
Project: 25_076 : DUB 20 Landfill Capping

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1. Introduction and Background information

Clifton Scannell Emerson Associates (CSEA) have been appointed by Crag Arklow Ltd. to provide civil engineering consultant services for the Landfill Capping project at the Avoca River Park site in Arklow, County Wicklow. CSEA have engaged geotechnical specialists (AGL Consulting) to advise on the project.

This report relates to the Northern Landfill East Cell at the Avoca River Park currently licensed under the Integrated Pollution Control (IPC) Licence No. P0031-02.

The purpose of this report is to provide information to the Environmental Protection Agency (EPA) in relation to the proposed works at the Northern Landfill East at the Avoca River Park. These works have been previously approved by the EPA in 2021 but due to insufficient capping material the works were not advanced on the Northern Landfill East Cell.

An updated design package prepared by DBFL (drawings and specifications) was submitted to the EPA in 2022 (EPA ref. LR067360) outlining the strategy to complete the capping work for the East Cell. The package submitted was also supported by a response to the Agency's request for further information (EPA ref. LR071189).

A suitable source of capping material has recently been identified in compliance with the engineering specification previously approved. As the landfill capping works are intended to start on site between September and October 2025, Crag Arklow Ltd now wishes to submit for approval the works strategy on how they intend to carry out the works, as previously approved by the EPA in 2022, and to provide information on the material intended to be sourced from a donor site.

2. Landfill Capping Strategy

2.1 Capping Design

To prevent surface water infiltration into the underlying waste material, the landfill cell will be capped with a continuous min. 500mm thick layer of compacted natural CLAY fill with a low permeability capacity ($k < 1 \times 10^{-9} \text{m/s}$) as recommended for hydraulic barrier layers in the EPA Manual for Landfill Site Design.

2.2 Material Specification

To ensure compliance with the approved engineering specification (EPA ref. LR067360; LR071189) and the EPA Landfill Manuals (Landfill Site Design), the proposed natural clay material shall satisfy the following requirements:

- The general earthworks specification for the project will be the TII Earthworks Specification for National Roads (TII Publication No. CC-SPW-00600, dated September 2024) with project-specific Series 600 Appendices 6/1 to 6/12, as required for the capping works.
- The capping material shall be a well graded low-permeability inert natural CLAY fill that meets the requirements for either Class 2A or Class 2C1 general cohesive fill, as defined in the TII Earthworks Specification with the following project-specific requirements:
 - Fines content (silt and clay-sized particles $< 0.063\text{mm}$) $\geq 35\%$
 - Maximum particle size of 63mm ($100\% < 63\text{mm}$)



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Table 2.1: Grading criteria for Class 2A & Class 2C1 Cohesive Fill from the TII Earthworks Specification

Class	Percentage by Mass Passing the Size Shown																			Class	
	Size (mm)		Size (mm) BS Series											Size (microns) BS Series				Size (microns)			
	500	300	125	100	75	37.5	28	20	14	10	6.3	5	3.35	2	1.18	600	300	150	63		2
2A & 2B			100												80-100				15-100		2A & 2B
2C1			100												35-80				35-80		2C1

- Project-specific Moisture Condition Value (MCV) limits will be determined by laboratory compaction and permeability tests on the source material to ensure that the moisture content of the material is within acceptable limits to achieve the following end-product criteria:
 - ≥95% of the maximum dry density determined by standard 5-point compaction tests with the 2.5kg rammer
 - ≤5% air voids, A_v .
 - Permeability, $k \leq 1 \times 10^{-9} \text{m/s}$

Based on research carried out for the design of the clay hydraulic barrier layer in the tanked section of the Kildare Town Bypass, Dr. E. Farrell demonstrated that disturbed samples of boulder-clay type cohesive fill with ≥35% fines could achieve a permeability $< 1 \times 10^{-9} \text{m/s}$ when compacted using the 2.5kg rammer energy level at an appropriate moisture content, typically wet of optimum, as illustrated on Figure 2.1 (Farrell, 2024). This typically corresponded to an MCV ≤9, as shown on Figure 2.2. An MCV >7 is also required for the material to be able to support conventional earthmoving equipment.

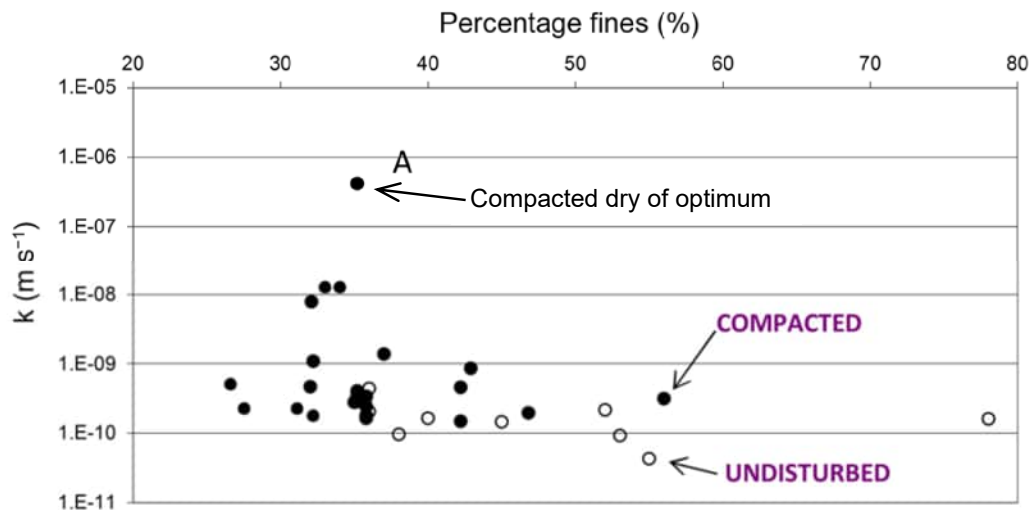


Figure 2.1 – Relationship between hydraulic permeability measured in a triaxial cell and percentage fines for compacted and undisturbed samples of boulder-clay type cohesive glacial till (Farrell, 2024).

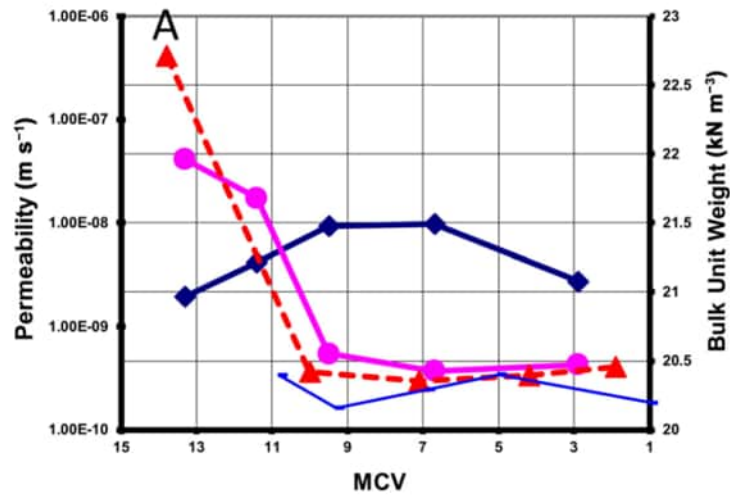


Figure 2.2 – Relationship between hydraulic permeability measured in a triaxial cell and MCV for compacted samples of boulder-clay type cohesive glacial till (Farrell, 2024).

2.3 Source of Material

The licensee has identified a site on the UCD Campus in South Dublin where suitable inert cohesive fill deposits will be encountered within subsurface excavations for Phase 2 of the Student Residential Masterplan. The location of the accommodation is shown on Figure 2.3. A copy of the ground investigation report for the site is included in **Appendix A** and Figure 2.4 shows the SI location plan and building overlay for the site.



Figure 2.3 – Location of Phase 2 of the UCD Student Residential Masterplan



Figure 2.3 – Site Investigation Location Plan and Building Overlay

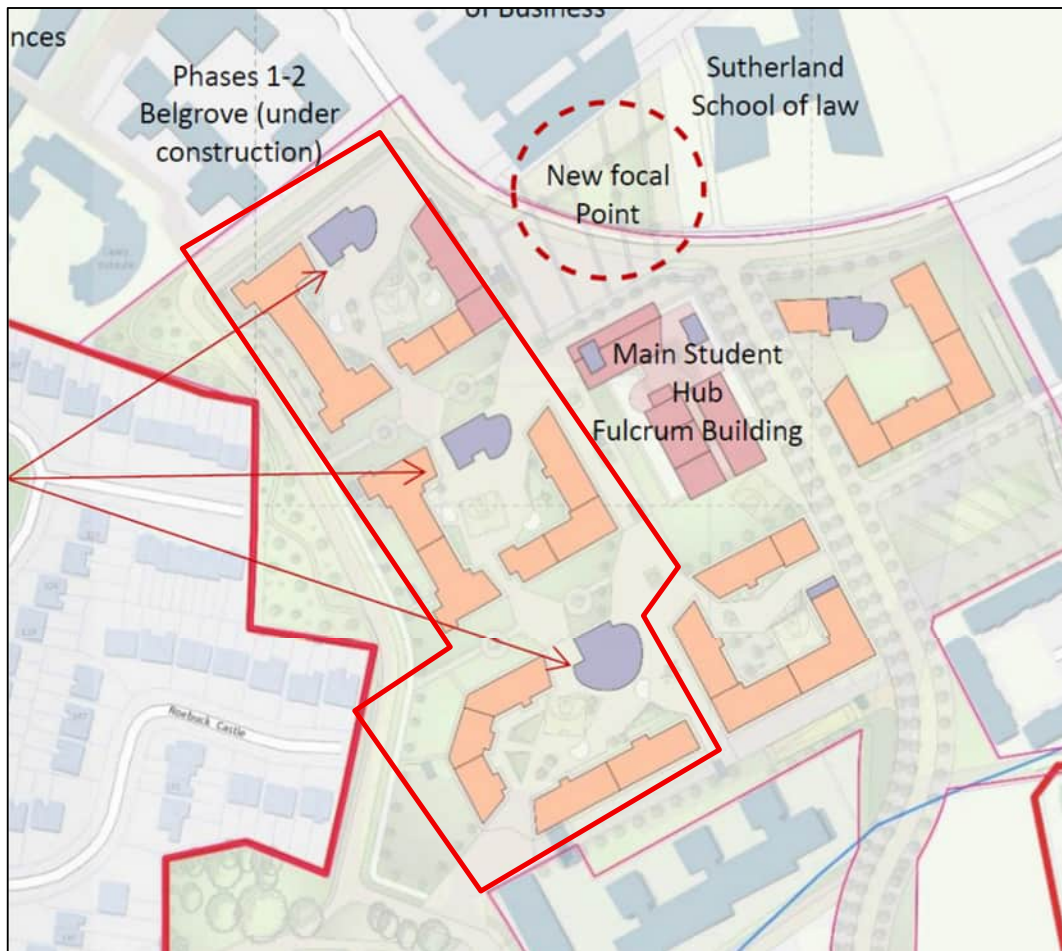


Figure 2.4 – Outline Site Plan

The trial pits and boreholes on the UCD site indicate that there are undisturbed inert natural deposits of cohesive glacial till (Boulder Clay) below a surface layer of Made Ground and some localised thin organic and alluvial deposits of peat, sand and gravel. The Boulder Clay was typically encountered at a depth of 0.5 to 2.5m but is locally >3.0-3.5mBGL where it is overlain by the organic and alluvial soils. It is generally described on the logs as a firm brown sandy gravelly CLAY grading to a stiff and very stiff grey and black sandy gravelly CLAY with depth. Occasional to frequent cobbles and boulders are noted throughout the deposits.

Particle size distribution test results on representative samples of the Boulder Clay demonstrate that it typically meets the project-specific grading criteria for Class 2C1 material with >35% fines (gen >40%), which meets the specification for the capping material.

Standard Penetration Tests (SPT) N-Values for the Stiff and Very Stiff Boulder Clay below a depth of about 3-5m are high (>20-40), which indicates that the material may be too dry to achieve the required in-situ density for the capping layer with the standard compaction effort. Therefore, the material will need to be wetted to process it into acceptable Class 2C1 cohesive fill prior to compaction on the site.

It is proposed to only use the suitable Class 2C1 cohesive fill material from below the Made Ground, Peat and alluvial sand and gravel within the proposed depth of deep excavations for the underground car parks on the site of the Phase 2 student accommodation blocks.

Prior to transporting material from the UCD site, CSEA will carry out a detailed review of the design and construction proposals for the project to assess the location, depth and extent of the deep excavations on the



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site to identify the source of the suitable materials. We will then commission the following tests to be carried out on 3 No. representative large bulk samples from the excavations:

- Natural moisture content
- Particle size distribution tests (wet sieve and hydrometer)
- Atterberg Limits (Liquid Limit, Plastic Limit, Plasticity Index)
- Particle density (Specific Gravity)
- 5-point standard compaction test (2.5kg rammer) with MCV at each moisture content (MCV calibration).
- Triaxial cell permeability test (specimens statically compacted to 95% MDD at 10kPa confining pressure)

These tests will confirm that material at an acceptable moisture content can comply with the earthworks specification for the capping material. The tests will also establish the control parameters for monitoring field compaction on the site over the course of the works.

Should excavated volumes prove insufficient, this testing protocol will be applied to suitable material from alternative sites. The licence holder has identified additional potential sources and is engaging contractors to secure suitable excavated material.

2.4 Procedures to ensure only appropriate soils leave the source site

To ensure the material being imported is not mixed with any made-ground material, a Resident Engineer (RE) will be on site to inspect the stockpiling works. Additionally, as noted above CSEA have engaged with AGL and they will also visit the site to inspect the material being exported from the donor site. This process will be recorded for later records.

At the donor site, during the excavation works, the material being excavated that is destined for the licensee site will be stockpiled separately and will be inspected periodically by the RE on site. Once the material is stockpiled at the donor site it will be recorded and bulk samples will be taken for testing (as noted above).

It should also be noted that as a way of ensuring the material is not contaminated, before the placing and compacting of the capping layer the material will undergo a series of tests (noted above) which will also form part of the as-built records. These tests will be carried out on the material stockpiled on the licensee site before being used for capping works.

To record and ensure the chain of custody of the material from the donor site, each truck destined for the licensee site will be weighed when it leaves the site in UCD and weighed again once it arrives at the licensee site.

2.5 Compaction Methodology

Topsoil will be stripped from the existing site and stockpiled for reinstatement in max. 2m high bunds.

The surface of the landfill will be regulated and proof rolled by static compaction with min. 2 No. passes of a smooth wheeled roller with a mass >5,000kg/m width of roll. Soft spots will be improved with suitable clay fill and plate load tests will be carried out to confirm a minimum California Bearing Ratio (CBR) $\geq 2\%$ on firm subgrade at underside of capping.

The clay capping layer will then be constructed across the surface of the landfill to a minimum depth of 500mm in 2 No. controlled lifts, with each layer not exceeding 250mm in compacted thickness in accordance with the Earthworks Specification.

Prior to placing and compacting the material, water content and MCV control testing will be carried out to ensure that the material is at an acceptable moisture content to achieve the required in-situ density and permeability when compacted, typically 0-3% wet of optimum.



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If testing indicates that the MCV of the material is too high (i.e. in stiff or very stiff clay with $MCV > 9$), then water will be added, as necessary to achieve the specified limits. This will be done with suitable earthworks plant to break down or pulverise the material and then add water through an integral spray bar to ensure that it is uniformly dispersed throughout the soil. Additional MCV testing will be carried out to confirm that the MCV of the treated soil is within acceptable limits immediately prior to compaction.

Where the MCV of the material is marginally below the acceptable limits (e.g. in soft clay with $MCV < 7$) the material can be improved by air drying in dry weather to increase the MCV to an acceptable value prior to compaction, which will be verified by further MCV testing. Material that cannot be improved to meet the specified criteria in the Earthworks Specification will not be used within the capping layer.

Acceptable material will be compacted in accordance with the method compaction specification for Class 2A/2C1 cohesive fill in Table 6/4 of the TII Earthworks Specification – i.e. min. 4 No. passes of the vibratory roller with a mass $> 5,000\text{kg/m}$ width of roll. A 100m^2 trial panel will initially be constructed to verify that the specified end product compaction criteria can be achieved (i.e. 95% Maximum Dry Density – 2.5kg Rammer @ $< 5\%$ air voids). In-situ density tests will be carried out by sand replacement tests or nuclear density tests to verify the moisture content, dry density and percentage air voids in the compacted material.

Additional quality control and quality assurance testing will be carried out over the course of the works to form a record of the works and demonstrate compliance with the Earthworks Specification, including the following minimum requirements:

- 5-Point standard compaction tests with the 2.5kg rammer: $1/2,500\text{m}^3$
- MCV tests: $1/500\text{m}^3$
- In-situ density tests with the nuclear density gauge or by sand replacement @ $1/250\text{m}^3$
- Soil classification tests:
 - Moisture content: @ $1/500\text{m}^3$
 - Particle Size Distribution – wet sieve & hydrometer @ $1/1,000\text{m}^3$
- Permeability tests on core samples: $1/2,500\text{m}^3$

2.6 Quantity of Soil

Per CSEA design, the required volume of soil to complete the proposed capping works for the landfill is $12,500\text{m}^3$.

The overall area of the donor site is approximately $22,000\text{m}^2$. Figure 2.4 above shows the outline of 9 buildings which equates to an estimated area of $10,500\text{m}^2$. Considering an excavation depth of 1.5m, the donor site is expected to exceed the needed volume.

These quantities will be confirmed once further details from the donor site, in relation to the final excavation plans, are received (as noted in section 2.3 above).

References:

Farrell, E.R.; “*The 1st Hanrahan Lecture: Geotechnical properties of Irish glacial and interglacial soils*”, Quarterly Journal of Engineering Geology & Hydrogeology, Vol.57, 2024.

Appendix A – Ground Investigation Report



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UCD Residential Masterplan Phase 2

Ground Investigation Report

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Appendix 4	Plate Bearing Test Records
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1.0 Preamble

On the instructions of Barrett Mahony Consulting Engineers, a site investigation was carried out by Ground Investigations Ireland Ltd., between June and July 2019 at the site of the development in the grounds of UCD, Dublin 4.

2.0 Overview

2.1. Background

It is proposed to construct a new residential development with associated services, access roads and car parking at the proposed site. The site is currently situated on the UCD Campus. The proposed construction is envisaged to consist a single of single storey basement of 4.0m depth below ground level with conventional foundations and pavement make up with some local excavations for services and plant.

2.2. Purpose and Scope

The purpose of the site investigation was to investigate subsurface conditions utilising a variety of investigative methods in accordance with the project specification. The scope of the work undertaken for this project included the following:

- Visit project site to observe existing conditions
- Carry out 20 No. Trial Pits to a maximum depth of 4.00m BGL
- Carry out 5 No. Cable Percussion boreholes to a maximum depth of 9.30m BGL
- Carry out 5 No. Rotary Core follow on Boreholes to a maximum depth of 32.10m BGL
- Installation of 5 No. Groundwater monitoring wells
- Carry out 6 No. Plate Bearing Tests
- Geotechnical & Environmental Laboratory testing
- Report with recommendations

3.0 Subsurface Exploration

3.1. General

During the ground investigation a programme of intrusive investigation specified by the Consulting Engineer was undertaken to determine the sub surface conditions at the proposed site. Regular sampling and in-situ testing was undertaken in the exploratory holes to facilitate the geotechnical descriptions and to enable laboratory testing to be carried out on the soil samples recovered during excavation and drilling.

The procedures used in this site investigation are in accordance with Eurocode 7 Part 2: Ground Investigation and testing (ISEN 1997 – 2:2007) and B.S. 5930:2015.

3.2. Trial Pits

The trial pits were excavated using a JCB 3CX at the locations shown in the exploratory hole location plan in Appendix 1. The locations were checked using a CAT scan to minimise the potential for encountering services during the excavation. The trial pits were sampled, logged and photographed by a Geotechnical Engineer/Engineering Geologist prior to backfilling with arisings. Notes were made of any services, inclusions, pit stability, groundwater encountered and the characteristics of the strata encountered and are presented on the trial pit logs which are provided in Appendix 2 of this Report.

3.3. Cable Percussion Boreholes

The Cable Percussion Boreholes were drilled using a Dando 2000 drilling rig with regular in-situ testing and sampling undertaken to facilitate the production of geotechnical logs and laboratory testing.

The standard method of boring in soil for site investigation is known as the Cable Percussion method. It consists of using a Shell in non cohesive soils and a clay cutter in cohesive soils, both operated on a wire cable. Very hard soils, boulders and other hard obstructions are broken up by chiselling and the fragments removed with the Shell. Where ground conditions made it necessary, the borehole was lined with 200mm diameter steel casing. While the use of the Cable Percussion method of boring gives the maximum data on soil conditions, some mixing of laminated soil is inevitable. For this reason, thin lenses of granular material may not be noticed. Disturbed samples were taken from the boring tools at suitable depths, so that there is a representative sample at the top of each change in stratum and thereafter at regular intervals down the borehole until the next stratum was encountered. The disturbed samples were then sealed and sent to the laboratory where they were visually examined to confirm the description of the relevant strata. Standard Penetration Tests were carried out in the boreholes. The results of these tests, together with the depths at which the tests were taken are shown on the accompanying borehole records. The test consists of a thick wall sampler tube, 50mm external diameter, being driven into the soil by a monkey weighing 63.5kg and with a free drop of 760mm. For gravels and glacial till the driving shoe was replaced by a solid 60° cone. The Standard Penetration Test number referred to as the 'N' value is the number of blows required to drive the tube 300mm, after an initial penetration of 150mm. The number gives a guide to the consistency of the soil and can also be used to estimate the relative strength/density at the depth of the test and also to estimate the bearing capacity and compressibility of the soil. The cable percussion borehole logs are provided in Appendix 3 of this Report.

3.4. Rotary Boreholes

The rotary coring was carried out by a track mounted T44 Beretta rig at the locations shown on the location plan in Appendix 1. The rotary boreholes were completed from the ground surface or alternatively, where noted on the individual borehole log, from the base of the cable percussion borehole where a temporary liner was installed to facilitate follow-on rotary coring.

The T44 Beretta is equipped with rubber tracks which allow for short travel on pavement surfaces avoiding any damage to the surface. The T44 Beretta utilises a triple tube core barrel system operated using a

wireline drilling process. The outer barrel is rotated by the drill rods and at its lower end, carries the coring bit. The inner barrel is mounted on a swivel so that it does not rotate during the process. The third barrel or liner is placed within the second one to retain the core intact and to preserve as much as possible the fabric of the drilling stratum. The core is cut by the coring bit and passes to the inner liner. The core is brought up to the surface within the inner barrel on a small diameter wire rope or line attached to the “overshoot” recovery tool which is then placed into a core box in order of recovery. A drilling fluid, typically air mist or water flush is passed from the surface through hollow drill rods to the drill bit, and is used to cool the drill bit. Temporary casing is used in some situations to support unstable ground or to seal off fissures or voids. It should be noted that the rotary coring can only achieve limited recovery in overburden, particularly granular or weakly cemented strata due to the flushing medium washing away the cohesive fraction during coring. The recovery achieved, where required is noted on the borehole logs and core photographs are provided to allow assessment of the core recovered. The rotary borehole logs are provided in Appendix 3 of this Report.

3.5. Groundwater Monitoring Installations

Groundwater Monitoring Installation were installed upon the completion of the boreholes to enable sampling and the determination of the equilibrium groundwater level. The typical groundwater monitoring installation consists of a 50mm HDPE slotted pipe with a pea gravel response zone and bentonite seal installed to the Engineers specification. Where required the standpipe is sealed with a gas tap and finished with a durable steel cover fixed in place with a concrete surround. The installation details are provided on the exploratory hole logs in the appendices of this Report.

3.6. Insitu Plate Bearing Test

The plate bearing tests were carried out using a 305mm or 450mm diameter plate at the locations shown on the site plan in Appendix 1. The plate was loaded in increments using a hydraulic jack and an excavator to provide a reaction and the displacement was monitored in accordance with BS1377 Part 9 using independently mounted digital strain gauges. The constrained modulus and equivalent CBR are calculated in accordance with HD29/75 and are provided on the test reports in Appendix 4 of this Report.

3.7. Laboratory Testing

Samples were selected from the exploratory holes for a range of geotechnical and environmental testing to assist in the classification of soils and to provide information for the proposed design.

Environmental and chemical testing, including Waste Acceptance Criteria (WAC), Chloride, pH and sulphate testing was carried out by Jones Environmental Laboratory in the UK.

Geotechnical testing consisting of moisture content, Atterberg limits, Particle Size Distribution (PSD), Moisture Condition Value (MCV) tests were carried out in NMTL's Geotechnical Laboratory in Carlow.

Rock Testing consisting of point load and unconfined compressive (UCS) testing was carried out in Trinity's geotechnical laboratory.,

The results of the geotechnical and chemical laboratory testing are included in Appendix 5 of this Report. The results of the environmental testing are under the cover of a separate Report.

4.0 Ground Conditions

4.1. General

The ground conditions encountered during the investigation are summarised below with reference to insitu and laboratory test results. The full details of the strata encountered during the ground investigation are provided in the exploratory hole logs included in the appendices of this report.

The sequence of strata encountered were consistent across the site and are generally comprised;

- Surfacing
- Topsoil
- Fill
- Made Ground
- Peat
- Granular Deposits
- Cohesive Deposits
- Bedrock

SURFACING: Tarmac Surfacing was encountered in BH2.10, TP2.01, TP2.02, TP2.03 and TP2.27, typically to a depth of 0.10m BGL

TOPSOIL: Topsoil was encountered in BH2.2, BH2.3 and BH2.4 and was present to a maximum depth of 0.20m BGL

FILL: Fill deposits were encountered beneath the Surfacing and Topsoil in the majority of exploration holes and was present to a relatively depth between 0.50m and 1.00m BGL. These deposits were described generally as *Grey sandy fine to coarse angular to sub angular GRAVEL*.

MADE GROUND: Made Ground deposits were encountered beneath the Topsoil /Surfacing and FILL in the majority of exploration holes and was present to a relatively consistent depth of between 0.80m and 3.10m BGL. These deposits were described generally as *brown sandy gravelly CLAY with frequent cobbles and boulders and contained occasional fragments of concrete, red brick, string and wire*.

PEAT: Peat deposits were encountered beneath the Made Ground in exploration Holes BH2.04, TP2.12, TP2.15, TP2.16, TP2.19, TP2.21, TP2.22 and TP2.27 and was present to a relatively consistent depth of between 1.20m and 3.30m BGL. These deposits were described generally as *brown clayey PEAT*

COHESIVE DEPOSITS: Cohesive deposits were encountered beneath the Made Ground and Peat deposits and were described typically as *brown slightly sandy slightly gravelly silty CLAY with occasional cobbles and boulders* overlying a *stiff black sandy gravelly CLAY with occasional cobbles and boulders*. The secondary sand and gravel constituents varied across the site and with depth, with granular lenses occasionally present in the glacial till matrix. These deposits had some, occasional or frequent cobble and boulder content where noted on the exploratory hole logs.

GRANULAR DEPOSITS: The granular deposits were encountered below the cohesive deposits in exploration holes BH2.04, BH2.05, TP2.09, TP2.10, TP2.12, TP2.15, TP2.19, TP2.20, TP2.21, TP2.22 and TP2.29 and was present to a relatively consistent depth of between 0.50m and 5.00m BGL. These deposits were typically described as *Grey brown slight clayey fine to coarse sub angular to sub rounded SAND and GRAVEL with occasional cobbles and rare boulders*.

BEDROCK: The rotary core boreholes recovered *Weak to Medium Strong grey/dark grey fine to medium grained LIMESTONE interbedded with weak black fine-grained Mudstone*. The depth to rock varies from 12.00m BGL in BH+RC2.01 to a maximum of 26.01m BGL in BH+RC2.03. The total core recovery is good, typically 100% with some of the uppermost runs dropping to 80 or 90%. The SCR and RQD both are relatively poor in the upper weathered zone, often recovered as non-intact, however both indices show an increase with depth in each of the boreholes.

4.2. Groundwater

Groundwater strikes are noted on the exploratory hole logs where they occurred and where possible drilling was suspended for twenty minutes to allow the subsequent rise in groundwater to be recorded. We would point out that these exploratory holes did not remain open for sufficiently long periods of time to establish the hydrogeological regime and groundwater levels would be expected to vary with the time of year, rainfall, nearby construction and other factors. For this reason, standpipes were installed in all the boreholes to allow the equilibrium groundwater level to be determined. The groundwater monitoring is included in Appendix 6 of this Report.

4.3. Laboratory Testing

The geotechnical testing carried out on soil samples recovered generally confirm the descriptions on the logs with the primary constituent of the cohesive deposits found to be a CLAY low plasticity. The Particle Size Distribution tests confirm that generally the cohesive deposits are well-graded with percentages of sands and gravels ranging between 15% and 46% generally with fines contents of 25 to 47%.

The CBR testing on remoulded samples gave results ranging between 3.0% and 14.6% for the cohesive/granular deposits.

The pH and sulphate testing carried out indicate that pH results are near neutral and that the water soluble sulphate results is low when compared to the guideline values from BRE Special Digest 1:2005. The samples tested classify the soil as a Design Sulphate Level DS-1.

The compaction testing (MCV 5 point) using the 2.5kg rammer reported Optimum Moisture Contents (OMC) 9% for the granular deposit and between 9% and 11% for the for the cohesive samples tested, compared to a Natural Moisture Content (NMC) 1.7% for the granular deposit and between 11% to 15% in the cohesive deposits. The granular deposits are within 2.5% of the OMC and the cohesive samples are typically between 3 to 4% wet of the OMC.

The MCV results at OMC range from 3.1 to 5.4 in the cohesive samples and . The MCV testing is typically required to be greater than 8 for acceptable fill with 7-8 considered marginal.

The rock testing completed in Trinity College Dublin varies from weak to very strong, with the point load results ranging from 1.42 to 7.77 MPa. These results correlate to an approximate UCS values of 28.4 MPa to 155.4 MPa using an approximate correlation factor of 20. The UCS testing, which was completed on solid core typically 0.15m in length, ranged from 68 MPa to 137.6MPa ranging from weak to very strong.

The results of the laboratory testing are included in Appendix 5 of this Report.

5.0 Recommendations & Conclusions

5.1. General

The recommendations given and opinions expressed in this report are based on the findings as detailed in the exploratory hole records. Where an opinion is expressed on the material between exploratory hole locations, this is for guidance only and no liability can be accepted for its accuracy. No responsibility can be accepted for conditions which have not been revealed by the exploratory holes. Limited information has been provided at the ground investigation stage and any designs based on the recommendations or conclusions should be completed in accordance with the current design codes, taking into account the variation and the specific details contained within the exploratory hole logs.

5.2. Foundations

An allowable bearing capacity of 300 kN/m² is recommended for conventional pad foundations on the stiff or very stiff cohesive deposits at a depth of 4.0m BGL at the locations of BH2.1, BH2.3 and BH2.5. At the location of BH2.2 and BH2.4 we would recommend an allowable bearing capacity of 280 kN/m² and 250 kN/m² respectively at 4.0m BGL.

Due to the variation with the granular deposits and cohesive deposits encountered with depth across the site we would recommend that all foundations be founded on the same material. Alternatively to reduce the cost and avoid digging down to the deeper stratum, reinforcement in the foundations is proposed to prevent problems with differential settlement.

A ground bearing floor slab is recommended to be based on the stiff or very stiff cohesive deposits with an appropriate depth of compacted hardcore specified by the consulting engineer and in accordance with the limits and guidelines in SR21:2014 +A1:2016 and/or NRA SRW CL808 Type E granular stone fill.

The pH and sulphate testing completed on samples recovered from the trial pits indicates the pH results are near neutral and the sulphate results are low, when compared to the guideline values from BRE Special Digest 1:2005. No special precautions are required for concrete foundations to prevent sulphate attack.

5.3. External Pavements

The proposed pavements are recommended to be designed in accordance with the CBR test results included in the Appendixes of this Report. The CBR test results indicate that a capping layer or a sufficient depth of crushed stone fill may be required. Plate bearing tests are recommended at the time of construction to verify the design assumptions for the proposed pavement make up and to verify adequate compaction has been achieved.

The use of a geogrid and separation membrane may improve the performance of the proposed pavement and enable a more economical pavement design to be achieved, a specialist supplier is recommended to advise of the required strength, depth and type of geotextile for the proposed design.

5.4. Material Re-use

The Cohesive Deposits would not be suitable in their current state and would require treatment during the earthworks to reduce the moisture content to an acceptable level for use as Class 2 fill. The MCV testing is typically required to be greater than 8 for acceptable fill with 7-8 considered marginal. All samples were below these guideline values.

The Granular deposits would also not be suitable in their current state and would require treatment during the earthworks to increase the moisture content to increase the optimum moisture content to within 2% of the OMC or to achieve an MCV of greater than 7 or 8. Due to the fines content exceeding 15% the gravel material with treatment could be classified as a Class 2 Cohesive Fill.

The addition of cement can assist in reducing the moisture content and render it suitable for use as capping material, providing strict controls are put in place to monitor the works and to ensure compliance with the project earthworks specification. A specialist geotechnical consultant is recommended to review and to develop the earthworks specification for the proposed works, particularly where the uniformly grading granular material or cement stabilisation is proposed.

To assess fully the percentage of cement required to carry out the soil stabilisation, further testing needs to be carried out.

The moisture content should be carefully monitored and control to be within +/- 2% of the OMC or to achieve an MCV of greater than 7 or 8. The compaction should be specified to achieve 95% relative compaction where construction is proposed and settlement monitoring undertaken over an appropriate time period to confirm the formation level is suitable for pavement construction. A programme of regular compliance testing, including regular density testing should be undertaken during earthworks to confirm the final compaction achieved.

Material outside of the acceptable moisture content can be used as landscaping fill or in areas where settlement can be tolerated without further treatment.

5.5. Excavations

Short term temporary excavations in the cohesive deposits will remain stable for a limited time only and will require to be appropriately battered or the sides supported if the excavation is below 1.25m BGL or is required to permit man entry.

Excavations in the Made Ground, Peat or soft Cohesive Deposits will require to be appropriately battered or the sides supported due to the low strength of these deposits.

At the locations of TP2.09, 2.10, 2.12, 2.15, 2.19, 2.20, 2.21, 2.22, 2.29 and BH2.5 where granular deposits were encountered the material will require to be appropriately battered or the sides supported. Localised sumps may be required to allow dewatering due to the groundwater seepages noted in the exploratory hole logs in the Appendices of this Report. If a significant volume of water is encountered during excavation an assessment by a specialist dewatering contractor is recommended to determine the most cost-effective approach to the proposed excavation.

A waste classification report has been prepared by O Callaghan Moran and is under the cover of a separate Report.

The recommendations provided in this report should be verified in the design of the proposed buildings, using the full details of the loading conditions and taking into consideration the allowable tolerable settlements/movements that the building can accommodate. The founding strata should be inspected and verified by a suitably qualified engineer prior to construction of the building foundations.

APPENDIX 1 - Site Location Plan

718560.000

718640.000

718720.000

729680.000

729680.000



729600.000

729600.000




729520.000

729520.000

729440.000

729440.000

LEGEND

-  Plate Test Locations
-  TP Locations
-  BH Coords



GROUND INVESTIGATIONS IRELAND

Ground Investigations Ireland Ltd.
Catherinstown House,
Hazelhatch Road,
Newcastle, Co. Dublin
www.gii.ie 01-6015175/5176

Client:



Project Title:
UCD MasterplamPhase 2

Drawing Title:
Figure 1 GI Location Plan

GII Project Reference:
8715-05-19

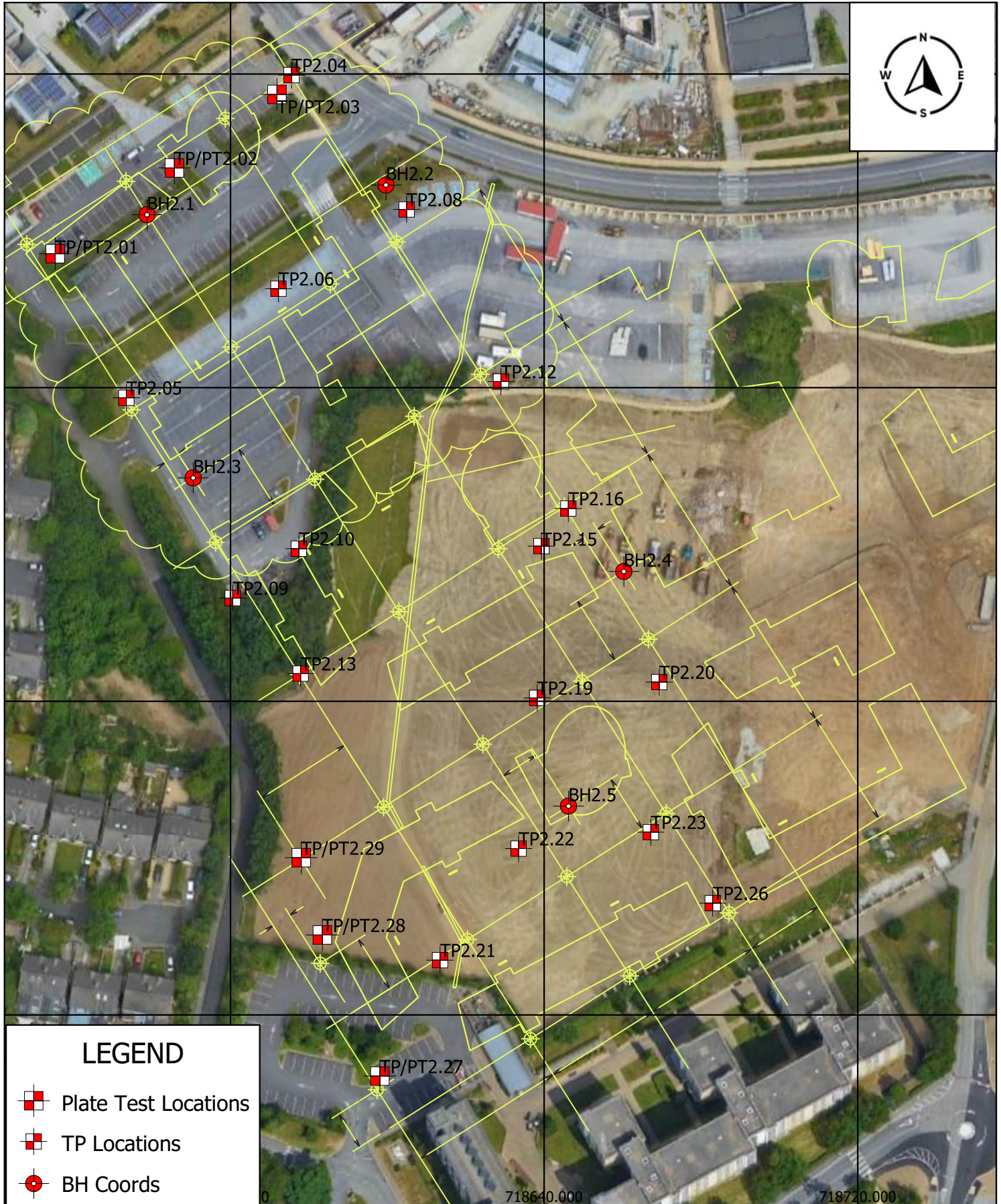
Site Location

0 25 50 m



Drawn By:
SK

Date:
06/03/2019



APPENDIX 2 – Trial Pit Records



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Site
UCD Residents Masterplan - Phase 2 S.I.

Trial Pit Number
TP2.01

Machine : JCB 3CX Method : Trial Pit	Dimensions	Ground Level (mOD) 27.08	Client UCD	Job Number 8715-05-19
	Location 718515.3 E 729633.8 N	Dates 12/06/2019	Engineer Barrett Mahony	Sheet 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.50-1.50	EN			26.98	(0.10)	TARMACADAM		
				26.88	(0.10) (0.20)	FILL: Grey sandy fine to coarse angular Gravel		
1.50-2.00	EN			26.48	(0.40)	MADE GROUND: Black sandy clayey angular to subangular fine to coarse Gravel with angular to subangular cobbles		
				26.28	0.60 (0.20)	Firm brown sandy gravelly silty CLAY with rare subangular cobbles. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse		
					0.80 (1.10)	Firm grey sandy gravelly CLAY with frequent subrounded cobbles with some boulders. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse. Sand lenses between 0.90-1.10mBGL		
				25.18	1.90 (0.60)	Stiff to very stiff black slightly sandy gravelly CLAY with frequent subrounded to rounded cobbles with some boulders. Sand is fine to coarse. Gravel is subrounded to rounded fine to coarse		
				24.58	2.50	Complete at 2.50m		

Plan .	Remarks TP terminated at 2.50mBGL Sidewalls stable No water observed in TP TP backfilled on completion	
		Scale (approx) 1:25



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Site
UCD Residents Masterplan - Phase 2 S.I.

Trial Pit Number
TP2.02

Machine : JCB 3CX Method : Trial Pit	Dimensions	Ground Level (mOD) 26.82	Client UCD	Job Number 8715-05-19
	Location (dGPS) 718545.6 E 729655.6 N	Dates 13/06/2019	Engineer Barrett Mahony	Sheet 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.30-0.80	EN			26.67	(0.15)	TARMACADAM		
				26.52	(0.15)	MADE GROUND: Grey sandy angular fine to coarse Gravel		
				26.32	(0.20)	MADE GROUND: Dark grey clayey sandy fine to coarse Gravel with angular to subangular cobbles. Fragments of red bricks present		
				26.02	(0.30)	MADE GROUND: Firm brown sandy gravelly CLAY with subangular to subrounded cobbles. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse		
1.50-2.50	EN			25.22	(0.80)	Firm grey sandy gravelly CLAY with frequent subangular to subrounded cobbles. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse		
				24.42	(0.80)	Firm to stiff black sandy gravelly CLAY with frequent subangular to subrounded cobbles. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse		
				24.42	2.40	Complete at 2.40m		

Plan	Remarks		
	TP terminated at 2.40mBGL Sidewalls stable No Groundwater encountered TP backfilled on completion		
	Scale (approx)	Logged By	Figure No.
	1:25	RO'T	8715-05-19.TP2.02



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Site
UCD Residents Masterplan - Phase 2 S.I.

Trial Pit Number
TP2.03

Machine : JCB 3CX	Dimensions	Ground Level (mOD) 26.46	Client UCD	Job Number 8715-05-19
Method : Trial Pit	Location (dGPS) 718571.8 E 729674.4 N	Dates 13/06/2019	Engineer Barrett Mahony	Sheet 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.50-1.50	EN			26.36	(0.10)	TARMACADAM		
				26.26	(0.10)	FILL: Grey sandy angular fine to coarse Gravel		
					(0.30)	Dark grey brown clayey sandy sinangular to subrounded fine to coarse GRAVEL with angular to subangular cobbles		
				25.96	0.50	Firm brown sandy gravelly CLAY with rare subangular cobbles. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse		
1.50-1.80	EN		Water strike(1) at 1.80m.		(0.35)	Firm grey sandy gravelly CLAY with frequent subangular to subrounded cobbles. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse		
				24.96	1.50	Stiff black sandy gravelly CLAY with frequent subrounded to rounded cobbles and boulders. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse		
				24.66	1.80	Complete at 1.80m		▽1

<p>Plan</p> <p style="text-align: center;">.</p>	<p>Remarks</p> <p>TP terminated at 1.80mBGL Sidewalls stable Groundwater encountered at 1.80mBGL TP backfilled on completion</p>			
	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 30%;">Scale (approx) 1:25</td> <td style="width: 30%;">Logged By RO'T</td> <td style="width: 40%;">Figure No. 8715-05-19.TP2.03</td> </tr> </table>	Scale (approx) 1:25	Logged By RO'T	Figure No. 8715-05-19.TP2.03
Scale (approx) 1:25	Logged By RO'T	Figure No. 8715-05-19.TP2.03		



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Site
UCD Residents Masterplan - Phase 2 S.I.

Trial Pit Number
TP2.05

Machine : JCB 3CX		Dimensions		Ground Level (mOD) 27.37		Client UCD		Job Number 8715-05-19	
Method : Trial Pit		Location 718533.4 E 729597.1 N		Dates 12/06/2019		Engineer Barrett Mahony		Sheet 1/1	

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	
0.50-1.00	EN				27.27	(0.10)	SURFACING: Grey sandy Gravel		
						(0.30)	FILL: Dark grey sandy fine to coarse angular to subangular Gravel		
					26.97	0.40	FILL: Brown slightly clayey fine to coarse angular to subrounded Sand and Gravel		
					26.87	(0.50)	FILL: Grey slightly clayey sandy fine to coarse subangular to rounded Gravel		
1.60-2.40	EN		Water strike(1) at 1.00m.		26.37	1.00	Firm brown sandy gravelly silty CLAY with occasional subangular to subrounded cobbles. Sand is fine to coarse. Gravel is angular to subrounded fine to coarse		▽1
						(0.60)			
					25.77	1.60	Stiff black slightly sandy gravelly CLAY with occasional subangular to rounded cobbles. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse		
					25.37	2.00	Complete at 2.50m		

Plan .	Remarks TP terminated at 2.50mBGL Sidewalls stable No water encountered TP backfilled on completion		
	Scale (approx) 1:25	Logged By RO'T	Figure No. 8715-05-19.TP2.05



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Site
UCD Residents Masterplan - Phase 2 S.I.

Trial Pit Number
TP2.08

Machine : JCB 3CX		Dimensions		Ground Level (mOD) 27.21		Client UCD		Job Number 8715-05-19	
Method : Trial Pit		Location 718604.9 E 729645.1 N		Dates 12/06/2019		Engineer Barrett Mahony		Sheet 1/1	

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.30-0.80	EN			27.11	(0.10)	SURFACING: Grey sandy Gravel		
					0.10	FILL: Black sandy fine to coarse angular Gravel		
1.50-2.00	EN		Water strike(1) at 1.30m.	26.71	0.50	Firm brown slightly sandy gravelly CLAY with occasional subrounded cobbles. Sand is fine to coarse. Gravel is subrounded fine to coarse		
				26.51	0.70	Firm grey sandy gravelly silty CLAY with occasional angular to subrounded cobbles. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse		
				25.91	1.30	Stiff grey black slightly sandy gravelly CLAY with occasional subangular to rounded with some boulders		
				25.21	2.00	Complete at 2.00m		

Plan				Remarks					
<p>TP terminated at 2.00mBGL Sidewalls stable Water strike at 1.30mBGL - Fast ingress TP backfilled on completion</p>									
				Scale (approx)		Logged By		Figure No.	
				1:25		RO'T		8715-05-19.TP2.08	



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Site
UCD Residents Masterplan - Phase 2 S.I.

Trial Pit Number
TP2.09

Machine : JCB 3CX	Dimensions	Ground Level (mOD) 28.29	Client UCD	Job Number 8715-05-19
Method : Trial Pit	Location 718560.6 E 729546 N	Dates 12/06/2019	Engineer Barrett Mahony	Sheet 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.30-0.80	EN			28.09	(0.20)	SURFACING: Grey sandy Gravel		
				27.99	0.20 (0.10) 0.30	FILL: Grey sandy subrounded to rounded fine to coarse Gravel		
1.00-2.00	EN				(0.90)	MADE GROUND: Brown sandy gravelly CLAY with occasional angular to subrounded cobbles with some boulders. Sand is fine to coarse. Gravel is angular to subrounded fine to coarse. Fragments of red brick and concrete present.		
			Water strike(1) at 1.70m.	27.09	1.20	Grey fine to coarse subangular to subrounded SAND and GRAVEL with frequent subangular to rounded cobbles with some boulders.		∇ ₁
				26.29	2.00	Stiff black slightly sandy gravelly CLAY with occasional subangular to subrounded cobbles with some rounded boulders. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse		
				25.99	(0.30) 2.30	Complete at 2.30m		

Plan	Remarks		
	TP terminated at 2.30mBGL Sidewalls stable Water strike at 1.70mBGL - Fast ingress TP backfilled on completion		
	Scale (approx)	Logged By	Figure No.
	1:25	RO'T	8715-05-19.TP2.09



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Site
UCD Residents Masterplan - Phase 2 S.I.
Trial Pit Number
TP2.10

Machine : JCB 3CX Method : Trial Pit	Dimensions	Ground Level (mOD) 28.21	Client UCD	Job Number 8715-05-19
	Location 718577.4 E 729558.6 N	Dates 12/06/2019	Engineer Barrett Mahony	Sheet 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.30-0.80	EN			28.01 27.91	(0.20) 0.20 (0.10) 0.30	SURFACING: Grey sandy Gravel FILL: Black sandy slightly clayey angular to subangular fine to coarse Gravel		
1.20-2.20	EN		Water strike(1) at 1.20m.	27.71 27.01	(0.20) 0.50 (0.70) 1.20	Firm brown slightly sandy gravelly CLAY with occasional subangular to subrounded cobbles. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse Brown grey subangular to subrounded fine to coarse SAND and GRAVEL with frequent subrounded to rounded cobbles with some boulders Soft black slightly sandy gravelly CLAY with occasional subangular to subrounded cobbles with some boulders		∇1
				26.01	2.20	Complete at 2.20m		

Plan	Remarks		
	TP terminated at 2.20mBGL Sidewalls stable Water strike at 1.20mBGL - Fast ingress TP backfilled on completion		
	Scale (approx)	Logged By	Figure No.
	1:25	RO'T	8715-05-19.TP2.10



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Site
UCD Residents Masterplan - Phase 2 S.I.

Trial Pit Number
TP2.12

Machine : JCB 3CX	Dimensions (L x W x D) 3.20 x 0.60 x 2.00	Ground Level (mOD) 28.15	Client UCD	Job Number 8715-05-19
Method : Trial Pit	Location (dGPS) 718629 E 729601.2 N	Dates 12/06/2019	Engineer Barrett Mahony	Sheet 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.00-0.90	EN					Soft brown sandy gravelly CLAY with occasional sub angular to sub rounded cobbles. Gravel fine to coarse sub angular to sub rounded		
				27.25	0.90 (0.90)	Soft black clayey PEAT		
			Fast flow(1) at 1.20m.	26.95	1.20 (0.20)	Grey clayey fine to coarse rounded GRAVEL with occasional rounded to sub rounded cobbles		∇1
1.40-2.00	EN			26.75	1.40 (0.60)	Firm to stiff black slightly sandy gravelly CLAY with frequent angular to rounded cobbles with frequent boulders. Gravel fine to coarse sub angular to sub rounded.		
				26.15	2.00	Complete at 2.00m		

Plan	Remarks		
	TP terminated at 2.00m BGL Sidewalls stable Water observed in TP 1.20m - Fast flow TP backfilled on completion		
	Scale (approx)	Logged By	Figure No.
	1:25	RO'T	8715-05-19.TP2.12



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Site
UCD Residents Masterplan - Phase 2 S.I.
Trial Pit Number
TP2.13

Machine : JCB 3CX Method : Trial Pit		Dimensions		Ground Level (mOD) 29.24		Client UCD		Job Number 8715-05-19	
		Location (dGPS) 718577.9 E 729526.7 N		Dates 13/06/2019		Engineer Barrett Mahony		Sheet 1/1	

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.00-1.50	EN					MADE GROUND: Brown clayey silty Sand with frequent subrounded to rounded cobbles and rare boulders		
				28.24	1.00	MADE GROUND: Grey subangular to subrounded fine to coarse Sand and Gravel with frequent subangular to subrounded cobbles. Fragment of clay pipe present		
					(1.10)			
2.10-2.70	EN			27.14	2.10	Grey sandy gravelly CLAY with frequent subangular to subrounded boulders		
					(0.60)			
				26.54	2.70	Complete at 2.70m		

Plan					Remarks					
.					TP terminated at 2.70m BGL					
.					Sidewalls stable					
.					No Groundwater encountered					
.					TP backfilled on completion					
.					Scale (approx)		Logged By		Figure No.	
.					1:25		RO'T		8715-05-19.TP2.13	



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Site
UCD Residents Masterplan - Phase 2 S.I.

Trial Pit Number
TP2.15

Machine : JCB 3CX	Dimensions (L x W x D) 3.20 x 0.60 x 3.80	Ground Level (mOD) 29.92	Client UCD	Job Number 8715-05-19
Method : Trial Pit	Location (dGPS) 718639.3 E 729559.2 N	Dates 12/06/2019	Engineer Barrett Mahony	Sheet 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.00-2.00	EN			29.72	(0.20) 0.20	FILL: Black sandy fine to coarse angular GRAVEL		
					(0.80)	MADE GROUND: Brown sandy gravelly Clay with occasional angular to sub angular cobbles. Gravel is fine to coarse sub angular to sub rounded with fragments of reinforced concrete		
			Slow flow(1) at 1.50m.	28.92	1.00	MADE GROUND: Black sandy gravelly Clay with frequent angular to sub angular cobbles. Gravel is fine to coarse sub angular to sub rounded with fragments of plastic and wood		∇1
				27.92	2.00	Soft to firm slightly sandy gravelly clayey SILT. Gravel fine to medium		
2.30-3.80	EN			27.62	2.30 (0.10)	Soft brown clayey PEAT		
				27.52	2.40	Grey silty fine to coarse angular to sub rounded SAND and GRAVEL with frequent sub rounded cobbles.		
					(0.50)			
				27.02	2.90	Brown slightly clayey silty fine to coarse sub rounded to sub angular SAND and GRAVEL with occasional sub rounded to rounded cobbles.		
				26.62	3.30	Stiff brown sandy silty CLAY with occasional sub rounded cobbles. Gravel is fine to coarse sub angular to sub rounded		
					(0.50)			
				26.12	3.80	Complete at 3.80m		

Plan	<p>Remarks</p> <p>TP terminated at 3.80m BGL Sidewalls stable Water observed in TP 1.50m - Slow flow TP backfilled on completion</p>		
	Scale (approx) 1:25	Logged By RO'T	Figure No. 8715-05-19.TP2.15



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Site
UCD Residents Masterplan - Phase 2 S.I.

Trial Pit Number
TP2.16

Machine : JCB 3CX	Dimensions (L x W x D) 3.20 x 0.60 x 2.60	Ground Level (mOD) 29.32	Client UCD	Job Number 8715-05-19
Method : Trial Pit	Location (dGPS) 718646.2 E 729568.8 N	Dates 12/06/2019	Engineer Barrett Mahony	Sheet 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.30-1.80	EN			29.02	(0.30)	FILL: Grey brown sandy gravelly Clay with frequent rounded to angular cobbles. Gravel is fine to coarse sub angular to sub rounded with fragments of wood, plastic and concrete.		
					(0.30)	FILL: Grey sandy fine to coarse angular to sub angular Gravel		
					(0.40)	MADE GROUND: Black slightly sandy gravelly Clay with frequent rounded to sub rounded cobbles. Gravel fineto coarse sub angular to sub rounded with fragments of red brick and wood.		
					(0.80)	MADE GROUND: Grey slightly sandy gravelly Clay with frequent sub angular to sub rounded cobbles. Gravel is fine to coarse sub angular to sub rounded with fragments of wire		
1.80-2.60	EN			27.52	(0.10)	Soft brown grey clayey sandy SILT		
					(0.40)	Soft brown clayey PEAT		
					(0.30)	Firm grey gravelly clayey sandy SILT. Gravel is fine to coarse sub angular to rounded		
					26.72	2.60	Complete at 2.60m	

Plan	Remarks		
.	TP terminated at 2.60m BGL		
.	Sidewalls stable		
.	No water observed in TP		
.	TP backfilled on completion		
.	Scale (approx)	Logged By	Figure No.
.	1:25	RO'T	8715-05-19.TP2.16



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Site
UCD Residents Masterplan - Phase 2 S.I.
Trial Pit Number
TP2.19

Machine : JCB 3CX Method : Trial Pit	Dimensions (L x W x D) 3.20 x 0.60 x 3.50	Ground Level (mOD) 29.76	Client UCD	Job Number 8715-05-19
	Location (dGPS) 718638.3 E 729520.5 N	Dates 28/05/2019	Engineer Barrett Mahony	Sheet 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.00-1.50	EN				(0.50)	SURFACING: Grey sandy fine to coarse Gravel with some rounded cobbles		
				29.26	0.50	MADE GROUND: Brown grey slightly sandy gravelly Clay with occasional sub angular to sub rounded cobbles with rare boulders. Gravel is fine to coarse sub angular to sub rounded		
				28.46	1.30	MADE GROUND: Grey slightly sandy slightly gravelly CLAY with occasional sub angular to sub rounded cobbles with fragments of red brick.		
1.50-3.00	EN			27.76	2.00	Soft black clayey PEAT		
				27.66	2.10	Stiff grey slightly sandy clayey SILT		
					(0.50)			
			Fast Flow(1) at 2.60m.	27.16	2.60	Grey slightly clayey gravelly fine to coarse silty SAND with occasional rounded to sub rounded cobbles. Gravel is fine to coarse sub angular to sub rounded		∇1
				26.66	3.10	Stiff brown sandy SILT. Sand is fine to medium		
				26.26	3.50	Complete at 3.50m		

Plan	Remarks		
	TP terminated at 3.50m BGL Sidewalls stable Water observed in TP at 2.60m - Fast Flow TP backfilled on completion		
	Scale (approx)	Logged By	Figure No.
	1:25	RO'T	8715-05-19.TP2.19



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Site
UCD Residents Masterplan - Phase 2 S.I.

Trial Pit Number
TP2.20

Machine : JCB 3CX	Dimensions (L x W x D) 3.20 x 0.60 x 4.00	Ground Level (mOD) 30.22	Client UCD	Job Number 8715-05-19
Method : Trial Pit	Location (dGPS) 718669.4 E 729524.6 N	Dates 28/05/2019	Engineer Barrett Mahony	Sheet 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	
0.00-1.50	EN					SURFACING: Grey sandy fine to coarse Gravel with some rounded cobbles			
					29.72	0.50 (0.30)			MADE GROUND: Brown slightly sandy gravelly Clay with occasional sub angular to sub rounded cobbles with rare boulders. Gravel is fine to coarse sub angular to sub rounded
					29.42	0.80 (0.40)			MADE GROUND: Brown slightly sandy gravelly CLAY with occasional sub angular to sub rounded cobbles. Gravel fine to coarse sub angular to sub rounded
					29.02	1.20 (0.50)			MADE GROUND: Grey slightly sandy slightly gravelly CLAY with occasional sub angular to sub rounded cobbles with fragments of red brick.
					28.52	1.70 (0.70)			Firm brown grey sandy gravelly CLAY with occasional sub angular cobbles. Gravel is fine to coarse sub angular to sub rounded.
3.00-3.50	EN				27.82	2.40 (0.60)	Grey slightly clayey fine to coarse sub angular rounded SAND and GRAVEL with occasional rounded to sub rounded cobbles.		
					27.22	3.00 (1.00)	Stiff black slightly sandy gravelly CLAY with frequent rounded to sub rounded cobbles with some boulders. Gravel is fine to coarse sub angular to sub rounded		
				26.22	4.00				

Plan

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Remarks

TP terminated at 4.00m BGL
Sidewalls stable
No water observed in TP
TP backfilled on completion

Scale (approx) 1:25	Logged By RO'T	Figure No. 8715-05-19.TP2.20
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Site
UCD Residents Masterplan - Phase 2 S.I.
Trial Pit Number
TP2.21

Machine : JCB 3CX Method : Trial Pit	Dimensions (L x W x D) 3.20 x 0.60 x 3.40	Ground Level (mOD) 30.60	Client UCD	Job Number 8715-05-19
	Location (dGPS) 718613.4 E 729453.6 N	Dates 13/06/2019	Engineer Barrett Mahony	Sheet 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.00-1.50	EN				(1.90)	MADE GROUND: Brown sandy gravelly Clay with subrounded to rounded cobbles. Sand is fine to coarse. Gravel is subrounded to rounded fine to coarse. Fragments of plastic and red brick present		
				28.70	1.90 (0.20)	Grey silty CLAY		
				28.50	2.10 (0.50)	Brown PEAT		
2.40-3.40	EN			28.00	2.60 (0.80)	Grey angular to subangular fine to coarse SAND and GRAVEL with frequent angular to subangular cobbles		
			Water strike(1) at 3.40m.	27.20	3.40	Complete at 3.40m		∇ ₁

Plan .	Remarks TP terminated at 3.40m BGL Sidewalls stable Water observed in TP at 3.40m BGL TP backfilled on completion	
		Scale (approx) 1:25



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Site
UCD Residents Masterplan - Phase 2 S.I.

Trial Pit Number
TP2.22

Machine : JCB 3CX	Dimensions (L x W x D) 3.20 x 0.60 x 3.80	Ground Level (mOD) 29.96	Client UCD	Job Number 8715-05-19
Method : Trial Pit	Location (dGPS) 718633.5 E 729482.1 N	Dates 13/06/2019	Engineer Barrett Mahony	Sheet 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	
0.25-1.50	EN		Fast Flow(1) at 1.70m.	29.71	(0.25)	FILL: Black sandy fine to coarse sub angular to angular Gravel with frequent angular to sub angular cobbles with fragments of wood and plastic			
					0.25	FILL: Brown sandy gravelly Clay with frequent angular cobbles. Gravel in fine to coarse angular to sub rounded with fragmetns of plastic, wood and red brick			
					(0.75)				
					28.96	1.00	MADE GROUND: Firm grey slightly sandy gravelly Clay with frequent rounded to sub rounded cobbles and rare boulders. Gravel is fine to coarse sub angular to sub rounded with fragmetns of red brick.		
					(0.50)				
					28.46	1.50	Soft grey sandy clayey SILT		
28.36	1.60	Dark brown clayey PEAT							
2.50-3.80	EN		Fast Flow(1) at 1.70m.	28.26	(0.10)	Grey fine to coarse sub angular to sub rounded SAND and GRAVEL with occasional sub rounded cobbles		▽1	
				(1.00)					
				27.26	2.70	Firm to stiff brown grey sandy clayey SILT with occasional rounded to sub rounded cobbles			
				(1.10)					
				26.16	3.80	Complete at 3.80m			

Plan	Remarks																																																												
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Scale (approx) 1:25	Logged By RO'T	Figure No. 8715-05-19.TP2.22																																																											



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Site
UCD Residents Masterplan - Phase 2 S.I.

Trial Pit Number
TP2.23

Machine : JCB 3CX	Dimensions (L x W x D) 3.20 x 0.60 x 3.50	Ground Level (mOD) 30.06	Client UCD	Job Number 8715-05-19
Method : Trial Pit	Location (dGPS) 718667.2 E 729486.3 N	Dates 12/06/2019	Engineer Barrett Mahony	Sheet 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.00-1.50	EN			29.86	(0.20)	SURFACING: Grey sandy fine to coarse Gravel with some rounded cobbles		
					0.20	MADE GROUND: Brown grey slightly sandy gravelly Clay with occasional sub angular to sub rounded cobbles with rare boulders. Gravel is fine to coarse sub angular to sub rounded		
2.00-3.50	EN			28.76	(1.10)			
					1.30	Soft brown sandy gravelly CLAY with occasional sub angular cobbles. Gravel is fine to coarse sub angular to sub rounded		
					(0.40)			
					28.36	1.70		
				28.06	2.00	Firm grey sandy gravelly CLAY with occasional sub angular to sub rounded cobbles. Gravel is fine to coarse sub angular to sub rounded		
					(0.50)			
					27.56	2.50		
				26.56	3.50	Complete at 3.50m		

Plan	Remarks
.	TP terminated at 3.50m BGL Sidewalls stable No water observed in TP TP backfilled on completion
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	Scale (approx) 1:25
	Logged By RO'T
	Figure No. 8715-05-19.TP2.23



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Site
UCD Residents Masterplan - Phase 2 S.I.

Trial Pit Number
TP2.27

Excavation Method Trial Pit	Dimensions		Ground Level (mOD) 30.67	Client UCD	Job Number 8715-05-19
	Location 718598.1 E 729423.9 N		Dates 12/06/2019	Engineer Barrett Mahony	Sheet 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.70-1.20	EN			30.57	(0.10)	TARMACADAM		
				30.47	(0.10) (0.20)	FILL: Grey sandy fine to coarse angular Gravel		
2.00-2.40	EN		Water strike(1) at 1.50m.	29.97	(0.50)	FILL: Black clayey sandy angular fine to coarse Gravel with occasional cobbles		V1
					0.70	MADE GROUND: Dark grey slightly sandy gravelly Clay with occasional subrounded cobbles. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse. Ceramics, red brick, plastic and concrete fragments present		
					(1.10)			
				28.87	1.80	Soft black clayey PEAT		
				28.67	(0.20)			
					2.00	Stiff sandy gravelly silty CLAY with occasional subangular to subrounded cobbles		
					(0.50)			
				28.17	2.50	Complete at 2.50m		

Plan .	Remarks TP terminated at 2.50mBGL Sidewalls stable Water strike at 1.50mBGL - Slow ingress TP backfilled on completion	
		Scale (approx) 1:25



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Site
UCD Residents Masterplan - Phase 2 S.I.
Trial Pit Number
TP2.28

Machine : JCB 3CX		Dimensions		Ground Level (mOD) 30.74		Client UCD		Job Number 8715-05-19	
Method : Trial Pit		Location (dGPS) 718583.4 E 729459.9 N		Dates 13/06/2019		Engineer Barrett Mahony		Sheet 1/1	

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.00-1.50	EN				(1.50)	MADE GROUND: Brown sandy silty Clay with rare subrounded to rounded cobbles		
				29.24	1.50	MADE GROUND: Firm to stiff brown sandy gravelly CLAY. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse. Clay pipe fragments present		
				28.54	2.20	Section of concrete layer		
				28.34	2.40	grey sandy gravelly CLAY with frequent subrounded to rounded boulders. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse		
2.80-3.10	EN		Water strike(1) at 2.80m.		(0.70)			∇1
				27.64	3.10	Complete at 3.10m		

Plan					Remarks				
.					TP terminated at 3.10m BGL				
.					Sidewalls stable				
.					Water observed in TP at 2.80m BGL				
.					TP backfilled on completion				
.					Scale (approx)		Logged By		Figure No.
.					1:25		RO'T		8715-05-19.TP2.28



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Site
UCD Residents Masterplan - Phase 2 S.I.
Trial Pit Number
TP2.29

Machine : JCB 3CX Method : Trial Pit	Dimensions	Ground Level (mOD) 30.75	Client UCD	Job Number 8715-05-19
	Location (dGPS) 718578 E 729479.7 N	Dates 13/06/2019	Engineer Barrett Mahony	Sheet 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.00-1.50	EN				(1.50)	MADE GROUND: Brown clayey silty Sand with rare subrounded to rounded cobbles		
				29.25	1.50	MADE GROUND: Firm brown sandy gravelly silty CLAY with rare subangular cobbles		
					(0.80)			
2.30-3.40	EN			28.45	2.30	Grey subangular to subrounded fine to coarse SAND and GRAVEL with subangular to subrounded cobbles		
					(1.10)			
				27.35	3.40	Complete at 3.40m		

Plan	Remarks		
.	TP terminated at 3.40m BGL		
.	Sidewalls stable		
.	No Groundwater encountered		
.	TP backfilled on completion		
.	Scale (approx)	Logged By	Figure No.
.	1:25	RO'T	8715-05-19.TP2.29

Trial Pit Photographs – UCD Residents Masterplan



TP2.01





TP2.01



TP2.02



TP2.02



TP2.02



TP2.05



TP2.05



TP2.05



TP2.06



TP2.06



TP2.06



TP2.08



TP2.08



TP2.08



TP2.09



TP2.09



TP2.09



TP2.10



TP2.10



TP2.10



TP2.12



TP2.12



TP2.12



TP2.13



TP2.13



TP2.13



TP2.15



TP2.15



TP2.15



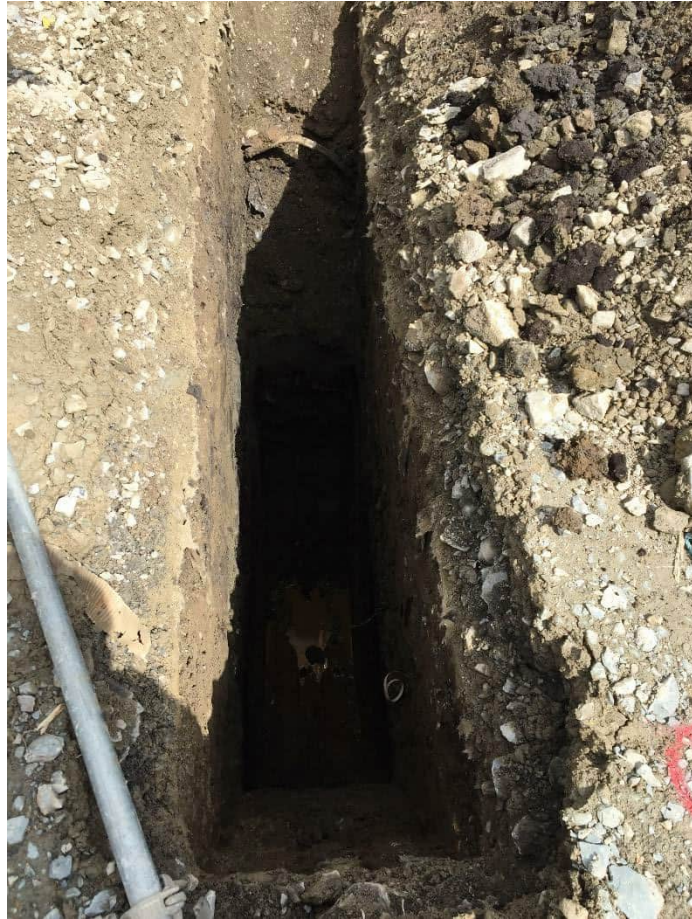
TP2.16



TP2.16



TP2.16



TP2.19



TP2.19



TP2.19



TP2.21



TP2.21



TP2.21



TP2.23



TP2.23



TP2.23



TP2.27



TP2.27



TP2.27



TP2.29



TP2.29



TP2.29

APPENDIX 3 –Borehole Records



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Site
UCD Residents Masterplan - Phase 2 S.I.

Borehole Number
BH2.1

Machine : Dando 2000 & T44	Casing Diameter 200mm cased to 5.10m 100mm cased to 26.00m	Ground Level (mOD) 26.77	Client UCD	Job Number 8715-05-19
Method : Cable Percussion with Rotary Follow On	Location 718541.2 E 729640.6 N	Dates 20/06/2019	Engineer Barrett Mahony	Sheet 1/3

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
0.50	B				26.67	0.10	TARMACADAM			
					26.57	0.20 (0.30)	CONCRETE			
					26.27	0.50	FILL: Angular fine to coarse Gravel			
1.00 1.00-1.45	B SPT(C) N=9			1,2/2,2,2,3		(1.10)	MADE GROUND: Brown slightly sandy gravelly Clay with rare angular to sub-angular cobbles with rare red brick and concrete fragments. Sand is fine to coarse. Gravel is angular to sub-angular fine to coarse			
2.00 2.00-2.45	B SPT(C) N=21			2,3/4,5,6,6	25.17	1.60 (0.40)	Firm black sandy slightly gravelly slightly silty CLAY. Sand is fine to coarse. Gravel is sub-angular to sub-rounded fine to coarse			
3.00 3.00-3.45	B SPT(C) N=32			3,5/7,7,8,10	24.77	2.00 (1.00)	Stiff black sandy slightly gravelly slightly silty CLAY. Sand is fine to coarse. Gravel is sub-angular to sub-rounded fine to coarse			
4.00 4.00-4.45	B SPT(C) N=34			4,5/7,8,8,11	23.77	3.00 (2.10)	Very stiff black sandy slightly gravelly slightly silty CLAY. Sand is fine to coarse. Gravel is sub-angular to sub-rounded fine to coarse			
5.00-5.10 4.90 5.00	TCR SCR RQD FI			25/50 SPT(C) 25*/75 50/25 B						
	3				21.67	5.10 (1.40)	Poor Recovery - Driller notes: Cobbles and clay. Recovery consists of grey sub-angular to sub-rounded coarse Gravel with clay washed away (Very stiff)			
6.50-6.66 6.50	90			17,17/50 SPT(C) 50/10	20.27	6.50 (3.50)	Very stiff brown slightly sandy gravelly CLAY with occasional sub-angular to sub-rounded cobbles. Sand is fine to coarse. Gravel is sub-angular to sub-rounded fine to coarse			
8.00	100									
9.50-9.52 9.50				25/50 SPT(C) 25*/10 50/10						

Remarks Wavin pipe installed in cable percussion borehole upon completion to facilitate rotary follow on Borehole secured by placing steel plate over opening Standpipe installed on completion - Slotted pipe installed from 26.00m-1.00mBGL with gravel surround. Plain pipe installed from 1.00mBGL to ground level with bentonite seal and flush cover Chiselling from 5.10m to 5.10m for 1 hour.	Scale (approx) 1:50	Logged By MMC & TMcl
Figure No. 8715-05-19.BH2.1		



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Site
UCD Residents Masterplan - Phase 2 S.I.

Borehole Number
BH2.1

Machine : Dando 2000 & T44	Casing Diameter 200mm cased to 5.10m 100mm cased to 26.00m	Ground Level (mOD) 26.77	Client UCD	Job Number 8715-05-19
Flush : Water			Engineer Barrett Mahony	Sheet 2/3
Core Dia : 68 mm	Location 718541.2 E 729640.6 N	Dates 20/06/2019		
Method : Cable Percussion with Rotary Follow On				

Depth (m)	TCR	SCR	RQD	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
11.00-11.02	43				25/50 SPT(C) 25*/10 50/10	16.77	10.00	Very stiff brown sandy slightly gravelly silty CLAY with frequent fine to coarse sandy laminations. Gravel is sub-angular to sub-rounded fine to coarse			
11.00							(2.00)				
12.00	60					14.77	12.00	Weak to medium strong thinly bedded to thinly laminated dark grey fine grained LIMESTONE with calcite veins and some fossiliferous beds. Partially weathered			
12.50							(2.30)				
14.00	66	20	17	NI			12.00-14.30 - Non-Intact				
14.30	100	53	43			12.47	14.30	Medium strong medium bedded to thinly laminated fine grained LIMESTONE with some fossiliferous beds. Partially weathered to unweathered			
15.50							(6.10)				
17.00	100	80	73					14.30-20.40 - Two fracture sets. F1: Dipping 0-20 degrees, medium to wide, undulating rough. F2: Dipping 45-65 degrees close to wide spacing, planar to undulating rough with some brown clay infill and staining			
18.50											
20.00	100	66	47								

Remarks	Scale (approx)	Logged By
	1:50	MMC & TMcl
Figure No. 8715-05-19.BH2.1		



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Site
UCD Residents Masterplan - Phase 2 S.I.

Borehole Number
BH2.1

Machine : Dando 2000 & T44	Casing Diameter 200mm cased to 5.10m 100mm cased to 26.00m	Ground Level (mOD) 26.77	Client UCD	Job Number 8715-05-19
Flush : Water			Engineer Barrett Mahony	Sheet 3/3
Core Dia: 68 mm				
Method : Cable Percussion with Rotary Follow On	Location 718541.2 E 729640.6 N	Dates 20/06/2019		

Depth (m)	TCR	SCR	RQD	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
20.40	100	97	97			6.37	20.40	Medium strong very thickly bedded dark grey fine to coarse grained fossiliferous LIMESTONE with some stylolites. Partially weathered to unweathered			
21.50	100	97	87	4			(2.20)	20.40-22.60 - Two fracture sets. F1: Dipping 0-10 degrees, medium to wide, undulating rough with some black clay staining. F2: Dipping 40-50 degrees, close to medium, planar rough with some black clay staining			
22.60						4.17	22.60	Strong to medium strong thickly bedded to thinly laminated dark grey fine grained LIMESTONE with some fossiliferous beds. Partially weathered to unweathered			
23.00	100	66	53				(3.40)	22.60-26.00 - Two fracture sets. F1: Dipping 0-20 degrees, medium to wide, undulating rough clean. F2: Dipping 40-60 degrees, very close to wide spacing, planar to undulating smooth with some brown and black clay smearing			
24.50	100	90	70	7							
26.00						0.77	26.00	Complete at 26.00m			

Remarks	Scale (approx) 1:50	Logged By MMC & TMcl
	Figure No. 8715-05-19.BH2.1	



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Site
UCD Residents Masterplan - Phase 2 S.I.

Borehole Number
BH2.2

Machine : Dando 2000 & T44	Casing Diameter 200mm cased to 7.40m 100mm cased to 32.10m	Ground Level (mOD) 27.26	Client UCD	Job Number 8715-05-19
Method : Cable Percussion with Rotary Follow On	Location 718602.3 E 729650.1 N	Dates 18/06/2019	Engineer Barrett Mahony	Sheet 1/4

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
0.50	B				27.06	(0.20)	TOPSOIL			
						(0.30)	FILL: Angular fine to coarse Gravel			
1.00	B				26.76	0.50	MADE GROUND: Brown mottled grey slightly sandy gravelly CLAY with rare subangular to subrounded cobbles with rare bits of string. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse			
1.00-1.45	SPT(C) N=8			1,1/2,2,2,2	26.16	1.10				
						(0.50)	Soft to firm dark brown mottled dark grey slightly sandy gravelly CLAY with rare subrounded to rounded cobbles. Sand is fine to coarse. Gravel is subrounded to rounded fine to coarse			
2.00	B			Water strike(1) at 1.80m, rose to 1.50m in 20 mins.	25.66	1.60	Soft to firm dark grey slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is subangular to subrounded fine to medium			
2.00-2.45	SPT(C) N=7			4,3/2,1,2,2		(1.40)				
3.00	B				24.26	3.00	Stiff black slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is subangular to subrounded fine to medium			
3.00-3.45	SPT(C) N=20			2,3/4,5,5,6		(2.00)				
4.00	B					(2.00)	Very stiff black slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is subangular to subrounded fine to medium			
4.00-4.45	SPT(C) N=28			3,5/5,7,7,9		5.00				
5.00	B				22.26	5.00	Very stiff black slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is subangular to subrounded fine to medium			
5.00-5.45	SPT(C) N=37			4,6/8,9,9,11		(2.40)				
6.00	B					(2.40)	Very stiff brownish grey slightly sandy gravelly silty CLAY with frequent angular to subangular cobbles. Sand is fine to coarse. Gravel is angular to subangular fine to coarse			
6.00-6.45	SPT(C) N=34			5,6/6,7,9,12		7.40				
7.00	B					7.40	Very stiff brownish grey slightly sandy gravelly silty CLAY with frequent angular to subangular cobbles. Sand is fine to coarse. Gravel is angular to subangular fine to coarse			
7.00-7.40	SPT(C) 50/250			9,11/12,12,21,5		19.86				
7.40	TCR	SCR	RQD	FI						
	100									
8.10-8.26										
8.10	100									
9.10										
9.60-9.62										

Remarks Wavin pipe installed in cable percussion borehole upon completion to facilitate rotary follow on Borehole secured by placing steel plate over opening Standpipe installed on completion - Slotted pipe installed from 30.00m-1.00mBGL with gravel surround. Plain pipe installed from 1.00mBGL to ground level with bentonite seal and flush cover Chiselling from 7.40m to 7.40m for 1 hour.	Scale (approx) 1:50	Logged By MMC
Figure No. 8715-05-19.BH2.2		



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Site
UCD Residents Masterplan - Phase 2 S.I.

Borehole Number
BH2.2

Machine : Dando 2000 & T44	Casing Diameter 200mm cased to 7.40m 100mm cased to 32.10m	Ground Level (mOD) 27.26	Client UCD	Job Number 8715-05-19
Flush : Water			Engineer Barrett Mahony	Sheet 2/4
Core Dia: 68 mm				
Method : Cable Percussion with Rotary Follow On	Location 718602.3 E 729650.1 N	Dates 18/06/2019		

Depth (m)	TCR	SCR	RQD	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
11.10-11.26 11.10	65				13,26/50 SPT(C) 50/10		(6.70)				
12.60-12.62 12.60	100				21/50 SPT(C) 21*/10 50/10						
14.10-14.33 14.10	90				12,16/16,34 SPT(C) 50/76	13.16	14.10	Poor recovery driller notes sand and gravelly Clay: Recovery consists of very stiff brownish grey slightly sandy gravelly silty CLAY with frequent angular to subangular cobbles. Sand is fine to coarse. Gravel is angular to subangular fine to coarse (majority of clay washed away)			
15.60-15.98 15.60	20				8,8/12,12,14,12 SPT(C) 50/226	11.66	15.60	Poor recovery driller notes yellow brown silty Clay. Recovery consists of very stiff brown very sandy slightly gravelly slightly silty CLAY with frequent subangular cobbles. Sand is fine to coarse. Gravel is subangular fine to coarse			
17.10-17.55 17.10	53				6,9/8,10,10,12 SPT(C) N=40	10.16	17.10	Poor recovery driller notes boulder Clay with seams of Sand. Recovery consists of very stiff brown/grey sandy gravelly CLAY with occasional subangular cobbles. Gravel is subangular fine to coarse			
18.60-18.83 18.60	20				17,19/19,31 SPT(C) 50/76	8.66	18.60	Poor recovery driller notes Silty Sand. recovery consists of brown gravelly SAND with occasional subrounded cobbles			

Remarks	Scale (approx)	Logged By
	1:50	MMC
	Figure No. 8715-05-19.BH2.2	



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Site
UCD Residents Masterplan - Phase 2 S.I.

Borehole Number
BH2.2

Machine : Dando 2000 & T44	Casing Diameter 200mm cased to 7.40m 100mm cased to 32.10m	Ground Level (mOD) 27.26	Client UCD	Job Number 8715-05-19
Flush : Water			Engineer Barrett Mahony	Sheet 3/4
Core Dia : 68 mm				
Method : Cable Percussion with Rotary Follow On	Location 718602.3 E 729650.1 N	Dates 18/06/2019		

Depth (m)	TCR	SCR	RQD	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
20.10-20.26					SPT(C) 50/10	7.16	20.10 (0.30)	Poor recovery driller notes Weathered Rock. Recovery consists residual rock recovered as a brown laminated sandy gravelly CLAY with relic bedding layers			
20.10	23				22/50	6.86	20.40 (1.20)	Poor recovery driller notes Weathered Rock: Recovery consists of angular cobbles and boulders of LIMESTONE			
21.60	40					5.66	21.60 (3.00)	Driller notes very fractured and weathered rock. Recovery consists of residual rock recovered as brown very sandy slightly gravelly slightly silty CLAY with frequent subangular cobbles			
23.10	80										
24.60	60					2.66	24.60 (2.90)	Driller notes decomposed rock with silt. Recovery consists of residual rock recovered as brown slightly sandy gravelly CLAY with relic bedding			
26.10	80										
27.60	47					-0.24	27.50 (4.60)	Driller notes decomposed rock with silt. Recovery consists of residual rock recovered as brown with orange and black mottling slightly sandy slightly gravelly CLAY with frequent subangular cobbles. Sand is fine to coarse. Gravel is subangular fine to coarse			
29.10	80										

Remarks	Scale (approx)	Logged By
	1:50	MMC
	Figure No. 8715-05-19.BH2.2	



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Borehole Number
BH2.2

Machine : Dando 2000 & T44	Casing Diameter 200mm cased to 7.40m 100mm cased to 32.10m	Ground Level (mOD) 27.26	Client UCD	Job Number 8715-05-19
Flush : Water	Location 718602.3 E 729650.1 N	Dates 18/06/2019	Engineer Barrett Mahony	Sheet 4/4
Core Dia : 68 mm				
Method : Cable Percussion with Rotary Follow On				

Depth (m)	TCR	SCR	RQD	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
30.60											
	43										
32.10						-4.84	32.10	Complete at 32.10m			

Remarks	Scale (approx) 1:50	Logged By MMC
	Figure No. 8715-05-19.BH2.2	



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Site
UCD Residents Masterplan - Phase 2 S.I.

Borehole Number
BH2.3

Machine : Dando 2000 and T44	Casing Diameter 200mm cased to 6.40m 100mm cased to 26.10m	Ground Level (mOD) 27.78	Client UCD	Job Number 8715-05-19
Method : Cable Percussion with Rotary Follow On	Location 718550.9 E 729577.5 N	Dates 19/06/2019	Engineer Barrett Mahony	Sheet 1/3

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
0.50	B				27.28	0.50	FILL: Angular fine to coarse Gravel			
1.00-1.45	B SPT(C) N=8			1,2/2,2,2,2	26.48	0.80	Dark brown mottled grey sandy very gravelly CLAY. Sand is fine to coarse. Gravel is angular to subangular fine to coarse			
2.00-2.45	B SPT(C) N=23			3,3/4,5,7,7	25.78	1.30	Firm dark brown slightly sandy gravelly CLAY. Sand is fine to coarse. Gravel is subrounded to rounded fine to coarse			
3.00-3.45	B SPT(C) N=29			4,5/5,7,8,9		2.00				
4.00-4.45	B SPT(C) N=36			4,6/8,8,10,10	23.78	4.00	Very stiff black slightly sandy gravelly CLAY. Sand is fine to coarse. Gravel is subrounded to rounded fine to coarse			
5.00-5.45	B SPT(C) N=47			5,7/9,10,13,15		(2.40)				
6.00-6.40	B SPT(C) 50/250			6,8/9,11,16,14						
6.40					21.38	6.40	Poor recovery driller notes brown boulder Clay: Recovery consists of angular to sub-angular cobbles of Limestone with clay washed away (very stiff)			
8.10-8.55				6,9/7,8,10,10						
8.10				SPT(C) N=35						
9.60-9.62				26/50		(6.20)				
9.60				SPT(C) 26*/10 50/10						

Remarks Wavin pipe installed in cable percussion borehole facilitate rotary follow on Borehole secured by placing steel plate over opening Standpipe installed in borehole upon completion - Slotted from 16.10m to 1.0m BGL with gravel surround and plain from 1.0m to groundlevel with flush cover Chiselling from 6.40m to 6.40m for 1 hour.	Scale (approx) 1:50	Logged By MMC
Figure No. 8715-05-19.BH2.3		



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Site
UCD Residents Masterplan - Phase 2 S.I.

Borehole Number
BH2.3

Machine : Dando 2000 and T44	Casing Diameter 200mm cased to 6.40m 100mm cased to 26.10m	Ground Level (mOD) 27.78	Client UCD	Job Number 8715-05-19
Flush : Water			Engineer Barrett Mahony	Sheet 2/3
Core Dia : 68 mm	Location 718550.9 E 729577.5 N	Dates 19/06/2019		
Method : Cable Percussion with Rotary Follow On				

Depth (m)	TCR	SCR	RQD	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
11.10-11.55 11.10	23				9,8/10,12,12,11 SPT(C) N=45						
12.60-13.05 12.60	10				10,9/12,14,8,10 SPT(C) N=44	15.18	12.60	Poor recovery driller notes brown boulder Clay: Recovery consists medium to coarse subangular Gravel with occasional subangular to angular cobbles boulders and clay washed away (very stiff)			
14.10							(3.00)				
15.10-15.26	30				17,23/50 SPT(C) 50/10						
15.60						12.18	15.60	Poor recovery driller notes brown boulder Clay: Recovery consists of subangular cobbles and boulders of Limestone with clay washed away (very stiff)			
16.60	47	20	17				(1.00)				
16.60				>25		11.18	16.60	Weathered Rock: Recovered as weak dark grey very fine to fine grained fossiliferous LIMESTONE with calcite veins. Distinct to destructed weathering 16.60-17.60 - Two fracture sets. F1: Closely spaced sub-horizontal 5 to 20 degrees, undulating rough. F2: Closely spaced sub-vertical to 60 degrees, undulating rough			
17.10				NI		10.48	17.30				
17.70	87	35	23	7				Weak dark grey very fine to fine grained fossiliferous LIMESTONE with calcite veins. Distinct to destructed weathering 17.60-18.60 - Medium spaced dipping to 45 degrees, planar rough			
18.60				15			(3.15)	18.60-19.60 - Two fracture sets. F1: Closely spaced sub-horizontal to 40 degrees, undulating rough, stepped. F2: Closely spaced sub-vertical to 85 degrees, undulating rough			
19.60	93	42	40								

Remarks	Scale (approx)	Logged By
	1:50	MMC
	Figure No. 8715-05-19.BH2.3	



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Site
UCD Residents Masterplan - Phase 2 S.I.

Borehole Number
BH2.3

Machine : Dando 2000 and T44 Flush : Water Core Dia : 68 mm Method : Cable Percussion with Rotary Follow On	Casing Diameter 200mm cased to 6.40m 100mm cased to 26.10m	Ground Level (mOD) 27.78	Client UCD	Job Number 8715-05-19
Location 718550.9 E 729577.5 N		Dates 19/06/2019	Engineer Barrett Mahony	Sheet 3/3

Depth (m)	TCR	SCR	RQD	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr		
20.10				NI		7.33	20.45	19.60-20.60 - Non Intact					
20.60	83	4		NI		(0.90)	Weak to medium strong light grey coarse grained altered LIMESTONE with occasional relic fossils. Distinct weathering 20.60-21.60 - Non Intact						
21.60	40	5		NI		(1.65)	Weak to medium strong dark grey very fine to fine grained fossiliferous LIMESTONE. Distinct weathering 21.60-22.60 - Non Intact						
22.60				NI		4.78	22.60-23.60 - Non Intact						
23.10				NI		(3.10)	Medium strong light grey coarse grained altered LIMESTONE interbedded with a lens of weak dark grey very fine grained Limestone. Distinctly weathered 23.60-24.60 - Non Intact						
23.60	67	5		NI									
24.60	93	13	7	NI			24.60-25.60 - Predominantly non Intact, recovery pattern indicates one fracture set of sub-horizontal to 15 degrees, undulating rough, sub-vertical to 70 degrees, undulating rough						
25.60				NI			25.60-26.10 - Non Intact						
26.10						1.68	26.10	Complete at 26.10m					

Remarks	Scale (approx) 1:50	Logged By MMC
Figure No. 8715-05-19.BH2.3		



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Site
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Borehole Number
BH2.4

Machine : Dando 2000 and T44	Casing Diameter 200mm cased to 9.30m 100mm cased to 26.00m	Ground Level (mOD) 29.82	Client UCD	Job Number 8715-05-19
Method : Cable Percussion with Rotary Follow On	Location 718664.3 E 729542.6 N	Dates 17/06/2019- 18/07/2019	Engineer Barrett Mahony	Sheet 1/3

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
0.50	B				29.62	(0.20) 0.20	TOPSOIL			
1.00 1.00-1.45	B SPT(C) N=5			1,1/1,1,2,1		(1.80)	MADE GROUND: Brown slightly sandy gravelly Clay. Sand is fine to coarse. Gravel is sub-rounded to rounded fine to coarse. Red brick fragments present			
2.00 2.00-2.45	B SPT(C) N=11			1,1/4,3,2,2	27.82	2.00 (1.10)	Possible Made Ground: Brown mottled grey slightly sandy slightly gravelly Clay. Sand is fine to coarse. Gravel is sub-rounded to rounded fine to coarse. Rare small fragments of red brick present		▼1 ▽1	
3.00 3.00-3.45	B SPT(C) N=15			Water strike(1) at 3.00m, rose to 2.70m in 20 mins. 1,2/3,3,4,5	26.72 26.52	3.10 (0.20) 3.30	Driller notes black PEAT			
4.00 4.00-4.45	B SPT(C) N=24			3,4/5,5,7,7		(2.70)	Stiff black to dark brown sandy very gravelly CLAY. Sand is fine to coarse. Gravel is sub-angular to sub-rounded fine to coarse			
5.00 5.00-5.45	B SPT(C) N=28			3,5/7,7,7,7						
6.00 6.00-6.45	B SPT(C) N=23			3,3/4,5,7,7	23.82	6.00 (1.00)	Medium dense dark brown slightly clayey slightly silty sandy sub-rounded to rounded fine to coarse GRAVEL. Sand is fine to coarse			
7.00 7.00-7.45	B SPT(C) N=31			4,5/5,7,9,10	22.82	7.00 (1.00)	Dense dark grey clayey silty slightly gravelly fine to coarse SAND. Gravel is sub-angular to sub-rounded fine to medium			
8.00 8.00-8.45	B SPT(C) N=39			5,6/6,8,11,14	21.82	8.00 (1.30)	Very stiff dark grey mottled brown slightly sandy gravelly CLAY with occasional sub-angular to sub-rounded cobbles. Sand is fine to coarse. Gravel is sub-angular to sub-rounded fine to coarse			
9.00 9.00-9.38	B SPT(C) 50/225			6,10/15,35						
9.20	TCR	SCR	RQD	FI	20.52	9.30	Poor Recovery - Drillers notes: Very stiff brown gravelly CLAY. Recovery consists of very stiff dark brown slightly sandy gravelly CLAY.			

Remarks Wavin pipe installed in cable percussion borehole to facilitate rotary follow on Borehole secured by placing steel plate over opening Standpipe installed on completion - Slotted pipe installed from 26.00m-1.00mBGL with gravel surround. Plain pipe installed from 1.00mBGL to ground level with bentonite seal and flush cover Chiselling from 9.30m to 9.30m for 1 hour.	Scale (approx) 1:50	Logged By MMC
Figure No. 8715-05-19.BH2.4		



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Site
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Borehole Number
BH2.4

Machine : Dando 2000 and T44	Casing Diameter 200mm cased to 9.30m 100mm cased to 26.00m	Ground Level (mOD) 29.82	Client UCD	Job Number 8715-05-19
Flush : Water			Engineer Barrett Mahony	Sheet 2/3
Core Dia: 68 mm	Location 718664.3 E 729542.6 N	Dates 17/06/2019- 18/07/2019		
Method : Cable Percussion with Rotary Follow On				

Depth (m)	TCR	SCR	RQD	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
11.00-11.18 11.00	17				18,7/50 SPT(C) 25*/125 50/50	18.82	11.00	Very stiff brown slightly sandy gravelly CLAY with rare sub-angular to sub-rounded cobbles. Sand is fine to coarse. Gravel is sub-angular to sub-rounded fine to coarse			
12.50-12.70 12.50	100			12,17/50 SPT(C) 50/50		(3.00)					
14.00-14.24 14.00	43				12,13/50 SPT(C) 25*/115 50/125	15.82	14.00	Poor Recovery - Driller notes: Stiff gravelly cobbly CLAY. Recovery consists of very stiff dark grey sub-angular to sub-rounded fine to coarse Gravel			
15.50-15.78 15.50	17				12,12/17,33 SPT(C) 50/125	14.32	15.50	Poor Recovery - Driller notes: Stiff gravelly silty cobbly CLAY. Recovery consists of very stiff greyish brown slightly sandy slightly gravelly silty Clay			
17.00-17.38 17.00	27				14,14/16,16,17,1 SPT(C) 50/230	12.82	17.00	Very stiff dark grey slightly sandy slightly gravelly silty CLAY with fine to coarse sand lenses. Gravel is sub-angular to sub-rounded fine to coarse			
18.50-18.78 18.50	73				18,19/19,31 SPT(C) 50/125	11.32	18.50	Poor Recovery - Driller notes: Very stiff sandy gravelly cobble CLAY. Recovery consists of very stiff grey/brown clayey sub-angular to sub-rounded fine to coarse Gravel			
20.00	23						(1.50)				

Remarks	Scale (approx)	Logged By
	1:50	MMC
	Figure No. 8715-05-19.BH2.4	



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Site
UCD Residents Masterplan - Phase 2 S.I.

Borehole Number
BH2.4

Machine : Dando 2000 and T44	Casing Diameter 200mm cased to 9.30m 100mm cased to 26.00m	Ground Level (mOD) 29.82	Client UCD	Job Number 8715-05-19
Flush : Water			Engineer Barrett Mahony	Sheet 3/3
Core Dia: 68 mm	Location 718664.3 E 729542.6 N	Dates 17/06/2019- 18/07/2019		
Method : Cable Percussion with Rotary Follow On				

Depth (m)	TCR	SCR	RQD	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
20.00-20.29					SPT(C) 50/135 18,18/19,31	9.82	20.00	Poor Recovery - Driller notes: SAND. Recovery consists of grey slightly clayey fine to coarse Sand			
	12						(2.10)				
22.10	100	33	33	7		7.72	22.10	Medium strong medium bedded to thinly laminated dark grey/black fine grained LIMESTONE with some black mudstone laminations. Partially weathered			
23.00								22.70-23.40 - Two fracture sets. F1: 0-10 Degrees, medium spacing, planar rough. F2: 30-40 Degrees, very close to medium, planar smooth to rough with some clay staining			
23.40	100	37	20	14			(3.90)	23.40-24.60 - Two fracture sets. F1: 0-15 Degrees, close to medium, undulating rough. F2: 80-90 Degrees, planar rough with some clay staining			
24.50				NI				24.60-24.90 - Non-Intact			
24.60											
24.90	100	0	0	10				24.90-26.00 - Two fractures sets. F1: 40-50 Degrees, close to medium, planar rough with some clay staining. F2: 75-85 Degrees, undulating rough with some clay staining and some sandy infill			
26.00						3.82	26.00	Complete at 26.00m			

Remarks	Scale (approx) 1:50	Logged By MMC
	Figure No. 8715-05-19.BH2.4	



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Site
UCD Residents Masterplan - Phase 2 S.I.

Borehole Number
BH2.5

Machine : Dando 2000	Casing Diameter 200mm cased to 7.80m 100mm cased to 29.00m	Ground Level (mOD) 30.07	Client UCD	Job Number 8715-05-19
Method : Cable Percussion	Location 718634.1 E 729492.9 N	Dates 19/06/2019	Engineer Barrett Mahony	Sheet 1/3

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr								
0.50	B					(1.30)	MADE GROUND: Light brown sandy clayey sub-angular to sub-rounded fine to coarse GRAVEL with frequent pieces of fabric and chicken wire. Sand is fine to coarse											
1.00 1.00-1.10	B SPT(C) 25*/50 50/50			25/50	28.77	1.30 (0.70)	MADE GROUND: Brown mottled grey slightly sandy gravelly CLAY with rare pieces of chicken wire. Sand is fine to coarse. Gravel is sub-angular to sub-rounded fine to coarse											
2.00 2.00-2.45	B SPT(C) N=6			3,3/1,1,1,3	28.07	2.00 (1.00)	Soft to firm dark grey mottled brown slightly sandy gravelly CLAY. Sand is fine to coarse. Gravel is sub-angular to sub-rounded fine to coarse											
3.00 3.00-3.45	B SPT(C) N=7			1,1/1,1,2,3	27.07	3.00 (1.00)	Loose dark grey sandy slightly silty angular to sub-rounded fine to coarse GRAVEL with rare angular to sub-rounded cobbles. Sand is fine to coarse											
4.00 4.00-4.32	B SPT(C) 50/170			12,15/19,21,10	26.07	4.00 (1.00)	Very dense dark grey sandy slightly silty angular to sub-rounded fine to coarse GRAVEL with rare angular to sub-rounded cobbles. Sand is fine to coarse											
5.00 5.00-5.30	B SPT(C) 50/145			7,10/15,35	25.07	5.00	Very stiff dark grey to black sandy gravelly CLAY. Sand is fine to coarse. Gravel is angular to sub-angular fine to coarse											
6.00 6.00-6.45	B SPT(C) N=31			4,3/4,7,9,11		(2.80)												
7.00 7.00-7.43	B SPT(C) 50/275			4,5/9,9,14,18														
7.80 7.60	<table border="1" style="width: 100%;"><tr><th>TCR</th><th>SCR</th><th>RQD</th><th>FI</th></tr><tr><td></td><td></td><td></td><td>B</td></tr></table>	TCR	SCR	RQD	FI				B			B	22.27	7.80				
TCR	SCR	RQD	FI															
			B															
8.00-8.10 8.00	62			25/50 SPT(C) 25*/50 50/50			Poor Recovery: Driller notes: Very stiff black gravelly CLAY. Recovery consists of brown slightly sandy gravelly Clay											
9.50-9.74 9.50	27			17,18/41,9 SPT(C) 50/85														

Remarks Wavin pipe installed in cable percussion borehole to facilitate rotary follow on Borehole secured by placing steel plate over opening Standpipe installed on completion - Slotted pipe installed from 29.50m-1.00mBGL with gravel surround. Plain pipe installed from 1.00mBGL to ground level with bentonite seal with flush cover Chiselling from 7.80m to 7.80m for 1 hour.	Scale (approx)	Logged By
	1:50	MMC
	Figure No. 8715-05-19.BH2.5	



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Site
UCD Residents Masterplan - Phase 2 S.I.

Borehole Number
BH2.5

Machine : Dando 2000	Casing Diameter 200mm cased to 7.80m 100mm cased to 29.00m	Ground Level (mOD) 30.07	Client UCD	Job Number 8715-05-19
Flush : Water	Location 718634.1 E 729492.9 N	Dates 19/06/2019	Engineer Barrett Mahony	Sheet 2/3
Core Dia : 68 mm				
Method : Cable Percussion				

Depth (m)	TCR	SCR	RQD	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
11.00-11.21 11.00	57				15,19/50 SPT(C) 50/60		(4.70)				
12.50-12.81 12.50	10				12,15/15,17,18 SPT(C) 50/160	17.57	12.50	Very stiff brown slightly sandy gravelly CLAY with occasional sub-angular to sub-rounded cobbles. Sand is fine to coarse. Gravel is sub-angular to sub-rounded fine to coarse			
14.00-14.02 14.00	86				25/50 SPT(C) 25*/10 50/10	16.07	14.00	Very stiff dark brown slightly sandy gravelly CLAY with occasional sub-angular to sub-rounded cobbles. Sand is fine to coarse. Gravel is sub-angular to sub-rounded fine to coarse			
15.50	100										
17.00-17.02 16.90	100				23/50 SPT(C) 23*/10 50/10		(6.00)				
18.50-18.52 18.50	100				25,25/50 SPT(C) 50*/10 50/10						
19.40	92										
20.00											

Remarks	Scale (approx)	Logged By
	1:50	MMC
	Figure No. 8715-05-19.BH2.5	



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Site
UCD Residents Masterplan - Phase 2 S.I.

Borehole Number
BH2.5

Machine : Dando 2000	Casing Diameter 200mm cased to 7.80m 100mm cased to 29.00m	Ground Level (mOD) 30.07	Client UCD	Job Number 8715-05-19
Flush : Water			Engineer Barrett Mahony	Sheet 3/3
Core Dia: 68 mm	Location 718634.1 E 729492.9 N	Dates 19/06/2019		
Method : Cable Percussion				

Depth (m)	TCR	SCR	RQD	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
						10.07	20.00	Very stiff brown sandy gravelly CLAY. Recovery consists of brown slightly sandy gravelly Clay			
	73						(1.50)				
21.50						8.57	21.50	Poor Recovery - Driller notes gravelly boulder clay. Recovery consists of angular to sub-angular cobbles of Limestone and medium to coarse subangular gravel with clay washed away			
	47						(1.50)				
23.00						7.07	23.00	Poor Recovery - Driller notes gravelly boulder clay. Recovery consists of medium to coarse subangular Gravel with clay washed away			
	23						(3.00)				
24.50											
	16										
26.00						4.07	26.00	Core Loss - Driller notes Gravels			
	0						(1.50)				
27.50						2.57	27.50	Driller notes: Weathered Rock. Recovery consists of dark grey slightly gravelly sub-angular Cobbles of LIMESTONE			
	27						(1.50)				
29.00						1.07	29.00	Complete at 29.00m			

Remarks	Scale (approx) 1:50	Logged By MMC
	Figure No. 8715-05-19.BH2.5	

UCD Masterplan phase 2 – Rotary Core Photographs

BH2.1



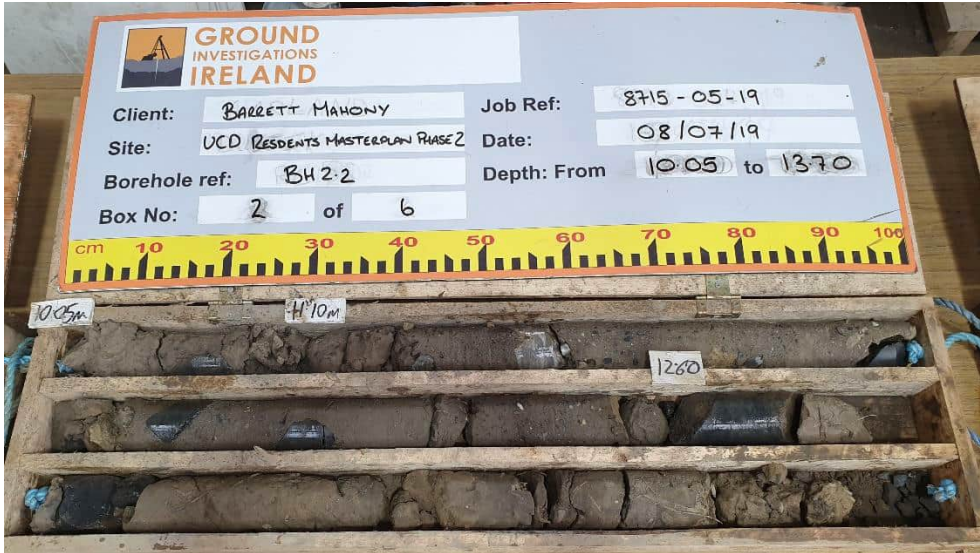






BH2.2







BH2.3





BH2.4



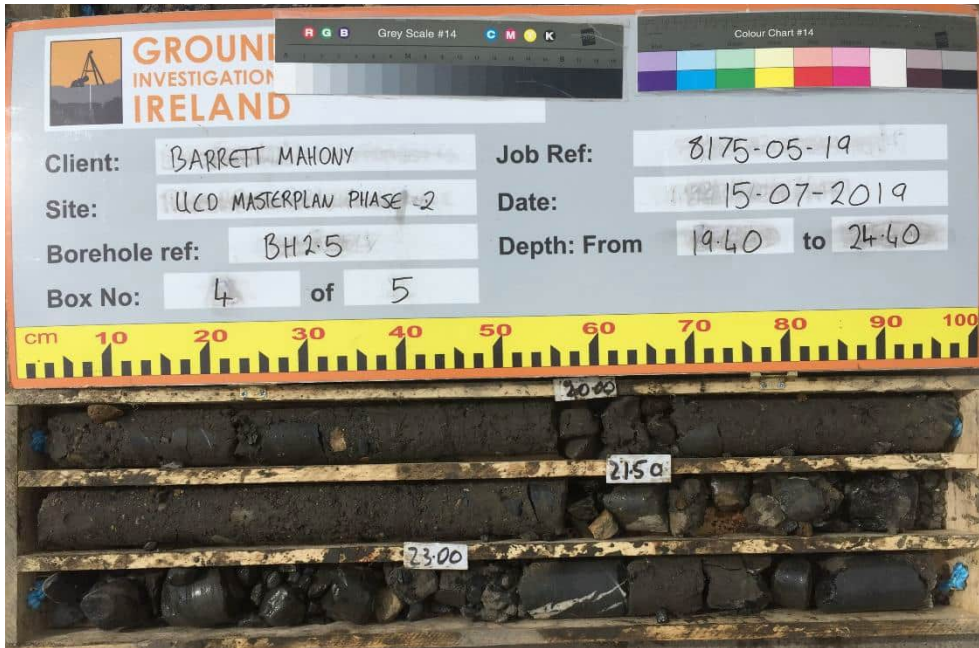




BH2.5







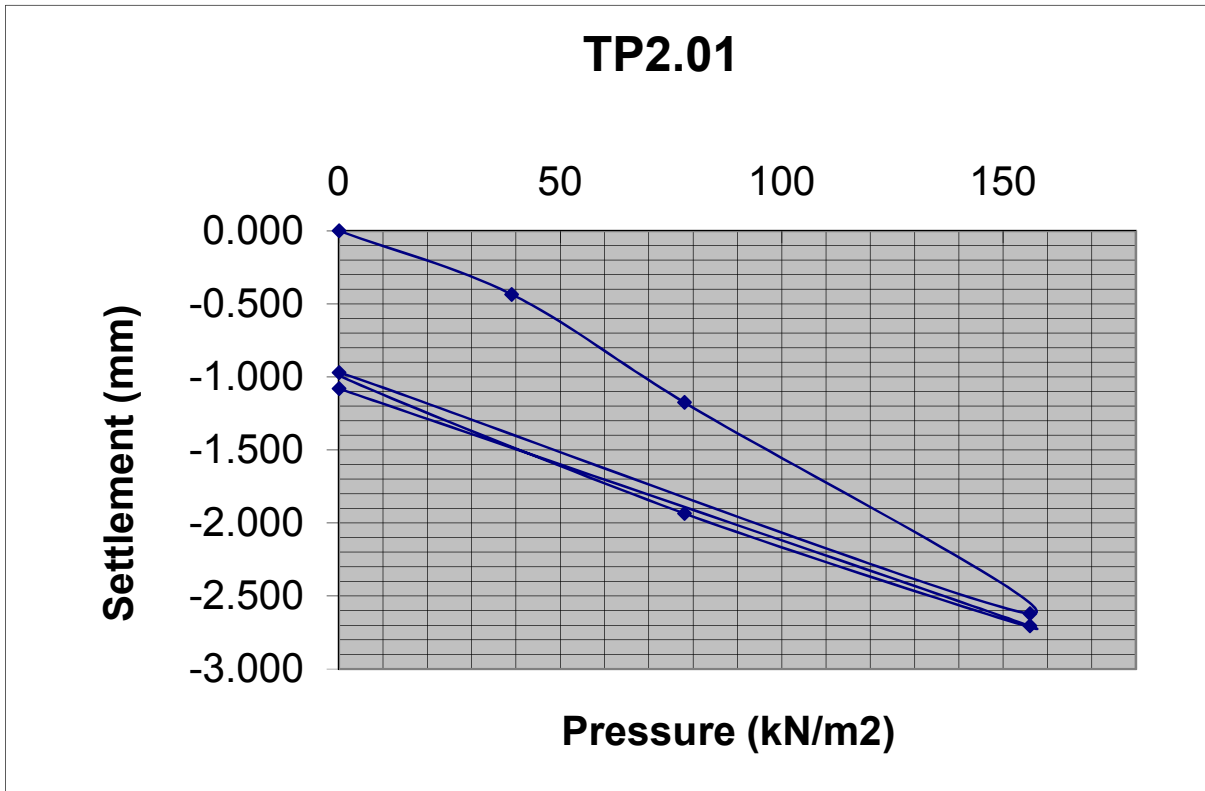
APPENDIX 4 – Plate Bearing Test Records

UCD Residents Masterplan - Phase 2

Applied Load	Gauge settlement
0	0.000
39	-0.435
78	-1.175
156	-2.62
0	-0.97
78	-1.935
156	-2.705
0	-1.08



LOCATION	UCD Residents Masterplan	MATERIAL	Brown sandy gravelly CLAY
CONTRACT NO.	8715-05-19		
DATE	14/06/2019		
CLIENT	Barrett Mahony	DEPTH	0.50m BGL
PLATE DIAMETER	457mm	NOTES	
TEST NO.	Test 1	SAMPLES	



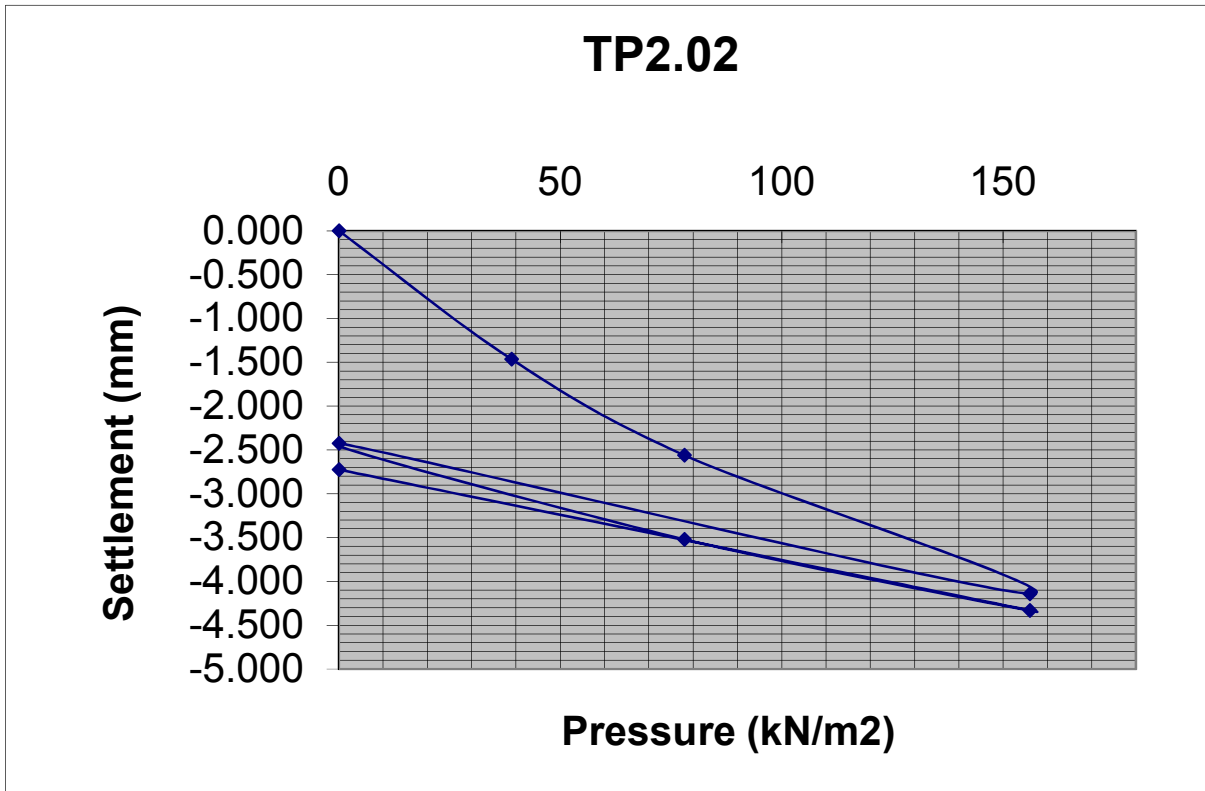
Modulus of subgrade reaction, K (Initial) =	39.68 MN/m²/m
Modulus of subgrade reaction, K (Reload) =	48.31 MN/m²/m
Equivalent CBR(initial)in accordance with HD25/94 volume7 section2 =	5.68 %
Equivalent CBR(reload)in accordance with HD25/94 volume7 section2 =	8.00 %

UCD Residents Masterplan - Phase 2

Applied Load	Gauge settlement
0	0.000
39	-1.465
78	-2.56
156	-4.14
0	-2.425
78	-3.52
156	-4.33
0	-2.725



LOCATION UCD Residents Masterplan **MATERIAL** Brown sandy gravelly CLAY
CONTRACT NO. 8715-05-19
DATE 14/06/2019
CLIENT Barrett Mahony **DEPTH** 0.50m BGL
PLATE DIAMETER 457mm **NOTES**
TEST NO. Test 1 **SAMPLES**



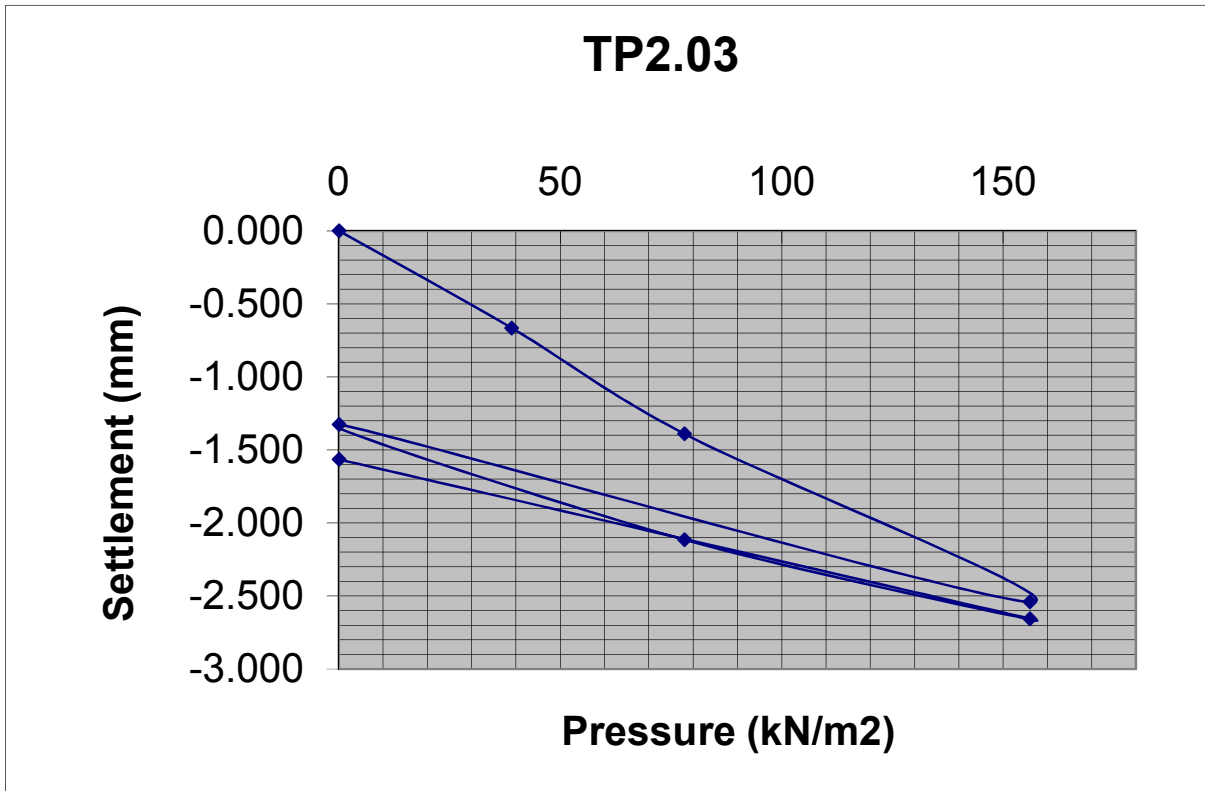
Modulus of subgrade reaction, K (Initial) = **18.21 MN/m²/m**
 Modulus of subgrade reaction, K (Reload) = **42.58 MN/m²/m**
 Equivalent CBR(initial)in accordance with HD25/94 volume7 section2 = **1.47 %**
 Equivalent CBR(reload)in accordance with HD25/94 volume7 section2 = **6.42 %**

UCD Residents Masterplan - Phase 2

Applied Load	Gauge settlement
0	0.000
39	-0.665
78	-1.39
156	-2.54
0	-1.325
78	-2.115
156	-2.655
0	-1.565



LOCATION UCD Residents Masterplan **MATERIAL** Brown sandy gravelly CLAY
CONTRACT NO. 8715-05-19
DATE 14/06/2019 **DEPTH** 0.50m BGL
CLIENT Barrett Mahony **NOTES**
PLATE DIAMETER 457mm **SAMPLES**
TEST NO. Test 1



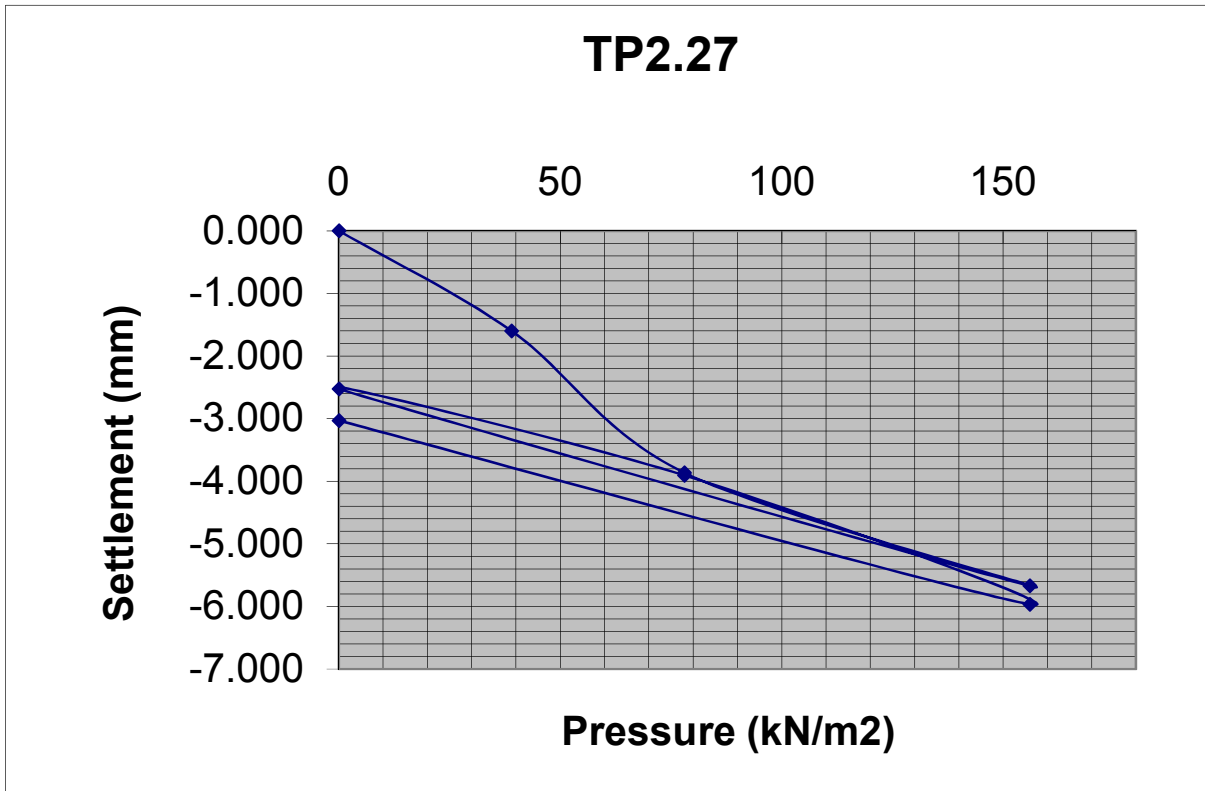
Modulus of subgrade reaction, K (Initial) = **33.54 MN/m²/m**
 Modulus of subgrade reaction, K (Reload) = **59.02 MN/m²/m**
 Equivalent CBR(initial)in accordance with HD25/94 volume7 section2 = **4.25 %**
 Equivalent CBR(reload)in accordance with HD25/94 volume7 section2 = **11.31 %**

UCD Residents Masterplan - Phase 2

Applied Load	Gauge settlement
0	0.000
39	-1.6
78	-3.865
156	-5.67
0	-2.525
78	-3.905
156	-5.965
0	-3.03



LOCATION	UCD Residents Masterplan	MATERIAL	Brown sandy gravelly CLAY
CONTRACT NO.	8715-05-19		
DATE	14/06/2019		
CLIENT	Barrett Mahony	DEPTH	0.50m BGL
PLATE DIAMETER	457mm	NOTES	
TEST NO.	Test 1	SAMPLES	



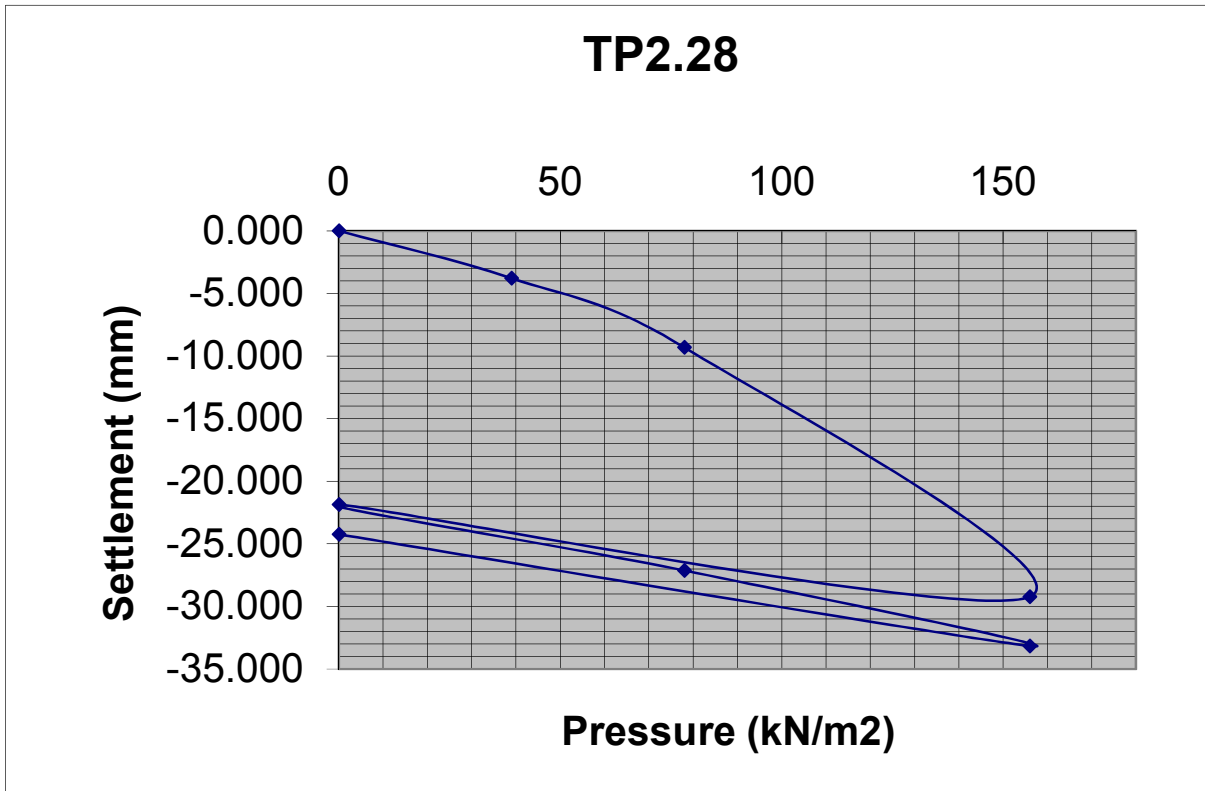
Modulus of subgrade reaction, K (Initial) =	12.06 MN/m²/m
Modulus of subgrade reaction, K (Reload) =	33.79 MN/m²/m
Equivalent CBR(initial)in accordance with HD25/94 volume7 section2 =	0.72 %
Equivalent CBR(reload)in accordance with HD25/94 volume7 section2 =	4.30 %

UCD Residents Masterplan - Phase 2

Applied Load	Gauge settlement
0	0.000
39	-3.79
78	-9.315
156	-29.23
0	-21.865
78	-27.125
156	-33.15
0	-24.245



LOCATION UCD Residents Masterplan **MATERIAL** Brown sandy gravelly CLAY
CONTRACT NO. 8715-05-19
DATE 14/06/2019 **DEPTH** 0.50m BGL
CLIENT Barrett Mahony **NOTES**
PLATE DIAMETER 457mm **SAMPLES**
TEST NO. Test 1



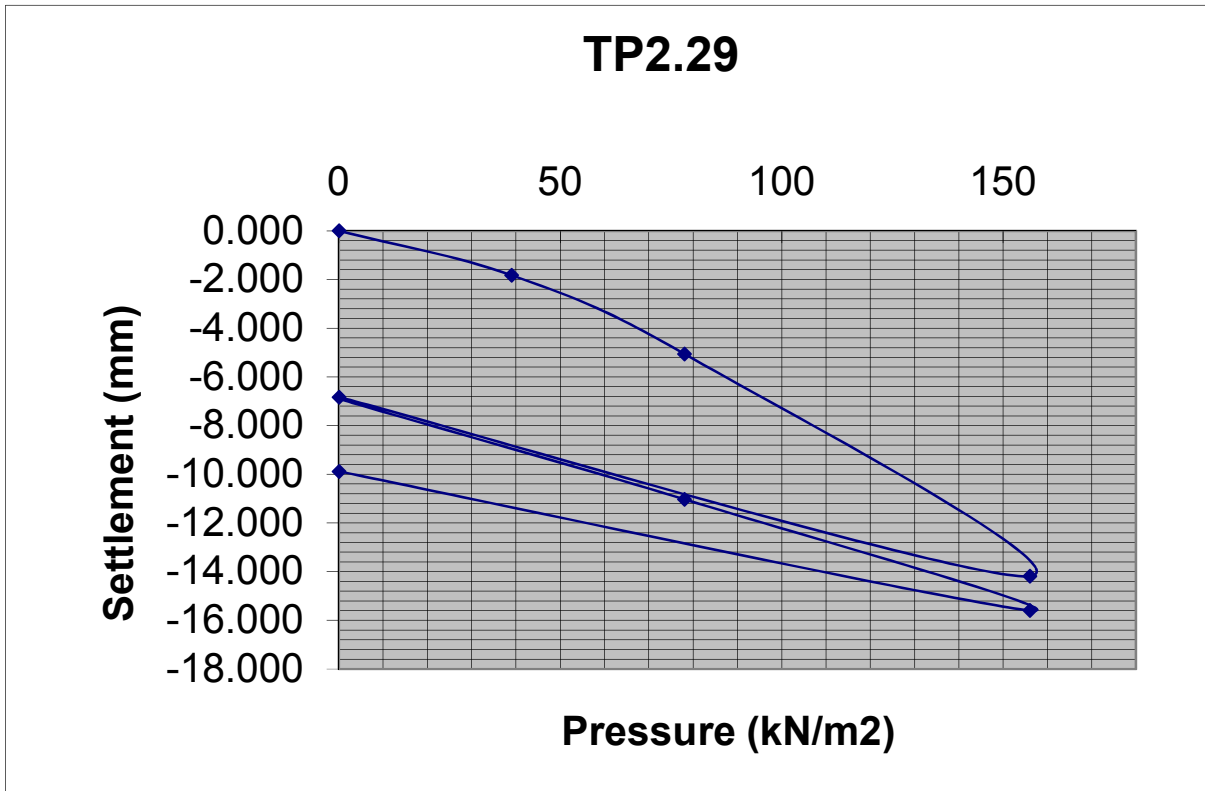
Modulus of subgrade reaction, K (Initial) = **5.01 MN/m²/m**
 Modulus of subgrade reaction, K (Reload) = **8.86 MN/m²/m**
 Equivalent CBR(initial)in accordance with HD25/94 volume7 section2 = **0.16 %**
 Equivalent CBR(reload)in accordance with HD25/94 volume7 section2 = **0.42 %**

UCD Residents Masterplan - Phase 2

Applied Load	Gauge settlement
0	0.000
39	-1.825
78	-5.055
156	-14.185
0	-6.835
78	-11.025
156	-15.59
0	-9.88



LOCATION	UCD Residents Masterplan	MATERIAL	Brown sandy gravelly CLAY
CONTRACT NO.	8715-05-19		
DATE	14/06/2019		
CLIENT	Barrett Mahony	DEPTH	0.50m BGL
PLATE DIAMETER	457mm	NOTES	
TEST NO.	Test 1	SAMPLES	



Modulus of subgrade reaction, K (Initial) =	9.22 MN/m²/m
Modulus of subgrade reaction, K (Reload) =	11.13 MN/m²/m
Equivalent CBR(initial)in accordance with HD25/94 volume7 section2 =	0.45 %
Equivalent CBR(reload)in accordance with HD25/94 volume7 section2 =	0.63 %

APPENDIX 5 – Laboratory Test Records



LABORATORY REPORT



4043

Contract Number: PSL19/4019

Report Date: 24 July 2019
Client's Reference: 8715-05-19
Client Name: Ground Investigations Ireland Ltd
Catherinestown House
Hazelhatch Road
Newcastle
Co Durham

For the attention of: Stephen Kealy

Contract Title: UCD Residents Masterplan - Phase 2 SI
Date Received: 2/7/2019
Date Commenced: 2/7/2019
Date Completed: 24/7/2019

Notes: Opinions and Interpretations are outside the UKAS Accreditation

A copy of the Laboratory Schedule of accredited tests as issued by UKAS is attached to this report. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced other than in full, without the prior written approval of the laboratory.

Checked and Approved Signatories:


R Gunson
(Director)

A Watkins
(Director)

R Berriman
(Quality Manager)

S Royle
(Laboratory Manager)

S Eyre
(Senior Technician)

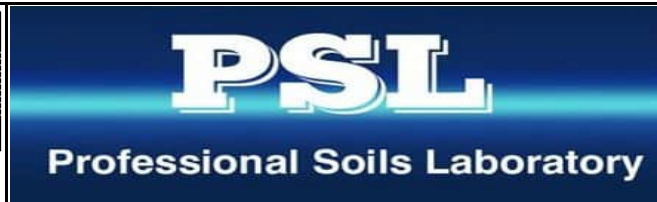
L Knight
(Senior Technician)

5 – 7 Hexthorpe Road, Hexthorpe,
Doncaster DN4 0AR
tel: +44 (0)844 815 6641
fax: +44 (0)844 815 6642
e-mail: rgunson@prosoils.co.uk
awatkins@prosoils.co.uk

Page 1 of

SUMMARY OF LABORATORY SOIL DESCRIPTIONS

Hole Number	Sample Number	Sample Type	Top Depth m	Base Depth m	Description of Sample
BH2.1		B	2.00		Dark grey very sandy very clayey GRAVEL.
BH2.1		B	3.00		Dark grey very gravelly very sandy CLAY.
BH2.1		B	4.00		Dark grey very gravelly very sandy CLAY.
BH2.2		B	3.00		Dark grey very gravelly very sandy CLAY.
BH2.2		B	4.00		Dark very grey gravelly very sandy CLAY.
BH2.2		B	7.00		Dark grey very gravelly very sandy CLAY.
BH2.3		B	3.00		Dark grey very gravelly very sandy CLAY.
BH2.3		B	5.00		Dark grey very gravelly very sandy CLAY.
BH2.3		B	6.00		Dark grey very gravelly very sandy CLAY.
BH2.4		B	3.00		Dark grey gravelly very sandy CLAY with cobbles.
BH2.4		B	4.00		Dark grey sandy GRAVEL.
BH2.4		B	6.00		Dark grey very gravelly very sandy CLAY.
BH2.5		B	4.00		Dark grey very sandy very clayey GRAVEL with cobbles.
BH2.5		B	6.00		Dark grey gravelly SAND.
BH2.5		B	7.00		Dark grey very sandy very clayey GRAVEL.



UCD Residents Masterplan - Phase 2 SI

Contract No:
PSL19/4019
Client Ref:
8715-05-19

SUMMARY OF SOIL CLASSIFICATION TESTS

(BS1377 : PART 2 : 1990)

Hole Number	Sample Number	Sample Type	Top Depth m	Base Depth m	Moisture Content % Clause 3.2	Linear Shrinkage % Clause 6.5	Particle Density Mg/m ³ Clause 8.2	Liquid Limit % Clause 4.3/4	Plastic Limit % Clause 5.3	Plasticity Index % Clause 5.4	Passing .425mm %	Remarks
BH2.1		B	2.00		12			24	13	11	42	Low plasticity CL.
BH2.1		B	3.00		16							
BH2.1		B	4.00		9.6			26	15	11	61	Low plasticity CL.
BH2.2		B	3.00		9.1							
BH2.2		B	4.00		11							
BH2.2		B	7.00		11			27	15	12	60	Low plasticity CL.
BH2.3		B	3.00		8.4							
BH2.3		B	5.00		8.4							
BH2.3		B	6.00		9.2			29	16	13	55	Low plasticity CL.
BH2.4		B	3.00		12			30	17	13	63	Low plasticity CL.
BH2.4		B	4.00		1.4							
BH2.4		B	6.00		8.2							
BH2.5		B	4.00		11			25	13	12	36	Low plasticity CL.
BH2.5		B	6.00		4.6							
BH2.5		B	7.00		11							

SYMBOLS : NP : Non Plastic

* : Liquid Limit and Plastic Limit Wet Sieved.



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Professional Soils Laboratory

UCD Residents Masterplan - Phase 2 SI

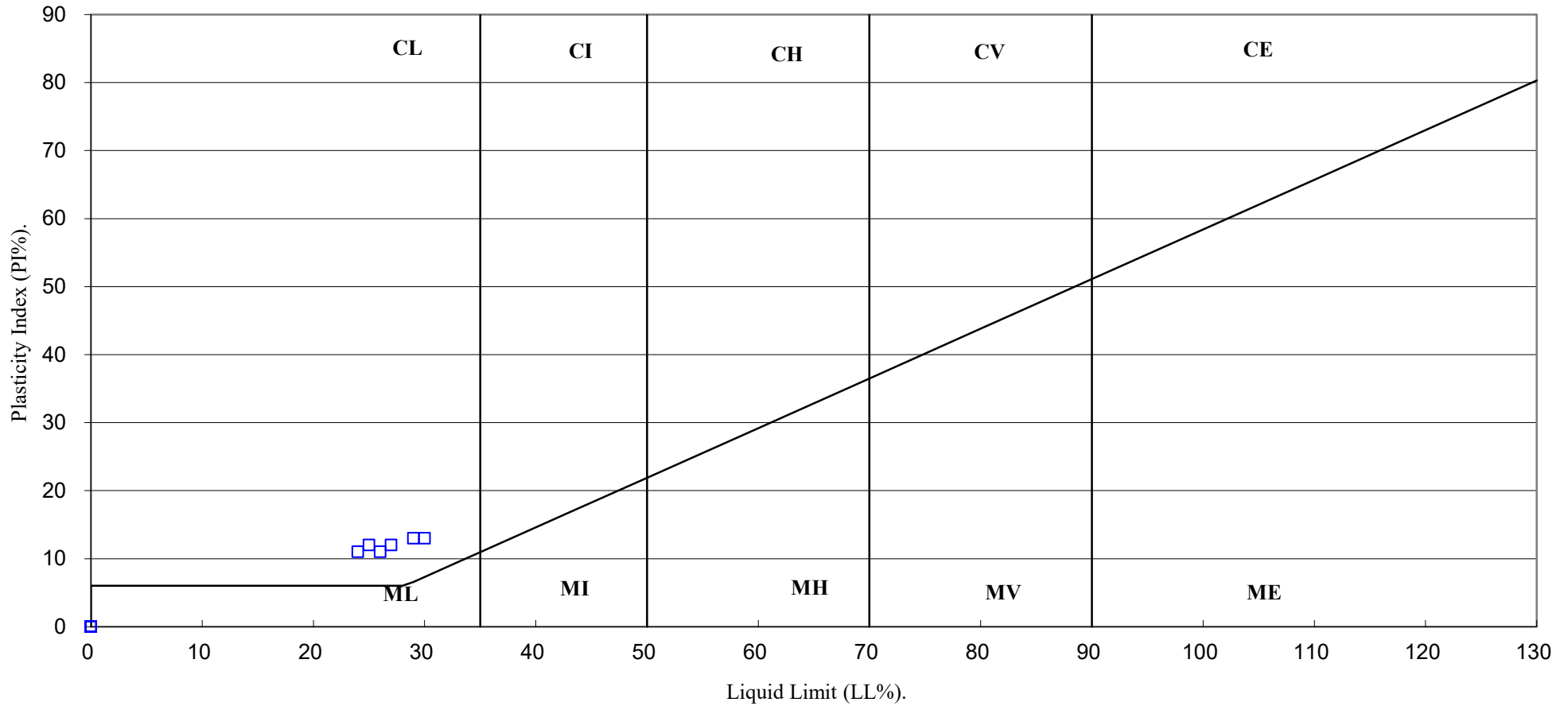
Contract No:

PSL19/4019

Client Ref:

8715-05-19

PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION.



4043

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UCD Residents Masterplan - Phase 2 SI

Contract No:

PSL19/4019

Client Ref:

8715-05-19

PARTICLE SIZE DISTRIBUTION TEST

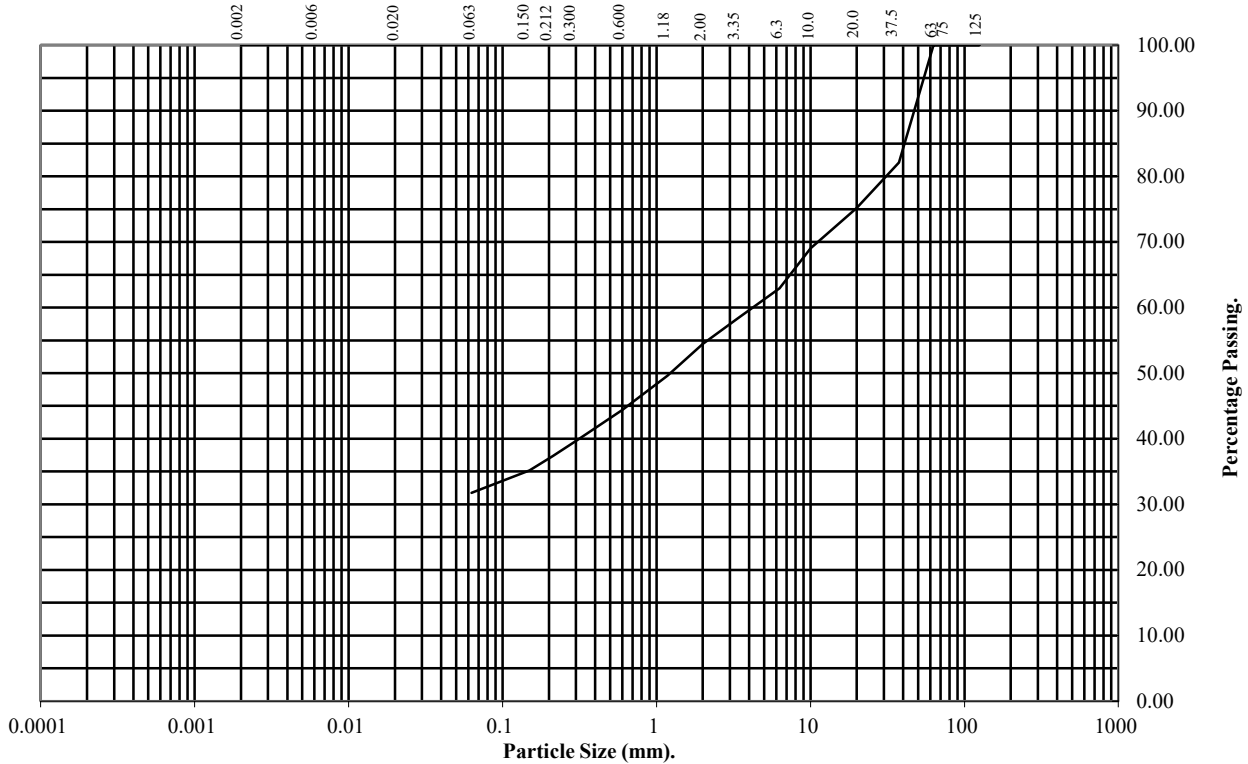
BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number: **BH2.1** Top Depth (m): **2.00**

Sample Number: Base Depth(m):

Sample Type: **B**



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	82
20	75
10	69
6.3	63
3.35	58
2	54
1.18	50
0.6	44
0.3	40
0.212	37
0.15	35
0.063	32

Soil Fraction	Total Percentage
Cobbles	0
Gravel	46
Sand	22
Silt/Clay	32

Remarks:
See Summary of Soil Descriptions



UCD Residents Masterplan - Phase 2 SI

Contract No:
PSL19/4019
Client Ref:
8715-05-19

PARTICLE SIZE DISTRIBUTION TEST

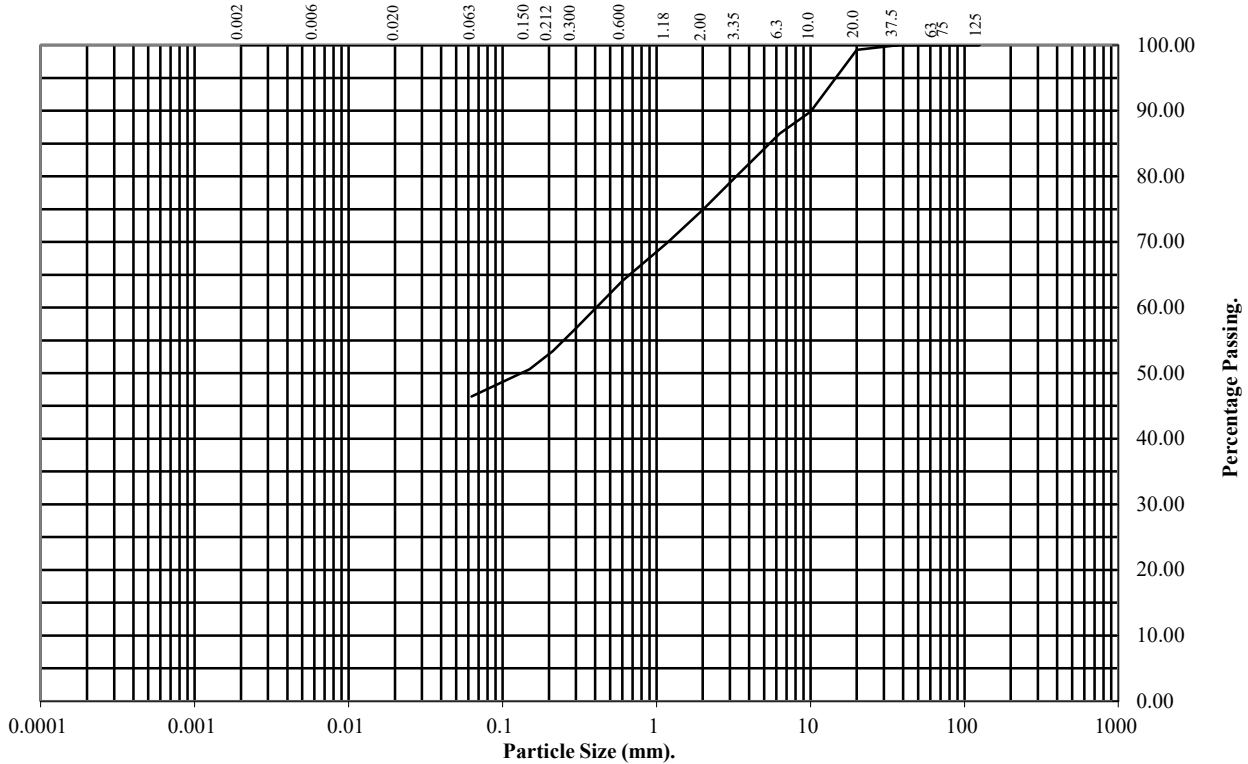
BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number: **BH2.1** Top Depth (m): **4.00**

Sample Number: Base Depth(m):

Sample Type: **B**



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	99
10	90
6.3	87
3.35	80
2	75
1.18	70
0.6	64
0.3	57
0.212	53
0.15	51
0.063	46

Soil Fraction	Total Percentage
Cobbles	0
Gravel	25
Sand	29
Silt/Clay	46

Remarks:
See Summary of Soil Descriptions



UCD Residents Masterplan - Phase 2 SI

Contract No:
PSL19/4019
Client Ref:
8715-05-19

PARTICLE SIZE DISTRIBUTION TEST

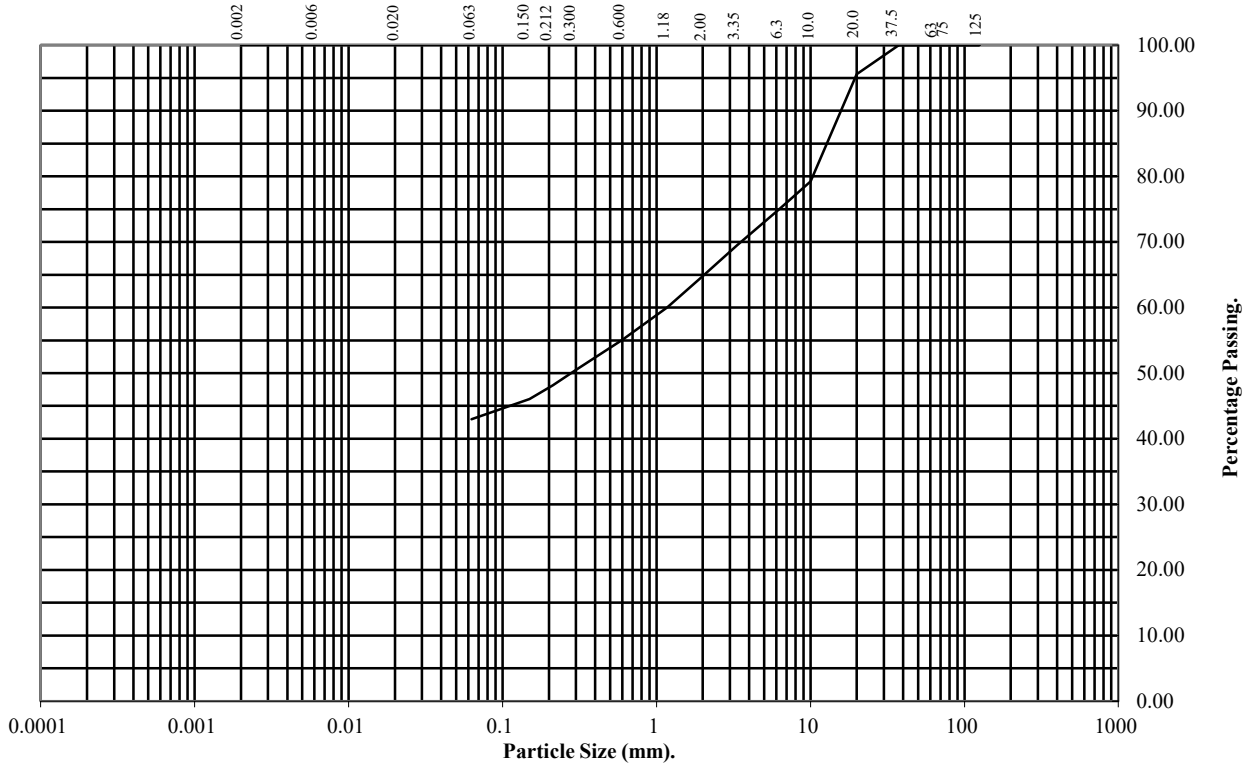
BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number: **BH2.2** Top Depth (m): **3.00**

Sample Number: Base Depth(m):

Sample Type: **B**



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	96
10	79
6.3	75
3.35	70
2	65
1.18	60
0.6	55
0.3	50
0.212	48
0.15	46
0.063	43

Soil Fraction	Total Percentage
Cobbles	0
Gravel	35
Sand	22
Silt/Clay	43

Remarks:
See Summary of Soil Descriptions



UCD Residents Masterplan - Phase 2 SI

Contract No:
PSL19/4019
Client Ref:
8715-05-19

PARTICLE SIZE DISTRIBUTION TEST

BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number:

BH2.2

Top Depth (m):

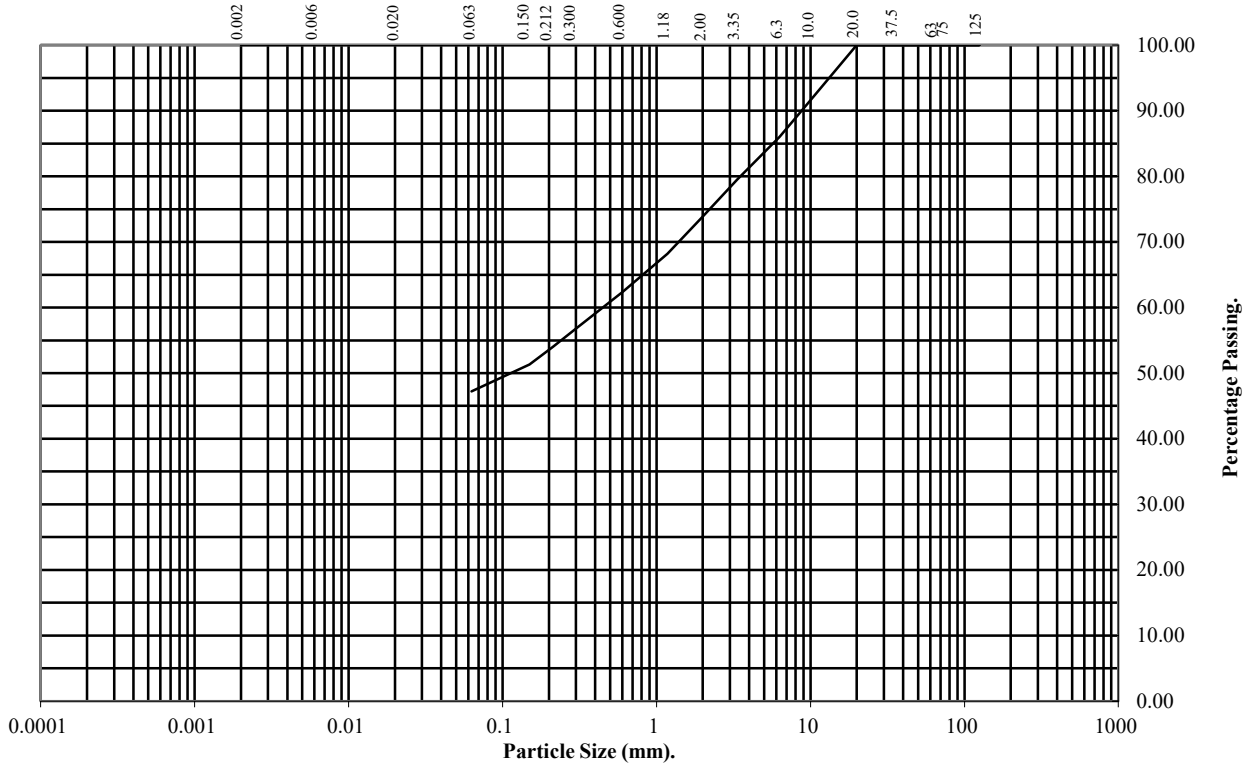
7.00

Sample Number:

Base Depth(m):

Sample Type:

B



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	100
10	92
6.3	86
3.35	80
2	74
1.18	68
0.6	62
0.3	57
0.212	54
0.15	51
0.063	47

Soil Fraction	Total Percentage
Cobbles	0
Gravel	26
Sand	27
Silt/Clay	47

Remarks:

See Summary of Soil Descriptions



UCD Residents Masterplan - Phase 2 SI

Contract No:
PSL19/4019
Client Ref:
8715-05-19

PARTICLE SIZE DISTRIBUTION TEST

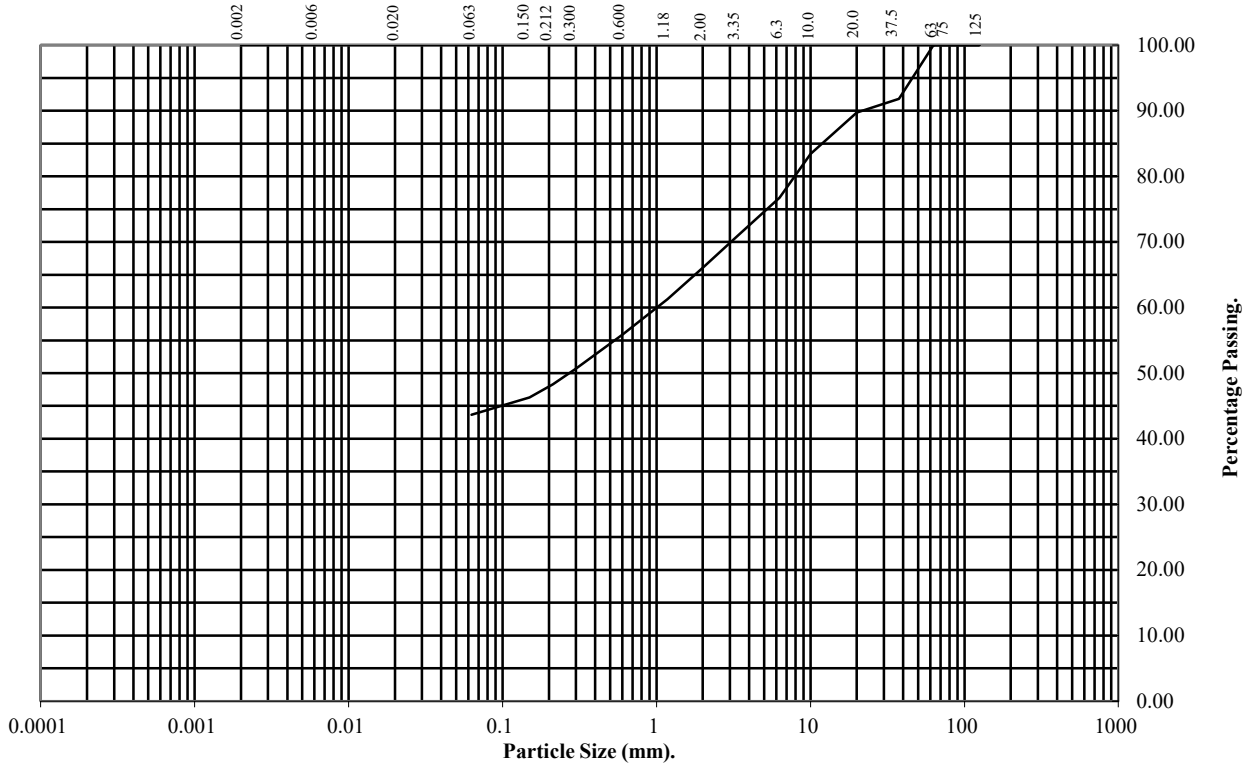
BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number: **BH2.3** Top Depth (m): **5.00**

Sample Number: Base Depth(m):

Sample Type: **B**



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	92
20	90
10	83
6.3	77
3.35	71
2	66
1.18	61
0.6	56
0.3	51
0.212	48
0.15	46
0.063	44

Soil Fraction	Total Percentage
Cobbles	0
Gravel	34
Sand	22
Silt/Clay	44

Remarks:
See Summary of Soil Descriptions



UCD Residents Masterplan - Phase 2 SI

Contract No:
PSL19/4019
Client Ref:
8715-05-19

PARTICLE SIZE DISTRIBUTION TEST

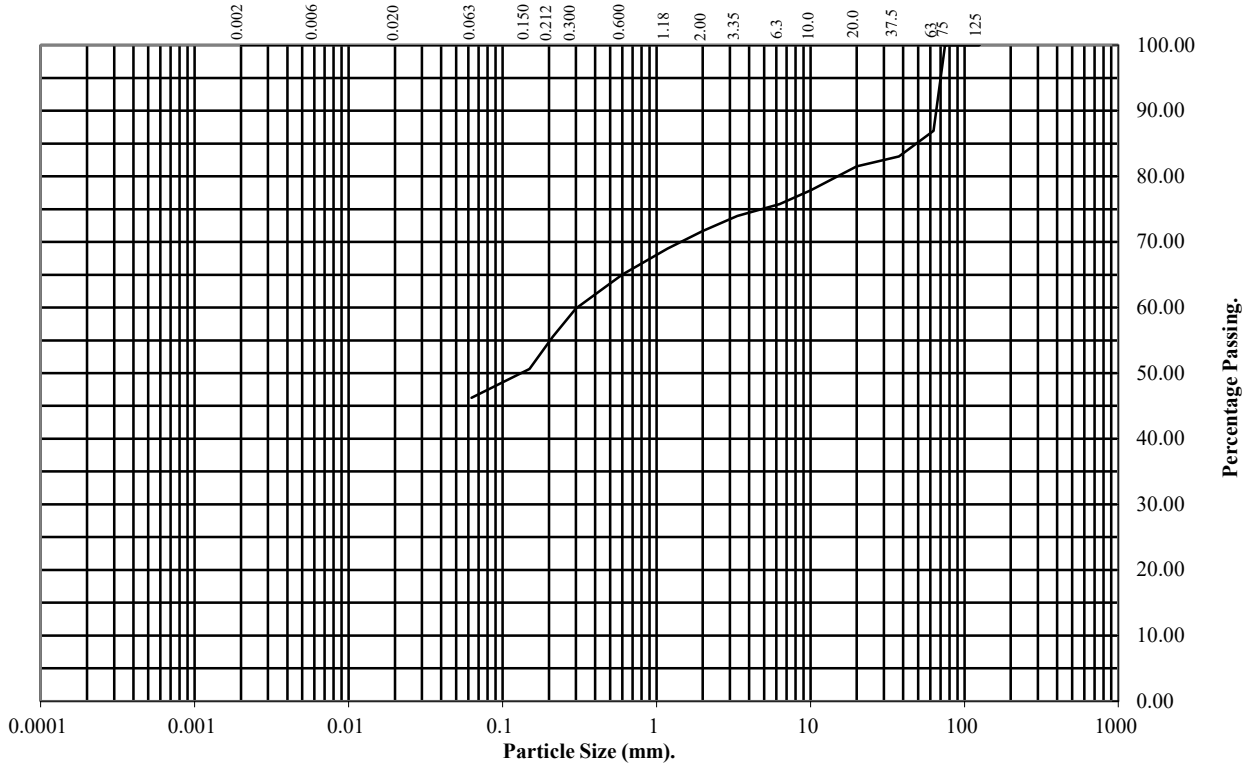
BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number: **BH2.4** Top Depth (m): **3.00**

Sample Number: Base Depth(m):

Sample Type: **B**



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	87
37.5	83
20	82
10	78
6.3	76
3.35	74
2	72
1.18	69
0.6	65
0.3	60
0.212	56
0.15	51
0.063	46

Soil Fraction	Total Percentage
Cobbles	13
Gravel	15
Sand	26
Silt/Clay	46

Remarks:
See Summary of Soil Descriptions



UCD Residents Masterplan - Phase 2 SI

Contract No:
PSL19/4019
Client Ref:
8715-05-19

PARTICLE SIZE DISTRIBUTION TEST

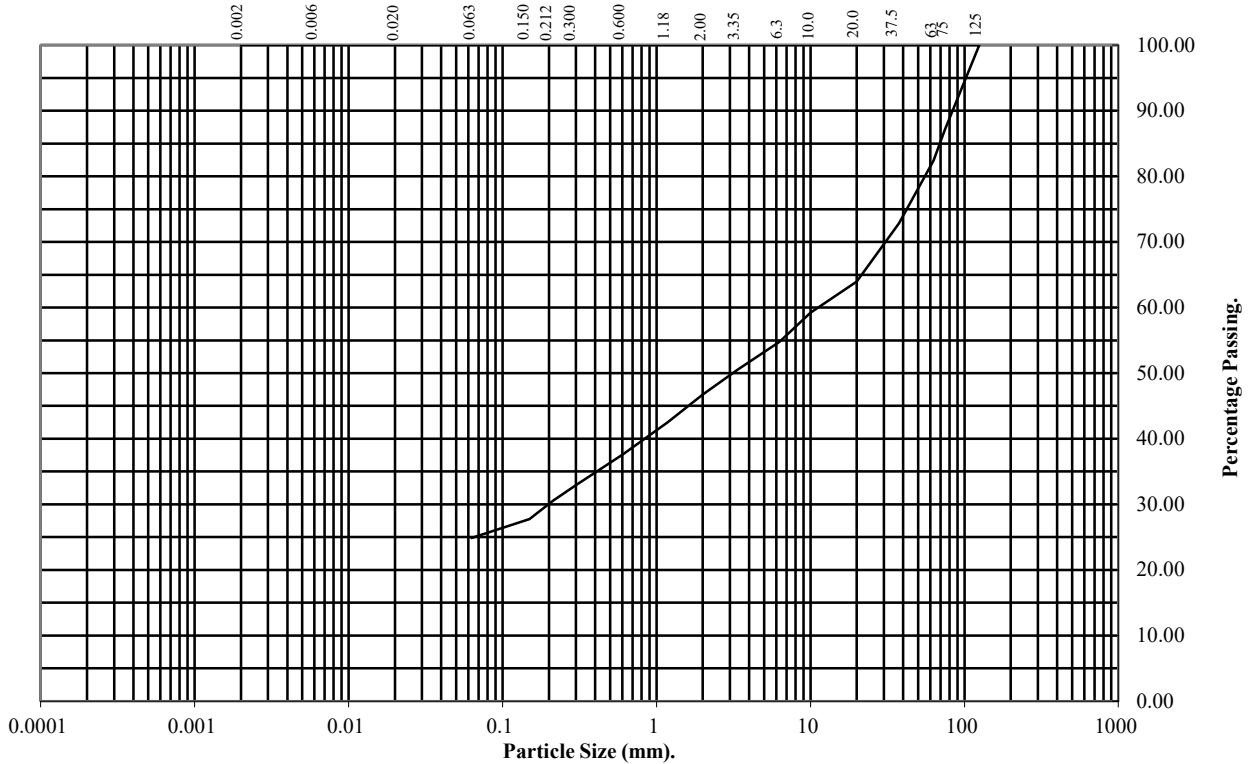
BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number: **BH2.5** Top Depth (m): **4.00**

Sample Number: Base Depth(m):

Sample Type: **B**



BS Test Sieve (mm)	Percentage Passing
125	100
75	87
63	82
37.5	73
20	64
10	59
6.3	55
3.35	51
2	47
1.18	42
0.6	38
0.3	33
0.212	31
0.15	28
0.063	25

Soil Fraction	Total Percentage
Cobbles	18
Gravel	35
Sand	22
Silt/Clay	25

Remarks:
See Summary of Soil Descriptions



UCD Residents Masterplan - Phase 2 SI

Contract No:
PSL19/4019
Client Ref:
8715-05-19

PARTICLE SIZE DISTRIBUTION TEST

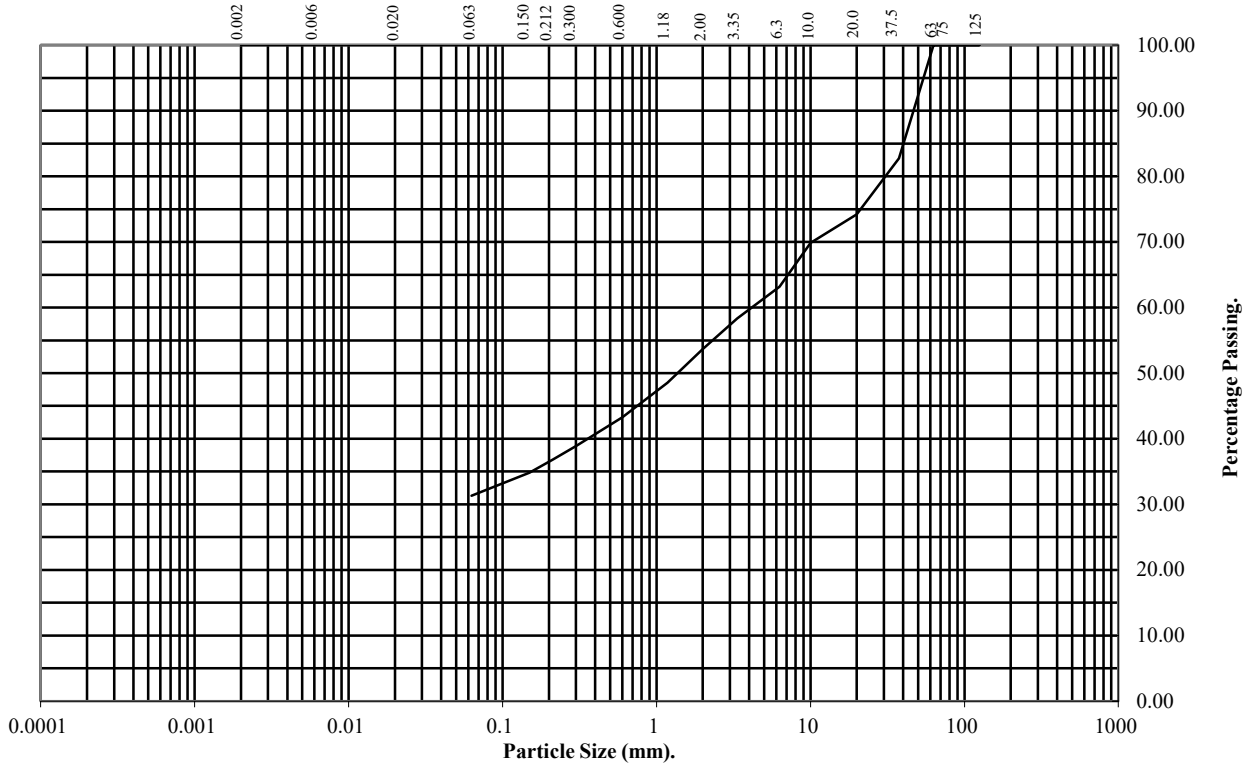
BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number: **BH2.5** Top Depth (m): **7.00**

Sample Number: Base Depth(m):

Sample Type: **B**



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	83
20	74
10	70
6.3	63
3.35	58
2	54
1.18	49
0.6	43
0.3	39
0.212	37
0.15	35
0.063	31

Soil Fraction	Total Percentage
Cobbles	0
Gravel	46
Sand	23
Silt/Clay	31

Remarks:
See Summary of Soil Descriptions



UCD Residents Masterplan - Phase 2 SI

Contract No:
PSL19/4019
Client Ref:
8715-05-19

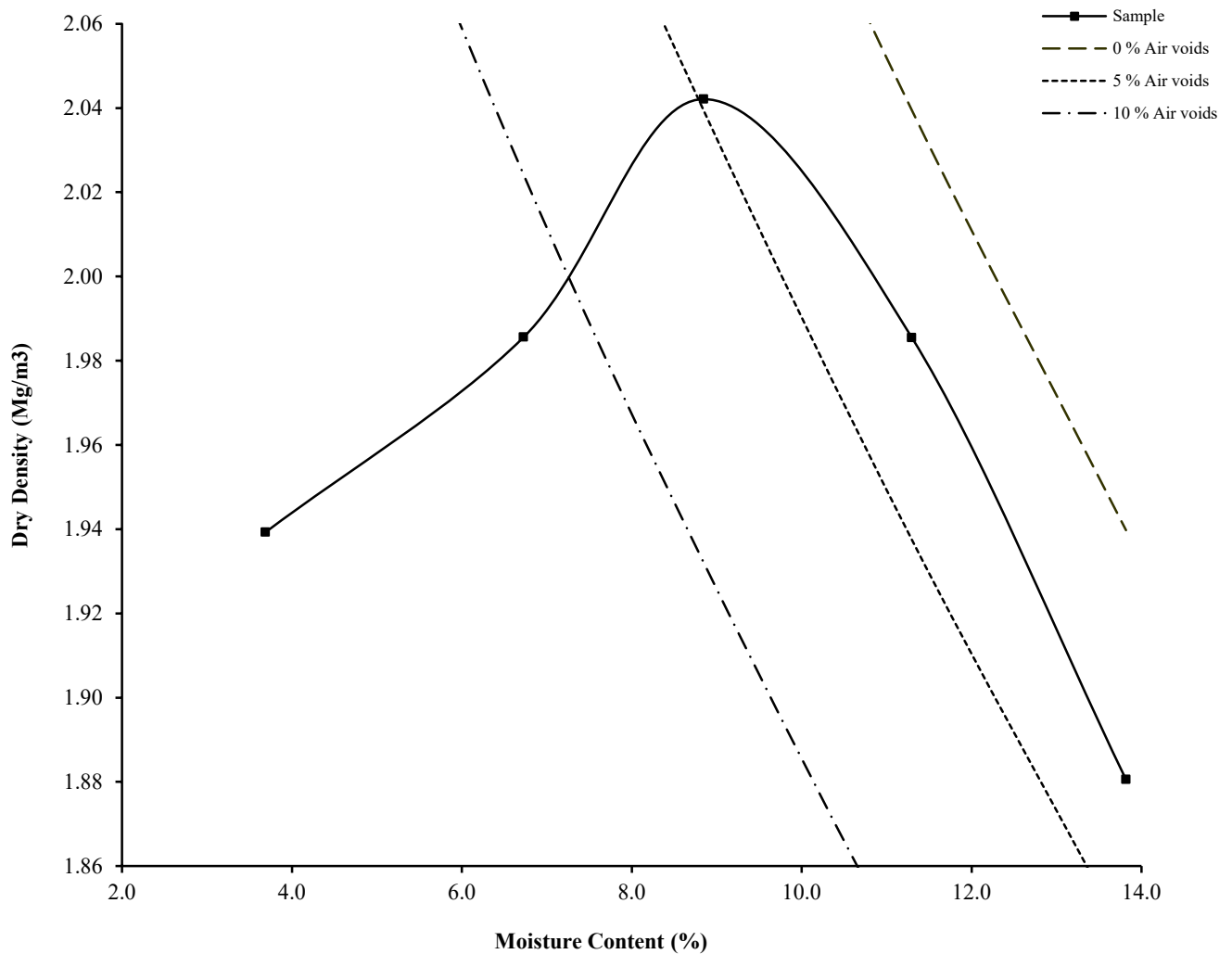
DRY DENSITY / MOISTURE CONTENT RELATIONSHIP

Non compliance with BS 1377 : Part 4 : 1990

Hole Number: **BH2.1** Top Depth (m) : **2.00**

Sample Number: Base Depth (m) :

Sample Type: **B**



Initial Moisture Content:	14	Method of Compaction:	2.5kg	Separate Samples
Particle Density (Mg/m ³):	2.65	Assumed	Material Retained on 37.5 mm Test Sieve (%):	18
Maximum Dry Density (Mg/m ³):	2.04		Material Retained on 20.0 mm Test Sieve (%):	7
Optimum Moisture Content (%):	10			
Remarks See summary of soil descriptions.				



UCD Residents Masterplan - Phase 2 SI

Contract
PSL19/4019
Client Ref
8715-05-19

DRY DENSITY / MOISTURE CONTENT RELATIONSHIP

Non compliance with BS 1377 : Part 4 : 1990

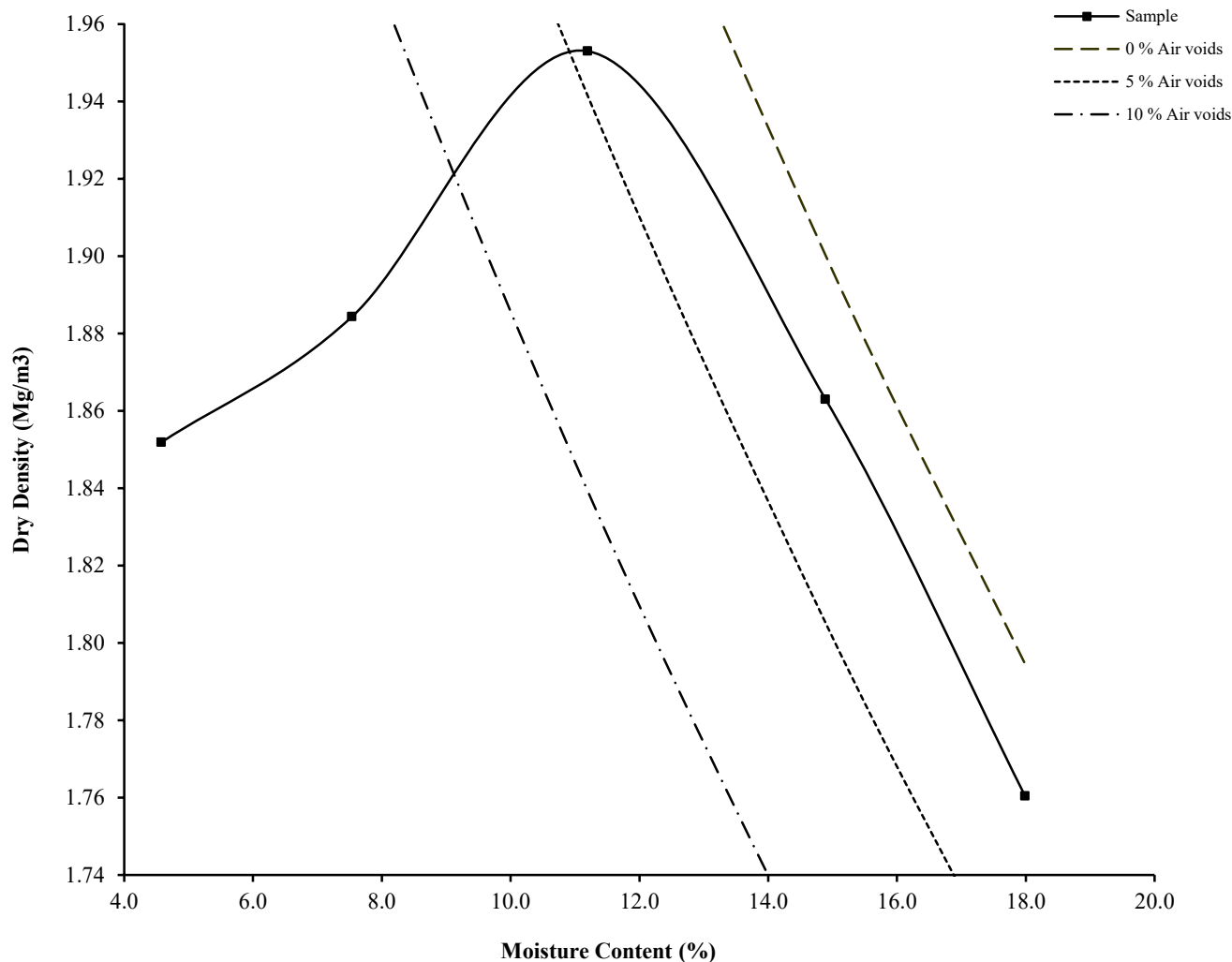
Hole Number: **BH2.4**

Top Depth (m) : **3.00**

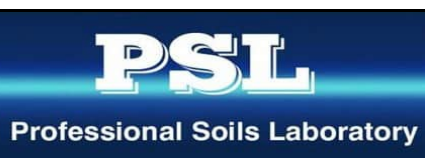
Sample Number:

Base Depth (m) :

Sample Type: **B**



Initial Moisture Content:	15	Method of Compaction:	2.5kg	Separate Samples
Particle Density (Mg/m ³):	2.65	Assumed	Material Retained on 37.5 mm Test Sieve (%):	17
Maximum Dry Density (Mg/m ³):	1.95	Material Retained on 20.0 mm Test Sieve (%):	1	
Optimum Moisture Content (%):	11			
Remarks				
See summary of soil descriptions.				



UCD Residents Masterplan - Phase 2 SI

Contract
PSL19/4019
Client Ref
8715-05-19

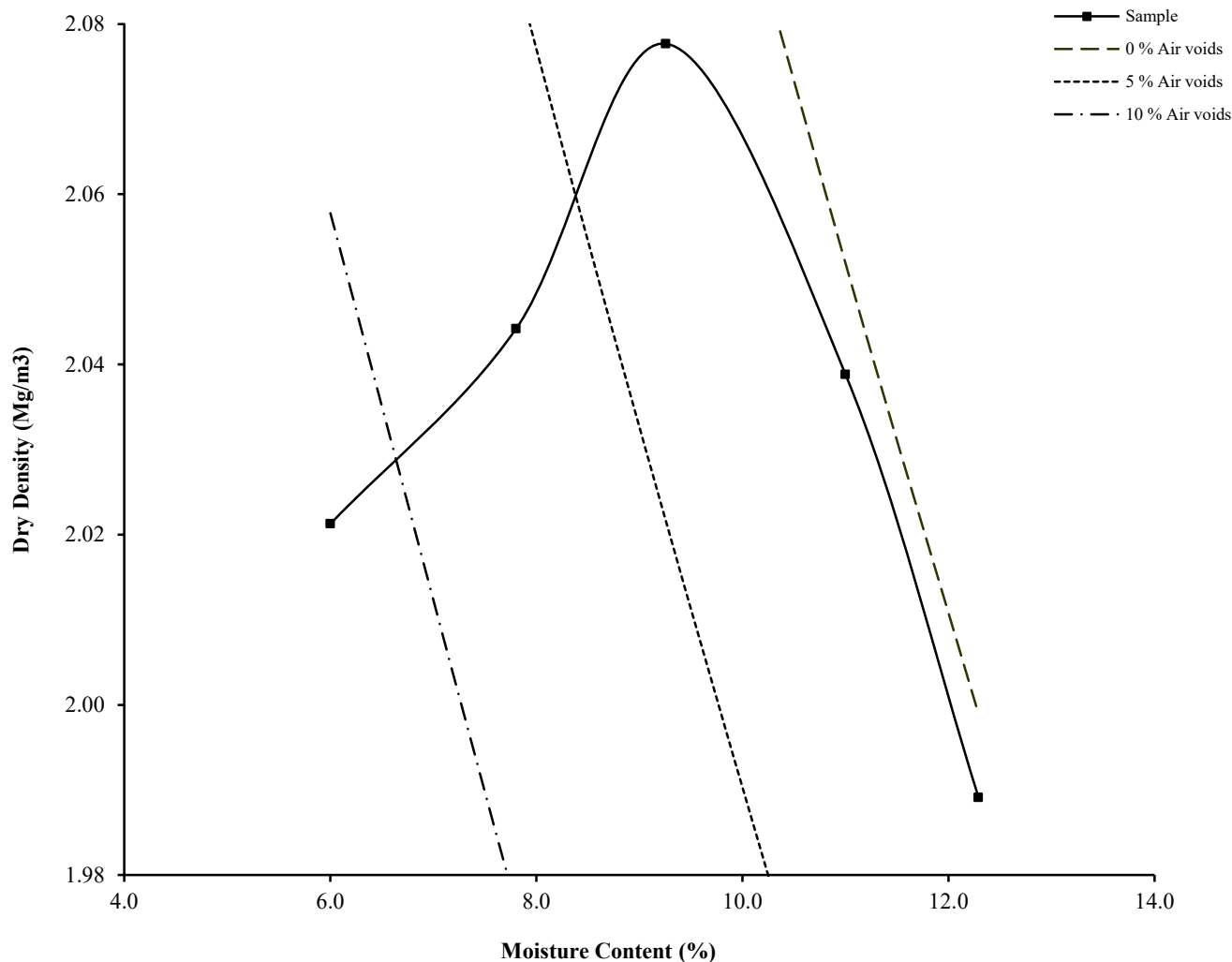
DRY DENSITY / MOISTURE CONTENT RELATIONSHIP

Non compliance with BS 1377 : Part 4 : 1990

Hole Number: **BH2.4** Top Depth (m) : **4.00**

Sample Number: Base Depth (m) :

Sample Type: **B**



Initial Moisture Content:	1.7	Method of Compaction:	2.5kg	Separate Samples
Particle Density (Mg/m ³):	2.65	Assumed	Material Retained on 37.5 mm Test Sieve (%):	38
Maximum Dry Density (Mg/m ³):	2.08		Material Retained on 20.0 mm Test Sieve (%):	9
Optimum Moisture Content (%):	9			
Remarks See summary of soil descriptions.				



UCD Residents Masterplan - Phase 2 SI

Contract
PSL19/4019
Client Ref
8715-05-19

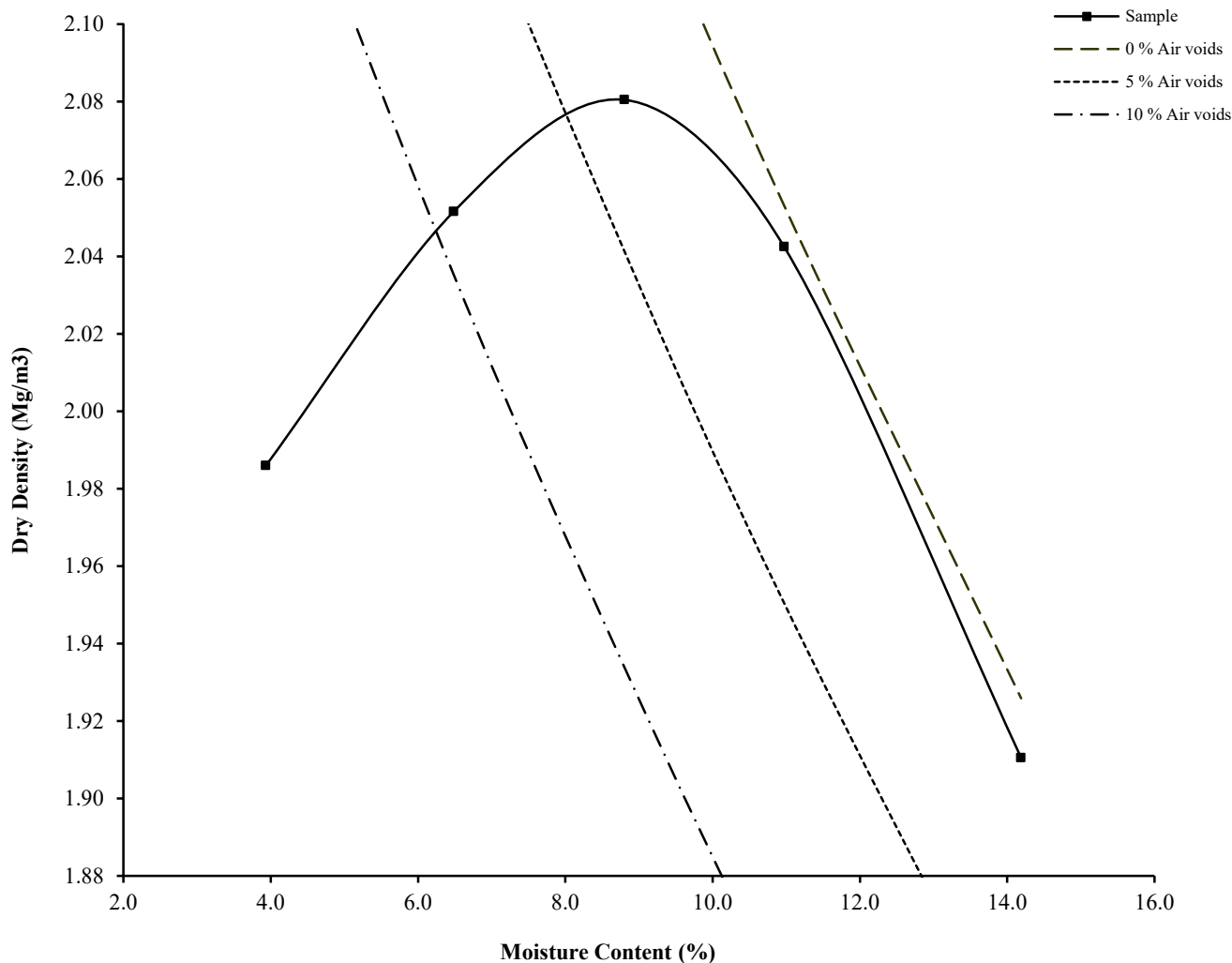
DRY DENSITY / MOISTURE CONTENT RELATIONSHIP

Non compliance with BS 1377 : Part 4 : 1990

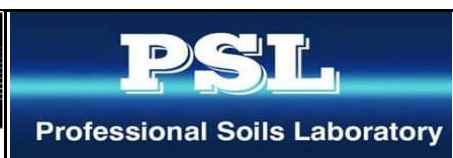
Hole Number: **BH2.5** Top Depth (m) : **4.00**

Sample Number: Base Depth (m) :

Sample Type: **B**



Initial Moisture Content:	11	Method of Compaction:	2.5kg	Separate Samples
Particle Density (Mg/m ³):	2.65	Assumed	Material Retained on 37.5 mm Test Sieve (%):	27
Maximum Dry Density (Mg/m ³):	2.08	Material Retained on 20.0 mm Test Sieve (%):	9	
Optimum Moisture Content (%):	9			
Remarks See summary of soil descriptions.				



UCD Residents Masterplan - Phase 2 SI

Contract
PSL19/4019
Client Ref
8715-05-19

MOISTURE CONDITION VALUE CALIBRATION

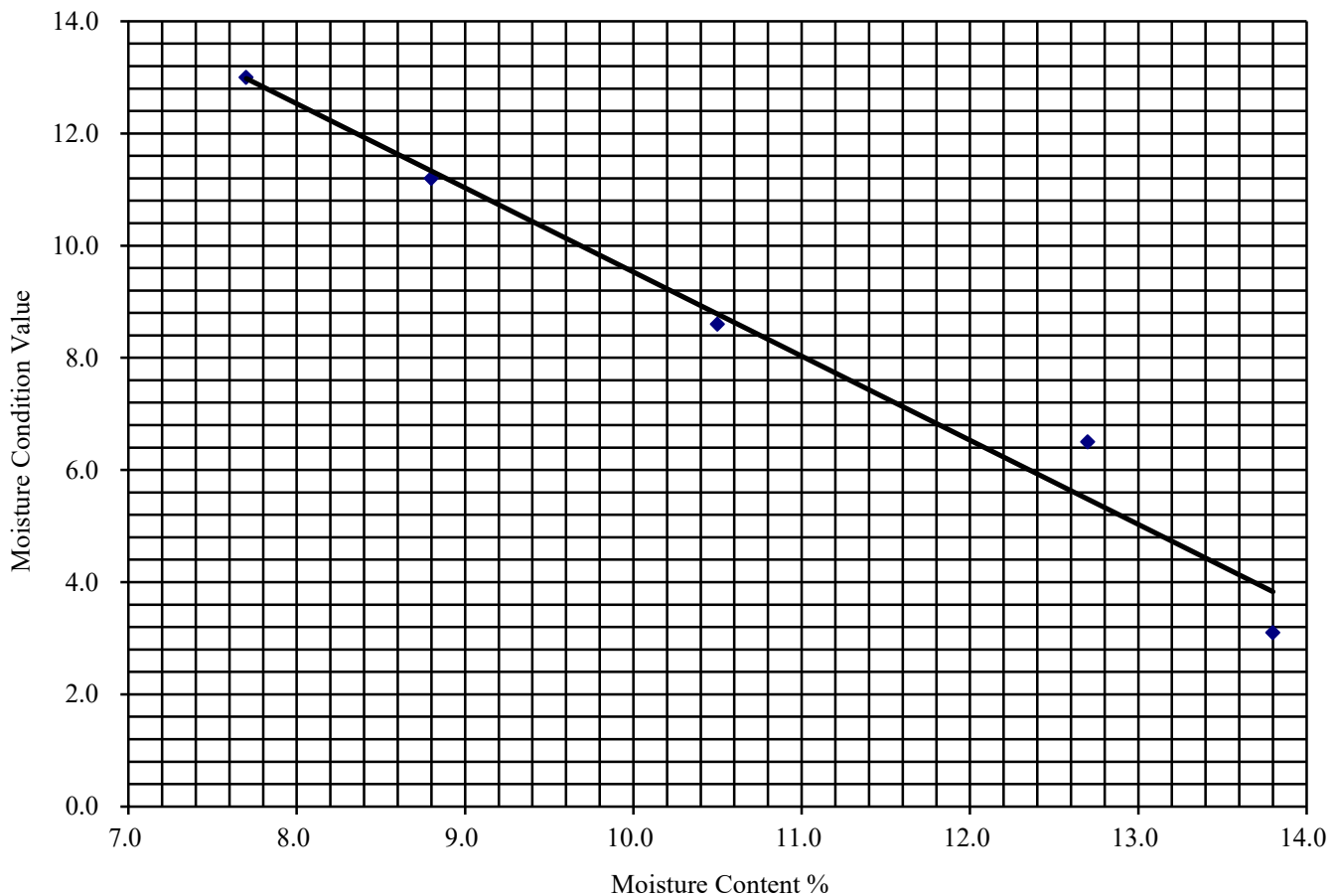
BS1377 : Part 4 : 1990 Clause 5.5

Hole Number: BH2.1 Top Depth (m): 2.00

Sample Number: Base Depth (m):

Sample Type: B

Initial Moisture Content (%):	14
Single/Separate Samples Tested	Separate
Material Retained on the 20mm BS Test Sieve (%):	25



Test Results.

Test Number	1	2	3	4	5
Moisture Content (%)	7.7	8.8	10.5	12.7	13.8
MCV	13.0	11.2	8.6	6.5	3.1



PSL
Professional Soils Laboratory

UCD Residents Masterplan - Phase 2 SI

Contract No:	PSL19/4019
Client Ref:	8715-05-19

MOISTURE CONDITION VALUE CALIBRATION

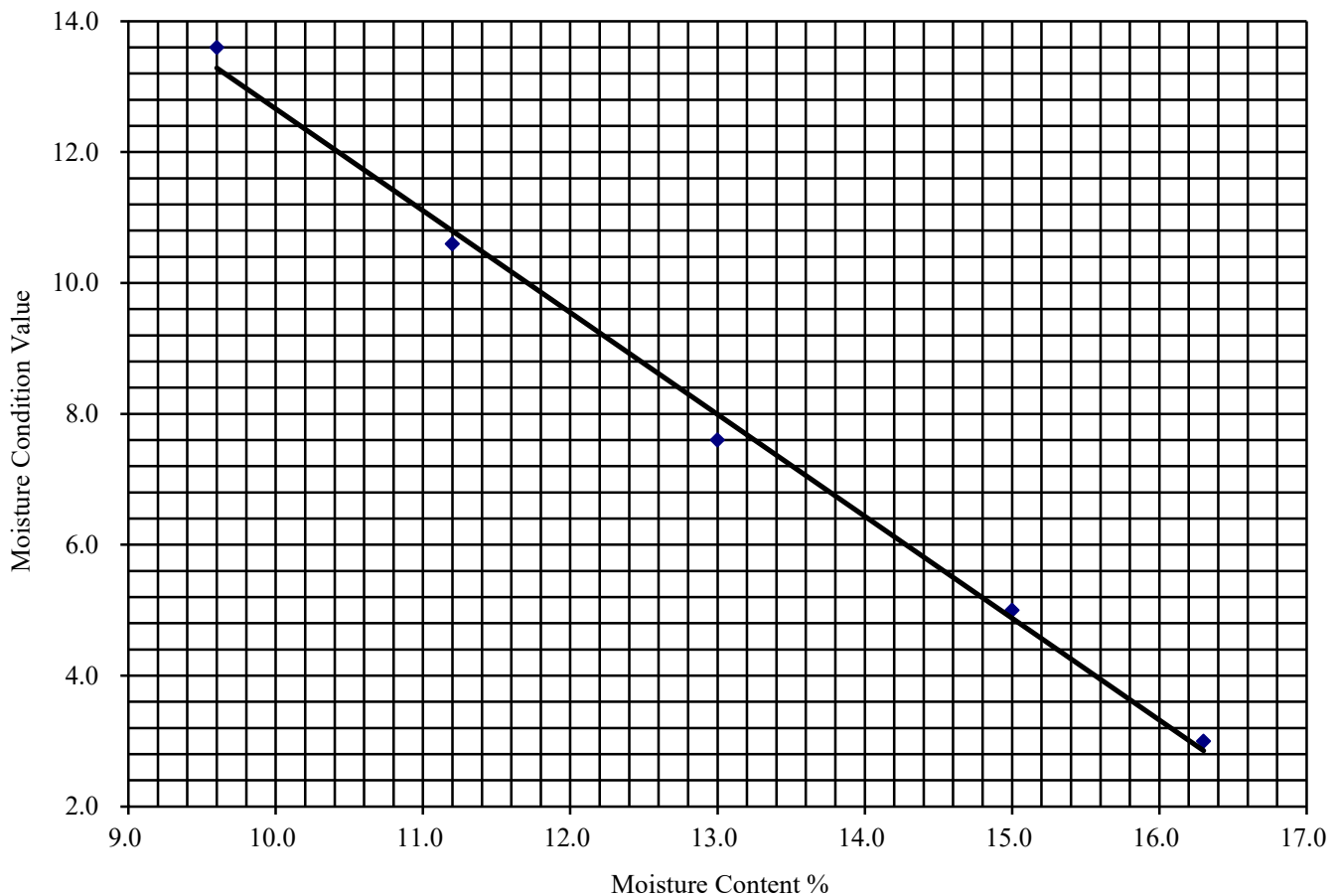
BS1377 : Part 4 : 1990 Clause 5.5

Hole Number: BH2.4 Top Depth (m): 3.00

Sample Number: Base Depth (m):

Sample Type: B

Initial Moisture Content (%):	15
Single/Separate Samples Tested	Separate
Material Retained on the 20mm BS Test Sieve (%):	18



Test Results.

Test Number	1	2	3	4	5
Moisture Content (%)	9.6	11.2	13.0	15.0	16.3
MCV	13.6	10.6	7.6	5.0	3.0



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UCD Residents Masterplan - Phase 2 SI

Contract No:
PSL19/4019
Client Ref:
8715-05-19

MOISTURE CONDITION VALUE

BS1377 : Part 4 : 1990 Clause 5.4

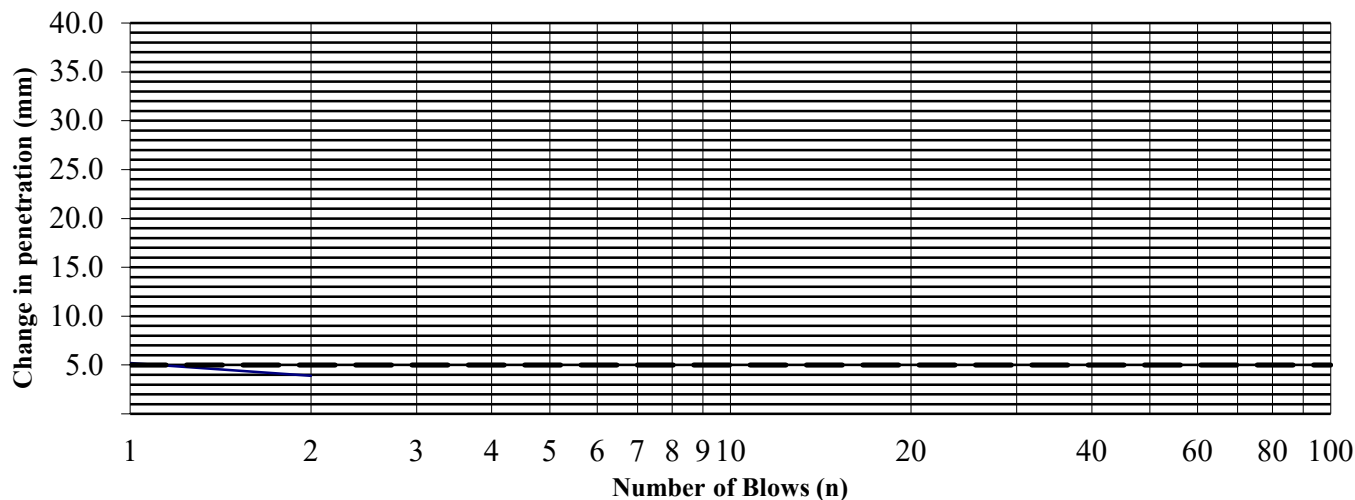
Hole Number: **BH2.4** Top Depth (m): **4.00**

Sample Number: Base Depth (m):

Sample Type: **B**

Material Retained on the 20mm BS Test Sieve (%):	47
Interpretation based on steepest straight line intercept with 5mm change in penetration.	

MCV Determination



Blows (N)	Penetration (mm)	n to 4n (mm)
1	81.5	5.2
2	78.9	3.9
3	77.0	
4	76.3	
6	75.3	
8	75.0	
12		
16		
24		
32		
48		
64		
96		
128		
192		
256		

Test Results.

Moisture Content (%)	1.7
MCV	0.5



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MOISTURE CONDITION VALUE CALIBRATION

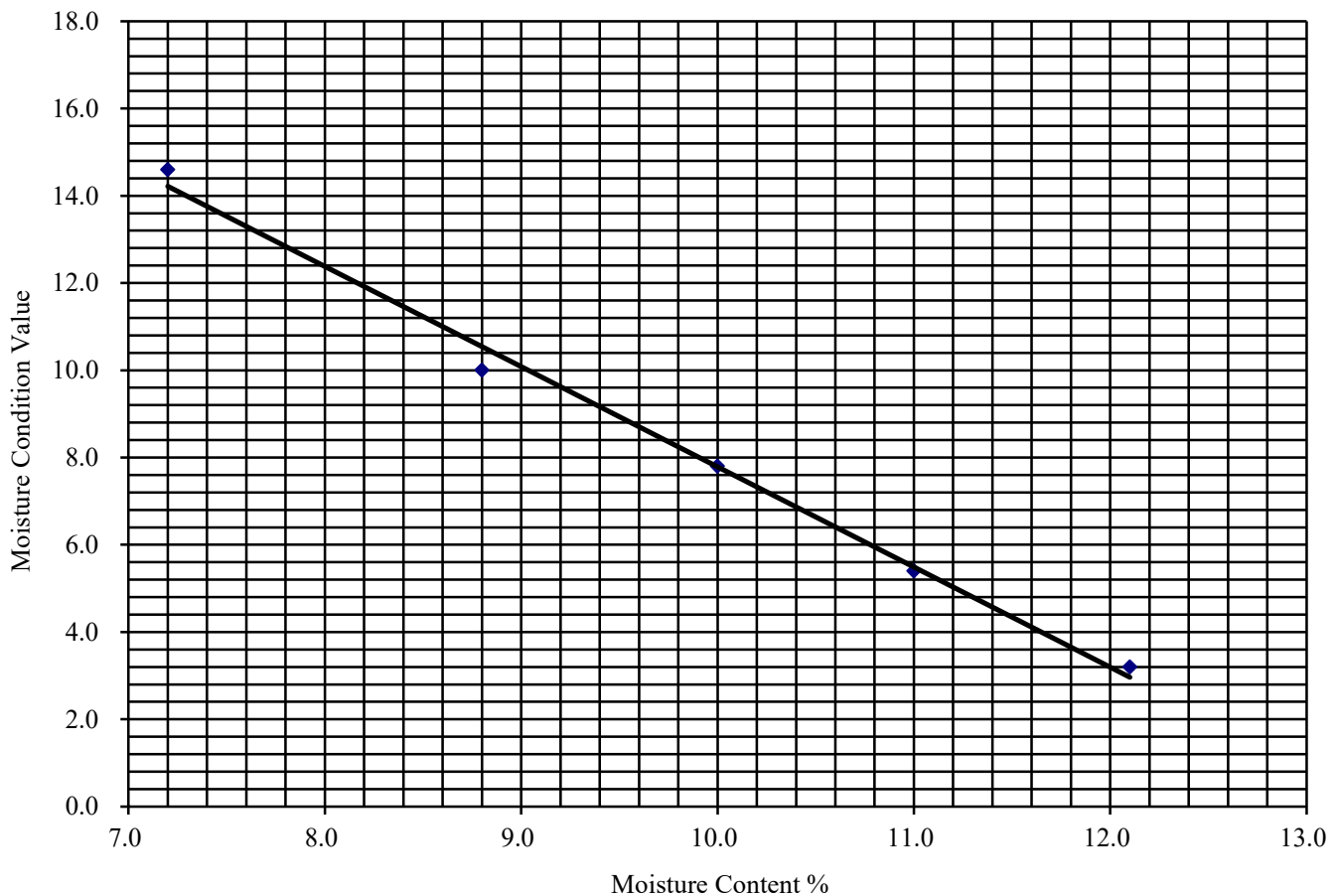
BS1377 : Part 4 : 1990 Clause 5.5

Hole Number: BH2.5 Top Depth (m): 4.00

Sample Number: Base Depth (m):

Sample Type: B

Initial Moisture Content (%):	11
Single/Separate Samples Tested	Separate
Material Retained on the 20mm BS Test Sieve (%):	36



Test Results.

Test Number	1	2	3	4	5
Moisture Content (%)	7.2	8.8	10.0	11.0	12.1
MCV	14.6	10.0	7.8	5.4	3.2



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DETS

Certificate of Analysis

Certificate Number 19-13062

16-Jul-19

Client Professional Soils Laboratory Ltd
5/7 Hexthorpe Road
Hexthorpe
DN4 0AR

Our Reference 19-13062

Client Reference PSL19/4019

Order No (not supplied)

Contract Title UCD Residents Masterplan - Phase 2

Description 4 Soil samples.

Date Received 10-Jul-19

Date Started 10-Jul-19

Date Completed 16-Jul-19

Test Procedures Identified by prefix DETSn (details on request).

Notes Opinions and interpretations are outside the laboratory's scope of ISO 17025 accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approved By



Adam Fenwick
Contracts Manager



2139

Summary of Chemical Analysis

Soil Samples

Our Ref 19-13062

Client Ref PSL19/4019

Contract Title UCD Residents Masterplan - Phase 2

Lab No	1529457	1529458	1529459	1529460
Sample ID	BH2.1	BH2.3	BH2.4	BH2.5
Depth	4.00	4.00	4.00	4.00
Other ID				
Sample Type	B	B	B	B
Sampling Date	n/s	n/s	n/s	n/s
Sampling Time	n/s	n/s	n/s	n/s

Test	Method	LOD	Units				
Inorganics							
pH	DETSC 2008#			8.3	7.8	8.2	8.2
Chloride Aqueous Extract	DETSC 2055	1	mg/l	8.4	11	11	14
Sulphate Aqueous Extract as SO4	DETSC 2076#	10	mg/l	290	680	43	67

Information in Support of the Analytical Results

Our Ref 19-13062

Client Ref PSL19/4019

Contract UCD Residents Masterplan - Phase 2

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1529457	BH2.1 4.00 SOIL		PT 1L	Sample date not supplied, Anions 2:1 (365 days), pH + Conductivity (7 days)	
1529458	BH2.3 4.00 SOIL		PT 1L	Sample date not supplied, Anions 2:1 (365 days), pH + Conductivity (7 days)	
1529459	BH2.4 4.00 SOIL		PT 1L	Sample date not supplied, Anions 2:1 (365 days), pH + Conductivity (7 days)	
1529460	BH2.5 4.00 SOIL		PT 1L	Sample date not supplied, Anions 2:1 (365 days), pH + Conductivity (7 days)	

Key: P-Plastic T-Tub

DETS cannot be held responsible for the integrity of samples received whereby the laboratory did not undertake the sampling. In this instance samples received may be deviating. Deviating Sample criteria are based on British and International standards and laboratory trials in conjunction with the UKAS note 'Guidance on Deviating Samples'. All samples received are listed above. However, those samples that have additional comments in relation to hold time, inappropriate containers etc are deviating due to the reasons stated. This means that the analysis is accredited where applicable, but results may be compromised due to sample deviations. If no sampled date (soils) or date+time (waters) has been supplied then samples are deviating. However, if you are able to supply a sampled date (and time for waters) this will prevent samples being reported as deviating where specific hold times are not exceeded and where the container supplied is suitable.

Soil Analysis Notes

Inorganic soil analysis was carried out on a dried sample, crushed to pass a 425µm sieve, in accordance with BS1377.

Organic soil analysis was carried out on an 'as received' sample. Organics results are corrected for moisture and expressed on a dry weight basis.

The Loss on Drying, used to express organics analysis on an air dried basis, is carried out at a temperature of 28°C +/-2°C.

Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-

Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months

APPENDIX 6 - Groundwater Monitoring



GROUNDWATER MONITORING

UCD Residential Masterplan Phase 2

BOREHOLE	DATE	TIME	GROUNDWATER (mBGL)	Comments
BH2.1	28/08/2019		-	Not Accessible
BH2.2	28/08/2019		17.00	
BH2.3	28/08/2019		7.30	
BH2.4	28/08/2019		2.20	
BH2.5	28/08/2019		-	Monitoring Well Not Found
BH2.1	03/10/2019		13.15	
BH2.2	03/10/2019		17.36	
BH2.3	03/10/2019		7.56	
BH2.4	03/10/2019		2.46	
BH2.5	03/10/2019		-	Monitoring Well Not Found