	0.40	54.15		AA116288	B	0.40		
1.0										
						AA116289	B	1.00		
	End of Trial Pit at 1.60m		1.60	52.95						
2.0										
3.0										

**Groundwater Conditions**  
Dry

**Stability**  
Unstable in made ground.

**General Remarks**

REVISION: 18/07/2023





# TRIAL PIT RECORD

**REPORT NUMBER**

**22150**

<b>CONTRACT</b> Liffey Park Technology Campus		<b>TRIAL PIT NO.</b> <b>TP08</b>
<b>LOGGED BY</b> Sean Cunningham	<b>CO-ORDINATES</b> 698,657.13 E 734,528.32 N	<b>SHEET</b> Sheet 1 of 1
	<b>GROUND LEVEL (m)</b> 54.11	<b>DATE STARTED</b> 05/11/2019 <b>DATE COMPLETED</b> 05/11/2019
<b>CLIENT ENGINEER</b> O' Flynn Group Arup		<b>EXCAVATION METHOD</b> JCB 8T

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples			Vane Test (KPa)	Hand Penetrometer (KPa)
						Sample Ref	Type	Depth		
0.0	TOPSOIL: Brown slightly sandy clay with occasional roots and rootlets.									
0.25	MADE GROUND comprised of brown sandy gravelly CLAY with occasional plastic and iron pipes, red bricks and plastic fragments. Sand is fine to coarse. Gravel is subangular to subrounded, fine to coarse.			53.86						
0.50						AA116273	B	0.50		
1.0	Firm to stiff brown mottled grey slightly sandy gravelly CLAY with medium cobble and boulder content									
1.50				52.61		AA116274	B	1.00		
1.50										
1.50						AA116275 AA116276	B B	1.50 1.50		
2.0	Firm to stiff brown mottled grey sandy gravelly CLAY with a high cobble and a low boulder content. Sand is fine to medium. Gravel is subangular, fine to medium. Cobble is subrounded to subangular. Boulders are rounded to subrounded.									
2.30				51.81		AA116277 AA116278	B B	2.30 2.30		
2.60	End of Trial Pit at 2.60m			51.51						

**Groundwater Conditions**  
Medium seepage at 1.2m

**Stability**  
Stable

**General Remarks**

IGSL TP LOG 22150.GPJ IGSL GDT 25/11/19

REF ID: 18/07/2023



# TRIAL PIT RECORD

**REPORT NUMBER**

**22150**

**CONTRACT** Liffey Park Technology Campus

**TRIAL PIT NO.** **TP09**

**LOGGED BY** Victoria Lowe

**CO-ORDINATES** 698,835.69 E  
734,298.25 N

**SHEET** Sheet 1 of 1

**DATE STARTED** 05/11/2019

**DATE COMPLETED** 05/11/2019

**CLIENT ENGINEER** O' Flynn Group  
Arup

**GROUND LEVEL (m)** 51.02

**EXCAVATION METHOD** JCB 8T

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples			Vane Test (KPa)	Hand Penetrometer (KPa)
						Sample Ref	Type	Depth		
0.0	TOPSOIL: Brown slightly sandy clay with occasional roots and rootlets.									
	SUBSOIL: Brown sandy gravelly CLAY.		0.20	50.82						
	Firm to stiff light brown mottled grey sandy gravelly CLAY with a medium cobble and a low boulder content. Sand is fine to medium. Gravel is subangular, fine to medium. Cobble is subrounded to subangular. Boulders are rounded to subrounded.		0.45	50.57						
							AA116279 AA116280	B B	0.70 0.70	
1.0					 1 (Moderate)  2 (Rapid)					
2.0										
	Stiff dark grey to black sandy very gravelly CLAY with a medium cobble and boulder content. Sand is fine to medium. Gravel is subangular, fine to medium. Cobble is subrounded to subangular. Boulders are rounded to subrounded.		2.40	48.62						
							AA116281 AA116282	B B	2.00 2.00	
			2.70	48.32						
	End of Trial Pit at 2.70m									
3.0										

**Groundwater Conditions**  
Medium seepage at 1.1m. Fast inflow at 1.3m

**Stability**  
Unstable at 1.1m

**General Remarks**

REF ID: 18/07/2023



# TRIAL PIT RECORD

**REPORT NUMBER**

**22150**

<b>CONTRACT</b> Liffey Park Technology Campus		<b>TRIAL PIT NO.</b> <b>TP10</b>
<b>LOGGED BY</b> Sean Cunningham		<b>SHEET</b> Sheet 1 of 1
<b>CO-ORDINATES</b> 699,053.49 E 734,505.50 N		<b>DATE STARTED</b> 29/10/2019
<b>GROUND LEVEL (m)</b> 48.58		<b>DATE COMPLETED</b> 29/10/2019
<b>CLIENT ENGINEER</b> O' Flynn Group Arup	<b>EXCAVATION METHOD</b> JCB 8T	

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples			Vane Test (KPa)	Hand Penetrometer (KPa)
						Sample Ref	Type	Depth		
0.0	<p>MADE GROUND comprised of dark grey sandy GRAVEL with a low cobble content. Sand is fine to coarse. Gravel is subangular to subrounded, fine to coarse. Cobble is subrounded to subrounded.</p> <p>SUBSOIL: Light grey sandy CLAY.</p> <p>Firm brown mottled grey sandy gravelly CLAY with low cobble content and occasional boulders &lt;450mm. Sand is fine to medium. Gravel is subangular, fine to medium. Cobble is subrounded to subangular. Boulders are rounded to subrounded.</p> <p>Firm greyish brown sandy gravelly CLAY with a medium cobble content and occasional boulders. Sand is fine to coarse. Gravel is subangular to subrounded, fine to coarse. Cobble is subrounded to subangular. Boulders are rounded to subrounded.</p>		0.25	48.33	↓ (Seepage)	AA118605	B	0.20		
0.35			48.23							
0.45			48.13							
1.0										
1.45			1.45	47.13		AA118606	B	0.80		
2.0						AA118607	B	1.60		
2.70	End of Trial Pit at 2.70m		2.70	45.88		AA118608	B	2.60		

**Groundwater Conditions**  
Moist at 2.5m. Seepage at 2.6m.

**Stability**  
Slightly unstable to 0.25m. Stable after 0.25m

**General Remarks**

IGSL TP LOG 22150.GPJ IGSL GDT 25/11/19



# TRIAL PIT RECORD

**REPORT NUMBER**

**22150**

<b>CONTRACT</b> Liffey Park Technology Campus		<b>TRIAL PIT NO.</b> <b>TP11</b>
<b>LOGGED BY</b> Sean Cunningham		<b>SHEET</b> Sheet 1 of 1
<b>CO-ORDINATES</b> 699,023.51 E 734,676.58 N		<b>DATE STARTED</b> 31/10/2019
<b>GROUND LEVEL (m)</b> 50.00		<b>DATE COMPLETED</b> 31/10/2019
<b>CLIENT ENGINEER</b> O' Flynn Group Arup	<b>EXCAVATION METHOD</b> JCB 8T	

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples			Vane Test (KPa)	Hand Penetrometer (KPa)
						Sample Ref	Type	Depth		
0.0	TOPSOIL: Brown slightly sandy CLAY									
	MADE GROUND comprised of dark grey to black sandy gravelly CLAY with a low cobble content and boulder content (<500mm) with occasional plastic wire, wood fragments, breeze blocks and large pieces of polystyrene. (Reworked black boulder CLAY)		0.25	49.75		AA118614	B	0.50		
1.0	Reinforced concrete and polystyrene					AA118615	B	1.00		
	MADE GROUND comprised of loose to medium dense clayey very gravelly SAND with occasional polystyrene fragments. Sand is fine to coarse. Gravel is subangular to rounded, fine to medium.		1.50	48.50		AA118616	B	1.50		
2.0	Stiff black sandy gravelly CLAY with a medium cobble and boulders content. Sand is fine to coarse. Gravel is subangular to subrounded, fine to coarse. Cobble is subrounded to subangular. Boulders are rounded to subrounded.		2.10	47.90		AA118617 AA118618	B B	2.60 2.60		
3.0	End of Trial Pit at 3.20m		3.20	46.80		AA118619 AA118620	B B	3.20 3.20		

**Groundwater Conditions**  
Dry

**Stability**  
Very unstable at 1.1m

**General Remarks**  
Reinforced concrete and polystyrene at 1.3m



# TRIAL PIT RECORD

**REPORT NUMBER**

**22150**

<b>CONTRACT</b> Liffey Park Technology Campus		<b>TRIAL PIT NO.</b> <b>TPSA01</b>
<b>LOGGED BY</b> Sean Cunningham		<b>SHEET</b> Sheet 1 of 1
<b>CO-ORDINATES</b> 698,516.40 E 735,156.12 N		<b>DATE STARTED</b> 06/11/2019
<b>GROUND LEVEL (m)</b> 56.20		<b>DATE COMPLETED</b> 06/11/2019
<b>CLIENT ENGINEER</b> O' Flynn Group Arup	<b>EXCAVATION METHOD</b> JCB 8T	

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples			Vane Test (KPa)	Hand Penetrometer (KPa)
						Sample Ref	Type	Depth		
0.0	TOPSOIL: Brown slightly sandy CLAY with occasional roots and rootlets.									
	SUBSOIL: Brown sandy gravelly CLAY.		0.25	55.95						
	Firm brown mottled grey mottled black sandy gravelly CLAY with a medium cobble and a low boulder content. Sand is fine to medium. Gravel is subangular, fine to medium. Cobble is subrounded to subangular. Boulders are rounded to subrounded.		0.40	55.80		AA128606	B	0.50		
1.0	Firm to stiff dark grey mottled black sandy gravelly CLAY with a medium cobble and a low boulder content. Sand is fine to medium. Gravel is subangular, fine to medium. Cobble is subrounded to subangular. Boulders are rounded to subrounded.		1.20	55.00		AA128607	B	1.00		
						AA128608	B	1.50		
2.0						AA128609	B	2.00		
	End of Trial Pit at 2.45m		2.45	53.75						

**Groundwater Conditions**  
Dry

**Stability**  
Stable

**General Remarks**

IGSL TP LOG 22150.GPJ IGSL GDT 25/11/19

REF ID: A181072023



# TRIAL PIT RECORD

**REPORT NUMBER**

22150

<b>CONTRACT</b> Liffey Park Technology Campus		<b>TRIAL PIT NO.</b> <b>TPSA02</b>
<b>LOGGED BY</b> Sean Cunningham	<b>CO-ORDINATES</b> 698,854.61 E 734,565.04 N	<b>SHEET</b> Sheet 1 of 1
	<b>GROUND LEVEL (m)</b> 51.86	<b>DATE STARTED</b> 30/10/2019 <b>DATE COMPLETED</b> 30/10/2019
<b>CLIENT ENGINEER</b> O' Flynn Group Arup		<b>EXCAVATION METHOD</b> JCB 8T

Depth (m)	Elevation	Water Strike	Samples			Vane Test (KPa)	Hand Penetrometer (KPa)
			Sample Ref	Type	Depth		
0.0							
0.30	51.56		AA118609	B	0.60		
1.0		↓ (Seepage)					
1.20	50.66		AA118610	B	1.30		
1.50	50.36		AA118611	B	1.80		
2.0							
2.60			AA118612	B	2.60		
2.90	48.96						
3.0							

**Groundwater Conditions**  
Seepage at 1.0m and 1.2m

**Stability**  
Stable

**General Remarks**

IGSL TP LOG 22150.GPJ IGSL GDT 25/11/19



# TRIAL PIT RECORD

**REPORT NUMBER**

**22150**

**CONTRACT** Liffey Park Technology Campus

**TRIAL PIT NO.** **TPSA03**  
**SHEET** Sheet 1 of 1

**LOGGED BY** Sean Cunningham

**CO-ORDINATES** 699,153.06 E  
734,803.73 N

**DATE STARTED** 29/10/2019  
**DATE COMPLETED** 29/10/2019

**CLIENT ENGINEER** O' Flynn Group  
Arup

**GROUND LEVEL (m)** 49.26

**EXCAVATION METHOD** JCB 8T

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples			Vane Test (KPa)	Hand Penetrometer (KPa)
						Sample Ref	Type	Depth		
0.0	TOPSOIL: Brown slightly sandy CLAY with occasional rootlets.									
	MADE GROUND comprised of brownish grey slightly sandy gravelly CLAY with rare plastic and wood fragments. Sand is fine to coarse. Gravel is subangular to subrounded, fine to coarse. Cobble is subrounded to subangular. Boulders are rounded to subrounded.		0.20	49.06	↓ (Seepage)	AA118601	B	0.30		
	Firm brown mottled black sandy gravelly CLAY with a medium cobble content and occasional boulders <450mm. Sand is fine to coarse. Gravel is subangular to subrounded, fine to coarse. Cobble is subrounded to subangular. Boulders are rounded to subrounded.		0.60	48.66		AA118602	B	0.80		
1.0	Firm to stiff dark grey slightly sandy very gravelly CLAY with a medium cobble content and occasional boulders. Sand is fine to coarse. Gravel is subangular to subrounded, fine to coarse. Cobble is subrounded to subangular. Boulders are rounded to subrounded.		1.50	47.76		AA118603	B	1.70		
2.0	End of Trial Pit at 2.90m		2.90	46.36		AA118604	B	2.80		
3.0										

**Groundwater Conditions**  
Seepage at 0.5m

**Stability**  
Stable

**General Remarks**

REF ID: 18/07/2023



# TRIAL PIT RECORD

**REPORT NUMBER**

**22150**

<b>CONTRACT</b> Liffey Park Technology Campus		<b>TRIAL PIT NO.</b> <b>TPSA04</b>
<b>LOGGED BY</b> Victoria Lowe		<b>SHEET</b> Sheet 1 of 1
<b>CO-ORDINATES</b> 699,223.71 E 735,091.01 N		<b>DATE STARTED</b> 06/11/2019
<b>GROUND LEVEL (m)</b> 50.93		<b>DATE COMPLETED</b> 06/11/2019
<b>CLIENT ENGINEER</b> O' Flynn Group Arup	<b>EXCAVATION METHOD</b> JCB 8T	

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples			Vane Test (KPa)	Hand Penetrometer (KPa)
						Sample Ref	Type	Depth		
0.0	TOPSOIL: Brown slightly sandy CLAY with occasional roots and rootlets.									
	MADE GROUND comprised of brown sandy gravelly CLAY with geomembrane and occasional brick fragments. Sand is fine to coarse. Gravel is subangular to subrounded, fine to coarse.		0.30	50.63		AA128601	B	0.20		
	MADE GROUND comprised of dark grey to black sandy very gravelly CLAY with a medium cobble and boulder content with concrete and plastic fragments. (Reworked black boulder CLAY)		0.90	50.03	↓ (Seepage)	AA128602	B	0.60		
1.0										
	Firm brown mottled grey sandy gravelly CLAY with low cobble content and occasional boulders <450mm. Sand is fine to medium. Gravel is subangular, fine to medium. Cobble is subrounded to subangular. Boulders are rounded to subrounded.		1.90	49.03		AA128603	B	1.40		
2.0										
	Stiff black sandy gravelly CLAY with a medium cobble content and a medium boulder content. Sand is fine to coarse. Gravel is subangular to subrounded, fine to coarse. Cobble is subrounded to subangular. Boulders are rounded to subrounded.		2.50	48.43		AA128604	B	2.20		
	End of Trial Pit at 2.70m		2.70	48.23		AA128605	B	2.60		
3.0										

**Groundwater Conditions**  
Seepage at 0.9m

**Stability**  
Stable

**General Remarks**

IGSL TP LOG 22150.GPJ IGSL GDT 25/11/19



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**TP01 – 2 of 4**



**TP01 – 3 of 4**



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**TP01 – 4 of 4**



**TP02 – 1 of 4**



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**TP02 – 2 of 4**



**TP02 – 3 of 4**



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**TP03 – 1 of 4**



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