

Appendix B

**IGSL Limited** 

**DBFL Consulting Engineers** 

Blanchardstown Town Centre Development North Co. Dublin

Ground Investigation Report

Report No. 23311

September 2021





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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 (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 mean time, 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 DBFL 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.

#### **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. 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 have been used to recover bedrock samples in line with Section 3.5 of IS EN 1997-2:2007 and IS EN ISO 22475-1. Where cable percussive boreholes terminated prematurely on an obstruction within overburden, open hole drilling methods (odex or symmetrix) were utilized to advance the drillholes through the superficial deposits with coring in bedrock. The key objectives of the rock sampling were to obtain high core recovery (TCR), minimize sample disturbance and facilitate accurate identification of strength, weathering and discontinuity characteristics.

#### 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 and Objectives

It is proposed to redevelop three existing car parks at the Blanchardstown Town Centre in North Co. Dublin. The car park sites are denoted Site A, B and C as shown on Figure 1.

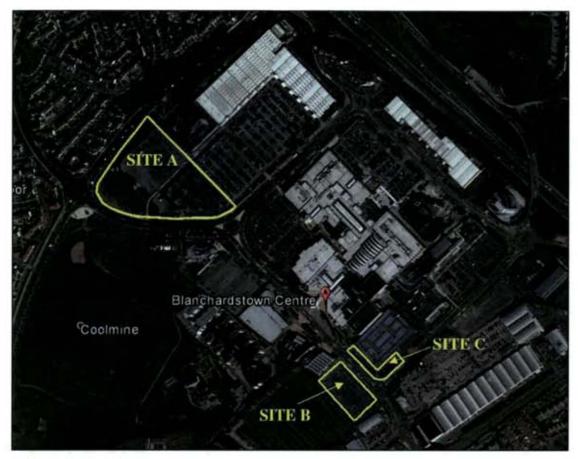


Figure 1 - Site Locations

In May 2021, IGSL Limited were appointed by the project consulting engineers, DBFL, to conduct a ground investigation at each of the three sites.

The objectives of the investigation were as follows:

- Ascertain the soil stratigraphy at the site
- Ascertain suitable bearing strata for structural foundations
- Determine the infiltration characteristics of the subsoils with respect to soakaway design
- Investigate the potential for sulphate attack on buried concrete
- Investigate for the presence of subsoil contamination
- Assess the suitability for the disposal of excavated soils to an inert landfill

This report presents the findings of the ground investigation and discusses these findings with respect to future development of this site. The environmental elements of the investigation were interpreted by O'Callaghan Moran and discussed in their Waste Characterisation Assessment, which is presented under separate cover.

## 2.0 Scope of Works

The exploratory works included the following:

- 22 nr. trial pits (inspection pits at rotary corehole locations)
- 22 nr. rotary coreholes
- 22 nr. window samples (at rotary corehole locations)
- 3 nr. infiltration tests
- A programme of geotechnical, chemical and environmental laboratory testing

## 2.1 Trial (Inspection) Pits

Trial pitting was performed in 22 locations (TP01 to TP22) using hand-digging with assistance from a 3-tonne tracked excavator. The prime purpose of the trial pits was to check for buried services in advance of rotary drilling and also to recover samples of the upper soils for environmental testing. The pits were typically dug to the target depth of 1.2 m BGL, although some pits terminated at shallower depths due to obstructions.

The trial pits were logged and sampled by an IGSL geotechnical engineer in accordance with BS 5930 (2015) and were excavated

Pit sidewalls were assessed in terms of their short-term stability and any instances of groundwater ingress were recorded. Environmental sub-samples were procured and placed in appropriate containers (amber glass jars and vials).

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 1 include descriptions of the soils encountered, groundwater conditions and stability of the pit sidewalls.

Since the trial pits were located within existing car parks, the surface materials comprised tarmacadam, which was underlain by a support layer of granular fill (hardcore). The total pavement construction typically extended to depths of between 0.35 and 0.5 m BGL.

The underlying soils consisted of predominately firm to stiff (locally soft to firm) brown sandy gravelly CLAY with cobbles, which remained present to the excavated depths.

In Car Park A, a thin layer of clay fill (Made Ground) was present beneath the granular fill. Some fragments of brick and plastic pipe were present within the fill material, which terminated at 0.6 m BGL. Similar material was encountered in trial pit TP20 (Car Park C) to a depth of 1.1 m BGL. Extraneous (non-natural) material in this location included fragments of concrete and plastic.

While most pits terminated within sandy gravelly clay at a depth of 1.2 m BGL, coarse granular material was encountered within the upper metre in trial pits TP01, 02, 08, 11 and 13 in Site A, and in TP16 in Site B.

All trial pits remained dry and stable during the period of excavation (typically 45 minutes). At TP02, seepage at a depth of 0.45 m BGL was attributed to surface water infiltration through the granular layer.

## 2.2 Window Samples

Window samples WS01 to WS22 were undertaken at each corehole and trial pit location. The prime purpose of the window samples was to recover undisturbed samples of the overburden soils from which environmental test specimens could be extracted.

Window samples are advanced by driving a steel sampling tube under constant percussive effort. The soils enter the tube within a protective plastic liner, which is withdrawn after every metre of progress. The liners are then placed in wooden channel boxes and transported to the IGSL offices where they are logged and sub-sampled as required.

Environmental sub-samples were extracted from the window sample recovery and placed in appropriate containers (amber glass jars and vials).

The window samples advanced through the base of the trial (inspection) pits, thereby commencing recovery below 1.2 m BGL in most instances.

Similar to the trial pits, the window samples encountered firm / stiff brown sandy gravelly CLAY to the sampled depth of 2.0 m BGL. In some instances, coarse obstructions (cobbles / boulders) prevented this depth from being achieved.

The window sample records are presented in Appendix 2 of this report.

## 2.3 Rotary Coreholes

Following the excavation of trial pits, rotary coreholes RC01 to RC22 were drilled using a Beretta T44 tracked coring rig in order to investigate for the presence of bedrock.

Symmetrix open hole techniques were used to advance through the overburden deposits, reverting to rotary coring in bedrock. It is noted that Symmetrix drilling produces highly pulverised drill returns and therefore, soil descriptions based on these returns are very approximate.

Rotary coring of bedrock was carried out using an air/mist flush to maximize recovery. Cores of 78 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.

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. Corehole records and photographs are included in Appendix 3 of this report.

Table 1 shows the terminal depth of the window samples and the depths to weathered rock in each adjacent corehole at Site A. Table 2 shows similar information for Sites B and C. Also shown are the interpreted soil descriptions below the window sample depths, although it is again stressed that these are based on highly pulverised drill returns and should be taken as approximate only.

Location	Window Sample Depth (m BGL)	Overburden below window sample depth (based on Pulverised Drill Returns only)	Depth to Weathered Bedrock (m BGL)	Elevation of Weathered Bedrock (m OD)
RC01	2.00	Clayey GRAVEL	2.10	59.03
RC02	2.00	Clayey GRAVEL	2.30	58.95
RC03	1.50	Clayey GRAVEL	2.90	58.61
RC04	1.40	Clayey GRAVEL	2.70	59.46
RC05	1.80	Gravelly CLAY	2.60	60.07
RC06	2.00	Clayey GRAVEL	2.30	59.35
RC07	2.00	Clayey GRAVEL	2.30	59.19
RC08	1.10	Gravelly CLAY	2.40	59.10
RC09	2.00	Clayey GRAVEL	2.40	59.69
RC10	2.00	Gravelly cobbly CLAY	2.60	59.21
RC11	2.00	Gravelly CLAY	2.10	59.67
RC12	1.40	Clayey GRAVEL	2.40	59.43
RC13	1.10	Gravelly CLAY / clayey GRAVEL	2.40	60.01

Table 1 - Summary of Rotary Coring - Site A

Location	Window Sample Depth (m BGL)	Overburden below window sample depth (based on Pulverised Drill Returns only)	Depth to Weathered Bedrock (m BGL)	Elevation of Weathered Bedrock (m OD)
RC14	1.60	Clayey GRAVEL	2.80	59.58
RC15	2.00	Clayey GRAVEL	2.80	59.33
RC16	1.50	Gravelly CLAY	3.50	58.52
RC17	1.40	Clayey GRAVEL	3.00	59.68
RC18	2.00	Gravelly CLAY	3.30	59.11
RC19	3.00	Gravelly CLAY	3.90	58.32
RC20	1.60	Gravelly CLAY	2.50	59.38
RC21	1.60	Gravelly CLAY	3.00	58.28
RC22	1.50	Gravelly CLAY	3.00	58.12

Table 2 - Summary of Rotary Coring - Sites B and C

It can be seen from Table 1 that the depth to weathered bedrock at Site A ranged between approximately 2 and 3 m BGL (58.6 to 60.0 mOD) across the site. At Sites B and C, the depth to bedrock mostly ranged between approximately 2.5 and 3.5 m BGL (58.3 to 59.7 mOD)

The overlying overburden soils were assessed as gravelly clays or clayey gravels. However, it is noted that the water flush medium used during rotary drilling can "wash-out" clay soils, giving the drill returns the appearance of coarse granular material.

The bedrock was classified as predominately weak to strong black / dark grey fine-grained muddy LIMESTONE. The limestone was predominately fresh to locally slightly weathered and Pyrite crystallisation was locally evident.

Total Core Recovery (TCR) was 100% for all runs. Solid Core Recovery (SCR) was generally in the range 60 to 90% within the upper weathered limestone, locally reducing to 16% where the bedrock horizon was highly weathered and fractured. RQD values showed similar variations.

Photo 1 shows typical core recovery of the upper Limestone at Site A (RC03). The weathered (fractured) condition of the upper bedrock is clearly evident.

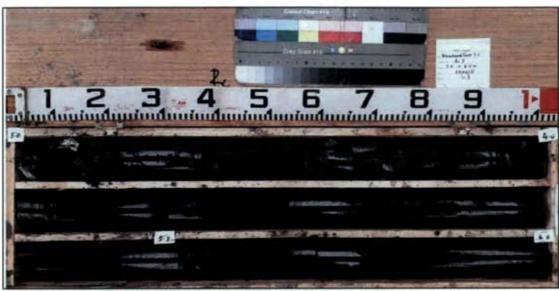


Photo 1 - Core recovery at RC03 (3.0 to 6.0 m BGL)

Photo 2 shows typical core recovery of the upper bedrock at Site B (RC15). Fracturing (weathering) of the upper limestone is clearly evident within the upper metre of recovery, with fresher rock present below approximately 4 m BGL.

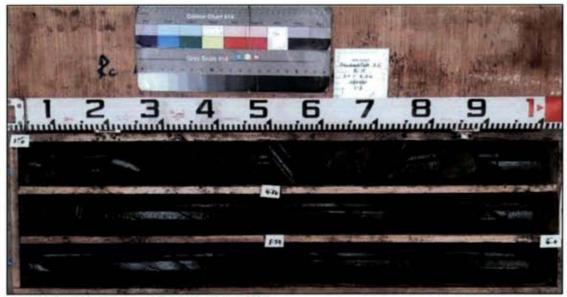


Photo 2 - Core recovery at RC15 (3.0 to 6.0 m BGL)

Photo 3 shows typical core recovery at Site C (RC21). The bedrock is generally fresh (intact) from the outset and only slightly fractured.

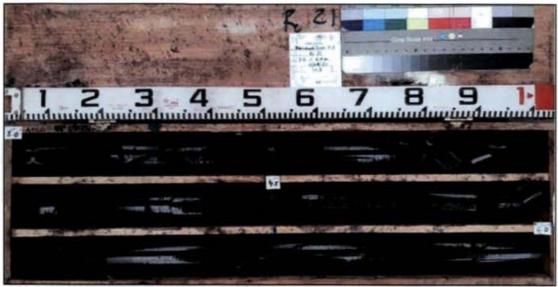


Photo 3 - Core recovery at RC21 (3.0 to 6.0 m BGL)

#### 2.4 Infiltration Tests

Infiltration tests were undertaken in three locations (SA01 to SA03) to ascertain the suitability of the sub-soils for soakaway purposes. Tests SA01 and SA02 were located within Site A, while SA03 was positioned within Site B.

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 to ensure total saturation of the sub-soils. This procedure is typically repeated twice more, and records taken of the fall in water level against time.

All test pits encountered a surfacing of Tarmacadam and granular fill, which was underlain by firm and stiff sandy gravelly clay.

Within Site A, test SA01 recorded a minimal fall in water level, which was not sustained. Test SA02 showed no infiltration during the test period.

At Site B, SA03 recorded a slow but steady fall in water level during the test period of 90 minutes, resulting in a relatively low infiltration rate of 0.0001 m/min (1.75 x 10-6 m/s).

#### 2.5 Groundwater

No groundwater strikes were observed during drilling, although it is noted that the water flush medium used during rotary drilling and coring can mask or obscure groundwater strikes.

Water was present in all coreholes at the end of drilling, mostly at depths in the range 2.0 to 2.5 m BGL, locally deepening to 4.4 m BGL.

Since the short period of drilling rarely permits the true water table to establish, standpipes were installed in RC01, 09 and 16 in order to permit long-term groundwater monitoring.

The site was revisited on two occasions post-fieldwork in order to record groundwater levels in the standpipes. These are summarised on Table 3.

Location	Corehole Depth (m BGL)	Top of Response Zone (m BGL)	Base of Response Zone (m BGL)	Groundwater Depth / Elevation 27/07/2021 (m BGL)	Groundwater Depth / Elevation 22/09/2021 (m BGL)
RC01	10.20	2.00	10.20	1.19 / 59.94	1.17 / 59.96
RC09	10.00	2.00	10.00	1.96 / 60.13	1.97 / 60.12
RC16	10.00	2.00	10.00	1.97 / 60.05	1.50 / 60.52

Table 3 - Summary of Groundwater Monitoring

## 2.6 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 7 of this report.

#### 2.7 Waste Characterisation Assessment

The results of environmental laboratory analyses on recovered samples were issued to environmental specialists O'Callaghan Moran (OCM), who have used this data to produce a detailed Waste Characterisation Assessment (WCA).

Their report, which is presented under separate cover, classifies the samples as either Hazardous or Non-Hazardous and assigns the appropriate List of Waste (LoW) code to each. Also included are recommended waste receptors for landfill disposal purposes.

## 3.0 Laboratory Testing

Laboratory testing was undertaken on selected samples of soil and rock. The results of rock strength testing are included in Appendix 5, while the results of chemical and environmental testing of both soil and rock are presented in Appendix 6.

## 3.1 Point Load and Uniaxial Compressive Strength Tests (Rock Core Samples)

Point Load Index tests were undertaken on selected rock core samples.

The Point Load Index Test provides a rapid strength assessment from rock fragments or cores. 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. The compressive strength of the rock (qc) can be established using a correlation suggested by Goodman where UCS  $\approx$  18 to 24 x Is50.

The results of rock strength testing showed Is50 values mostly in the range 1 to 3 MPa, with an average of 2.5 MPa. These values correlated to equivalent UCS values in the range 20 to 60 MPa.

Uniaxial Compressive Strength (UCS) tests showed a similar scatter of results, measuring strengths in the range 2.5 to 65 MPa, but mostly in the range 20 to 50 MPa. In accordance with Table 5 of EN ISO 14869-1, these strengths would confirm the rock to be predominately Weak to Medium Strong.

#### 3.2 Sulphate and pH Analyses

Determination of pH values and Sulphate content were conducted on five samples by a nominated accredited environmental laboratory (Eurofins Chemtest). Results are presented in reports prepared by the laboratory (Appendix 6).

The results of water-soluble (water/soil extract) Sulphate and pH analyses of soils revealed low SO<sub>4</sub> levels (maximum Water-Soluble Sulphate of 0.2 g/l) and near-neutral pH levels of 8.4 to 8.8. A maximum water-soluble Sulphate level of 0.42 g/l was measured for the rock core samples.

Twelve samples of limestone, as recovered from the rotary coreholes, were tested for Total Sulphur and Acid Soluble Sulphate. Testing was undertaken by UK laboratory Nicholls Colton in accordance with EN 1744.

The tests revealed Total Sulphur contents in the range 0.12 to 0.42% in association with Acid Soluble Sulphate contents of 0.02 to 0.06% SO<sub>4</sub>.

The Nicholls Colton report is also presented in Appendix 6.

## 3.3 Environmental Laboratory Testing

A total of 22 soil 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.

The analyses were carried out by Eurofins Chemtest Laboratory and their reports are presented in Appendix 6.

#### 4.0 Discussion

#### 4.1 General

The ground conditions at Sites A, B and C have been shown to be relatively homogenous.

A surfacing of Tarmacadam and granular fill (Clause 804 hardcore or similar) overlies all three sites.

The underlying natural soils comprise firm to stiff brown sandy gravelly CLAY. This becomes coarser with depth, grading to clayey angular GRAVEL with cobbles. While only pulverised drill returns of this material were recovered using "open hole" drilling methods, it is likely that the coarse granular material is representative of the highly to completely weathered limestone bedrock (residual soil).

Rotary drilling and coring have confirmed the presence of bedrock at depths of between 2 and 3 m BGL at Site A, and between approximately 2.5 and 3.5 m BGL at Sites B and C. For all sites, the bedrock levels lie within an elevation range of 58 to 60 m OD.

The bedrock consists of weak to strong Limestone, which is locally heavily fractured at upper levels, while the "intact" limestone is predominately fresh, with only localised moderately weathered zones.

Groundwater strikes were not observed within the trial pits or window samples. On completion of drilling, water was observed at a shallowest depth of 1.9 m BGL in the coreholes.

Standpipes were installed within three rotary coreholes, and groundwater monitoring has shown shallowest levels of 1.2 m BGL (60.0 mOD) at Site A and 1.5 m BGL (60.5 mOD) at Site B.

#### 4.2 Structural Foundations

While the particular details of any proposed development are not yet confirmed, it is understood that future structural foundations will be supported on the limestone bedrock.

With reference to Tables 1 and 2, it can be seen that the weathered limestone is presented at depths ranging between 2 and 3 m BGL at Site A and between approximately 2.5 and 3.5 m BGL at Sites B and C.

Where foundations are constructed directly on the limestone bedrock, an allowable bearing pressure of the order of 600 kPa could be assumed for the upper weathered and highly fractured bedrock (residual soils), increasing to c. 1.5 MPa within "intact" limestone. Based on the findings of the coreholes, it is expected that the removal of circa 0.5 metres of upper bedrock would be sufficient to reach the "intact" limestone.

## 4.3 Groundwater and Trench Stability

The trial pits remained stable during the period of excavation (typically 45 minutes) but were limited to a maximum depth of 1.2 m BGL. While no water was observed in the pits, this is unsurprising, given their limited depth.

Subsequent groundwater monitoring of standpipes has shown standing groundwater levels in the range 60.0 to 60.5 mOD (1.2 to 2.0 m BGL).

The observations made during trial pitting suggests that temporary foundation excavations to depths of 1.2 m BGL will remain mostly dry in the short term. Any water ingress is likely to arise from surface water infiltration and should be controllable using nominal pumping.

A key consideration if adopting trench / fill techniques for foundations will be the stability of open excavations. As noted previously, the trial pits remained stable during the period of excavation, although these were limited to 1.2 m depth. Some instability could be expected within deeper granular soils (or highly fractured weathered rock), particularly where groundwater is present.

Where excavations are left open for extended periods (e.g. drainage trenches), instability is likely to occur as the sidewalls relax, in which case trench control measures (e.g. trench box) will be required.

If basements are constructed, the associated mass excavation (typically c. 4 metres for single-level) would be expected to intercept the groundwater table. The rate of ingress is difficult to predict, since the groundwater table was not intercepted in the trial pits and therefore could not be observed. However, increased flow rates could be expected where excavations intercept the upper bedrock, which is highly fractured and will likely permit relatively free flowing ingress.

Based on the monitoring to date, water levels could rise to at least 1.2 m BGL, and possibly higher. For this reason, ongoing monitoring of standpipes would be recommended in order to provide a better understanding of the true groundwater level, and its fluctuations due to seasonal change or prolonged periods of heavy rainfall.

## 4.4 Excavation of Existing Materials

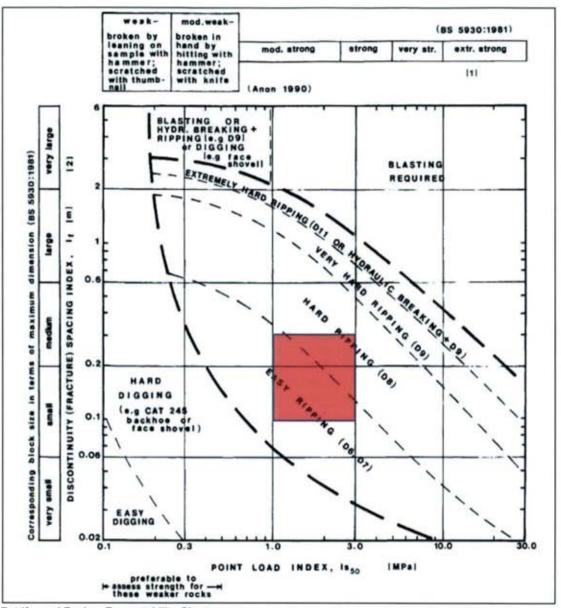
The inspection pits were excavated through firm and stiff sandy gravelly clay using a 6.5 tonne digger, which achieved the target depth of 1.2 m BGL in most locations. In some instances, the presence of large cobbles and boulders impeded excavation. However, the limited capacity of the excavator must be taken into account and it is likely that a larger machine (e.g. 20 tonne excavator equipped with a toothed bucket) could have loosened the cobbles / boulders and advanced further, possibly to the weathered bedrock horizon.

If a basement is proposed, a minimum excavation depth of circa 4 metres would be expected. With reference to Tables 1 and 2, the removal of up to 2 metres of Limestone bedrock may therefore be required in order to form the basement dig.

When estimating the excavatability of the limestone bedrock, reference should be made to the graph produced by Pettifer and Fookes, which categorises rock excavatability based on the Fracture Spacing Index and Point Load Index (Is 50) of the rock.

The  $ls_{50}$  values mostly range between 1 and 3 MPa. The bedrock Fracture Spacings above the typical basement depth of c. 8 m BGL are mostly clustered in the range 100 to 250 mm, although there are some instances of up to 400 mm spacings. To permit a preliminary assessment of rock excavatability with respect to the Pettifer and Fookes Chart, a typical Fracture Spacing range of 100 to 300 mm is suggested.

The adopted Fracture Spacing and Is<sub>50</sub> strength ranges have been plotted on the Pettifer and Fookes chart. The relevant zone within the chart, corresponding to the adopted ranges is highlighted.



Pettifer and Fookes Excavatability Chart

Using these guideline parameters, the excavatability of the upper limestone bedrock is categorised as Easy to Hard Ripping, requiring the use of a D7 or D8 Caterpillar (32 tonne) or equivalent. However, it should be noted that the Pettifer and Fookes chart tends to underestimate the excavatability characteristics of Irish rock masses. Civil engineering contractors should be aware of this and carefully consider the difficulties associated with excavatability within intact limestone. It is therefore anticipated that large tracked excavators (40T) equipped with heavy duty hydraulic breakers (8T) will be required to efficiently or economically loosen the rock mass

Due to the nature of ripping and breaking, this will cause both vibratory and noise disturbance. Tolerable levels of both should be established and agreed with the civils contractor prior to excavation works commencing. It will be necessary to position vibration monitors adjacent to nearby structures to check that specified peak particle velocities are not exceeded.

In advance of excavation operations, it would be advisable to conduct dilapidation surveys of any vulnerable structures so that their initial condition can be established.

#### 4.5 Chemical Attack on Buried Concrete

The results of Sulphate and pH testing showed low Sulphate and near-neutral pH levels.

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.

#### 4.6 Soakaway Design

Infiltration testing in two locations at Site A recorded both low and unsustained infiltration. This is not surprising, since very low permeability would be expected of the upper clay soils. In soils such as these, it is generally recommended that conventional soakaway systems are not attempted.

While deepening of the soakaways would ordinarily be considered in these circumstances, it is noted that the groundwater levels are relatively shallow (up to 1.2 m BGL) and conventional soakaway systems will not function below the water table.

At Site B, the upper soils exhibited a very low infiltration rate of 1.75 x 10-6 m/s. While consideration could be given to a soakaway system such as permeable paving or shallow trenches, the required storage volume (attenuation) is likely to be very high, which may render such designs impractical.

In light of the above, it may be preferable to discharge surface run-off water to an existing surface water system, using attenuation techniques to regulate the flow.

#### 4.7 Potential for Pyritic Heave

As discussed in Section 2.3, the bedrock comprises grey/black "muddy" limestone. There was evidence of localised pyrite crystallisation, which is not uncommon amongst the Dublin limestones.

With regard to the potential for pyritic heave of foundations, there should be no concerns where foundations are constructed on suitably prepared limestone. Any loose / unconsolidated material (mudstone / shale) should be removed and the bedrock formation blinded with lean-mix concrete without delay. The purpose of this is to reduce the timeframe for potential oxidation.

Foundations can then be constructed directly on the lean mix concrete with no residual concerns regarding pyritic heave.

## 4.8 Chemical Assessment of Bedrock

Chemical analyses of rock core samples show very low Sulphate (Acid Soluble) and Sulphur levels.

If this material is subsequently crushed for re-use as capping on this site, the maximum Total Sulphur level of 0.40% satisfies the Upper Limit of 1% for Class 6F Capping, as specified in Table 6/1 of the Series 600 (Specification for Road Works).

While the chemical requirements for reuse have been satisfied, any bedrock proposed for reuse will require further assessment in accordance with Series 600 of the Specification for Roadworks in order to assess its mechanical and durability properties.

#### 5.0 References

- BS 5930:1999 +A2:2010 Code of Practice for Site Investigations; British Standards Institute
- 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
- EN 1997-3; Eurocode 7: Geotechnical Design Part 3: Design assisted by field testing; 1997
- 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
- 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
- ISRM Suggested Methods for Determining the Uniaxial Compressive Strength and Deformability of Rock Materials
- 11. TRL Report 447- Sulphate specification for structural backfills

# Appendix 1

Trial (Inspection) Pit Records



REPORT NUMBER

CON	TRACT Blanchardstown T.C.	The experimental of the Control of t									T NO. TP01 Sheet 1 of 1				
LOG	GED BY I.Reder	CO-ORDINAT	ES	706,7 739.4	00.34 E 77.88 N		DATE ST		26/05	/2021					
		GROUND LEV	/EL (m)	61.13			DATE COMPLETED 26/05/20			ACCEPTANT OF	3506 AV				
CLIE		onto the LE	1.10					TION	3T Mi	ni Digg	er				
ENGI	NEER DBFL						7850								
								Samples	1	(Pa)	rometer				
	Geotechnical Description		Legend	Depth (m)	Elevation	Water Strike	Sample Ref	Type	Depth	Vane Test (KPa)	Hand Penetrometer				
0.0	TARMAC		*****	0.05	61.08										
	MADE GROUND (comprised of grey angula cobbles - C.L.804)  Firm to stiff, brown, slightly sandy gravelly S			0.35	60.78										
	some flat angular cobbles	ILT/OLAT WILL	* × · ×	/ T2// IE/C 5	NEW OF		AA138472	Env	0.50-0.85						
	Very dense, brown/grey mottled, silty angula	ar GRAVEL	8000	0.65	60.48				000000000000000000000000000000000000000						
	with angular cobbles (possible weathered ro TP terminated due to possible boulders	ock)	0 19	0.85	60.28										
1.0	End of Trial Pit at 0.85m														
2.0															
			1 1												
3.0							1 1								
4.0															
Grou TP dr	ndwater Conditions														
er ul	E:														
Stabi	lity														
TP st															
Gene	ral Remarks dug for check of any underground services in	WS01/RC01+	he locatio	nn.											
PUI	day for check of any underground services if	WOUNKOUT	ne locatil	m.											



REPORT NUMBER

CON	TRACT Blanchardstown T.C.		SOCIO.				TRIAL PI	T NO.	TP02 Sheet		5	
.OG	GED BY I.Reder	CO-ORDINA		739,4	34.91 E 45.10 N		DATE STARTED 27/05/2021 DATE COMPLETED 27/05/2021					
LIE	NT NEER DBFL	GROUND LE	GROUND LEVEL (m) 61.25				EXCAVATION 3T Mini Digger METHOD					
	July 1							Samples			ster	
	Geotechnical Description		Legend	Depth (m)	Elevation	Water Strike	Sample Ref	Type	Depth	Vane Test (KPa)	Hand Penetrometer	
0.0	TARMAC		/ <b>****</b>	0.04	61.21							
	MADE GROUND (comprised of grey angu- cobbles - C.L.804)	IND (comprised of grey angular gravel and 804)										
	Firm to stiff, greyish brown, slightly sandy SILT/CLAY with some angular to subangu	to stiff, greyish brown, slightly sandy gravelly CLAY with some angular to subangular cobbles dense, grey, slightly silty angular GRAVEL with ar cobbles (possible weathered rock)		0.45	60.80		AA138475	Env	0.50-1.00			
0	Very dense, grey, slightly silty angular GR angular cobbles (possible weathered rock			0.90	60.35							
	End of Trial Pit at 1.20m			1.20	60.05							
0												
4.0												
Sligh	indwater Conditions thy seepage at 0.45m											
P st	table											
	eral Remarks 2 dug for check of any underground services	s in WS02/RC02	the location	on								



REPORT NUMBER

23311

CONTRACT Blanchardstown T.C. TRIAL PIT NO. TP03 SHEET Sheet 1 of 1 706,771.10 E 739,409.42 N **CO-ORDINATES** DATE STARTED 27/05/2021 LOGGED BY I.Reder DATE COMPLETED 27/05/2021 GROUND LEVEL (m) 61.51 EXCAVATION METHOD 3T Mini Digger CLIENT **ENGINEER** DBFL Hand Penetrometer (KPa) Samples Vane Test (KPa) Water Strike Geotechnical Description Elevation Legend Sample Ref Depth (m) 0.0 0.05 61.46 TARMAC MADE GROUND (comprised of grey angular gravel and cobbles - C.L.804) 0.35 61.16 Firm to stiff, brown, slightly sandy gravelly silty CLAY with some flat angular cobbles AA138476 0.50-1.00 Env 1.0 1.20 60.31 End of Trial Pit at 1.20m 2.0 3.0 4.0 Groundwater Conditions TP dry TP LOG 23311.GPJ IGSL.GDT 30/9/21

Stability TP stable

IGSL

General Remarks

TP03 dug for check of any underground services in WS03/RC03 the location



REPORT NUMBER

100	997								0.000.00	000000		
CON	TRACT Blanchardstown T.C.	0					TRIAL PI	T NO.	TP04	1 1 1 of 1		
LOG	GED BY LReder	CO-ORDINA	TES	706,8 739,3	05.40 E 77.29 N		DATE STARTED 27/05			5/2021 5/2021		
CLIE		GROUND LE	GROUND LEVEL (m) 62.16								i Digger	
ENG	NEER DBFL							- 1			_	
						Water Strike		Samples		(Pa)	omete	
	Geotechnical Description		Puegend	Depth (m)	Elevation		Sample Ref	Type	Depth	Vane Test (KPa)	Hand Penetrometer	
0.0	TARMAC MADE GROUND (comprised of grey angula	ar gravel and		0.07	62.09							
	cobbles - C.L.804)  Firm to stiff, brown to grevish brown, slightly	sandy	· · ·	0.35	61.81							
1.0	gravelly SILT/CLAY with some angular cobb	bles	**************************************				AA138577	Env	0.50-1.00			
	End of Trial Pit at 1.20m		×-	1.20	60.96							
2.0												
ā												
3.0												
3												
4.0												
4.0												
Grou	ndwater Conditions											
TP d	ry											
Stabi	ility											
TP st	table											
	eral Remarks I dug for check of any underground services i	n WS04/PC04	the location	nn.								
	say for elect of any underground services i	11304/1004	are rocatil	ut1								



REPORT NUMBER

23311

TRIAL PIT NO. TP05 CONTRACT Blanchardstown T.C. SHEET Sheet 1 of 1 CO-ORDINATES 706,839.82 E DATE STARTED 28/05/2021 LOGGED BY I.Reder 739,345.44 N DATE COMPLETED 28/05/2021 GROUND LEVEL (m) 62.67 **EXCAVATION** 3T Mini Digger CLIENT METHOD **ENGINEER** DBFL Hand Penetrometer (KPa) Samples Vane Test (KPa) Water Strike Geotechnical Description Elevation Sample Ref Legend Depth (m) Type 0.0 TARMAC 0.08 62.59 MADE GROUND (comprised of brown/grey angular gravel and cobbles - C.L.804) 62.32 0.35 Firm to stiff, brown, slightly sandy slightly gravelly CLAY with some roots, occasional small pieces of red brick, and AA138484 0.50-1.00 Env 0.60 62.07 single pieces of old plastic pipe (FILL) Stiff to very stiff, light brown/brown, slightly sandy slightly gravelly SILT/CLAY with some angular cobbles 1.0 1.10 61.57 End of Trial Pit at 1.10m 2.0 3.0 **Groundwater Conditions** TP dry 30/9/21

Stability TP stable

GDT

23311.GPJ

TP L0G

General Remarks

TP13 dug for check of any underground services in WS13/RC13 the location



REPORT NUMBER

ma	331								200		
CON	TRACT Blanchardstown T.C.						TRIAL PI	T NO.	TP06		
.og	GED BY I.Reder	CO-ORDINATE	ES		60.14 E 36.05 N		DATE STARTED 26/0			et 1 of 1 05/2021 05/2021	
CLIE		GROUND LEV	EL (m)	61.65			DATE COMPLETED 26/05/2021  EXCAVATION 3T Mini Digger METHOD				
ING	NEER DBFL						Sample	s		ter	
	Geotechnical Description		Legend	Depth (m)	Elevation	Water Strike	Sample Ref	Type	Depth	Vane Test (KPa)	Hand Penetrometer
0.0	TARMAC		*****	0.05	61.60						
	MADE GROUND (comprised of grey angula cobbles - C.L.804)		<u> </u>	0.35	61.30						
1.0	Firm to stiff, greyish brown, slightly sandy gr SILT/CLAY with some angular to subangula	iff, greyish brown, slightly sandy gravelly Y with some angular to subangular cobbles					AA138471	Env	0.50-1.00		
	End of Trial Pit at 1.20m		° x. ° 0	1.20	60.45						
2.0											
3.0											
4.0											
P d	undwater Conditions ry										
Stab	ility table										
Sene IP06	eral Remarks 3 dug for check of any underground services i	in WS06/RC06 ti	he locati	on							



REPORT NUMBER

23311

TRIAL PIT NO. TP07 Blanchardstown T.C. CONTRACT SHEET Sheet 1 of 1 **CO-ORDINATES** 706,702.56 E DATE STARTED 26/05/2021 LOGGED BY I.Reder 739,411.01 N DATE COMPLETED 26/05/2021 GROUND LEVEL (m) 61.49 EXCAVATION METHOD 3T Mini Digger CLIENT ENGINEER DBFL Hand Penetrometer (KPa) Samples Vane Test (KPa) Water Strike Geotechnical Description Sample Ref Legend Depth (m) Type 0.0 0.05 61.44 TARMAC MADE GROUND (comprised of grey angular gravel and cobbles - C.L.804) 0.30 61.19 9 Firm, light brown/brown, slightly sandy gravelly SILT/CLAY with occasional cobbles × 0.55 60.94 AA138473 Env 0.50-1.00 9 Firm to stiff, brown/grey mottled, very gravelly SILT/CLAY with many angular cobbles (possible very silty/clayey gravel) 1.20 60.29 End of Trial Pit at 1.20m 2.0 3.0 4.0 **Groundwater Conditions** TP dry

Stability TP stable

IGSL TP LOG 23311.GPJ IGSL.GDT 30/9/21

General Remarks

TP07 dug for check of any underground services in WS07/RC07 the location



REPORT NUMBER

100	331								233	110	
CON	TRACT Blanchardstown T.C.						TRIAL PI	T NO.	TP08	3 1 of 1	
.og	GED BY I.Reder	CO-ORDINAT	ES	706,74 739,3	41.29 E 79.86 N		DATE STARTE		ED 27/05/2021		
CLIE	NT NEER DBFL	GROUND LEVEL (m) 61.50				EXCAVA METHOD	TION		ni Digg	er	
								Sample	5	_	eter
	Geotechnical Description		Legend	Depth (m)	Elevation	Water Strike	Sample Ref	Type	Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0	TARMAC		*****	0.05	61.45	- 22			- 88		-
	MADE GROUND (comprised of grey angula cobbles - C.L.804)	r gravel and	<b>****</b>	0.30	61.20						
	Firm to stiff, greyish brown, slightly sandy gr SILT/CLAY with some angular to subangula	revish brown, slightly sandy gravelly		0.95	60.55		AA138479	Env	0.50-0.90		
2.0	End of Trial Pit at 0.95m										
3.0											
Grou TP d	ndwater Conditions										



REPORT NUMBER

23311

TRIAL PIT NO. TP09 CONTRACT Blanchardstown T.C. SHEET Sheet 1 of 1 CO-ORDINATES 706,776.26 E DATE STARTED 27/05/2021 LOGGED BY I.Reder 739,346.97 N 27/05/2021 DATE COMPLETED GROUND LEVEL (m) 62.09 **EXCAVATION** 3T Mini Digger CLIENT METHOD **ENGINEER** DBFL Hand Penetrometer (KPa) Samples Vane Test (KPa) Water Strike Geotechnical Description Elevation Sample Ref Depth (m) Depth Type 0.0 0.05 62.04 TARMAC MADE GROUND (comprised of grey angular gravel and cobbles - C.L.804) 0.35 61.74 Soft to firm, brown, very sandy slightly gravelly SILT/CLAY with occasional cobbles AA138478 Env 0.50-1.00 1.0 1.20 60.89 End of Trial Pit at 1.20m 2.0 3.0 4.0 **Groundwater Conditions** TP dry 23311.GPJ IGSL.GDT 309/21

Stability TP stable

IGSL TP LOG

General Remarks

TP09 dug for check of any underground services in WS09/RC09 the location



REPORT NUMBER

CON	TRACT Blanchardstown T.C.						TRIAL PI	T NO.	TP10				
LOG	GED BY I.Reder	CO-ORDINA	TES	706,63 739,40	626.36 E 401.60 N		SHEET   Sheet 1 of 1						
CLIE	NT	GROUND LE	GROUND LEVEL (m) 61.81					EXCAVATION 3T Mini Digger					
	NEER DBFL			4	v,		METHOD	)					
							5	Sample	S @		neter		
	Geotechnical Description		Legend	Depth (m)	Elevation	Water Strike	Sample Ref	Туре	Depth	Vane Test (KPa)	Hand Penetrometer		
0.0	TARMAC MADE GROUND (comprised of grey angula cobbles - C.L.804)	r gravel and		0.08	61.73								
1.0	Firm, brown/grey mottled, sandy slightly gra SILT/CLAY	velly	X0	0.55	61.26		AA138470	Env	0.60-1.00				
	End of Trial Pit at 1.20m			1.20	60.61								
3.0													
4.0													
P dr	lity												
P st													
Sene P10	ral Remarks dug for check of any underground services i	n WS01/PC10											



REPORT NUMBER

CON	TRACT Blanchardstown T.C.						TRIAL PI	T NO.	TP1 <sup>4</sup> Shee	1 1 1 of 1		
LOG	GED BY I.Reder	CO-ORDINA		739,3	70.39 E 59.93 N		DATE ST			ED 26/05/2021		
CLIE		GROUND LE	VEL (m)	61.77			EXCAVA METHOD		3T Mini Digger			
ENGI	NEER DBFL										_	
							-	Sample	S	(Pa)	omete	
	Geotechnical Description		Puegend	Depth (m)	Elevation	Water Strike	Sample Ref	Type	Depth	Vane Test (KPa)	Hand Penetrometer	
0.0	TARMAC			0.05	61.72							
	MADE GROUND (comprised of grey angular gravel and cobbles - C.L.804)  Firm to stiff, brown to greysih brown, slightly sandy		X X	0.35	61.42							
	Firm to stiff, brown to greysih brown, slightly gravelly SILT/CLAY with many angular cobi	y sandy bles	*****************				AA138473	Env	0.50-1.00			
	TP terminated due to possible boulders End of Trial Pit at 1.00m		*3 × 1									
1.0				1.00	60.77							
	d of Irial Pit at 1.00m											
2.0												
3.0												
4.0												
							1 1					
Grou	ndwater Conditions					<u>.                                    </u>						
TP dr	у											
Stabi												
TP st	2005											
Gene TP11	ral Remarks dug for check of any underground services i	in WS11/RC11	the location	on								



REPORT NUMBER

1931									23311		
ON'	TRACT Blanchardstown T.C.						TRIAL PI	T NO.	TP12		
								SHEET Sheet 1 of 1			
OG	GED BY I.Reder	CO-ORDINAT	RDINATES 706,692.68 E 739,338.09 N			DATE STARTED 28/05/2021					
			LEVEL (m) 61.83				DATE COMPLETED 28/05/2021 EXCAVATION 3T Mini Digg				ner
	NEER DBFL						METHOD	)	31 1111	iii Digg	jul .
							Sample				70
							Sample		•	Pa)	mete
	Geotechnical Description				-	trike				st (K	netro
				th.	Elevation	Water Strike	Sample Ref	9	ŧ	Vane Test (KPa)	Hand Penetrometer
			Legend	Depth (m)	=	Wa	Sar	Type	Depth	\a_	Har
.0	TARMAC			0.06	61.77						
ļ	MADE GROUND (comprised of grey angular gravel and cobbles - C.L.804)			0.35	61.48						
	Firm to stiff, brown, slightly sandy gravelly S some angular cobbles	ILT/CLAY with	* X -	0,00	51,40		AA138482	Env	0.50-1.00		
	The state of the s		*O.*9				N130402	LIIV	0.30-1.00		
			× × ×								
0			× × × 0								
1	End of Trial Pit at 1.20m		×-	1.20	60.63						
0											
0											
0											
ou dr	ndwater Conditions y										
abi	able										
ene	ral Remarks dug for check of any underground services in	WS10/PC10	the location	00							
- 15	and the prices of any underground services if	A A STOLLO	are rocatil	urt 8							



REPORT NUMBER

23311

CON	ONTRACT Blanchardstown T.C.								TRIAL PIT NO. TP13 SHEET Sheet 1 of 1					
LOGGED BY I.Reder CO-ORDINATES 706,756.55 E 739,321.20 N						DATE STARTED 28/05/2021 DATE COMPLETED 28/05/2021								
CLIE		GROUND LE	VEL (m)	62.41			EXCAVATION 3T Mini Digger METHOD							
ENGI	NEER DBFL						III III III							
			Pegend	Depth (m)	Elevation	Water Strike	Sample		3	(B)	meter			
	Geotechnical Description						Sample Ref	Туре	Depth	Vane Test (KPa)	Hand Penetrometer (KPa)			
0.0	TARMAC		*****	0.06	62.35									
	MADE GROUND (comprised of grey angular gravel and cobbles - C.L.804)													
	Stiff, light brown/brown, slightly sandy gravelly SIL with some angular cobbles		O.X	0.35	62.06		Contractor and	_						
	with some angular couples		× X X				AA138483	Env	0.50-0.80					
1,0	TP terminated due to possible boulders End of Trial Pit at 0.85m		× ×	0.85	61.56									
3.0														
4.0														
Groui TP dr	ndwater Conditions y													
Stabi TP st	lity able													
Gene TP13	ral Remarks dug for check of any underground services in	n WS13/RC13	the location	on										



REPORT NUMBER

23311

TP14 CONTRACT Blanchardstown T.C. TRIAL PIT NO. SHEET Sheet 1 of 1 **CO-ORDINATES** 707,055.04 E DATE STARTED 08/06/2021 LOGGED BY I.Reder 739,043.48 N DATE COMPLETED 08/06/2021 GROUND LEVEL (m) 62.38 EXCAVATION METHOD 3T Mini Digger CLIENT **ENGINEER** DBFL Hand Penetrometer (KPa) Samples Vane Test (KPa) Water Strike Geotechnical Description Elevation TARMAC 0.09 62.29 MADE GROUND (comprised of dark grey angular gravel -C.L.804) 0.50 61.88 Soft to firm, brown, slightly sandy slightly gravelly CLAY with very occasional cobbles AA156051 Env 0.50-1.00 1.0 1.20 61.18 End of Trial Pit at 1.20m 2.0 3.0 4.0 **Groundwater Conditions** TP dry IGSL GDT 30/9/21

Stability TP stable

23311.GPJ

TP LOG GSL

General Remarks
TP14 dug for check of any underground services in WS14/RC14 the location



REPORT NUMBER

23311

TRIAL PIT NO. Blanchardstown T.C. TP15 CONTRACT SHEET Sheet 1 of 1 **CO-ORDINATES** 707,090.74 E DATE STARTED 08/06/2021 LOGGED BY 1.Reder 739,008.76 N DATE COMPLETED 08/06/2021 **GROUND LEVEL (m)** 62.13 EXCAVATION METHOD 3T Mini Digger CLIENT ENGINEER DBFL Hand Penetrometer (KPa) Samples Vane Test (KPa) Water Strike Geotechnical Description Elevation Legend Sample Depth (m) Type 0.0 TARMAC 0.07 62.06 MADE GROUND (comprised of dark grey angular gravel -C.L.804) 0.50 61.63 Firm, brownish grey, sandy slightly gravelly SILT/CLAY AA156052 Env 0.50-1.00 0.65 61.48 Firm, light brown/brown, sandy slightly gravelly SILT/CLAY X 0.90 61.23 Firm, light brown/brown, sandy gravelly SILT/CLAY with occasional cobbles 1.20 60.93 End of Trial Pit at 1.20m 2.0 3.0 4.0 **Groundwater Conditions** TP dry

GDT 30/9/21 Stability TP stable TP LOG 23311 GPJ

IGSL

General Remarks

TP15 dug for check of any underground services in WS15/RC15 the location



REPORT NUMBER

CON	TRACT Blanchardstown T.C.						TRIAL PI	T NO.	TP16 Sheet				
.OG	GED BY I.Reder	CO-ORDINAT		738,9	11.87 E 39.93 N		DATE STARTED         08/06/2021           DATE COMPLETED         08/06/2021           EXCAVATION METHOD         3T Mini Digger						
LIE		GROUND LE	/EL (m)	62.02									
NG	NEER DBFL										J.		
	Geotechnical Description				-	rike		Samples		st (KPa)	Hand Penetrometer		
			Legend	Depth (m)	Elevation	Water Strike	Sample Ref	Type	Depth	Vane Test (KPa)	Hand Pe		
0.0	TARMAC		*****	0.10	61.92								
	MADE GROUND (comprised of dark grey a C.L.804)	ngular gravel -											
	Firm, brown, sandy slightly gravelly slightly	silty CLAY	×××××	0.60	61.42		AA156051	Env	0.60-1.00				
.0	Firm, brown, sandy slightly gravelly slightly some subangular cobbles  TP terminated due to possible boulders	silty CLAY with	<b>®</b> _	0.90	61.12 60.92								
	End of Trial Pit at 1.10m												
.0													
3.0													
4.0													
				,									
P d	ndwater Conditions Ty												
tabi	lity able												
	eral Remarks dug for check of any underground services i	in WS16/PC16	the location	00									
r 10	dug for check of any underground services i	II WOID/RCID	ure rocatio	Uri:									



REPORT NUMBER

_												
CON	ITRACT Blanchardstown T.C.						TRIAL PI	T NO.	TP1			
LOG	GED BY I.Reder	CO-ORDINAT	ES	707,0	19.77 E 03.28 N		DATE ST					
		GROUND LE	DATE CO	mental management	CITY PROGRAMMENT PROPERTY							
CLIE	INT INEER DBFL		,	62.68			METHOD	TION	3T M	ini Digg	er	
								Sample	5	œ.	neter	
	Geotechnical Description	Legend (m)	Elevation	Water Strike	Sample Ref	Туре	Depth	Vane Test (KPa)	Hand Penetrometer			
0.0	TARMAC		*****	0.09	62.59							
	MADE GROUND (comprised of dark grey a C.L.804)	ngular gravel -		18575	Anna ta							
	Firm, brown, slightly sandy slightly gravelly of some cobbles	CLAY with	<u> </u>	0.45	62.23		AA156053	Env	0.50-1.00			
	Firm to stiff, brown, slightly sandy gravelly C			0.70	61.98							
	some subangular to subrounded cobbles		0_0									
1.0			3-0	1.20	61.48							
	End of Trial Pit at 1.20m			1.20	01.40							
									1 1			
20			1 1									
20												
3.0												
									1 1			
									1 1			
4.0												
			1 1									
Grov	indwater Conditions											
TP d												
Stab TP s	table											
Gene	eral Remarks		2 12 - 00									
TP17	dug for check of any underground services in	n WS17/RC17 t	he location	n								



REPORT NUMBER

8 8 1 1 of 1 8/2021 8/2021 ini Digger
3/2021 3/2021
3/2021
(Pa)
Vane Test (KPa)
91



REPORT NUMBER

CON	ITRACT Blanchardstown T.C.	00 000000	ree	707.0	04.50=		TRIAL PI			t 1 of 1			
LOG	GED BY I.Reder	CO-ORDINA		738,9	84.58 E 42.44 N		DATE STARTED 08/06/2021 DATE COMPLETED 08/06/2021						
CLIE	INT INEER DBFL	GROUND LE	VEL (m)	62.22			EXCAVATION 3T Mini Digger METHOD						
								Sample	s	0	eter		
	Geotechnical Description		Legend	Depth (m)	Elevation	Water Strike	Sample Ref	Type	Depth	Vane Test (KPa)	Hand Penetrometer (KPa)		
0.0	TARMAC MADE GROUND (comprised of dark grey a	navilar araval		0.07	62.15								
1.0	C.L.804) Soft to firm, brown, sandy gravelly CLAY wit cobbles		0 0 0 0 0 0	1.20	61.89		AA156055	Env	0.50-1.00				
2.0													
3.0													
4.0													
Grou TP d	undwater Conditions lry												
Stab TP s	ility table												
Gene TP19	eral Remarks 9 dug for check of any underground services in	n WS19/RC19	the location	on									



REPORT NUMBER

03	31								250	,,,		
CONT	RACT Blanchardstown T.C.						TRIAL PI	T NO.	TP20	)		
							SHEET	Sheet	Sheet 1 of 1			
.ogg	ED BY I.Reder	CO-ORDINAT	ES	96.13 E 64.60 N		DATE ST						
LIEN		GROUND LEVEL (m) 61.88					EXCAVATION 3T Mini Di METHOD 3T M					
								Sample	s	0	neter	
	Geotechnical Description		Legend	Depth (m)	Elevation	Water Strike	Sample Ref	Type	Depth	Vane Test (KPa)	Hand Penetrometer	
	TARMAC			0.11	61.77							
	MADE GROUND (comprised of dark grey a C.L.804)	ngular gravel -	****									
T	MADE GROUND (comprised of brown/grey gravelly clay, many angular cobbles, lean-movery occasional plastic rubbish)	mottled sandy nix/concrete,		0.40	61.48		AA156090	Env	0.50-1.00			
0	Fig. Land State and State	Mr E. E. I	<u> </u>	1.10	60.78		1 1					
1	Firm, brown, slightly sandy gravelly CLAY w (possible original ground)	ith cobbles	9	1.20	60.68							
1	End of Trial Pit at 1.20m											
2.0												
							1 1					
							1 1					
							1 1					
							1 1					
							1 1					
1.0												
							1 1					
0.0												
					1 1							
	dwater Conditions											
P dry												
tabili	tv											
P sta												
iener	al Remarks											
	dug for check of any underground services i	n WS20/RC20	the location	on								



REPORT NUMBER

CON	TRACT Blanchardstown T.C.						TRIAL PI	T NO.	TP21	1 of 1		
LOG	GED BY I.Reder	CO-ORDINAT		707,1 739,0	36.08 E 30.57 N		DATE ST		17/06/2021			
CLIE	NT	GROUND LE	VEL (m)	61.28			EXCAVA	3T Mi	3T Mini Digger			
ENGI	NEER DBFL						METHOD		1			
							Sample		s	(a)	meter	
	Geotechnical Description		Legend	Depth (m)	Elevation	Water Strike	Sample Ref	Type	Depth	Vane Test (KPa)	Hand Penetrometer	
0.0	TARMAC MADE GROUND (comprised of dark grey a C.L.804)	ngular gravel -		0.08	61.20					+		
1.0	Firm to stiff, greyish brown, slightly sandy gr CLAY with many angular to subangular cob	ravelly silty bles	® - 39 - 3	0.55	60.73		AA156089	Env	0.60-1.00			
	End of Trial Pit at 1.20m		3-	1.20	60.08							
2.0												
3.0												
4.0												
	ndwater Conditions					-	-1		11			
TP di	у											
Stabi	lity able											
TP st												
Gene	eral Remarks dug for check of any underground services i	n WS21/RC21	the location	on								



REPORT NUMBER

23311

TRIAL PIT NO. TP22 CONTRACT Blanchardstown T.C. SHEET Sheet 1 of 1 CO-ORDINATES 707,172.92 E DATE STARTED 17/06/2021 LOGGED BY I.Reder 739,068.23 N DATE COMPLETED 17/06/2021 GROUND LEVEL (m) 61.12 EXCAVATION METHOD 3T Mini Digger CLIENT ENGINEER DBFL Hand Penetrometer (KPa) Samples Vane Test (KPa) Water Strike Geotechnical Description Elevation Sample Depth Depth (m) Type 0.0 TARMAC 0.07 61.05 MADE GROUND (comprised of dark grey angular gravel -C.L.804) 0.55 60.57 Soft to firm, very sandy gravelly silty CLAY with AA156088 0.60-1.00 Env occasional cobbles 1.0 1.20 59.92 End of Trial Pit at 1.20m 2.0 3.0 4.0 **Groundwater Conditions** TP dry Stability TP stable

IGSL.GDT 30/9/21 TP LOG 23311.GPJ

GSL

General Remarks
TP22 dug for check of any underground services in WS22/RC22 the location



## TRIAL PIT PHOTOGRAPHY RECORD

TP 01 (Inspection Pit)



TP 01 - spoil

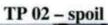




#### TRIAL PIT PHOTOGRAPHY RECORD

TP 02 (Inspection Pit)









#### TRIAL PIT PHOTOGRAPHY RECORD

TP 03 (Inspection Pit)



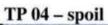




#### TRIAL PIT PHOTOGRAPHY RECORD

TP 04 (Inspection Pit)









## TRIAL PIT PHOTOGRAPHY RECORD

TP 05 (Inspection Pit)



TP 05 – spoil





#### TRIAL PIT PHOTOGRAPHY RECORD

TP 06 (Inspection Pit)



TP 06 - spoil

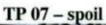




#### TRIAL PIT PHOTOGRAPHY RECORD

TP 07 (Inspection Pit)









#### TRIAL PIT PHOTOGRAPHY RECORD

TP 08 (Inspection Pit)







## TRIAL PIT PHOTOGRAPHY RECORD

TP 09 (Inspection Pit)









## TRIAL PIT PHOTOGRAPHY RECORD

TP 10 (Inspection Pit)



TP 10 – spoil





#### TRIAL PIT PHOTOGRAPHY RECORD

TP 11 (Inspection Pit)









## TRIAL PIT PHOTOGRAPHY RECORD

TP 12 (Inspection Pit)



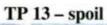
TP 12 – spoil





## TRIAL PIT PHOTOGRAPHY RECORD









## TRIAL PIT PHOTOGRAPHY RECORD

TP 14 (Inspection Pit)









#### TRIAL PIT PHOTOGRAPHY RECORD







#### TRIAL PIT PHOTOGRAPHY RECORD



TP 16 – spoil





## TRIAL PIT PHOTOGRAPHY RECORD

TP 17 (Inspection Pit)



TP 17 - spoil





## TRIAL PIT PHOTOGRAPHY RECORD

TP 18 (Inspection Pit)



TP 18 - spoil

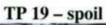




#### TRIAL PIT PHOTOGRAPHY RECORD

TP 19 (Inspection Pit)









## TRIAL PIT PHOTOGRAPHY RECORD

TP 20 (Inspection Pit)







## TRIAL PIT PHOTOGRAPHY RECORD

TP 21 (Inspection Pit)



TP 21 - spoil

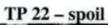




## TRIAL PIT PHOTOGRAPHY RECORD

TP 22 (Inspection Pit)



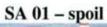






#### TRIAL PIT PHOTOGRAPHY RECORD SA 01



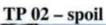






## TRIAL PIT PHOTOGRAPHY RECORD









# TRIAL PIT PHOTOGRAPHY RECORD





# Appendix 2 Window Sample Records



#### WINDOW SAMPLE RECORD

REPORT NUMBER

00	331									233	311	
100000	TRACT Blanchardstown T.C.			@211252.211	1/2		BH NO. SHEET			WS0 Sheet	1 1 1 of 1	
co-c	706,700 E 739,478 N	GROUND LI	EVEL	(mOD)	6	1.13	DATE D				/2021 /2021	
CLIE	NT NEER DBFL						DRILLE			C.Kav	/anagh	
							9				Sampl	es
Depth (m)	Geotechnical Description		Legend	Depth (m)	Elevation	Water Strike	Depth of Sample Run (m)	Recovery (%)	Blowcount	Ref. Number	Sample Type	Depth (m)
0.0	Machine / hand dug inspection pit for services - for a TP01 log	I details see							Insp Pit blow	ection /s		
	Firm, grey mottled brown, sandy gravelly SILT/CLAY		×	0.85	60.28		0.85-1.00	100	81 blow	RA144818		
1.0	Firm to stiff, grey, sandy gravelly SILT/CLAY with any	gular cobbles	- 180 180 180 1	1.10	60.03		1.00-2.00	100	356 blow		ENV	1.00-2.00
2.0	Final Depth 2.00m		DI&CO.	2.00	59.13							
3.0												
Gene	ral Remarks											
Gene	lations											

#### WINDOW SAMPLE RECORD

REPORT NUMBER

0331			THIS OF SAME ALL RESORD								23311				
CON	TRACT Blanchardstown T.C.						BH NO. SHEET			WS0 Sheet	2 1 of 1				
co-c	CO-ORDINATES(_) 706,735 E 739,445 N  CLIENT  ENGINEER DBFL		ROUND LEVEL (mOD) 61.25				The Control of the Park	DATE DRILLED DATE LOGGED							
							100000000000000000000000000000000000000	DRILLED BY LOGGED BY			C.Kavanagh C.H.				
							9			9	es				
Depth (m)	Geotechnical Description		Legend	Depth (m)	Elevation	Water Strike	Depth of Sample Run (m)	Recovery (%)	Blowcount	Ref. Number	Sample Type	Depth (m)			
0.0	Machine / hand dug inspection pit for services - for a TP02 log	ill details see							Inspe Pit blow	ection s		(			
1.0	Dense to very dense, grey, slighlty silty angular GRA angular cobbles	AVEL with	8000	1.20	60.05		1.20-2.00	100	269 blow	AA144816 B	ENV	1.00-2.00			
20	Final Depth 2.00m		5808 BOK 8	2.00	59.25										
3.0															
Gene	eral Remarks														
Insta	llations														



Je	181						-CILD			233	311	
CON	TRACT Blanchardstown T.C.						BH NO. SHEET		_	WS0 Sheet	3 t 1 of 1	
co-o	706,771 E 739,409 N	GROUND LE	VEL	(mOD)	6	1.51	DATE L				/2021 /2021	
CLIE	NT NEER DBFL						DRILLE			C.Kav	vanagh	Ü.
							Φ				Sampl	es
Depth (m)	Geotechnical Description		Legend	Depth (m)	Elevation	Water Strike	Depth of Sample Run (m)	Recovery (%)	Blowcount	Ref. Number	Sample Type	Depth (m)
0.0	Machine / hand dug inspection pit for services - for a TP03 log	III details see							Insp Pit blow	ection s		
1.0	Firm, grey/brown, sandy gravelly silty CLAY			1.20	60.31		1.20-1.50	100	210 blow	AA144803	ENV	1.00-1.50
20	Obstruction - possible rock or boulder Final Depth 1.50m			3.50	55.51							
3.0												
Gene	ral Remarks											
Instal	lations											

03	331									23	311	
CON	TRACT Blanchardstown T.C.						BH NO. SHEET			WS0 Shee	)4 t 1 of 1	
co-c	706,805 E 739,377 N	GROUND LE	EVEL	(mOD)	6	2.16	DATE D			08/06	3/2021	
CLIE	NT INEER DBFL						DRILLE			C.H.	vanagh	
							0			-	Sample	rs .
Depth (m)	Geotechnical Description		Legend	Depth (m)	Elevation	Water Strike	Depth of Sample Run (m)	Recovery (%)	Blowcount	Ref. Number	Sample Type	Depth (m)
0.0	Machine / hand dug inspection pit for services - for all TP04 log	details see							Insp Pit blow	ection s		(
1.0	Firm to stiff, brown to greyish brown, slightly sandy gre SILT/CLAY with some angular cobbles	avelly	<u>*</u> @	1.20	60.96		1.20-1.40	0	133			
	Obstruction - possible rock or boulder Final Depth 1.40m		××	1.40	60.76				blow	5		
20												
3.0												
	eral Remarks											
insta	Illations											



REPORT NUMBER

23311

OGE	37												
CONTR	RACT Blanch	ardstown T.C.						BH NO. SHEET			WS0 Sheet	5 1 of 1	
CO-OR	DINATES(_)	706,840 E 739,345 N	GROUND L	EVEL	(mOD)	6	2.67	DATE D			08/06/		
CLIENT								DRILLE			C.Kav	anagh	
ENGINE	EEK DBFL							LOGGE	БВІ			Sampl	es
Depth (m)		Geotechnical Descript	erin.	Legend	Depth (m)	Elevation	Water Strike	Depth of Sample Run (m)	Recovery (%)	Blowcount	Ref. Number	Sample Type	Depth (m)
0.0 N	Machine / hand dug	inspection pit for services	- for all details see							Insp Pit blow	ection 5		
1.0 S a	Stiff, green/grey, sli angular cobbles	ghtly sandy very gravelly S	ILT/CLAY with many		1.10	61.57		1.10-1.80	100	280 blow	AA149802 S	ENV	1.00-1.80
2.0 C F	Distruction - possit Final Depth 1.80m	ole rock or boulder		\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	1.80	60.87							
	ıl Remarks	*											
Installa	tions												

03	331									233	311	
	TRACT Blanchardstown T.C.						BH NO. SHEET			WS0 Sheet	6 1 of 1	
0-0	706,660 E 739,436 N	GROUND LE	EVEL	(mOD)	6	1.65	DATE D			27/05 27/05		
CLIE	NT NEER DBFL						DRILLE			C.Kav	anagh	
							ple				Sampl	es
Depth (m)	Geotechnical Description		Legend	Depth (m)	Elevation	Water Strike	Depth of Sample Run (m)	Recovery (%)	Blowcount	Ref. Number	Sample Type	Depth (m)
0.0	Machine / hand dug inspection pit for services - for al TP06 log	I details see							Inspe Pit blow	ection		•
1.0	Firm to stiff, dark grey/grey sandy gravelly SILT/CLA	Y	X	1.20	60.45		1.20-2.00	100	302 blow	AA149800	ENV	1.00-2.00
	Dense, dark grey, sandy angular GRAVEL with angu (possible weathered rock)	lar cobbles	11 18 200 8 8	1.50	60.15							
3.0	Final Depth 2.00m			2.00	59.65							
	eral Remarks											

REPORT NUMBER

100	<u>s</u> /									50,000		
CONTRA	ACT Blanchardstown T.C.						BH NO. SHEET			WS0 Sheet	<b>7</b> 1 of 1	
CO-ORD	706,703 E 739,411 N	GROUND LE	VEL	(mOD)	6	1,49	DATE D			27/05 27/05		
CLIENT	ER DBFL						DRILLE			C.Kav	anagh	1
										-	Sampl	es
Depth (m)	Geotechnical Description		Legend	Depth (m)	Elevation	Water Strike	Depth of Sample Run (m)	Recovery (%)	Blowcount	Ref. Number	Sample Type	Depth (m)
0.0 Mi	achine / hand dug inspection pit for services - for al 207 log	II details see							Insp Pit blow	ection /s		
Fir an	rm to stiff, brown/grey mottled, very gravelly SILT/C ngular cobbles	CLAY with many	\$\$\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	1.20	60.29		1.20-2.00	90	322 blow	AA144821	ENV	1.00-2.00
2.0 Fir	nal Depth 2.00m		Q≥	2.00	59.49							
3.0												
General	Remarks											

REPORT NUMBER

CON	TRACT Blanchardstown T.C.			lui Parine			BH NO. SHEET			WS0 Sheet		
co-c	ORDINATES(_) 706,741 E 739,380 N	GROUND L	EVEL	(mOD)	6	1.50	DATE D			08/06/		
CLIE	NT INEER DBFL						DRILLE			C.Kav	anagh	
	The state of the s										Sampl	es
Depth (m)	Geotechnical Description		Legend	Depth (m)	Elevation	Water Strike	Depth of Sample Run (m)	Recovery (%)	Blowcount	Ref. Number	Sample Type	Depth
0.0	Machine / hand dug inspection pit for services - for a TPOB log	all details see							Inspe Pit blow	ection s		
1.0	Stiff, greyish brown, slightly sandy gravelly SILT/CL/ angular to subangular cobbles Obstruction - possible rock or boulder Final Depth 1.10m	AY with some	100	0.95	60.55		0.95-1.10	100	147 blow	AA144809 B	ENV	1.00-1.1
2.0												
3.0												
Gene	eral Remarks											
Insta	llations											



REPORT NUMBER

CON	TRACT Blanchardstown T.C.						BH NO. SHEET			WS0 Sheet	9 1 of 1	7
co-c	706,776 E 739,347 N	GROUND LE	VEL	(mOD)	6	2.09	DATE D			08/06	/2021	
CLIE							DRILLE				anagh	i.
ENG	INEER DBFL		П				LOGGE	DBY		C.H.	Sampl	es
Depth (m)	Geotechnical Description		Legend	Depth (m)	Elevation	Water Strike	Depth of Sample Run (m)	Recovery (%)	Blowcount	Ref. Number	Sample Type	Depth (m)
0.0	Machine / hand dug inspection pit for services - for a TP09 log	all details see							Pit blow			
1.0	Soft to firm, brown, very sandy gravelly CLAY with s	ome subangular	\$1000 G00	1.20	60.89		1.20-2.00	60	126 blow	AA144812 B	ENV	1.00-2.00
20	Final Depth 2.10m			2.00	60.09							
3.0												
Gene	eral Remarks											
Instal	llations											



OG	333		VVII	NDOW	SAMPL	E KEC	OKD			233	11	
CON	TRACT Blanchardstown T.C.	_					BH NO. SHEET			WS1		
0-00	706,626 E 739,402 N	GROUND L	EVEL	(mOD)	6	1.81	DATE D			27/05/ 27/05/	2021	
CLIE	NT NEER DBFL						DRILLE			C.Kav	anagh	
	NEEK DDFL		7. 1		-			001			Sampl	es
Depth (m)	Geotechnical Description		Legend	Depth (m)	Elevation	Water Strike	Depth of Sample Run (m)	Recovery (%)	Blowcount	Ref. Number	Sample Type	Depth (m)
0.0	Machine / hand dug inspection pit for services - for TP10 log	all details see							Inspe Pit blow	ection		,
1.0	Firm, brown/grey mottled, sandy slightly gravelly St occasional cobbles	LT/CLAY with	\$0,100,100,100	1.20	60.61		1.20-2.00	80	233 blow	AA144814	ENV	1.00-2.00
2.0	Final Depth 2.00m		- Qx	2.00	59.81	5						
30												
	eral Remarks											

REPORT NUMBER

1931									233	111	
CONTRACT Blanchardstown T.C.						BH NO. SHEET			WS1 Sheet	<b>1</b>	
CO-ORDINATES(_) 706,670 E 739,360 N	GROUND LE	VEL	(mOD)	6	1.77	DATE D	RILLE		27/05	/2021	
CLIENT ENGINEER DBFL				,		DRILLE			C.Kav	anagh	1
Geotechnical Description		Legend	-fi	Elevation	Water Strike	Depth of Sample Run (m)	Recovery (%)	Blowcount	Ref. Number	Sample Type	
0.0 Machine / hand dug inspection pit for services - for TP11 log	r all details see	Leg	Depth (m)	Elev	Wat	Dep	Rec	150504	ection	San	Depth (m)
1.0 Firm to stiff, brown to greysih brown, slightly sandy SILT/CLAY with many angular cobbles	gravelly		1.00	60.77		1.00-2.00	90	251 blow	AA144823 S	ENV	1.00-2.00
2.0 Final Depth 2.00m		N DISO	2.00	59.77							
3.0											
General Remarks											
installations											

REPORT NUMBER

	TRACT Blanchardstown T.C.		1.3.05		7		BH NO. SHEET			WS1		
:0-0	706,693 E 739,338 N	GROUND LE	EVEL	(mOD)	61	1.83	DATE D			08/06/		
LIE	NT NEER DBFL						DRILLEI			C.Kav	anagh	
	Jon E		П								Sample	es
Depth (m)	Geotechnical Description		Legend	Depth (m)	Elevation	Water Strike	Depth of Sample Run (m)	Recovery (%)	Blowcount	Ref. Number	Sample Type	Depth
1.0	Machine / hand dug inspection pit for services - for a TP12 log	ali detalis see							Pit blow	ection S	ENV	1.00-1
	Firm to stiff, brown, slightly sandy gravelly SILT/CL/ angular cobbles	AY with some	100	1.20	60.63		1.20-1.40	100	161 blow	5		
2.0	Obstruction - possible rock or boulder Final Depth 1:40m											
3.0												
	eral Remarks											



#### IGSL Ltd

#### WINDOW SAMPLE RECORD

REPORT NUMBER

	TRACT Blanchardstown T.C.			16123			BH NO. SHEET			WS1 Sheet	3 1 1 of 1	
CO-C	706,757 E 739,321 N	GROUND LE	EVEL	(mOD)	6	2.41	DATE D			08/06 08/06	/2021 /2021	
CLIE	NT NEER DBFL						DRILLE			C.Kav	vanagh	
	JUL 2	1	П							_	Sample	es
Depth (m)	Geotechnical Description		Legend	Depth (m)	Elevation	Water Strike	Depth of Sample Run (m)	Recovery (%)	Blowcount	Ref. Number	Sample Type	Depth (m)
0.0	Machine / hand dug inspection pit for services - for a TP13 log	ill details see							Inspe Pit blow	ection s		
	Stiff, light brown/brown, slightly sandy gravelly SILT/ angular cobbles	CLAY with	<b>©</b>	0.85	61.56		0.85-1.10	20	210 blow	5		
1.0	Obstruction - possible rock or boulder Final Depth 1.10m		-7	1.10	61.31							
2.0												
3.0												
Gene	ral Remarks											
Instal	lations											

REPORT NUMBER

03	331									233		
CON	TRACT Blanchardstown T.C.						BH NO. SHEET			WS1		
:0-0	707,055 E 739,043 N	GROUND LE	VEL	(mOD)	62	2.38	DATE D			29/06/ 29/06/		
CLIE	NT INEER DBFL			V			DRILLE			C.Kav	1.000.000	
Depth (m)	Geotechnical Description		Legend	Depth (m)	Elevation	Water Strike	Depth of Sample Run (m)	Recovery (%)	Blowcount	Ref. Number	Sample Type	
1.0	Machine / hand dug inspection pit for services - for a TP14 log	Il details see							Pit blow	ection B	ENV B	1.00-1.6
2.0	Firm, light brown mottled grey and black sandy very gravelly si CLAY with occasional cobbles  Obstruction - possible rock or boulder Final Depth 1.60m	gravelly silty	100 C	1.60	61.18	,	1.20-1.60	100	149 blow	5		
3.0												
	eral Remarks Ilations											

REPORT NUMBER

	331		WII	NDOW	SAMPI	LE REC	CORD			233	11	
CONT	TRACT Blanchardstown T.C.						BH NO.			WS1		
co-o	707,091 E 739,009 N	GROUND LI	EVEL	(mOD)	6	2.13	DATE D			29/06/	2021	
CLIE	NT	1					DRILLE	D BY		C.Kav	anagh	i.
ENGI	NEER DBFL		_				LOGGE	DBY		J.C.		EGS
			Ш				9				Sample	es
Depth (m)	Geotechnical Description		Legend	Depth (m)	Elevation	Water Strike	Depth of Sample Run (m)	Recovery (%)	Blowcount	Ref. Number	Sample Type	Depth (m)
0.0	Machine / hand dug inspection pit for services - for a TP15 log	III details see							Inspe Pit blow	ection		
1.0				1.20	60.93					AA169726	ENV B	1.00-2.00
	Firm, greyish brown, sandy gravelly CLAY		0	1.20	00.55		1.20-2.00	100	168 blow	В		
	Medium dense, grey slightly clayey sandy GRAVEL		0-1-1-0-0-0-0	1.60	60.53					AA169727	В	1.60-2.00
2.0	Final Depth 2.00m		10	2.00	60.13							
30							la l					
Gene	ral Remarks											
Install	lations											

03	331		12.537							233	111	
	TRACT Blanchardstown T.C.			2 223			BH NO. SHEET			WS1 Sheet		
CO-C	707,112 E 738,970 N	GROUND LE	VEL	(mOD)	63	2.02	DATE D			29/06 29/06		
CLIE	NT NEER DBFL						DRILLE	D BY		C.Kav		1
							9				Samp	es
Depth (m)	Geotechnical Description		Legend	Depth (m)	Elevation	Water Strike	Depth of Sample Run (m)	Recovery (%)	Blowcount	Ref. Number	Sample Type	Depth (m)
0.0	Machine / hand dug inspection pit for services - for a TP16 log	Il details see							Inspe Pit blow	ection		
1.0	Firm to stiff, grey brown mottled, sandy very gravelly some cobbles	silty CLAY with	Ø   Ø	1.10	60.92		1.10-1.50	50	177 blow	AA169729 B	ENV B	1.00-1.50 1.00-1.50
3.0	Obstruction - possible rock or boulder Final Depth 1.50m			1.50	60.52							
	eral Remarks											



#### IGSL Ltd

#### WINDOW SAMPLE RECORD

De	331		•		Oram i	11-0	OND			233	311	
CON	TRACT Blanchardstown T.C.		(Jr. 1871	C September			BH NO. SHEET			WS1 Shee	7 t 1 of 1	
co-c	707,020 E 739,003 N	GROUND LE	VEL	(mOD)	6	2.68	DATE D				/2021 /2021	
CLIE	NT NEER DBFL						DRILLE			0000000	vanagh	1
											Sampl	es
Depth (m)	Geotechnical Description		Legend	Depth (m)	Elevation	Water Strike	Depth of Sample Run (m)	Recovery (%)	Biowcount	Ref. Number	Sample Type	Depth (m)
0.0	Machine / hand dug inspection pit for services - for a TP17 log	all details see							Inspi Pit blow	ection 'S		
1.0	Firm to stiff, brown, slightly sandy gravelly CLAY with subangular to subrounded cobbles Obstruction - possible rock or boulder Final Depth 1.40m	h some	<u>a</u>	1.20	61.48 61.28		1.20-1.40	100	183 blow	5	ENV	1.00-1.40
2.0												
3.0												
Gene	ral Remarks											
Instal	llations											

03	331									233	311	
	TRACT Blanchardstown T.C.	l anaviri -					BH NO. SHEET				1 of 1	
CO-C	707,054 E 738,968 N	GROUND LE	VEL	(mOD)	6	2.41	DATE D			29/06 29/06		
CLIE	NT INEER DBFL						DRILLE			C.Kav	vanagh ndon	1
							9				Sampl	es
Depth (m)	Geotechnical Description		Legend	Depth (m)	Elevation	Water Strike	Depth of Sample Run (m)	Recovery (%)	Biowcount	Ref. Number	Sample Type	Depth (m)
1.0	MADE GROUND - Tar Machine / hand dug inspection pit for services - for a TP18 log MADE GROUND comprised of firm brownish grey sa gravelly CLAY.  Firm to stiff brown sandy gravelly CLAY	/		0.10	62.31		1,20-2.00	100	Insp Pit blow	ection /s	ENV	1.00-2.00
2.0	Firm to stiff brown sandy gravelly CLAY  Final Depth 2.00m			1.40	61.01		1,20-2,00	100	blow	/B AA153622	В	1.40-2.00
	The Super Court											
Gene	eral Remarks											
Insta	llations											



REPORT NUMBER

23311

CON	TRACT Blanchardstown T.C.	2000 State S	0.000				BH NO. SHEET			WS1 Sheet		
co-c	707,085 E 738,942 N	GROUND LE	EVEL	(mOD)	62	2.22	DATE D			29/06/ 29/06/		
CLIE	NT INEER DBFL						DRILLE LOGGE			C.Kav J. Cor		
Depth (m)	Geotechnical Description		Legend	Depth (m)	Elevation	Water Strike	Depth of Sample Run (m)	Recovery (%)	Blowcount	Ref. Number	Sample Campida Sample Type	Depth (m)
0.0	MADE GROUND - Tar Machine / hand dug inspection pit for services - for al TP19 log MADE GROUND comprised of soft to firm brownish gravelly CLAY.		1	0.10	62:12	>	GE.	Œ		ection	81	
1.0	Soft to firm greyish brown sandy gravelly CLAY.		<b></b>	0.90	61.32						ENV	1.00-2.0
	Soft to firm, greyish brown, sandy gravelly CLAY		49 149 14	1.20	61.02		1.20-2.00	100	85 blow	AA153524 B	В	1.20-1.8
2.0	Soft to firm brownish grey sandy gravelly CLAY. (Exc 2.3m)	ess water from		1.80	60.42		2.00-3.00	90	138 blow	AA153525 B	В	1.80-3.0
	Soft to firm brownish grey vry sandy very gravelly CL	AY.		2.70	59.52							
3.0	Final Depth 3.00m		ō	3.00	59.22							
Gene	eral Remarks											
Insta	llations											

IGSL Ltd

#### WINDOW SAMPLE RECORD

03	131				Oram E					233	311	
CON	TRACT Blanchardstown T.C.						BH NO. SHEET			WS2 Shee	20 t 1 of 1	
co-c	707,096 E 739,065 N	GROUND LE	VEL	(mOD)	6	1.88	DATE D				/2021 /2021	
CLIE	NT INEER DBFL				,		DRILLE LOGGE			C.Ka	vanagh ndon	
											Sampl	es
Depth (m)	Geotechnical Description		Legend	Depth (m)	Elevation	Water Strike	Depth of Sample Run (m)	Recovery (%)	Blowcount	Ref. Number	Sample Type	Depth (m)
1.0	MADE GROUND - Tar Machine / hand dug inspection pit for services - for a TP20 log  MADE GROUND comprised of firm brownish grey sa gravelly CLAY.	/		0.10	61.78				Inspe Pit blow	ection B	ENV	1.00-1.60
	Firm, brown, sandy gravelly CLAY with some cobble		8	1.20	60.68 60.58		1.20-1.60	100	164			
	MADE GROUND comprised of firm brown sandy gra	evelly CLAY.	<b>8</b>	1.50	00.30				blow	5		
3.0												
	eral Remarks											
Insta	llations											

REPORT NUMBER

03	333									233	11	
CON	TRACT Blanchardstown T.C.						BH NO.			WS2		
co-c	ORDINATES(_) 707,136 E	GROUND LE	VEL	(mOD)	6	1.28	DATE D			29/06/		
CLIE	739,031 N	-					DATE L		D	29/06/	/2021 /anagh	7
	NEER DBFL						LOGGE			J. Cor	ndon	
Depth (m)	Geotechnical Description		Legend	Depth (m)	Elevation	Water Strike	Depth of Sample Run (m)	Recovery (%)	Blowcount	Ref. Number	Sample Type	Depth (m)
1.0	MADE GROUND - Tar Machine / hand dug inspection pit for services - for a TP21 log MADE GROUND comprised of firm brownish grey si gravelly CLAY.		**************************************		61.18				Insp Pit blow	ection 's	ENV	1.00-1.6
	Possible weathered rock - MUDDY LIMESTONE rec grey clayey GRAVEL.  Dense, grey, clayey angular GRAVEL with angular of weathered rock)	/	10 00 00 00 00 00 00 00 00 00 00 00 00 0		60.18 60.08		1.20-1.60	100	189 blow	AA153528	В	1.10-1.60
20	Obstruction - possible rock or boulder Final Depth 1.80m											
3.0												
Gene	eral Remarks											
Insta	llations											

REPORT NUMBER

1337										250		
CONTRACT Blanchardstown	ı T.C.						BH NO. SHEET			WS2 Sheet	2 1 1 of 1	
CO-ORDINATES(_) 707,17 739,06	3 E 8 N	GROUND L	EVEL	(mOD)	6	1.12	DATE D			29/06 29/06		
CLIENT ENGINEER DBFL							DRILLE LOGGE			J. Co		
Depth (n	nical Description		Legend	Depth (m)	Elevation	Water Strike	Depth of Sample Run (m)	Recovery (%)	Blowcount	Ref. Number	Sample Type	
0.0 Machine / hand dug inspection TP22 log	n pit for services - for	all details see							Inspe Pit blow	ection B	ENV	1.00-1.1
Firm to stiff, sandy gravelly sit  Obstruction - possible rock or Final Depth 1.50m			(2) 1 (4)	1.20	59.92		1.20-1.50	100	159 blow	s		
General Remarks												

# Appendix 3 Rotary Corehole Records



REPORT NUMBER

100	2												$\perp$			
ONTR	ACT	В	lanch	nardstown T.C.							DRILI	LHOLE	NO	RC	01 et 1 of 2	10
O-ORE			(mOl	706,700.34 E 739,477.88 N D) 61.13	k		RIG TYPE FLUSH			BT - 44 Air/Mist	DATE	DRILLI		08/0	6/2021 06/2021	
LIENT NGINE	ER	D	BFL				INCLINATI	ON (deg) METER (mi	m)	-90 78	100000000	LED BY GED BY			SSL .O'Shea	6/
Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing Log (mm)	Non-intact Zone	Legend			Descript	tion			Depth (m)	Elevation	Standpipe Details	SPT (N Value)
						00000000	as returns	of clayey (	GRAVEL	covery, obse	NEW.		2.10	59.03		
2.80	100	83	53				Weak to s fine-grain local sand	strong, thick	Calised pyr	bedded, bla fominantely ite crystallis	muddy wit	rey, th	2.80	58.33		
4.30				Ė			planar to l moderate iron-oxide	locally curv ly open, loc	iplanar. Apo ally clay-sn cally calcite	sely spaced ertures are neared, loca e-veined (1-	tight to locally slightly	0000			0 0 0	
5.80	100	87	67	L	640										0 0 0	
7.30	100	95	78													
8.80	100	61	55	<b>F</b>	6.3											
	100	91	91													
ele ca	_	0 83 53				the	Water	Casing	Sealed	Rise	Time	1		TRIKE D	ETAILS	
ole ca:	sed (	.00-2	2.80r	n, Erect Covid-19	Safe	Zone	- 1hr	Strike	Depth	At At	To	(min)		mmen lo wate		recorde
io.		(mm)						D.:	Hole	Casing	Depth to		200000		WATER	DETAILS
						75		Date	Depth	Depth	Depth to Water		ment			
Date 9-06-2								09-06-21	10.20	2.80	2.10	drilling	sevel re	corded 5	mins after	end of



REPORT NUMBER

12	33	3													_	331	1
co	NTRA	ACT	В	lanc	hardstown	n T.C.						33355	LHOLE	NO	RC		4
0:	ORD	INAT	TES	_	706,70	0.34 E						SHE				et 2 of 2	
					739,47	7.88 N			RIG TYPE		BT - 44	22,000	E DRILLI E LOGGI			6/2021 6/2021	
	ENT	D LE	VEL	(mO	D)	61.13	_	-	FLUSH INCLINATION (deg)		Air/Mist -90	-	LED BY		2,230	SL	
	SINE	ER	D	BFL					CORE DIAMETER (n	nm)	78		GED BY			O'Shea	a .
Ê	0																
Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Frac Spac Lo (mi	cing og m)	Non-intact Zone	Legend		Descript	ion			Depth (m)	Elevation	Standpipe Details	SPT (N Value)
0	10.20							Ι.	End of Borehol	e at 10 20 m	1			10.20	50.93	0 0	
11 12 13 14																	
18																	
9																	
E	MARI	KS												WAT	ER ST	RIKE D	DETAIL
-	_		.00-2	2.80r	m. Erect C	Covid-19	Safe	Zone	1hr Water Strike	Casing Depth	Sealed At	Rise To	Time (min)		mmen		
ol									Suite	Бериг	71	.0	Amin's	N	o wate	r strike	record
ol																	
lol														GRO	DUNDY	VATER	DETA
	TALL	LATIC	ON D	ETA	ILS				Date	Hole Depth	Casing Depth	Depth to Water	Com	GRO		VATER	DETA



REPORT NUMBER

O-OR	DINA	TES		706,734 739,445	.91 E			RIG TYPE FLUSH			BT - 44 Air/Mist	200000	100 - 2 mm	ED	09/0	et 1 of 6/2021 6/2021	
LIENT		D	BFL					INCLINATI CORE DIA		m)	-90 78		LED BY			SL O'She	a
Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fract Spac Log (mn	sing g n)	Non-intact Zone	Legend			Descrip	otion			Depth (m)	Elevation	Standpipe Details	SPT (N Value)
							000000000000000000000000000000000000000	as returns	RIX DRILL of clayey	ING: No re GRAVEL	covery, obs	erved by d	riller	2 30	58.95		
							Ť	SYMMETI as returns	RIX DRILL of ROCK	ING: No re	covery, obs	erved by d	riller	2.50	30.83		
3.00	100	62	36			4		fine-graine local sand locally slig	ed, LIMES ly layers, k thtly weath	TONE (pre ocalised py ered.	bedded, bl dominantely rite crystallis	y muddy wi sation), fre	th sh to	3.00	58.25		
4.30	-					/ 5 1		planar to I	ocally curv	iplanar. Ap	sely spaced ertures are meared, loc	tight to loc	ally				
	100	65	25	Ē		A L v		iron-oxide	stained, lo	ocally calcit ocally 50°.	e-veined (1	-25mm this	ck).				
5.80	100	79	65														
7.30	100	90	86	F													
8,80	77			L													
10.00	100	78	51			Assy	H										
EMAR								End o	of Borehole	at 10.00 r	n		_	10.00 WAT	-	RIKE	DETAIL
ole ca	sed (	0.00-3	3.00m	n. Erect Co	ovid-19	Safe	Zone	- 1hr	Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Co	mment	s	record
														GRO	UNDW	ATER	DETAI
ISTAL	LATI	ON D	ETAI	LS					Date	Hole	Casing	Depth to Water	Com	ments			22174
Date	1	Γip De	epth	RZ Top	RZ Base		Тур	е	10-06-21	Depth 10.00	Depth 3.00	1.90	_	level rec	corded 5	mins afte	r end of



REPORT NUMBER

1 खड	15/														-	00 .	
NTR	ACT	В	lanc	hardstow	m T.C.							DRII	LLHOLE	NO	RC	03	
).OPI	DINA	TES		706 77	11 10 E							SHE	ET		Shee	et 1 of	1
			/m0	739,40	9.42 N						BT - 44	2,535,000			100000000000000000000000000000000000000		
		VEL	(mO	U)	61.51		_	FLUSH	10N/-1>		Air/Mist	1077001		77.7	10097103		
		D	BFL	A-1				The Company of the Co	Particular Control of the Control of	m)	-90 78	37507	SON TO SON OW				а
2																	
Core Run Depth (r	T.C.R.%	S.C.R.%	R.Q.D.%	Spa Li (m	og om)	Non-intact Zone	Legend			Descrip	otion			Depth (m)	Elevation	Standpipe Details	SPT (N Value)
							_0	SYMMET	RIX DRILLI	NG: No re	covery, obs	served by	driller				
							0	as return	s of gravelly	CLAY							
	PACT Blanchardstown T.C.  DINATES 706,771.10 E 739,409.42 N RIG TYPE FLUSH INCLINATIO CORE DIAM  PACT DISTRIBUTION 61.51  Fracture Spacing Log (mm)  Distribution of Spacing Log (mm)  Distribution of Spacing Log (mm)  Distribution of Symmetric as returns of Symmetric as																
							- 0										
							_0_							1.50	60.01		
											covery, obs	served by	triller				
							20		o or orayo, c	31011166							
							00-										
							100							2 90	58 61		
3.00	-		-	1	8	ÁΨλ	Ť			NG: No re	covery, obs	served by	friller				
	100	10		_	j	+ 1		New species and administration of the contract	elizabel common folicimi materialismos	ly to thinly	hedded hi	lack/dark o	rev				
	100	10	0			124	H	fine-grain	ed, LIMEST	ONE (pre	dominantel	y muddy w	rith				
4.00	-			_		7		local sand	dy layers, lo ghtly weathe	calised py ered.	rite crystalli	sation), fre	sh to				
							T	Discontin	uities are wi	idely to cla	selv space	d smooth					
	100	97	92			580	T	planar to	locally curvi	planar. Ap	ertures are	tight to lo	cally				
							H	moderate iron-oxide	ely open, loca e stained, loc	ally clay-sı callv calcit	meared, loc e-veined (1	ally slightl	y ck).				
5.30	_					5/0	F	Dips are	10°-20° & lo	cally 50°.			2000				
	100	94	63				F										
6.00							F										
	100	96	74				H										
6.70	,,,,	-	17			_	H										
2.000							H										
	TD0090	No.			_		H										
	100	95	70			_	$\Box$										
				-			1										
8.20		-					T										
8.50	100	77	50				T										
							T										
	100	50	40				T										
		-	10	-		A + A	-										
10.00						23	T						8	10.00	51 51		
								End			-	195 N				RIKE	DETAILS
le cas	sed 0	0.00-3	3.00n	n. Erect (	Covid-19	Safe	Zone	- 1hr	Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Co	mment	S	
														N	o water	r strike	recorde
														CDC	N INION	IATER	DETAIL
TALI	ATI	ON D	ETAI	15					Date	Hole	Casing	Depth to	Com			MICK	DETAIL
CONTRACT   Blanchardstown T.C.     CONTRACT   State   CONTRACT   Sta								mins afte	r and of								
	Τ'	ope day	-	100	, and a second		- 16		NAME !	10.00	3.00	1.50	drilling		- material of	and	and M
Date	1	ip De	epth	RZ Top	RZ Base		Тур	e	29-06-21				Water		corded 5	mins afte	r end of



REPORT NUMBER

1	33	7																
100	NTR	ACT	BI	anch	nardstown	T.C.							DRIL	LHOLE	NO	RC0 Shee	14 t 1 of	1
:0-	ORE	OINA'	TES		706,805									DRILL	ED		3/2021	
20/	OLIN	DIE	vei i	-01	739,377				RIG TYPE			BT - 44	0.000	LOGG			3/2021	
			VEL (	mOl	J)	62.16	_	_	FLUSH			Air/Mist	25,5510	10000	200	2 (0.00)		
	ENT		DE	BFL					CORE DIA		n)	-90 78	2500000	LED BY GED BY		IG:	SL O'She	
Т		LK		DFL					CORE DIA	METER (IIII	",	70	LOG	JED D			O Sile	a
Downlose Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Frac Spac Lo (mi	cing g m)	Non-intact Zone	Legend			Descript				Depth (m)	Elevation	Standpipe Details	SPT (N Value)
									SYMMETI as returns		NG: No rec	covery, obse	erved by d	riller	1 50	60.66		
								000	as returns	RIX DRILLI of clayey 0	NG: No red SRAVEL	covery, obse	erved by d	riller	1,50	00.00		
								000	1						2 70	59.46		
	3.00							Ĭ,			NG: No rec	covery, obs	erved by d	riller		59.46		
1	3.00								as returns	of ROCK			New Agents of Agents	/	3.00	59.16		
1								1	Weak to s	strong, thick	ly to thinly ONE (prec	bedded, bla dominantely	ack/dark gr muddy wi	rey, th				
		100	54	28				H	local sand	ly layers, lo	calised pyr	ite crystallis	sation), free	sh to				
	13-50.4							H	locally slig	htly weather	ered.							
1	4.25		-	-				$\Box$	Discontinu	uities are w	dely to clos	sely spaced	, smooth,	-11				
												ertures are neared, loca						
		100	79	61					iron-oxide	stained, lo	cally calcite	e-veined (1-	-10mm thic	:k).				
1		100	1,90)	31					Dips are 1	10°-20° & lo	cally 50°.							
	5.65								1									
	2.00							H	1									
					田太	•	A=2		1									
		100	78	74	عكو			廿	1									
1	7.00								1									
								-	1									
									1									
		100	90	72														
1								1										
	8.50					1												
		100	58	42			401											
1	9.00			-	William.		5 11 1	1	-									
			1322	7,200	10			T.	1									
		100	92	65				1	1									
	10.00								1						10.00	52.16		
-	MAR	_								of Borehole				-	WA	TER ST	RIKE	DETAILS
oli	e ca	sed (	0.00-3	3.00r	m. Erect (	Covid-19	Safe	Zone	- 1hr	Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Co	mment	s	
															N	lo water	r strike	recorded
												-			GR	OUNDW	VATER	DETAILS
ıs	TAL	LATI	ON D	ETA	ILS					Date	Hole Depth	Casing Depth	Depth to Water	Con	nment	s		
1	Date	1	Tip De	epth	RZ Top	RZ Base	9	Ту	pe	30-06-21	10.00	3.00	4.40	Water		corded 5	mins afte	er end of
														drilling	9-			



REPORT NUMBER

	NTR			anch	nardstown T.C.						SHE	LHOLE N ET	10	Shee	15 et 1 of	1
		INA	-0000	/m01	706,839.82 E 739,345.44 N			RIG TYPE		BT - 44	94060896	DRILLE			7/2021	
	ENT	DLE	VEL	lOmj	D) 62.67			FLUSH INCLINATION (deg		Air/Mist -90		LED BY	TO C	STOSSO	SL	V
	SINE	ER	D	BFL				CORE DIAMETER		78	20738003	GED BY	-		O'She	a
Ê	(h														Touris	
Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing Log (mm)	Non-intact Zone	Legend		Descri	ption			Depth (m)	Elevation	Standpipe Details	SPT (N Value)
0							=	SYMMETRIX DR		ecovery, obs	erved by d	riller				
1							0	SYMMETRIX DR	71	ecovery obs	erved by d		1.50	61.17		
2								as returns of grav			u by u	33336				
							7	SYMMETRIX DR	LLING: No re	acovery ober	erved by d		2.60	60.07		
3	3.00	_					H	as returns of ROC	K			3	3.00	59.67		
						Λ. λ.	$\perp$	Weak to strong, to fine-grained, LIMI	STONE (pre	edominantely	muddy wi	th				
		100	61	7		7	1	local sandy layers locally slightly we	, localised by athered.	rite crystailis	sation), fre	on to				
4							井	Discontinuities an	widely to cle	osely spaced	i, smooth,	aller				
	4.50				F		-	planar to locally c moderately open,	locally clay-s	meared, loca	ally slightly	158				
5							+	iron-oxide stained Dips are 10°-20°	, locally calci & locally 50°.	te-veined (1-	-omm thick	).				
9		100	74	41			T.									
	0.00						1									
6	6.00															
			500													
,		100	83	66			Ť									
	7.50															
	ACOTATA.						4									
8		100	82	67			+									
		100	JE	31	190	XG 50	+									
	9.00						1									
9							1									
	2021	100	92	78								7/	2020			
	MARI	(S		-				End of Borel	ole at 10.00	m			Name and Address of the	52.67 ER ST	RIKE	DETAILS
tole	cas	ed 0	.00-3	.00n	n. Erect Covid-19	Safe	Zone	- 1hr Wate Strike		Sealed At	Rise To	Time (min)	T	mment		
													N	o water	strike	record
									Ual-	Casina	Do-ett 1	_	GRO	UNDW	ATER	DETAIL
		ATIC			7292		-	Date	Depth		Depth to Water	_	1		1	
_ (	Date	-11	ID D	ptn	RZ Top RZ Base	3	Typ	e 01-07-	10.00	3.00	4.20	Water le	rvel re	corded 5 r	mins afte	er end of



REPORT NUMBER

435	2																
ONTR	ACT	В	lanci	hardstown	T.C.							DRILL	LHOLE	NO	RCC	6 t 1 of 1	
D-ORI			(mO	706,660 739,436 D)				RIG TYPE			BT - 44 Air/Mist	DATE	DRILLE		02/06	3/2021 3/2021	
LIENT		D	BFL					INCLINATI	ON (deg) METER (mr	m)	-90 78	100000000000000000000000000000000000000	LED BY		IG D	SL O'Shea	
T																	
Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fractu Spaci Log (mm	ing ) n)	Non-intact Zone	Legend			Descript				Depth (m)	Elevation	Standpipe Details	SPT (N Value)
							000000000000000000000000000000000000000	as returns	RIX DRILLI	GRAVEL				2.30	59.35		
							井	as returns	RIX DRILLI of ROCK	NG: No red	covery, obse	erved by dr	riller				
3.00	_			_				Weak to s	strong, thick	ly to thinly	bedded, bla	ick/dark gr	ey.	3.00	58.65		
4.50	100	71	25	F				Weak to strong, thickly to thinly bedded, black/dark grey, fine-grained, LIMESTONE (predominantely muddy with local sandy layers, localised pyrite crystallisation), fresh to locally slightly weathered.  Discontinuities are widely to closely spaced, smooth, planar to locally curviplanar. Apertures are tight to locally moderately open, locally clay-smeared, locally slightly iron-oxide stained, locally calcite-veined (1-20mm thick).  Dips are 10°-20° & locally 50°.									
6.00	100	86	42	F				Dips are	e stained, lo 10°-20° & lo	cally calcite cally 50°.	e-veined (1-	20mm thic	<b>*</b> ).				
7.50	100	84	39	F													
9.00	100	92	71														
10.00	100	97	97			1000								10.00	E1 05		
MAR	KS	-							of Borehole						51.65 ER ST	RIKE [	ETAIL
le ca	sed (	0.00-3	3.00r	n. Erect Co	ovid-19	Safe	Zone	- 1hr	Water Strike	Casing Depth	Sealed At	Rise To	Time (min)		mment o wate		recorde
													_	GRO	DUNDV	ATER	DETAIL
STAL		1.1						(e) to la	Date	Hole Depth	Casing Depth	Depth to Water	Com	ments	3		
Date		Tip D	epth	RZ Top F	RZ Base	В	Ту	oe .	04-06-21	10.00	3.00	3.20	Water		corded 5	mins afte	rend of
						1			1	1							



REPORT NUMBER

ONT				anch	ardstown T.C.						DRILI	LHOLE I	NO	Shee	)7 et 1 of	1
		NAT LEV		(mOE	706,702.56 E 739,411.01 N 0) 61.49			RIG TYPE FLUSH		BT - 44 Air/Mist		DRILLE			6/2021 6/2021	
LIEN	NEE	R	DI	BFL				INCLINATION (deg) CORE DIAMETER (r	nm)	-90 78		LED BY			SL O'She	а
Downnoie Depth (m)	Core Kun Deptn (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing Log (mm)	Non-intact Zone	Legend		Descrip	ition			Depth (m)	Elevation	Standpipe Details	SPT (N Value)
							000000000000000000000000000000000000000	SYMMETRIX DRILL as returns of clayey		covery, obs	erved by dr		2 30	59.19		
r							Ť	SYMMETRIX DRILL as returns of ROCK	ING: No re	covery, obs	erved by dr		2.00	33.13		
3.	00	_	_	_		( )	中	Weak to strong, thic	kly to thinly	hardad hi	ack/dark or		3.00	58.49		
4.	50	100	79	64	Ŀ	( : h		fine-grained, LIMES local sandy layers, locally slightly weat Discontinuities are planar to locally cur moderately open, ic	STONE (pre- ocalised py- nered. widely to clo viplanar. Ap- cally clay-si	dominantely rite crystallis sely spaced ertures are meared, loc	y muddy wit sation), fres d, smooth, tight to locally slightly	th sh to ally				
6.		100	91	74	F			iron-oxide stained, Dips are 10°-20° &	ocally 60°.	e-veined (1	-2mm tnick	1				
7.5	50	100	56	41												
9.	00	100	75	59		0.236										
10	00	100	92	84				End of Boreho	e at 10.00	,		1		51.49	DIVE	DETAIL
	case		00-3	.00m	. Erect Covid-19	Safe	Zone	- 1hr Water	Casing	Sealed	Rise	Time (min)	1	mment		DETAILS
								Strike	Depth	At	То	(min)				record
													GRO	DUNDV	VATER	DETAIL
STA	ALL	ATIO	N D	ETAII	LS			Date	Hole Depth	Casing Depth	Depth to Water	Com	ment	3		
Da	ate	Ti	p De	pth	RZ Top RZ Base	2	Typ	e 11-06-21	10.00	3.00	1.95	_		corded 5	mins aft	er end of



REPORT NUMBER

ON	TRA	СТ	В	lanch	ardstow	n T.C.							DRIL	LHOLE	NO	RC	08 et 1 of	
		INAT		(mOI	706,74 739,37				RIG TYPE FLUSH			BT - 44	DATE	DRILL		23/0	6/2021	
LIE	NT		-	BFL					INCLINATI	ON (deg) METER (mr	m)	Air/Mist -90 78		LED BY			SL O'Shea	
(11)	(m)	.0	.0	و														
	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Frac Spa Lo (m	cing og m)	Non-intact Zone	Legend			Descrip	tion			Depth (m)	Elevation	Standpipe Details	SPT (N Value)
								0 0 0 0	SYMMET as returns	RIX DRILLI s of gravelly	NG: No rec CLAY	covery, obs	erved by d	riller	240	50.10		
r								T	SYMMET	RIX DRILLI	NG: No rec	covery, obs	erved by d	riller	2.40	59.10		
3	.00								Weak to s	strong, thick ed, LIMEST dy layers, lo	ONE (pred	dominantely	muddy wi	th	3.00	58.50		
4	.50	100	81	45	Ł				Disconting planar to moderate	ghtly weather uities are w locally curving ly open, locally stained, locally	ered. idely to clos planar. Apo ally clay-sn	sely spaced ertures are neared, loc	i, smooth, tight to loc	ally				
	.00	100	81	55					Dips are 1	10"-20" & lo	cally 60".	, romos (						
		100	84	65														
7	.50	100	89	77	ì													
9	00	100	09	11.														
	0.00	100	83	68				臣										
-	AR	(S					CHAZ	_	End	of Borehole	at 10.00 m	1				51.50 ER ST	RIKE D	ETAILS
le	cas	ed 0	.00-3	3.00m	n. Erect (	Covid-19	Safe	Zone	- 1hr	Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Co	mment	s	recorde
															GRO	UNDW	ATER	DETAIL
ST	ALL			ETAI	1000					Date	Hole Depth	Casing Depth	Depth to Water	Com	ments			
D	ate	T	ip De	epth	RZ Top	RZ Base		Typ	oe	23-06-21	10.00	3.00	3.20			corded 5	mins after	end of



REPORT NUMBER

_	33	_		500000	MARCH, PONE POLICE						- Inc.		Ţ	741142	u-61	
CO	NTR	ACT	В	lanch	ardstown T.C	*					DRIL	LHOLE I	NO	RC	09 et 1 of 1	
СО	-ORE	NAIC	TES		706,776.26							E I E DRILLE	n		6/2021	_
C.P.	OLIN	DIE	VEI	(mOD	739,346.97	.09		RIG TYPE		BT - 44		ELOGGE			6/2021	
-	ENT	U LL	VEL	(IIIOD	02	.08		FLUSH INCLINATION (deg		Air/Mist -90	DRII	LED BY		_	SSL	
	SINE	ER	D	BFL				CORE DIAMETER		78	550000	GED BY			.O'Shea	
6	2															
Downhole Depth (m)	Core Run Depth (m)	%	%	%	Fracture	e									Standpipe Details	_
e De	De	T.C.R.%	C.R.	O.D.	Spacing Log	% Non-intact Zone	3		Descri	otion			_		e D	SPT (N Value)
of	R	-	S	œ	(mm)	intag	B						E	tion	혚	ž
DOWN	Sore			l l	250	500	Legend						Depth (m)	Elevation	tan	PT
0	-			-	250	- III		SYMMETRIX DRI	LING: No re	covery obs	erved by d	riller		ш		0)
							==	as returns of grave	elly CLAY	covery, obs	cived by c					
							0_									
1							-3									
													1.50	60.59		
							000	SYMMETRIX DRII as returns of claye	LING: No re y GRAVEL	covery, obs	erved by d	riller				
2							°a0									
							00	SYMMETRIX DRI	LING: No re	covery, obs	erved by d	riller	2.40	59.69	∘ 🗒 ∘	
	3.00							as returns of ROC	K	7, 556			3 00	59.09	•    •	
3	3,00					100	1	Weak to strong, th	ickly to thinly	bedded, bl	ack/dark g	rey.	3.00	39.08		
		100	51	11		6.12	1	fine-grained, LIME local sandy layers,	localised py	dominantely rite crystallis	muddy w sation), fre	sh to				
	4.00	1.53	and the			-		locally slightly wea	thered.	r. 100 (100 (100 (100 (100 (100 (100 (100		100000			0	
4							H	Discontinuities are planar to locally cu	widely to clo	sely spaced	d, smooth,	ally			• 📑 •	
		275.0	eg talak	200				moderately open,	ocally clay-s	meared, loc	ally slightly	,			• 📑 •	
		100	89	74				iron-oxide stained, Dips are 10°-20° 8	locally calcil locally 60°.	e-veined (1	-smm thick	0.			• 🗐 •	
5	57237						-								• 🗐 •	
	5.50						-								• <b>∃</b> •	
							-									
5		100	92	83		510										
						510	$-\Box$								。目。	
,	7.00					2									°E°	
ं							-									
		100	55	111			1									
В			-		77		T								• 🗐 •	
	8.50					1000	H								·    •	
9						-										
		100	91	84												
	0.00						1						0.00		E I	
_	MARI	(S						End of Boreho	ole at 10.00 r	n				52.09 ER ST	RIKE D	ETAILS
lole	cas	ed 0	.00-3	.00m	Erect Covid-	19 Safe	Zone	- 1hr Water Strike	Casing Depth	Sealed At	Rise To	Time (min)		mmen		
												N = 15-	N	o wate	r strike	recorde
NI.S									Hole	Casing	Don'th t-		_		VATER	DETAIL
48	TALL Date			ETAIL	S RZ Top   RZ B	nac	Typ	Date	Depth	Depth 300	Depth to Water				mins after	11 11 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
1.5	ATTENDED	1.1	- en 2 14	STREET, SA	Z TOD IRZ B	and No. of St.	LVI	e 25-06-2	1 10.00	3.00	2.40	1 Montar le	MARKET PARK	nominal 6	STREET, SQUARE,	end of



REPORT NUMBER

-OR	DINA	res	500550	706,626 739,401	3.36 E 1.60 N			RIG TYPE			BT - 44	SHEE	T DRILLI LOGGI	ED	01/06	0 t 1 of 3/2021 3/2021	
IENT		2.0	BFL	)	61.81			INCLINATION CORE DIA	ON (deg) METER (mr	n)	Air/Mist -90 78	DRIL	LED BY		IG	20	
Girec	LIN		1					CORE DIA	me ren (iiii		70	LOOK	JLD DI			OSITE	
Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fract Spac Lo (mr	cing g n)	Non-intact Zone	Legend			Descripti	on			Depth (m)	Elevation	Standpipe Details	SPT (N Value)
							000000000000000000000000000000000000000	as returns	RIX DRILLI of clayey C RIX DRILLI of gravelly	SRAVEL	overy, obse			1.50	60.31		
							7	SYMMET	RIX DRILLI	NG: No rec	oueni obei	ned by d	riller	2.60	59.21		
3.00	_						H	as returns	of ROCK		1.50			3.00	58.81		
4.50	100	33	14	<u>L</u>		GY Gy Gy		fine-graine local sand locally slig Discontinu planar to I moderatel	strong, thick ed, LIMEST dy layers, lo ghtly weather uities are with locally curving ly open, loc	ONE (predicalised pyritered.)  dely to close planar. Apeally clay-sm	ely spaced rtures are	muddy wi ation), fres , smooth, tight to loc ally slightly	th sh to ally				
6.00	100	81	63	E					e stained, lo 10°-20° & lo		-veined (1-	80mm thic	:k).				
7.50	100	75	58		ı												
9.00	100	69	47	Ē		ARA											
	100	77	39				片										
10.0		2001					1							10.00	51.81		
MAF	*							End	of Borehole							RIKE	DETAIL
e ca	sed (	0.00-3	3.00m	. Erect C	Covid-19	Safe	Zone	- 1hr	Water Strike	Casing Depth	Sealed At	Rise To	Time (min)		mment o wate		record
														CDC	W INCOM	IATED	DETAI
	LATI	ON D	ETAII	e		_			Date	Hole	Casing	Depth to Water		10000	4.1	AIER	DETA
TAI										Depth	Depth	Depth to	Carr	ments			



REPORT NUMBER

COI	NTR	ACT	В	ianci	hardstown T.C.							DRIL	LHOLE ET	NO	RC1	11 et 1 of	1
		D LE		(mOl	706,670.39 E 739,359.93 N D) 61.77			RIG TYPE FLUSH			BT - 44 Air/Mist	DATE	DRILLI LOGG		22/0	8/202	1
10.75	ENT		D	BFL	y			INCLINATI		nm)	-90 78	0.500.000	LED BY GED BY			SL O'She	a
Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing Log (mm)	Non-intact Zone	Legend			Descrip	tion			Depth (m)	Elevation	Standpipe Details	SPT (N Value)
1									RIX DRILL of CLAY	.ING: No re	covery, obs	erved by d	riller	and the same of th			
							0_0	SYMMET as returns	RIX DRILL of gravell	ING: No re y CLAY	covery, obs	erved by d			59.67		
2							H		RIX DRILL of ROCK		covery, obs	erved by d		2.10	33.07		
3	3.00	100	69	15		6-14		fine-grain	ed, LIMES	TONE (pred ocalised pyr	bedded, bla dominantely ite crystallis	muddy wi	rey, th	3.00	58.77		
	4.50	,00	us	13	Ė			Discontinu planar to I moderate	uities are v locally curv ly open, lo	videly to clo viplanar. Ap cally clay-sr	sely spaced ertures are neared, loca e-veined (1-	tight to loc ally slightly					
5		100	77	61				Dips are 1	10°-20° & I	ocally 60°.	- Turned (1		7				
3	6.00	100	88	54													
	7.50					750											
3		100	88	82													
	9.00	100	84	75		(43)								des stanta			
	0.00	(S		_				End	of Borehole	e at 10.00 n	1			or the same of the same of	51.77 ER ST	RIKE	DETAILS
lole	e cas	ed 0	.00-3	.00m	n. Erect Covid-19	Safe	Zone	- 1hr	Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Co	mment	s	record
NST	TALL	ATIC	N DI	ETAII	LS				Date	Hole	Casing	Depth to Water	Come	GRO		ATER	DETAIL
7.50	ate			DES 15	RZ Top RZ Base		Тур	e	22-06-21	Depth 10.00	Depth 3.00	Water 2.60	_	evel rec	corded 5 r	nins afte	er end of



REPORT NUMBER

1997															
ONTRACT	В	lanch	nardstown T.C.							DRILL	HOLE	NO	RC1	2 t 1 of 1	
O-ORDINA		(mOl	706,692.68 E 739,338.09 N D) 61.83			RIG TYPE FLUSH			BT - 44 Air/Mist	DATE	DRILLE		18/06	3/2021	
IENT GINEER	D	BFL				CORE DIAM		n)	-90 78	100000000000000000000000000000000000000	ED BY		IG D.	SL O'Shea	ì
Core Run Depth (m) T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing Log (mm)	Non-intact Zone	Legend			Descript	ion			Depth (m)	Elevation	Standpipe Details	SPT (N Value)
					000000000000000000000000000000000000000	as returns	of clayey C	GRAVEL	overy, obse		4.00	2.40	59.43		
3.00			L		茊	as returns	of ROCK		overy, obse			3.00	58.83		
100	69	37		-		Weak to st fine-graine local sandy locally slight Discontinui planar to lo moderately	h h to								
100	81	66		0.30		iron-oxide Dips are 10	stained, lo	cally calcite	e-veined (1-	15mm thic	k).				
7.50	92	67		590.000	0000000										
9.00	75	55		634											
100	82	72			H										
MARKS	1					Fnd A	f Borehole	at 10.00 m	1				51.83	DIKE	DETAIL
	0.00-	3.00r	m. Erect Covid-19	Safe	Zone		Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Co	mment	s	
												N	o wate	rstrike	record
				_			7255	Hole	Casing	Denth to	To:			VATER	DETAI
STALLAT	1			-1	-		Date	Depth	Depth	Depth to Water	_	ment			
Date	Tip D	epth	RZ Top RZ Bas	e	Ty	De .	21-06-21	10.00	3.00	2.30	Water		corded 5	mins afte	rend of



REPORT NUMBER

ONTR	A01-3C1	0.75	lanc	hardstow	000 18 550000							DRI	ET	NO	RC'	13 et 1 of	1
O-ORI			(mO	739,32	56.55 E 21.20 N 62.41			RIG TYPE			BT - 44 Air/Mist	100	E DRILL E LOGG			6/2021 6/2021	
NGINE		D	BFL						ION (deg) AMETER (m	m)	-90 78		GED B			SL O'She	а
Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Spa L (m	cture acing og nm)	Non-intact Zone	Legend			Descrip	tion			Depth (m)	Elevation	Standpipe Details	SPT (N Value)
							0 0	SYMMET as returns	RIX DRILL s of gravelly	ING: No red	covery, obs	erved by o	driller	1.50	60.91		
							00000	as returns	RIX DRILL s of clayey (	GRAVEL	550				60.01		
3.00	100	85	61	E				Weak to s fine-grain local sand	s of ROCK strong, thick ed, LIMEST dy layers, lo ghtly weath	ONE (pred calised pyr	dominantely	muddy w	ith	3.00	59.41		
5.50	100	95	77					planar to moderate iron-oxide	uities are w locally curv ly open, loc stained, lo 10°-20° & lo	planar. Ap- ally clay-sn cally calcite	ertures are neared, loc	tight to locally slightly	cally				
7.00	100	79	58	Ŀ													
8.50	100	81	45	E													
10.00	100	92	81			50 0000	J T T T T T T T T T T T T T T T T T T T							10.00	52.41		
MAR								End	of Borehole	at 10.00 m				Contract of the last	-	RIKE D	ETAILS
le cas	sed 0	0.00-3	.00n	n. Erect (	Covid-19 S	Safe	Zone -	1hr	Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Cor	nment	5	recorde
														GRO	UNDW	ATER	DETAIL
STALL					07.0				Date	Hole Depth	Casing Depth	Depth to Water	Com	ments			
Date	-17	ip De	pth	RZ Top	RZ Base		Тур	9	28-06-21	10.00	3.00	2.70	Water drilling	level rec	corded 5 r	nins after	rend of



REPORT NUMBER

	ACT	0	anch	ardstown								DRILL	HOLE T	NO	RC1 Shee	<b>4</b> t 1 of	1
	DINA ND LE		(mOD	707,055 739,043 )				RIG TYPE FLUSH			BT - 44 Air/Mist	FE0 900	DRILLE			7/2021 7/2021	
GINE		D	BFL	-				INCLINATION CORE DIAM		n)	-90 78	1000000	ED BY		IG.	SL O'She	а
Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fract Spac Log (mn	ing g n)	Non-intact Zone	Legend			Descript				Depth (m)	Elevation	Standpipe Details	SPT (N Value)
						AND CHARLES OF STREET WAY		as returns	RIX DRILLII of gravelly  RIX DRILLII of clayey G	CLAY		178		1.50	60.88		
3.00	)					63-50	0000	as returns	RIX DRILLI						59.58 59.38		
4.20	100	68	34	E				fine-graine local sand locally slig Discontinu planar to l	h ih to ally								
5,70	100	92	75			110		iron-oxide	ly open, loc stained, lo 0°-20° & lo	cally calcite	neared, loca e-veined (1-	ally slightly 2mm thick	).				
7.20	100	95	83														
	100	47	45	E		Ann											
8.70	100	85	72		P	A v A/								10.00	50.00		
10.0	_	_			1			End	of Borehole	at 10.00 n	1				52.38 TER ST	RIKE	DETAILS
-		0.00-	3.00n	n. Erect C	Covid-19	Safe	Zone		Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Co	mment	s	e recorde
														GR	DUNDV	VATER	R DETAIL
STAI	LLAT	ION E	ETAI	LS					Date	Hole Depth	Casing Depth	Depth to Water	Con	ment	s		
Dat	е	Tip D	epth	RZ Top	RZ Base	8	Ту	pe	26-07-21	10.00	3.00	1.90	Water		corded 5	mins aft	er end of



GDT

IGSL

23311.GPJ

TOM

RC

GSE

#### GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER

23311

CONTRACT Blanchardstown T.C. DRILLHOLE NO **RC15** SHEET Sheet 1 of 1 **CO-ORDINATES** 707.090.74 E DATE DRILLED 27/07/2021 739,008.76 N BT - 44 **RIG TYPE** DATE LOGGED 28/07/2021 GROUND LEVEL (mOD) 62.13 FLUSH Air/Mist CLIENT INCLINATION (deg) -90 DRILLED BY IGSL **ENGINEER** DBFL CORE DIAMETER (mm) 78 LOGGED BY D.O'Shea Ē E Downhole Depth Details Core Run Depth Non-intact Zone Fracture S.C.R. ROD T.C.R. SPT (N Value) Spacing Description Log Standpipe E Elevation (mm) Legend Depth ( 250 500 0 SYMMETRIX DRILLING: No recovery, observed by driller as returns of CLAY 1.50 60.63 SYMMETRIX DRILLING: No recovery, observed by driller 00 as returns of clayey GRAVEL 00 2 00 00 00 0-1 2.80 59.33 3.00 59.13 3.00 SYMMETRIX DRILLING: No recovery, observed by driller - 3 as returns of ROCK Weak to strong, thickly to thinly bedded, black/dark grey, fine-grained, LIMESTONE (predominantely muddy with 100 29 8 local sandy layers, localised pyrite crystallisation), fresh to locally slightly weathered Local shale layer at 5.62-5.63m 4.50 Discontinuities are widely to closely spaced, smooth, planar to locally curviplanar. Apertures are tight to locally moderately open, locally clay-smeared, locally strongly 42 100 63 5 iron-oxide stained, locally calcite-veined (1-2mm thick). Dips are 10°-20° & locally 50°. 5.50 6 100 77 58 7.00 100 57 54 8 8.50 100 85 69 0.00 52.13 REMARKS End of Borehole at 10.00 m WATER STRIKE DETAILS Casing Hole cased 0.00-3.00m. Erect Covid-19 Safe Zone - 1hr Water Sealed Rise Time Comments Strike Depth To (min) No water strike recorded **GROUNDWATER DETAILS** Hole Casing Depth to Water INSTALLATION DETAILS Date Comments Depth Depth Tip Depth RZ Top RZ Base Type 28-07-21 10.00 2.10 3.00 Water level recorded 5 mins after end of



REPORT NUMBER

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NTRA	СТ	ВІ	anch	ardstown	T.C.							1000000	HOLE	NO	RC			
ORDI			mOE	707,111 738,969				RIG TYPE	RIG TYPE BT - 44 DA Air/Mist						Sheet 1 of 1 27/07/2021 28/07/2021			
IENT GINEE			BFL					INCLINATION CORE DIAM	100 miles 100 mi	110000000000000000000000000000000000000	ED BY		IGSL D.O'Shea					
Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fract Spac Lo (mr	eing g m)	Non-intact Zone	Legend			Depth (m)	Elevation	Standpipe Details	SPT (N Value)					
							<u></u>	as returns	of CLAY	NG: No rec	overy, obse			1.50	60.52			
3.50	100	44	22	-		6-9	5 5 7	fine-graine local sand locally mo	ed, LIMEST by layers, loo derately we	ONE (pred calised pyreathered (a	bedded, bla lominantely ite crystallis t 3.61-4.04r & 8.44-8.50	muddy wit ation), fres n)	ey, th	3.50	58.52			
5.50	100	71	46			6.20		planar to l moderatel iron-oxide	locally curvi	planar. Apo ally clay-sn cally calcite	sely spaced ertures are t neared, loca e-veined (1-	light to locally strong	y					
6.50	100	55	14	Ę		Avx												
7.50	100	47	33			4-1												
8.50	100	88	76															
10.00	100	89	78	E		709.996								10.00	52.02			
MARK	KS							End	of Borehole	at 10.00 n	n	W-00				TRIKE D	ETAIL	
e cas	ed 0	.00-3	3.50n	n. Erect C	Covid-19	Safe	Zone	- 1hr	Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	-	mmer	-		
														N	lo wate	er strike	record	
														GR	OUND	WATER	DETAI	
STALL	ATI	חאכ	ΕΤΔ	ILS					Date	Hole	Casing	Depth to	Con	ment			JEIM	
Date		1000	Friday.	RZ Top	RZ Bas	e	Tv	pe	28-07-21	Depth 10.00	Depth 3.50	Water 2.80	1000		000	5 mins after	end of	
-07-2		10.0	-	2.00	10.00	_		n SP			10000		drilling			-		



REPORT NUMBER

OC	33.	5/														-	JJ 1	•		
ON	TRA	СТ	В	lanch	nardstow	n T.C.							DRIL	LHOLE	NO	RC1	7 t 1 of	1		
		INAT		(mOl	739,00	19.77 E 03.28 N 62.68			RIG TYPE			BT - 44 Air/Mist	DATE	DRILLI		22/0	7/2021	)		
LIE	NT			BFL	,				INCLINATI	ON (deg) METER (mi	n)	-90 78	J11.05-100-1	DRILLED BY LOGGED BY			IGSL D.O'Shea			
Downtone Depth (m)	Core Kun Deptn (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Spa Li (m	cture acing og nm)	Non-intact Zone	Legend			Descrip	ition			Depth (m)	Elevation	Standpipe Details	SPT (N Value)		
4.	50 _	100	84 84 88	33 41 81				000000000000000000000000000000000000000	Weak to s fine-grain local sand locally slig Discontinu planar to I moderate iron-oxide	strong, thick ed, LIMEST dy layers, lo phtly weather uities are w locally curvi	dy to thinly ONE (pre- calised py- ered. idely to clo planar. Ap ally clay-si- cally calcit	bedded, bladominantely ife crystallis sely spaced ertures are meared, loce-veined (1	ack/dark gr y muddy wi sation), free d, smooth, tight to loc ally slightly	ey, th sh to	3.00	59.68				
_	.00							+	Fod	If Basabala	-1 10 00 -					52.68	DIVE	DETAIL 0		
eM/	_	-	00-3	3 000	n Frect	Covid-19	Safe	Zone		of Borehole Water	Casing	Sealed	Rise	Time				DETAILS		
ord .	<b>J</b>	- G			. Erect	J0710-13	Jaio	Luid		Strike	Depth	At	То	(min)	+	mment o wate		recorde		
															GRO	DUNDW	ATER	DETAIL		
ST	ALL	ATIC	ON D	ETAI	LS					Date	Hole	Casing	Depth to Water	Com	ment	s				
4000	ate				1500	RZ Base	2	Тур	е	23-07-21	Depth 10.00	Depth 3.00	2.10	_	level re	corded 5	mins afte	er end of		



REPORT NUMBER

	ACT	- 1000	anch	nardstown								SHEE	LHOLE ET	NO	RC1	8 t 1 of	1
O-ORI			mOt	707,054 738,968 <b>O)</b>				RIG TYPE FLUSH			BT - 44 Air/Mist	100000000000000000000000000000000000000	DRILL			7/2021 7/2021	
JENT	N.			13				INCLINATION (	deg)		-90	DRIL	LED BY	10	IG	SL	
IGINE	ER	D	BFL					CORE DIAMETI	ER (mm	1)	78	LOG	GED BY		D.	O'Shea	1
Core Run Depth (m)	T.C.R.%	S.C.R.%	R.O.D.%	Frac Spac Lo (mi	cing g m)	Non-intact Zone	Legend			Descripti	on			Depth (m)	Elevation	Standpipe Details	SPT (N Value)
						100000000000000000000000000000000000000		SYMMETRIX I as returns of C		IG: No rec	overy, obs	erved by d	riller		20323		
							0 0	SYMMETRIX I as returns of g	ORILLIN ravelly	IG: No rec CLAY	overy, obs	erved by d	riller	1.50	60.91		
							0 - 0	CVMMETRIV	OBILLIA	IC: No ree	auga, aba	anuad bu d	dia	3.00	59.41		
3.30	$\vdash$				+		000	as returns of cl	layey G	RAVEL		-	/	3.30	59.11		
4.30	100	84	46					Weak to strong fine-grained, L local sandy lay locally slightly	IMESTO ers, loc	ONE (predicalised pyrit	ominantely	muddy wi	th				
	100	100	80		•		Ħ	Discontinuities are widely to closely spaced, smooth, planar to locally curviplanar. Apertures are tight to locally moderately open, locally clay-smeared, locally slightly									
5.10	100	73	44			5534	Ħ	iron-oxide stair Dips are 10°-2	ned, loc	ally calcite	-veined (1-	8mm thick	<b>()</b> .				
6.30	350		-			502											
7.30	100	85	61	F	ı		H										
	100	90	76			10	H										
8.30	100	74	64	Es.													
9.30	100	100	66	5													
10.00			951					F-4 45	enhat-	-1.10.00				10.00			
		0.00-3	.50n	n. Erect C	ovid-19	Safe	Zone	- 1hr W	ater		Sealed	Rise	Time	1	ER ST		ETAIL
			2007/1					St	rike	Depth	At	То	(min)		mment o water		record
														GRO	UNDW	ATER	DETAI
STAL	LATI	ON D	ETAI	LS					Date	Hole Depth	Casing Depth	Depth to Water	Com	ments			



REPORT NUMBER

1	1 ज उ	5													-	00	
СО	NTR	ACT	В	lanch	nardstown T.C.								LHOLE	NO	RC		
co	-ORE	OINA'	TES		707,084.58 E							SHE			2777	et 1 of	
					738,942.44 N	0		RIG TYPE			BT - 44	55.55	E DRILL E LOGG			7/202 7/202	
	OUN		VEL	(mOl	0) 62.23	2		FLUSH			Air/Mist			000-0	22272		1
	GINE		D	BFL				CORE DIAME		m)	-90 78	700000	LED BY			SL O'She	ea.
2	_											120					T
Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing Log (mm)	Non-intact Zone	Legend			Descrip	otion			Depth (m)	Elevation	Standpipe Details	SPT (N Value)
0	-	_	_		p <sup>250</sup> 50	-		SYMMETRIX	DRILL	ING: No re	covery obs	erved by d	riller	0	ш	0)	0,
1								as returns of			oovery, out	orved by o					
2								CVMMETRIV	DBILL	ING: No re	county observed	anuad by d	rillor	3.00	59.22		N = 46
To a								as returns of	gravelly	CLAY	covery, obs	erved by d	niier				(7, 9, 6, 13, 15
														3.90	58.32		
4							Ŧ	SYMMETRIX as returns of	DRILL	ING: No re	covery, obs	erved by d	riller				
5	4.50	100	54	29	#	(s = 2)	T T T	Weak to stron fine-grained, I local sandy la locally slightly Discontinuitie	yers, lo weath	TONE (pre calised py ered.	dominantel rite crystalli	y muddy wi sation), fre	th	4,50	57.72		N = 30/20 (30, 30
5	6.00	100	60	22				planar to loca moderately op iron-oxide sta Dips are 10°-/	pen, loc ined, lo	cally clay-si cally calcit	meared, loc	ally slightly	1.				
7		100	69	23			臣										
	7.50			-	E .		H										
8		100	63	38		ALC:											
9	9.00	100	92	92		560											
_	10.00 MAR	_						End of B	orehole	at 10.00 r	n		-		52.22	DIVE	DETAILS
_	_		.00-4	.50m	n. Erect Covid-19	Safe	Zone	- 1hr V	Vater	Casing	Sealed	Rise	Time	1	mment		DETAILS
								S	trike	Depth	At	То	(min)			-	e recorde
														GRO	DUNDV	VATER	RDETAIL
NS	TALL	ATIO	ON D	ETAI	LS				Date	Hole Depth	Casing Depth	Depth to Water	Com	ment	s		
	Date	T	ip De	epth	RZ Top RZ Bas	е	Тур	e 0	7-07-21	10.00	4.50	2.20			corded 5	mios afi	er end of



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	ACT	BI	anch	ardstown T.C.						SHEE	HOLE T	NO	RC2 Shee	20 t 1 of 1		
O-ORE			mOD	707,096.13 E 739,064.60 N 61.88			RIG TYPE FLUSH		BT - 44 Air/Mist	DATE	DRILLI		29/07	7/2021 7/2021		
IENT	ER	DE	BFL				INCLINATION (deg) CORE DIAMETER (mm)	-90 78	75 5555	DRILLED BY LOGGED BY						
Core Run Depth (m)	SYMMETRIX DRILLING: No recovery, observed by dril as returns of gravelly CLAY											Depth (m)	Elevation	Standpipe Details	SPT (N Value)	
						0 0 0	as returns of gravelly CL	AY			(B.54)	2.50	59.38			
3.00						土	SYMMETRIX DRILLING as returns of ROCK				A.Intel	3.00	58.88			
4.50	100	70	28				Weak to strong, thickly to fine-grained, LIMESTON local sandy layers, locali locally slightly weathered Discontinuities are widel planar to locally curvipla moderately open, locally 6.41-6.47m), locally slight	IE (pred sed pyrid. ly to close nar. Ape clay-sm htly iron-	ominantely ite crystallis sely spaced ertures are t neared & fill oxide stain-	muddy wit ation), fres , smooth, tight to loca ed at ed, locally	h h to ally					
6.00	100	83	63		K-a		calcite-veined (1-15mm 50°.	thick), L	aps are 10°	-20° & loca	illy					
7.50	100	81	61		Z.s.											
9.00	100	81	62		520											
-	100	96	96			H						10.00	51.88			
10.00							End of Borehole at	10.00 m	Sealed	Disa			ER ST	RIKE D	ETAIL	
10.00 MAR	KS	00.2	00-	Ernet Could 10	Cata	7000					Time	100				
10.00 MAR	KS	.00-3	3.00m	n. Erect Covid-19	Safe	Zone		epth	At	Rise To	Time (min)	1,300	mment o water	XVIII Control		
10.00 MAR	KS sed 0				Safe	Zone						N	5110000	r strike	record	



REPORT NUMBER

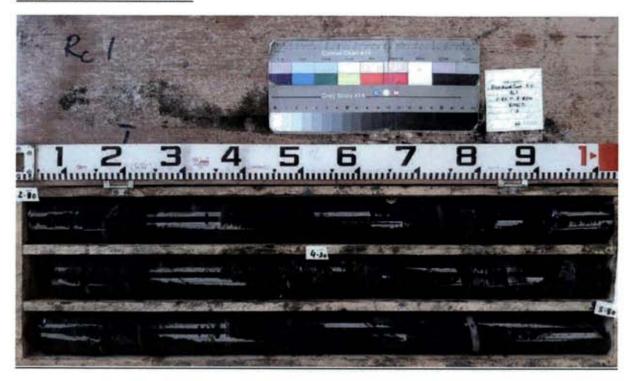
n	ฮฮ	5																
CON	ITR	ACT	В	lanci	hardstown T.C.							LHOLE	NO	RC2				
00-	ORD	'ANIC	TES		707,136.08 E 739,030.57 N					ESB DAT	DATE	ET E DRILLE	ED	7 Lane 1984	et 1 of 8/2021			
GRO	UN	DLE	VEL	(mOl				RIG TYPE BT - 44 FLUSH Air/Mist DATE LOC										
	INE	ER	D	BFL				INCLINATION (deg) CORE DIAMETER (		-90 78	7.15.15	LED BY GED BY			SL O'She	a		
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						Standpipe Details	SPT (N Value)		
1 2							900000000000000000000000000000000000000	SYMMETRIX DRIL as returns of clayer	LING: No re GRAVEL	ecovery, obs	erved by d	iriller						
3	3.00	100	72	34	E	Kar	2000	Weak to strong, thi fine-grained, LIMEs local sandy layers, locally slightly weat	STONE (pre localised py	dominantely	muddy wi	rey, th	3.00	58.28				
4	50	Discorplans mode 6.41-calcit 50°.	Discontinuities are planar to locally cur moderately open, k 6.41-6.47m), locally calcite-veined (1-2r 50°.	rviplanar. Ap ocally clay-s y slightly iron	pertures are meared & fil n-oxide stain	tight to loc lled at led, locally												
6	100 79 43																	
7	.50	100	84	57														
	.00	100	88	68														
_	0.00	100	91	69				Endlen	la at 10 00	_		1		51.28				
	cas	_	.00-3	.00m	n. Erect Covid-19	Safe	Zone -	End of Boreho  1hr Water	Casing	Sealed	Rise	Time			-	DETAIL		
					- LINN OVIIG-10	Jule		Strike	Depth	At	То	(min)	1	nments o water		record		
													GRO	UNDW	ATER	DETAI		
-				ETAII				Date	Hole Depth	Casing Depth	Depth to Water	Comr	nents					
D	ate	T	ip De	pth	RZ Top RZ Base		Тур	04-08-21		3.00	2.25	Water le	evel rec	orded 5 r	nins afte	r end of		



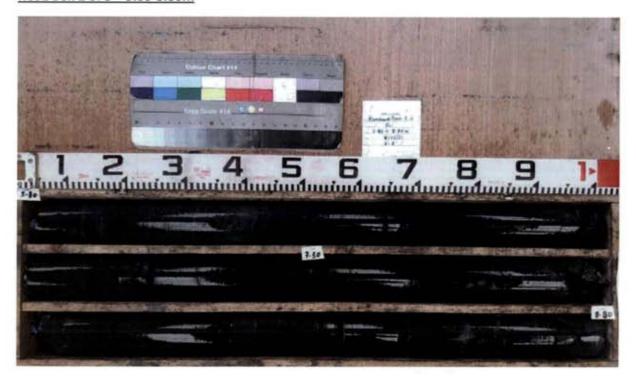
REPORT NUMBER

0	33	L/													2	331	i.		
0	NTRA	СТ	ВІ	anch	ardstown T.C.							DRIL	LHOLE I	NO	O RC22 Sheet 1 of 1				
	ORD			mOD.	707,172.92 E 739,068.23 N 61.1	2		RIG TYPE BT - 44 FLUSH Air/Mist INCLINATION (deg) -90					DRILLE		03/08	3/2021			
-	ENT	J LE	VEL (	IIIOD	01.1								LED BY	5 M.OX					
	SINE	ER	D	BFL		_			CORE DIAMETER (mm) 78 L						D.O'Shea				
Ê	(i			T															
Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing Log (mm)	Non-intact Zone	Legend			Descript	tion			Depth (m)	Elevation	Standpipe Details	SPT (N Value)		
0							000				covery, obs	erved by d	riller						
1		5					000000		5.25		covery, obs	erved by d		1.50	59.62				
220	3.00						0 0	as returns			overy, obs	orved by d		3.00	58.12				
1								Weak to s	trong, thick	dy to thinly	bedded, bla fominantely	ack/dark g	rey,						
		100	32	11		443		local sand	y layers, lo	calised pyr	ite crystallis								
4	4.00			,		0.13		locally slightly weathered.  Discontinuities are widely to closely spaced, smooth,											
				1	-	6.58		planar to locally curviplanar. Apertures are tight to locally moderately open, locally clay-smeared & filled at				ally							
5	5.50	100	45	23		4 - 4		4.14-4.16r	m, 7.44-7.4 stained, lo	5m & 7.75- cally calcite	7.76m), loc e-veined (1	cally slight	y k).						
6		100	75	45		644													
7	7.00			-		()	H												
		100	71	56															
8	0.50					22.5		1											
	8.50						1												
9						643	1	1											
		100	83	74				1											
						880		1											
_	10.00 MAR						-	End (	of Borehole	at 10.00 n	n				51.12 TER ST	RIKE	DETAILS		
lol	le cas	sed 0	.00-3	3.00m	. Erect Covid-1	9 Safe	Zone	- 1hr	Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	1	mment				
										_ арат	74		Viniti	N	o wate	r strike	e recorde		
														GR	DUNDV	VATER	RDETAIL		
NS	TAL	LATIC	ON D	ETAI	LS				Date	Hole Depth	Casing Depth	Depth to Water	Com	ment	s				
	Date	7	ip D	epth	RZ Top RZ Ba	ise	Ту	pe	03-08-21	10.00	3.00	2.90			corded 5	mins aft	er end of		

#### RC01 Box 1 of 3 - 2.80-5.80m



#### RC01 Box 2 of 3 - 5.80-8.80m



### RC01 Box 3 of 3 - 8.80-10.20m



#### RC02 Box 1 of 3 - 3.00-5.80m



#### RC02 Box 2 of 3 - 5.80-8.80m



#### RC02 Box 3 of 3 - 8.80-10.00m



### RC03 Box 1 of 3 - 3.00-6.00m



#### RC03 Box 2 of 3 - 6.00-9.00m

