Appendix 4.2 B
Site Investigation Report

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IGSL Ltd

Lands at Halverstown

Ground Investigation & Geotechnical Interpretative Report

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Project No. 24330

July 2023

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

Standards
The ground investigation works for this project (**Lands at Halverstown**) have been carried out by IGSL in accordance with Eurocode 7 - Part 2: Ground Investigation & Testing (EN 1997-2:2007). This has been used together with complementary documents such as Engineers Ireland Specification for Ground Investigation (2nd Ed, 2016), BS 5930 (2015+A1:2020) and BS 1377 (Parts 1 to 9) and the following European Norms:

- EN 1997-2 Eurocode 7: 2007 – Geotechnical Design – Part 2: Ground Investigation & Testing
- EN ISO 22475-1:2006 Geotechnical Investigation and Sampling – Sampling Methods & Groundwater Measurements
- EN ISO 14688-1:2017 Geotechnical Investigation and Testing – Identification and Classification of Soil, Part 1: Identification and Description
- EN ISO 14688-2:2017 Geotechnical Investigation and Testing – Identification and Classification of Soil, Part 2: Principles for a classification
- EN ISO 14689-1:2017 Geotechnical Investigation and Testing – Identification, description & classification of rock

The Eurocode 7, Part 2 – Ground Investigation and Testing GI specification shall be read in conjunction with the Specification and Related Documents for Ground Investigation in Ireland, 2nd Edition, published by Engineers Ireland in 2016.

Reporting
No responsibility can be held by IGSL Ltd for ground conditions between exploratory hole locations. The engineering logs provide ground profiles and configuration of strata relevant to the investigation depths achieved and caution should be taken when extrapolating between exploratory points. No liability is accepted for ground conditions extraneous to the investigation points. Unless specifically stated, no account has been taken of possible subsidence due to mineral extraction, mining works or karstification below or close to the site.

This report has been prepared for DOBA Consulting Engineers and the information should not be used without their prior written permission. IGSL Ltd accepts no responsibility or liability for this document being used other than for the purposes for which it was intended.

Boring Procedures
Where required, 'shell and auger' or cable percussive boring technique is employed as defined by Section 6.3 of IS EN ISO 22475-1:2006. The boring operations, sampling and in-situ testing meet with the recommendations set out in IS EN 1997-2:2007 and BS 1377:1990 and EN ISO 22476-3:2005. The shell and auger boring technique allows for continuous sampling in clay and silt above the water table and sand and gravel below the water table (Table 2 of IS EN ISO 22475-1:2006).

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

In-Situ Testing
Where required, Standard Penetration Tests (SPT's) are conducted strictly in accordance with Section 4.6 of IS EN 1997-2:2007. The SPT equipment (hammer energy test) has been calibrated in accordance with EN ISO 22476-3:2005 and the Energy Ratio (E_r). A calibration certificate is

available upon request. The E_r is defined as the ratio of the actual energy E_{meas} (measured energy during calibration) delivered to the drive weight assembly into the drive rod below the anvil, to the theoretical energy (E_{theor}) as calculated from the drive weight assembly. The measured number of blows (N) reported on the engineering logs are uncorrected. In sands, the energy losses due to rod length and the effect of the overburden pressure should be taken into account (see IS EN ISO 22476-3:2005).

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Soil Sampling

Three categories of sampling methods are outlined in EN ISO 22475-1:2006. The categories are referenced A, B and C for any given ground conditions and are shown in Tables 1 and 2 of EN ISO 22475-1:2006. Reference should be made to EN 1997-2:2002 for guidelines on sample class and quality for strength and compressibility testing. Samples of quality classes 1 or 2 can only be obtained by using Category A sampling methods.

Class 1 thin wall undisturbed tube samples (UT100) were obtained in fine grained soils and strictly meet the requirements of EN 1997-2:2002 and EN ISO 22475-1:2006. Soil samples for laboratory tests are divided into five classes with respect to the soil properties that are assumed to remain unchanged during sampling, handling transport and storage. The minimum sample quality required for testing purposes to Eurocode 7 compatibility (EN 1997-2:2002) is shown in Table A.

Table A – Details of Sample Quality Requirements

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

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

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

Groundwater

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

subject to diurnal, seasonal and climatic variations and can also be affected by drainage conditions, tidal variations etc.

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Engineering Logging

Soil and rock identification has been based on the examination of the samples recovered and conforms with IS EN ISO 14688-1:2017 and IS EN ISO 14688-2:2017. Rock weathering classification conforms to IS EN ISO 14689-1:2017 along with discontinuities (bedding planes, joints, cleavages, faults etc) as classified in Section 6.4 of IS EN ISO 14689-1:2017 and Annex C of same. Rock mechanical indices (TCR, SCR, RQD) are defined in accordance with IS EN ISO 22475-1:2006.

Where peat has been encountered, samples have been logged in accordance with the Von Post Classification (ref. Von Post, L. 1992. Sveriges Gologiska Undersoknings torvinventering och nogra av dess hittils vunna resultat (SGU peat inventory and some preliminary results) Svenska Mosskulturforeningens Tidskrift, Jonkoping, Swedden, 36, 1-37 and Hobbs N. B. Mire morphology and the properties of some British and foreign peats. QJEG, Vol. 19, 1986.

Retention of Samples

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

1. INTRODUCTION

At the instruction of DOBA Consulting Engineers, IGSL has carried out a ground investigation at a greenfield site in the townland of Halverstown, 2.5 kilometres west of the town of Naas, Co. Kildare. The site comprises a number of connected field enclosures, all contained within one farm, centred around a now derelict, former family homestead with functioning farmyard / outbuildings. The site is located to the south of the R409 Regional Road and directly west of the M7 Motorway. The M7 Business Park is located to the south and south east of the site with the Osberstown Industrial Park to the northeast.

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Figure 1 – Site Location Plan (perimeter outlined in red)



Retrieved from Google Earth Professional 08/2022

Two high voltage transmission lines run across the property with a three-phase line also running north-south through the farm. The site is relatively flat lying, falling towards a stream which forms the southern boundary. Levels range from 85m OD in the northwest to 77.6m OD in the southeast. Intrusive investigation locations were set out as per the J&L Surveys Limited drawing entitled “Lands at Halverstown, Naas, Co. Kildare.” Micro-siting was performed where proposed locations were found to lie too close to tress, field boundaries / ditches or in proximity to the hazard zone of overhead power lines. ESB Networks HV Transmission overseers were contacted ahead of works

commencing to inform them of our presence on site and of the safety measures to be employed when moving plant on site.

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The investigation comprised cable percussion boreholes, machine-dug trial pits, dynamic probes, in situ plate load testing and soakaway testing (to BRE365). A resistivity survey was undertaken by Minerex Geophysics Limited.

Following a review of the findings from the initial investigation, a supplementary investigation comprising rotary cored drillholes, rotary openholes along with machine excavated trial pits and soakaway tests were undertaken. The investigations were executed in accordance with BS 5930, Code of Practice for Site Investigations (2015+A1:2020) and EN 1997-2 Eurocode 7 Part 2 Ground Investigation & Testing and supervised by an IGSL geotechnical engineer.

Geotechnical, chemical and environmental laboratory testing was scheduled on a range of soil samples with an environmental suite of testing also conducted on water samples retrieved from the standpipe wells and the neighbouring stream. The geotechnical testing included moisture contents, Atterberg Limits, compactions and MCV testing among others. Varying percentage lime and cement binder was added to samples to investigate any improvement in performance under subsequent CBR and MCV testing. Chemical testing was undertaken to BRE SD-1 on both natural 'as received' samples and on the soil stabilised samples (analysis ongoing). Environmental tests were undertaken on soil samples (RPS Suite A, B, C & E - WAC *Rilta* suite) to assess suitability for off-site disposal to landfill and/or Soil Recovery Facility. Rock strength tests were undertaken on the recovered cores.

In addition to presenting the field and laboratory test records this report provides an interpretation of the data and an assessment of the key geotechnical issues. In addition, a separate Waste Characterisation Report was prepared by O'Callaghan Moran Environmental Consultants, conducted in accordance with the Environmental Protection Agency (EPA) Guidelines on the Classification of Waste (2015). It assesses the environmental test results and apportions a List of Waste classification for each of the nominated samples. Based on that appraisal, a particular waste management option is generated for each analysed sample. This report is presented separately in Appendix 13.

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2. FIELDWORK

2.1 General

The initial tranche of IGSL Limited fieldworks were undertaken in October and November 2022. The works completed on site comprised the following:

- Trial Pits (34 No.)
- Cable Percussion Boreholes (14 No.)
- Dynamic Probing (55 No.)
- Plate Bearing Testing (23 No.)
- Soakaway Tests (to BRE 365) (14 No.[i])
- Resistivity Survey
- Groundwater Monitoring / Sampling
- Gas Monitoring
- Surveying of Exploratory Hole Locations

[i] A second shallow soakaway test (SA05B) was conducted at location SA05 following interception of water in SA05A at 1.70m bgl

Supplementary works were undertaken during April and May 2023 following a review of the findings from the 2022 investigation. The additional works comprised:

- Trial Pits (TP RO) (10 No.)
- Soakaway Tests (BRE SA) (6 No.[ii])
- Rotary Drilling
- Rotary Openhole Drilling
- Groundwater Monitoring
- Surveying of Exploratory Hole Locations

[ii] Soakaway tests were conducted in only two of the six pits due to sidewall instability and groundwater ingress during excavation.

2.2 Trial Pits

Trial pitting was undertaken at thirty-four locations across the site ca. 90 acre site. The locations were set out as per the J&L Surveys Limited drawing entitled "Lands at Halverstown, Naas, Co. Kildare." The trial pits were excavated, logged and sampled under the direction of an IGSL geotechnical engineer in accordance with BS 5930 (2015+A1:2020). Bulk disturbed samples (typically 20 to 30kg) were taken as the pits progressed.

The bulk samples were placed in heavy-duty polyethylene bags and sealed before being transported to Naas for laboratory testing. The trial pits were backfilled with the as-dug arisings and reinstated to the satisfaction of IGSL's site geotechnical engineer. The trial pit logs and photos are presented in Appendix 1 and include descriptions of the soils encountered, groundwater conditions and stability of the pit sidewalls.

Additional trial pits were undertaken in April and May 2023 at ten locations across the site. The pits were excavated with a 13 tonne tracked excavator. Pits were extended from 2.30m to 3.60m with sidewall collapse and groundwater entry generally limiting the depths attainable on site. The pit logs and photographs are presented in Appendix 1A.

2.3 Cable Percussion Boreholes

Cable percussive boring (200mm diameter) was undertaken at fourteen locations using a Dando 2000 rig. The boreholes extended to depths of between 1.10m and 3.90m. At all locations, boring commenced through hand-dug service inspection pits. Disturbed bulk samples were recovered at 1m intervals or change of strata during boring and these are denoted 'B' on the engineering logs.

Standard Penetration Tests (SPT's) were performed in the boreholes and given the nature of the soils, a solid cone was used. It is noted that the SPT N-Values reported are the number of blows for 300mm increment penetration (e.g. BH01 at 1.0m where N=10). These exclude the seating blow values, which represent the initial 150mm depth of penetration. Where partial penetration was achieved during testing, the number of blows is shown for the actual penetration depth achieved (e.g. BH06 at 1.0m where N=48/225mm). In accordance with Eurocode 7, the SPT hammer has been calibrated and the energy ratio (Er) value is incorporated on the engineering logs. It is highlighted that the SPT N-Values reported on the engineering logs are uncorrected for energy ratio.

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Descriptions of the soils encountered, in-situ tests undertaken and samples recovered are presented on the borehole records in Appendix 2. Details of groundwater strikes and hard strata boring (i.e. chiselling) are also presented on the aforementioned records.

2.4 Dynamic Probing

In-situ "Heavy" dynamic probing (DPH) was performed at fifty-five locations using a compact crawler rig. The tracked Archway probing unit meets the requirements of BS 1377, Part 9 (1990) and IS EN 1997-2:2007. The probing rig utilized a 50kg drop weight and 500mm drop height with a 60° cone. In accordance with the standards, the number of blows required to drive the cone each 100mm increment into the sub-soil was recorded. Probing is generally terminated when blow counts, N_{100} values, exceed 25, in order to avoid damage to equipment. The probe records are presented in Appendix 3 and include blow-counts in both numerical and graphical format.

2.5 Plate Bearing Testing

Plate bearing tests were conducted at twenty-three locations at depths ranging 0.40m to 0.60m below ground level [bgl]. Plate testing was undertaken to evaluate the modulus of sub-grade reaction (Ks) and equivalent CBR value. A 450mm diameter plate was used for the tests with kentledge provided by a mechanical excavator. Two load cycle tests were performed and the load / settlement plots, Ks and equivalent CBR values are presented in Appendix 4.

2.6 Soakaway Tests (to BRE 365)

Fourteen number infiltration tests were performed to assess the suitability of the sub-soils for dispersion of storm water through a soakaway system. The infiltration tests were each performed in accordance with BRE Digest 365 'Soakaway Design'. To obtain a measure of the infiltration rate of the sub-soils, water was poured into each test pit, with records taken of the fall in water level against time. Following the first soak cycle, the procedure was repeated to ensure saturation of the sub-soils. The infiltration rate is the volume of water dispersed per unit of exposed area per unit of time, and is generally expressed as metres / minute or metres / second. Designs are based on the slowest infiltration rate, which is generally calculated from the final soak cycle. The soakaway design logs are presented in Appendix 5. Two soak test locations (a deep soak pit initially followed by a shallow soak pit) were constructed at location SA05 due to water ingress in the first attempted pit.

Additional soakaway tests were scheduled for the April 2023 re-visit. Of the six locations, actual tests were only possible in two of the opened pits. This was attributable to the poor sidewall stability witnessed during pit construction. Instability was often accompanied by groundwater entry. Where groundwater entered prior to achieving test depth, no soakaway test was performed. SA01 and SA06 saw tests run with limited success. As with the additional pits, the soak pits were excavated using a 13 tonne tracked excavator. The soakaway test logs together with pit logs and photographs are presented in Appendix 5A.

2.7 Resistivity Survey

A resistivity survey was conducted by Minerex Geophysics Limited. It consisted of two different methods. The methodology employed used both Vertical Electrical Sounding (VES) and Soil Resistivity (SR) in the Wenner electrode configuration at a range of electrode spacing agreed with the client prior to the fieldwork. The increase in the electrode spacing leads to an increase in the

depth - the VES permitting deeper soundings and Soil Resistivity Tests shallow. The Minerex report is presented in Appendix 6.

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2.8 Rotary Drilling - *Additional Works April-May '23*
Rotary drilling was carried out at five locations (holes denoted RC_) using a tracked Comacchio GEO-205 top-drive rig. This hydraulic rig utilised Symmetrex drilling system within the superficial deposits and through initial fractured rockhead, with coring techniques deployed in the underlying bedrock. Coring was also attempted in CLAY intercepted at depth in RC01A. Rotary core drilling produced 78mm diameter cores which, in bedrock, was logged as variably weak to strong, thickly to thinly bedded, pale to mid bluish grey fine-grained LIMESTONE. The limestone was likely locally slightly dolomitised, with stromatctic structure and abundant calcite veining. The rock was further described as slightly weathered. In the case of RC01 and RC01A, crystalline calcite was noted at depth in the rock record with a complete absence of competent limestone bedrock.

The cores were placed in 3m capacity timber boxes and logged by an IGSL engineering geologist. This included photography of the cores with a digital camera. Where rock core was recovered, a graphic fracture log is also presented alongside the mechanical indices. This illustrates the fracture state of the rock cores and allows easy identification of highly fractured / non-intact zones and discontinuity spacings. It should be noted that no correction for dip of the joints has been made and that the spacings shown are successive joint / core intersections within the core.

The core log record is presented in Appendix 7 and this includes engineering geological descriptions, details of the bedding / discontinuities and mechanical indices (TCR, SCR and RQD's) for each core run. Core photographs are also presented in Appendix 7 and these illustrate the structure and fracture state of the bedrock.

2.9 Rotary Open Hole Drilling - *Additional Works April-May '23*
Rotary Open-Hole [TPRO-_] drilling was carried out at ten locations on site. The holes (TPRO-01 to TPRO-10) were carried out using a tracked Comacchio GEO-205 top-drive drill rig and extended to a maximum depth of 5.20m bgl. Wells installed in the holes permit groundwater monitoring. SPT testing was undertaken during open-hole drilling with the resulting test records featuring on the logs in Appendix 8.

Symmetrex open-hole drilling was utilised within the overlying superficial deposits stopping shy of the underlying bedrock (not intercepted). The groundwater monitoring standpipes installed consisted of 50mm diameter HDPE pipework with proprietary 1mm slots and incorporated a pea gravel filter pack and cement / bentonite grout seal. Headwork covers were concreted in place. The drilling records are presented in Appendix 8.

2.10 Groundwater Monitoring
The initial fieldworks period saw the installation of standpipes in five newly constructed cable percussion boreholes. The standing groundwater levels in each of the installations was measured following the fieldworks. Groundwater levels were measured using an electric dipmeter. The levels recorded are shown in Appendix 9. The dates of monitoring are shown in Table 1.

Water sampling was undertaken during the first monitoring visit (02-Dec-22). Prior to sampling, installations were developed in accordance with ISO 14868 (2003) and then purged of three times well volume (in accordance with BS 6068). Water samples were dispatched to Chemtest Laboratories (UK) under controlled conditions (ice packed cooler box) to preserve the integrity of the individual samples.

The additional works saw the introduction of a further fourteen wells across the site. Of the fourteen, ten were placed in the holes constructed using Symmetrex openholing methods with a further four in the rotary core drillholes.

Table 1 – Water Monitoring and Sampling Dates at on site wells

Borehole Water Monitoring Dates	Borehole Water Sampling Date
02-12-22	02-12-22 (excl. BH05)
19-12-22	-
10-07-23	-

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2.11 Gas Monitoring

Following installation of 50mm diameter standpipes in the four cable percussion boreholes, a gas tap was fitted to each well (BH03, BH10, BH12, BH13). This enabled gas monitoring post project completion. Gas level measurements, taken in accordance with CIRIA C665:2007, were performed using a calibrated GA5000 gas monitor. Both steady state and peak gas results are presented in Appendix 10 accompanied by groundwater measurements. The flow rate measurements recorded by the GA5000 were logged after the initial gas quantification readings were taken. The unit does not allow for simultaneous monitoring of gas quantities and gas flow. At all times the Geotech GA5000 portable gas analyser was used as per the guidelines whilst conforming to the on-screen notifications.

2.12 Surveying of Exploratory Hole Locations

Following completion of the exploratory works, surveying was carried out using GPS techniques. Co-ordinates (x, y) were measured to Irish Transverse Mercator and ground levels (z) established to Malin Head. The co-ordinates and ground levels are shown on the exploratory hole logs with locations shown on the exploratory hole plan in Appendix 16.

3. LABORATORY TESTING

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Geotechnical laboratory testing was carried out at IGSL's INAB-accredited laboratory in accordance with BS1377; British Standard Methods of Test for Soils for Civil Engineering Purposes; British Standards Institute:1990. Soil testing was performed on selected trial pit samples and included tests to assess earthwork characteristics (MCV & CBR) and trial mix testing by the addition of lime to re-engineer the soils as high strength fill ('ground improvement'). A number of fine-grained samples were selected for testing with 1%, 2% and 3% lime (calcium oxide) or a combination of lime and cement binders. The geotechnical laboratory test results will feature in Appendix 11.

Five soil samples were selected for Waste Acceptance Criteria (WAC) analysis as per the *Rilta* set of testing (RPS Suite E). The results can be used to classify the material with regard to its potential for disposal to landfill. A further thirty-one soil samples were selected for analysis using RPS Suites A, B and C. These results are enclosed in Appendix 12. The chemical analysis tests on natural soil samples, in addition to testing on soils following treatment with cement / lime binders (to BRE SD1), also feature in Appendix 12.

A Waste Characterisation Report, prepared by O'Callaghan Moran Environmental Consultants, will assess the environmental test results arising from RPS Suite E / 'IGSL Rilta' testing. A 'List of Waste' classification and a particular waste management option for each of the five samples is included in that report. The reports features in Appendix 13.

Water samples were taken from three of the four wells - BH10 was found to be dry. Prior to sampling, installations were developed in accordance with ISO 14868 (2003) and then purged of three times well volume (in accordance with BS 6068). In addition to the well samples, two stream samples were collected from points along the sites' southern boundary. Samples were dispatched to Chemtest in December 2022. The resulting environmental analysis features in Appendix 14 (Report 22-47891).

Point load strength index (PLSI) tests were conducted on selected core samples. These are presented in Appendix 15.

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4. DESK STUDY

The site comprises a number of field enclosures separated by mature tree-lined hedgerows. The 6" Cassini map (retrieved from the OSI website) shows the central farmyard but also reveals the presence of a bronze age 'Fulacht Fia'. The online Historic Environment Viewer on the National Monuments Service website (archaeology.ie) also highlights the presence of this prehistoric feature and notes the following;

> *"Some 30m N of a small, NW-flowing stream in well-drained, level pasture. Described in 1985 as horseshoe-shaped mound (diam. c. 6m N-S; H. 1m) open towards the S (SMR file). No obvious surface trace survived in 2000, but the area, although recently drained with a plastic field-pipe (Wth 0.5m; D 0.3m) just N of the site was still wet and rushy to the SE of the site. Sub-surface features may survive intact."*

Figure 2A & 2B – ca. 1940's OSI drawing for the Halverstown site and Modern (2013-2018) orthophotograph



Fig 2A



Fig 2B

From the 2013-2018 aerial image (Fig 2B), some of the lower lying areas can be identified as they are covered in tussocky grasses which appear light brown in colour. The areas are located towards

the southern fringe of the site and in the northeastern triangular-shaped field. The construction in 1983 of the adjacent motorway, then the Naas Motorway Bypass, bisected the farmland. Truncated hedgelines can be identified in the landscape to this day both east and west of the motorway.

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The OSI drawing dated 1897-1913 (Figure 3) shows the presence of a series of NW-SE trending '*Gravel Pit*' open pits located ca. 350m west of the site (site outlined in red). The scar on the landscape can be viewed clearly in the OSI 2004-2005 aerial image. The western site boundary is lined in red.

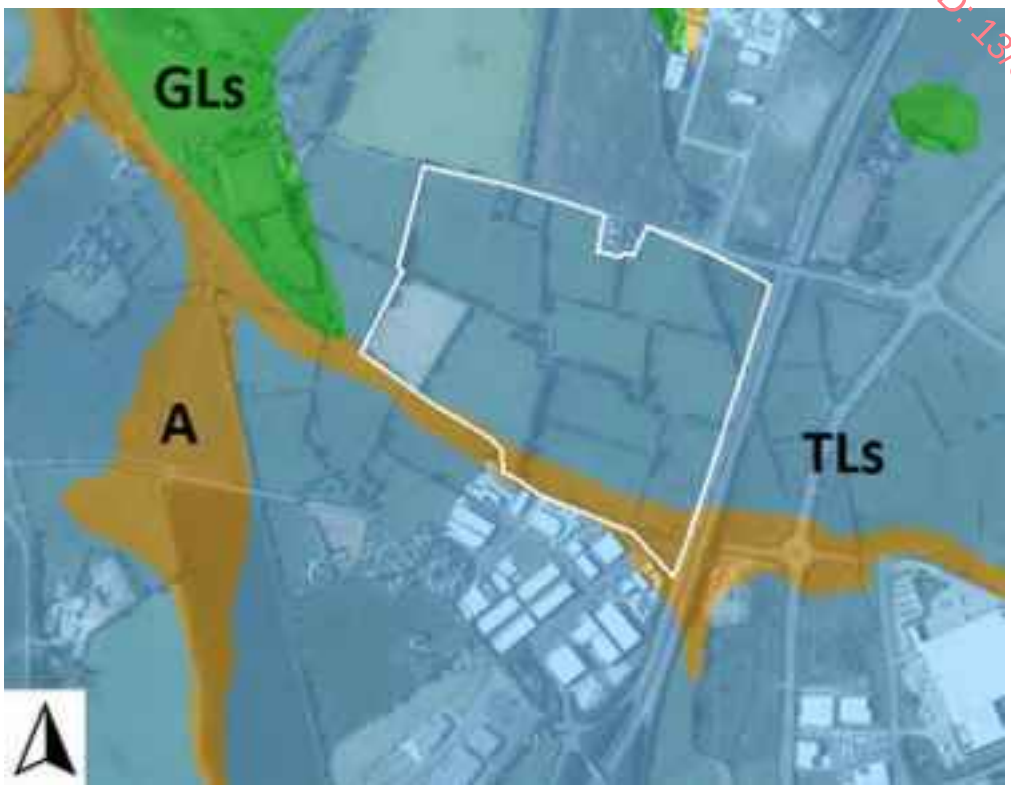
Figure 3 – OSI 1897-1913 survey with 2004-2005 inset showing former extraction pits or 'Gravel Pit' at Halverstown, 350m west of the site. Dashed section equals approximate area shown in 2004-2005 orthophotograph.



The Quaternary Soils map indicates the presence of both natural glacial till and alluvial deposits. The majority of the site is highlighted as being underlain by 'Till derived from Limestones' (Figure 4).

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Figure 4 – Quaternary Soils Plot for Halverstown Site (site outlined)



Map Key	**A**	- Alluvium
	GLs	- Gravels derived from Limestones
	TLs	- Till derived from Limestones

Reference to the GSI map for the area (Figure 5, 1:100,000 Solid Geology series) shows that the site is underlain by the Carboniferous, Viséan-aged Rickardstown Formation. The rock formation consists of cherty often dolomitised limestone. No outcrops were found on site. Rotary drilling was carried out at five locations and proved a variably weak to strong limestone bedrock described as thickly to thinly bedded, pale to mid bluish grey fine-grained LIMESTONE. Crystalline calcite was unearthed at depth in coreholes RC01 and RC01A.

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Figure 5 - Bedrock Geological Map for the Halverstown Site (retrieved from GSI website)



Key: **RK** = Rickardstown Formation
BA = Ballysteen Limestone

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5. GROUND CONDITIONS & GROUNDWATER

5.1 Ground Profile – Superficial Deposits

The following is a summary of the ground conditions encountered across the ca. 90 acre site. The summary is presented in three parts. The works to the west of the access lane (off the R409) comprise 'Area 1'. The fields to the east of the main access lane are termed 'Area 2'. Finally, the fields to the southeast of the centrally located farmyard are termed 'Area 3'. This area includes the lowest lying area of the farm.

The newly completed intrusive locations (April / May 2023) are included in the synopsis with the information used to enhance the findings for each of Areas 1, 2 and 3 (as per Table 2).

Table 2 – Supplementary (2023) investigation points in Areas 1, 2 and 3

Exploratory Hole Locations	Area 1 (West)	Area 2 (East)	Area 3 (South)
Trial Pits	TP/RO 01 TP/RO 02 TP/RO 03 TP/RO 04 TP/RO 09	TP/RO 05 TP/RO 06 TP/RO 07	TP/RO 08 TP/RO 10
Soakaway Pits & Tests	BRE SA01 BRE SA02 BRE SA03 BRE SA04	BRE SA06	BRE SA05
Rotary Open-Hole Wells	TPRO-01 TPRO-02 TPRO-03 TPRO-04 TPRO-09	TPRO-05 TPRO-06 TPRO-07	TPRO-08 TPRO-10
Rotary Drillhole	RC03	RC01 RC01A RC02	

5.1.1 Area 1



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In the northwest, ground levels along the R409 road boundary measure approximately 85m OD (DP50). These fall to 77.3m OD (PB03) towards the M7 Business Park in the southeast. The boreholes extended to depths ranging 1.80m to 3.90m without reporting bedrock. Rotary open-holes were extended in overburden to 5.20m bgl. Rotary core drillhole RC03 proved rock at a depth of 8.80m bgl (70.57m OD).

Of the fifteen trial pits in 'Area 1' constructed during the initial phase of the investigation, each reported completion depths ranging 2.30m to 3.0m. The pits in the supplementary investigation (listed in Table 2) also ranged from 2.30m to 3.0m in depth. Twenty-nine probes were undertaken, the deepest of which achieved a termination depth of 4.90m (DP14). Some probes terminated at a shallow 1.0m bgl. In 2023, four additional soakaway pits were excavated to depths ranging 2.50m to 3.0m. However, due to sidewall instability and water ingress, soakaway testing was only undertaken in one pit (SA BRE01).

TOPSOIL

- In the northern half of 'Area 1' (the northernmost field), the topsoil noted varies in thickness from 0.15 to 0.40m. In the case of BH13, no topsoil was remarked. Given the consistent recording of between 0.30m and 0.40m of topsoil in trial pits, this is likely to be a more reliable measurement.

- In the southern half of 'Area 1' (the two fields to the south), a 200 to 400mm thick cover of topsoil was logged. The mantle of topsoil appears to have been omitted from the borehole records.

GLACIAL DEPOSITS

Area 1 - Northern Field

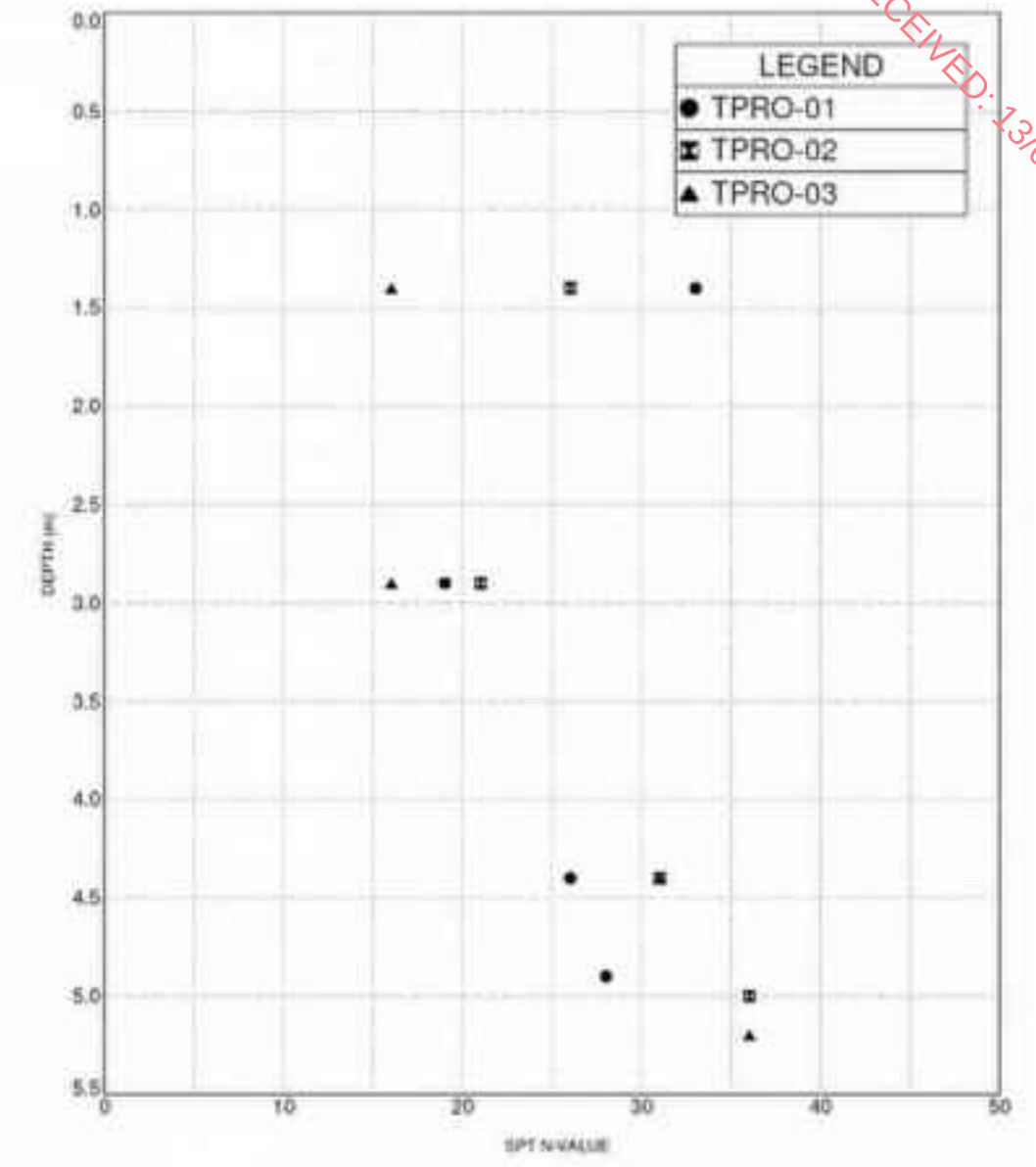
- A firm brown and brownish orange very sandy gravelly slightly silty CLAY was reported underlying topsoil in all trial pits in the northern half of 'Area 1'. Hand vanes were regularly undertaken in this layer which extended to a depth of between 0.80m and 0.90m bgl. Resulting shear vane values show a progressive stiffening with depth, with an improvement in values when comparing test results obtained from 0.20m bgl to 0.50m bgl depth. The values from the 0.50m horizon measured between 60 and 80kPa indicative of firm to stiff soils. Vanes attempted at ca. 0.70m bgl in the additional pits returned shear values ranging 65 – 110 indicative of stiff and firm to stiff soil. It was remarked that the soils at this depth were often 'too gravelly' to complete a vane test.

- The four trial pits in the northern section of 'Area 1' each reported firm to stiff and stiff becoming very stiff soil with depth beyond 0.80m and 0.90m (TP31-TP34). Corroborating this increase in stiffness, dynamic probes generally show a progressive increase in N_{100} values with shallow refusals found in numerous probes (DP33-DP36, DP49 & DP54) at depths ranging 1.0m to 1.70m.

- Of the three open-holes carried out in the northern field (TPRO-01, 02 & 03), SPT values indicate firm to stiff soils from 1.50m. There was negligible improvement at 3.0m but some stiffening noted from 4.50m depth (See Figure 6).

Figure 6 – SPT Vs Depth plot for Open-holes TPRO-01, 02 & 03

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- There are incidences of consecutive zero N_{100} values found in probes extending from ground level throughout the same area, namely DP51 to 1.40m bgl, DP52 to ca. 0.70m, DP53 to ca. 0.80m and DP55 to 0.90m (See Figure 33). It is assumed that these probes, rather than passing through very soft or soft soils, are in fact penetrating a predominantly fine sand deposit. A firm very sandy slightly gravelly silty CLAY was logged in a number of trial pits. This type of stratigraphy, occasionally becoming more sand-dominant at shallow levels, would explain the mixed probe results obtained locally.

- Plate test results in the same area suggest soft to firm soils at depths of 0.50m. A SPT N-value of 3 was recorded at 1.0m in BH14 which again highlights the presence of loose, likely sand-dominant upper soils. SPT N-values improved significantly with depth.

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- The deepest probe in the area, DP50, achieved a depth of 4.10m bgl (80.95m OD) and shows a consistent N_{100} value of ≥6 from a depth of 0.80m bgl. This suggests the presence of uniformly stiff soils beyond the initial upper layer.

- Trial pit TP/RO01 indicates soft to firm grey brown very sandy very gravelly CLAY at a depth of 1.80-2.30m. However, no softening was reported in the corresponding open-hole SPT testing. The softening may be related to water softening and/or disturbance upon bucket excavation.

- Three of the additional pits (TP/RO01, TP/RO02 & BRE SA01) reported deep-seated sandy clayey GRAVEL from 2.30m (81.80m OD), from 1.20m (81.38m OD) and from 2.40m (82.33m OD). A very gravelly sand layer was also remarked in TP/RO02 from 1.80-2.20m bgl. Seepages were coincident with these lower granular strata along with instability.

- The most pronounced ("rapid") water strikes occurred in both TP/RO03 at 2.0m (79.59m OD) in a sandy very gravelly CLAY and in pit BRE SA02 at 2.60m (79.63m OD) in a slightly sandy very gravelly CLAY. It appears from pitting that water-charged granular deposits underlie the Northern Field interspersed with firm to stiff and stiff CLAY-dominant soils. This is further reinforced by the findings of rotary open-hole TPRO-01 and TPRO-02. Clay-dominant TPRO-03 did not encounter any gravel deposits to a depth of 5.20m nor was there any water strike intercepted during its construction.

Area 1 – Southern Fields

- Beneath the upper cover of topsoil, a firm grey very sandy slightly clayey SILT was noted in many trial pits. This was found to persist to ca. 1.50m bgl. In places, the silt was replaced by brownish grey gravelly clayey SAND with localised sand lenses, e.g., TP02 from 0.80–0.90m, or sand pockets, e.g., TP01 from 1.60m to 2.60m.

- Gravelly clayey SAND layers were intercepted within the first metre of pits TP02 and TP03. A brownish grey very gravelly silty SAND with cobbles and boulders was intercepted at depth in TP03 (2.20-2.90m). In the case of TP10, a greyish brown gravelly SAND was found from 0.80m to 1.60m bgl. Strata in the area were generally remarked as 'very sandy'.

- Dense brown silty sandy GRAVEL was frequently found at depth in a number of pits. Table 3 lists the frequent intervals where it was observed during pitting.

Table 3 – Occurrences of GRAVEL-dominant strata and waterstrikes in trial pits across the southern fields of 'Area 1'

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Trial Pit No.	GRAVEL STRATUM Depth m bgl (m OD)	DESCRIPTION	Waterstrike m bgl (m OD)
BRE SA03	0.30 (79.38) to 1.10 (78.58) and again from 2.0 (77.68) to base of pit (77.18)	Initially brownish grey very sand y GRAVEL with a low cobble content Secondly, a grey sandy clayey GRAVEL with a high cobble and medium boulder content	1.40 (78.28) – Seepage 2.40 (77.28) – Rapid
TP01	2.60 (77.03) to base of pit at 2.90 (76.73)	Brown silty sandy GRAVEL with a medium cobble content	2.90 (76.73) – Seepage
TP/RO04	1.70 (78.65) to base of pit at 2.30 (78.05)	Grey brown sandy very clayey GRAVEL with a high cobble content and occasional boulders	1.80 (78.55) – Rapid
TP05	2.0 (78.91) to base of pit at 2.90 (78.01)	Brown silty sandy GRAVEL with a medium cobble content	2.90 (78.01) – Seepage
TP07	2.20 (78.59) to base of pit at 2.80 (77.99)	Brown silty sandy GRAVEL with a medium cobble content	2.80 (77.99) – Seepage
TP08	2.30 (78.09) to base of pit at 3.0 (77.39)	Brown silty sandy GRAVEL with a medium cobble content	3.0 (77.39) – Seepage
TP09	1.60-2.40 (78.06 to 77.26)	Brown silty sandy GRAVEL with a medium cobble content	2.50 (77.16) – Seepage
BRE SA04	0.30 (78.01) to 1.20 (77.11)	Grey sandy slightly clayey GRAVEL with a high cobble content	Multiple seepages 0.70 (77.61) 1.20 (77.11) 1.50 (76.81)
TP/RO09	0.30 (77.01) to 1.0 (76.31) underlain by slightly gravelly silty SAND to pit base at 2.80 (74.51)	Grey very sandy silt SAND with rare cobbles	No Waterstrike

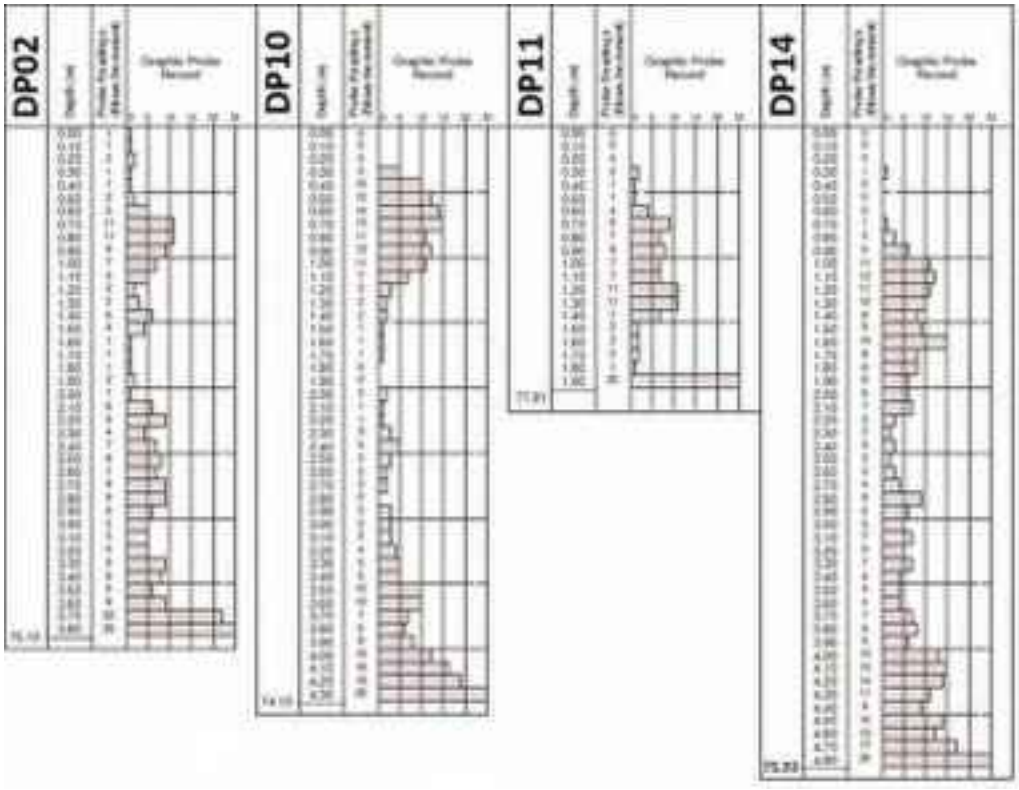
- The occurrence of sand intervals within mixed firm and stiff fines and gravelly strata can generate an inconsistent N_{100} profile. Figure 7 demonstrates the passage of high N_{100}

values passing abruptly into low values and vice versa. This is attributed to the sand pockets and lenses found in the mixed fluvio-glacial deposit.

- In proximity to DP10, TP/RO09 reports the presence of a very sandy GRAVEL overlying a grey slightly gravelly silty SAND from 1.0m (76.31m OD). It extends to the pit base at 2.80m depth (73.11m OD). This tallies well with the high blowcounts initially recorded in DP10 followed by the low blowcounts from 1.40m (77.13m OD) to ca. 2.80m (75.73m OD). However, equally, BRE SA04 shows the existence of an upper GRAVEL layer (0.30-1.20m) underlain by a soft to firm dark grey slightly sandy very gravelly CLAY. This sequencing also appears plausible when viewing the pattern of the probe blowcounts in DP10.

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Figure 7 - Mixed probe results in southern fields at Area 1



- Probes extended to depths ranging 1.0m and 4.90m. They regularly highlighted the potential for intercepting both shallow and deep obstructions. For probes which penetrated deepest, N_{100} values were typically consistent showing N_{100} values of 4-6 per 100mm, often higher – the exceptions being those probes pictured in Figure 6 where it is thought sand lenses, or possibly soft to firm CLAY, entered the soil column. N_{100} values from 4-6 would suggest stiff consistency.

- Hand vanes undertaken at 0.50m showed shear values ranging 50-80kPa indicative of firm and firm to stiff soil deposits. Those completed at 0.70m were notably higher, ranging from 70-80kPa. These set of values are more indicative of a stiff deposit. A shear strength value of 120kPa was recorded at 0.70m in TP07.

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- Cases of large diameter, rounded boulders occurring in pits were common, some of which were up to 1200mm (TP05 at 1.80m bgl) (Figure 8B)

- SPT's were undertaken in boreholes BH01-BH04 in the southern part of 'Area 1'. A plot showing the scatter of N values achieved versus depth is presented in Figure 9. It illustrates the presence of generally firm soils at 1.0m, passing to stiff from 2.0m depth.

- SPT N-values obtained from testing in the two southern fields of Area 1 highlight the presence of both soft and soft to firm / loose soils in the upper metre. This extends to 3m bgl in the case of TPRO-09 located in the southeastern corner. The low blowcounts are attributable to a grey silty SAND which was identified to a depth of 3.40m in TPRO-09. Where GRAVEL strata were intercepted, higher N values, typical of a more dense deposit, were recorded.

- As with the northern field in Area 1, medium dense to dense GRAVEL underlies much of the area. There is a definite heterogeneity however, with clay and sand soils intertwined. The granular deposits are often accompanied by water ingress. Shallow CLAY was remarked as 'soft to firm' in both BRE SA04 (1.20 – 3.0m) and TP/RO04 (1.0-1.70m). Elsewhere, it is found as 'firm' in BRE SA03 to the west of the site.

- Limestone bedrock was cored in RC03 from a depth of 8.80m bgl (70.57m OD). The drillhole reported initially loose (N=7 at 1.50m) becoming dense grey brown sandy silty/clayey GRAVEL.

Figure 8A & 8B – Sidewall photo of TP05 showing SILT over dense GRAVEL at 2.0m (78.91m OD). Boulder found in pit at 1.80m measuring 1200mm.





Figure 9 – SPT Vs Depth plot for BH01-BH04

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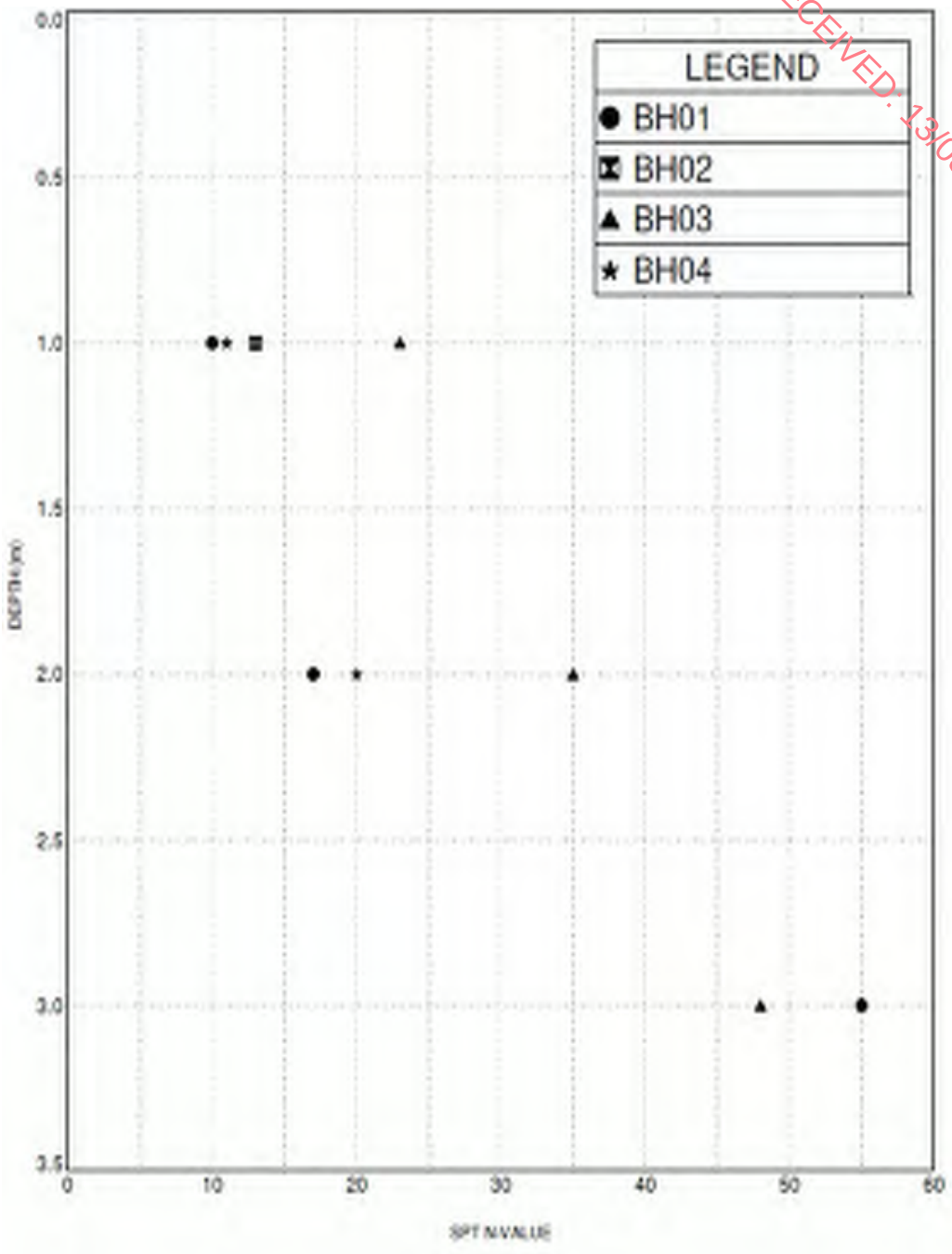
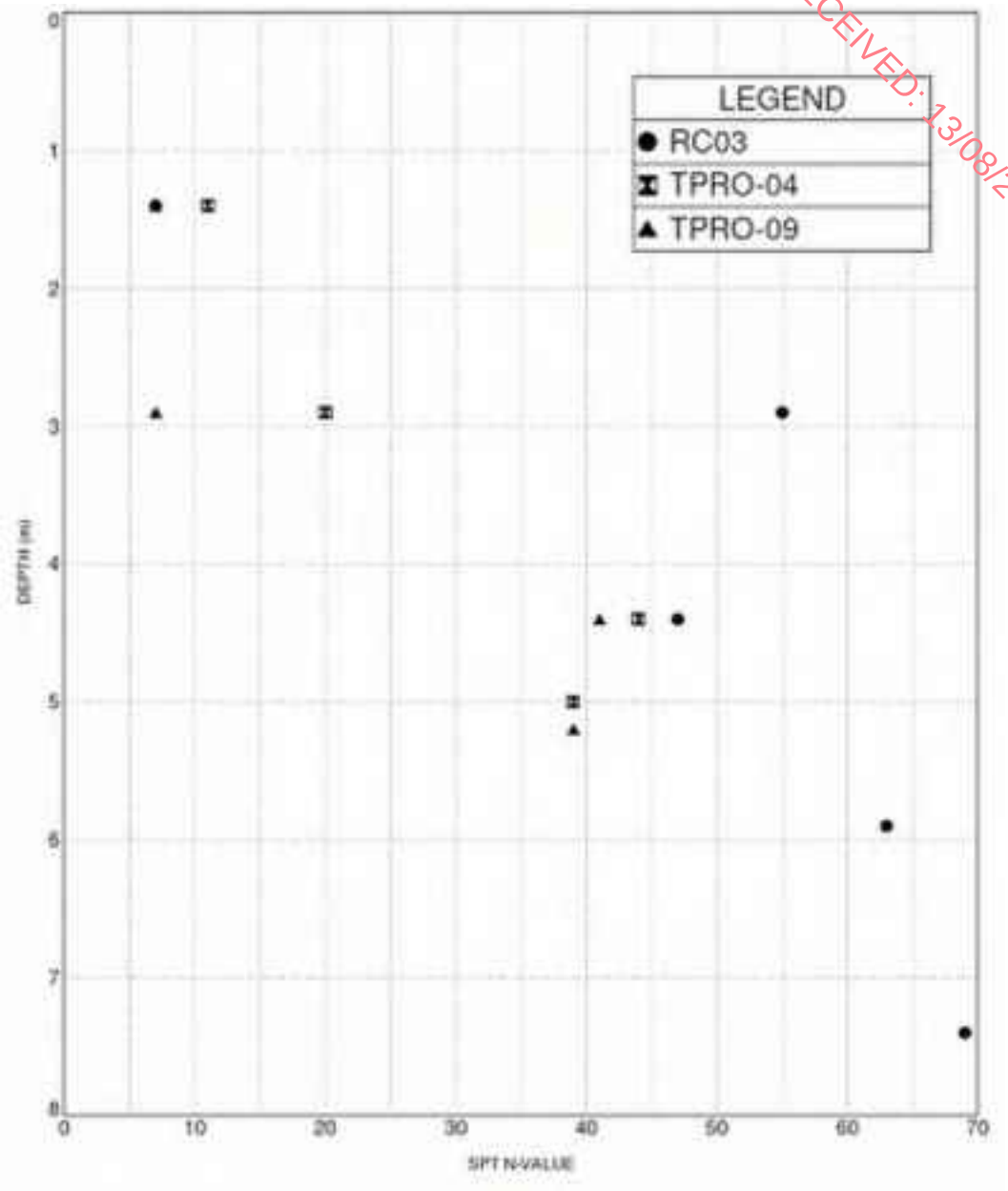


Figure 10 – SPT Vs Depth plot for TPRO-04, TPRO-09 & RC03

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5.1.2 Area 2



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Ground levels range from ca. 85m OD in the west (BH10) to 80.50m OD (BH12) in the east, closest to the M7 motorway. The initial 2022 suite of intrusive works completed in this area included nine trial pits and thirteen dynamic probes. The deepest probe achieved a depth of 3.80m bgl (76.80m OD) with the pits extending to depths of between 2.50m (80.61m OD) and 3.10m (78.24m OD). The three cable percussion boreholes (BH10-BH12) reached depths ranging 1.80m to 3.50m bgl (80.03m OD).

The supplementary works in April / May 2023 consisted of three rotary core drillholes and three rotary open-holes. Additionally, three trial pits were excavated at each rotary open-hole. A soakaway test (BRE SA06) was excavated with a soak test performed in the overburden soils.

TOPSOIL

- Topsoil ranges in thickness from 0.20m to 0.50m across the area, thinning towards the east in the low-lying field adjacent to the motorway (Figure 11). It was noted that up to 0.50m of topsoil was present in TP28.

Figure 11 – Tussock grasses in triangular-shaped field to east of Area 2. View SE.



GLACIAL DEPOSITS

- The pits along the western edge of 'Area 2', closest to the main farm access track, revealed the presence of generally firm and firm to stiff sandy slightly gravelly silty CLAY to ca. 1.0m, underlain by a stiff brown slightly sandy gravelly SILT. Hand vanes conducted at 0.80m in TP22 range from 75-84 suggestive of stiff material. The probes conducted across the same area (DP's 23, 37, 38, 39 & 40) each indicate progressively stiffer deposits with

depth, albeit only achieving probe depths between 1.10m and 1.70m prior to refusal. Equally, the SPT plot for the tests undertaken in the drillholes in the area reflect the firm nature of the soils from 1.50m (Figure 16).

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- Shallow refusal was also encountered in nearby BH10 where a depth of 1.80m (82.99m OD) was realised before termination. 1.50 hours of chiselling were used from 1.50m to 1.80m in attempting to further the depth of the borehole. The shallow refusal in BH10 at 1.80m coincides with the entry of a grey brown clayey sandy GRAVEL in TPRO-05. This may be the reasoning behind the refusal. Trial pit TP/RO05 also reported sandy clayey GRAVEL with cobbles and boulders from 1.50m (83.18m OD).

- A band of buried sand was flagged in both TP25 and in BRE06 / SATP06. From 1.20m (84.16m OD) to 2.40m (82.96m OD) in TP25, a greyish brown gravelly clayey SAND with cobbles and occasional boulders was recorded (Figure 10). In nearby SATP06, a grey brown gravelly silty SAND with cobbles was logged from 1.20m (82.25m OD) to a pit end depth of 2.0m (81.45m OD). Probes did not extend deep enough to penetrate this layer. However, given the stability viewed in sidewalls, and the reported stiffness of adjacent layers, it is likely to be dense / medium dense. The log for BRE12 / SATP12 also notes the presence of grey brown gravelly silty SAND from 1.20m (83.12m OD) to the pit base at 2.20m (82.12m OD).

- Rotary works in the western field of Area 2 show firm CLAY passing to progressively stiffer CLAY with occasional gravel bands. A deep-seated GRAVEL was encountered towards the base of TPRO-05 from 4.60m (80.04m OD) to pit base at 5.10m bgl (79.54m OD). A GRAVEL was also encountered from 3.70m (81.33m OD) to pit base (5.0m) in TPRO-06. Both GRAVEL layers were reported dry.

Figure 12 – Sandy stratum from 1.20-2.40m in TP25



- Based on SPT testing, rotary drilling at RC01 revealed the presence of firm gravelly silty sandy CLAY soil at 1.50m improving to stiff consistency at 3.0m. GRAVEL was logged at

depth from 7.50m (77.83m OD) to 9.60m (75.73m OD) and again from 10.40m (74.93m OD) to 14.80m (70.53m OD). At this point the gravel changed colour from grey brown to brown. There was also a water strike at 14.50m (70.33m OD). The driller notes rockhead or 'possible weathered rock' from 16.30m bgl (69.03m OD).

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- Corroborating the weathered nature of the rock at depth, a sequence of orange brown sandy gravelly CLAY was met from 17.10m (68.23m OD) to 18.70m (66.63m OD) in RC01A. This material contained highly weathered angular to subangular fine to coarse gravel, thought to be a mixture of crystalline calcite and dolomitised limestone. A water strike was observed at 16.80m (68.53m OD).

- Progressing eastwards, the next field east shows a firm and soft to firm soil extending towards 1.0m in BH11. An SPT N-value of 10 at 1.0m coupled with some low N_{100} blowcounts in adjacent probes point to a relatively lower strength upper stratum. Low shear vane values at 0.50m (47-52kPa) in trial pit TP29 indicate firm soil. Overall, however, shear vane values at 0.50m and at 0.70m in pits indicate generally firm to stiff and stiff soils. The stratigraphy in rotary open-hole TPRO-07 suggests a uniformly firm and firm to stiff becoming stiff CLAY soil extending from ca. 1.50m to 4.60m (78.26m OD).

- The most complete probe records in the area are DP41, DP43 and DP45. DP41 suggests stiff and very stiff soil from 1.0m in line with the findings of nearby trial pit TP26 and borehole BH11. DP41 ended at a depth of 2.90m (80.83m OD). DP43, from 2.10 – 2.80m, showed some localised softening with relatively lower N_{100} blowcounts. However, the soil would still be classed as firm and was visually confirmed as so in TP28. Similarly, in DP45, blowcounts from 1.30m to 1.80m are consistently recorded as 3. They are somewhat lower than N_{100} blowcounts both above and below this interval. Nearby trial pit TP27 reports stiff SILT in this same interval, becoming firm from 1.80 to 3.10m bgl.

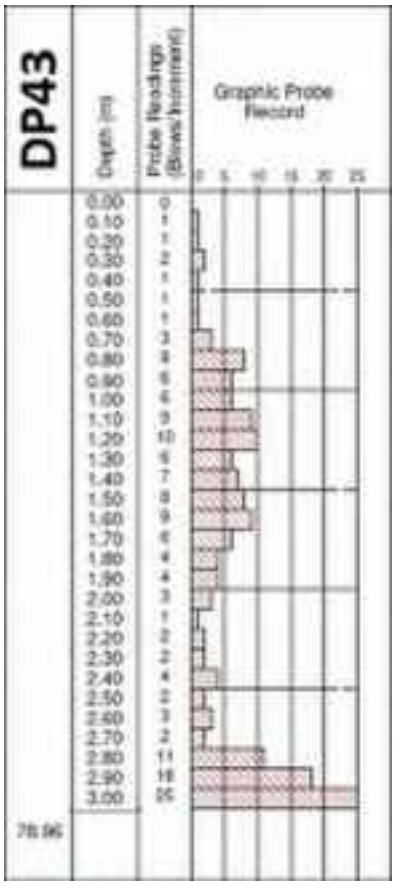


Figure 13 – Probe results for DP43

- Trial pit TP/RO07 intercepted a layer of soft to firm light brown sandy very gravelly CLAY from 1.80m (81.06m OD) to 2.50m (80.36m OD). Two seepages were encountered in this stratum. Potential water-softening may be accountable for the low blowcounts registered in nearby DP43 (Figure 13). The marked increase in blowcounts from 2.80m (79.26m OD) likely hints to a basal dense GRAVEL as found in TP/RO07 from 2.50m (80.36m OD) to the pit base at 3.30m (79.56m OD).

- Trial pit TP29 demonstrated the presence of uniformly stiff soils from 0.60m bgl to an end depth of 2.90m. In this pit, all strata are recorded as very sandy from a depth of 0.60m. Where isolated sand lenses exist, devoid of a larger granular clast component, such deposits are thought to report low N_{100} values in probe drives.

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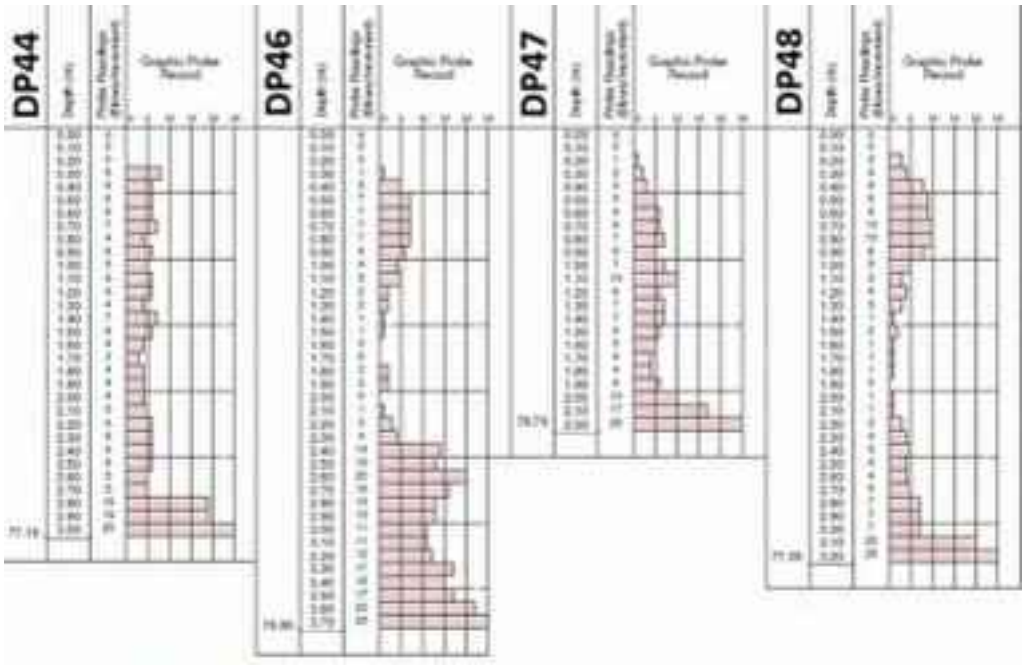
- Rotary core drillhole RC02 reported a grey brown sandy clayey GRAVEL from ground level to 13.90m (69.02m OD). Ahead of rockhead, a CLAY band was logged by the driller. At 15.10m OD, a strong to very strong, thickly to medium bedded light grey blue fine grained LIMESTONE, possibly slightly dolomitised with abundant calcite veining was cored.

- The triangular field to the northeast of the site is covered intermittently with tussock grasses, which can be an indicator of locally high water levels. Deeply cut drainage ditches also traverse the same field. The motorway, separated from the field by a mature hedgeline, is almost at grade with the level of the field (80.30 – 81.10m OD).

- Visual observation in trial pit TP30 shows initially silty SAND to 1.0m. Plate bearing tests in PB21 and PB22 performed on this silty SAND to sandy SILT revealed reasonably high values, most especially for reload cycles (6.4% & 18.9%). A stiff and firm to stiff sandy and very sandy gravelly clayey SILT completes pit TP30 at 2.50m. A water seepage was observed at 2.40m. Later recorded levels in the standpipe at BH12 were approx. 1.0m bgl.

- The resulting blowcounts from probes DP44, DP46-48 are shown in Figure 14. Both probe DP46 and probe DP48 show low (0 and 1) N_{100} values from ca. 1.50m to 2.0m. The pit nearby, BRE09 / SATP09, shows the presence of grey brown gravelly silty SAND from 0.80m to 1.80m. This stratum, it is thought, is responsible for the low to freefall drop in respective probe drives DP46 and DP48.

Figure 14 - Mixed probe results in the triangular field in Area 2



- Neither DP44 nor DP47 show any fluctuation in N_{100} blowcount to depths of 3.10m and 2.30m. The N_{100} values are remarkably consistent throughout each probe drive suggestive of an homogeneous stiff soil stratigraphy.

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- BH12, sited close to an existing drainage ditch, extended to 2.40m depth (78.10m OD) before termination. A very stiff CLAY was intercepted at 1.80m (78.70m OD). A SPT test undertaken at 1.0m recorded a N value of 10. This soft to firm consistency aligns well with the findings of probe DP46 and DP48 from 1.0m to ca. 2.0m. However, no sand layers were logged during the drilling of the borehole.

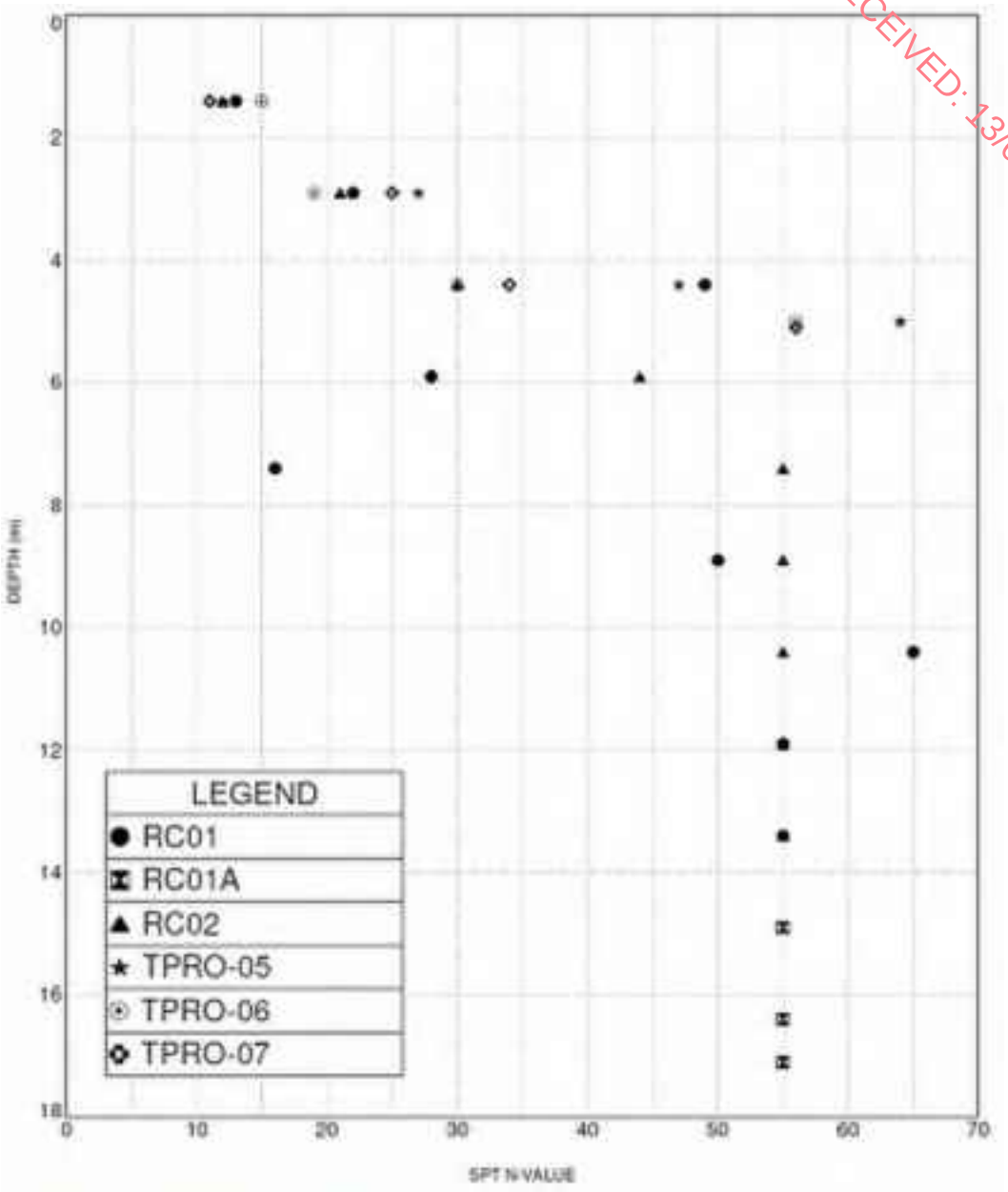
- BRE SA06 (2023 phase of works) was undertaken in the same field as BRE07 (2022 phase of works). BRE SA06 demonstrates a more complete stratigraphy ranging from near surface firm brown CLAY (as found in BRE07), to a soft to firm light brown mottled golden brown and grey sandy gravelly CLAY (1.40-2.25m) to a basal stiff and very stiff dark grey CLAY (Figure 15). The pit was ended at 3.30m (79.25m OD) in the very stiff dark grey CLAY.

Figure 15 – Sidewall profile in BRE SA06. Pit walls unstable from 1.25m bgl.



Figure 16 – SPT Vs Depth plot for TPRO-05, TPRO-06, TPRO-07 & RC01 / 01A & RC02

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5.1.3 Area 3



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Area 3 covers the three fields to the southeast of the project. The fields are accessed via the central farmyard. Aside from BRE08 / SATP08, all of the intrusive investigation locations are positioned in the two westernmost fields.

Ground levels range from 81m OD, near the farmyard in the northwest, to 78m OD nearing the southern field boundary and stream. Termination depths in probing across the two main fields range from 1.0m to 5.60m. The trial pits conducted on site achieved depths between 1.50m to 3.20m. The cable percussion boreholes mirrored these depths, being terminated between 1.10m and 3.60m bgl.

A rotary corehole suggests rockhead lies at 10.60m (67.72m OD) with coring commencing in RC04 from 11.60m (66.72m OD). Elsewhere, rotary open-holes permitted the installation of a further two water wells in the area, namely TPRO-08 and TPRO-10. Two trial pits were also conducted adjacent to the rotary open-holes. A soak pit, BRE SA05, was also opened but no soak test was performed due to shallow water ingress.

TOPSOIL

- Topsoil ranges in thickness from 0.15m to 0.40m. The normally soft brown slightly gravelly sandy silty CLAY topsoil gives way to a darker peaty CLAY nearing the southernmost stream as evidenced in the trenches excavated for plate test PB04 (Figure 17A) and PB05 (Figure 17B). At PB05, the upper organic soil was underlain by stiff grey sandy gravelly CLAY.

Figures 17A & 17B – Upper organic soils in PB04 & PB05



Fig 17A



Fig 17B

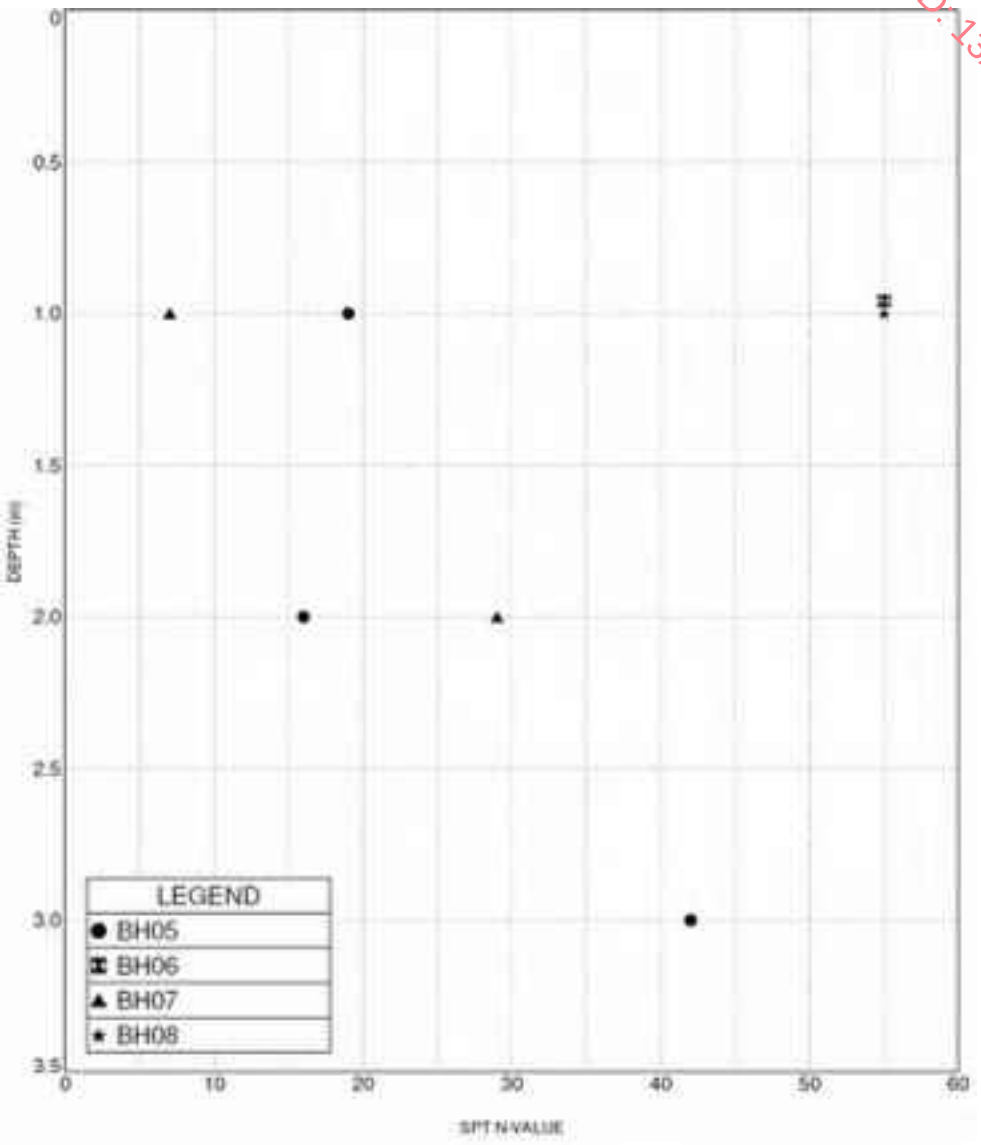
GLACIAL DEPOSITS

- The westernmost fringe of 'Area 3' is underlain exclusively by stiff and dense deposits. Trial pit TP12 outlines a changeable stratigraphy between stiff light brown very sandy very gravelly clayey SILT and dense silty gravelly SAND. Predominantly granular soils extend to 2.40m where a firm to stiff dark brown to dark grey gravelly SILT was found. The pit was terminated at 2.70m (78.01m OD).

- Borehole BH05 reported firm to stiff and later stiff soils (based on SPT N values) to a base depth of 3.60m (74.28m OD) (See Figure 18).

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Figure 18 – SPT Vs Depth plot for BH05-BH08



- Mirroring the high strength soils found in both TP12 and in BH05, dynamic probe DP20 achieved only 1.0m before refusal. DP19 also reported high N_{100} values in the upper 2.0m. However, in DP19 a notable 800mm long sequence of N_{100}=0 blowcounts was logged from 2.30m to 3.10m bgl. This is considered to be a pocket of uniform SAND or CLAY/SILT offering little in the way of resistance to the driven probe. It is not thought to be a soft to very soft soil - the assumption is based on the generally high strength, consolidated nature of the soils both above and below the same stratum in addition to the visual observation made in nearby TP13 where a 'firm slightly sandy gravelly silty CLAY' was logged from 2.40m to 2.70m (See Figure 19A & 19B).

- BH06 in the original phase of investigation refused in very stiff light brown CLAY at a depth of 1.10m bgl (80.19m OD). In the supplementary investigation, trial pit TP/RO08 was

scheduled nearby. It encountered a band of GRAVEL from 1.30m to 1.50m. It is thought that this may have halted the progress of the cable percussion boring rig at BH06. The underlying soils, as evidenced in the trial pit, comprised firm grey brown CLAY from becoming stiff to very stiff dark brown CLAY to a depth of 3.30m (78.10m OD).

- The high strength lower till is also intercepted in both rotary open-hole TPRO-08 and TPRO-10 with SPT refusals from 3.0m depth. Trial pits TP/RO08 and TP/RO10 both show stiff to very stiff dark brown sandy very gravelly CLAY from 2.90m (78.50m OD) and 2.70m (74.57m OD). At 1.50m, SPT N-values suggest the presence of firm soils.

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Figure 19A – 19D – Fig 19A TP13 with firm silty CLAY from 2.40m to 2.70m. **Fig 19B** Spoil with excavated silty CLAY on top of heap. **Fig 19C** TP/RO08 intercepted firm CLAY to 1.30m, GRAVEL from 1.30-1.50m underlain by firm CLAY passing to stiff to very stiff dark brown CLAY from 2.90-3.30 (pit base). **Fig 19D** TP/RO08 spoil.



Fig 19A



Fig 19B



Fig 19C



Fig 19D

- TP14 failed to penetrate the high strength upper soils formed of very sandy silty CLAY, gravelly SILT and dense gravelly SAND. The pit was ended at 1.50m (77.80m OD).

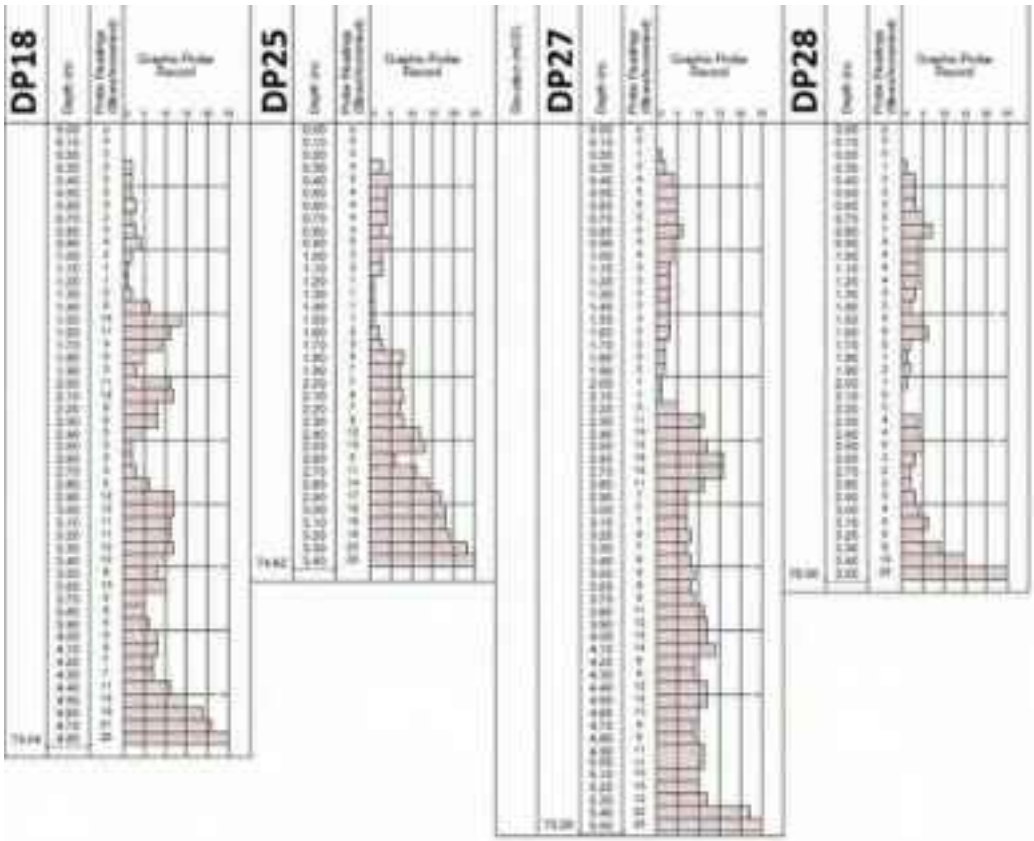
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- Towards the south of the site, in situ SPT test results show the presence of soft / loose soils in BH07 at a depth of 1.0m. Equally, in nearby RC04, SPT testing at 1.50m shows an N-value of 9 (See Figure 18). Elsewhere, SPT N-values generally indicate the progression from firm to firm to stiff and stiff soils. The shallow refusal at 1.0m in both boreholes BH06 (1.10m) and BH08 (1.30m) is also depicted in the SPT plot (Figure 18).

- Towards the central / southern part of the site, probes DP18, DP25, DP27 and DP28 combined with the findings of borehole BH07 (from 0.50m to 1.70m), signal a decrease in strength in the uppermost soil layer. Probes extended to significant depth locally (5.60m at DP27 – Figure 15) and suggest collectively that the upper 1.50m to 2.0m comprises a mix of firm and firm/stiff or medium dense soils. Based on blowcounts, there appears to be a discrete stratum of possible soft and soft to firm soil / loose fine sand from 1.10m-1.30m in DP18, 1.20-1.60m in DP25, 2.0m to 2.20m in DP27 and 2.0 to 2.30m in DP28 (See Figure 20). Lenses of fine sand were observed in nearby TP17 from 1.10 to 1.30m with very sandy SILT to 2.0m bgl. These lenses may account for the localised low blowcounts.

- Supplementary pitting at TP/RO10 (near DP28) did encounter a soft to firm grey brown sandy very gravelly CLAY with "frequent pockets of sand" from 1.0m to 1.80m (76.27-75.47m OD). This aligns well with the findings in DP28 and nearby probes where the upper strata generated often mixed N_{100} blowcounts. No other soil softening was noted in TP/RO10 in what was otherwise a pit comprising firm and stiff CLAY. No SPT results suggestive of soft soils were generated in either TPRO-08 or TPRO-10 (See Figure 22).

Figure 20 – Probe blowcounts in dynamic probes DP18, DP25, DP27 and DP28 in the southern section of 'Area 3'



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- Overall, the N_{100} values viewed in DP18 show no coherent pattern of strengthening or densifying deposits with depth in the upper three metres. This may highlight the locally changeable till composition and consistency as well as possible cobble / clast content which may cause obstructions locally.

- SATP04 / BRE04 indicates the presence of a grey silty gravelly SAND from 0.40m to 0.90m with SATP05 / BRE05 also showing very gravelly SAND and sandy GRAVEL from 0.50m to 1.70m (76.91m OD). Pit TP19 also identified a mixed silty SAND from 2.0m to pit base at 3.20m bgl (75.78m OD). Sidewalls were notably unstable in these strata. Sands and Gravels were also logged in SATP05 / BRE05 from 0.50m to pit end depth at 1.70m. Moderate water ingress was observed at 1.70m.

- Supplementary soakaway pit BRE SA05 reported a thin cover of topsoil and firm CLAY to 0.40m overlying SAND to the pit end depth at 1.70m (77.14m OD). A moderate water strike was encountered at 1.70m bgl (77.14m OD) (See Figure 21B).

- Probes to the northeastern extent of 'Area 3' show a marked consistency in blowcounts from ground level to, in the case of DP29, 5.20m. Soils are clearly stiff and dense in probes DP29 and DP30 and do not show any loose / soft intervals. Both probes DP31 and DP32 terminated on shallow, apparently progressively stiff to very stiff / dense soils. In the base of nearby pit TP20, the soils were remarked as 'firm, occasionally soft to firm'. In any case, the vertical pit sidewalls appear stable to 3.0m (76.78m OD) depth (Figure 16A).

- Plate bearing tests undertaken on the upper soils (PB04, PB05 & PB09 & PB10) at depths of 0.40m and 0.50m report equivalent CBR values of between 2.0% and 3.5% (discounting the low result from PB04 of 0.1%). These are indicative of a firm subgrade.

Figure 21A & 21B – Sidewalls in trial pits located in Area 3. Fig 21A Sidewall in TP20 showing firm and firm to stiff clayey SILT and silty CLAY to 2.60m. A firm occasionally soft to firm blackish grey clayey SILT was logged from 2.60m to 3.0m (76.78m OD) **Fig 21B** Sidewall collapse in BRE SA05. Water sitting at 1.70m bgl.



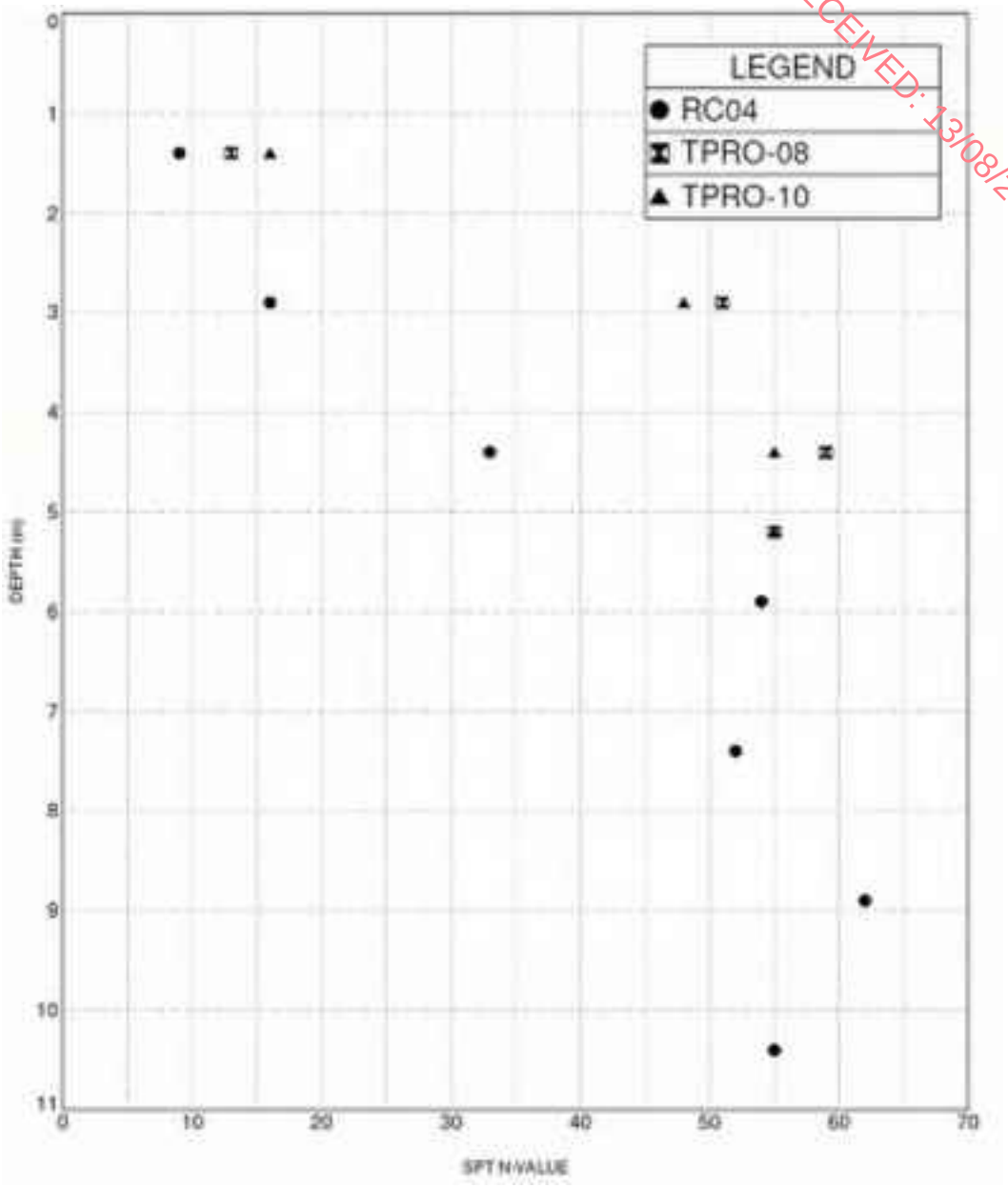
Fig 21A



Fig 21B

Figure 22 – SPT Vs Depth plot for TPRO-08, TPRO-10 & RC04

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5.2 Bedrock

Reference to the GSI map for the area (Figure 23, 1:100,000 Solid Geology series) shows that the site is underlain by the Carboniferous, Viséan-aged Rickardstown Formation. The rock formation consists of cherty often dolomitised limestone. No outcrops were found on site.

Figure 23 - Bedrock Geological Map for the Halverstown Site (retrieved from GSI website)



Key: **RK** = Rickardstown Formation
BA = Ballysteen Limestone

Bedrock was not intercepted at either the base of machine excavated trial pits or cable percussion boreholes. However, rotary core drilling, undertaken as part of the supplementary investigation, did prove rock at each of the five locations. Of the five locations, one rotary corehole was undertaken in Area 1 (western fields), three in Area 2 (eastern fields) and one in Area 3 (southeastern fields).

Recovered cores in RC02, RC03 and RC04 were logged as slightly weathered, thickly to thinly bedded, light blue grey, fine-grained LIMESTONE with localised dolomitization. A stromatactic structure was evident in the cores as well as abundant calcite veining (Figure 24). RC04 displayed more visibly interbedded calcisiltite and argillaceous layers. In the case of RC01 and RC01A, no competent bedrock was met. Instead, the recovered cores (RC01A) returned a clay / calcite crystal mix from 17.30 – 18.70m. Given the unlithified, brittle crystalline structure of the calcite, open-hole techniques were deployed in both RC01 and RC01A. SPT testing was undertaken to provide further detail on density of the calcite veinfill. Arisings from the drilling at RC01 were photographed on the ground following drilling (Figure 25).

Discontinuity spacings in the limestone rotary cores ranged from widely (600 to 2000mm) to closely (60 to 200mm) spaced, medium (200 to 600mm) to closely spaced in the case of RC02. The rock encountered in RC01 and RC01A comprised crystalline calcite, presumed localised veinfill hosted in the limestone bedrock. Given the dolomitised nature of the limestone in the area, the development of fissures / fractures in the rock and subsequent infill by calcite is not surprising. However, in the

case of RC01 and RC01A (performed approximately 5m apart), the calcite is extensive and not restricted to thin veinfill in dolomitised bedrock (as observed in RC02 & RC03 and to a lesser extent in RC04).

The discontinuity surfaces in the limestone are typically smooth to very locally rough, planar. Apertures are tight to locally moderately open, occasionally exhibiting clay smearing. Calcite veins (1-10mm thick) and slight iron oxide staining were often noted. Dips are subhorizontal and locally 30° and 40°.

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Figure 24 – Bedrock cores from RC02



Figure 25 – Pulverised returns at the surface following open-hole drilling through crystalline calcite at RC01

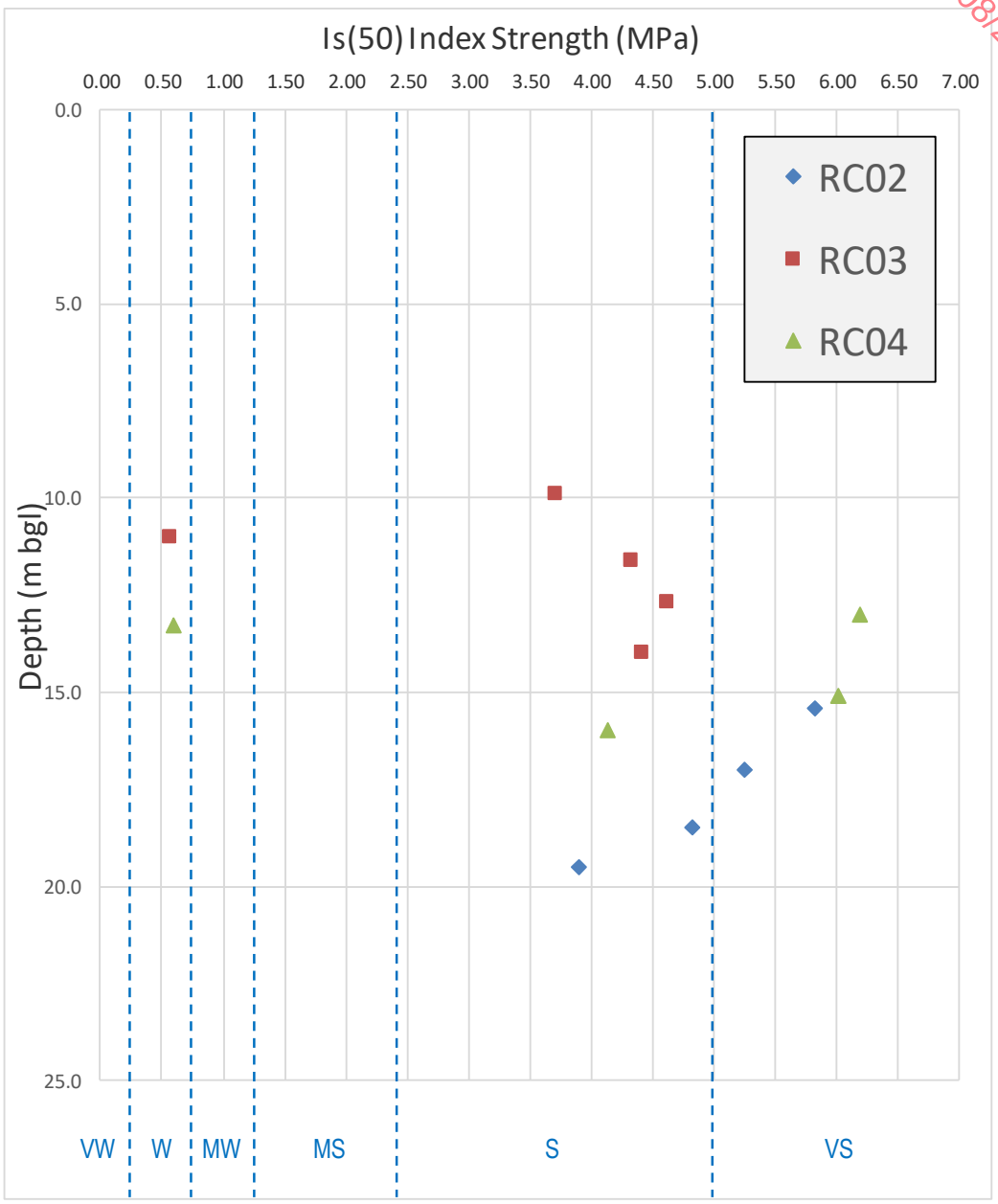




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The point load strength index (PLSI) test data produced $I_s(50)$ values ranging from 0.57 to 6.20 MPa, with a mean value of 4.19 MPa. The strengths when plotted show a broad scatter but are chiefly placed in the centre of the PLSI chart (Figure 26), corroborating the largely medium strong strengths recorded in core logging.

Figure 26 – $I_s(50)$ strengths obtained from diametrial Point Load Strength Index testing



VW = Very Weak, W = Weak, MW = Moderately Weak, MS = Medium Strong, S = Strong, VS = Very Strong (ISO 14689:2017 (E))

Using a correlation factor (K) of 20 to assess compressive strength, this suggests a characteristic strength envelope in the order of 11 to 124 MPa and categorizes the bedrock as weak (5 to 12.5 MPa) to very strong (100 to 250MPa). The visual strength descriptors determined during engineering geological logging marry well with the overall plot scatter in Figure 26.

ISO 14689:2017 (E) rock strength parameters are drawn on Figure 26 to allow correlation between UCS and Point Load Strength tests. A correlation factor (K) of 20 was used to plot the ISO 14689:2017 (E) MPa strength divisions on the Point Load strength ($I_s(50)$) plot.

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5.3 Groundwater

Water strikes (seepage, slow and moderate inflows) were intercepted during shallow trial pit excavation, with groundwater also struck during borehole construction at BH01, BH02, BH04 and BH12. A well installed in BH13 later reported water only to be dipped dry in July 2023. With the exception of TP30 and BH12 in the northeast, during the 2022 phase of investigation, shallow groundwater was found exclusively towards the south of the site, near the stream boundary (See holes identified on Figure 27 & Table 4).

Figure 27 – Trial pits and boreholes where groundwater entry was recorded (initial 2022 phase of investigation)



During the supplementary investigation in April / May 2023, of the ten rotary open-holes drilled across the site, six remained dry to their bases on the date of construction. These were TPRO-03, 05, 06, 07, 08 and 10. Standpipes were installed in each well to permit future monitoring. In July 2023, groundwater was found in all standpipes. In the case of the trial pits excavated near each corresponding open-hole, with the exception of TP/RO09 and 10, water strikes in various forms, ranging from seepages to rapid inflows, were encountered. Occasionally, multiple strikes were recorded in a single trial pit. In the case of the six soakaway pits, water strikes were again prolific, being encountered in each of the six pits. This may account for the erroneous results in both tests run in BRE SA06, namely SA06_A and SA06_A1, where the water levels rose during the respective soak tests. No soak tests were performed in pits BRE SA02 – BRE SA05 due to water ingress accompanied by poor pit sidewall stability.

Finally, of the five rotary coreholes constructed on the site, where rock was found at appreciable depths, strikes were encountered at depth. Where rock was met at higher levels, noted in both RC03 and RC04, water strikes were generally intercepted at higher levels. It should be added that both RC03 and RC04 were conducted in the topographically lower (southern) portion of the site

where groundwater was typically found at higher levels. As with the rotary open-holes, each cored drillhole had a standpipe installed to permit later groundwater monitoring. The holes were dipped in early July 2023.

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During the 2022 investigation, for the most part the groundwater entries were reported as seepages in trial pits, frequently in gravel horizons at the base of trial pits at ca. 3.0m. Instability and sidewall collapse generally accompanied the entry of water into open pits. Figure 27 shows the individual exploratory hole locations where water strikes were encountered (2022). There is a pattern across the site which follows, for the most part, the occurrence of buried Gravel and Sand at depth (at ca. 2.50-3.0m).

In 'Area 1', groundwater was met between elevation 76m OD and 79.50m OD, related to the occurrence of granular water-bearing soils or potentially isolated lenses in more extensive clays. Charged groundwater strikes were intercepted in each of BH1, BH03 and BH04 where, at each bore, groundwater was found to rise considerably during the 20minute observation period. This may be suggestive of a significant piezometric pressure at depth.

During the April / May 2023 investigation, in the northern field of 'Area 1', gravel and sand strata hosted seepages in TP/RO01, TP/RO02, TP/RO03 as well as BRE SA01 at depths ranging 1.50-2.80m. At depth, in both TP/RO03 and BRE SA02, rapid ingress was observed at 2.0m (79.59m OD) and 2.60m (79.63m OD), strikes clearly linked in elevation despite being located ca. 160m apart.

Within the fields to the south of 'Area 1', trial pits again encountered water strikes, save for TP/RO09 which remained dry to its base at 2.80m (74.51m OD). It may be the case that the pit did not remain open for a period long enough to allow groundwater equilibrate. Nearby, rotary open-hole TPRO-09 reported 'blowing sands' from 1.20-4.20m with a water strike encountered at 4.0m bgl. For sands to 'blow' in the casing, there must be water present to allow for sand solifluction to occur. It is deemed therefore that the sands observed were likely water saturated. Collapse during trial pit excavation suggests water-laden silty sands were present (Figure 28).

Figure 28 – Sidewall collapse in grey silty SAND upon completion of TP/RO09 excavation.



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Strikes in the southern field in 'Area 1' were observed as seepages to rapid flow, sometimes occurring in the same pit, eg., BRE SA03 where a seepage was recorded at 1.40m followed by a rapid strike at 2.40m. Once again, water strikes were generally found in clayey GRAVEL and very gravelly CLAY layers and ranged in depth from 0.70m (seepage) to 2.40m (rapid). The water strike intercepted at 5.90m in RC03 was later found to have risen (by drillhole completion) to a depth of 1.70m bgl. It was later dipped at 3.33m (July 2023).

The strikes in 'Area 2' were restricted to the lower elevation locations of BH12 and TP30, both positioned beside a deep drainage ditch. Strike levels were remarkably consistent at 78.20 and 78.30m OD with the strike in the borehole noted to rise inside the drill casing from 2.20m to 0.70m bgl (over the twenty-minute monitoring period).

The additional phase of works in 'Area 2' reported water strikes in trial pits TP/RO05, TP/RO06 and TP/RO07. A moderate strike was intercepted in TP/RO05 at 2.30m (82.38m OD) with only seepages in TP/RO06. A seepage and rapid strike were both observed in TP/RO07, the rapid strike at 2.40m bgl (80.46m OD) immediately above a very clayey GRAVEL layer at 2.50m bgl. Some softening appears to be present in what was described on site as a "soft to firm light brown CLAY" coincident with the appearance of the seepage and rapid ingress in TP/RO-07. Likewise, in TP/RO06, a soft to firm layer was encountered from 1.50-2.50m with a seepage recorded at 2.0m. Rotary open-holes 05, 06 and 07 remained dry during their construction but were later found to have water levels between 2.43 to 3.79m bgl (between 80.43-81.27m OD) when dipped in July 2023.

Coreholes intercepted bedrock at significant depth (between 14.80-17.10m bgl), in the case of RC01 and RC01A, encountering what is thought to be an extensive calcite veinfill rather than limestone bedrock. Across the five holes, water strikes were encountered at depths ranging 11.80m to 16.80m bgl. By completion of drilling at each of the five cored locations, water in the respective coreholes had risen to levels ranging 3.40m to 6.0m bgl.

Finally, in 'Area 3', during the initial phase on investigation, strikes were measured between 75m OD and 77m OD, the deepest being the water strike observed in BH05 at 2.80m bgl (75.08m OD). Strikes in trial pits were, as with other areas, observed between 2.50m and 3.0m bgl. The shallowest ingress was reserved for both BH07 (1.30m) and SATP05 / BRE05 (1.70m), both of which were located in closest proximity to the stream / southern boundary.

In the case of the two boreholes, BH02 and BH03, water strikes were recorded at greater depths than in nearby trial pits. The depths are noted in Table 4. Once encountered, groundwater rose inside the drill casings suggestive of a buildup of piezometric pressure at depth. Water levels were documented to rise by 1.0m and 3.20m respectively from initial strike levels of 4.0m (104.01m OD) and 5.20m (100.86m OD). As with trial pits, the two strikes were seated in clayey/silty sandy Gravel layers.

In relation to the additional 2023 works, a moderate water strike was encountered in BRE SA05 at 1.70m (77.14m OD) marrying exactly with the findings in SATP05 / BRE05. Elsewhere, the two nearby TP/RO pits remained largely dry with only a seepage recorded in TP/RO08 at 2.30m (79.10m OD). No strikes were noted in either rotary open-hole, TPRO-08 or TPRO-10. Rotary corehole RC04 intercepted groundwater at 5.40m with water dipped inside the casing at the end of drilling at 3.50m bgl (74.82m OD). It was dipped in July 2023 at 1.12m bgl (77.20m OD).

The potential does exist for there to be seasonal changes in groundwater level. The limited groundwater monitoring information collected over the course of the project suggests there is such a variation present.

Table 4 – Water measurements in on-site exploratory holes (TP-, SA-, BH-, TP/RO, TPRO-, RC- and BRE SA-)

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	Exploratory Hole No.	Water Struck **m bgl** (m OD)	Stratum Description	Rate of Flow	Remarks / Stratum of water ingress (m OD)
AREA 1 (WEST)					
2022 Works	BH01	**2.80** (77.24)	Firm to stiff dark brown sandy gravelly silty CLAY	Moderate	Rose to 1.30m (78.74) after 20minutes
	BH03	**2.70** (75.92)	Stiff light brown very sandy gravelly CLAY	Moderate	Rose to 0.60m (78.02) after 20minutes. Installation dipped at 1.30m (77.32) & 1.80m (76.82) & 2.05m (76.57)
	BH04	**1.60** (79.46)	Firm to stiff and stiff dark and light brown sandy gravelly silty CLAY	Slow	Rose to 0.60m (80.46) after 20minutes
	BH13	**-**	-	-	Installation dipped at 2.20m (80.60m) & 2.38m (80.42). Dry on 10-07-23
	TP01	**2.90** (76.73)	Brown silty sandy GRAVEL	Seepage	Slightly unstable from 1.60m – seepage at base of pit
	TP05	**2.90** (78.01)	Silty sandy GRAVEL	Seepage	Unstable w/ sidewall collapse from 2.80m – seepage at base of pit
	TP07	**2.80** (77.99)	Brown silty sandy GRAVEL	Seepage	Unstable from 2.0m – seepage at base of pit
	TP08	**3.0** (77.39)	Brown silty sandy GRAVEL	Seepage	Unstable from 2.30m – seepage at base of pit
	TP09	**2.50** (77.16)	Dark grey very sandy gravelly clayey SILT	Seepage	Unstable w/ sidewall collapse from 1.60m
2023 Works	TP/RO01	**2.40** (81.70)	Grey brown sandy very clayey GRAVEL	Seepage	Slightly unstable from 1.90m
	TP/RO02	**2.10** (80.48)	Brown slightly clayey very gravelly SAND	Seepage	Unstable from 0.40m
	TP/RO03	**1.50** (80.09)	Firm light brown sandy very gravelly CLAY	Seepage	Unstable from 1.0m
		2.0 (79.59)		Rapid	
	TP/RO04	**1.80** (78.55)	Grey brown sandy very clayey GRAVEL	Rapid	Unstable from 1.50m
	TPRO-01	**3.50** (80.56)	Grey brown slightly clayey sandy GRAVEL	Seepage	Depth to water at end of drilling = 4.90m (79.16) Installation dipped at 3.63m (80.43m)
	TPRO-02	**4.40** (78.12)	Grey brown clayey sandy GRAVEL	Seepage	Depth to water at end of drilling = 4.80m (77.72) Installation dipped at 3.16m (79.36m)
	TPRO-03	Dry	-	Dry	Installation dipped at 1.49m (80.14m)
	TPRO-04	**4.50** (75.78)	Dark grey slightly clayey sandy GRAVEL	Seepage	Depth to water at end of drilling = 4.70m (75.58) Installation dipped at 2.27m (78.01m)

Cont.

2023 Works	TPRO-09	**4.0** (73.31)	Grey silty gravelly SAND ("blowing sands")	Seepage	Depth to water at end of drilling = 4.80m (72.51) Installation dipped at 0.64m (76.67m)
	BRE SA01	**2.80** (81.93)	Brownish grey sandy clayey GRAVEL	Seepage	Unstable from 2.0m
	BRE SA02	**2.60** (79.63)	Firm to stiff light brown slightly sandy very gravelly CLAY	Rapid	Strike rising 150mm in 14minutes
	BRE SA03	**1.40** (78.28)	Firm yellowish grey sandy very gravelly CLAY	Seepage	Sidewall collapse from 0.40m – Rapid ingress rising 150mm in 4minutes
		2.40 (77.28)	Grey sandy clayey GRAVEL	Rapid	
	BRE SA04	**0.70** (77.61)	Grey sandy slightly gravelly CLAY	Seepage	Sidewall collapse from 0.70m
		1.20 (77.11)	Soft to firm dark grey slightly sandy very gravelly CLAY	Seepage	
		1.50 (76.81)	Soft to firm dark grey slightly sandy very gravelly CLAY	Seepage	
	RC03	**5.90** (73.47)	Grey brown sandy silty/clayey GRAVEL	Seepage	Depth to water at end of drilling = 1.70m (77.67) Installation dipped at 3.33m (76.04m)
AREA 2 (NORTHEAST)					
2022 Works	BH12	**2.20** (78.30)	Light brown sandy silty gravelly CLAY	Moderate	Rose to 0.70m (79.80) after 20minutes. Installation dipped at 0.98m (79.52) & 1.0m (79.50) & 1.54 (78.96)
	TP30	**2.40** (78.21)	Grey very sandy gravelly clayey SILT	Seepage	Unstable w/ sidewall collapse from 0.20m
2023 Works	TP/RO05	**2.30** (82.38)	Brownish grey sandy clayey GRAVEL	Moderate	Slightly unstable from 1.50m
	TP/RO06	**2.0** (82.92)	Soft to firm light brown sandy very gravelly CLAY	Seepage	Slightly unstable from 1.50m
		3.0 (81.92)	Grey brown sandy very clayey GRAVEL	Seepage	
	TP/RO07	**1.80** (81.06)	Soft to firm light brown sandy very gravelly CLAY	Seepage	Slightly unstable from 1.10m
		2.40 (80.46)		Rapid	
	TPRO-05	Dry	-	Dry	Installation dipped at 3.79m (80.85m)
	TPRO-06	Dry	-	Dry	Installation dipped at 3.76m (81.27m)
	TPRO-07	Dry	-	Dry	Installation dipped at 2.43m (80.43m)
	BRE SA06	**2.50** (80.05)	Stiff occasionally very stiff grey slightly sandy very gravelly CLAY	Seepage	Slightly unstable from 1.25m

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2023 Works	RC01	**14.50** (70.83)	Grey brown clayey sandy coarse GRAVEL	Seepage	Depth to water at end of drilling = 3.50m (81.83)
	RC01A	**16.80** (68.53)	Grey brown slightly clayey sandy GRAVEL	Seepage	Depth to water at end of drilling = 6.0m (79.33) Installation noted Dry on 10-07-23
	RC02	**11.80** (71.12)	Grey brown sandy clayey GRAVEL	Seepage	Depth to water at end of drilling = 3.40m (79.52). Installation dipped at 2.85m (80.07m)
AREA 3 (SOUTH & SOUTHEAST)					
2022 Works	BH05	**2.80** (75.08)	Dark brown sandy silty gravelly CLAY	Moderate	Rose to 1.50m (76.38) after 20minutes. Installation dipped at 0.87m (77.01m)
	BH07	**1.30** (76.64)	Dark brown sandy SILT/CLAY	Slow	Rose to 0.90m (77.04) after 20minutes
	TP13	**2.70** (77.13)	Slightly sandy gravelly silty CLAY	Seepage	Seepage at base of pit
	TP16	**2.80** (76.27)	Brownish grey sandy very silty GRAVEL	Moderate	Slightly unstable, sidewall collapse at 2.0m
	TP18	**3.0** (76.37)	Dark grey sandy gravelly SILT	Seepage	Slightly unstable, sidewall collapse at 2.50m - Seepage at base of pit
	TP19	**2.50** (76.48)	Slightly gravelly silty SAND	Moderate	Slightly unstable, sidewall collapse at 2.50m
	SATP05 / BRE05	**1.70** (76.91)	Grey sandy GRAVEL	Moderate	Unstable – sidewall collapse from 0.70m
2023 Works	TP/RO08	**2.30** (79.10)	Firm grey brown sandy very gravelly CLAY	Seepage	Slightly unstable from 2.0m
	TPRO-08	Dry	-	Dry	Installation dipped at 1.22m (80.18m)
	TPRO-10	Dry	-	Dry	Installation dipped at 1.40m (78.20m)
	BRE SA05	**1.70** (77.14)	Greyish brown SAND	Moderate	Unstable from 0.60m
	RC04	**5.40** (72.92)	Grey brown sandy silty/clayey GRAVEL	Seepage	Depth to water at end of drilling = 3.50m (74.82). Installation dipped at 1.12m (77.20m)

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5.4 Ground Gases

Gas monitoring was undertaken in the borehole standpipes to measure concentrations of methane, carbon dioxide, oxygen and hydrogen sulphide. A Geotech GA5000 apparatus was used and the readings were conducted by an IGSL engineering geologist. Summary details of the gas concentrations are presented in Table 5. The monitoring works determined carbon dioxide concentrations (peak readings) of 0.6 to 2.3%. No methane (CH_4) or hydrogen sulphide (H_2S) ppm concentration was detected in any of the four wells.

Table 5 - Summary of Ground Gas (Peak) Measurements

BH	Reading Date	CH_4 (%)	CO_2 (%)	O_2 (%)	CO (ppm)	H_2S (ppm)	Flow Rate (l/hr)
BH10	19-Dec-22	0	2.3	15.9	0	0	0.1
BH12	19-Dec-22	0	1.1	15.9	0	0	0.1
BH03	19-Dec-22	0	0.6	20.6	0	0	0.1
BH13	19-Dec-22	0	0.8	18.9	0	0	0.1

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6. GROUND ASSESSMENT & ENGINEERING RECOMMENDATIONS

6.1 General

In light of the ground investigation findings, the following geotechnical issues are developed and discussed for engineering design:

- Foundation Solutions
- Earthworks & Ground Improvement
- Groundwater / Infiltration
- Slopes / Batters
- Pavement Construction
- Buried Concrete
- Ground Gas
- Environmental Testing - Water
- Waste Acceptance Criteria [WAC] & Environmental Testing

Figure 29 – DC Building Layout and ESB GiS Substation with 2023 investigation point overlay



Taken from RKD Drawing No. 22217-RKD-ZZ-ZZ-DR-A-1100

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6.2 Foundation Solutions

6.2.1 DC Bld 1

DC Building 1 is located on glacial soils, typically firm to stiff and stiff in consistency. The dynamic probes did not extend beyond a depth of 1.70m (82.62m OD), each terminating or refusing in stiff soils. SPT N-values in BH09 and BH10 indicate firm soils to c3.0m. Visual observations during trial pitting show the upper soils are generally firm and firm to locally stiff. Shear vane tests at 0.50m in TP25 range from 80b to 90kPa and are suggestive of stiff deposits. The stiff fine grained soils (clay matrix) should be capable of offering a safe or allowable beating capacity of 125 to 150kPa and appear mostly at a depth of 1.0m bgl. This depth and bearing capacity could be used to size conventional strip footings and pads at Building 1 (and to limit long term settlements to <15 to 20mm).

Levels range widely across the footprint of Building 1 from 83.0 to 85.30m OD, hence excavations to construct conventional strip footings and/or pads will subsequently vary. It is expected that considerable cut / fill earthworks will be required over the building footprint. For this reason, if significant mass excavation is planned, in order to re-use the material and reduce stockpiling or 'soil waste' removal from site, a programme of soil stabilisation could be undertaken. Laboratory testing on samples acquired from site was conducted using varying percentages of lime and lime/cement binders. The modification trial testing established an incremental increase in soil performance in terms of strength / stiffness (refer to Section 6.3). Given the greenfield site currently extends over a large unobstructed expanse, soil stabilisation is seen as a practical solution. In our experience, such soils treated with lime or lime / cement should offer bearing capacities in the order of 250 to 300kPa.

If the design makes provision for ground improvement / soil stabilisation methods, then a field demonstration trial (footprint of c. 10 x 10m) is advised to assess the performance of the modified soils with lime or lime / cement binders. This would allow for in-situ testing (plate load, nuclear gauge, sand replacement and CBR mould samples) to measure CBR / stiffness, relative compaction (percentage degree of compaction) and air voids.

A greyish brown gravelly clayey SAND with a medium cobble content and occasional boulders was intercepted at 1.20m (84.16m OD) in TP25. This is the only occurrence of a granular-type stratum found at the proposed building during the 2022 investigation. Plate bearing testing on exposed sand will offer some degree of assistance in determining the settlement regime within the sand / fine gravel layers. A series of plate bearing tests will allow for determination of dig depth upon which treated soils can be placed. A nominal CBR percentage of 3% for untreated soils should be sought ahead of placement.

No water was found in the shallow installation constructed at well BH10 to a base depth of 1.80m (82.99m OD) and so the shallow dig area should remain free of groundwater inundation. A drainage plan should be developed for surface water drainage however so as not to inadvertently cause softening of the freshly exposed soils through water ponding. There is also the potential to intercept water in isolated, perched sand/gravel lenses.

Additional investigation in 2023 at 'Building 1' involved the construction of two rotary coreholes, a rotary open-hole and a trial pit. The rotary holes each unearthed a sequence of initially firm soil passing to progressively stiff to very stiff / dense soils from 3.0m (based on SPT data – see Figure 16). TP/RO05, excavated in the central area of proposed 'Building 1' reported firm CLAY to 3.60m with an intervening water-bearing gravel horizon from 1.50-2.90m bgl. The gravel layer, deemed dense on the basis of probe blowcounts, is thought to be the reason for shallow termination in nearby probes DP37, 38 & 39. Rotary open-hole drilling also highlighted the presence of the gravel layer (from 1.60-2.0m) and showed (by SPT blowcounts) the underlying CLAY to be stiff, becoming very stiff. Gravel was again intercepted at depth (from 4.60m to 5.0m). The rotary coreholes both suggest stiff and very stiff soils extend to depth with some medium dense gravel interbeds (ca. 7.50 – 9.0m bgl). Rock was reported at depths ranging ca. 14.80m to 17.10m bgl. Should larger loadings be

required, the use of bored piling methods would be recommended. As the bedrock was not identified as limestone but rather crystalline calcite veinfill, and as the spatial extent of the calcite in unknown in the area around RC01 / RC01A, pile design should not be over reliant on end bearing but achieve its strength from skin friction in both the stiff clay overburden and intervening gravel. Given the uncemented, extremely closely fractured nature of the rock in the area, it should be treated from a geotechnical view as a dense gravel. The bearing capacities offered by the crystalline calcite would therefore be in the order of 300kPa.

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6.2.2 DC Bld 2

This building straddles an existing field boundary. Currently, the topographically lower eastern field has the appearance of regular waterlogging due to its thick cover of tussocked grass. Deep drainage ditches traverse the same field to assist with drainage.

For the purposes of designing shallow foundations, safe or allowable bearing capacities will depend on soil type / composition and stiffness. Across the Building 2 area, the soils consist of initially firm becoming stiff Silt and Clay matrix till and should offer a similar capacity as that noted for Building 1, i.e., 125 to 150kPa at 1.0m bgl. Many strength indicators, from shear vanes, probes and SPT N-values, as well as visual strength descriptions made during pitting, point to the presence of firm and stiff soils generally. However, there are also outliers where probe values and SPT N values from 1.0m to 2.0m flag the potential for low strength soils to be present in the stratigraphy. Consecutive N_{100} values of 0 and 1 were recorded in DP46 and DP48 and SPT N values of 10 were returned for tests from 1.0-1.45m (indicative of soft to firm soil) in both BH11 and BH12. The possibility of there being fine sand and clast-free Silt and Clay may offer an explanation for the lower blowcounts in the driven dynamic tests. Such fine-grained coarse soils present little resistance to probing and often appear as successive zero blow counts.

Trial pit TP/RO07, excavated during the 2023 phase of works, intercepted a 'soft to firm' sandy very gravelly CLAY layer from 1.80m to 2.50m bgl. Its position aligns well with the lower blowcounts registered in nearby probe DP43 from 2.10m to 2.70m. Entry of gravel at depth in TP/RO07 (from 2.50m) is marked by an immediate rise in blowcounts in DP43, suggestive of a dense nature.

In light of the lower strength shallow horizons, it is recommended (if choosing conventional foundation design) to size pads and strip footings with a safe bearing capacity of 100kPa at c1.0m. Locally, if softened soils are intercepted, these can be excavated and replaced with low-grade C20 leanmix concrete to underside of foundation.

As with Building 1, the option to modfify and stabilise soils should be considered thereby offering a significantly higher bearing capacity (250 to 300 kPa). It would also 'build out' the risk of foundations bearing on to or traversing zones of low strength (soft) soils.

Given the occurrence of possible lower strength soils from 1.50m to 2.50m, soil stabilisation would need to incorporate this layer. This would bring soil stripping and soil re-working close to the water-bearing gravel stratum on site. This makes modification of soils somewhat more impractical without first initiating water drawdown (water level in wells RC02 and TPRO-07 was found between 2.43-2.85 / 80.43-80.07m OD). As an alternative design solution, to homogenise the strength of the ground without extensive soil stabilisation, given consistently stiff / dense ground lies at ca. 5.0m bgl, it is recommended installing a network of controlled modulus columns to stiffen the ground. A load distribution mattress (comprised of SR21 compliant hardcore) should be installed to allow for construction of this network of columns. This cover will offer a foundation from which to develop the building floor / ground floor slab.

Water levels in well BH12 were dipped at ca. 1.0m / 79.50m OD in December 2022 which, although possibly generated from a deeper-seated water strike (at 2.20m), do present concerns for open excavations in the area. Any shallow excavations should be formed and backfilled once blinded to

prevent water entry. A dig plan should aspire to immediate blinding on the same day. Inundation of excavations will see a subsequent softening and associated lowering of shear strengths. This could lead to unnecessary over-excavation.

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Bedrock cores were recovered from 15.10m comprising strong to very strong LIMESTONE. The cover of overburden soils was reported (based on SPT N values) as being as being dense from 4.50m. Extension of bored piles to depth is another potential foundation solution which would deliver larger loadings via skin friction and ultimately, end bearing (at ca. 15.0m). A piling contractor should be consulted with regard to depth of pile embedment based on loadings required.

6.2.3 DC Bld 3

Geotechnical inconsistencies are once again present when the findings of the intrusive holes over the 'Building 3' footprint are considered. These are illustrated most succinctly in the blowcount pattern recovered from probes DP06, DP07 and DP08. Shallow obstructions were recorded in both DP07 and DP08 but low N_{100} blowcounts were obtained in DP06 to a depth of ca. 1.50m (Figure 30). Nearby TP02 reported firm sandy gravelly cobbly SILT to ca. 3.0m. The only deviation from this was the occurrence of a brownish grey gravelly clayey SAND from 0.80m to 1.0m. This may be the cause of the low blowcounts in DP06 to ca. 1.50m.

In light of this uncertainty, the additional SI undertaken in April / May 2023 saw trial pit TP/RO04 conducted a matter of metres away from DP06. This uncovered a 'soft to firm' stratum from 1.0m to 1.70m before encountering a sandy very clayey gravel at depth. This explains the blowcount pattern registered in DP06 where low N_{100} values were found in the clay, gradually increasing, and ultimately terminating in the underlying gravel. Nearby, rotary open-hole TPRO-04 did not intercept shallow dense gravels but rather firm becoming firm to stiff clay soils extending to ca. 3.50m (based on SPT N values). This suggests the gravel is variable in its spatial extent.

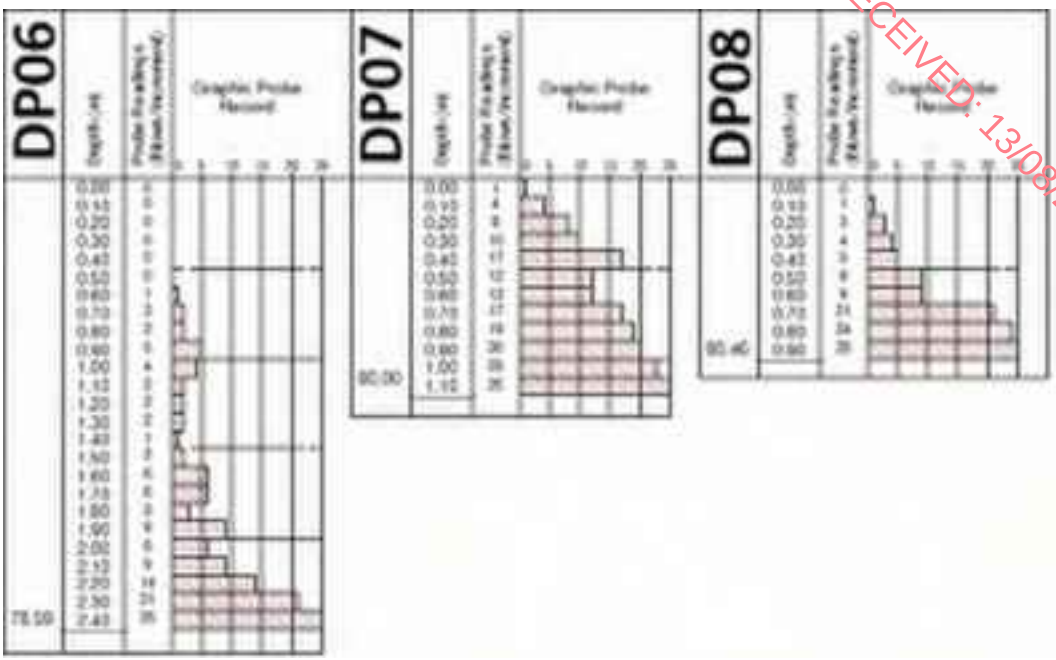
Elsewhere, BH01 and BH02 recorded SPT N-values at 1.0m indicative of lowerbound firm soils, with a slight improvement from 1.50-2.0m (See Figure 9). As with the other buildings, placing conventional footings on the upper soils could be considered. Given the disparity locally in stiffnesses, it is recommended that footings placed at depths of ca. 1.0m are assessed and approved by a competent engineering geologist / geotechnical engineer. Where deemed appropriate, plate load testing should be conducted to evaluate settlement under loading and stiffness (not ignoring the limited stress distribution by a plate load test). Positioning the pads at depths of ca. 1.0m should offer a safe or allowable bearing capacity of 100kPa bearing at best. Excavating to ca. 1.50m should see an increase in safe bearing pressure (up to 150Pa) but there will in all likelihood be areas of marked changes in soil type and these should be examined ahead of blinding.

The alternative to placing pads and strip footings in the upper soils would be to modify / stabilise the areal extent of the building thereby creating a uniform working platform in which to site pads and strip footings. Pads and trenches formed in stabilised fill should offer a bearing capacity of 250 to 300kPa.

As with Building 2, the operation of soil stripping and later modification with lime / lime-cement binder may see groundwater ingress during excavation / treated soil placement. The water levels dipped in July 2023 show elevations ranging by two metres, from 78m OD to 76m OD. The standpipe installed in TPRO-04 is likely to represent the local level (2.27m / 78.01m OD) given the pipework extends to 5.0m bgl. It equates approximately with a rapid ingress of water in gravels in nearby trial pit TP/RO04, intercepted at 1.80m bgl / 78.55m OD.

The use of piles to achieve greater bearing pressures would see bored piles extend to ca. 9.0m with limestone having been encountered at 8.80m (70.57m OD). Overlying bedrock in the area, a grey brown sandy silty clayey GRAVEL was reported which appears very dense from 3.0m bgl. A low SPT N value obtained at 1.50m (N=7) corroborates the presence of shallow soft soils in the area.

Figure 30 – Probes positioned in NW corner of DC Building 3



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6.2.4 DC Bld 4

The 2023 investigation sited a trial pit TP/RO03 in the central area of proposed 'Building 4'. The pit proved a firm CLAY to 2.30m at which point the dig was terminated due to instability. A seepage at 1.50m (80.09m OD) was followed by a rapid inflow of water at 2.0m. Both strikes were recorded in a 'very gravelly CLAY'. Nearby rotary open-hole TPRO-03 suggested firm CLAY extends to at least 3.0m (SPT N values of 16 at both 1.50m and 3.0m bgl). CLAY was found to persist to the finish depth of 5.0m bgl. On the day of construction (02-05-23), the drillhole was reported dry. When dipped on 10-07-23, the well reported a water level of 1.49m (80.14m OD) equating to the seepage first registered in TP/RO03 at 1.50m bgl.

The original phase of investigation reported a firm to stiff and stiff dark and light brown CLAY from 1.20m to 2.80m in BH04. A slow water strike was recorded at 1.60m (79.46m OD). As with other boreholes in the area, BH09 registered firm soils to ca. 2.0 / 3.0m depth.

Aside from probes DP13 and DP14 located to the southeast of the proposed footprint, all other probes terminated at shallow levels generally shy of 1.60m bgl. These shallow refusals are thought attributable to increasing clast / gravel content in the till. The two probes which extended to depth (4.70m and 4.90m respectively) do not show an overly similar pattern in blowcounts (Figure 31). Given that locally pits reported the entry of gravel at depths between 2.0 to 2.30m bgl, the inconsistencies between probe N_{100} values are thought due to the heterogeneity of the gravel at depth interspersed occasionally with finer sand lenses. In contrast to SPT N values, probes DP13 and DP14 suggest dense / stiff soils from ca. 1.20m.

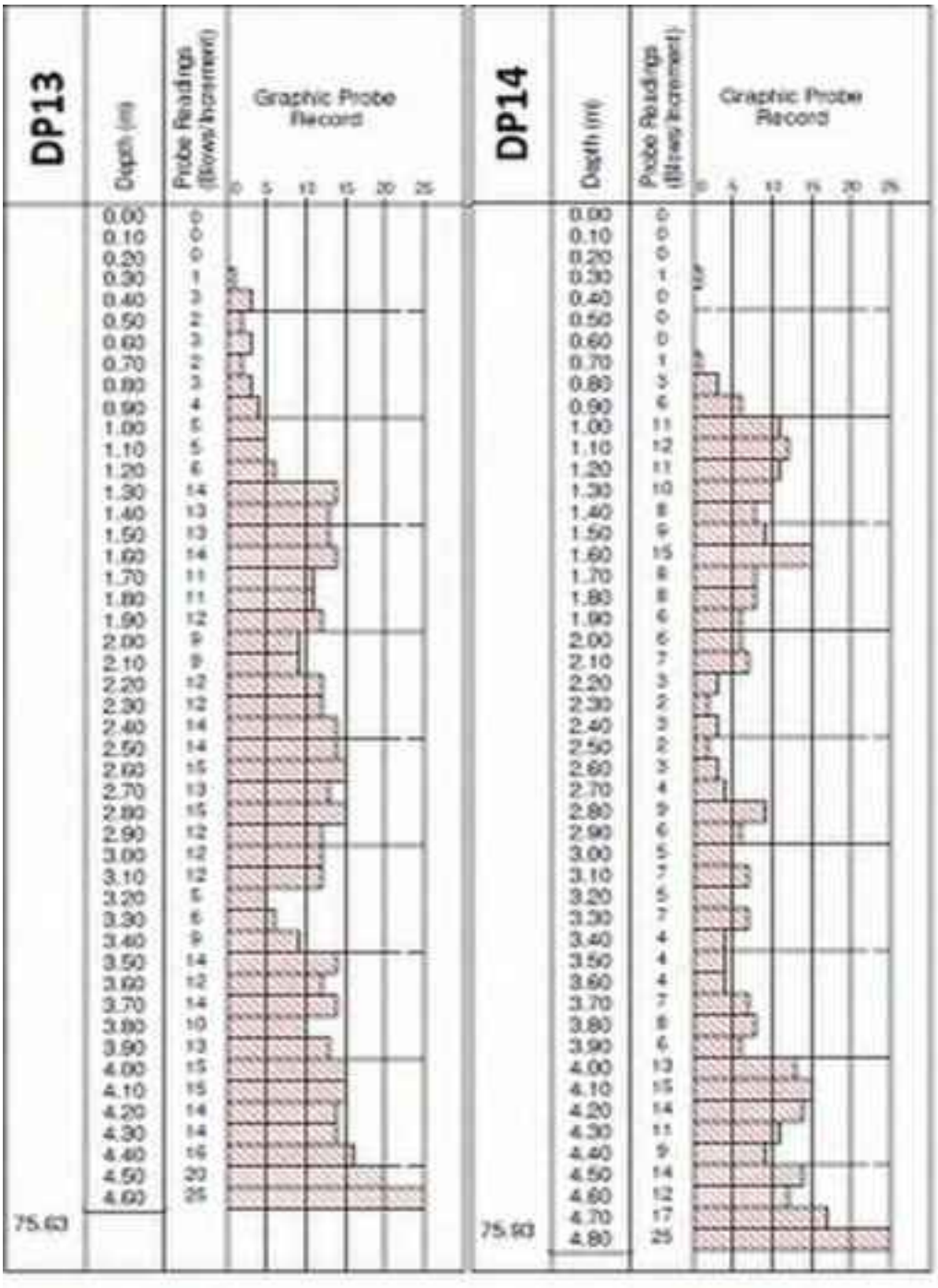
Given the variability in the area, allied with low SPT N values in boreholes indicative of firm / medium dense soils, a bearing capacity of 100kPa is recommended at c1.0m at Building 4. As with other buildings on the site, if greater load bearing capacities are required the use of excavate and replace and re-engineer the upper soils by stabilisation techniques could be used to produce a high strength engineered fill.

Alternatively, rotary open-hole drilling proved stiff soils from 4.0m (to 5.0m end depth). The use of CMC (controlled modulus columns) methods across the footprint to found into this stratum could be

considered. The installation of piles (rockhead levels unproven in the area of Building 4) to support the column loads should be considered with capacity derived from skin friction and end bearing (rockhead at 8.80m in RC03 / ca. 15m in RC01A). It is not known what the spatial extent of calcite veinfill as found in RC01 / RC01A is and further rotary holes should be considered if piling is selected.

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Figure 31 – DP13 & DP14 profiles - both located towards the southeast of Building 4



6.2.5 DC Bld 5

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Borehole BH05, to the south of the newly positioned 'Building 5', reported initially firm soils to ca. 2.0m. Stiffer soils, based on SPT N-values, extended to end depths of 3.60m. BH06 achieved only 1.10m before termination and so it does not provide much information on local stratigraphy. Likewise, a number of probes (DP20, 24, 31) achieved only shallow depths terminating at 1.0m.

A number of probes extended to depths ranging ca. 3.50 – 5.20m bgl at this area. In these probes, an array of N_{100} patterns exist. Some show steady increase in blowcounts with depth, ie., DP21, whilst others suggest the presence of deeply buried, potential soft / low strength zones, ie., DP19 & DP28 (Figure 32).

In the more recent 2023 investigation, rotary open-hole ROTP-08 was conducted along with trial pit TP/RO08. The rotary open-hole, based on SPT N-values recorded firm soils to ca. 2.0m with stiff soils from 2.40m, becoming very stiff from 3.20m to a base depth of 5.0m. The pit, TP/RO08, also registered a firm CLAY to 2.90m, being stiff to very stiff from 2.90m to pit base at 3.30m. A gravel was identified in TP/RO08 from 1.30m to 1.50m and this may be relevant when considering the shallow termination depths in nearby probes. The water level in standpipe TPRO-08 was read at 1.22m bgl (July 2023). This relatively elevated level may be linked to the shallow buried gravel layer.

The low blowcounts in DP19 and DP28 may reflect potential soft or low strength zones where water softening may be a factor. Alternatively, the probes may infer the presence of fine sands and gravels which offer little point load resistance compared to more gravelly Silt and Clay soils above and below.

Both DP19 and DP28 are placed spatially in a linear trend where waterstrikes were encountered in both trial pits and boreholes (See Figure 27). If this were the case, this would imply the presence of water saturated, likely granular soils at depth and this may correspond to the low N_{100} interval.

The use of conventional strip and pad footings should see a bearing capacity of 125kPa achievable at c 1.0m depth. Where it is deemed that unsuitable / low strength soils are in place at this depth, the use of excavate and replace methods (i.e. lean mix concrete to underside of footings) is advised to deepen excavations locally.

As with other proposed buildings, soil stabilisation offers a technique to homogenise the strength of the upper soils. A stiff dark grey brown CLAY appears in

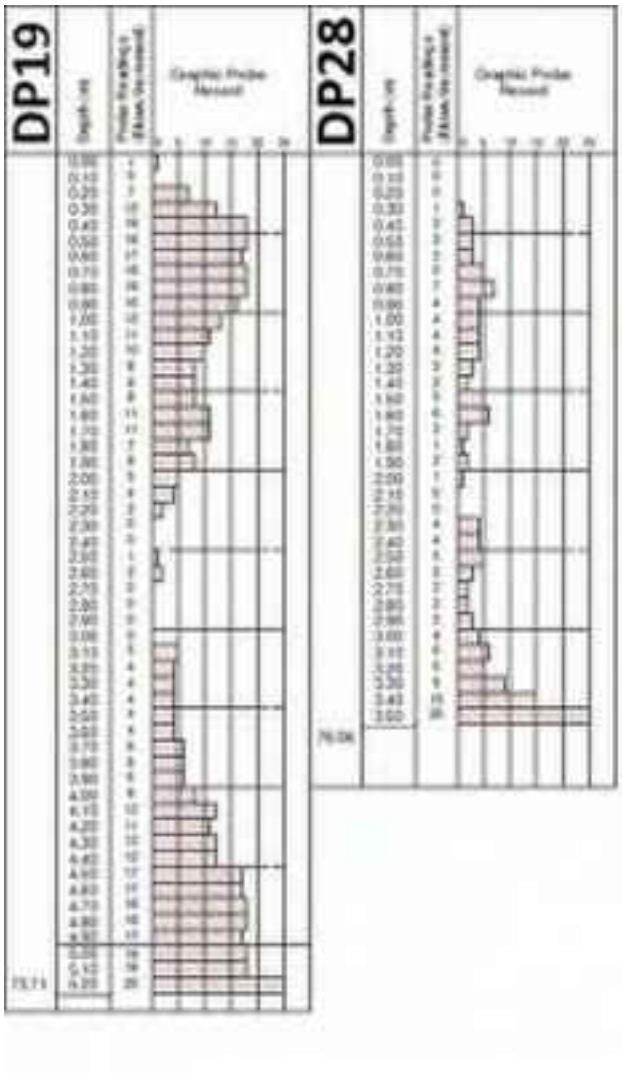


Figure 32 – DP19 and DP28 profiles

the deeper holes and pits (at ca. 3.0m) and this over-consolidated glacial till should provide a founding layer capable of offering ca. 200-250kPa. However, practical ways of founding on this layer would suggest use of shallow piles or CMC techniques to avoid excavation through water-saturated granular or low strength zones.

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6.2.6 DC Bld 6

The disparity in soil stiffness observed between BH07 in the south and BH08 (2022 investigation) in the north underlines the variability in the soils underlying Building 6. Towards the south (the lowest topographical point on the site), soft soils were reported in BH07 to 1.70m (76.24m OD). Nearby probe DP25 reaffirms the possible soft nature of the upper stratum to a similar depth. However, DP26 shows no such softening. Instead, stiff / dense soils are reported from immediately below the topsoil. The potential softening in BH07 and DP25 is also reported at depth in both DP27 and DP28 where both probes registered their lowest probe N_{100} values in an interval from ca. 2.0m to 2.20m. Since this is roughly coincident with the water table, water softening or possible sand lenses may account for the low N_{100} values obtained. In any case, it would be advised to investigate further the soil type and strength at each of DP25, 27 and 28.

The presence of potentially soft / low strength soils to c 1.70m (BH07), coupled with the reported softening at 2.0m in some probe logs, implies shallow footings may not be suitable across the entire footprint without extensive excavation and replacement. Additionally, the higher water table could undermine shallow excavations where formed.

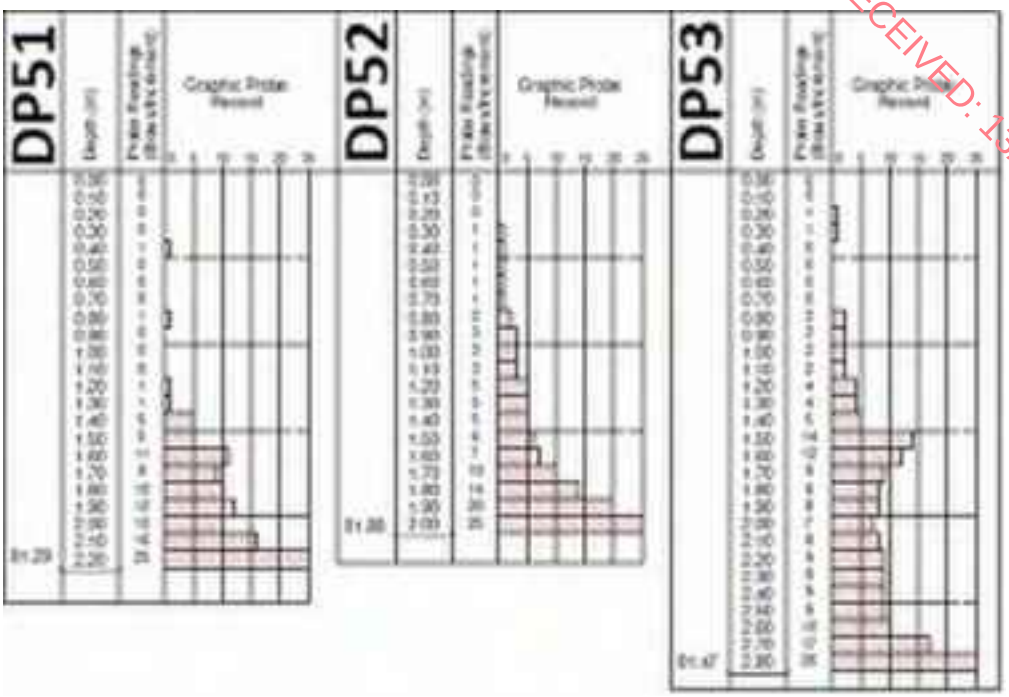
There is a 3m difference in levels between BH07 and BH08, from south to north. Ground Improvement (soil stabilization) could be adopted to produce a high strength engineered fill upon which the building could be sited. As outlined previously, this is a well proven method in achieving a significant improvement in strength and hence bearing capacity and would largely eliminate off-site disposal of low strength / unsuitable deposits. Utilising soil stabilisation would permit re-use of the site-won materials when forming an enhanced strength subgrade. A soil stabilised layer built off the underlying stiff soils should offer bearing capacities in the order of 250 to 300 kPa.

The alternative to employing soil stabilisation techniques would be to excavate and replace *en masse* the low strength soil and bring up with layers of imported granular fill (T0 to SR21 Annex E). The introduction of compacted gravel would provide a medium in which to found pads and strip footings at bearing capacities of ca.200kPa. This may not be practical on a large-scale basis given the likely excavation depths and volume of soil arisings generated and subsequent fill required.

6.2.7 GiS Sub

Trial pitting across the GiS Sub area reported firm onto stiff soils at 1.0m bgl. The stratum was logged as very sandy throughout. Probes constructed through the upper layer revealed negligible resistance with successive 0 and 1 blowcounts per 100mm (Figure 33). It is thought this is related to the sandy nature of the soil rather than highlighting a soft zone. Equally, boreholes BH13 and BH14 reported low SPT N-values indicative of loosened soils. A bearing capacity of 125kPa should be possible on the sandy clay soils at 1.0m based on visual observations in trial pits. Use of large diameter plate bearing tests at formation level will allow for better assessment of the density of the soils at 1.0m. Should larger capacities be required, it is likely the use of soil stabilisation measures would see an increase in the bearing pressures of 250 to 300 kPa.

Figure 33 – Probes positioned W to E across GiS Sub showing low N_{100} values for 1m bgl



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6.3 Earthworks & Ground Improvement

To evaluate the re-use properties of the upper soils, a programme of earthworks laboratory testing was conducted. This comprised CBR, Moisture Condition Value (MCV) and Dry Density / Moisture Content relationship. Bulk samples were acquired from a selection of trial pits excavated across the site with testing initially conducted on the material at their natural or 'as-received' moisture contents. Earthworks testing was undertaken on those samples listed in Table 6. Their respective depth intervals and soil descriptions are shown in the aforementioned table.

Table 6 – Sample description of soils used in Earthworks testing – soil strength taken from TP logs

Exploratory Hole No.	Sample Depth	Sample Description
TP04*	0.60	('Firm') Brown slightly sandy slightly gravelly CLAY
TP12*	0.50	('Stiff') Brown slightly sandy slightly gravelly CLAY
TP13	1.0	("Firm") Grey/brown sandy gravelly SILT/CLAY
TP13	1.50	('Firm') Brown slightly sandy, slightly gravelly, CLAY
TP16	1.0	('Stiff') Mottled brown slightly sandy, slightly gravelly, CLAY
TP18	0.50	('Firm to stiff') Mottled brown sandy gravelly SILT/CLAY
TP19*	0.50	('Firm to stiff') Brown sandy gravelly SILT/CLAY
TP20	0.60	('Firm') Grey/brown sandy gravelly SILT/CLAY
TP21	0.50	('Firm') Brown sandy gravelly SILT/CLAY
TP22	0.60	('Firm') Brown sandy gravelly SILT/CLAY
TP24	0.60	('Firm to stiff') Brown sandy gravelly SILT/CLAY
TP26*	0.50	('Firm') Brown slightly sandy, slightly gravelly, CLAY
TP28	0.70	('Firm') Mottled brown slightly sandy, slightly gravelly, CLAY
TP29	0.50	('Firm') Brown sandy gravelly SILT/CLAY
TP31*	0.50	('Firm') Brown slightly sandy slightly gravelly CLAY
TP33	0.60	('Firm') Brown slightly sandy, slightly gravelly, CLAY
TP34	0.60	('Firm') Brown sandy gravelly CLAY

*Soil samples subject to1% Lime addition, 1% lime / 2% cement addition & 3% lime addition

The samples, ahead of being subject to reusability testing, each have their >20mm fraction removed. This, in the case of the CLAY and SILT/CLAY soils, removed 2.7 to 14% of the 'as received' soil sample.

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The resultant earthworks testing (on natural 'as-received' samples) produced laboratory CBR results in the range 0.5 to 48% with MCV's of 0.2 to 12.7. Moisture contents ranged from 9.2 to 26%. Maximum dry densities were proven to range between 1.76 and 2.01mg/m³ at optimum moisture contents of 8% to 14% (refer to Table 7).

Table 7 - Summary Details of Laboratory Testing samples

Hole No.	Depth	Lab CBR Value % (Moisture Content %)	MCV at Natural Moisture Content (Moisture Content %)	Dry Density / Moisture Content Relationship
TP04*	0.60	1.9 (15)	4.6 (13)	Max Dry Density = 1.93mg/m³ at 9% OMC
TP12*	0.50	2.1 (17)	6.0 (13)	Max Dry Density = 1.87mg/m³ at 11% OMC
TP13	1.0	1.6 (13)	8.8 (12)	-
TP15	1.50	1.5 (13)	7.1 (13)	Max Dry Density = 1.99mg/m³ at 10% OMC
TP16	1.0	0.5 (14)	0.2 (14)	Max Dry Density = 2.01mg/m³ at 8% OMC
TP18	0.50	48 (10)	12.3 (9.2)	-
TP19*	0.50	8 (13)	8.2 (13)	Max Dry Density = 1.94mg/m³ at 11% OMC
TP20	0.60	-	2.4 (18)	-
TP20	1.0	0.6 (19)	-	-
TP21	0.50	1.6 (20)	7.6 (20)	-
TP22	0.60	1.1 (20)	5.7 (20)	Max Dry Density = 1.80mg/m³ at 14% OMC
TP24	0.60	47 (13)	11.2 (14)	-
TP26*	0.50	1.0 (13)	6.4 (14)	Max Dry Density = 1.96mg/m³ at 10% OMC
TP28	0.70	0.5 (26)	2.8 (25)	Max Dry Density = 1.76mg/m³ at 14% OMC
TP29	0.50	42 (9.2)	16 (9.9)	-
TP31*	0.50	7.4 (13)	12.7 (11)	Max Dry Density = 1.96mg/m³ at 9% OMC

Following this initial classification, trial mixes were carried out to evaluate the performance of the soils following the addition of lime and lime / cement binders. Once mixed with the binder, the samples were then subjected to further Moisture Condition Value (MCV) and soaked CBR tests at designated time intervals. The MCV tests were conducted after mixing and air curing for one hour with soaked CBR tests following curing for 3, 5 and 7 days respectively. Tables 8 and 9 provide a summary of the laboratory test results on samples which, for comparative purposes, are presented with and without the lime and lime / cement addition.

Table 8 – Moisture Condition Value [MCV] at natural moisture content for overburden soil samples and MCV at varying % lime and % lime / cement content

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Exploratory Hole No.	Sample Depth Range	MCV (Moisture Content %)			
		Initial MCV (MC %)	1% Lime MCV (MC %)	1% Lime / 2% Cement MCV (MC %)	3% Lime MCV (MC %)
TP04	0.60m	4.6 (13)	7.2 (10)	8.6 (14)	13.6 (11)
TP12	0.50m	6.0 (13)	8.0 (13)	8.9 (14)	11.7 (12)
TP19	0.50m	8.2 (13)	11.2 (13)	11.5 (12)	12.9 (12)
TP26	0.50m	6.4 (14)	8.4 (11)	9.8 (12)	11.9 (12)
TP31	0.50m	12.7 (11)	15.4 (9.5)	15.4 (10)	16.1 (9.2)

In classification testing, moisture contents for the natural soils examined were found to range from 6.5 to 19% (aside from some outliers) with those samples selected for reusability testing ranging from 12 to 18%. Optimum MCV and dry density values were obtained over a similar range of moisture contents (between 8 and 14%). The addition of lime / cement binder is seen to raise the MCV value since hydration further reduces moisture content. MCV testing shows effective improvement with lime addition. However, there are samples where the MCV value becomes dry of optimum suggesting optimum MCV results are achieved with a 1% lime admixture.

Table 9 – Summary of CBR Tests at NMC and with addition of Lime / Lime-Cement Binders

Exploratory Hole No.	Sample Depth	CBR % Value												
		Initial Unsoaked (Natural state)	1% Lime			2% Lime			3% Lime			1% Lime / 2% Cement		
			3-Day Soaked	5-Day Soaked	7-Day Soaked	3-Day Soaked	5-Day Soaked	7-Day Soaked	3-Day Soaked	5-Day Soaked	7-Day Soaked	3-Day Soaked	5-Day Soaked	7-Day Soaked
TP04	0.60m	1.9	11	34	49	34	41	42	31	52	61	41	67	90
TP12	0.50m	2.1	7.4	14.6	20.4	12	24	36	29	40	48	39	40	53
TP19	0.50m	8	14	24	37	39	55	60	39	77	86	74	82	122
TP26	0.50m	1.0	13	21	32	35	46	53	58	69	63	58	83	95
TP31	0.50m	7.4	7.6	19	37	41	41	63	35	50	62	46	74	95

There trial testing shows an incremental increase in strength over the CBR test duration. Clearly there is a distinct improvement with treatment using higher percentage lime and with the combined lime and cement binder. Values appear to level off with little divide noted in CBR values for treated soils by the 7-day period whether there was a 2% or 3% lime admixture added. A marked increase in CBR results was noted where cement (2%) was combined with lime (1%) being even more pronounced when allowed cure for 7 days compared with 5 days.

There is a marked heterogeneity in the uppermost soils on site. There are instances in the same pit where the CLAY subsoils are remarked as firm to stiff (BRE SA06 0.65-1.40m) with deeper soils logged as 'soft to firm' (1.40-2.25m). The use of binder will obviously improve those areas where lower strength compressible soils are encountered and will serve to elevate the already positive performance of the more firm / stiff soils. The investigation did not indicate a consistent pattern of soil strengths across the site. The various SPT plots drafted for the site (See Figures 6, 9, 10, 16, 18, 22) do suggest that the upper 2m to 3m of soil could be classed as generally firm, occasionally soft to firm as well as variably firm to stiff.

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Therefore, in certain localised areas, without reworking / drying or modification with lime (calcium oxide), the natural, uppermost, surficial fine-grained soft to firm and occasionally soft soil would be unsuitable for re-use as a sub-structure formation. However, it is clear that the addition of binders, in its varying concentrations, will produce an acceptable sub-formation layer (high strength Class 2 engineered fill with an MCV 8 to 15). Soil stabilisation may also be relevant to the overall development of this gently sloping site, particularly if cut and fill operations are envisaged.

It is vital that during the soil stabilization process if chosen, that any stockpiles are graded and shaped so that surface water cannot collect or pond. Similarly, careful control of excavation, transporting, stockpiling, placing and compaction is advised to ensure that degradation of the shallow soil deposits does not occur. This is extremely important as poor earthworks management would render the fine soils as unsuitable for re-use.

Chemical analysis tests to measure sulphate and sulphur contents to BRESD1 were scheduled on the lime treated CBR samples (after 7 days curing). The results on the samples tested from TP04, TP26, TP19, TP12 & TP31 show negligible concentrations of water soluble sulphate, acid soluble sulphate and total sulphur (See Appendix 12) demonstrating no adverse reaction with lime.

If the design makes provision for ground improvement or soil stabilization methods, then a field demonstration trial (footprint of c. 10 x 10m) is advised to assess the performance of the modified soils with lime or lime / cement binders. This would allow for in-situ testing (plate load, nuclear gauge, sand replacement and CBR mould samples) to measure CBR / stiffness, relative compaction (percentage degree of compaction) and air voids.

6.4 Groundwater / Infiltration

As noted in Section 5.3, during the 2022 investigation, groundwater strikes were generally restricted to areas towards the southern half of the site (south of the existing farmyard). The construction of shallow monitoring wells throughout the site, augmented by the completion of further pits in April / May 2023, highlighted the occurrence of water in gravelly CLAY and GRAVEL layers in the northern half of the site between 1.50-2.80m bgl. Possible softened layers ('Soft to firm') were also documented in pits TP/RO06 and TP/RO07 coincident with water seepages and rapid ingress. Rotary open-holes 05, 06 and 07, which remained dry during their construction, were later found to have water levels between 2.43 to 3.79m bgl (between 80.43-81.27m OD) when dipped in July 2023.

A plan of the pits and boreholes where water strikes were encountered during the 2022 investigation is shown in Figure 27. The influence local topography has on the occurrence of groundwater strikes is clearly demonstrated in 'Area 3'. Strikes were intercepted generally in buried sandy GRAVEL soils at depths in the region 2.0m bgl in the trial pits and from 2.0m to 3.0m in boreholes. In boreholes, it was frequently noted that after a twenty-minute observation period, the strikes rose appreciably.

In 'Area 1', a water seepage, the shallowest noted on the project, was noted in BRE SA04 at 0.70m towards the southernmost field boundary. Rotary open hole TPRO-09 identified peat to 1.20m in this relatively low-lying area. The standpipe in TPRO-09 was dipped at 0.64m bgl (76.67m OD) in July 2023.

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Given the depths where groundwater strikes were reported, ingress in shallow foundation excavation should be anticipated in certain areas of the site. However, it is generally regarded as unlikely, with the water sitting in deeper-seated Gravel. Should localised seepages occur, they should be readily controlled by sump pumping. Should water-bearing sandy deposits be encountered, pumping in these deposits will serve to remove sand-sized grains and may de-stabilise areas where wash-out occurs. This should be noted in any risk assessment developed for dewatering deep digs / service trenches.

As mentioned in Section 5.3 and evidenced in water monitoring, the potential exists for seasonal changes in groundwater levels. The works were mainly carried out during October 2022. It may be the case that the various waterbodies at depth are subject to seasonal variations. Further monitoring will assist in this matter.

Discounting the potentially erroneous results obtained from the April / May 2023 tests, fourteen soakaway tests were conducted on the site (See Table 10). A second shallow soakaway test (SA05B) was conducted at location SA05 following interception of water in SA05A at 1.70m bgl. The remaining soak pits were found to be devoid of groundwater. A test failure (no or negligible infiltration) was recorded in tests conducted in soak pits SA01, SA03 and SA08. These results are thought typical of largely impermeable fine glacial till material. Such soils would not be suitable for conventional soakaways offering only low or very limited natural infiltration.

Similarly, the infiltration rates where water did permeate through sidewalls were generally measured at -06E and -07E m/sec typical of sandy silts, very silty fine sands and laminated or mixed strata of silts/sand/clay. Permeability classification would be low to very low in these cases.

Table 10 – Measured infiltration rates (f) expressed as exposed area (metre) per unit time (minute)

Soakaway Test No.	Depth of Test (m bgl)	Infiltration Rate *f* (m/min)	Infiltration Rate *f* (m/sec)
SA01	1.60	0 m/min	0 m/sec
SA02	1.50	0.00015 m/min	2.441E-06 m/sec
SA03	1.80	0 m/min	0 m/sec
SA04	2.10	5.2E-05 m/min	8.591E-07 m/sec
SA05A	1.70	0.0005 m/min	8.333E-06 m/sec
SA05B	1.20 (Cycle 1)	0.00057 m/min	9.47E-06 m/sec
	1.20 (Cycle 2)	0.00041 m/min	6.887E-06 m/sec
SA06	2.0 (Cycle 1)	0.00029 m/min	4.851E-06 m/sec
	2.0 (Cycle 2)	0.00021 m/min	3.467E-06 m/sec
SA07	2.20	9.6E-05 m/min	1.603E-06 m/sec
SA08	2.10	0 m/min	0 m/sec
SA09	2.0 (Cycle 1)	0.00025 m/min	4.212E-06 m/sec
	2.0 (Cycle 2)	0.00016 m/min	2.718E-06 m/sec
SA10	1.60	0.000207039 m/min	3.451E-06 m/sec
SA11	1.80	8.46561E-05 m/min	1.411E-06 m/sec
SA12	2.20	0.0003 m/min	5.002E-06 m/sec
	2.20	0.00024 m/min	3.961E-06 m/sec
SA13	1.60	0.00022 m/min	3.59E-06 m/sec

6.5 Slopes / Batters

A maximum slope angle of 1V to 1.5H (33°) is recommended for temporary batters constructed within the upper medium to low strength fine grained soils. A long-term slope angle of 1V to 2H (26°) should be appropriate for batters in the same soils. Where deep excavation works are required in the

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superficial deposits, the use of trench box support is advised especially given the instability noted at depth in some of the trial pits, moreso upon encountering groundwater. In addition, the uppermost fine subsoils will be susceptible to softening and degradation and surface water or groundwater ingress can lead to a significant reduction in shear strength. Perched water can exist locally in isolated sand lenses and this should be considered in risk assessments for excavations.

Site operatives or personnel should not enter unsupported excavations and should be informed of potential risks. Where site operatives or engineering staff work in close proximity to temporary slopes or batters, these should be inspected and approved by a suitably experienced civil engineer, preferably with geotechnical experience. Where there is a risk of spalling of battered slopes, the use of a geogrid is recommended. The geogrid should be anchored at the top and bottom of the ridge face to contain particles such as gravel, cobbles and / or boulders that may become dislodged.

6.6 Pavement Construction

Twenty-three plate load tests were conducted on the shallow subsoil at depths ranging 0.40m bgl to 0.60m bgl. The plate load test permits an assessment of the in-situ stiffness of the upper soil. The test results are reported in Appendix 4 and summarised below in Table 11. The equivalent CBR values range from 0.1 to 3.5% on the initial load cycle (Cycle 1) and 0.2 to 18.9% on the reload cycle (Cycle 2).

Table 11 – Equivalent CBR % Values obtained in Plate Bearing Testing

Test No.	Depth	CBR at Load Cycle (%)	CBR at Re-Load (%)
PB 01	0.60	0.3	4.7
PB 02	0.60	0.3	0.8
PB 03	0.50	0.6	3.2
PB 04	0.40	0.1	2.2
PB 05	0.40	3.5	15.9
PB 06	0.40	0.3	3.8
PB 07	0.60	0.5	1.5
PB 08	0.50	0.2	0.8
PB 09	0.40	2.0	7.1
PB 10	0.50	2.7	3.0
PB 11	0.50	0.2	1.1
PB 12	0.50	0.2	0.7
PB 13	0.50	0.3	0.3
PB 14	0.40	0.2	0.3
PB 15	0.50	0.6	0.6
PB 16	0.60	0.2	0.6
PB 17	0.40	0.7	2.4
PB 18	0.50	0.2	0.7
PB 19	0.60	0.3	0.8
PB 20	0.40	1.5	8.3
PB 21	0.40	0.7	6.4
PB 22	0.50	2.4	18.9
PB 23	0.50	0.9	1.9

The majority of plate test results indicate extremely low CBR values (0.1 – 1.0%). For the most part, the plate tests were conducted on a sub-topsoil layer which was described as very sandy, potentially loose. There were areas where topsoil was reported as 0.50m thick (TP28) but generally 0.40m thick and so some plate tests may have been performed on a contact between lowerbound topsoil and upperbound loose subsoil. Often no appreciable increase is noted between load and reload cycle

implying no effectual increase in density with compaction. Where such a combination of results was obtained, the installation of a thickened sub-formation layer will be required.

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There were instances of higher load and reload values, namely at PB05, PB09 and PB22. It is thought that these soils may have been stiffer and more gravelly in composition. In such cases, significant increases were observed between the initial load cycle and the following reload cycle. This infers room for gain with static pre-rolling.

Overall, a CBR design value of 1% should be adopted for the near surface soils in their current state. Ahead of road construction, and following compaction of the soils, a further set of plate testing (450 or 600mm diameter) could be undertaken to assess the improvement in stiffness of the formation. Given the negligible improvement seen in many tests (from load to reload), if the same test levels are again adopted it is unlikely that a significant improvement will be achieved.

In their current state, either geogrid reinforcement or the use of starter material (Class 6A / 6B) should be considered to provide a suitable foundation layer especially for access or haul / spine roads. Such a mechanically stabilized layer would be expected to consist of at least 1 layer of geogrid with 500 to 600mm of granular fill (well graded aggregate, possibly T1). Where geogrid is not utilized then approximately 500mm build-up of Class 6A / 6B starter layer material could be considered in conjunction with c300mm thick capping layer (Class 6F capping in line with Series 600 of TII SRW). This should provide a satisfactory foundation layer to adequately support the pavement.

During construction, it is important that the subgrade is not allowed to deteriorate if exposed to surface water. Locally the capping layer thickness may need to be increased if pockets or zones of lower strength formation areas are encountered. The time of year will play a role in subgrade strength especially during winter or early Spring where heavy rainfall would cause degradation of the formation. If there are particular concerns regarding the condition of the formation soils, then additional plate bearing tests should be considered during construction to verify or validate the stiffness / density of the formation soils and adequate capping thickness.

In addition, the durability of the capping material should be confirmed as capping will be exposed to the elements (especially if the works are undertaken during the winter / spring period). It is important that argillaceous sedimentary rocks (i.e. muddy limestone, calcareous mudstone, shale, etc.) are not used as capping or as a starter layer. These have high potential to give rise to degradation (i.e. poor durability and soundness) and slaking and therefore would not be suitable. All granular fills used in pavement construction should be tested and approved in advance of being used in the pavement construction.

Should soil stabilisation methods be used on site, significantly increased CBR values should be achievable on near surface soils upon the addition of lime and lime-cement binders. This may prove to be a useful method in re-using the soils on site without importation of granular material. If soil stabilisation with lime/cement is envisaged, additional plate load tests (450 or 600mm diameter) would be prudent during construction operations to verify or validate the improvement in stiffness of the formation prior to construction of the base course layer.

6.7 Buried Concrete

The chemical analysis tests on natural soil samples show pH (2.5:1) values range from 8.2 to 8.7. The sulphate aqueous extract (SO_4) results from shallow trial pit soil samples and from borehole samples produced values of <10mg/l. This would suggest the 'as-received' soil samples tested could be categorised as BRE Class DS-1. Table C1 ACEC for greenfield sites in BRE SD 1 (2005) can be used in the selection and design of concrete. If mobile groundwater conditions prevail at the site and given the pH values obtained from the testing, then ACEC class AC-1^d would be expected to be appropriate for buried concrete in the soils. In line with I.S. EN 206-1:2013, concrete could be

manufactured to Class XA1 where founded or positioned in the upper soils (Class XA1 being ≥ 2000 and ≤ 3000 SO_4^{2-} mg/kg).

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6.8 Ground Gas

Peak Carbon dioxide gas levels recorded on site were found to measure 0.6% to 2.3%. No detectable methane gas, carbon monoxide nor hydrogen sulphide were found in any of the four wells. Peak flow rates measured 0.1l/hr implying negligible generation within the individual wells. The gas measurements are presented in Appendix 8.

An RSK Group report commissioned by the National House-Building Council (NHBC) entitled 'Guidance on Evaluation of Development Proposals on Sites Where Methane and Carbon Dioxide are Present' (2007) offers some explanation for the derivation of carbon dioxide. Carbon dioxide gas is known to have both anthropogenic and natural sources. In relation to generation from anthropogenic sources, the decomposition of organic material results in the production of methane and carbon dioxide in approximately equal proportions. As equivalent methane levels were not recorded on site, it is unlikely that the CO_2 levels were generated from the decomposition of organic-containing waste materials – in any case, none were found on site during pitting or boring. Likewise, the potential for carbon dioxide to be generated naturally from the underlying limestone bedrock can be discounted since the wells are all shallow.

Offering a potential reason for the carbon dioxide levels, the report (NHBC, 2007) states that;

> *'the drilling and installation of monitoring wells will introduce artificially high concentrations of oxygen into the ground, which will cause aerobic conditions to develop. Biological micro-organisms in the ground that thrive in such conditions will not generate methane, although they will generate carbon dioxide. Any trace amounts of methane generated would typically be expected to be readily oxidised. As the microorganisms consume the oxygen, the ground conditions will revert back from aerobic to anaerobic (oxygen deficient) '*

This would suggest that the increased carbon dioxide levels measured in December 2022 are likely the result of temporary fluctuations in the overall background concentration rates. It would also imply that further monitoring would eventually see a return to original background levels once the anaerobic conditions became re-established.

6.9 Environmental Testing - Water

Environmental analysis was conducted on five water samples. Three samples were bailed from installed monitoring wells, BH03, BH12 and BH13. Well samples were acquired only after having first developing each installation. Two additional samples were acquired from the stream at its eastern entry point ('Stream Start') and at the point where its course leaves the site, towards the western end ('Stream End'). Results from analysis have been compared to standards outlined in the EPA publication *Towards Setting Guideline Values for the Protection of Groundwater in Ireland Interim Report*, EPA 2003 (EPA IGV) and to the *European Communities Environmental Objectives (Groundwater) Regulations, 2010* (S.I. No. 9 of 2010) (See Table 14). Lastly, where trigger values were not available, results have been compared to standards outlined in the fourth edition of the World Health Organization's (WHO) *Guidelines for drinking-water quality* (GDWQ) (2017).

No hydrocarbon contamination was detected in the samples. Table 12 shows the instances where exceedances were recorded. The universal Total Hardness exceedances may be reflective of the calcium carbonate limestone bedrock upon which the soils overlie.

Table 12 – Elevated values (Water Analysis compared to EPA Interim Guideline Values & S.I. No.9 of 2010)

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Parameter	Stream Start (East)	Stream End (West)	BH03	BH12	BH13	Environmental Guideline Source [EPA IGV]
Total Hardness as $CaCo_3$	360	360	230	360	270	200 mg/l
Manganese (Dissolved)	0.57	0.58	450	170	1.3	50 μg/l

6.10 Waste Acceptance Criteria [WAC] & Environmental Testing

Environmental soil samples were taken across a range of depths from trial pits. Samples were analysed for their compliance to the criteria set out in the 2002 European Council Decision (2003/33/EC). O'Callaghan Moran & Associates have conducted a waste characterisation assessment of the samples in accordance with the Environmental Protection Agency (EPA) Guidelines on the Classification of Waste (2015). This report, together with conclusions and recommendations, is presented in Appendix 13.

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1.0 BS 5930 (2015+A1:2020) Code of Practice for Site Investigation, British Standards Institution (BSI).

2.0 BS 1377 (1990) Methods of Testing of Soils for Civil Engineering Purposes, BSI.

3.0 Eurocode 7, Part 2: Ground Investigation & Testing (EN 1997-2:2007)

4.0 Irish Standard IS 888:2016, NSAI (Published in March 2016)

5.0 National House-Building Council [NHBC] (2007). Guidance on Evaluation of Development Proposals on Sites Where Methane and Carbon Dioxide are Present. Report No. 10627-R01(04). NHBC and RSK Group.

6.0 Site Investigation Practice: Assessing BS 5930 (1986), Geological Society Special Publication, No. 2.

7.0 Sowers, G.F. (1962) Shallow Foundations, Foundation Engineering, McGraw Hill

8.0 SR21:2014+A1:2016 Guidance on the use of IS EN 13242+A1:2007

9.0 Terzaghi, K., Peck, R.B., & Mesri, G. (1996). Soil Mechanics in Engineering, 3rd Edition. New York, Wiley.

10.0 Tomlinson, M.J. Pile Design & Construction Practice, 4th Edition

11.0 Site Investigation Practice: Assessing BS 5930 (1986), Geological Society Special Publication, No. 2.

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Appendix 1

Trial Pit Logs and Photographs

TRIAL PIT RECORD

REPORT NUMBER 24330

CONTRACT	Halverstown	**TRIAL PIT NO.**	**TP01**
		SHEET	Sheet 1 of 1
LOGGED BY	MB	**CO-ORDINATES**	686,064.74 E 719,680.12 N
		DATE STARTED	18/10/2022
		DATE COMPLETED	18/10/2022
CLIENT		**GROUND LEVEL (m)**	79.63
		EXCAVATION METHOD	7t Hitachi
ENGINEER	DOBA		

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Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0 TOPSOIL: Soft brown slightly gravelly sandy CLAY. Sand is fine to coarse. Gravel is fine to medium subrounded.									
Firm grey very sandy slightly clayey SILT. Sand is fine to medium		0.30	79.33		AA186957	B	0.50-0.60	38 42 34 45 56 59	
1.0									
Firm brown very sandy very gravelly SILT with pockets of yellow fine sand and medium cobbles. Sand is fine to coarse. Gravel is fine to coarse subrounded.Cobbles are subrounded to rounded of limestone.		1.60	78.03		AA186958	B	1.60-1.70		
2.0									
Brown silty sandy GRAVEL with a medium cobble content. Sand is fine to coarse. Gravel is fine to coarse subrounded.Cobbles are subrounded to rounded of limestone.		2.60	77.03		AA186959	B	2.60-2.70		
End of Trial Pit at 2.90m		2.90	76.73	(Seepage)					
3.0									

Groundwater Conditions
Seepage at 2.90m

Stability
Slightly unstable from 1.60m

General Remarks
Pit footprint scanned using cable avoidance tool [CAT]. Shear vanes (set of three) carried out at both 0.30m & 0.50m bgl. Vane attempted at 0.70m - too gravelly. Pit backfilled with arisings.

TRIAL PIT RECORD

REPORT NUMBER 24330

CONTRACT	Halverstown	**TRIAL PIT NO.**	**TP02**
		SHEET	Sheet 1 of 1
LOGGED BY	MB	**CO-ORDINATES**	686,127.58 E 719,725.08 N
		DATE STARTED	18/10/2022
		DATE COMPLETED	18/10/2022
CLIENT		**GROUND LEVEL (m)**	81.08
ENGINEER	DOBA	**EXCAVATION METHOD**	7t Hitachi

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Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0 TOPSOIL: Soft brown slightly gravelly sandy CLAY. Sand is fine to coarse. Gravel is fine to medium subrounded.									
Firm brown sandy gravelly CLAY with a low cobble content. Sand is fine to coarse. Gravel is fine to coarse subrounded.Cobbles are subrounded to rounded of limestone.		0.20	80.88					38 42 32	
					AA181997	B	0.50-0.50		
					AA181998	B	0.70-0.70		
Brownish grey gravelly clayey SAND. Sand is fine to medium. Gravel is fine to coarse subangular to subrounded.		0.80	80.28						
1.0 0.80-0.90m Fine to medium sand lens		1.00	80.08						
Firm brown sandy gravelly SILT with a medium cobble content. Sand is fine to coarse. Gravel is fine to coarse subrounded.Cobbles are subrounded to rounded of limestone.									
					AA181999	B	1.70-1.70		
2.0									
					AA181200	B	2.60-2.60		
3.0 End of Trial Pit at 3.00m		3.00	78.08						

Groundwater Conditions
Dry

Stability
Good

General Remarks
Pit footprint scanned using cable avoidance tool [CAT]. Shear vane (set of three) carried out at 0.30m bgl. Vane attempted at 0.50m - too gravelly. Pit backfilled with arisings.

TRIAL PIT RECORD

REPORT NUMBER 24330

CONTRACT	Halverstown	**TRIAL PIT NO.**	**TP03**
		SHEET	Sheet 1 of 1
LOGGED BY	MB	**CO-ORDINATES**	686,128.56 E 719,683.63 N
		DATE STARTED	18/10/2022
		DATE COMPLETED	18/10/2022
CLIENT		**GROUND LEVEL (m)**	80.45
ENGINEER	DOBA	**EXCAVATION METHOD**	7t Hitachi

RECEIVED: 13/08/2024

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0 TOPSOIL: Soft brown slightly gravelly sandy CLAY. Sand is fine to coarse. Gravel is fine to medium subrounded.									
		0.30	80.15					39	
Brownish grey slightly gravelly silty SAND. Sand is fine to medium. Gravel is fine to coarse subangular to subrounded.					AA186953	B	0.50-0.60	31	
		0.80	79.65					34	
1.0 Stiff grey mottled orange sandy gravelly SILT. Sand is fine to medium. Gravel is fine to coarse subangular to subrounded.					AA186954	B	1.20-1.20		
		1.80	78.65		AA186955	B	1.80-1.80		
2.0 Firm to stiff brown sandy gravelly clayey SILT with a medium cobble content. Sand is fine to coarse. Gravel is fine to coarse subrounded.Cobbles are subrounded to rounded of limestone.									
		2.20	78.25						
Brownish grey very gravelly silty SAND with medium cobbles and ocassional boulders. Sand is fine to medium. Gravel is fine to coarse subangular to subrounded.Cobbles and boulders are subrounded to rounded of limestone.					AA186956	B	2.50-2.60		
		2.90	77.55						
3.0 End of Trial Pit at 2.90m									

Groundwater Conditions
Dry

Stability
Slightly unstable from 2.20m

General Remarks
Pit footprint scanned using cable avoidance tool [CAT]. Shear vane (set of three) carried out at 0.30m bgl. Pit backfilled with arisings.

TRIAL PIT RECORD

REPORT NUMBER 24330

CONTRACT	Halverstown	**TRIAL PIT NO.**	**TP04**
		SHEET	Sheet 1 of 1
LOGGED BY	MB	**CO-ORDINATES**	686,151.77 E 719,626.13 N
		DATE STARTED	19/10/2022
		DATE COMPLETED	19/10/2022
CLIENT		**GROUND LEVEL (m)**	79.83
		EXCAVATION METHOD	7t Hitachi
ENGINEER	DOBA		

RECEIVED: 13/08/2024

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
TOPSOIL: Soft brown slightly gravelly sandy CLAY. Sand is fine to coarse. Gravel is fine to medium subrounded.		0.30	79.53						
Firm brown sandy gravelly SILT with a low cobble content. Sand is fine to coarse. Gravel is fine to coarse subrounded.Cobbles are subrounded to rounded of limestone.					AA186982	B	0.60-0.60	45 50 43 67 68 71 78 82 84	
Firm brown sandy gravelly silty CLAY with a medium cobble content and occassional boulders. Sand is fine to coarse. Gravel is fine to coarse subrounded.Cobbles and boulders are subrounded to rounded of limestone.		1.40	78.43		AA186983	B	1.50-1.60		
					AA186984	B	2.60-2.70		
End of Trial Pit at 2.80m		2.80	77.03						

Groundwater Conditions
Dry

Stability
Good

General Remarks
Pit footprint scanned using cable avoidance tool [CAT]. Shear vanes (set of three) carried out at 0.30m, 0.50m and 0.70m bgl. Pit backfilled with arisings.

TRIAL PIT RECORD

REPORT NUMBER 24330

CONTRACT	Halverstown	**TRIAL PIT NO.**	**TP05**
		SHEET	Sheet 1 of 1
LOGGED BY	MB	**CO-ORDINATES**	686,195.58 E 719,693.69 N
		DATE STARTED	18/10/2022
		DATE COMPLETED	18/10/2022
CLIENT		**GROUND LEVEL (m)**	80.91
		EXCAVATION METHOD	7t Hitachi
ENGINEER	DOBA		

RECEIVED: 13/08/2024

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0 TOPSOIL: Soft brown slightly gravelly sandy CLAY. Sand is fine to coarse. Gravel is fine to medium subrounded.									
Firm brownish grey slightly clayey sandy gravelly SILT. Sand is fine to coarse. Gravel is fine to coarse subrounded		0.40	80.51		AA186960	B	0.50-0.60	32 38 35 65 72 76	
1.0 Firm brown sandy gravelly SILT with a medium cobble content and occassional boulders. Sand is fine to coarse. Gravel is fine to coarse subrounded.Cobbles and boulders are subrounded to rounded of limestone.		1.20	79.71		AA186961	B	1.50-1.60		
Boulder at 1.80m (up to 1200mm)									
2.0 Brown silty sandy GRAVEL with a medium cobble content. Sand is fine to coarse. Gravel is fine to coarse subrounded.Cobbles are subrounded to rounded of limestone.		2.00	78.91						
Sidewall collapse at 2.0m					AA186962	B	2.50-2.60		
		2.90	78.01	(Seepage)					
3.0 End of Trial Pit at 2.90m									

Groundwater Conditions
Seepage at 2.90m

Stability
Unstable, side wall collapse from 2.80m

General Remarks
Pit footprint scanned using cable avoidance tool [CAT]. Shear vanes (set of three) carried out at both 0.30m & 0.50m bgl. Vane attempted at 0.70m - too gravelly. Pit backfilled with arisings.

TRIAL PIT RECORD

REPORT NUMBER 24330

CONTRACT	Halverstown	**TRIAL PIT NO.**	**TP06**
		SHEET	Sheet 1 of 1
LOGGED BY	MB	**CO-ORDINATES**	686,189.63 E 719,600.91 N
		DATE STARTED	19/10/2022
		DATE COMPLETED	19/10/2022
CLIENT		**GROUND LEVEL (m)**	79.75
ENGINEER	DOBA	**EXCAVATION METHOD**	7t Hitachi

RECEIVED: 13/08/2024

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
TOPSOIL: Soft brown slightly gravelly sandy CLAY. Sand is fine to coarse. Gravel is fine to medium subrounded.		0.30	79.45						
Firm grey mottled orange very gravelly sandy SILT. Sand is fine to coarse. Gravel is fine to coarse subrounded.					AA186979	B	0.50-0.60	45 56 42 58 67 74	
Firm brown very sandy very gravelly SILT with a medium cobble content and occassional boulders. Sand is fine to coarse. Gravel is fine to coarse subrounded. Cobbles and boulders are subrounded to rounded of limestone. Sidewall collapse at 1.20m		1.20	78.55		AA186980	B	1.50-1.60		
					AA186981	B	2.50-2.60		
End of Trial Pit at 2.70m		2.70	77.05						

Groundwater Conditions
Dry

Stability
Unstable, side wall collapse at 1.20m

General Remarks
Pit footprint scanned using cable avoidance tool [CAT]. Shear vanes (set of three) carried out at both 0.30m & 0.50m bgl. Pit backfilled with arisings.

TRIAL PIT RECORD

REPORT NUMBER 24330

CONTRACT	Halverstown	**TRIAL PIT NO.**	**TP07**
		SHEET	Sheet 1 of 1
LOGGED BY	MB	**CO-ORDINATES**	686,233.75 E 719,669.34 N
		DATE STARTED	18/10/2022
		DATE COMPLETED	18/10/2022
CLIENT		**GROUND LEVEL (m)**	80.79
ENGINEER	DOBA	**EXCAVATION METHOD**	7t Hitachi

RECEIVED: 13/08/2024

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
TOPSOIL: Soft brown slightly gravelly sandy CLAY. Sand is fine to coarse. Gravel is fine to medium subrounded.		0.30	80.49						
Firm brownish grey sandy gravelly silty CLAY with pockets of silty SAND. Sand is fine to medium. Gravel is fine to coarse subangular to subrounded.					AA186963	B	0.50-0.60	24 27 38 70 76 77 120	
Firm to stiff brownish grey sandy gravelly SILT with a medium cobble content. Sand is fine to coarse. Gravel is fine to coarse subrounded. Cobbles are subrounded to rounded of limestone.		1.10	79.69		AA186964	B	1.50-1.60		
Brown silty sandy GRAVEL with a medium cobble content. Sand is fine to coarse. Gravel is fine to coarse subrounded. Cobbles are subrounded to rounded of limestone.		2.20	78.59		AA186965	B	2.50-2.60		
End of Trial Pit at 2.80m		2.80	77.99	(Seepage)					

Groundwater Conditions
Seepage at 2.80m

Stability
Unstable from 2.0m

General Remarks
Pit footprint scanned using cable avoidance tool [CAT]. Shear vanes (set of three) carried out at both 0.30m & 0.50m bgl. Single vane attempted at 0.70m bgl. Vane attempted at 0.70m - too gravelly. Pit backfilled with arisings.

TRIAL PIT RECORD

REPORT NUMBER 24330

CONTRACT Halverstown

TRIAL PIT NO. TP08
SHEET Sheet 1 of 1

LOGGED BY MB

CO-ORDINATES 686,254.83 E
719,606.17 N

DATE STARTED 19/10/2022
DATE COMPLETED 19/10/2022

GROUND LEVEL (m) 80.39

CLIENT

ENGINEER DOBA

EXCAVATION METHOD 7t Hitachi

RECEIVED: 13/08/2024

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0 TOPSOIL: Soft brown slightly gravelly sandy CLAY. Sand is fine to coarse. Gravel is fine to medium subrounded.		0.20	80.19						
Firm brownish grey sandy gravelly SILT. Sand is fine to medium. Gravel is fine to coarse subangular to subrounded.					AA186966	B	0.50-0.60	38 42 36 71 60 65	
1.0 Firm brown slightly clayey sandy gravelly SILT with a medium cobble content. Sand is fine to coarse. Gravel is fine to coarse subrounded.Cobbles are subrounded to rounded of limestone.		0.90	79.49		AA186967	B	1.50-1.60		
2.0 Brown silty sandy GRAVEL with a medium cobble content. Sand is fine to coarse. Gravel is fine to coarse subrounded.Cobbles are subrounded to rounded of limestone.		2.30	78.09		AA186968	B	2.50-2.60		
3.0 End of Trial Pit at 3.00m		3.00	77.39	(Seepage)					

Groundwater Conditions
Seepage at 3.0m

Stability
Unstable from 2.3m

General Remarks
Pit footprint scanned using cable avoidance tool [CAT]. Shear vanes (set of three) carried out at both 0.30m & 0.50m bgl. Vane attempted at 0.70m - too stiff. Pit backfilled with arisings.

TRIAL PIT RECORD

REPORT NUMBER 24330

CONTRACT	Halverstown	**TRIAL PIT NO.**	**TP09**
		SHEET	Sheet 1 of 1
LOGGED BY	MB	**CO-ORDINATES**	686,274.81 E 719,546.61 N
		DATE STARTED	19/10/2022
		DATE COMPLETED	19/10/2022
CLIENT		**GROUND LEVEL (m)**	79.66
		EXCAVATION METHOD	7t Hitachi
ENGINEER	DOBA		

RECEIVED: 13/08/2024

	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0	TOPSOIL: Soft brown slightly gravelly sandy CLAY. Sand is fine to coarse. Gravel is fine to medium subrounded.		0.30	79.36						
	Firm grey mottled orange sandy gravelly SILT with silty sand lenses. Sand is fine to coarse. Gravel is fine to coarse subrounded.					AA186975	B	0.50-0.60	40 38 46 60 63 67	
1.0	Firm greyish brown sandy gravelly clayey SILT with a low cobble content. Sand is fine to coarse. Gravel is fine to coarse subrounded.Cobbles are subrounded to rounded of limestone.		0.80	78.86						
						AA186976	B	1.20-1.30		
	Brown silty sandy GRAVEL with a medium cobble content. Sand is fine to coarse. Gravel is fine to coarse subrounded.Cobbles are subrounded to rounded of limestone.		1.60	78.06						
2.0	Side wall collapse at 1.60m					AA186977	B	1.90-2.00		
	Firm dark grey very sandy gravelly clayey SILT with a medium cobble content. Sand is fine to coarse. Gravel is fine to coarse subrounded.Cobbles are subrounded to rounded of limestone. (Recovered wet)		2.40	77.26	1 (Seepage)	AA186978	B	2.50-2.60		
3.0	End of Trial Pit at 3.00m		3.00	76.66						

Groundwater Conditions
Seepage at 2.50m

Stability
Unstable, side wall collapse from 1.60m

General Remarks
Pit footprint scanned using cable avoidance tool [CAT]. Shear vanes (set of three) carried out at both 0.30m & 0.50m bgl. Vane attempted at 0.70m - too gravelly. Pit backfilled with arisings.

TRIAL PIT RECORD

REPORT NUMBER 24330

CONTRACT	Halverstown	**TRIAL PIT NO.**	**TP10**
		SHEET	Sheet 1 of 1
LOGGED BY	MB	**CO-ORDINATES**	686,322.16 E 719,619.95 N
		DATE STARTED	19/10/2022
		DATE COMPLETED	19/10/2022
CLIENT		**GROUND LEVEL (m)**	80.87
ENGINEER	DOBA	**EXCAVATION METHOD**	7t Hitachi

RECEIVED: 13/08/2024

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0 TOPSOIL: Soft brown sandy CLAY with rootlets. Sand is fine to coarse.									
Firm to stiff grey mottled orange sandy gravelly clayey SILT. Sand is fine to coarse. Gravel is fine to coarse subrounded.		0.30	80.57		AA186969	B	0.50-0.60	38 42 35 63 65 71	
Greyish brown gravelly SAND with a low cobble content. Sand is fine to coarse. Gravel is fine to coarse subrounded.		0.80	80.07		AA186970	B	1.20-1.30		
1.0									
Firm brown slightly silty sandy gravelly CLAY with a medium cobble content. Sand is fine to coarse. Gravel is fine to coarse subrounded.Cobbles are subrounded to rounded of limestone.		1.60	79.27		AA186971	B	2.60-2.70		
2.0									
End of Trial Pit at 2.80m		2.80	78.07						
3.0									

Groundwater Conditions
Dry

Stability
Good

General Remarks
Pit footprint scanned using cable avoidance tool [CAT]. Shear vanes (set of three) carried out at both 0.30m & 0.50m bgl. Vane attempted at 0.70m - too gravelly. Pit backfilled with arisings.

TRIAL PIT RECORD

REPORT NUMBER 24330

CONTRACT	Halverstown	**TRIAL PIT NO.**	**TP11**
		SHEET	Sheet 1 of 1
LOGGED BY	MB	**CO-ORDINATES**	686,313.08 E 719,522.07 N
		DATE STARTED	19/10/2022
		DATE COMPLETED	19/10/2022
CLIENT		**GROUND LEVEL (m)**	79.52
		EXCAVATION METHOD	7t Hitachi
ENGINEER	DOBA		

RECEIVED: 13/08/2024

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0 TOPSOIL: Soft brown sandy CLAY with rootlets. Sand is fine to coarse.		0.20	79.32						
Firm grey mottled orange sandy gravelly clayey SILT. Sand is fine to coarse. Gravel is fine to coarse subrounded.					AA186972	B	0.50-0.60	49 45 48 56 52 61	
0.70-0.80m Fine to medium sand lens									
1.0 Stiff grey brown sandy gravelly SILT with a low cobble content. Sand is fine to coarse. Gravel is fine to coarse subrounded.Cobbles are subrounded to rounded of limestone.		1.10	78.42		AA186973	B	1.50-1.60		
2.0 Firm to stiff dark grey slightly clayey sandy gravelly SILT with a medium cobble content. Sand is fine to coarse. Gravel is fine to coarse subrounded.Cobbles are subrounded to rounded of limestone.		2.20	77.32		AA186974	B	2.50-2.60		
End of Trial Pit at 2.90m		2.90	76.62						
3.0									

Groundwater Conditions
Dry

Stability
Good

General Remarks
Pit footprint scanned using cable avoidance tool [CAT]. Shear vanes (set of three) carried out at both 0.30m & 0.50m bgl. Vane attempted at 0.70m - too gravelly. Pit backfilled with arisings.

TRIAL PIT RECORD

REPORT NUMBER 24330

CONTRACT	Halverstown	**TRIAL PIT NO.**	**TP12**
		SHEET	Sheet 1 of 1
LOGGED BY	MB	**CO-ORDINATES**	686,361.01 E 719,589.72 N
		DATE STARTED	06/10/2022
		DATE COMPLETED	06/10/2022
CLIENT		**GROUND LEVEL (m)**	80.71
		EXCAVATION METHOD	7t Hitachi
ENGINEER	DOBA		

RECEIVED: 13/08/2024

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
TOPSOIL: Soft brown slightly gravelly sandy silty CLAY. Sand is fine to coarse. Gravel is fine to medium subrounded.									
Stiff light brown very sandy very gravelly clayey SILT. Sand is fine to coarse. Gravel is fine to coarse subrounded. Cobbles are subrounded to rounded of limestone.		0.30	80.41					20 25 22	
					AA185481	B	0.50-0.60		
(Dense) Silty gravelly SAND with a low cobble content. Sand is fine to medium. Gravel is fine to coarse subrounded. Cobbles are subrounded to rounded of limestone.		0.70	80.01						
					AA185482	B	0.80-0.90		
(Medium dense) Brown silty gravelly SAND with a medium cobble content. Sand is fine to medium. Gravel is fine to coarse subrounded. Cobbles are subrounded to rounded of limestone.		1.60	79.11						
					AA185483	B	1.80-1.90		
Firm to stiff dark brown to dark grey slightly clayey sandy gravelly SILT with a low cobble content. Sand is fine to coarse. Gravel is fine to coarse subangular to subrounded. Cobbles are subrounded to rounded of limestone		2.40	78.31						
					AA185484	B	2.50-2.60		
End of Trial Pit at 2.70m		2.70	78.01						

Groundwater Conditions
Dry

Stability
Good

General Remarks
Pit footprint scanned using cable avoidance tool [CAT]. Shear vane (set of three) carried out at 0.20m bgl. Vane attempted at 0.50m - too gravelly. Pit backfilled with arisings.

TRIAL PIT RECORD

REPORT NUMBER 24330

CONTRACT	Halverstown	**TRIAL PIT NO.**	**TP13**
		SHEET	Sheet 1 of 1
LOGGED BY	MB	**CO-ORDINATES**	686,381.27 E 719,525.82 N
		DATE STARTED	04/10/2022
		DATE COMPLETED	04/10/2022
CLIENT		**GROUND LEVEL (m)**	79.83
ENGINEER	DOBA	**EXCAVATION METHOD**	7t Hitachi

RECEIVED: 13/08/2024

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0 TOPSOIL: Soft brown slightly silty gravelly sandy CLAY with a low cobble content and rootlets. Sand is fine to coarse. Gravel is fine to medium subrounded. Cobbles are subrounded of limestone								45	
Firm to stiff brown mottled grey slightly sandy gravelly silty CLAY. Sand is fine to coarse. Gravel is fine to coarse subrounded.		0.40	79.43		AA185474	B	0.50-0.50	55	
1.0 Firm greyish brown slightly sandy gravelly clayey SILT with a low cobble content. Sand is fine to coarse. Gravel is fine to coarse subrounded. Cobbles are subrounded to rounded of limestone		0.90	78.93		AA185475	B	1.00-1.00		
Firm brownish grey sandy gravelly silty CLAY with a low cobble content. Gravel is fine to coarse subrounded. Cobbles are subrounded to rounded of limestone.		1.40	78.43		AA185476	B	1.50-1.50		
2.0									
Firm slightly sandy gravelly silty CLAY. Gravel is fine to medium subrounded.		2.40	77.43		AA185477	B	2.50-2.50		
End of Trial Pit at 2.70m		2.70	77.13	(Seepage)					
3.0									

Groundwater Conditions
Seepage at 2.70m

Stability
Good

General Remarks
Pit footprint scanned using cable avoidance tool [CAT]. Shear vanes carried out at both 0.30m & 0.50m bgl. Vane attempted at 0.60m - too gravelly. Pit backfilled with arisings.

TRIAL PIT RECORD

REPORT NUMBER 24330

CONTRACT	Halverstown	**TRIAL PIT NO.**	**TP14**
		SHEET	Sheet 1 of 1
LOGGED BY	MB	**CO-ORDINATES**	686,397.36 E 719,469.29 N
		DATE STARTED	03/10/2022
		DATE COMPLETED	03/10/2022
CLIENT		**GROUND LEVEL (m)**	79.30
		EXCAVATION METHOD	7t Hitachi
ENGINEER	DOBA		

RECEIVED: 13/08/2024

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
TOPSOIL: Soft brown sandy CLAY with timber rootlets. Sand is fine to coarse.		0.15	79.15						
(Loose) Light brown fine silty SAND with rootlets. Sand is fine to coarse.		0.25	79.05						
Firm to stiff light grey mottled yellow very sandy silty CLAY. Sand is fine to coarse.								100	
		0.60	78.70		AA185457	B	0.50-0.50		
Very stiff light brown mottled orange and grey sandy very gravelly SILT. Sand is fine to coarse. Gravel is fine to coarse subrounded. Slow progress from 0.80m to 1.50m due to cobbles and boulders.		0.90	78.40		AA185458	B	0.80-0.90		
(Dense) Light grey slightly silty slightly clayey gravelly SAND with a medium to high cobble content. Sand is fine to coarse. Gravel is fine to coarse subrounded. Cobbles are subrounded to rounded of limestone					AA185459	B	1.20-1.20		
Obstruction at 1.50m - possible boulders End of Trial Pit at 1.50m		1.50	77.80						

Groundwater Conditions
Dry

Stability
Good

General Remarks
Pit footprint scanned using cable avoidance tool [CAT]. Shear vane carried out at 0.35m bgl. Vane attempted at 0.75m - too stiff. Pit backfilled with arisings.

TRIAL PIT RECORD

REPORT NUMBER 24330

CONTRACT Halverstown

TRIAL PIT NO. TP15
SHEET Sheet 1 of 1

LOGGED BY MB

CO-ORDINATES 686,444.04 E
719,538.61 N

DATE STARTED 04/10/2022
DATE COMPLETED 04/10/2022

GROUND LEVEL (m) 80.39

CLIENT
ENGINEER DOBA

EXCAVATION METHOD 7t Hitachi

RECEIVED: 13/08/2024

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0 TOPSOIL: Soft brown gravelly sandy CLAY with rootlets. Sand is fine to coarse. Gravel is fine to medium subrounded.									
		0.30	80.09						
Firm greyish brown sandy gravelly slightly clayey SILT with a low coblle content. Sand is fine to coarse. Gravel is fine to coarse subrounded. Cobbles are subrounded to rounded of limestone					AA185478	B	0.50-0.50		
1.0 Firm greyish brown sandy gravelly SILT. Sand is fine to coarse. Gravel is fine to coarse subrounded. Cobbles are subrounded to rounded of limestone		1.00	79.39						
					AA185479	B	1.50-1.50		
Firm rarely soft to firm brown slightly sandy gravelly silty CLAY with a low cobble content with pockets of coarse yellow sand from 2.50m. Gravel is fine to coarse subrounded. Cobbles are subrounded to rounded of limestone 2.0 Side wall collapse from 2.0m to 2.50m		1.70	78.69						
					AA185480	B	2.30-2.30		
End of Trial Pit at 2.80m 3.0		2.80	77.59						

Groundwater Conditions
Dry

Stability
Slightly unstable, side wall collapse at 2.0m

General Remarks
Pit footprint scanned using cable avoidance tool [CAT]. Pit backfilled with arisings.

TRIAL PIT RECORD

REPORT NUMBER 24330

CONTRACT	Halverstown	**TRIAL PIT NO.**	**TP16**
		SHEET	Sheet 1 of 1
LOGGED BY	MB	**CO-ORDINATES**	686,437.15 E 719,442.70 N
		DATE STARTED	03/10/2022
		DATE COMPLETED	03/10/2022
CLIENT		**GROUND LEVEL (m)**	79.07
ENGINEER	DOBA	**EXCAVATION METHOD**	7t Hitachi

RECEIVED: 13/08/2024

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0 TOPSOIL: Soft brown gravelly sandy CLAY with rootlets. Sand is fine to coarse. Gravel is fine to medium subrounded.									
Firm to stiff brown mottled orange very sandy silty gravelly CLAY with a low cobble content. Gravel is fine to coarse subrounded. Cobbles are subrounded to rounded of limestone		0.30	78.77					45	
					AA185460	B	0.50-0.50		
Stiff light grey sightly clayey sandy gravelly SILT with a low cobble content. Sand is fine to coarse. Sand is fine to coarse. Gravel is fine to coarse subrounded. Cobbles are subrounded to rounded of limestone		0.70	78.37					60	
1.0					AA185461	B	1.00-1.00		
					AA185462	B	1.50-1.50		
(Medium dense) Brownish grey sandy very silty GRAVEL with a low cobble content and occasional boulders. Sand is fine to coarse. Gravel is fine to coarse subrounded. Cobbles and boulders are subrounded to rounded of limestone Side wall collapse from 2.0m to 3.0m		1.80	77.27						
2.0					AA185463	B	2.20-2.20		
				1 (Moderate)					
3.0 End of Trial Pit at 3.00m		3.00	76.07						

Groundwater Conditions
Moderate flow at 2.80m

Stability
Slightly unstable, side wall collapse at 2.0m

General Remarks
Pit footprint scanned using cable avoidance tool [CAT]. Shear vanes carried out at both 0.30m & 0.70m bgl. Pit backfilled with arisings.

TRIAL PIT RECORD

REPORT NUMBER 24330

CONTRACT	Halverstown	**TRIAL PIT NO.**	**TP17**
		SHEET	Sheet 1 of 1
LOGGED BY	MB	**CO-ORDINATES**	686,475.64 E 719,507.57 N
		DATE STARTED	06/10/2022
		DATE COMPLETED	06/10/2022
CLIENT		**GROUND LEVEL (m)**	80.15
		EXCAVATION METHOD	7t Hitachi
ENGINEER	DOBA		

RECEIVED: 13/08/2024

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0 TOPSOIL: Soft brown slightly silty gravelly sandy CLAY with a low cobble content and rootlets. Sand is fine to coarse. Gravel is fine to medium subrounded. Cobbles are subrounded of limestone									
Localised sidewall collapse from 0.20m to 2.0m		0.30	79.85						
Stiff greyish brown slightly sandy gravelly clayey SILT. Sand is fine to coarse. Gravel is fine to coarse subrounded.					AA185485	B	0.60-0.60	57 39 42 80 72 66	
1.0 (Loose) Light brown to grey silty SAND. Sand is fine to medium. Sand tapers to the north.		1.10	79.05						
1.10-1.30m Fine to medium sand lens		1.30	78.85						
Firm grey very sandy gravelly SILT. Sand is fine to medium. Gravel is fine to coarse subrounded.					AA185486	B	1.40-1.40		
2.0 Firm brown to dark grey gravelly sandy silty CLAY with a low cobble content. Sand is fine to medium. Gravel is fine to coarse subrounded. Cobbles are subrounded to rounded of limestone.		2.00	78.15		AA185487	B	2.20-2.20		
		2.90	77.25						
3.0 End of Trial Pit at 2.90m									

Groundwater Conditions
Dry

Stability
Unstable - wall collapse from 0.20m with renewed collapse in unstable sandy horizon at 2.50m

General Remarks
Pit footprint scanned using cable avoidance tool [CAT]. Shear vanes (set of three) carried out at both 0.30m & 0.50m bgl. Vane attempted at 0.70m - too gravelly. Pit backfilled with arisings.

TRIAL PIT RECORD

REPORT NUMBER 24330

CONTRACT	Halverstown	**TRIAL PIT NO.**	**TP18**
		SHEET	Sheet 1 of 1
LOGGED BY	MB	**CO-ORDINATES**	686,500.35 E 719,443.56 N
		DATE STARTED	03/10/2022
		DATE COMPLETED	03/10/2022
CLIENT		**GROUND LEVEL (m)**	79.37
ENGINEER	DOBA	**EXCAVATION METHOD**	7t Hitachi

RECEIVED: 13/08/2024

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0 TOPSOIL: Soft brown sandy CLAY with rootlets. Sand is fine to coarse.								30	
Firm to stiff brown mottled grey slightly sandy gravelly silty CLAY with a low cobble content. Sand is fine to coarse. Gravel is fine to coarse subrounded. Cobbles are subrounded to rounded of limestone.		0.40	78.97		AA185464	B	0.50-0.50	54	
Stiff greyish brown slightly sandy gravelly SILT with a low cobble content. Sand is fine to coarse. Gravel is fine to coarse subrounded. Cobbles are subrounded to rounded of limestone.		0.80	78.57						
1.0									
Firm brownish grey sandy slightly gravelly SILT. Sand is fine to coarse. Gravel is fine to medium subrounded		1.60	77.77		AA185465	B	1.50-1.50		
2.0									
Firm and soft dark grey sandy gravelly SILT with a low cobble content. Sand is fine to coarse. Gravel is fine to coarse subrounded. Cobbles are subrounded to rounded of limestone (Recovered wet)		2.50	76.87		AA185466	B	2.50-2.50		
Side wall collapse from 2.50m to 3.0m									
3.0 End of Trial Pit at 3.00m		3.00	76.37	1 (Seepage)	AA185467	B	3.00-3.00		

Groundwater Conditions
Seepage at 3.0m

Stability
Slightly unstable, side wall collapse at 2.50m

General Remarks
Pit footprint scanned using cable avoidance tool [CAT]. Shear vanes carried out at both 0.20m & 0.50m bgl. Vane attempted at 0.70m - too stiff. Pit backfilled with arisings.

TRIAL PIT RECORD

REPORT NUMBER 24330

CONTRACT Halverstown

TRIAL PIT NO. TP19
SHEET Sheet 1 of 1

LOGGED BY MB

CO-ORDINATES 686,519.89 E 719,387.48 N

DATE STARTED 03/10/2022
DATE COMPLETED 03/10/2022

GROUND LEVEL (m) 78.98

CLIENT
ENGINEER DOBA

EXCAVATION METHOD 7t Hitachi

RECEIVED: 13/08/2024

	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0	TOPSOIL: Soft brown sandy CLAY with rootlets. Sand is fine to coarse.									
	Firm to stiff grey mottled orange sandy gravely silty CLAY with a low cobble content. Sand is fine to coarse. Gravel is fine to coarse subrounded. Cobbles are subrounded to rounded of limestone.		0.30	78.68		AA185468	B	0.50-0.50	50	
1.0	Firm grey gravelly sandy SILT with a low cobble content. Sand is fine to coarse. Gravel is fine to coarse subrounded. Cobbles are subrounded to rounded of limestone.		0.90	78.08		AA185469	B	1.00-1.00		
2.0	(Medium dense) Slightly gravelly silty SAND with a low cobble content. Sand is fine. Gravel is fine to coarse subrounded. Cobbles are subrounded to rounded of limestone.		2.00	76.98		AA185470	B	2.20-2.20		
	(Dense) Slightly gravelly silty SAND with a medium cobble content and occasional boulders. Sand is fine. Gravel is fine to coarse subrounded. Cobbles and boulders are subrounded to rounded of limestone.		2.50	76.48	1 (Moderate)					
3.0	Side wall collapse from 2.50m to 3.20m					AA185471	B	2.90-2.90		
	End of Trial Pit at 3.20m		3.20	75.78						

Groundwater Conditions
Moderate flow at 2.50m

Stability
Slightly unstable, side wall collapse at 2.50m

General Remarks
Pit footprint scanned using cable avoidance tool [CAT]. Shear vane carried out at 0.30m bgl. Vane attempted at 0.50m - too stiff. Pit backfilled with arisings.

TRIAL PIT RECORD

REPORT NUMBER 24330

CONTRACT Halverstown

TRIAL PIT NO. TP20
SHEET Sheet 1 of 1

LOGGED BY MB

CO-ORDINATES 686,566.81 E
719,458.67 N

DATE STARTED 06/10/2022
DATE COMPLETED 06/10/2022

GROUND LEVEL (m) 79.78

CLIENT

ENGINEER DOBA

EXCAVATION METHOD 7t Hitachi

RECEIVED: 13/08/2024

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0 TOPSOIL: Soft brown slightly gravelly sandy silty CLAY. Sand is fine to coarse. Gravel is fine to medium subrounded.									
Firm grey slightly sandy gravelly clayey SILT. Sand is fine to coarse. Gravel is fine to coarse subrounded.		0.40	79.38					45 40	
					AA185488	B	0.60-0.60	65 70 60	
Slow progress from 0.80m onwards due to cobbles and boulders.									
1.0									
Firm to stiff brown mottled grey very silty slightly sandy gravelly CLAY with silt pockets. Sand is fine to coarse. Gravel is fine to coarse subrounded.		1.40	78.38						
					AA185489	B	1.60-1.70		
2.0									
Firm slightly clayey slightly gravelly sandy SILT. Sand is fine to coarse. Gravel is fine to medium subrounded.		2.40	77.38		AA185490	B	2.40-2.50		
Firm occasionally soft to firm blackish grey slightly sandy gravelly clayey SILT with a low cobble content. Sand is fine to coarse. Gravel is fine to medium subrounded.		2.60	77.18						
					AA185491	B	2.90-2.90		
3.0 End of Trial Pit at 3.00m		3.00	76.78						

Groundwater Conditions
Dry

Stability
Good

General Remarks
Pit footprint scanned using cable avoidance tool [CAT]. Shear vanes (set of three) carried out at both 0.40m & 0.60m bgl. Vane attempted at 0.70m - too gravelly. Pit backfilled with arisings.

TRIAL PIT RECORD

REPORT NUMBER 24330

CONTRACT	Halverstown	**TRIAL PIT NO.**	**TP21**
		SHEET	Sheet 1 of 1
LOGGED BY	MB	**CO-ORDINATES**	686,295.25 E 719,774.44 N
		DATE STARTED	14/10/2022
		DATE COMPLETED	14/10/2022
CLIENT		**GROUND LEVEL (m)**	82.96
		EXCAVATION METHOD	7t Hitachi
ENGINEER	DOBA		

RECEIVED: 13/08/2024

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0 TOPSOIL: Soft brown gravelly sandy CLAY. Sand is fine to coarse. Gravel is fine to medium subrounded.								34 38 43	
Firm brownish orange slightly gravelly silty sandy CLAY . Sand is fine to medium. Gravel is fine to coarse subangular to subrounded.		0.40	82.56		AA181983	B	0.50-0.60	77 81 83	
1.0 Firm to stiff brown very gravelly sandy silty CLAY with a medium cobble content. Sand is fine to coarse. Gravel is fine to coarse subrounded. Cobbles are subrounded to rounded of limestone.		0.90	82.06		AA181984	B	1.50-1.60		
2.0 Firm to stiff brownish grey slightly sandy gravelly clayey SILT with a medium cobble content and occassional boulders. Sand is fine to coarse. Gravel is fine to coarse subrounded. Cobbles and boulders are subrounded to rounded of limestone.		2.20	80.76		AA181985	B	2.50-2.60		
3.0 End of Trial Pit at 2.90m		2.90	80.06						

Groundwater Conditions
Dry

Stability
Good

General Remarks
Pit footprint scanned using cable avoidance tool [CAT]. Shear vanes (set of three) carried out at both 0.20m & 0.50m bgl. Vane attempted at 0.70m - too gravelly. Pit backfilled with arisings.

TRIAL PIT RECORD

REPORT NUMBER 24330

CONTRACT Halverstown

TRIAL PIT NO. TP22
SHEET Sheet 1 of 1

LOGGED BY MB

CO-ORDINATES 686,367.54 E
719,727.88 N

DATE STARTED 11/10/2022
DATE COMPLETED 11/10/2022

GROUND LEVEL (m) 83.38

CLIENT
ENGINEER DOBA

EXCAVATION METHOD 7t Hitachi

RECEIVED: 13/08/2024

	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0	TOPSOIL: Soft brown slightly gravelly sandy CLAY. Sand is fine to coarse. Gravel is fine to medium subrounded.									
	Firm brown sandy slightly gravelly silty CLAY.Sand is fine to coarse. Gravel is fine to coarse subrounded.		0.30	83.08		AA185497	B	0.60-0.60	50 48 52 60 68 70	
1.0	Stiff brown slightly sandy gravelly SILT with a low cobble content. Sand is fine to coarse. Gravel is fine to coarse subrounded. Cobbles are subrounded to rounded of limestone.		0.90	82.48		AA185498	B	1.40-1.40	75 84 81	
2.0	Stiff brownish grey sandy gravelly silty CLAY with a low cobble content. Sand is fine to coarse. Gravel is fine to coarse subrounded. Cobbles are subrounded to rounded of limestone.		1.80	81.58		AA185499	B	1.90-1.90		
	Brownish grey slightly silty gravelly SAND with a medium cobble content. Sand is fine to coarse. Gravel is fine to coarse subrounded. Cobbles are subrounded to rounded of limestone.		2.20	81.18		AA185500	B	2.40-2.40		
3.0	End of Trial Pit at 2.90m		2.90	80.48						

Groundwater Conditions
Dry

Stability
Good

General Remarks
Pit footprint scanned using cable avoidance tool [CAT]. Shear vanes (set of three) carried out at 0.30m, 0.50m & 0.70m bgl. Vane attempted at 0.90m - too gravelly. Pit backfilled with arisings.

TRIAL PIT RECORD

REPORT NUMBER 24330

CONTRACT	Halverstown	**TRIAL PIT NO.**	**TP23**
		SHEET	Sheet 1 of 1
LOGGED BY	MB	**CO-ORDINATES**	686,365.66 E 719,792.47 N
		DATE STARTED	11/10/2022
		DATE COMPLETED	11/10/2022
CLIENT		**GROUND LEVEL (m)**	84.33
		EXCAVATION METHOD	7t Hitachi
ENGINEER	DOBA		

RECEIVED: 13/08/2024

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
TOPSOIL: Soft brown slightly gravelly sandy CLAY. Sand is fine to coarse. Gravel is fine to medium subrounded.		0.30	84.03						
Firm brown sandy slightly gravelly silty CLAY.Sand is fine to coarse. Gravel is fine to coarse subrounded.					AA181957	B	0.50-0.60	45 50 55 55 62 63 63 65 67	
Stiff brown sandy gravelly SILT with a low cobble content. Sand is fine to coarse. Gravel is fine to coarse subrounded. Cobbles are subrounded to rounded of limestone.		1.30	83.03		AA181958	B	1.50-1.50		
Very stiff sandy gravelly clayey SILT. Sand is fine to coarse. Gravel is fine to coarse subrounded.		2.30	82.03		AA181959	B	2.50-2.60		
End of Trial Pit at 2.80m		2.80	81.53						

0.0
1.0
2.0
3.0

Groundwater Conditions
Dry

Stability
Good

General Remarks
Pit footprint scanned using cable avoidance tool [CAT]. Shear vanes (set of three) carried out at 0.30m, 0.50m & 0.70m bgl. Vane attempted at 0.80m - too gravelly. Pit backfilled with arisings.

TRIAL PIT RECORD

REPORT NUMBER 24330

CONTRACT	Halverstown	**TRIAL PIT NO.**	**TP24**
		SHEET	Sheet 1 of 1
LOGGED BY	MB	**CO-ORDINATES**	686,354.34 E 719,849.15 N
		DATE STARTED	12/10/2022
		DATE COMPLETED	12/10/2022
CLIENT		**GROUND LEVEL (m)**	85.19
ENGINEER	DOBA	**EXCAVATION METHOD**	7t Hitachi

RECEIVED: 13/08/2024

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
TOPSOIL: Soft brown gravelly sandy CLAY. Sand is fine to coarse. Gravel is fine to medium subrounded.								30 35 32	
Firm to stiff brown mottled orange very sandy gravelly CLAY. Sand is fine to coarse. Gravel is fine to coarse subangular to subrounded.		0.40	84.79		AA181960	B	0.60-0.70	76 81 89	
Firm brown very sandy slightly gravelly CLAY with a low cobble content. Sand is fine to coarse. Gravel is fine to coarse subrounded.Cobbles are subrounded to rounded of limestone.		1.20	83.99						
		1.60	83.59		AA181961	B	1.50-1.60		
End of Trial Pit at 2.60m					AA181962	B	2.60-2.70		

Groundwater Conditions
Dry

Stability
Good

General Remarks
Pit footprint scanned using cable avoidance tool [CAT]. Shear vanes (set of three) carried out at both 0.20m & 0.30m bgl. Vane attempted at 0.70m - too gravelly. Pit backfilled with arisings.

TRIAL PIT RECORD

REPORT NUMBER 24330

CONTRACT Halverstown

TRIAL PIT NO. TP25
SHEET Sheet 1 of 1

LOGGED BY MB

CO-ORDINATES 686,425.96 E
719,809.88 N

DATE STARTED 12/10/2022
DATE COMPLETED 12/10/2022

GROUND LEVEL (m) 85.36

CLIENT
ENGINEER DOBA

EXCAVATION METHOD 7t Hitachi

RECEIVED: 13/08/2024

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0 TOPSOIL: Soft brown gravelly sandy CLAY. Sand is fine to coarse. Gravel is fine to medium subrounded.									
Firm brown mottled orange very sandy gravelly CLAY. Sand is fine to coarse. Gravel is fine to coarse subangular to subrounded.		0.40	84.96		AA181963	B	0.50-0.60	50 52 47 80 95 83	
1.0 Greyish brown gravelly clayey SAND with a medium cobble content and occasional boulders. Sand is fine to coarse. Gravel is fine to coarse subrounded.Cobbles and boulders are subrounded to rounded of limestone.		1.20	84.16		AA181964	B	1.50-1.60		
2.0 Firm brownish grey very sandy gravelly SILT with a low cobble content. Sand is fine to coarse. Gravel is fine to coarse subrounded.Cobbles are subrounded to rounded of limestone.		2.40	82.96		AA181965	B	2.50-2.60		
3.0 End of Trial Pit at 3.00m		3.00	82.36						

Groundwater Conditions
Dry

Stability
Good

General Remarks
Pit footprint scanned using cable avoidance tool [CAT]. Shear vanes (set of three) carried out at both 0.30m & 0.50m bgl. Vane attempted at 0.80m - too gravelly. Pit backfilled with arisings.

TRIAL PIT RECORD

REPORT NUMBER 24330

CONTRACT Halverstown

TRIAL PIT NO. TP26
SHEET Sheet 1 of 1

LOGGED BY MB

CO-ORDINATES 686,611.58 E
719,726.52 N

DATE STARTED 13/10/2022
DATE COMPLETED 13/10/2022

GROUND LEVEL (m) 83.00

CLIENT
ENGINEER DOBA

EXCAVATION METHOD 7t Hitachi

RECEIVED: 13/08/2024

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
TOPSOIL: Soft brown gravelly sandy silty CLAY. Sand is fine to coarse. Gravel is fine to medium subrounded.									
Firm brown sandy gravelly silty CLAY with root hairs. Sand is fine to coarse. Gravel is fine to coarse subangular to subrounded.		0.30	82.70					38 46 42	
					AA181975	B	0.50-0.60	66 73 68	
Stiff brown very sandy very gravelly silty CLAY with a medium cobble content and ocassional boulders. Sand is fine to coarse. Gravel is fine to coarse subrounded.Cobbles and boulders are subrounded to rounded of limestone.		0.90	82.10						
					AA181976	B	1.30-1.40		
Boulder at 1.80m (up to 400mm)									
Firm to stiff brown sandy very gravelly silty CLAY with a low cobble content. Sand is fine to coarse. Gravel is fine to coarse subrounded.Cobbles are subrounded to rounded of limestone.		2.10	80.90						
					AA181978	B	2.40-2.50		
End of Trial Pit at 2.70m		2.70	80.30						

Groundwater Conditions
Dry

Stability
Good

General Remarks
Pit footprint scanned using cable avoidance tool [CAT]. Shear vanes (set of three) carried out at both 0.20m & 0.50m bgl. Vane attempted at 0.70m - too gravelly. Pit backfilled with arisings.

TRIAL PIT RECORD

REPORT NUMBER 24330

CONTRACT Halverstown

TRIAL PIT NO. TP27
SHEET Sheet 1 of 1

LOGGED BY MB

CO-ORDINATES 686,682.52 E
719,695.28 N

DATE STARTED 13/10/2022
DATE COMPLETED 13/10/2022

GROUND LEVEL (m) 81.34

CLIENT
ENGINEER DOBA

EXCAVATION METHOD 7t Hitachi

RECEIVED: 13/08/2024

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0 TOPSOIL: Soft brown gravelly sandy silty CLAY. Sand is fine to coarse. Gravel is fine to medium subrounded.									
		0.30	81.04						
Firm grey mottled orange sandy gravelly SILT. Sand is fine to coarse. Gravel is fine to coarse subrounded.					AA181972	B	0.50-0.60	45 48 49 78 85 82 120 118	
1.0									
		1.10	80.24						
Stiff grey sandy gravelly SILT with a low cobble content. Sand is fine to coarse. Gravel is fine to coarse subrounded.Cobbles are subrounded to rounded of limestone.					AA181973	B	1.50-1.60		
		1.80	79.54						
2.0 Firm brown sandy gravelly clayey SILT with a low cobble content. Sand is fine to coarse. Gravel is fine to coarse subrounded.Cobbles are subrounded to rounded of limestone.					AA181974	B	2.20-2.30		
3.0									
		3.10	78.24						
End of Trial Pit at 3.10m									

Groundwater Conditions
Dry

Stability
Good

General Remarks
Pit footprint scanned using cable avoidance tool [CAT]. Shear vanes (set of three) carried out at 0.30m, 0.50m & 0.70m bgl. Pit backfilled with arisings.

TRIAL PIT RECORD

REPORT NUMBER 24330

CONTRACT	Halverstown	**TRIAL PIT NO.**	**TP28**
		SHEET	Sheet 1 of 1
LOGGED BY	MB	**CO-ORDINATES**	686,668.41 E 719,756.26 N
		DATE STARTED	13/10/2022
		DATE COMPLETED	13/10/2022
CLIENT		**GROUND LEVEL (m)**	81.28
ENGINEER	DOBA	**EXCAVATION METHOD**	7t Hitachi

RECEIVED: 13/08/2024

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
TOPSOIL: Soft brown gravelly sandy silty CLAY with roolets and timber roots. Sand is fine to coarse. Gravel is fine to medium subrounded.								38 35 41	
Firm grey mottled orange sandy gravelly SILT. Sand is fine to coarse. Gravel is fine to coarse subrounded.		0.50	80.78		AA181969	B	0.60-0.70	80 95 98	
Firm grey mottled orange sandy gravelly SILT. Sand is fine to coarse. Gravel is fine to coarse subrounded.		1.30	79.98		AA181970	B	1.60-1.70		
Firm brown sandy gravelly clayey SILT with a low cobble content. Sand is fine to coarse. Gravel is fine to coarse subrounded.Cobbles are subrounded to rounded of limestone.		2.20	79.08		AA181971	B	2.50-2.60		
End of Trial Pit at 2.70m		2.70	78.58						

Groundwater Conditions
Dry

Stability
Good

General Remarks
Pit footprint scanned using cable avoidance tool [CAT]. Shear vanes (set of three) carried out at both 0.20m & 0.50m bgl. Vane attempted at 0.70m - too gravelly. Pit backfilled with arisings.

TRIAL PIT RECORD

REPORT NUMBER 24330

CONTRACT Halverstown

TRIAL PIT NO. TP29
SHEET Sheet 1 of 1

LOGGED BY MB

CO-ORDINATES 686,647.26 E
719,817.71 N

DATE STARTED 13/10/2022
DATE COMPLETED 13/10/2022

GROUND LEVEL (m) 81.66

CLIENT
ENGINEER DOBA

EXCAVATION METHOD 7t Hitachi

RECEIVED: 13/08/2024

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0 TOPSOIL: Soft brown gravelly sandy silty CLAY with roolets. Sand is fine to coarse. Gravel is fine to medium subrounded.									
Firm brown sandy gravelly CLAY. Sand is fine to coarse. Gravel is fine to coarse subrounded.		0.30	81.36					28 31 34	
Stiff grey very sandy gravelly CLAY. Sand is fine to coarse. Gravel is fine to coarse subrounded.		0.60	81.06		AA181966	B	0.50-0.60	47 52 48	
1.0 Stiff brown very sandy very gravelly silty CLAY with a medium cobble content. Sand is fine to coarse. Gravel is fine to coarse subrounded.Cobbles and boulders are subrounded to rounded of limestone.		1.20	80.46		AA181967	B	1.50-1.60		
2.0 Stiff greyish brown very sandy gravelly SILT with a low cobble content. Sand is fine to coarse. Gravel is fine to coarse subrounded.Cobbles and boulders are subrounded to rounded of limestone.		2.20	79.46		AA181968	B	2.50-2.60		
3.0 End of Trial Pit at 2.90m		2.90	78.76						

Groundwater Conditions
Dry

Stability
Good

General Remarks
Pit footprint scanned using cable avoidance tool [CAT]. Shear vanes (set of three) carried out at both 0.20m & 0.50m bgl. Vane attempted at 0.70m - too gravelly. Pit backfilled with arisings.

TRIAL PIT RECORD

REPORT NUMBER 24330

CONTRACT	Halverstown	**TRIAL PIT NO.**	**TP30**
		SHEET	Sheet 1 of 1
LOGGED BY	MB	**CO-ORDINATES**	686,733.51 E 719,786.79 N
		DATE STARTED	13/10/2022
		DATE COMPLETED	13/10/2022
CLIENT		**GROUND LEVEL (m)**	80.61
ENGINEER	DOBA	**EXCAVATION METHOD**	7t Hitachi

RECEIVED: 13/08/2024

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
TOPSOIL: Soft dark brown sandy silty CLAY with roolets. Sand is fine to coarse. Gravel is fine to medium subrounded.		0.20	80.41						
Firm grey mottled orange gravelly silty SAND. Sand is fine to medium. Gravel is fine to coarse subangular to subrounded. Sidewall collapse from 0.20m					AA181978	B	0.50-0.60	32 35 39	
Stiff greyish brown sandy gravelly clayey SILT with a medium cobble content. Sand is fine to coarse. Gravel is fine to coarse subrounded. Cobbles are subrounded to rounded of limestone.		1.00	79.61					>120	
					AA181979	B	1.50-1.60		
Firm to stiff grey very sandy gravelly clayey SILT with a low cobble content and bands of silty sand. Sand is fine to coarse. Gravel is fine to coarse subrounded. Cobbles are subrounded to rounded of limestone. Recovered wet from 2.0-2.5. 1.70m-1.80m Fine to medium sandy silt lens		1.70	78.91						
				1 (Seepage)	AA181980	B	2.30-2.40		
End of Trial Pit at 2.50m		2.50	78.11						

Groundwater Conditions
Seepage at 2.40m

Stability
Unstable, sidewall collapse from 0.20m

General Remarks
Pit footprint scanned using cable avoidance tool [CAT]. Shear vane (set of three) carried out at 0.30m bgl. Single vane undertaken at 1.0m bgl. Pit ended at 2.50m due to instability. Pit backfilled with arisings.

TRIAL PIT RECORD

REPORT NUMBER 24330

CONTRACT	Halverstown	**TRIAL PIT NO.**	**TP31**
		SHEET	Sheet 1 of 1
LOGGED BY	MB	**CO-ORDINATES**	686,101.19 E 719,955.04 N
		DATE STARTED	17/10/2022
		DATE COMPLETED	17/10/2022
CLIENT		**GROUND LEVEL (m)**	83.80
		EXCAVATION METHOD	7t Hitachi
ENGINEER	DOBA		

RECEIVED: 13/08/2024

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0 TOPSOIL: Soft brown gravelly sandy CLAY with roolets. Sand is fine to coarse. Gravel is fine to medium subrounded.									
Firm brown very sandy slightly silty gravellly CLAY. Sand is fine to medium. Gravel is fine to coarse subangular to subrounded.		0.30	83.50					30 34 38	
					AA181992	B	0.50-0.60	67 74 78	
Stiff brown very sandy gravelly CLAY with a medium cobble content. Sand is fine to coarse. Gravel is fine to coarse subrounded. Cobbles are subrounded to rounded of limestone.		0.80	83.00						
1.0									
					AA181993	B	1.40-1.50		
2.0									
Obstruction - Possible Boulders Boulders from 2.30m		2.30	81.50						
End of Trial Pit at 2.80m									
3.0									

Groundwater Conditions
Dry

Stability
Good

General Remarks
Pit footprint scanned using cable avoidance tool [CAT]. Shear vanes (set of three) carried out at both 0.20m & 0.50m bgl. Vane attempted at 0.70m - too gravelly. Pit backfilled with arisings.

TRIAL PIT RECORD

REPORT NUMBER 24330

CONTRACT	Halverstown	**TRIAL PIT NO.**	**TP32**
		SHEET	Sheet 1 of 1
LOGGED BY	MB	**CO-ORDINATES**	686,084.15 E 719,879.36 N
		DATE STARTED	17/10/2022
		DATE COMPLETED	17/10/2022
CLIENT		**GROUND LEVEL (m)**	83.16
		EXCAVATION METHOD	7t Hitachi
ENGINEER	DOBA		

RECEIVED: 13/08/2024

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0 TOPSOIL: Soft brown gravelly sandy CLAY with roolets. Sand is fine to coarse. Gravel is fine to medium subrounded.									
		0.30	82.86					25 34 29	
Firm brown very sandy slightly gravelly silty CLAY. Sand is fine to coarse. Gravel is fine to coarse subrounded.Cobbles are subrounded to rounded of limestone.					AA181994	B	0.50-0.60	50 56 58	
		0.80	82.36						
Stiff brown very sandy slightly silty gravelly CLAY with a medium cobble content.Sand is fine to coarse. Gravel is fine to coarse subrounded. Cobbles are subrounded to rounded of limestone.					AA181995	B	1.40-1.50		
		2.30	80.86						
Stiff greyish brown sandy gravelly clayey SILT with a medium cobble content and occassional boulders. Sand is fine to coarse. Gravel is fine to coarse subrounded. Cobbles and boulders are subrounded to rounded of limestone.					AA181996	B	2.50-2.60		
		2.80	80.36						
End of Trial Pit at 2.30m									

Groundwater Conditions
Dry

Stability
Good

General Remarks
Pit footprint scanned using cable avoidance tool [CAT]. Shear vanes (set of three) carried out at both 0.20m & 0.50m bgl. Vane attempted at 0.70m - too stiff. Pit backfilled with arisings.

TRIAL PIT RECORD

REPORT NUMBER 24330

CONTRACT	Halverstown	**TRIAL PIT NO.**	**TP33**
		SHEET	Sheet 1 of 1
LOGGED BY	MB	**CO-ORDINATES**	686,199.88 E 719,934.90 N
		DATE STARTED	17/10/2022
		DATE COMPLETED	17/10/2022
CLIENT		**GROUND LEVEL (m)**	84.73
		EXCAVATION METHOD	7t Hitachi
ENGINEER	DOBA		

RECEIVED: 13/08/2024

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
TOPSOIL: Soft brown gravelly sandy CLAY with roolets. Sand is fine to coarse. Gravel is fine to medium subrounded.								25 26 32	
Firm brown very sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is fine to coarse subrounded.Cobbles are subrounded to rounded of limestone.		0.40	84.33		AA181989	B	0.50-0.60	51 53 48 58 62 63	
Stiff brown very sandy slightly silty gravelly CLAY with a medium cobble content.Sand is fine to coarse. Gravel is fine to coarse subrounded. Cobbles are subrounded to rounded of limestone.		0.90	83.83		AA181990	B	1.40-1.50		
Firm to stiff brown sandy gravelly clayey SILT with a medium cobble content and ocassional boulders. Sand is fine to coarse. Gravel is fine to coarse subrounded.Cobbles and bouldes are subrounded to rounded of limestone. Boulder at 2.70m (up to 500mm)		2.20	82.53		AA181991	B	2.50-2.60		
End of Trial Pit at 2.80m		2.80	81.93						

Groundwater Conditions
Dry

Stability
Good

General Remarks
Pit footprint scanned using cable avoidance tool [CAT]. Shear vanes (set of three) carried out at 0.20m, 0.50m & 0.70m bgl. Pit backfilled with arisings.

TRIAL PIT RECORD

REPORT NUMBER 24330

CONTRACT	Halverstown	**TRIAL PIT NO.**	**TP34**
		SHEET	Sheet 1 of 1
LOGGED BY	MB	**CO-ORDINATES**	686,182.78 E 719,866.42 N
		DATE STARTED	17/10/2022
		DATE COMPLETED	17/10/2022
CLIENT		**GROUND LEVEL (m)**	83.94
		EXCAVATION METHOD	7t Hitachi
ENGINEER	DOBA		

RECEIVED: 13/08/2024

	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0	TOPSOIL: Soft brown gravelly sandy CLAY with roolets. Sand is fine to coarse. Gravel is fine to medium subrounded.									
	Firm brown sandy slightly gravelly silty CLAY.Sand is fine to coarse. Gravel is fine to coarse subrounded.		0.30	83.64					25 23 26	
						AA181986	B	0.50-0.60	48 51 53	
	Stiff brown very sandy slightly silty gravelly CLAY with a medium cobble content.Sand is fine to coarse. Gravel is fine to coarse subrounded. Cobbles are subrounded to rounded of limestone.		0.90	83.04					64 63 67	
1.0										
						AA181987	B	1.40-1.50		
2.0										
	Firm to stiff brown very sandy silty gravelly CLAY with a medium cobble content.Sand is fine to coarse. Gravel is fine to coarse subrounded. Cobbles are subrounded to rounded of limestone. Large boulder at 2.60m (up to 900mm)		2.40	81.54						
						AA181988	B	2.50-2.60		
3.0	End of Trial Pit at 3.00m		3.00	80.94						

Groundwater Conditions
Dry

Stability
Good

General Remarks
Pit footprint scanned using cable avoidance tool [CAT]. Shear vanes (set of three) carried out at 0.20m, 0.50m & 0.80m bgl. Pit backfilled with arisings.

RECEIVED: 13/08/2024

TP01 – 1 of 3



TP01 – 2 of 3



TP01 – 3 of 3



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RECEIVED: 13/08/2024

TP02 – 1 of 3



TP02 – 2 of 3



TP02 – 3 of 3

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TP03 – 1 of 3



TP03 – 2 of 3



TP03 – 3 of 3



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TP04 – 1 of 3

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TP04 – 2 of 3



TP04 – 3 of 3

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TP05 – 1 of 4

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TP05 – 2 of 4



TP05 – 3 of 4

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TP06 – 1 of 3

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TP06 – 2 of 3



TP06– 3 of 3



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TP07 – 1 of 3

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TP07 – 2 of 3



TP07 – 3 of 3



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TP08 – 2 of 3



TP08 – 3 of 3

RECEIVED: 13/08/2024



TP09 – 1 of 3

RECEIVED: 13/08/2024



TP09 – 2 of 3



TP09 – 3 of 3

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TP10 – 1 of 3

RECEIVED: 13/08/2024



TP10 – 2 of 3



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TP11– 1 of 3

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TP12 – 1 of 3



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TP15 – 1 of 3



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TP16 – 1 of 3

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TP16 – 2 of 3



TP16 – 3 of 3

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TP17 – 1 of 3

RECEIVED: 13/08/2024



TP17 – 2 of 3



TP17 – 3 of 3

RECEIVED: 13/08/2024



TP18 – 1 of 3

RECEIVED: 13/08/2024



TP18 – 2 of 3



TP18 – 3 of 3

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TP19 – 1 of 3

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TP20 – 1 of 3

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TP21 – 1 of 3

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TP22 – 1 of 3



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TP23 – 1 of 3



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TP25 – 1 of 3



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TP32 – 1 of 3



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Appendix 1A

Trial Pit Logs (TP/RO) and Photographs

TRIAL PIT RECORD

REPORT NUMBER 24330

CONTRACT	Halverstown	**TRIAL PIT NO.**	**TP/RO01**
		SHEET	Sheet 1 of 1
LOGGED BY	IC	**CO-ORDINATES**	686,147.64 E 719,931.87 N
		DATE STARTED	27/04/2023
		DATE COMPLETED	27/04/2023
CLIENT		**GROUND LEVEL (m)**	84.10
ENGINEER	DOBA	**EXCAVATION METHOD**	13t Tracked Excavator

RECEIVED: 15/08/2024

	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0	TOPSOIL: Soft to firm brown sandy clay with roolets. Sand is fine to coarse.									
	Firm greyish light brown very sandy gravelly CLAY with medium cobble content. Sand is fine to coarse. Gravel is fine to coarse subrounded to subangular. Cobbles are rounded to subangular of limestone.		0.20	83.90					85	
						AA198171	B	0.60-0.60	110	
1.0	Firm to stiff grey/brown very sandy very gravelly CLAY with high cobble content. Sand is fine to coarse. Gravel is fine to coarse subrounded to subangular. Cobbles are rounded to subangular of limestone.		1.00	83.10						
						AA198172	B	1.50-1.50		
	Soft to firm grey/brown very sandy very gravelly CLAY with high cobble and medium boulder content. Sand is fine to coarse. Gravel is fine to coarse subrounded. Cobbles are rounded to subangular of limestone. Boulders are subrounded.		1.80	82.30						
2.0						AA198173	B	2.10-2.10		
	Grey/brown sandy very clayey GRAVEL with high cobble and medium boulder content. Sand is fine to coarse. Gravel is fine to coarse subrounded to subangular. Cobbles are rounded to subangular of limestone. Boulders are subrounded of limestone (up to 400mm).		2.30	81.80	1 (Seepage)					
						AA198174	B	2.80-2.80		
3.0	End of Trial Pit at 3.00m		3.00	81.10						

Groundwater Conditions
Seepage at 2.40m

Stability
Slightly unstable from 1.90m

General Remarks
Pit footprint scanned using cable avoidance tool [CAT]. Shear vanes (set of three) carried out at 0.30m & 0.70m bgl. Pit backfilled with arisings.

TRIAL PIT RECORD

REPORT NUMBER 24330

CONTRACT	Halverstown	**TRIAL PIT NO.**	**TP/RO02**
		SHEET	Sheet 1 of 1
LOGGED BY	IC	**CO-ORDINATES**	686,076.88 E 719,826.77 N
		DATE STARTED	02/05/2023
		DATE COMPLETED	02/05/2023
CLIENT		**GROUND LEVEL (m)**	82.58
ENGINEER	DOBA	**EXCAVATION METHOD**	13t Tracked Excavator

RECEIVED: 15/08/2024

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0 TOPSOIL: Soft to firm light brown sandy clay with roolets. Sand is fine to coarse.		0.15	82.43						
Firm light brown very sandy CLAY with occasional cobbles. Gravel is fine to coarse subrounded to subangular. Cobbles are rounded to subangular of limestone.								80	
		0.60	81.98		AA198190	B	0.50-0.50		
Firm greyish brown sandy gravelly CLAY with occasional cobbles. Gravel is fine to coarse subrounded to subangular. Cobbles are rounded to subangular of limestone.								105	
1.0									
		1.20	81.38						
Grey/brown slightly sandy very clayey GRAVEL with medium cobble content and occasional boulders. Sand is fine to coarse. Gravel is fine to coarse subrounded to subangular. Cobbles are rounded to subangular of limestone. Boulders are subrounded of limestone (up to 300mm).					AA198191	B	1.50-1.50		
		1.80	80.78						
Soft to firm brown slightly clayey very gravelly SAND with occasional cobbles, (possible sandy gravel). Sand is fine to coarse. Gravel is fine to coarse rounded to subangular. Cobbles are rounded to subangular of limestone.				1 (Seepage)	AA198192	B	2.00-2.00		
2.0									
		2.20	80.38						
Grey/brown sandy clayey GRAVEL with medium cobble and low boulder content. Sand is fine to coarse. Gravel is fine to coarse subrounded to subangular. Cobbles are rounded to subangular of limestone. Boulders are subrounded of limestone.									
		2.50	80.08		AA198193	B	2.50-2.50		
TP terminated due to major instability End of Trial Pit at 2.50m									
3.0									

Groundwater Conditions
Seepage at 2.10m

Stability
Unstable from 0.40m

General Remarks
Pit footprint scanned using cable avoidance tool [CAT]. Shear vanes (set of three) carried out at 0.30m & 0.70m bgl. Pit backfilled with arisings.

TRIAL PIT RECORD

REPORT NUMBER 24330

CONTRACT	Halverstown	**TRIAL PIT NO.**	**TP/RO03**
		SHEET	Sheet 1 of 1
LOGGED BY	IC	**CO-ORDINATES**	686,269.42 E 719,719.55 N
		DATE STARTED	02/05/2023
		DATE COMPLETED	02/05/2023
CLIENT		**GROUND LEVEL (m)**	81.59
ENGINEER	DOBA	**EXCAVATION METHOD**	13t Tracked Excavator

RECEIVED: 15/08/2024

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
TOPSOIL: Soft to firm light brown sandy clay with roolets. Sand is fine to coarse.		0.15	81.44						
Firm light brown sandy CLAY with occasional cobbles. Gravel is fine to coarse subrounded to subangular. Cobbles are rounded to subangular of limestone.								90	
Firm brown mottled golden brown and grey sandy slightly gravelly CLAY with occasional cobbles and occasional boulders. Sand is fine to coarse. Gravel is fine to coarse subrounded to subangular. Cobbles are rounded to subangular of limestone. Boulders are subrounded of limestone.		0.50	81.09		AA198187	B	0.50-0.50		
		0.80	80.79					87	
Firm light brown sandy very gravelly CLAY with high cobble content and medium boulder content. Sand is fine to coarse. Gravel is fine to coarse rounded to subangular. Cobbles are rounded to subangular of limestone. Boulders are subrounded of limestone.				1 (Seepage)	AA198188	B	1.50-1.50		
				2 (Rapid)	AA198189	B	2.10-2.10		
TP terminated due to major instability and rapid water flow End of Trial Pit at 2.30m		2.30	79.29						

Groundwater Conditions
Seepage at 1.50m; rapid water flow at 2.0m

Stability
Unstable from 1.00m

General Remarks
Pit footprint scanned using cable avoidance tool [CAT]. Shear vanes (set of three) carried out at 0.30m & 0.70m bgl. Pit backfilled with arisings.

TRIAL PIT RECORD

REPORT NUMBER 24330

CONTRACT	Halverstown	**TRIAL PIT NO.**	**TP/RO04**
		SHEET	Sheet 1 of 1
LOGGED BY	IC	**CO-ORDINATES**	686,165.76 E 719,660.76 N
		DATE STARTED	02/05/2023
		DATE COMPLETED	02/05/2023
CLIENT		**GROUND LEVEL (m)**	80.35
ENGINEER	DOBA	**EXCAVATION METHOD**	13t Tracked Excavator

RECEIVED: 15/08/2024

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
TOPSOIL: Soft to firm light brown sandy clay with roolets. Sand is fine to coarse.		0.15	80.20						
Firm light brown slightly sandy CLAY. Sand is fine to coarse.		0.30	80.05						
Firm yellowish brown very sandy gravelly CLAY with occasional cobbles. Sand is fine to coarse. Gravel is fine to coarse rounded to subangular. Cobbles are rounded to subangular of limestone.					AA193200	B	0.50-0.50	85 65	
Soft to firm light brown sandy very gravelly CLAY with high cobble content and medium boulder content. Sand is fine to coarse. Gravel is fine to coarse rounded to subangular. Cobbles are rounded to subangular of limestone. Boulders are subrounded of limestone.		1.00	79.35		AA193201	B	1.50-1.50		
Grey/brown sandy very clayey GRAVEL with high cobble content and occasional boulders. Sand is fine to coarse. Gravel is fine to coarse rounded to subangular. Cobbles are rounded to subangular of limestone. Boulders are subrounded of limestone.		1.70	78.65	1 (Rapid)	AA193202	B	2.20-2.20		
TP terminated due to major instability and rapid water flow End of Trial Pit at 2.30m		2.30	78.05						

Groundwater Conditions
Rapid water flow at 1.80m

Stability
Unstable from 1.50m

General Remarks
Pit footprint scanned using cable avoidance tool [CAT]. Shear vanes (set of three) carried out at 0.40m & 0.70m bgl. Pit backfilled with arisings.

TRIAL PIT RECORD

REPORT NUMBER 24330

CONTRACT	Halverstown	**TRIAL PIT NO.**	**TP/RO05**
		SHEET	Sheet 1 of 1
LOGGED BY	IC	**CO-ORDINATES**	686,384.21 E 719,792.15 N
		DATE STARTED	27/04/2023
		DATE COMPLETED	27/04/2023
CLIENT		**GROUND LEVEL (m)**	84.68
ENGINEER	DOBA	**EXCAVATION METHOD**	13t Tracked Excavator

RECEIVED: 15/08/2024

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0 TOPSOIL: Firm brown sandy clay with roolets. Sand is fine to coarse.		0.15	84.53						
Firm brown sandy slightly gravelly CLAY with occasional cobbles. Sand is fine to coarse. Gravel is fine to coarse rounded to subangular. Cobbles are rounded to subangular of limestone.					AA198237	B	0.50-0.50	90	
		0.80	83.88					110	
1.0 Firm yellowish brown sandy very gravelly CLAY with occasional cobbles. Sand is fine to coarse. Gravel is fine to coarse rounded to subangular. Cobbles are rounded to subangular of limestone and mudstone.					AA198238	B	1.20-1.20		
		1.50	83.18						
2.0 Brownish grey sandy clayey GRAVEL with medium cobble and medium boulder content. Sand is fine to coarse. Gravel is fine to coarse rounded to subangular. Cobbles are rounded to subangular of limestone. Boulders are subrounded of limestone.				1 (Moderate)	AA198239	B	2.10-2.10		
		2.90	81.78						
3.0 Firm grey/brown sandy very gravelly CLAY with medium cobble and medium boulder content. Sand is fine to coarse. Gravel is fine to coarse rounded to subangular. Cobbles are rounded to subangular of limestone. Boulders are subrounded of limestone.					AA198240	B	3.30-3.30		
		3.60	81.08						
End of Trial Pit at 3.60m									

Groundwater Conditions
Moderate flow at 2.30m

Stability
Slightly unstable from 1.50m

General Remarks
Pit footprint scanned using cable avoidance tool [CAT]. Shear vanes (set of three) carried out at 0.40m & 0.80m bgl. Pit backfilled with arisings.

TRIAL PIT RECORD

REPORT NUMBER 24330

CONTRACT	Halverstown	**TRIAL PIT NO.**	**TP/RO06**
		SHEET	Sheet 1 of 1
LOGGED BY	IC	**CO-ORDINATES**	686,490.29 E 719,819.15 N
		DATE STARTED	26/04/2023
		DATE COMPLETED	26/04/2023
CLIENT		**GROUND LEVEL (m)**	84.92
ENGINEER	DOBA	**EXCAVATION METHOD**	13t Tracked Excavator

RECEIVED: 15/08/2024

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0 TOPSOIL: Soft to firm brown sandy clay with roolets. Sand is fine to coarse.		0.15	84.77						
Firm yellowish brown sandy CLAY. Sand is fine to coarse.					AA198233	B	0.50-0.50	92	
Firm to stiff greyish brown sandy slightly gravelly CLAY with occasional cobbles. Sand is fine to coarse. Gravel is fine to coarse rounded to subangular. Cobbles are rounded to subangular of limestone.		0.70	84.22					97	
1.0					AA198234	B	1.10-1.10		
Soft to firm light brown sandy very gravelly CLAY with medium cobble content and occasional boulders. Sand is fine to coarse. Gravel is fine to coarse rounded to subangular. Cobbles are rounded to subangular of limestone. Boulders are subrounded of limestone (up to 500mm).		1.50	83.42	1 (Seepage)					
2.0					AA198235	B	2.00-2.00		
Grey/brown sandy very clayey GRAVEL with high cobble and medium boulder content. Sand is fine to coarse. Gravel is fine to coarse rounded to subangular. Cobbles are rounded to subangular of limestone. Boulders are subrounded of limestone (up to 500mm).		2.50	82.42	2 (Seepage)					
3.0					AA198236	B	3.20-3.20		
End of Trial Pit at 3.30m		3.30	81.62						

Groundwater Conditions
Seepage at 2.0m and 3.0m

Stability
Slightly unstable from 1.50m

General Remarks
Pit footprint scanned using cable avoidance tool [CAT]. Shear vanes (set of three) carried out at 0.30m & 0.70m bgl. Pit backfilled with arisings.

TRIAL PIT RECORD

REPORT NUMBER 24330

CONTRACT	Halverstown	**TRIAL PIT NO.**	**TP/RO07**
		SHEET	Sheet 1 of 1
LOGGED BY	IC	**CO-ORDINATES**	686,613.61 E 719,733.59 N
		DATE STARTED	26/04/2023
		DATE COMPLETED	26/04/2023
CLIENT		**GROUND LEVEL (m)**	82.86
ENGINEER	DOBA	**EXCAVATION METHOD**	13t Tracked Excavator

RECEIVED: 15/08/2024

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0 TOPSOIL: Firm brown sandy clay with roolets. Sand is fine to coarse.		0.15	82.71						
Firm brown sandy slightly gravelly CLAY with occasional cobbles. Sand is fine to medium. Gravel is fine to coarse rounded to subangular. Cobbles are rounded to subangular of limestone.		0.45	82.41		AA198233	B	0.40-0.40	100	
Firm greyish brown sandy gravelly CLAY with occasional cobbles, frequent pockets of sand. Sand is fine to coarse. Gravel is fine to coarse rounded to subangular. Cobbles are rounded to subangular of limestone.					AA198234	B	0.70-0.70	79	
1.0									
Firm brown mottled golden brown and grey sandy gravelly CLAY with medium cobble and medium boulder content, frequent pockets of sand. Sand is fine to coarse. Gravel is fine to coarse rounded to subangular. Cobbles are rounded to subangular of limestone. Boulders are subrounded of limestone.		1.20	81.66		AA198235	B	1.40-1.40		
Soft to firm light brown sandy very gravelly CLAY with medium cobble medium boulder content. Sand is fine to coarse. Gravel is fine to coarse rounded to subangular. Cobbles are rounded to subangular of limestone. Boulders are subrounded of limestone.		1.80	81.06	1 (Seepage)	AA198236	B	2.00-2.00		
2.0									
Grey/brown sandy very clayey GRAVEL with high cobble and medium boulder content. Sand is fine to coarse. Gravel is fine to coarse rounded to angular. Cobbles are rounded to subangular of limestone. Boulders are subrounded of limestone.		2.50	80.36	2 (Rapid)					
3.0									
End of Trial Pit at 3.30m		3.30	79.56		AA198237	B	3.20-3.20		

Groundwater Conditions
Seepage at 1.80m; rapid water flow at 2.40

Stability
Slightly unstable from 1.10m

General Remarks
Pit footprint scanned using cable avoidance tool [CAT]. Shear vanes (set of three) carried out at 0.30m & 0.70m bgl. Pit backfilled with arisings.

TRIAL PIT RECORD

REPORT NUMBER 24330

CONTRACT	Halverstown	**TRIAL PIT NO.**	**TP/RO08**
		SHEET	Sheet 1 of 1
LOGGED BY	IC	**CO-ORDINATES**	686,448.20 E 719,589.83 N
		DATE STARTED	27/04/2023
		DATE COMPLETED	27/04/2023
CLIENT		**GROUND LEVEL (m)**	81.40
ENGINEER	DOBA	**EXCAVATION METHOD**	13t Tracked Excavator

RECEIVED: 15/08/2024

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0 TOPSOIL: Firm light brown sandy clay with roolets. Sand is fine to coarse.		0.20	81.20						
Firm greyish brown very sandy gravelly CLAY with occasional cobbles. Sand is fine to coarse. Gravel is fine to coarse rounded to subangular. Cobbles are rounded to subangular of limestone.								112	
					AA198167	B	0.60-0.60	70	
1.0									
Grey/brown very sandy very clayey GRAVEL with high cobble content. Sand is fine to coarse. Gravel is fine to coarse rounded to angular. Cobbles are rounded to subangular of limestone.		1.30	80.10						
		1.50	79.90		AA198168	B	1.40-1.40		
Firm grey/brown sandy very gravelly CLAY with high cobble and medium boulder content. Sand is fine to coarse. Gravel is fine to coarse rounded to subangular. Cobbles are rounded to subangular of limestone. Boulders are subrounded of limestone.									
2.0				1 (seepage)					
					AA198169	B	2.50-2.50		
Stiff to very stiff dark brown slightly sandy very gravelly CLAY with high cobble and medium boulder content. Sand is fine to coarse. Gravel is fine to coarse rounded to subangular. Cobbles are rounded to subangular of limestone. Boulders are subrounded of limestone (up to 300mm).		2.90	78.50						
3.0									
		3.30	78.10		AA198170	B	3.30-3.30		
End of Trial Pit at 3.30m									

Groundwater Conditions
Seepage at 2.30m

Stability
Slightly unstable from 2.00m

General Remarks
Pit footprint scanned using cable avoidance tool [CAT]. Shear vanes (set of three) carried out at 0.40m & 0.80m bgl. Pit backfilled with arisings.

TRIAL PIT RECORD

REPORT NUMBER 24330

CONTRACT	Halverstown	**TRIAL PIT NO.**	**TP/RO09**
		SHEET	Sheet 1 of 1
LOGGED BY	IC	**CO-ORDINATES**	686,263.95 E 719,467.48 N
		DATE STARTED	28/04/2023
		DATE COMPLETED	28/04/2023
CLIENT		**GROUND LEVEL (m)**	77.31
ENGINEER	DOBA	**EXCAVATION METHOD**	13t Tracked Excavator

RECEIVED: 15/08/2024

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0 TOPSOIL: Firm dark brown sandy clay with roolets. Sand is fine to coarse.		0.15	77.16						
Firm dark brown sandy CLAY. Sand is fine to coarse.		0.30	77.01					70	
Grey very sandy GRAVEL with medium cobble and medium boulder content. Sand is fine to coarse. Gravel is fine to coarse rounded to subangular. Cobbles are rounded to subangular of limestone. Boulders are subrounded of limestone.					AA198179	B	0.60-0.60		
1.0 Grey slightly gravelly silty SAND with rare cobbles of limestone.		1.00	76.31						
					AA198180	B	1.50-1.50		
2.0									
					AA198176	B	2.50-2.50		
TP terminated due to major instability End of Trial Pit at 2.80m		2.80	74.51						
3.0									

Groundwater Conditions
Dry

Stability
Unstable from 2.80m

General Remarks
Pit footprint scanned using cable avoidance tool [CAT]. Shear vanes (set of three) carried out at 0.30m & 0.70m bgl. Pit backfilled with arisings.

TRIAL PIT RECORD

REPORT NUMBER 24330

CONTRACT	Halverstown	**TRIAL PIT NO.**	**TP/RO10**
		SHEET	Sheet 1 of 1
LOGGED BY	IC	**CO-ORDINATES**	686,258.36 E 719,471.03 N
		DATE STARTED	27/04/2023
		DATE COMPLETED	27/04/2023
CLIENT		**GROUND LEVEL (m)**	77.27
ENGINEER	DOBA	**EXCAVATION METHOD**	13t Tracked Excavator

RECEIVED: 15/08/2024

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0 TOPSOIL: Firm brown sandy clay with roolets. Sand is fine to coarse.		0.20	77.07						
Firm greyish brown very sandy gravelly CLAY with medium cobble content, frequent pockets of sand. Sand is fine to coarse. Gravel is fine to coarse rounded to subangular. Cobbles are rounded to subangular of limestone.					AA198163	B	0.60-0.60	72	
1.0 Soft to firm grey brown sandy very gravelly CLAY with high cobble content, frequent pockets of sand. Sand is fine to coarse. Gravel is fine to coarse rounded to subangular. Cobbles are rounded to subangular of limestone.		1.00	76.27					110	
					AA198164	B	1.50-1.50		
Firm grey brown sandy very gravelly CLAY with high cobble and medium boulder content, frequent pockets of sand. Sand is fine to coarse. Gravel is fine to coarse rounded to subangular. Cobbles are rounded to subangular of limestone. Boulders are subrounded of limestone.		1.80	75.47						
2.0					AA198165	B	2.50-2.50		
Stiff to very stiff dark brown sandy very gravelly CLAY with medium cobble and medium boulder content. Sand is fine to coarse. Gravel is fine to coarse rounded to subangular. Cobbles are rounded to subangular of limestone. Boulders are subrounded of limestone (up to 300mm).		2.70	74.57						
3.0					AA198166	B	3.50-3.50		
End of Trial Pit at 3.60m		3.60	73.67						

Groundwater Conditions
Dry

Stability
Unstable from 0.40m

General Remarks
Pit footprint scanned using cable avoidance tool [CAT]. Shear vanes (set of three) carried out at 0.40m & 0.90m bgl. Pit backfilled with arisings.

RECEIVED: 13/08/2024

TP/RO1 – 1 of 4



TP/RO1 – 2 of 4



RECEIVED: 13/08/2024

TP/RO1 – 3 of 4



TP/RO1 – 4 of 4



RECEIVED: 13/08/2024

TP/RO2 – 1 of 4



TP/RO2 – 2 of 4



RECEIVED: 13/08/2024

TP/RO2 – 3 of 4



TP/RO2 – 4 of 4



RECEIVED: 13/08/2024

TP/RO3 – 1 of 4



TP/RO3 – 2 of 4



RECEIVED: 13/08/2024

TP/RO3 – 3 of 4



TP/RO3 – 4 of 4



RECEIVED: 13/08/2024

TP/RO4 – 1 of 5



TP/RO4 – 2 of 5



RECEIVED: 13/08/2024

TP/RO4 – 3 of 5



TP/RO4 – 4 of 5



TP/RO4 – 5 of 5



RECEIVED: 13/08/2024

RECEIVED: 13/08/2024

TP/RO5 – 1 of 4



TP/RO5 – 2 of 4



RECEIVED: 13/08/2024

TP/RO5 – 3 of 4



TP/RO5 – 4 of 4



RECEIVED: 13/08/2024

TP/RO6 – 1 of 4



TP/RO6 – 2 of 4



RECEIVED: 13/08/2024

TP/RO6 – 3 of 4



TP/RO6 – 4 of 4



RECEIVED: 13/08/2024

TP/RO7 – 1 of 4



TP/RO7 – 2 of 4



RECEIVED: 13/08/2024

TP/RO7 – 3 of 4



TP/RO7 – 4 of 4



RECEIVED: 13/08/2024

TP/RO8 – 1 of 4



TP/RO8 – 2 of 4



RECEIVED: 13/08/2024

TP/RO8 – 3 of 4



TP/RO8 – 4 of 4



RECEIVED: 13/08/2024

TP/RO9 – 1 of 5



TP/RO9 – 2 of 5



RECEIVED: 13/08/2024

TP/RO9 – 3 of 5



TP/RO9 – 4 of 5



TP/RO9– 5 of 5



RECEIVED: 13/08/2024

RECEIVED: 13/08/2024

TP/RO10 – 1 of 4



TP/RO10 – 2 of 4



RECEIVED: 13/08/2024

TP/RO10 – 3 of 4



TP/RO10 – 4 of 4



RECEIVED: 13/08/2024

Appendix 2

Cable Percussion Borehole Records

GEOTECHNICAL BORING RECORD

REPORT NUMBER 24330

RECEIVED: 23/08/2024

CONTRACT	Halverstown	**BOREHOLE NO.**	**BH01**
		SHEET	Sheet 1 of 1
CO-ORDINATES	686,116.61 E 719,653.02 N	**RIG TYPE**	Dando 2000
		BOREHOLE DIAMETER (mm)	200
GROUND LEVEL (mOD)	80.04	**BOREHOLE DEPTH (m)**	3.10
		DATE COMMENCED	03/11/2022
		DATE COMPLETED	03/11/2022
CLIENT		**SPT HAMMER REF. NO.**	
ENGINEER	DOBA	**ENERGY RATIO (%)**	
		BORED BY	W.Cahill
		PROCESSED BY	JJ

Depth (m)	Description	Legend	Elevation	Depth (m)	Samples: Ref. Number	Samples: Sample Type	Samples: Depth (m)	Samples: Recovery	Field Test Results	Standpipe Details
0	Soft to firm dark brown sandy gravelly silty CLAY									
1					AA184687	B	1.00-1.45		N = 10 (2, 2, 3, 2, 2, 3)	
			78.64	1.40						
	Firm to stiff dark brown sandy gravelly silty CLAY with cobbles and boulders									
2					AA184688	B	2.00-2.45		N = 17 (3, 3, 3, 4, 5, 5)	
3			76.94	3.10					N = 50/40 mm (25, 50)	
	End of Borehole at 3.10 m									
4										

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
2.80	3.10	1.5	

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
2.80	2.80	No	1.30	20	Moderate

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

GROUNDWATER PROGRESS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

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

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

IGSL BH LOG 24330.GPJ IGSL.GDT 31/1/23

GEOTECHNICAL BORING RECORD

REPORT NUMBER 24330

CONTRACT Halverstown

BOREHOLE NO. BH02
SHEET Sheet 1 of 1

CO-ORDINATES 686,178.44 E
719,760.90 N
GROUND LEVEL (mOD) 81.86

RIG TYPE Dando 2000
BOREHOLE DIAMETER (mm) 200
BOREHOLE DEPTH (m) 1.80

DATE COMMENCED 03/11/2022
DATE COMPLETED 03/11/2022

CLIENT
ENGINEER DOBA

SPT HAMMER REF. NO.
ENERGY RATIO (%)

BORED BY W.Cahill
PROCESSED BY JJ

RECEIVED: 13/08/2024

Depth (m)	Description	Legend	Elevation	Depth (m)	Samples: Ref. Number	Samples: Sample Type	Samples: Depth (m)	Samples: Recovery	Field Test Results	Standpipe Details
0	Firm dark brown sandy gravelly silty CLAY									
1					AA184689	B	1.00-1.45		N = 13 (2, 2, 3, 3, 3, 4)	
			80.36	1.50						
	Stiff light brown very sandy gravelly CLAY with cobbles and boulders									
			80.06	1.80						
2	End of Borehole at 1.80 m									
3										
4										

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
1.50	1.80	1.5	

WATER STRIKE DETAILS

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

GROUNDWATER PROGRESS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

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

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

IGSL BH LOG 24330.GPJ IGSL.GDT 31/1/23

GEOTECHNICAL BORING RECORD

REPORT NUMBER 24330

RECEIVED: 23/08/2024

CONTRACT	Halverstown	**BOREHOLE NO.**	**BH03**
		SHEET	Sheet 1 of 1
CO-ORDINATES	686,206.06 E 719,531.92 N	**RIG TYPE**	Dando 2000
		BOREHOLE DIAMETER (mm)	200
GROUND LEVEL (mOD)	78.62	**BOREHOLE DEPTH (m)**	3.80
		DATE COMMENCED	03/11/2022
		DATE COMPLETED	04/11/2022
CLIENT		**SPT HAMMER REF. NO.**	
ENGINEER	DOBA	**ENERGY RATIO (%)**	
		BORED BY	W.Cahill
		PROCESSED BY	JJ

Depth (m)	Description	Legend	Elevation	Depth (m)	Samples: Ref. Number	Samples: Sample Type	Samples: Depth (m)	Samples: Recovery	Field Test Results	Standpipe Details
0	Firm to stiff and stiff dark brown sandy gravelly silty CLAY									
1					AA184690	B	1.00-1.45		N = 23 (2, 3, 3, 5, 6, 9)	
			77.12	1.50						
	Stiff light brown very sandy gravelly CLAY									
2					AA184691	B	2.00-2.45		N = 35 (4, 6, 6, 8, 10, 11)	
3			75.52	3.10	AA184692	B	3.00-3.45		N = 48 (6, 7, 9, 10, 14, 15)	
	Very stiff dark and light brown sandy gravelly silty CLAY with cobbles									
			74.82	3.80						
4	End of Borehole at 3.80 m									

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
3.50	3.80	1.5	

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
2.70	2.70	No	0.60	20	Moderate

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type
04-11-22	3.80	1.00	3.80	50mm SP

GROUNDWATER PROGRESS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

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

Sample Legend

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

IGSL BH LOG 24330.GPJ IGSL.GDT 31/1/23

GEOTECHNICAL BORING RECORD

REPORT NUMBER 24330

CONTRACT Halverstown

BOREHOLE NO. BH04
SHEET Sheet 1 of 1

CO-ORDINATES 686,291.68 E
719,659.60 N
GROUND LEVEL (mOD) 81.06

RIG TYPE Dando 2000
BOREHOLE DIAMETER (mm) 200
BOREHOLE DEPTH (m) 2.80

DATE COMMENCED 04/11/2022
DATE COMPLETED 04/11/2022

CLIENT
ENGINEER DOBA

SPT HAMMER REF. NO.
ENERGY RATIO (%)

BORED BY W.Cahill
PROCESSED BY JJ

RECEIVED: 23/08/2024

Depth (m)	Description	Legend	Elevation	Depth (m)	Samples: Ref. Number	Sample Type	Depth (m)	Recovery	Field Test Results	Standpipe Details
0	Firm dark brown sandy gravelly silty CLAY									
1			79.86	1.20	AA184693	B	1.00-1.45		N = 11 (2, 3, 3, 3, 2, 3)	
	Firm to stiff and stiff dark and light brown sandy gravelly silty CLAY with cobbles and boulders									
2					AA184694	B	2.00-2.45		N = 20 (3, 2, 4, 4, 5, 7)	
			78.26	2.80						
	End of Borehole at 2.80 m									
3										
4										

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
2.60	2.80	1.5	

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
1.60	1.60	No	0.60	20	Slow

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

GROUNDWATER PROGRESS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

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

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

IGSL BH LOG 24330.GPJ IGSL.GDT 31/1/23

GEOTECHNICAL BORING RECORD

REPORT NUMBER 24330

CONTRACT Halverstown

BOREHOLE NO. BH05
SHEET Sheet 1 of 1

CO-ORDINATES 686,340.00 E
719,449.17 N
GROUND LEVEL (mOD) 77.88

RIG TYPE Dando 2000
BOREHOLE DIAMETER (mm) 200
BOREHOLE DEPTH (m) 3.60

DATE COMMENCED 24/10/2022
DATE COMPLETED 24/10/2022

CLIENT
ENGINEER DOBA

SPT HAMMER REF. NO.
ENERGY RATIO (%)

BORED BY W.Cahill
PROCESSED BY FC

RECEIVED: 12/08/2024

Depth (m)	Description	Legend	Elevation	Depth (m)	Samples: Ref. Number	Sample Type	Depth (m)	Recovery	Field Test Results	Standpipe Details
0	TOPSOIL		77.73	0.15						
	Brown sandy SILT/CLAY with occasional fine gravel		77.58	0.30						
	Dark brown sandy SILT/CLAY with some gravel and occasional cobbles		77.08	0.80						
1	Stff to very stiff dark brown sandy silty gravelly CLAY with occasional cobbles				AA184670	B	1.00		N = 19 (2, 3, 4, 5, 6, 4)	
2					AA184671	B	2.00		N = 16 (3, 3, 4, 4, 3, 5)	
3					AA184672	B	3.00		N = 42 (4, 6, 6, 9, 11, 16)	
			74.28	3.60						
4	Obstruction End of Borehole at 3.60 m									

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
3.40	3.60	1.5	

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
2.80	2.80	No	1.50	20	Moderate

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

GROUNDWATER PROGRESS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

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

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

IGSL BH LOG 24330.GPJ IGSL.GDT 31/1/23

GEOTECHNICAL BORING RECORD

REPORT NUMBER 24330

CONTRACT Halverstown

BOREHOLE NO. BH06
SHEET Sheet 1 of 1

CO-ORDINATES 686,418.25 E
719,599.10 N
GROUND LEVEL (mOD) 81.29

RIG TYPE Dando 2000
BOREHOLE DIAMETER (mm) 200
BOREHOLE DEPTH (m) 1.10

DATE COMMENCED 21/10/2022
DATE COMPLETED 21/10/2022

CLIENT
ENGINEER DOBA

SPT HAMMER REF. NO.
ENERGY RATIO (%)

BORED BY W.Cahill
PROCESSED BY FC

RECEIVED: 12/08/2024

Depth (m)	Description	Legend	Elevation	Depth (m)	Samples: Ref. Number	Samples: Sample Type	Samples: Depth (m)	Samples: Recovery	Field Test Results	Standpipe Details
0	TOPSOIL		81.09	0.20						
	Light brown sandy SILT/CLAY with occasional fine gravel									
1			80.19	1.10	AA184669	B	1.00		N = 48/225 mm (8, 11, 17, 27, 4)	
	Very stiff light brown sandy silty CLAY with occasional cobbles End of Borehole at 1.10 m									
2										
3										
4										

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
0.90	1.10	1.5	

WATER STRIKE DETAILS

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

GROUNDWATER PROGRESS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

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

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

IGSL BH LOG 24330.GPJ IGSL.GDT 31/1/23

GEOTECHNICAL BORING RECORD

REPORT NUMBER 24330

RECEIVED: 23/08/2024

CONTRACT	Halverstown	**BOREHOLE NO.**	**BH07**
		SHEET	Sheet 1 of 1
CO-ORDINATES	686,452.03 E 719,373.68 N	**RIG TYPE**	Dando 2000
		BOREHOLE DIAMETER (mm)	200
GROUND LEVEL (mOD)	77.94	**BOREHOLE DEPTH (m)**	2.80
		DATE COMMENCED	21/10/2022
		DATE COMPLETED	21/10/2022
CLIENT		**SPT HAMMER REF. NO.**	
ENGINEER	DOBA	**ENERGY RATIO (%)**	
		BORED BY	W.Cahill
		PROCESSED BY	FC

Depth (m)	Description	Legend	Elevation	Depth (m)	Samples: Ref. Number	Samples: Sample Type	Samples: Depth (m)	Samples: Recovery	Field Test Results	Standpipe Details
0	TOPSOIL		77.74	0.20						
	Brown sandy SILT/CLAY with occasional fine gravel		77.44	0.50						
1	Soft dark brown sandy SILT/CLAY with occasional cobbles		76.24	1.70	AA184673	B	1.00		N = 7 (1, 1, 2, 2, 1, 2)	
2	Stiff dark brown sandy silty gravelly CLAY with some cobbles		75.14	2.80	AA184674	B	2.00		N = 29 (2, 4, 4, 6, 8, 11)	
3	Obstruction End of Borehole at 2.80 m									
4										

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
2.60	2.80	1.5	

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
1.30	1.30	No	0.90	20	Slow

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

GROUNDWATER PROGRESS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

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

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

IGSL BH LOG 24330.GPJ IGSL.GDT 31/1/23

GEOTECHNICAL BORING RECORD

REPORT NUMBER 24330

CONTRACT Halverstown

BOREHOLE NO. BH08
SHEET Sheet 1 of 1

CO-ORDINATES 686,549.61 E
719,522.50 N
GROUND LEVEL (mOD) 81.03

RIG TYPE Dando 2000
BOREHOLE DIAMETER (mm) 200
BOREHOLE DEPTH (m) 1.30

DATE COMMENCED 21/10/2022
DATE COMPLETED 21/10/2022

CLIENT
ENGINEER DOBA

SPT HAMMER REF. NO.
ENERGY RATIO (%)

BORED BY W.Cahill
PROCESSED BY FC

RECEIVED: 13/08/2024

Depth (m)	Description	Legend	Elevation	Depth (m)	Samples: Ref. Number	Samples: Sample Type	Samples: Depth (m)	Samples: Recovery	Field Test Results	Standpipe Details
0	TOPSOIL		80.83	0.20						
	Light brown sandy SILT/CLAY with occasional fine gravel		80.63	0.40						
	Very stiff light brown sandy silty CLAY with occasional cobbles				AA184668	B	1.00		N = 50/225 mm (8, 11, 17, 29, 4)	
1			79.73	1.30						
	Obstruction End of Borehole at 1.30 m									
2										
3										
4										

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
1.10	1.30	1.5	

WATER STRIKE DETAILS

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

GROUNDWATER PROGRESS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

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

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

IGSL BH LOG 24330.GPJ IGSL.GDT 31/1/23

GEOTECHNICAL BORING RECORD

REPORT NUMBER 24330

CONTRACT Halverstown

BOREHOLE NO. BH09
SHEET Sheet 1 of 1

CO-ORDINATES 686,290.64 E
719,822.45 N
GROUND LEVEL (mOD) 83.98

RIG TYPE Dando 2000
BOREHOLE DIAMETER (mm) 200
BOREHOLE DEPTH (m) 3.90

DATE COMMENCED 27/10/2022
DATE COMPLETED 27/10/2022

CLIENT
ENGINEER DOBA

SPT HAMMER REF. NO.
ENERGY RATIO (%)

BORED BY W.Cahill
PROCESSED BY FC

RECEIVED: 13/08/2024

Depth (m)	Description	Legend	Elevation	Depth (m)	Samples: Ref. Number	Sample Type	Depth (m)	Recovery	Field Test Results	Standpipe Details
0	TOPSOIL		83.78	0.20						
	Brown sandy SILT/CLAY with occasional fine gravel		83.53	0.45						
	Firm to stiff mottled light/dark brown sandy silty CLAY with occasional cobbles				AA184679	B	1.00		N = 14 (2, 2, 3, 4, 3, 4)	
1										
					AA184680	B	2.00		N = 15 (2, 3, 3, 4, 4, 4)	
2										
					AA184681	B	3.00		N = 24 (3, 4, 5, 6, 6, 7)	
3										
			80.18	3.80						
	Obstruction End of Borehole at 3.90 m									
4										

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
3.60	3.80	1.5	

WATER STRIKE DETAILS

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

GROUNDWATER PROGRESS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

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

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

IGSL BH LOG 24330.GPJ IGSL.GDT 31/1/23

GEOTECHNICAL BORING RECORD

REPORT NUMBER 24330

CONTRACT Halverstown

BOREHOLE NO. BH10
SHEET Sheet 1 of 1

CO-ORDINATES 686,436.07 E
719,740.74 N
GROUND LEVEL (mOD) 84.79

RIG TYPE Dando 2000
BOREHOLE DIAMETER (mm) 200
BOREHOLE DEPTH (m) 1.80

DATE COMMENCED 27/11/2022
DATE COMPLETED 27/11/2022

CLIENT
ENGINEER DOBA

SPT HAMMER REF. NO.
ENERGY RATIO (%)

BORED BY W.Cahill
PROCESSED BY FC

RECEIVED: 12/08/2024

Depth (m)	Description	Legend	Elevation	Depth (m)	Samples: Ref. Number	Samples: Sample Type	Samples: Depth (m)	Samples: Recovery	Field Test Results	Standpipe Details
0	TOPSOIL		84.59	0.20						
	Brown sandy SILT/CLAY with occasional fine gravel		84.39	0.40						
1	Firm dark brown sandy SILT/CLAY with some gravel and occasional cobbles				AA174678	B	1.00		N = 14 (2, 3, 3, 4, 3, 4)	
			82.99	1.80						
2	Obstruction End of Borehole at 1.80 m									
3										
4										

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
1.50	1.80	1.5	

WATER STRIKE DETAILS

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

GROUNDWATER PROGRESS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type
27-10-22	1.80	1.00	1.80	50mm SP

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

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

IGSL BH LOG 24330.GPJ IGSL.GDT 31/1/23

GEOTECHNICAL BORING RECORD

REPORT NUMBER 24330

CONTRACT Halverstown

BOREHOLE NO. BH11
SHEET Sheet 1 of 1

CO-ORDINATES 686,586.06 E
719,791.67 N
GROUND LEVEL (mOD) 83.53

RIG TYPE Dando 2000
BOREHOLE DIAMETER (mm) 200
BOREHOLE DEPTH (m) 3.30

DATE COMMENCED 26/10/2022
DATE COMPLETED 26/10/2022

CLIENT
ENGINEER DOBA

SPT HAMMER REF. NO.
ENERGY RATIO (%)

BORED BY W.Cahill
PROCESSED BY FC

RECEIVED: 13/08/2024

Depth (m)	Description	Legend	Elevation	Depth (m)	Samples: Ref. Number	Sample Type	Depth (m)	Recovery	Field Test Results	Standpipe Details
0	TOPSOIL		83.38	0.15						
	Brown sandy SILT/CLAY with occasional fine gravel		83.23	0.30						
1	Soft to firm dark brown sandy SILT/CLAY with some gravel and occasional cobbles				AA184677	B	1.00		N = 10 (2, 2, 2, 3, 3, 2)	
2					AA184678	B	2.00		N = 20 (3, 3, 4, 5, 5, 6)	
			81.13	2.40						
3	Stiff to very stiff light brown sandy sandy silty gravelly CLAY with some cobbles and occasional boulders				AA184679	B	3.00		N = 50/150 mm (18, 7, 39, 11)	
			80.03	3.50						
4	Obstruction End of Borehole at 3.30 m									

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
3.00	3.30	1.5	

WATER STRIKE DETAILS

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

GROUNDWATER PROGRESS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

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

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

IGSL BH LOG 24330.GPJ IGSL.GDT 31/1/23

GEOTECHNICAL BORING RECORD

REPORT NUMBER 24330

RECEIVED: 12/08/2024

CONTRACT	Halverstown	**BOREHOLE NO.**	**BH12**
		SHEET	Sheet 1 of 1
CO-ORDINATES	686,747.60 E 719,716.71 N	**RIG TYPE**	Dando 2000
		BOREHOLE DIAMETER (mm)	200
GROUND LEVEL (mOD)	80.50	**BOREHOLE DEPTH (m)**	2.40
		DATE COMMENCED	25/10/2022
		DATE COMPLETED	25/10/2022
CLIENT		**SPT HAMMER REF. NO.**	
ENGINEER	DOBA	**ENERGY RATIO (%)**	
		BORED BY	W.Cahill
		PROCESSED BY	FC

Depth (m)	Description	Legend	Elevation	Depth (m)	Samples: Ref. Number	Samples: Sample Type	Samples: Depth (m)	Samples: Recovery	Field Test Results	Standpipe Details
0	TOPSOIL		80.30	0.20						
	Dark brown sandy SILT/CLAY with occasional fine gravel		80.10	0.40						
1	Soft to firm light brown sandy silty gravellly CLAY with occasional cobbles				AA184675	B	1.00		N = 10 (2, 2, 2, 3, 2, 3)	
			78.70	1.80						
2	Very stiff light brown sandy silty gravellly CLAY with some cobbles				AA184676	B	2.00		N = 50/225 mm (8, 12, 16, 19, 15)	
			78.10	2.40						
3	Obstruction End of Borehole at 2.40 m									
4										

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
2.20	2.40	1.5	

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
2.20	2.20	No	0.70	20	Moderate

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type
25-10-22	2.40	1.00	2.40	50mm SP

GROUNDWATER PROGRESS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

REMARKS Very wet ground conditions. CAT scanned location and hand dug inspection pit carried out.

Sample Legend

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

IGSL BH LOG 24330.GPJ IGSL.GDT 31/1/23

GEOTECHNICAL BORING RECORD

REPORT NUMBER 24330

CONTRACT Halverstown

BOREHOLE NO. BH13
SHEET Sheet 1 of 1

CO-ORDINATES 686,124.91 E
719,837.47 N
GROUND LEVEL (mOD) 82.80

RIG TYPE Dando 2000
BOREHOLE DIAMETER (mm) 200
BOREHOLE DEPTH (m) 2.70

DATE COMMENCED 01/11/2022
DATE COMPLETED 01/11/2022

CLIENT
ENGINEER DOBA

SPT HAMMER REF. NO.
ENERGY RATIO (%)

BORED BY W.Cahill
PROCESSED BY JJ

RECEIVED: 23/08/2024

Depth (m)	Description	Legend	Elevation	Depth (m)	Samples: Ref. Number	Samples: Sample Type	Samples: Depth (m)	Samples: Recovery	Field Test Results	Standpipe Details
0	Firm brown sandy gravelly silty CLAY									
1					AA184685	B	1.00-1.45		N = 13 (2, 2, 3, 3, 4, 3)	
			81.20	1.60						
	Stiff brown sandy gravelly silty CLAY with cobbles and boulders									
2					AA184686	B	2.00-2.45		N = 34 (3, 3, 4, 7, 9, 14)	
			80.10	2.70						
	End of Borehole at 2.70 m									
3										
4										

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
2.40	2.70	1.5	

WATER STRIKE DETAILS

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

GROUNDWATER PROGRESS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type
01-11-22	2.50	1.00	2.70	50mm SP

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

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

IGSL BH LOG 24330.GPJ IGSL.GDT 31/1/23

GEOTECHNICAL BORING RECORD

REPORT NUMBER 24330

CONTRACT Halverstown

BOREHOLE NO. BH14
SHEET Sheet 1 of 1

CO-ORDINATES 686,152.24 E
719,976.74 N
GROUND LEVEL (mOD) 84.27

RIG TYPE Dando 2000
BOREHOLE DIAMETER (mm) 200
BOREHOLE DEPTH (m) 3.90

DATE COMMENCED 28/10/2022
DATE COMPLETED 28/10/2022

CLIENT
ENGINEER DOBA

SPT HAMMER REF. NO.
ENERGY RATIO (%)

BORED BY W.Cahill
PROCESSED BY FC

RECEIVED: 13/08/2024

Depth (m)	Description	Legend	Elevation	Depth (m)	Samples: Ref. Number	Sample Type	Depth (m)	Recovery	Field Test Results	Standpipe Details
0	TOPSOIL		84.12	0.15						
	Brown sandy SILT/CLAY with occasional gravel		83.87	0.40						
	Soft to firm dark brown sandy silty gravelly CLAY with some cobbles									
1					AA184682	B	1.00		N = 3 (0, 1, 1, 0, 1, 1)	
2					AA184683	B	2.00		N = 15 (2, 2, 3, 4, 3, 5)	
3					AA184684	B	3.00		N = 19 (4, 4, 5, 3, 5, 6)	
			80.37	3.90						
4	Obstruction End of Borehole at 3.90 m									

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
3.70	3.90	1.5	

WATER STRIKE DETAILS

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

GROUNDWATER PROGRESS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

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

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

IGSL BH LOG 24330.GPJ IGSL.GDT 31/1/23

RECEIVED: 13/08/2024

Appendix 3

Dynamic Probehole Records

DYNAMIC PROBE RECORD

REPORT NUMBER 24330

CONTRACT Halverstown

PROBE NO. DP01
SHEET Sheet 1 of 1

CO-ORDINATES 686,043.01 E
719,643.63 N
GROUND LEVEL (mOD) 78.58

HAMMER MASS (kg) 50
INCREMENT SIZE (mm) 100
FALL HEIGHT (mm) 500

DATE COMMENCED 13/10/2022
DATE COMPLETED 24/10/2022

CLIENT
ENGINEER DOBA

PROBE TYPE DPH

RECEIVED: 15/08/2024

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water	Depth (m)	Probe Readings (Blows/Increment)
0.0	.					0.00	0
						0.10	0
						0.20	1
						0.30	7
						0.40	9
						0.50	11
						0.60	11
						0.70	10
						0.80	14
						0.90	18
1.0						1.00	20
						1.10	12
						1.20	13
						1.30	12
						1.40	11
						1.50	13
						1.60	10
						1.70	8
						1.80	8
						1.90	8
2.0						2.00	5
						2.10	4
						2.20	3
						2.30	3
						2.40	4
						2.50	4
						2.60	3
						2.70	4
						2.80	4
						2.90	5
3.0						3.00	5
						3.10	8
						3.20	12
						3.30	16
						3.40	23
						3.50	25
	End of Probe at 3.60 m			74.98			
4.0							

Graphic Probe Record: 0 5 10 15 20 25

GROUNDWATER OBSERVATIONS

REMARKS

IGSL DP LOG 100MM INCREMENTS 24330.GPJ IGSL.GDT 31/1/23

DYNAMIC PROBE RECORD

REPORT NUMBER 24330

CONTRACT Halverstown

PROBE NO. DP02
SHEET Sheet 1 of 1

CO-ORDINATES 686,126.87 E
719,587.15 N
GROUND LEVEL (mOD) 79.02

HAMMER MASS (kg) 50
INCREMENT SIZE (mm) 100
FALL HEIGHT (mm) 500

DATE COMMENCED 13/10/2022
DATE COMPLETED 24/10/2022

CLIENT
ENGINEER DOBA

PROBE TYPE DPH

RECEIVED: 15/08/2024

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water	Depth (m)	Probe Readings (Blows/Increment)
0.0	.					0.00	1
						0.10	1
						0.20	2
						0.30	1
						0.40	1
						0.50	2
						0.60	5
						0.70	11
						0.80	11
						0.90	9
1.0						1.00	7
						1.10	5
						1.20	2
						1.30	3
						1.40	6
						1.50	4
						1.60	1
						1.70	1
						1.80	1
						1.90	2
2.0						2.00	1
						2.10	6
						2.20	9
						2.30	4
						2.40	7
						2.50	8
						2.60	7
						2.70	9
						2.80	9
						2.90	6
3.0						3.00	5
						3.10	5
						3.20	5
						3.30	9
						3.40	8
						3.50	6
						3.60	9
						3.70	22
						3.80	25
	End of Probe at 3.90 m			75.12			
4.0							

Graphic Probe Record: 0 5 10 15 20 25

GROUNDWATER OBSERVATIONS

REMARKS

IGSL DP LOG 100MM INCREMENTS 24330.GPJ IGSL.GDT 31/1/23

DYNAMIC PROBE RECORD

REPORT NUMBER 24330

CONTRACT Halverstown

PROBE NO. DP03
SHEET Sheet 1 of 1

CO-ORDINATES 686,108.07 E
719,656.12 N
GROUND LEVEL (mOD) 79.95

HAMMER MASS (kg) 50
INCREMENT SIZE (mm) 100
FALL HEIGHT (mm) 500

DATE COMMENCED 13/10/2022
DATE COMPLETED 24/10/2022

CLIENT
ENGINEER DOBA

PROBE TYPE DPH

RECEIVED: 15/08/2024

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water	Depth (m)	Probe Readings (Blows/Increment)
0.0	.					0.00	0
						0.10	0
						0.20	0
						0.30	0
						0.40	0
						0.50	2
						0.60	2
						0.70	3
						0.80	2
						0.90	6
1.0						1.00	5
						1.10	5
						1.20	3
						1.30	5
						1.40	6
						1.50	10
						1.60	10
						1.70	11
						1.80	13
						1.90	17
2.0						2.00	6
						2.10	3
						2.20	6
						2.30	10
						2.40	9
						2.50	8
						2.60	6
						2.70	7
						2.80	8
						2.90	6
3.0						3.00	5
						3.10	4
						3.20	5
						3.30	8
						3.40	7
						3.50	14
						3.60	20
						3.70	25
	End of Probe at 3.80 m			76.15			
4.0							

Graphic Probe Record: 0 5 10 15 20 25

GROUNDWATER OBSERVATIONS

REMARKS

IGSL DP LOG 100MM INCREMENTS 24330.GPJ IGSL.GDT 31/1/23

DYNAMIC PROBE RECORD

REPORT NUMBER 24330

CONTRACT Halverstown

PROBE NO. DP04
SHEET Sheet 1 of 1

CO-ORDINATES 686,094.86 E
719,707.93 N
GROUND LEVEL (mOD) 80.69

HAMMER MASS (kg) 50
INCREMENT SIZE (mm) 100
FALL HEIGHT (mm) 500

DATE COMMENCED 13/10/2022
DATE COMPLETED 24/10/2022

CLIENT
ENGINEER DOBA

PROBE TYPE DPH

RECEIVED: 15/08/2024

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water	Depth (m)	Probe Readings (Blows/Increment)
0.0	.					0.00	0
						0.10	0
						0.20	1
						0.30	3
						0.40	3
						0.50	0
						0.60	0
						0.70	0
						0.80	1
						0.90	2
1.0						1.00	5
						1.10	8
						1.20	13
						1.30	8
						1.40	7
						1.50	3
						1.60	3
						1.70	4
						1.80	5
						1.90	6
2.0						2.00	12
						2.10	9
						2.20	15
						2.30	16
						2.40	13
						2.50	15
						2.60	18
						2.70	25
	End of Probe at 2.80 m			77.89			
3.0							
4.0							

Graphic Probe Record: 0 5 10 15 20 25

GROUNDWATER OBSERVATIONS

REMARKS

IGSL DP LOG 100MM INCREMENTS 24330.GPJ IGSL.GDT 31/1/23

DYNAMIC PROBE RECORD

REPORT NUMBER 24330

CONTRACT Halverstown

PROBE NO. DP05
SHEET Sheet 1 of 1

CO-ORDINATES 686,174.73 E
719,662.34 N
GROUND LEVEL (mOD) 80.41

HAMMER MASS (kg) 50
INCREMENT SIZE (mm) 100
FALL HEIGHT (mm) 500

DATE COMMENCED 13/10/2022
DATE COMPLETED 24/10/2022

CLIENT
ENGINEER DOBA

PROBE TYPE DPH

RECEIVED: 15/08/2024

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water	Depth (m)	Probe Readings (Blows/Increment)
0.0	.					0.00	1
						0.10	1
						0.20	1
						0.30	1
						0.40	1
						0.50	5
						0.60	6
						0.70	3
						0.80	3
						0.90	8
1.0						1.00	7
						1.10	10
						1.20	9
						1.30	12
						1.40	9
						1.50	8
						1.60	8
						1.70	8
						1.80	9
						1.90	12
2.0						2.00	12
						2.10	12
						2.20	13
						2.30	9
						2.40	4
						2.50	3
						2.60	4
						2.70	4
						2.80	5
						2.90	7
3.0						3.00	11
						3.10	13
						3.20	12
						3.30	14
						3.40	22
						3.50	25
	End of Probe at 3.60 m			76.81			
4.0							

Graphic Probe Record: 0 5 10 15 20 25

GROUNDWATER OBSERVATIONS

REMARKS

IGSL DP LOG 100MM INCREMENTS 24330.GPJ IGSL.GDT 31/1/23

DYNAMIC PROBE RECORD

REPORT NUMBER 24330

CONTRACT Halverstown

PROBE NO. DP06
SHEET Sheet 1 of 1

CO-ORDINATES 686,152.47 E
719,720.80 N
GROUND LEVEL (mOD) 81.09

HAMMER MASS (kg) 50
INCREMENT SIZE (mm) 100
FALL HEIGHT (mm) 500

DATE COMMENCED 13/10/2022
DATE COMPLETED 24/10/2022

CLIENT
ENGINEER DOBA

PROBE TYPE DPH

RECEIVED: 15/08/2024

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water	Depth (m)	Probe Readings (Blows/Increment)
0.0	.					0.00	0
						0.10	0
						0.20	0
						0.30	0
						0.40	0
						0.50	0
						0.60	1
						0.70	2
						0.80	2
						0.90	5
1.0						1.00	4
						1.10	2
						1.20	2
						1.30	2
						1.40	1
						1.50	2
						1.60	6
						1.70	6
						1.80	3
						1.90	9
2.0						2.00	6
						2.10	9
						2.20	14
						2.30	21
						2.40	25
	End of Probe at 2.50 m			78.59			
3.0							
4.0							

Graphic Probe Record: 0 5 10 15 20 25

GROUNDWATER OBSERVATIONS

REMARKS

IGSL DP LOG 100MM INCREMENTS 24330.GPJ IGSL.GDT 31/1/23

DYNAMIC PROBE RECORD

REPORT NUMBER 24330

CONTRACT Halverstown

PROBE NO. DP07
SHEET Sheet 1 of 1

CO-ORDINATES 686,209.81 E
719,726.09 N
GROUND LEVEL (mOD) 81.20

HAMMER MASS (kg) 50
INCREMENT SIZE (mm) 100
FALL HEIGHT (mm) 500

DATE COMMENCED 13/10/2022
DATE COMPLETED 24/10/2022

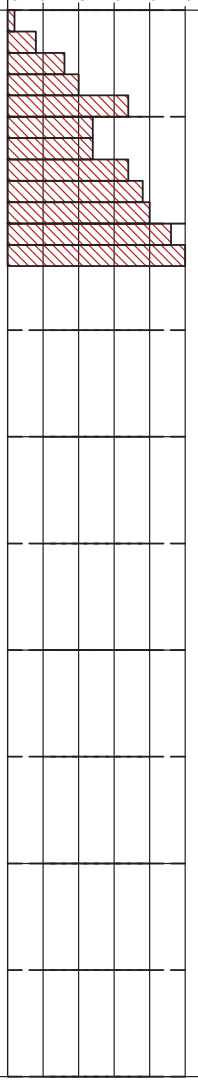
CLIENT
ENGINEER DOBA

PROBE TYPE DPH

RECEIVED: 15/08/2024

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water	Depth (m)	Probe Readings (Blows/Increment)
0.0	.					0.00	1
						0.10	4
						0.20	8
						0.30	10
						0.40	17
						0.50	12
						0.60	12
						0.70	17
						0.80	19
						0.90	20
1.0						1.00	23
						1.10	25
	End of Probe at 1.20 m			80.00			
2.0							
3.0							
4.0							

Graphic Probe Record



GROUNDWATER OBSERVATIONS

REMARKS

DYNAMIC PROBE RECORD

REPORT NUMBER 24330

CONTRACT Halverstown

PROBE NO. DP08
SHEET Sheet 1 of 1

CO-ORDINATES 686,166.66 E
719,743.78 N
GROUND LEVEL (mOD) 81.46

HAMMER MASS (kg) 50
INCREMENT SIZE (mm) 100
FALL HEIGHT (mm) 500

DATE COMMENCED 13/10/2022
DATE COMPLETED 24/10/2022

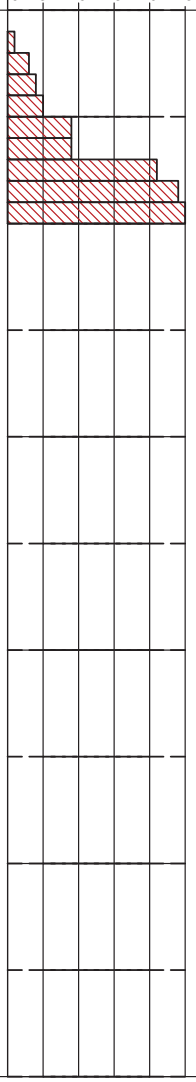
CLIENT
ENGINEER DOBA

PROBE TYPE DPH

RECEIVED: 15/08/2024

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water	Depth (m)	Probe Readings (Blows/Increment)
0.0	.					0.00	0
						0.10	1
						0.20	3
						0.30	4
						0.40	5
						0.50	9
						0.60	9
						0.70	21
						0.80	24
						0.90	25
1.0	End of Probe at 1.00 m			80.46			
2.0							
3.0							
4.0							

Graphic Probe Record



GROUNDWATER OBSERVATIONS

REMARKS

IGSL DP LOG 100MM INCREMENTS 24330.GPJ IGSL.GDT 31/1/23

DYNAMIC PROBE RECORD

REPORT NUMBER 24330

CONTRACT Halverstown

PROBE NO. DP09
SHEET Sheet 1 of 1

CO-ORDINATES 686,164.89 E
719,562.10 N
GROUND LEVEL (mOD) 79.00

HAMMER MASS (kg) 50
INCREMENT SIZE (mm) 100
FALL HEIGHT (mm) 500

DATE COMMENCED 13/10/2022
DATE COMPLETED 24/10/2022

CLIENT
ENGINEER DOBA

PROBE TYPE DPH

RECEIVED: 15/08/2024

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water	Depth (m)	Probe Readings (Blows/Increment)
0.0	.					0.00	0
						0.10	0
						0.20	1
						0.30	1
						0.40	2
						0.50	5
						0.60	6
						0.70	6
						0.80	7
						0.90	8
1.0						1.00	10
						1.10	11
						1.20	12
						1.30	14
						1.40	9
						1.50	10
						1.60	19
						1.70	11
						1.80	8
						1.90	6
2.0						2.00	5
						2.10	6
						2.20	8
						2.30	5
						2.40	4
						2.50	5
						2.60	5
						2.70	3
						2.80	6
						2.90	6
3.0						3.00	6
						3.10	8
						3.20	10
						3.30	24
						3.40	25
	End of Probe at 3.50 m			75.50			
4.0							

Graphic Probe Record: 0 5 10 15 20 25

GROUNDWATER OBSERVATIONS

REMARKS

IGSL DP LOG 100MM INCREMENTS 24330.GPJ IGSL.GDT 31/1/23

DYNAMIC PROBE RECORD

REPORT NUMBER 24330

CONTRACT Halverstown

PROBE NO. DP10
SHEET Sheet 1 of 1

CO-ORDINATES 686,250.86 E
719,508.89 N
GROUND LEVEL (mOD) 78.53

HAMMER MASS (kg) 50
INCREMENT SIZE (mm) 100
FALL HEIGHT (mm) 500

DATE COMMENCED 13/10/2022
DATE COMPLETED 24/10/2022

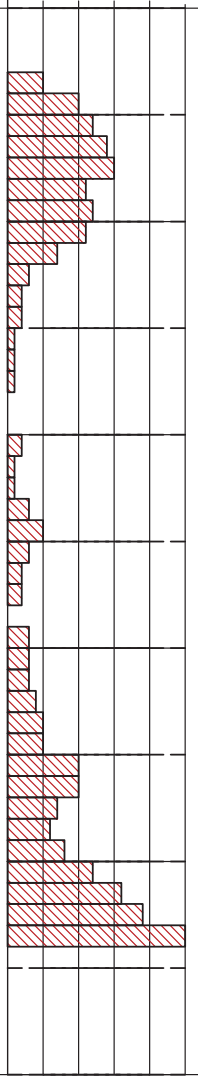
CLIENT
ENGINEER DOBA

PROBE TYPE DPH

RECEIVED: 15/08/2024

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water	Depth (m)	Probe Readings (Blows/Increment)
0.0	.					0.00	0
						0.10	0
						0.20	0
						0.30	5
						0.40	10
						0.50	12
						0.60	14
						0.70	15
						0.80	11
						0.90	12
1.0						1.00	11
						1.10	7
						1.20	3
						1.30	2
						1.40	2
						1.50	1
						1.60	1
						1.70	1
						1.80	0
						1.90	0
2.0						2.00	2
						2.10	1
						2.20	1
						2.30	3
						2.40	5
						2.50	3
						2.60	2
						2.70	2
						2.80	0
						2.90	3
3.0						3.00	3
						3.10	3
						3.20	4
						3.30	5
						3.40	5
						3.50	10
						3.60	10
						3.70	7
						3.80	6
						3.90	8
4.0						4.00	12
						4.10	16
						4.20	19
						4.30	25
	End of Probe at 4.40 m			74.13			

Graphic Probe Record



GROUNDWATER OBSERVATIONS

REMARKS

IGSL DP LOG 100MM INCREMENTS 24330.GPJ IGSL.GDT 31/1/23

DYNAMIC PROBE RECORD

REPORT NUMBER 24330

CONTRACT Halverstown

PROBE NO. DP11
SHEET Sheet 1 of 1

CO-ORDINATES 686,231.66 E
719,574.04 N
GROUND LEVEL (mOD) 79.81

HAMMER MASS (kg) 50
INCREMENT SIZE (mm) 100
FALL HEIGHT (mm) 500

DATE COMMENCED 13/10/2022
DATE COMPLETED 24/10/2022

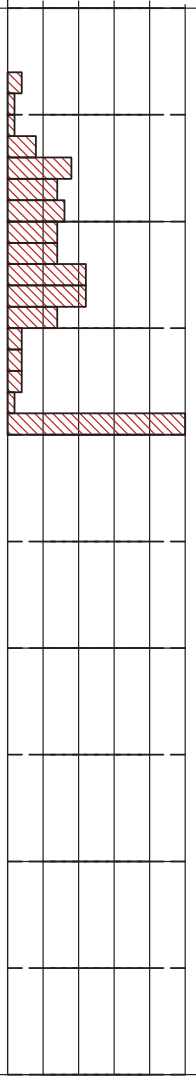
CLIENT
ENGINEER DOBA

PROBE TYPE DPH

RECEIVED: 15/08/2024

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water	Depth (m)	Probe Readings (Blows/Increment)
0.0	.					0.00	0
						0.10	0
						0.20	0
						0.30	2
						0.40	1
1.0						0.50	1
						0.60	4
						0.70	9
						0.80	7
						0.90	8
						1.00	7
						1.10	7
						1.20	11
						1.30	11
						1.40	7
						1.50	2
						1.60	2
						1.70	2
						1.80	1
2.0	End of Probe at 2.00 m			77.81		1.90	25
3.0							
4.0							

Graphic Probe Record



GROUNDWATER OBSERVATIONS

REMARKS

DYNAMIC PROBE RECORD

REPORT NUMBER 24330

CONTRACT Halverstown

PROBE NO. DP12
SHEET Sheet 1 of 1

CO-ORDINATES 686,211.86 E
719,636.56 N
GROUND LEVEL (mOD) 80.38

HAMMER MASS (kg) 50
INCREMENT SIZE (mm) 100
FALL HEIGHT (mm) 500

DATE COMMENCED 13/10/2022
DATE COMPLETED 24/10/2022

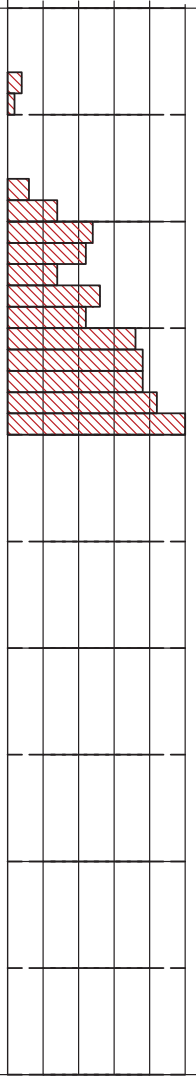
CLIENT
ENGINEER DOBA

PROBE TYPE DPH

RECEIVED: 19/08/2024

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water	Depth (m)	Probe Readings (Blows/Increment)
0.0	.					0.00	0
						0.10	0
						0.20	0
						0.30	2
						0.40	1
						0.50	0
						0.60	0
						0.70	0
						0.80	3
						0.90	7
1.0						1.00	12
						1.10	11
						1.20	7
						1.30	13
						1.40	11
						1.50	18
						1.60	19
						1.70	19
						1.80	21
						1.90	25
2.0	End of Probe at 2.00 m			78.38			
3.0							
4.0							

Graphic Probe Record



GROUNDWATER OBSERVATIONS

REMARKS

IGSL DP LOG 100MM INCREMENTS 24330.GPJ IGSL.GDT 31/1/23

DYNAMIC PROBE RECORD

REPORT NUMBER 24330

CONTRACT Halverstown

PROBE NO. DP13
SHEET Sheet 1 of 1

CO-ORDINATES 686,296.88 E
719,581.50 N
GROUND LEVEL (mOD) 80.33

HAMMER MASS (kg) 50
INCREMENT SIZE (mm) 100
FALL HEIGHT (mm) 500

DATE COMMENCED 13/10/2022
DATE COMPLETED 24/10/2022

CLIENT
ENGINEER DOBA

PROBE TYPE DPH

RECEIVED: 19/08/2024

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water	Depth (m)	Probe Readings (Blows/Increment)
0.0	.					0.00	0
						0.10	0
						0.20	0
						0.30	1
						0.40	3
						0.50	2
						0.60	3
						0.70	2
						0.80	3
						0.90	4
1.0						1.00	5
						1.10	5
						1.20	6
						1.30	14
						1.40	13
						1.50	13
						1.60	14
						1.70	11
						1.80	11
						1.90	12
2.0						2.00	9
						2.10	9
						2.20	12
						2.30	12
						2.40	14
						2.50	14
						2.60	15
						2.70	13
						2.80	15
						2.90	12
3.0						3.00	12
						3.10	12
						3.20	5
						3.30	6
						3.40	9
						3.50	14
						3.60	12
						3.70	14
						3.80	10
						3.90	13
4.0						4.00	15
						4.10	15
						4.20	14
						4.30	14
						4.40	16
						4.50	20
						4.60	25
	End of Probe at 4.70 m			75.63			

Graphic Probe Record: 0 5 10 15 20 25

GROUNDWATER OBSERVATIONS

REMARKS

IGSL DP LOG 100MM INCREMENTS 24330.GPJ IGSL.GDT 31/1/23

DYNAMIC PROBE RECORD

REPORT NUMBER 24330

CONTRACT Halverstown

PROBE NO. DP14
SHEET Sheet 1 of 2

CO-ORDINATES 686,274.54 E
719,641.63 N
GROUND LEVEL (mOD) 80.83

HAMMER MASS (kg) 50
INCREMENT SIZE (mm) 100
FALL HEIGHT (mm) 500

DATE COMMENCED 13/10/2022
DATE COMPLETED 24/10/2022

CLIENT
ENGINEER DOBA

PROBE TYPE DPH

RECEIVED: 15/08/2024

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water	Depth (m)	Probe Readings (Blows/Increment)
0.0	.					0.00	0
						0.10	0
						0.20	0
						0.30	1
						0.40	0
						0.50	0
						0.60	0
						0.70	1
						0.80	3
						0.90	6
1.0						1.00	11
						1.10	12
						1.20	11
						1.30	10
						1.40	8
						1.50	9
						1.60	15
						1.70	8
						1.80	8
						1.90	6
2.0						2.00	6
						2.10	7
						2.20	3
						2.30	2
						2.40	3
						2.50	2
						2.60	3
						2.70	4
						2.80	9
						2.90	6
3.0						3.00	5
						3.10	7
						3.20	5
						3.30	7
						3.40	4
						3.50	4
						3.60	4
						3.70	7
						3.80	8
						3.90	6
4.0						4.00	13
						4.10	15
						4.20	14
						4.30	11
						4.40	9
						4.50	14
						4.60	12
						4.70	17
						4.80	25
	End of Probe at 4.90 m						

Graphic Probe Record: 0 5 10 15 20 25

GROUNDWATER OBSERVATIONS

REMARKS

IGSL DP LOG 100MM INCREMENTS 24330.GPJ IGSL.GDT 31/1/23

DYNAMIC PROBE RECORD

REPORT NUMBER 24330

CONTRACT Halverstown

PROBE NO. DP14
SHEET Sheet 2 of 2

CO-ORDINATES 686,274.54 E
719,641.63 N
GROUND LEVEL (mOD) 80.83

HAMMER MASS (kg) 50
INCREMENT SIZE (mm) 100
FALL HEIGHT (mm) 500

DATE COMMENCED 13/10/2022
DATE COMPLETED 24/10/2022

CLIENT
ENGINEER DOBA

PROBE TYPE DPH

RECEIVED: 19/08/2024

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water	Depth (m)	Probe Readings (Blows/Increment)	Graphic Probe Record 0 5 10 15 20 25
5.0				75.93				
6.0								
7.0								
8.0								
9.0								

GROUNDWATER OBSERVATIONS

REMARKS

DYNAMIC PROBE RECORD

REPORT NUMBER 24330

CONTRACT Halverstown

PROBE NO. DP15
SHEET Sheet 1 of 1

CO-ORDINATES 686,256.18 E
719,704.87 N
GROUND LEVEL (mOD) 81.30

HAMMER MASS (kg) 50
INCREMENT SIZE (mm) 100
FALL HEIGHT (mm) 500

DATE COMMENCED 13/10/2022
DATE COMPLETED 24/10/2022

CLIENT
ENGINEER DOBA

PROBE TYPE DPH

RECEIVED: 15/08/2024

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water	Depth (m)	Probe Readings (Blows/Increment)
0.0	.					0.00	0
						0.10	1
						0.20	1
						0.30	1
						0.40	1
						0.50	6
						0.60	22
						0.70	21
						0.80	22
						0.90	24
1.0						1.00	25
	End of Probe at 1.10 m			80.20			
2.0							
3.0							
4.0							

Graphic Probe Record

0 5 10 15 20 25

GROUNDWATER OBSERVATIONS

REMARKS

IGSL DP LOG 100MM INCREMENTS 24330.GPJ IGSL.GDT 31/1/23

DYNAMIC PROBE RECORD

REPORT NUMBER 24330

CONTRACT Halverstown

PROBE NO. DP16
SHEET Sheet 1 of 1

CO-ORDINATES 686,327.65 E
719,646.84 N
GROUND LEVEL (mOD) 81.00

HAMMER MASS (kg) 50
INCREMENT SIZE (mm) 100
FALL HEIGHT (mm) 500

DATE COMMENCED 13/10/2022
DATE COMPLETED 24/10/2022

CLIENT
ENGINEER DOBA

PROBE TYPE DPH

RECEIVED: 15/08/2024

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water	Depth (m)	Probe Readings (Blows/Increment)
0.0	.					0.00	0
						0.10	4
						0.20	4
						0.30	3
						0.40	7
						0.50	14
						0.60	20
						0.70	8
						0.80	14
						0.90	12
1.0						1.00	10
						1.10	7
						1.20	6
						1.30	7
						1.40	15
						1.50	25
	End of Probe at 1.60 m			79.40			
2.0							
3.0							
4.0							

Graphic Probe Record

0 5 10 15 20 25

GROUNDWATER OBSERVATIONS

REMARKS

IGSL DP LOG 100MM INCREMENTS 24330.GPJ IGSL.GDT 31/1/23

DYNAMIC PROBE RECORD

REPORT NUMBER 24330

CONTRACT Halverstown

PROBE NO. DP17
SHEET Sheet 1 of 1

CO-ORDINATES 686,289.55 E
719,484.59 N
GROUND LEVEL (mOD) 78.26

HAMMER MASS (kg) 50
INCREMENT SIZE (mm) 100
FALL HEIGHT (mm) 500

DATE COMMENCED 13/10/2022
DATE COMPLETED 24/10/2022

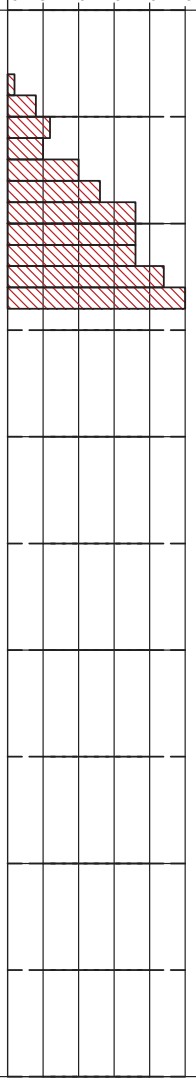
CLIENT
ENGINEER DOBA

PROBE TYPE DPH

RECEIVED: 15/08/2024

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water	Depth (m)	Probe Readings (Blows/Increment)
0.0	.					0.00	0
						0.10	0
						0.20	0
						0.30	1
						0.40	4
						0.50	6
						0.60	5
						0.70	10
						0.80	13
						0.90	18
1.0						1.00	18
						1.10	18
						1.20	22
	End of Probe at 1.40 m			76.86		1.30	25
2.0							
3.0							
4.0							

Graphic Probe Record



GROUNDWATER OBSERVATIONS

REMARKS

DYNAMIC PROBE RECORD

REPORT NUMBER 24330

CONTRACT Halverstown

PROBE NO. DP18
SHEET Sheet 1 of 2

CO-ORDINATES 686,375.70 E
719,431.73 N
GROUND LEVEL (mOD) 77.94

HAMMER MASS (kg) 50
INCREMENT SIZE (mm) 100
FALL HEIGHT (mm) 500

DATE COMMENCED 13/10/2022
DATE COMPLETED 24/10/2022

CLIENT
ENGINEER DOBA

PROBE TYPE DPH

RECEIVED: 19/08/2024

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water	Depth (m)	Probe Readings (Blows/Increment)
0.0	.					0.00	0
						0.10	0
						0.20	0
						0.30	2
						0.40	2
						0.50	2
						0.60	3
						0.70	2
						0.80	3
						0.90	4
1.0						1.00	2
						1.10	1
						1.20	1
						1.30	2
						1.40	6
						1.50	14
						1.60	11
						1.70	9
						1.80	5
						1.90	3
2.0						2.00	11
						2.10	12
						2.20	8
						2.30	8
						2.40	5
						2.50	2
						2.60	2
						2.70	3
						2.80	6
3.0						2.90	12
						3.00	12
						3.10	11
						3.20	11
						3.30	12
						3.40	10
						3.50	8
						3.60	10
						3.70	5
						3.80	5
						3.90	6
4.0						4.00	8
						4.10	8
						4.20	7
						4.30	7
						4.40	11
						4.50	15
						4.60	19
						4.70	21
						4.80	25
	End of Probe at 4.90 m						

Graphic Probe Record: 0 5 10 15 20 25

GROUNDWATER OBSERVATIONS

REMARKS

DYNAMIC PROBE RECORD

REPORT NUMBER 24330

CONTRACT Halverstown

PROBE NO. DP18
SHEET Sheet 2 of 2

CO-ORDINATES 686,375.70 E
719,431.73 N
GROUND LEVEL (mOD) 77.94

HAMMER MASS (kg) 50
INCREMENT SIZE (mm) 100
FALL HEIGHT (mm) 500

DATE COMMENCED 13/10/2022
DATE COMPLETED 24/10/2022

CLIENT
ENGINEER DOBA

PROBE TYPE DPH

RECEIVED: 19/08/2024

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water	Depth (m)	Probe Readings (Blows/Increment)	Graphic Probe Record 0 5 10 15 20 25
5.0				73.04				
6.0								
7.0								
8.0								
9.0								

GROUNDWATER OBSERVATIONS

REMARKS

DYNAMIC PROBE RECORD

REPORT NUMBER 24330

CONTRACT Halverstown

PROBE NO. DP19
SHEET Sheet 1 of 2

CO-ORDINATES 686,354.17 E
719,487.04 N
GROUND LEVEL (mOD) 79.01

HAMMER MASS (kg) 50
INCREMENT SIZE (mm) 100
FALL HEIGHT (mm) 500

DATE COMMENCED 13/10/2022
DATE COMPLETED 24/10/2022

CLIENT
ENGINEER DOBA

PROBE TYPE DPH

RECEIVED: 19/08/2024

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water	Depth (m)	Probe Readings (Blows/Increment)
0.0	.					0.00	1
						0.10	0
						0.20	7
						0.30	12
						0.40	18
						0.50	18
						0.60	17
						0.70	18
						0.80	18
						0.90	16
1.0						1.00	13
						1.10	11
						1.20	10
						1.30	8
						1.40	8
						1.50	8
						1.60	11
						1.70	11
						1.80	7
						1.90	8
2.0						2.00	5
						2.10	4
						2.20	2
						2.30	0
						2.40	0
						2.50	1
						2.60	2
						2.70	0
						2.80	0
						2.90	0
3.0						3.00	0
						3.10	5
						3.20	4
						3.30	4
						3.40	4
						3.50	4
						3.60	4
						3.70	6
						3.80	6
						3.90	6
4.0						4.00	8
						4.10	12
						4.20	11
						4.30	12
						4.40	12
						4.50	17
						4.60	17
						4.70	18
						4.80	18
						4.90	17

Graphic Probe Record: 0 5 10 15 20 25

GROUNDWATER OBSERVATIONS

REMARKS

IGSL DP LOG 100MM INCREMENTS 24330.GPJ IGSL.GDT 31/1/23

DYNAMIC PROBE RECORD

REPORT NUMBER 24330

CONTRACT Halverstown

PROBE NO. DP19
SHEET Sheet 2 of 2

CO-ORDINATES 686,354.17 E
719,487.04 N
GROUND LEVEL (mOD) 79.01

HAMMER MASS (kg) 50
INCREMENT SIZE (mm) 100
FALL HEIGHT (mm) 500

DATE COMMENCED 13/10/2022
DATE COMPLETED 24/10/2022

CLIENT
ENGINEER DOBA

PROBE TYPE DPH

RECEIVED: 19/08/2024

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water	Depth (m)	Probe Readings (Blows/Increment)	Graphic Probe Record (0 5 10 15 20 25)
5.0	. *(continued)*					5.00	18	
						5.10	18	
						5.20	25	
	End of Probe at 5.30 m			73.71				
6.0								
7.0								
8.0								
9.0								

GROUNDWATER OBSERVATIONS

REMARKS

DYNAMIC PROBE RECORD

REPORT NUMBER 24330

CONTRACT Halverstown

PROBE NO. DP20
SHEET Sheet 1 of 1

CO-ORDINATES 686,329.28 E
719,557.71 N
GROUND LEVEL (mOD) 80.10

HAMMER MASS (kg) 50
INCREMENT SIZE (mm) 100
FALL HEIGHT (mm) 500

DATE COMMENCED 13/10/2022
DATE COMPLETED 24/10/2022

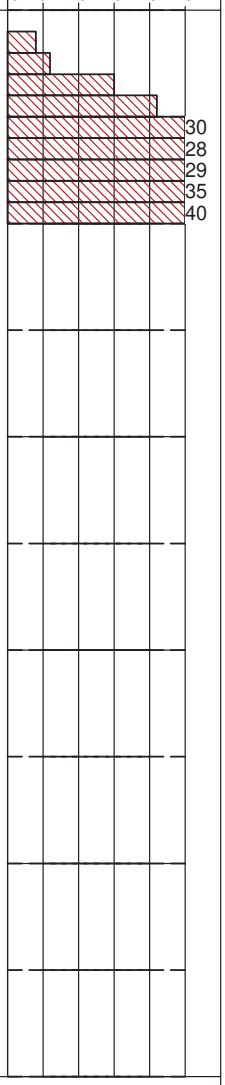
CLIENT
ENGINEER DOBA

PROBE TYPE DPH

RECEIVED: 15/08/2024

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water	Depth (m)	Probe Readings (Blows/Increment)
0.0	.					0.00	0
						0.10	4
						0.20	6
						0.30	15
						0.40	21
						0.50	30
						0.60	28
						0.70	29
						0.80	35
						0.90	40
1.0	End of Probe at 1.00 m			79.10			
2.0							
3.0							
4.0							

Graphic Probe Record



GROUNDWATER OBSERVATIONS

REMARKS

DYNAMIC PROBE RECORD

REPORT NUMBER 24330

CONTRACT Halverstown

PROBE NO. DP21
SHEET Sheet 1 of 1

CO-ORDINATES 686,420.96 E
719,504.62 N
GROUND LEVEL (mOD) 79.74

HAMMER MASS (kg) 50
INCREMENT SIZE (mm) 100
FALL HEIGHT (mm) 500

DATE COMMENCED 13/10/2022
DATE COMPLETED 24/10/2022

CLIENT
ENGINEER DOBA

PROBE TYPE DPH

RECEIVED: 15/08/2024

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water	Depth (m)	Probe Readings (Blows/Increment)
0.0	.					0.00	0
						0.10	0
						0.20	3
						0.30	1
						0.40	2
						0.50	3
						0.60	3
						0.70	4
						0.80	5
						0.90	5
1.0						1.00	6
						1.10	6
						1.20	3
						1.30	4
						1.40	3
						1.50	4
						1.60	4
						1.70	8
						1.80	6
						1.90	6
2.0						2.00	6
						2.10	9
						2.20	6
						2.30	4
						2.40	6
						2.50	7
						2.60	11
						2.70	10
						2.80	5
						2.90	4
3.0						3.00	5
						3.10	7
						3.20	7
						3.30	7
						3.40	7
						3.50	9
						3.60	11
						3.70	17
						3.80	14
						3.90	14
4.0						4.00	15
						4.10	14
						4.20	19
						4.30	19
						4.40	25
	End of Probe at 4.50 m			75.24			

Graphic Probe Record: 0 5 10 15 20 25

GROUNDWATER OBSERVATIONS

REMARKS

IGSL DP LOG 100MM INCREMENTS 24330.GPJ IGSL.GDT 31/1/23

DYNAMIC PROBE RECORD

REPORT NUMBER 24330

CONTRACT Halverstown

PROBE NO. DP22
SHEET Sheet 1 of 1

CO-ORDINATES 686,398.41 E
719,564.25 N
GROUND LEVEL (mOD) 80.57

HAMMER MASS (kg) 50
INCREMENT SIZE (mm) 100
FALL HEIGHT (mm) 500

DATE COMMENCED 13/10/2022
DATE COMPLETED 24/10/2022

CLIENT
ENGINEER DOBA

PROBE TYPE DPH

RECEIVED: 15/08/2024

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water	Depth (m)	Probe Readings (Blows/Increment)
0.0	.					0.00	0
						0.10	0
						0.20	1
						0.30	1
						0.40	2
						0.50	1
						0.60	1
						0.70	3
						0.80	5
						0.90	5
1.0						1.00	7
						1.10	8
						1.20	11
						1.30	14
						1.40	8
						1.50	14
						1.60	12
						1.70	4
						1.80	9
						1.90	5
2.0						2.00	7
						2.10	6
						2.20	11
						2.30	7
						2.40	8
						2.50	4
						2.60	6
						2.70	11
						2.80	12
						2.90	14
3.0						3.00	16
						3.10	19
						3.20	18
						3.30	25
	End of Probe at 3.40 m			77.17			
4.0							

Graphic Probe Record: 0 5 10 15 20 25

GROUNDWATER OBSERVATIONS

REMARKS

IGSL DP LOG 100MM INCREMENTS 24330.GPJ IGSL.GDT 31/1/23

DYNAMIC PROBE RECORD

REPORT NUMBER 24330

CONTRACT Halverstown

PROBE NO. DP23
SHEET Sheet 1 of 1

CO-ORDINATES 686,380.37 E
719,630.14 N
GROUND LEVEL (mOD) 81.50

HAMMER MASS (kg) 50
INCREMENT SIZE (mm) 100
FALL HEIGHT (mm) 500

DATE COMMENCED 13/10/2022
DATE COMPLETED 24/10/2022

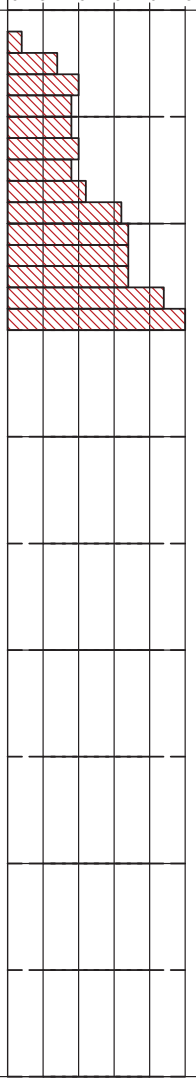
CLIENT
ENGINEER DOBA

PROBE TYPE DPH

RECEIVED: 15/08/2024

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water	Depth (m)	Probe Readings (Blows/Increment)
0.0	.					0.00	0
						0.10	2
						0.20	7
						0.30	10
						0.40	9
						0.50	9
						0.60	10
						0.70	9
						0.80	11
						0.90	16
1.0						1.00	17
						1.10	17
						1.20	17
						1.30	22
						1.40	25
	End of Probe at 1.50 m			80.00			
2.0							
3.0							
4.0							

Graphic Probe Record



GROUNDWATER OBSERVATIONS

REMARKS

DYNAMIC PROBE RECORD

REPORT NUMBER 24330

CONTRACT Halverstown

PROBE NO. DP24
SHEET Sheet 1 of 1

CO-ORDINATES 686,465.77 E
719,575.00 N
GROUND LEVEL (mOD) 81.35

HAMMER MASS (kg) 50
INCREMENT SIZE (mm) 100
FALL HEIGHT (mm) 500

DATE COMMENCED 13/10/2022
DATE COMPLETED 24/10/2022

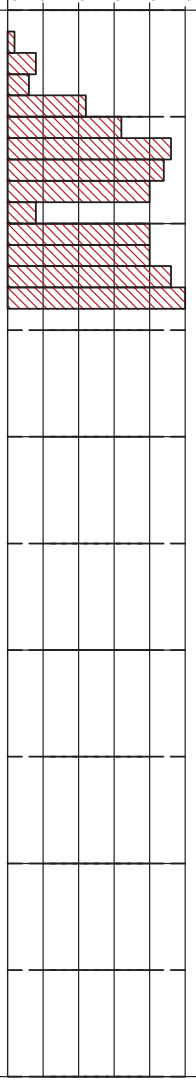
CLIENT
ENGINEER DOBA

PROBE TYPE DPH

RECEIVED: 15/08/2024

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water	Depth (m)	Probe Readings (Blows/Increment)
0.0	.					0.00	0
						0.10	1
						0.20	4
						0.30	3
						0.40	11
						0.50	16
						0.60	23
						0.70	22
						0.80	20
						0.90	4
1.0						1.00	20
						1.10	20
						1.20	23
	End of Probe at 1.40 m			79.95		1.30	25
2.0							
3.0							
4.0							

Graphic Probe Record



GROUNDWATER OBSERVATIONS

REMARKS

DYNAMIC PROBE RECORD

REPORT NUMBER 24330

CONTRACT Halverstown

PROBE NO. DP25
SHEET Sheet 1 of 1

CO-ORDINATES 686,412.89 E
719,404.73 N
GROUND LEVEL (mOD) 78.12

HAMMER MASS (kg) 50
INCREMENT SIZE (mm) 100
FALL HEIGHT (mm) 500

DATE COMMENCED 13/10/2022
DATE COMPLETED 24/10/2022

CLIENT
ENGINEER DOBA

PROBE TYPE DPH

RECEIVED: 15/08/2024

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water	Depth (m)	Probe Readings (Blows/Increment)
0.0	.					0.00	0
						0.10	0
						0.20	0
						0.30	3
						0.40	5
						0.50	4
						0.60	4
						0.70	4
						0.80	3
						0.90	5
1.0						1.00	3
						1.10	3
						1.20	1
						1.30	1
						1.40	1
						1.50	1
						1.60	2
						1.70	3
						1.80	8
						1.90	7
2.0						2.00	7
						2.10	8
						2.20	7
						2.30	8
						2.40	12
						2.50	13
						2.60	6
						2.70	11
						2.80	14
						2.90	17
3.0						3.00	18
						3.10	18
						3.20	19
						3.30	23
						3.40	25
	End of Probe at 3.50 m			74.62			
4.0							

Graphic Probe Record: 0 5 10 15 20 25

GROUNDWATER OBSERVATIONS

REMARKS

IGSL DP LOG 100MM INCREMENTS 24330.GPJ IGSL.GDT 31/1/23

DYNAMIC PROBE RECORD

REPORT NUMBER 24330

CONTRACT Halverstown

PROBE NO. DP26

SHEET Sheet 1 of 2

CO-ORDINATES 686,498.38 E
719,350.64 N

GROUND LEVEL (mOD) 78.29

HAMMER MASS (kg) 50

INCREMENT SIZE (mm) 100

FALL HEIGHT (mm) 500

DATE COMMENCED 13/10/2022

DATE COMPLETED 24/10/2022

CLIENT

ENGINEER DOBA

PROBE TYPE DPH

RECEIVED: 19/08/2024

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water	Depth (m)	Probe Readings (Blows/Increment)
0.0	.					0.00	0
						0.10	1
						0.20	6
						0.30	10
						0.40	11
						0.50	16
						0.60	17
						0.70	17
						0.80	24
						0.90	17
1.0						1.00	17
						1.10	16
						1.20	17
						1.30	16
						1.40	12
						1.50	10
						1.60	13
						1.70	10
						1.80	12
						1.90	11
2.0						2.00	12
						2.10	11
						2.20	9
						2.30	8
						2.40	7
						2.50	8
						2.60	7
						2.70	6
						2.80	6
						2.90	6
3.0						3.00	7
						3.10	6
						3.20	7
						3.30	11
						3.40	12
						3.50	9
						3.60	11
						3.70	7
						3.80	10
						3.90	8
4.0						4.00	8
						4.10	9
						4.20	9
						4.30	11
						4.40	12
						4.50	9
						4.60	11
						4.70	16
						4.80	18
						4.90	12

Graphic Probe Record

0 5 10 15 20 25

GROUNDWATER OBSERVATIONS

REMARKS

IGSL DP LOG 100MM INCREMENTS 24330.GPJ IGSL.GDT 31/1/23

DYNAMIC PROBE RECORD

REPORT NUMBER 24330

CONTRACT Halverstown

PROBE NO. DP26
SHEET Sheet 2 of 2

CO-ORDINATES 686,498.38 E
719,350.64 N
GROUND LEVEL (mOD) 78.29

HAMMER MASS (kg) 50
INCREMENT SIZE (mm) 100
FALL HEIGHT (mm) 500

DATE COMMENCED 13/10/2022
DATE COMPLETED 24/10/2022

CLIENT
ENGINEER DOBA

PROBE TYPE DPH

RECEIVED: 15/08/2024

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water	Depth (m)	Probe Readings (Blows/Increment)	Graphic Probe Record (0 5 10 15 20 25)
5.0	. *(continued)*					5.00	14	
						5.10	16	
						5.20	13	
						5.30	10	
						5.40	17	
						5.50	25	
	End of Probe at 5.60 m			72.69				
6.0								
7.0								
8.0								
9.0								

GROUNDWATER OBSERVATIONS

REMARKS

DYNAMIC PROBE RECORD

REPORT NUMBER 24330

CONTRACT Halverstown

PROBE NO. DP27
SHEET Sheet 1 of 2

CO-ORDINATES 686,478.95 E
719,416.85 N
GROUND LEVEL (mOD) 78.88

HAMMER MASS (kg) 50
INCREMENT SIZE (mm) 100
FALL HEIGHT (mm) 500

DATE COMMENCED 13/10/2022
DATE COMPLETED 24/10/2022

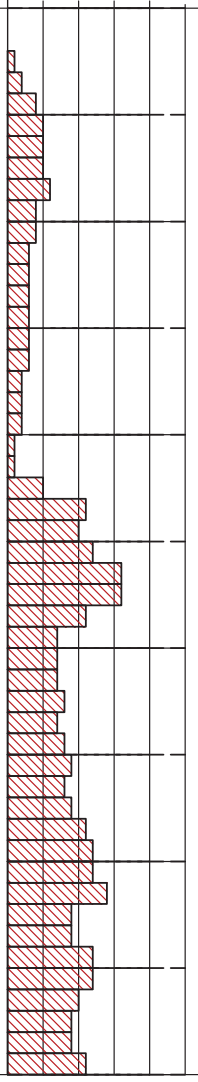
CLIENT
ENGINEER DOBA

PROBE TYPE DPH

RECEIVED: 15/08/2024

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water	Depth (m)	Probe Readings (Blows/Increment)
0.0	.					0.00	0
						0.10	0
						0.20	1
						0.30	2
						0.40	4
						0.50	5
						0.60	5
						0.70	5
						0.80	6
						0.90	4
1.0						1.00	4
						1.10	3
						1.20	3
						1.30	3
						1.40	3
						1.50	3
						1.60	3
						1.70	2
						1.80	2
						1.90	2
2.0						2.00	1
						2.10	1
						2.20	5
						2.30	11
						2.40	10
						2.50	12
						2.60	16
						2.70	16
						2.80	11
						2.90	7
3.0						3.00	7
						3.10	7
						3.20	8
						3.30	7
						3.40	8
						3.50	9
						3.60	8
						3.70	9
						3.80	11
						3.90	12
4.0						4.00	12
						4.10	14
						4.20	9
						4.30	9
						4.40	12
						4.50	12
						4.60	10
						4.70	9
						4.80	9
						4.90	11

Graphic Probe Record



GROUNDWATER OBSERVATIONS

REMARKS

IGSL DP LOG 100MM INCREMENTS 24330.GPJ IGSL.GDT 31/1/23

DYNAMIC PROBE RECORD

REPORT NUMBER 24330

CONTRACT Halverstown

PROBE NO. DP27
SHEET Sheet 2 of 2

CO-ORDINATES 686,478.95 E
719,416.85 N
GROUND LEVEL (mOD) 78.88

HAMMER MASS (kg) 50
INCREMENT SIZE (mm) 100
FALL HEIGHT (mm) 500

DATE COMMENCED 13/10/2022
DATE COMPLETED 24/10/2022

CLIENT
ENGINEER DOBA

PROBE TYPE DPH

RECEIVED: 19/08/2024

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water	Depth (m)	Probe Readings (Blows/Increment)
5.0	. *(continued)*					5.00	11
						5.10	10
						5.20	10
						5.30	12
						5.40	22
						5.50	25
	End of Probe at 5.60 m			73.28			
6.0							
7.0							
8.0							
9.0							

Graphic Probe Record
0 5 10 15 20 25

GROUNDWATER OBSERVATIONS

REMARKS

IGSL DP LOG 100MM INCREMENTS 24330.GPJ IGSL.GDT 31/1/23

DYNAMIC PROBE RECORD

REPORT NUMBER 24330

CONTRACT Halverstown

PROBE NO. DP28
SHEET Sheet 1 of 1

CO-ORDINATES 686,458.71 E
719,479.23 N
GROUND LEVEL (mOD) 79.66

HAMMER MASS (kg) 50
INCREMENT SIZE (mm) 100
FALL HEIGHT (mm) 500

DATE COMMENCED 13/10/2022
DATE COMPLETED 24/10/2022

CLIENT
ENGINEER DOBA

PROBE TYPE DPH

RECEIVED: 15/08/2024

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water	Depth (m)	Probe Readings (Blows/Increment)
0.0	.					0.00	0
						0.10	0
						0.20	0
						0.30	1
						0.40	3
						0.50	3
						0.60	3
						0.70	5
						0.80	7
						0.90	4
1.0						1.00	4
						1.10	4
						1.20	4
						1.30	3
						1.40	2
						1.50	5
						1.60	6
						1.70	2
						1.80	1
						1.90	2
2.0						2.00	1
						2.10	0
						2.20	0
						2.30	4
						2.40	4
						2.50	5
						2.60	3
						2.70	2
						2.80	2
						2.90	3
3.0						3.00	4
						3.10	6
						3.20	5
						3.30	9
						3.40	15
						3.50	25
	End of Probe at 3.60 m			76.06			
4.0							

Graphic Probe Record: 0 5 10 15 20 25

GROUNDWATER OBSERVATIONS

REMARKS

IGSL DP LOG 100MM INCREMENTS 24330.GPJ IGSL.GDT 31/1/23

DYNAMIC PROBE RECORD

REPORT NUMBER 24330

CONTRACT Halverstown

PROBE NO. DP29
SHEET Sheet 1 of 2

CO-ORDINATES 686,544.37 E
719,424.74 N
GROUND LEVEL (mOD) 79.26

HAMMER MASS (kg) 50
INCREMENT SIZE (mm) 100
FALL HEIGHT (mm) 500

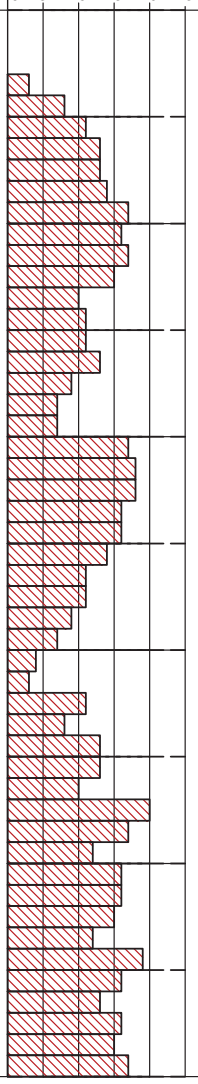
DATE COMMENCED 13/10/2022
DATE COMPLETED 24/10/2022

CLIENT
ENGINEER DOBA

PROBE TYPE DPH

RECEIVED: 15/08/2024

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water	Depth (m)	Probe Readings (Blows/Increment)
0.0	.					0.00	0
						0.10	0
						0.20	0
						0.30	3
						0.40	8
						0.50	11
						0.60	13
						0.70	13
						0.80	14
						0.90	17
1.0						1.00	16
						1.10	17
						1.20	15
						1.30	10
						1.40	11
						1.50	11
						1.60	13
						1.70	9
						1.80	7
						1.90	7
2.0						2.00	17
						2.10	18
						2.20	18
						2.30	16
						2.40	16
						2.50	14
						2.60	11
						2.70	11
						2.80	9
						2.90	7
3.0						3.00	4
						3.10	3
						3.20	11
						3.30	8
						3.40	13
						3.50	13
						3.60	10
						3.70	20
						3.80	17
						3.90	12
4.0						4.00	16
						4.10	16
						4.20	15
						4.30	12
						4.40	19
						4.50	16
						4.60	13
						4.70	16
						4.80	15
						4.90	17



GROUNDWATER OBSERVATIONS

REMARKS

IGSL DP LOG 100MM INCREMENTS 24330.GPJ IGSL.GDT 31/1/23

DYNAMIC PROBE RECORD

REPORT NUMBER 24330

CONTRACT Halverstown

PROBE NO. DP29
SHEET Sheet 2 of 2

CO-ORDINATES 686,544.37 E
719,424.74 N
GROUND LEVEL (mOD) 79.26

HAMMER MASS (kg) 50
INCREMENT SIZE (mm) 100
FALL HEIGHT (mm) 500

DATE COMMENCED 13/10/2022
DATE COMPLETED 24/10/2022

CLIENT
ENGINEER DOBA

PROBE TYPE DPH

RECEIVED: 19/08/2024

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water	Depth (m)	Probe Readings (Blows/Increment)	Graphic Probe Record (0 5 10 15 20 25)
5.0	End of Probe at 5.10 m			74.16		5.00	25	
6.0								
7.0								
8.0								
9.0								

GROUNDWATER OBSERVATIONS

REMARKS

DYNAMIC PROBE RECORD

REPORT NUMBER 24330

CONTRACT Halverstown

PROBE NO. DP30
SHEET Sheet 1 of 1

CO-ORDINATES 686,521.92 E
719,484.32 N
GROUND LEVEL (mOD) 79.97

HAMMER MASS (kg) 50
INCREMENT SIZE (mm) 100
FALL HEIGHT (mm) 500

DATE COMMENCED 13/10/2022
DATE COMPLETED 24/10/2022

CLIENT
ENGINEER DOBA

PROBE TYPE DPH

RECEIVED: 15/08/2024

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water	Depth (m)	Probe Readings (Blows/Increment)
0.0	.					0.00	0
						0.10	0
						0.20	0
						0.30	3
						0.40	4
						0.50	5
						0.60	6
						0.70	6
						0.80	8
						0.90	8
1.0						1.00	8
						1.10	7
						1.20	4
						1.30	3
						1.40	4
						1.50	6
						1.60	9
						1.70	12
						1.80	8
						1.90	12
2.0						2.00	10
						2.10	5
						2.20	2
						2.30	2
						2.40	4
						2.50	4
						2.60	4
						2.70	5
						2.80	4
						2.90	6
3.0						3.00	6
						3.10	5
						3.20	6
						3.30	8
						3.40	7
						3.50	7
						3.60	9
						3.70	8
						3.80	5
						3.90	8
4.0						4.00	14
						4.10	18
						4.20	22
						4.30	25
	End of Probe at 4.40 m			75.57			

Graphic Probe Record: 0 5 10 15 20 25

GROUNDWATER OBSERVATIONS

REMARKS

IGSL DP LOG 100MM INCREMENTS 24330.GPJ IGSL.GDT 31/1/23

DYNAMIC PROBE RECORD

REPORT NUMBER 24330

CONTRACT Halverstown

PROBE NO. DP31
SHEET Sheet 1 of 1

CO-ORDINATES 686,502.22 E
719,558.13 N
GROUND LEVEL (mOD) 81.27

HAMMER MASS (kg) 50
INCREMENT SIZE (mm) 100
FALL HEIGHT (mm) 500

DATE COMMENCED 13/10/2022
DATE COMPLETED 24/10/2022

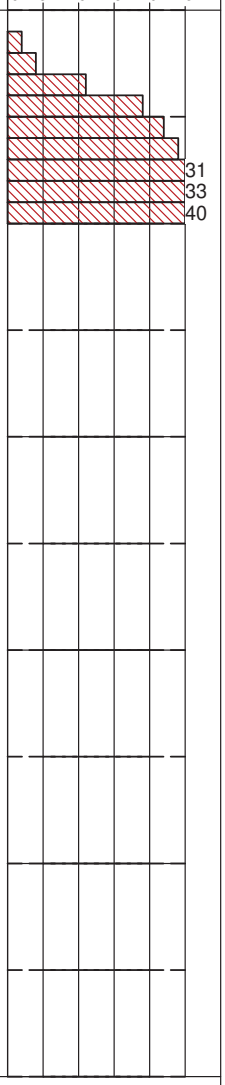
CLIENT
ENGINEER DOBA

PROBE TYPE DPH

RECEIVED: 15/08/2024

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water	Depth (m)	Probe Readings (Blows/Increment)
0.0	.					0.00	0
						0.10	2
						0.20	4
						0.30	11
						0.40	19
						0.50	22
						0.60	24
						0.70	31
						0.80	33
						0.90	40
1.0	End of Probe at 1.00 m			80.27			
2.0							
3.0							
4.0							

Graphic Probe Record



GROUNDWATER OBSERVATIONS

REMARKS

IGSL DP LOG 100MM INCREMENTS 24330.GPJ IGSL.GDT 31/1/23

DYNAMIC PROBE RECORD

REPORT NUMBER 24330

CONTRACT Halverstown

PROBE NO. DP32
SHEET Sheet 1 of 1

CO-ORDINATES 686,574.11 E
719,490.99 N
GROUND LEVEL (mOD) 80.56

HAMMER MASS (kg) 50
INCREMENT SIZE (mm) 100
FALL HEIGHT (mm) 500

DATE COMMENCED 13/10/2022
DATE COMPLETED 24/10/2022

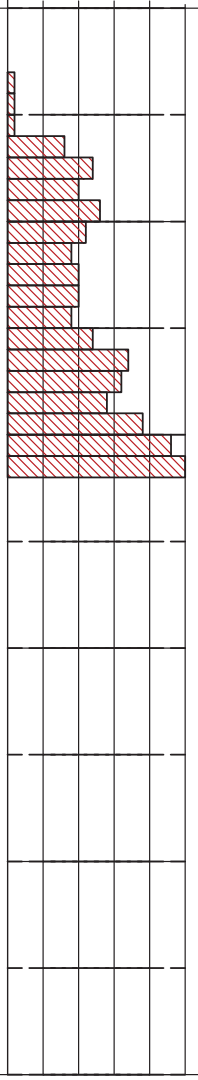
CLIENT
ENGINEER DOBA

PROBE TYPE DPH

RECEIVED: 15/08/2024

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water	Depth (m)	Probe Readings (Blows/Increment)
0.0	.					0.00	0
						0.10	0
						0.20	0
						0.30	1
						0.40	1
						0.50	1
						0.60	8
						0.70	12
						0.80	10
						0.90	13
1.0						1.00	11
						1.10	9
						1.20	10
						1.30	10
						1.40	9
						1.50	12
						1.60	17
						1.70	16
						1.80	14
						1.90	19
2.0						2.00	23
	End of Probe at 2.20 m			78.36		2.10	25
3.0							
4.0							

Graphic Probe Record



GROUNDWATER OBSERVATIONS

REMARKS

IGSL DP LOG 100MM INCREMENTS 24330.GPJ IGSL.GDT 31/1/23

DYNAMIC PROBE RECORD

REPORT NUMBER 24330

CONTRACT Halverstown

PROBE NO. DP33
SHEET Sheet 1 of 1

CO-ORDINATES 686,261.46 E
719,795.33 N
GROUND LEVEL (mOD) 83.07

HAMMER MASS (kg) 50
INCREMENT SIZE (mm) 100
FALL HEIGHT (mm) 500

DATE COMMENCED 13/10/2022
DATE COMPLETED 24/10/2022

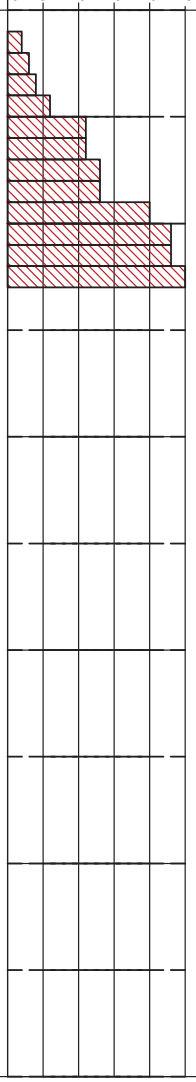
CLIENT
ENGINEER DOBA

PROBE TYPE DPH

RECEIVED: 15/08/2024

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water	Depth (m)	Probe Readings (Blows/Increment)
0.0	.					0.00	0
						0.10	2
						0.20	3
						0.30	4
						0.40	6
						0.50	11
						0.60	11
						0.70	13
						0.80	13
						0.90	20
1.0						1.00	23
						1.10	23
	End of Probe at 1.30 m			81.77		1.20	25
2.0							
3.0							
4.0							

Graphic Probe Record



GROUNDWATER OBSERVATIONS

REMARKS

DYNAMIC PROBE RECORD

REPORT NUMBER 24330

CONTRACT Halverstown

PROBE NO. DP34
SHEET Sheet 1 of 1

CO-ORDINATES 686,326.45 E
719,842.17 N
GROUND LEVEL (mOD) 84.72

HAMMER MASS (kg) 50
INCREMENT SIZE (mm) 100
FALL HEIGHT (mm) 500

DATE COMMENCED 13/10/2022
DATE COMPLETED 24/10/2022

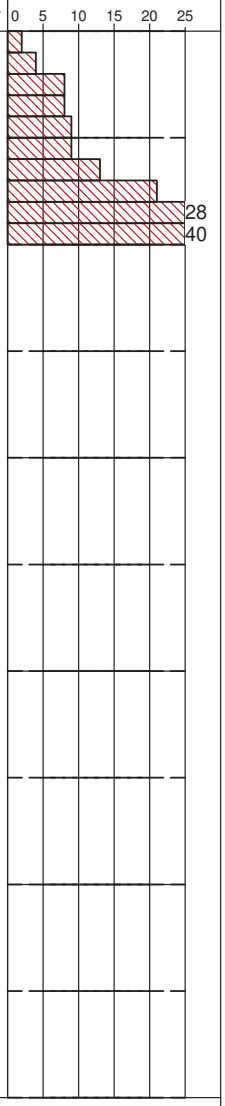
CLIENT
ENGINEER DOBA

PROBE TYPE DPH

RECEIVED: 15/08/2024

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water	Depth (m)	Probe Readings (Blows/Increment)
0.0	.					0.00	2
						0.10	4
						0.20	8
						0.30	8
						0.40	9
						0.50	9
						0.60	13
						0.70	21
						0.80	28
						0.90	40
1.0	End of Probe at 1.00 m			83.72			
2.0							
3.0							
4.0							

Graphic Probe Record



GROUNDWATER OBSERVATIONS

REMARKS

DYNAMIC PROBE RECORD

REPORT NUMBER 24330

CONTRACT Halverstown

PROBE NO. DP35
SHEET Sheet 1 of 1

CO-ORDINATES 686,324.99 E
719,813.24 N
GROUND LEVEL (mOD) 84.32

HAMMER MASS (kg) 50
INCREMENT SIZE (mm) 100
FALL HEIGHT (mm) 500

DATE COMMENCED 13/10/2022
DATE COMPLETED 24/10/2022

CLIENT
ENGINEER DOBA

PROBE TYPE DPH

RECEIVED: 15/08/2024

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water	Depth (m)	Probe Readings (Blows/Increment)
0.0	.					0.00	1
						0.10	2
						0.20	1
						0.30	1
						0.40	1
						0.50	2
						0.60	4
						0.70	4
						0.80	8
						0.90	12
1.0						1.00	17
						1.10	11
						1.20	11
						1.30	12
						1.40	17
						1.50	22
						1.60	25
	End of Probe at 1.70 m			82.62			
2.0							
3.0							
4.0							

Graphic Probe Record: 0 5 10 15 20 25

GROUNDWATER OBSERVATIONS

REMARKS

DYNAMIC PROBE RECORD

REPORT NUMBER 24330

CONTRACT Halverstown

PROBE NO. DP36
SHEET Sheet 1 of 1

CO-ORDINATES 686,334.59 E
719,748.61 N
GROUND LEVEL (mOD) 83.04

HAMMER MASS (kg) 50
INCREMENT SIZE (mm) 100
FALL HEIGHT (mm) 500

DATE COMMENCED 13/10/2022
DATE COMPLETED 24/10/2022

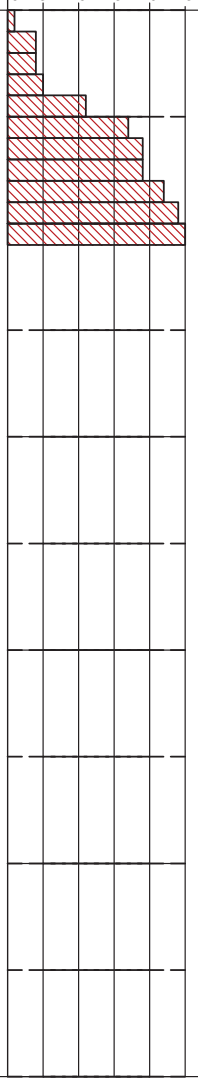
CLIENT
ENGINEER DOBA

PROBE TYPE DPH

RECEIVED: 19/08/2024

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water	Depth (m)	Probe Readings (Blows/Increment)
0.0	.					0.00	1
						0.10	4
						0.20	4
						0.30	5
						0.40	11
						0.50	17
						0.60	19
						0.70	19
						0.80	22
						0.90	24
1.0						1.00	25
	End of Probe at 1.10 m			81.94			
2.0							
3.0							
4.0							

Graphic Probe Record



GROUNDWATER OBSERVATIONS

REMARKS

IGSL DP LOG 100MM INCREMENTS 24330.GPJ IGSL.GDT 31/1/23

DYNAMIC PROBE RECORD

REPORT NUMBER 24330

CONTRACT Halverstown

PROBE NO. DP37
SHEET Sheet 1 of 1

CO-ORDINATES 686,384.86 E
719,834.91 N
GROUND LEVEL (mOD) 85.22

HAMMER MASS (kg) 50
INCREMENT SIZE (mm) 100
FALL HEIGHT (mm) 500

DATE COMMENCED 13/10/2022
DATE COMPLETED 24/10/2022

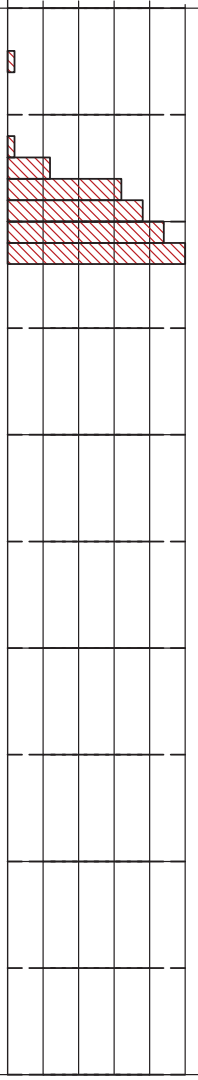
CLIENT
ENGINEER DOBA

PROBE TYPE DPH

RECEIVED: 15/08/2024

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water	Depth (m)	Probe Readings (Blows/Increment)
0.0	.					0.00	0
						0.10	0
						0.20	1
						0.30	0
						0.40	0
						0.50	0
						0.60	1
						0.70	6
						0.80	16
						0.90	19
1.0						1.00	22
	End of Probe at 1.20 m			84.02		1.10	25
2.0							
3.0							
4.0							

Graphic Probe Record



GROUNDWATER OBSERVATIONS

REMARKS

IGSL DP LOG 100MM INCREMENTS 24330.GPJ IGSL.GDT 31/1/23

DYNAMIC PROBE RECORD

REPORT NUMBER 24330

CONTRACT Halverstown

PROBE NO. DP38
SHEET Sheet 1 of 1

CO-ORDINATES 686,399.34 E
719,770.79 N
GROUND LEVEL (mOD) 84.73

HAMMER MASS (kg) 50
INCREMENT SIZE (mm) 100
FALL HEIGHT (mm) 500

DATE COMMENCED 13/10/2022
DATE COMPLETED 24/10/2022

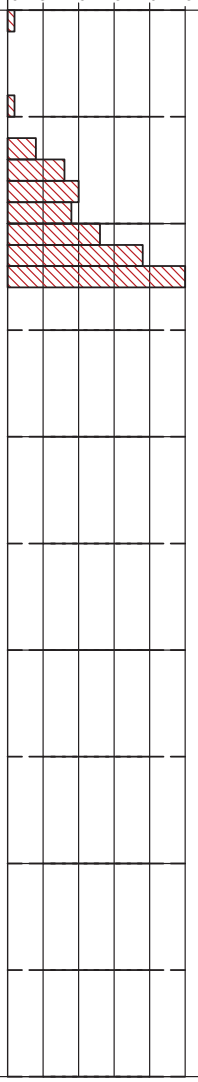
CLIENT
ENGINEER DOBA

PROBE TYPE DPH

RECEIVED: 19/08/2024

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water	Depth (m)	Probe Readings (Blows/Increment)
0.0	.					0.00	1
						0.10	0
						0.20	0
						0.30	0
						0.40	1
						0.50	0
						0.60	4
						0.70	8
						0.80	10
						0.90	9
1.0						1.00	13
						1.10	19
						1.20	25
	End of Probe at 1.30 m			83.43			
2.0							
3.0							
4.0							

Graphic Probe Record



GROUNDWATER OBSERVATIONS

REMARKS

DYNAMIC PROBE RECORD

REPORT NUMBER 24330

CONTRACT Halverstown

PROBE NO. DP39
SHEET Sheet 1 of 1

CO-ORDINATES 686,441.39 E
719,786.19 N
GROUND LEVEL (mOD) 85.33

HAMMER MASS (kg) 50
INCREMENT SIZE (mm) 100
FALL HEIGHT (mm) 500

DATE COMMENCED 13/10/2022
DATE COMPLETED 24/10/2022

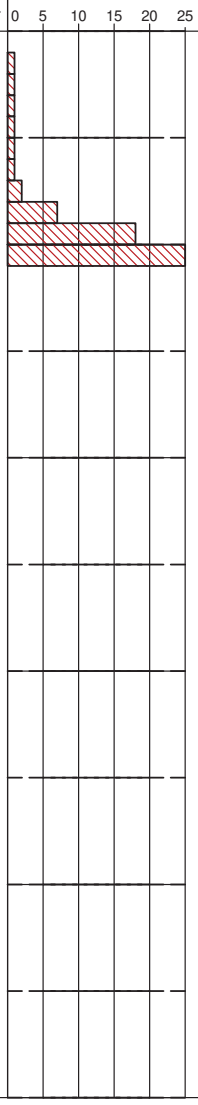
CLIENT
ENGINEER DOBA

PROBE TYPE DPH

RECEIVED: 15/08/2024

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water	Depth (m)	Probe Readings (Blows/Increment)
0.0	.					0.00	0
						0.10	1
						0.20	1
						0.30	1
						0.40	1
						0.50	1
						0.60	1
						0.70	2
						0.80	7
						0.90	18
1.0						1.00	25
	End of Probe at 1.10 m			84.23			
2.0							
3.0							
4.0							

Graphic Probe Record



GROUNDWATER OBSERVATIONS

REMARKS

IGSL DP LOG 100MM INCREMENTS 24330.GPJ IGSL.GDT 31/1/23

DYNAMIC PROBE RECORD

REPORT NUMBER 24330

CONTRACT Halverstown

PROBE NO. DP40
SHEET Sheet 1 of 1

CO-ORDINATES 686,405.91 E
719,704.42 N
GROUND LEVEL (mOD) 83.51

HAMMER MASS (kg) 50
INCREMENT SIZE (mm) 100
FALL HEIGHT (mm) 500

DATE COMMENCED 13/10/2022
DATE COMPLETED 24/10/2022

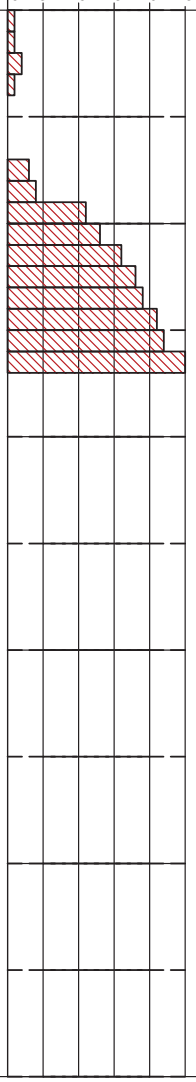
CLIENT
ENGINEER DOBA

PROBE TYPE DPH

RECEIVED: 15/08/2024

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water	Depth (m)	Probe Readings (Blows/Increment)
0.0	.					0.00	1
						0.10	1
						0.20	2
						0.30	1
						0.40	0
						0.50	0
						0.60	0
						0.70	3
						0.80	4
						0.90	11
1.0						1.00	13
						1.10	16
						1.20	18
						1.30	19
						1.40	21
						1.50	22
						1.60	25
	End of Probe at 1.70 m			81.81			
2.0							
3.0							
4.0							

Graphic Probe Record



GROUNDWATER OBSERVATIONS

REMARKS

DYNAMIC PROBE RECORD

REPORT NUMBER 24330

CONTRACT Halverstown

PROBE NO. DP41
SHEET Sheet 1 of 1

CO-ORDINATES 686,583.47 E
719,752.70 N
GROUND LEVEL (mOD) 83.73

HAMMER MASS (kg) 50
INCREMENT SIZE (mm) 100
FALL HEIGHT (mm) 500

DATE COMMENCED 13/10/2022
DATE COMPLETED 24/10/2022

CLIENT
ENGINEER DOBA

PROBE TYPE DPH

RECEIVED: 15/08/2024

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water	Depth (m)	Probe Readings (Blows/Increment)
0.0	.					0.00	0
						0.10	0
						0.20	0
						0.30	0
						0.40	1
						0.50	1
						0.60	1
						0.70	2
						0.80	3
						0.90	5
1.0						1.00	15
						1.10	12
						1.20	19
						1.30	18
						1.40	13
						1.50	5
						1.60	1
						1.70	11
						1.80	13
						1.90	13
2.0						2.00	10
						2.10	11
						2.20	11
						2.30	9
						2.40	7
						2.50	9
						2.60	10
						2.70	22
						2.80	25
3.0	End of Probe at 2.90 m			80.83			
4.0							

Graphic Probe Record: 0 5 10 15 20 25

GROUNDWATER OBSERVATIONS

REMARKS

IGSL DP LOG 100MM INCREMENTS 24330.GPJ IGSL.GDT 31/1/23

DYNAMIC PROBE RECORD

REPORT NUMBER 24330

CONTRACT Halverstown

PROBE NO. DP42
SHEET Sheet 1 of 1

CO-ORDINATES 686,612.89 E
719,835.08 N
GROUND LEVEL (mOD) 82.60

HAMMER MASS (kg) 50
INCREMENT SIZE (mm) 100
FALL HEIGHT (mm) 500

DATE COMMENCED 13/10/2022
DATE COMPLETED 24/10/2022

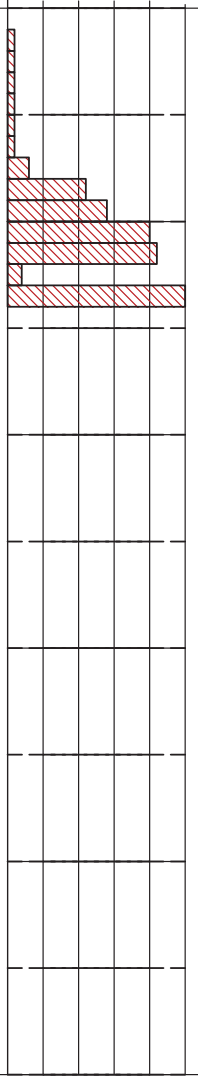
CLIENT
ENGINEER DOBA

PROBE TYPE DPH

RECEIVED: 15/08/2024

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water	Depth (m)	Probe Readings (Blows/Increment)
0.0	.					0.00	0
						0.10	1
						0.20	1
						0.30	1
						0.40	1
						0.50	1
						0.60	1
						0.70	3
						0.80	11
						0.90	14
1.0						1.00	20
						1.10	21
						1.20	2
	End of Probe at 1.40 m			81.20		1.30	25
2.0							
3.0							
4.0							

Graphic Probe Record



GROUNDWATER OBSERVATIONS

REMARKS

DYNAMIC PROBE RECORD

REPORT NUMBER 24330

CONTRACT Halverstown

PROBE NO. DP43
SHEET Sheet 1 of 1

CO-ORDINATES 686,631.36 E
719,771.95 N
GROUND LEVEL (mOD) 82.06

HAMMER MASS (kg) 50
INCREMENT SIZE (mm) 100
FALL HEIGHT (mm) 500

DATE COMMENCED 13/10/2022
DATE COMPLETED 24/10/2022

CLIENT
ENGINEER DOBA

PROBE TYPE DPH

RECEIVED: 15/08/2024

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water	Depth (m)	Probe Readings (Blows/Increment)
0.0	.					0.00	0
						0.10	1
						0.20	1
						0.30	2
						0.40	1
						0.50	1
						0.60	1
						0.70	3
						0.80	8
						0.90	6
1.0						1.00	6
						1.10	9
						1.20	10
						1.30	6
						1.40	7
						1.50	8
						1.60	9
						1.70	6
						1.80	4
						1.90	4
2.0						2.00	3
						2.10	1
						2.20	2
						2.30	2
						2.40	4
						2.50	2
						2.60	3
						2.70	2
						2.80	11
						2.90	18
3.0						3.00	25
	End of Probe at 3.10 m			78.96			
4.0							

Graphic Probe Record: 0 5 10 15 20 25

GROUNDWATER OBSERVATIONS

REMARKS

IGSL DP LOG 100MM INCREMENTS 24330.GPJ IGSL.GDT 31/1/23

DYNAMIC PROBE RECORD

REPORT NUMBER 24330

CONTRACT Halverstown

PROBE NO. DP44
SHEET Sheet 1 of 1

CO-ORDINATES 686,689.29 E
719,801.45 N
GROUND LEVEL (mOD) 80.29

HAMMER MASS (kg) 50
INCREMENT SIZE (mm) 100
FALL HEIGHT (mm) 500

DATE COMMENCED 13/10/2022
DATE COMPLETED 24/10/2022

CLIENT
ENGINEER DOBA

PROBE TYPE DPH

RECEIVED: 15/08/2024

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water	Depth (m)	Probe Readings (Blows/Increment)
0.0	.					0.00	0
						0.10	0
						0.20	0
						0.30	8
						0.40	6
						0.50	6
						0.60	6
						0.70	7
						0.80	4
						0.90	6
1.0						1.00	5
						1.10	6
						1.20	6
						1.30	4
						1.40	7
						1.50	6
						1.60	4
						1.70	3
						1.80	4
						1.90	4
2.0						2.00	4
						2.10	5
						2.20	6
						2.30	6
						2.40	6
						2.50	6
						2.60	5
						2.70	5
						2.80	19
						2.90	19
3.0						3.00	25
	End of Probe at 3.10 m			77.19			
4.0							

Graphic Probe Record: 0 5 10 15 20 25

GROUNDWATER OBSERVATIONS

REMARKS

IGSL DP LOG 100MM INCREMENTS 24330.GPJ IGSL.GDT 31/1/23

DYNAMIC PROBE RECORD

REPORT NUMBER 24330

CONTRACT Halverstown

PROBE NO. DP45
SHEET Sheet 1 of 1

CO-ORDINATES 686,651.20 E
719,711.31 N
GROUND LEVEL (mOD) 81.80

HAMMER MASS (kg) 50
INCREMENT SIZE (mm) 100
FALL HEIGHT (mm) 500

DATE COMMENCED 13/10/2022
DATE COMPLETED 24/10/2022

CLIENT
ENGINEER DOBA

PROBE TYPE DPH

RECEIVED: 15/08/2024

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water	Depth (m)	Probe Readings (Blows/Increment)
0.0	.					0.00	0
						0.10	0
						0.20	0
						0.30	1
						0.40	1
						0.50	1
						0.60	4
						0.70	9
						0.80	12
						0.90	12
1.0						1.00	11
						1.10	8
						1.20	6
						1.30	3
						1.40	3
						1.50	3
						1.60	3
						1.70	3
						1.80	3
						1.90	4
2.0						2.00	4
						2.10	5
						2.20	4
						2.30	4
						2.40	6
						2.50	6
						2.60	8
						2.70	10
						2.80	9
						2.90	10
3.0						3.00	18
						3.10	25
	End of Probe at 3.20 m			78.60			
4.0							

Graphic Probe Record: 0 5 10 15 20 25

GROUNDWATER OBSERVATIONS

REMARKS

IGSL DP LOG 100MM INCREMENTS 24330.GPJ IGSL.GDT 31/1/23

DYNAMIC PROBE RECORD

REPORT NUMBER 24330

CONTRACT Halverstown

PROBE NO. DP46
SHEET Sheet 1 of 1

CO-ORDINATES 686,707.11 E
719,737.16 N
GROUND LEVEL (mOD) 80.60

HAMMER MASS (kg) 50
INCREMENT SIZE (mm) 100
FALL HEIGHT (mm) 500

DATE COMMENCED 13/10/2022
DATE COMPLETED 24/10/2022

CLIENT
ENGINEER DOBA

PROBE TYPE DPH

RECEIVED: 15/08/2024

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water	Depth (m)	Probe Readings (Blows/Increment)
0.0	.					0.00	0
						0.10	0
						0.20	0
						0.30	1
						0.40	5
						0.50	7
						0.60	7
						0.70	7
						0.80	7
						0.90	6
1.0						1.00	4
						1.10	5
						1.20	2
						1.30	2
						1.40	1
						1.50	1
						1.60	0
						1.70	0
						1.80	2
						1.90	2
2.0						2.00	0
						2.10	1
						2.20	3
						2.30	4
						2.40	14
						2.50	13
						2.60	20
						2.70	16
						2.80	13
						2.90	13
3.0						3.00	11
						3.10	11
						3.20	12
						3.30	17
						3.40	15
						3.50	17
						3.60	22
						3.70	25
	End of Probe at 3.80 m			76.80			
4.0							

Graphic Probe Record: 0 5 10 15 20 25

GROUNDWATER OBSERVATIONS

REMARKS

IGSL DP LOG 100MM INCREMENTS 24330.GPJ IGSL.GDT 31/1/23

DYNAMIC PROBE RECORD

REPORT NUMBER 24330

CONTRACT Halverstown

PROBE NO. DP47
SHEET Sheet 1 of 1

CO-ORDINATES 686,765.22 E
719,769.16 N
GROUND LEVEL (mOD) 81.09

HAMMER MASS (kg) 50
INCREMENT SIZE (mm) 100
FALL HEIGHT (mm) 500

DATE COMMENCED 13/10/2022
DATE COMPLETED 24/10/2022

CLIENT
ENGINEER DOBA

PROBE TYPE DPH

RECEIVED: 15/08/2024

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water	Depth (m)	Probe Readings (Blows/Increment)
0.0	.					0.00	0
						0.10	0
						0.20	1
						0.30	2
						0.40	3
						0.50	5
						0.60	6
						0.70	6
						0.80	7
						0.90	5
1.0						1.00	7
						1.10	10
						1.20	6
						1.30	7
						1.40	7
						1.50	6
						1.60	5
						1.70	4
						1.80	4
						1.90	6
2.0						2.00	10
						2.10	17
						2.20	25
	End of Probe at 2.30 m			78.79			
3.0							
4.0							

Graphic Probe Record: 0 5 10 15 20 25

GROUNDWATER OBSERVATIONS

REMARKS

IGSL DP LOG 100MM INCREMENTS 24330.GPJ IGSL.GDT 31/1/23

DYNAMIC PROBE RECORD

REPORT NUMBER 24330

CONTRACT Halverstown

PROBE NO. DP48
SHEET Sheet 1 of 1

CO-ORDINATES 686,725.82 E
719,678.88 N
GROUND LEVEL (mOD) 80.69

HAMMER MASS (kg) 50
INCREMENT SIZE (mm) 100
FALL HEIGHT (mm) 500

DATE COMMENCED 13/10/2022
DATE COMPLETED 24/10/2022

CLIENT
ENGINEER DOBA

PROBE TYPE DPH

RECEIVED: 15/08/2024

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water	Depth (m)	Probe Readings (Blows/Increment)
0.0	.					0.00	0
						0.10	0
						0.20	3
						0.30	4
						0.40	8
						0.50	9
						0.60	9
						0.70	10
						0.80	10
						0.90	8
1.0						1.00	5
						1.10	3
						1.20	4
						1.30	3
						1.40	1
						1.50	2
						1.60	1
						1.70	1
						1.80	1
						1.90	0
2.0						2.00	1
						2.10	1
						2.20	3
						2.30	4
						2.40	5
						2.50	4
						2.60	4
						2.70	5
						2.80	7
						2.90	7
3.0						3.00	7
						3.10	20
	End of Probe at 3.30 m			77.39		3.20	25
4.0							

Graphic Probe Record: 0 5 10 15 20 25

GROUNDWATER OBSERVATIONS

REMARKS

IGSL DP LOG 100MM INCREMENTS 24330.GPJ IGSL.GDT 31/1/23

DYNAMIC PROBE RECORD

REPORT NUMBER 24330

CONTRACT Halverstown

PROBE NO. DP49
SHEET Sheet 1 of 1

CO-ORDINATES 686,106.77 E
719,990.16 N
GROUND LEVEL (mOD) 83.74

HAMMER MASS (kg) 50
INCREMENT SIZE (mm) 100
FALL HEIGHT (mm) 500

DATE COMMENCED 13/10/2022
DATE COMPLETED 24/10/2022

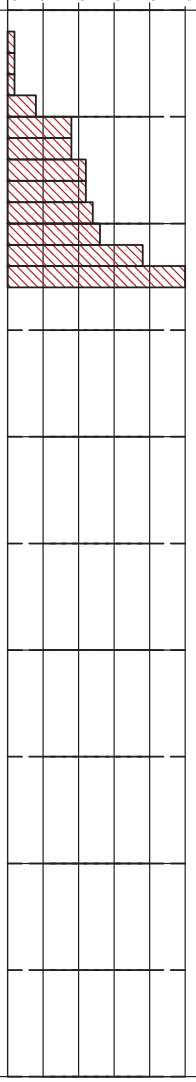
CLIENT
ENGINEER DOBA

PROBE TYPE DPH

RECEIVED: 15/08/2024

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water	Depth (m)	Probe Readings (Blows/Increment)
0.0	.					0.00	0
						0.10	1
						0.20	1
						0.30	1
						0.40	4
						0.50	9
						0.60	9
						0.70	11
						0.80	11
						0.90	12
1.0						1.00	13
						1.10	19
	End of Probe at 1.30 m			82.44		1.20	25
2.0							
3.0							
4.0							

Graphic Probe Record



GROUNDWATER OBSERVATIONS

REMARKS

IGSL DP LOG 100MM INCREMENTS 24330.GPJ IGSL.GDT 31/1/23

DYNAMIC PROBE RECORD

REPORT NUMBER 24330

CONTRACT Halverstown

PROBE NO. DP50
SHEET Sheet 1 of 1

CO-ORDINATES 686,210.39 E
719,967.00 N
GROUND LEVEL (mOD) 85.05

HAMMER MASS (kg) 50
INCREMENT SIZE (mm) 100
FALL HEIGHT (mm) 500

DATE COMMENCED 13/10/2022
DATE COMPLETED 24/10/2022

CLIENT
ENGINEER DOBA

PROBE TYPE DPH

RECEIVED: 19/08/2024

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water	Depth (m)	Probe Readings (Blows/Increment)
0.0	.					0.00	0
						0.10	1
						0.20	0
						0.30	0
						0.40	0
						0.50	0
						0.60	1
						0.70	3
						0.80	8
						0.90	11
1.0						1.00	14
						1.10	16
						1.20	17
						1.30	18
						1.40	17
						1.50	18
						1.60	20
						1.70	16
						1.80	16
						1.90	15
2.0						2.00	9
						2.10	8
						2.20	7
						2.30	6
						2.40	7
						2.50	8
						2.60	10
						2.70	13
						2.80	12
						2.90	11
3.0						3.00	9
						3.10	9
						3.20	8
						3.30	7
						3.40	9
						3.50	18
						3.60	21
						3.70	14
						3.80	20
						3.90	19
4.0						4.00	25
	End of Probe at 4.10 m			80.95			

Graphic Probe Record: 0 5 10 15 20 25

GROUNDWATER OBSERVATIONS

REMARKS

IGSL DP LOG 100MM INCREMENTS 24330.GPJ IGSL.GDT 31/1/23

DYNAMIC PROBE RECORD

REPORT NUMBER 24330

CONTRACT Halverstown

PROBE NO. DP51
SHEET Sheet 1 of 1

CO-ORDINATES 686,092.79 E
719,923.60 N
GROUND LEVEL (mOD) 83.59

HAMMER MASS (kg) 50
INCREMENT SIZE (mm) 100
FALL HEIGHT (mm) 500

DATE COMMENCED 13/10/2022
DATE COMPLETED 24/10/2022

CLIENT
ENGINEER DOBA

PROBE TYPE DPH

RECEIVED: 15/08/2024

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water	Depth (m)	Probe Readings (Blows/Increment)
0.0	.					0.00	0
						0.10	0
						0.20	0
						0.30	0
						0.40	1
						0.50	0
						0.60	0
						0.70	0
						0.80	1
						0.90	0
1.0						1.00	0
						1.10	0
						1.20	1
						1.30	1
						1.40	5
						1.50	5
						1.60	11
						1.70	9
						1.80	10
						1.90	12
2.0						2.00	10
						2.10	16
						2.20	25
	End of Probe at 2.30 m			81.29			
3.0							
4.0							

Graphic Probe Record: 0 5 10 15 20 25

GROUNDWATER OBSERVATIONS

REMARKS

IGSL DP LOG 100MM INCREMENTS 24330.GPJ IGSL.GDT 31/1/23

DYNAMIC PROBE RECORD

REPORT NUMBER 24330

CONTRACT Halverstown

PROBE NO. DP52
SHEET Sheet 1 of 1

CO-ORDINATES 686,144.75 E
719,915.16 N
GROUND LEVEL (mOD) 83.98

HAMMER MASS (kg) 50
INCREMENT SIZE (mm) 100
FALL HEIGHT (mm) 500

DATE COMMENCED 13/10/2022
DATE COMPLETED 24/10/2022

CLIENT
ENGINEER DOBA

PROBE TYPE DPH

RECEIVED: 15/08/2024

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water	Depth (m)	Probe Readings (Blows/Increment)
0.0	.					0.00	0
						0.10	0
						0.20	0
						0.30	1
						0.40	1
						0.50	1
						0.60	1
						0.70	1
						0.80	2
						0.90	3
1.0						1.00	3
						1.10	3
						1.20	5
						1.30	5
						1.40	5
						1.50	6
						1.60	7
						1.70	10
						1.80	14
						1.90	20
2.0						2.00	25
	End of Probe at 2.10 m			81.88			
3.0							
4.0							

Graphic Probe Record: 0 5 10 15 20 25

GROUNDWATER OBSERVATIONS

REMARKS

IGSL DP LOG 100MM INCREMENTS 24330.GPJ IGSL.GDT 31/1/23

DYNAMIC PROBE RECORD

REPORT NUMBER 24330

CONTRACT Halverstown

PROBE NO. DP53
SHEET Sheet 1 of 1

CO-ORDINATES 686,195.84 E
719,902.81 N
GROUND LEVEL (mOD) 84.37

HAMMER MASS (kg) 50
INCREMENT SIZE (mm) 100
FALL HEIGHT (mm) 500

DATE COMMENCED 13/10/2022
DATE COMPLETED 24/10/2022

CLIENT
ENGINEER DOBA

PROBE TYPE DPH

RECEIVED: 15/08/2024

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water	Depth (m)	Probe Readings (Blows/Increment)
0.0	.					0.00	0
						0.10	0
						0.20	1
						0.30	1
						0.40	0
						0.50	0
						0.60	0
						0.70	0
						0.80	2
						0.90	2
1.0						1.00	2
						1.10	2
						1.20	4
						1.30	4
						1.40	5
						1.50	14
						1.60	12
						1.70	9
						1.80	8
						1.90	8
2.0						2.00	7
						2.10	8
						2.20	9
						2.30	9
						2.40	9
						2.50	9
						2.60	10
						2.70	17
						2.80	25
3.0	End of Probe at 2.90 m			81.47			
4.0							

Graphic Probe Record: 0 5 10 15 20 25

GROUNDWATER OBSERVATIONS

REMARKS

IGSL DP LOG 100MM INCREMENTS 24330.GPJ IGSL.GDT 31/1/23

DYNAMIC PROBE RECORD

REPORT NUMBER 24330

CONTRACT Halverstown

PROBE NO. DP54
SHEET Sheet 1 of 1

CO-ORDINATES 686,072.66 E
719,843.36 N
GROUND LEVEL (mOD) 82.74

HAMMER MASS (kg) 50
INCREMENT SIZE (mm) 100
FALL HEIGHT (mm) 500

DATE COMMENCED 13/10/2022
DATE COMPLETED 24/10/2022

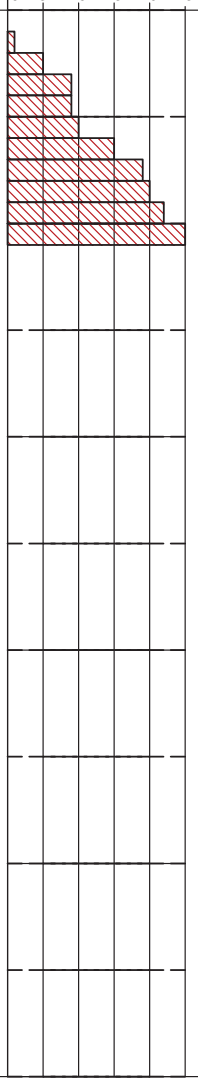
CLIENT
ENGINEER DOBA

PROBE TYPE DPH

RECEIVED: 15/08/2024

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water	Depth (m)	Probe Readings (Blows/Increment)
0.0	.					0.00	0
						0.10	1
						0.20	5
						0.30	9
						0.40	9
						0.50	10
						0.60	15
						0.70	19
						0.80	20
						0.90	22
1.0						1.00	25
	End of Probe at 1.10 m			81.64			
2.0							
3.0							
4.0							

Graphic Probe Record



GROUNDWATER OBSERVATIONS

REMARKS

IGSL DP LOG 100MM INCREMENTS 24330.GPJ IGSL.GDT 31/1/23

DYNAMIC PROBE RECORD

REPORT NUMBER 24330

CONTRACT Halverstown

PROBE NO. DP55
SHEET Sheet 1 of 1

CO-ORDINATES 686,165.55 E
719,844.59 N
GROUND LEVEL (mOD) 83.28

HAMMER MASS (kg) 50
INCREMENT SIZE (mm) 100
FALL HEIGHT (mm) 500

DATE COMMENCED 13/10/2022
DATE COMPLETED 24/10/2022

CLIENT
ENGINEER DOBA

PROBE TYPE DPH

RECEIVED: 15/08/2024

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water	Depth (m)	Probe Readings (Blows/Increment)
0.0	.					0.00	0
						0.10	0
						0.20	0
						0.30	0
						0.40	1
						0.50	0
						0.60	0
						0.70	0
						0.80	1
						0.90	4
1.0						1.00	3
						1.10	5
						1.20	5
						1.30	10
						1.40	11
						1.50	20
						1.60	22
						1.70	17
						1.80	10
						1.90	6
2.0						2.00	7
						2.10	10
						2.20	8
						2.30	6
						2.40	13
						2.50	19
						2.60	25
	End of Probe at 2.70 m			80.58			
3.0							
4.0							

Graphic Probe Record: 0 5 10 15 20 25

GROUNDWATER OBSERVATIONS

REMARKS

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Appendix 4

Plate Bearing Test Records and Photographs

Plate Bearing Test Location	Easting	Northing	Ground Elevation (m OD)
PB01	686026.191	719628.483	77.374
PB02	686136.534	719561.308	78.464
PB03	686256.743	719477.368	77.388
PB04	686382.137	719393.367	77.658
PB05	686492.325	719325.948	77.892
PB06	686083.424	719690.995	80.212
PB07	686195.383	719648.688	80.35
PB08	686321.511	719577.541	80.422
PB09	686449.717	719504.272	79.958
PB10	686560.525	719440.269	79.465
PB11	686111.564	719816.693	82.453
PB12	686257.433	719770.027	82.442
PB13	686376.995	719691.499	82.736
PB14	686508.037	719616.149	82.784
PB15	686669.886	719527.151	82.074
PB16	686223.894	719890.232	84.622
PB17	686250.619	719960.215	85.033
PB18	686538.545	719817.48	84.393
PB19	686382.704	719872.799	85.448
PB20	686620.439	719708.606	82.783
PB21	686739.46	719661.977	80.75
PB22	686775.685	719756.63	81.147
PB23	686604.429	719849.736	82.676

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PLATE TEST REPORT SHEET (F3.1)

Applied Pressure/Settlement Curve

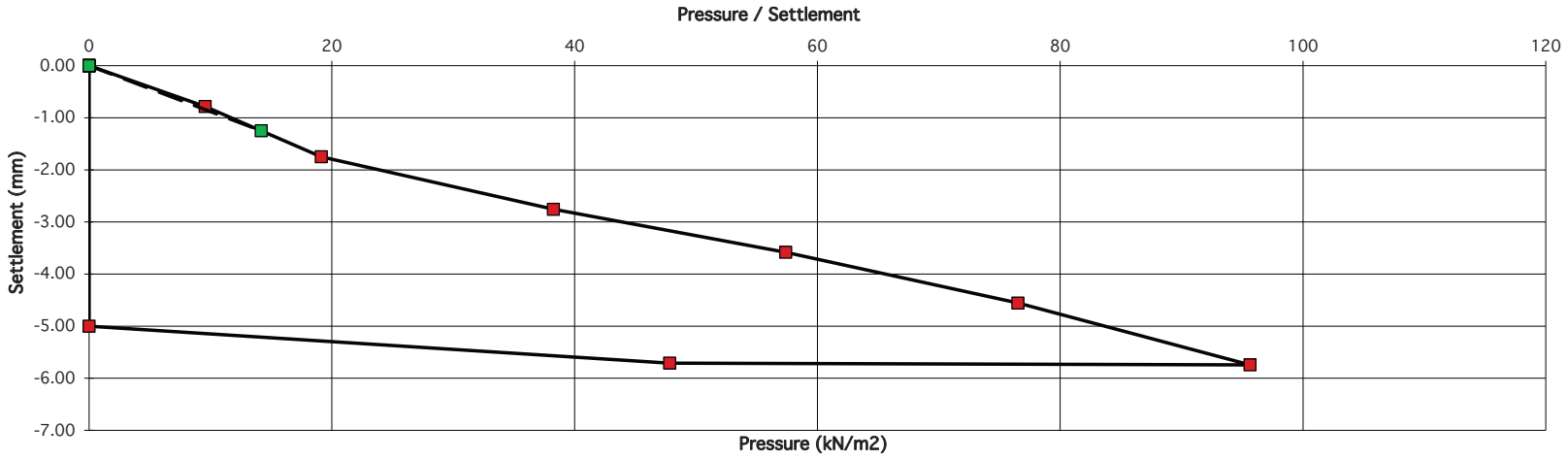
Reference No.	R139820
Contract	24330 Halverstown
Test No.	PBT01 (Load)
Location	See Site Map
Depth	0.60
Client	DOBA
Plate Diameter:	450 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	M.Brown
Authorised by	
Date	18/10/2022

Description of soil under test
(natural soil, placed fill, sub-base)

Light brownish grey gravelly silty SAND.

Sample Ref No.

Depth m bgl



Gradient at 1.25 mm settlement intersection = 11
Modulus of subgrade reaction = 7 MPa/m
Correction factor applied = 0.64 as per HD 25-26/10

Equivalent CBR value in accordance with NRA HD25-26/10 0.3 %

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PLATE TEST REPORT SHEET (F3.1)

Applied Pressure/Settlement Curve

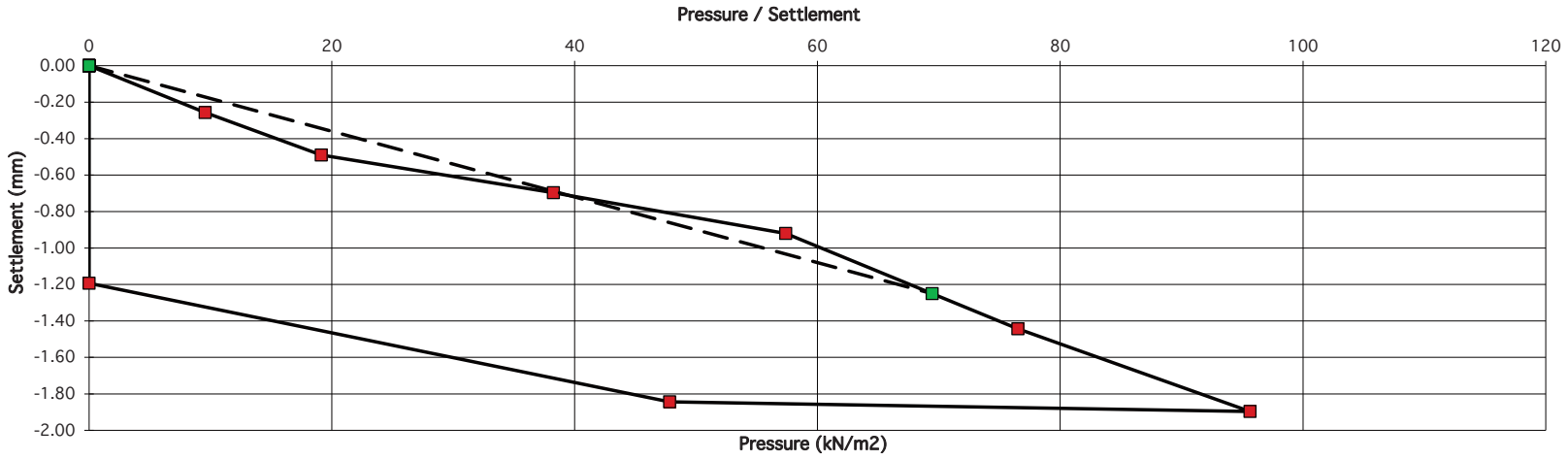
Reference No.	R139820
Contract	24330 Halverstown
Test No.	PBT01 (Reload)
Location	See Site Map
Depth	0.60
Client	DOBA
Plate Diameter:	450 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	M.Brown
Authorised by	
Date	18/10/2022

Description of soil under test (natural soil, placed fill, sub-base)

Light brownish grey gravelly silty SAND.

Sample Ref No.

Depth m bgl



Gradient at 1.25 mm settlement intersection = 56

Modulus of subgrade reaction = 36 MPa/m

Correction factor applied = 0.64 as per HD 25-26/10

Equivalent CBR value in accordance with NRA HD25-26/10 4.7 %

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PLATE TEST REPORT SHEET (F3.1)

Applied Pressure/Settlement Curve

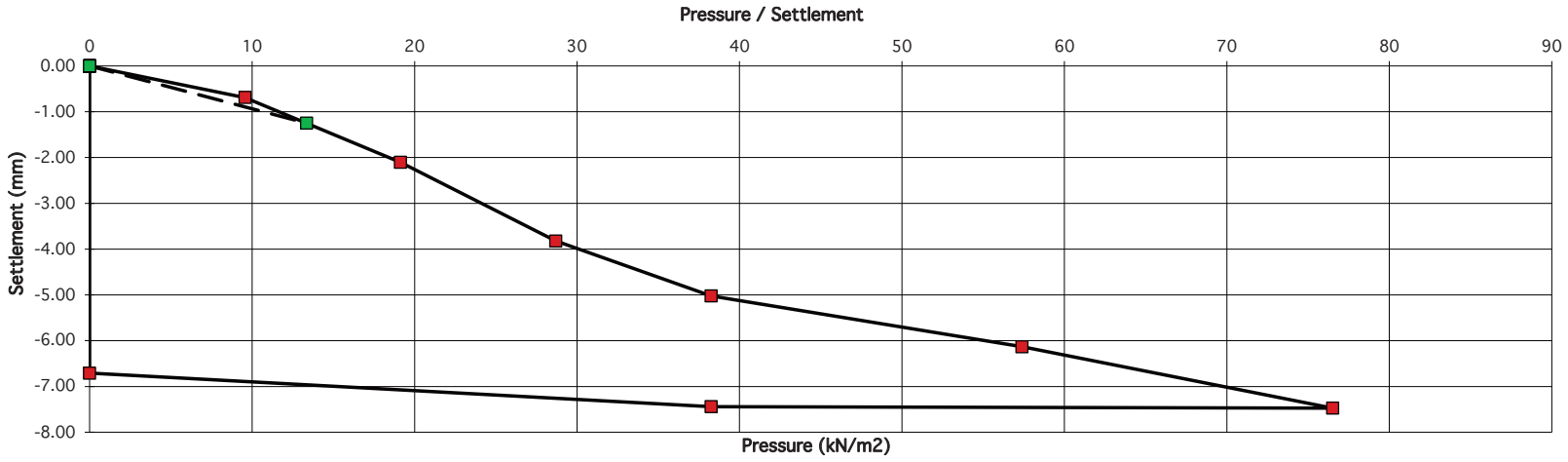
Reference No.	R139821
Contract	24330 Halverstown
Test No.	PBT02(Load)
Location	See Site Map
Depth	0.60
Client	DOBA
Plate Diameter:	450 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	M.Brown
Authorised by	
Date	19/10/2022

Description of soil under test (natural soil, placed fill, sub-base)

Grey mottled orange gravelly silty SAND

Sample Ref No.

Depth m bgl



Gradient at 1.25 mm settlement intersection = 11

Modulus of subgrade reaction = 7 MPa/m

Correction factor applied = 0.64 as per HD 25-26/10

Equivalent CBR value in accordance with NRA HD25-26/10 0.3 %

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PLATE TEST REPORT SHEET (F3.1)

Applied Pressure/Settlement Curve

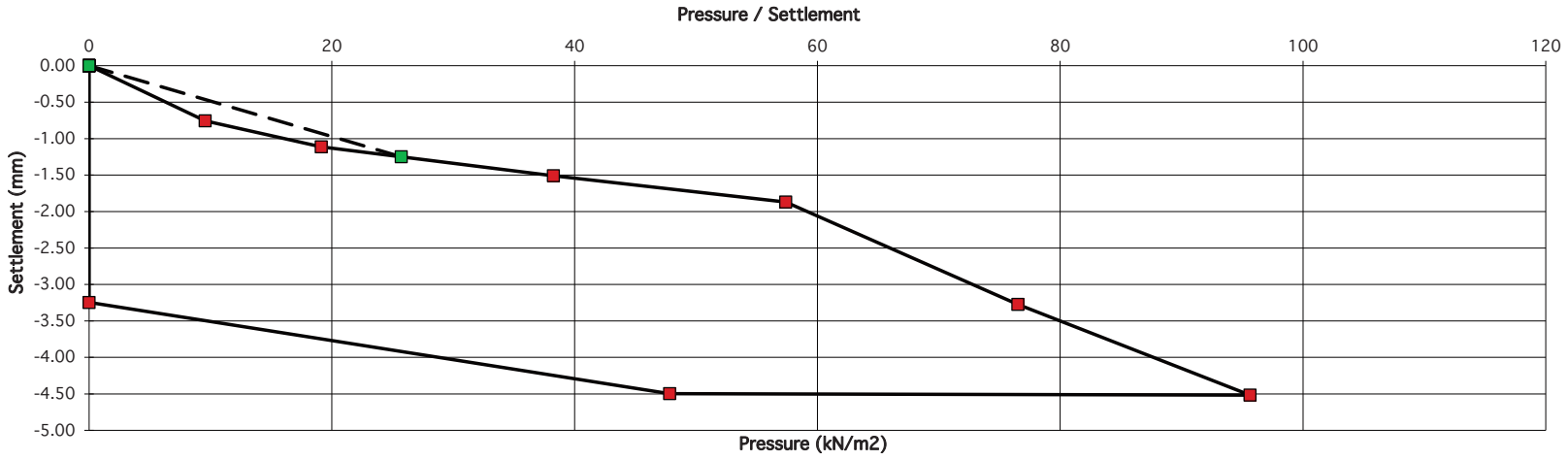
Reference No.	R139821
Contract	24330 Halverstown
Test No.	PBT02 (Reload)
Location	See Site Map
Depth	0.60
Client	DOBA
Plate Diameter:	450 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	M.Brown
Authorised by	
Date	19/10/2022

Description of soil under test
(natural soil, placed fill, sub-base)

Grey mottled orange gravelly silty SAND

Sample Ref No.

Depth m bgl



Gradient at 1.25 mm settlement intersection = 21
Modulus of subgrade reaction = 13 MPa/m
Correction factor applied = 0.64 as per HD 25-26/10

Equivalent CBR value in accordance with NRA HD25-26/10 0.8 %

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PLATE TEST REPORT SHEET (F3.1)

Applied Pressure/Settlement Curve

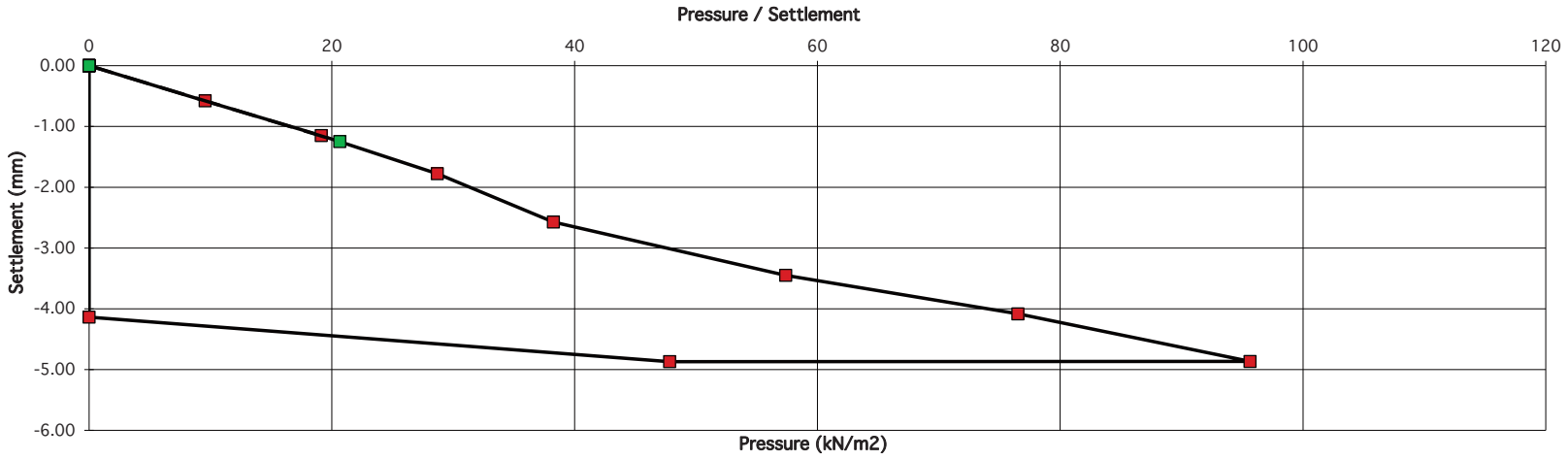
Reference No.	R139822
Contract	24330 Halverstown
Test No.	PBT03 (Load)
Location	See Site Map
Depth	0.50
Client	DOBA
Plate Diameter:	450 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	M.Brown
Authorised by	
Date	19/10/2022

Description of soil under test
(natural soil, placed fill, sub-base)

Grey mottled orange silty sandy CLAY.

Sample Ref No.

Depth m bgl



Gradient at 1.25 mm settlement intersection = 17
Modulus of subgrade reaction = 11 MPa/m
Correction factor applied = 0.64 as per HD 25-26/10

Equivalent CBR value in accordance with NRA HD25-26/10 0.6 %

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PLATE TEST REPORT SHEET (F3.1)

Applied Pressure/Settlement Curve

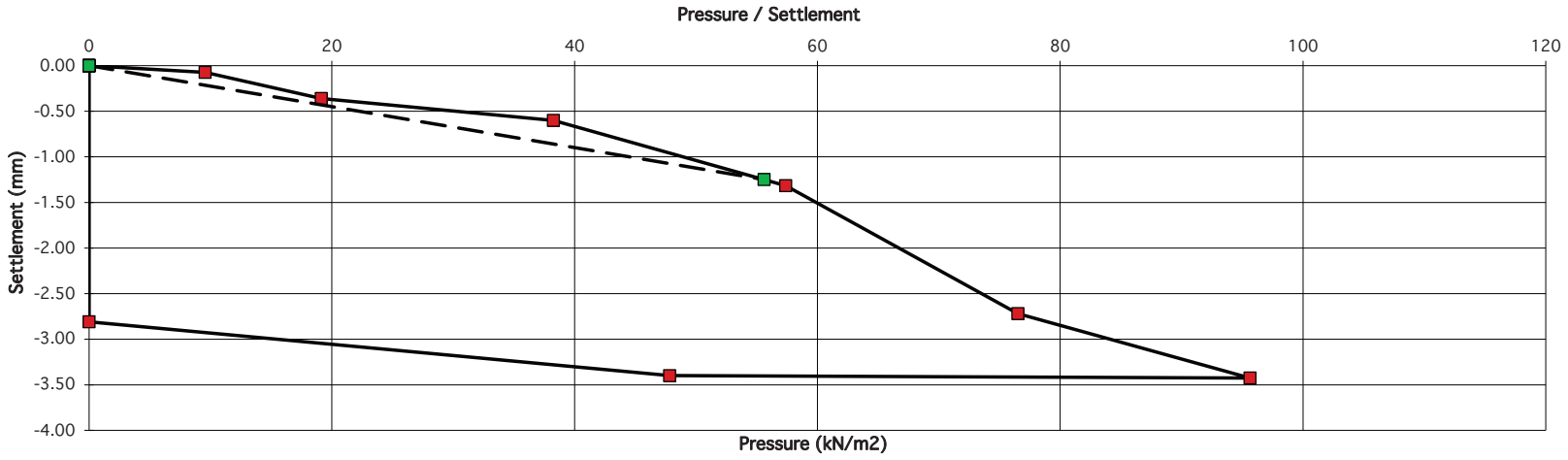
Reference No.	R139822
Contract	24330 Halverstown
Test No.	PBT03 (Reload)
Location	See Site Map
Depth	0.50
Client	DOBA
Plate Diameter:	450 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	M.Brown
Authorised by	
Date	19/10/2022

Description of soil under test
(natural soil, placed fill, sub-base)

Grey mottled orange silty sandy CLAY.

Sample Ref No.

Depth m bgl



Gradient at 1.25 mm settlement intersection = 44
Modulus of subgrade reaction = 29 MPa/m
Correction factor applied = 0.64 as per HD 25-26/10

Equivalent CBR value in accordance with NRA HD25-26/10 3.2 %

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PLATE TEST REPORT SHEET (F3.1)

Applied Pressure/Settlement Curve

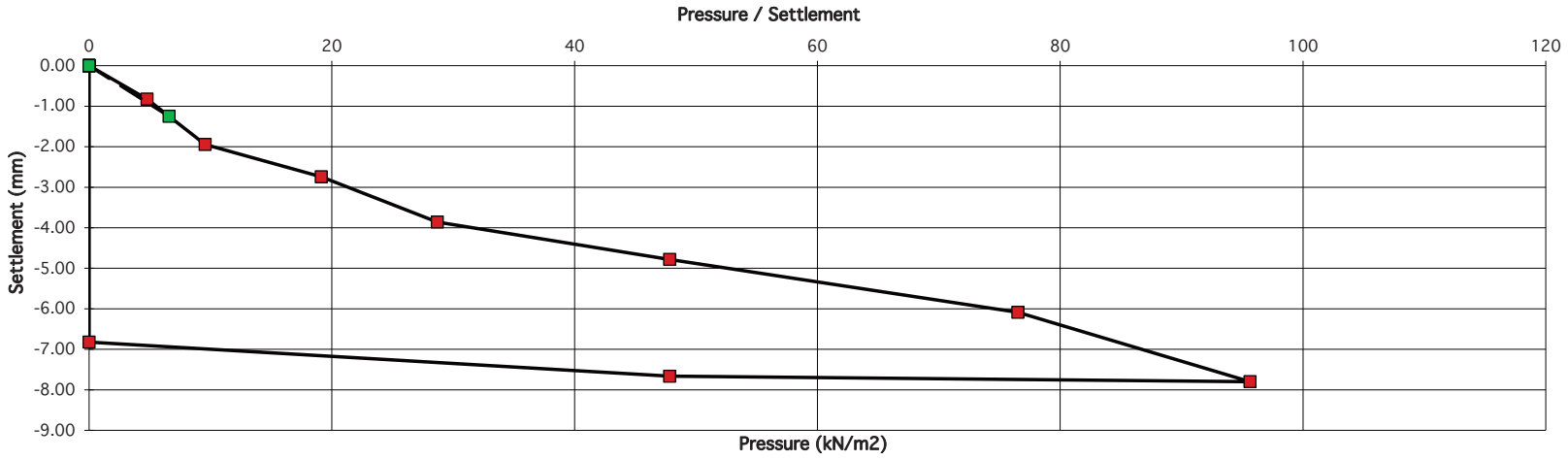
Reference No.	R139823
Contract	24330 Halverstown
Test No.	PBT04 (Load)
Location	See Site Map
Depth	0.40
Client	DOBA
Plate Diameter:	450 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	M.Brown
Authorised by	
Date	04/10/2022

Description of soil under test
(natural soil, placed fill, sub-base)

Grey gravelly silty CLAY with medium cobbles.

Sample Ref No.

Depth m bgl



Gradient at 1.25 mm settlement intersection = 5
Modulus of subgrade reaction = 3 MPa/m
Correction factor applied = 0.64 as per HD 25-26/10

Equivalent CBR value in accordance with NRA HD25-26/10 0.1 %

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PLATE TEST REPORT SHEET (F3.1)

Applied Pressure/Settlement Curve

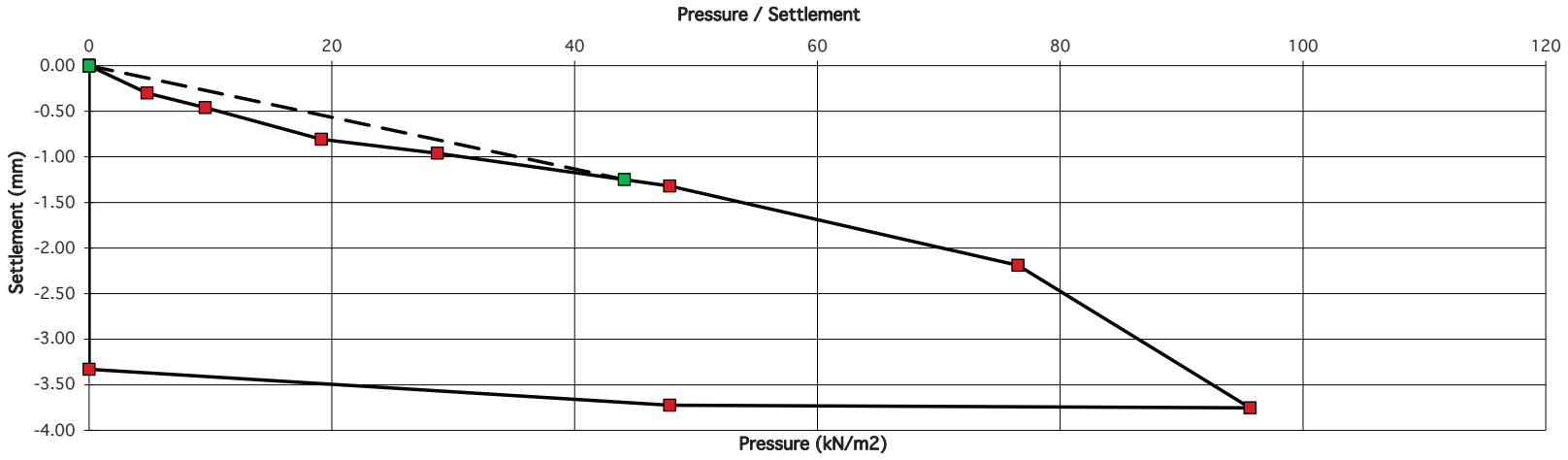
Reference No.	R139823
Contract	24330 Halverstown
Test No.	PBT04 (Reload)
Location	See Site Map
Depth	0.40
Client	DOBA
Plate Diameter:	450 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	M.Brown
Authorised by	
Date	04/10/2022

Description of soil under test
(natural soil, placed fill, sub-base)

Grey gravelly silty CLAY with medium cobbles.

Sample Ref No.

Depth m bgl



Gradient at 1.25 mm settlement intersection = 35
Modulus of subgrade reaction = 23 MPa/m
Correction factor applied = 0.64 as per HD 25-26/10

Equivalent CBR value in accordance with NRA HD25-26/10 2.2 %

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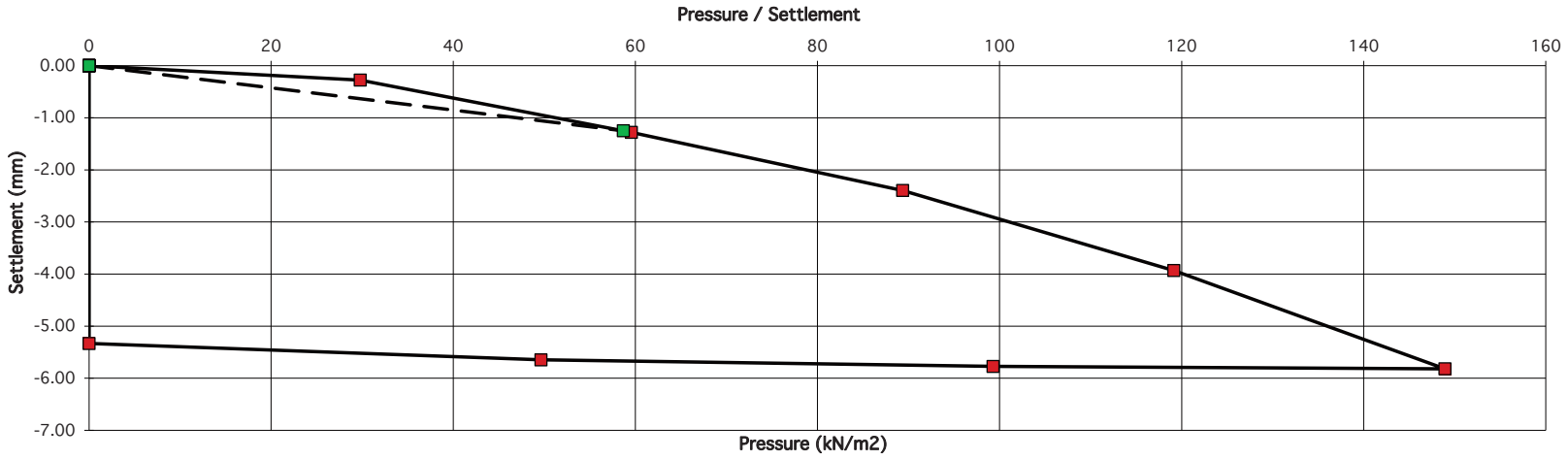
PLATE TEST REPORT SHEET (F3.1)

Applied Pressure/Settlement Curve

Reference No.	R139824
Contract	24330 Halverstown
Test No.	PBT05 (Load)
Location	See Site Map
Depth	0.40
Client	DOBA
Plate Diameter:	450 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	M.Brown
Authorised by	
Date	03/10/2022

Description of soil under test
(natural soil, placed fill, sub-base)
Grey gravelly sandy CLAY

Sample Ref No.
Depth m bgl



Gradient at 1.25 mm settlement intersection = 47
Modulus of subgrade reaction = 30 MPa/m
Correction factor applied = 0.64 as per HD 25-26/10

Equivalent CBR value in accordance with NRA HD25-26/10 3.5 %

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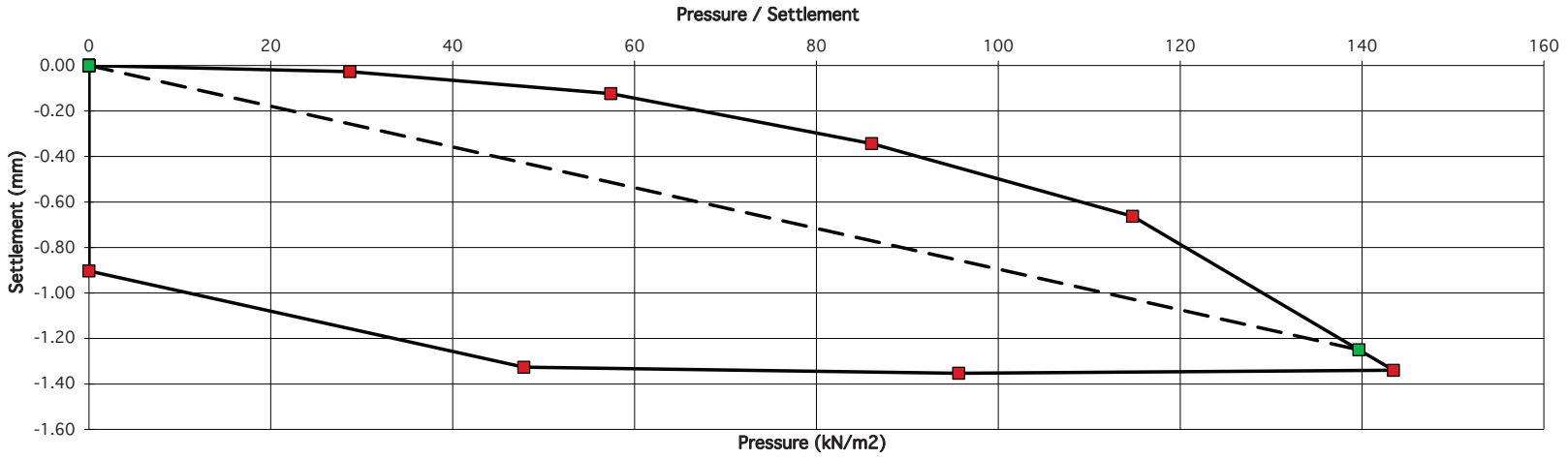
PLATE TEST REPORT SHEET (F3.1)

Applied Pressure/Settlement Curve

Reference No.	R139824
Contract	24330 Halverstown
Test No.	PBT05 (Reload)
Location	See Site Map
Depth	0.40
Client	DOBA
Plate Diameter:	450 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	M.Brown
Authorised by	
Date	03/10/2022

Description of soil under test
(natural soil, placed fill, sub-base)
Grey gravelly sandy CLAY

Sample Ref No.
Depth m bgl



Gradient at 1.25 mm settlement intersection = 112
Modulus of subgrade reaction = 72 MPa/m
Correction factor applied = 0.64 as per HD 25-26/10

Equivalent CBR value in accordance with NRA HD25-26/10 15.9 %

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PLATE TEST REPORT SHEET (F3.1)

Applied Pressure/Settlement Curve

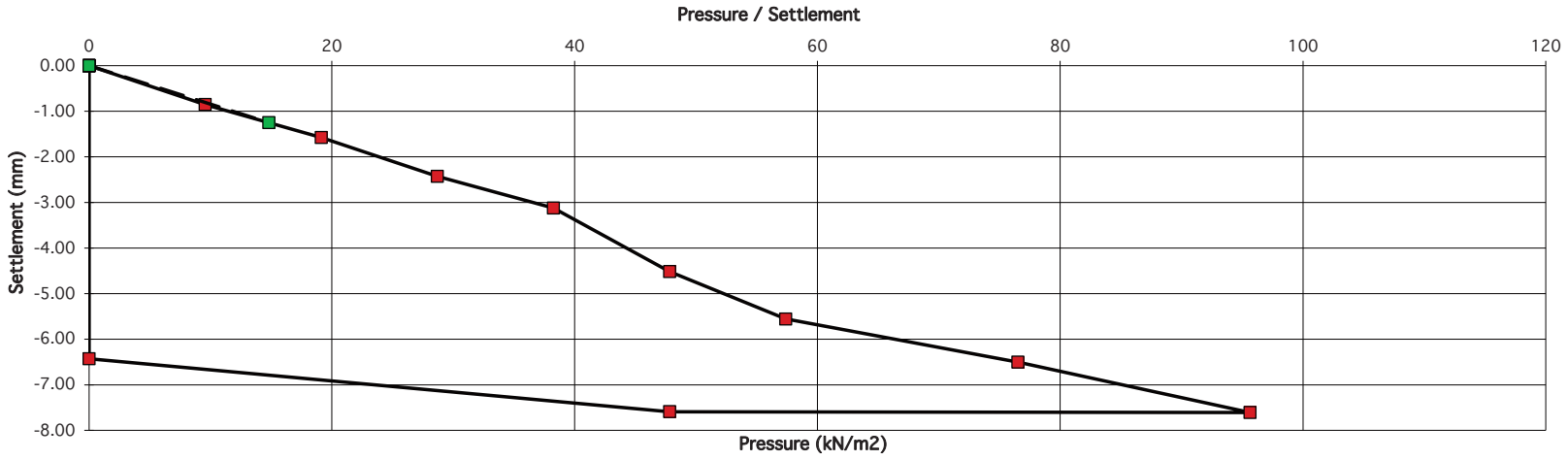
Reference No.	R139825
Contract	24330 Halverstown
Test No.	PBT06 (Load)
Location	See Site Map
Depth	0.40
Client	DOBA
Plate Diameter:	450 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	M.Brown
Authorised by	
Date	18/10/2022

Description of soil under test (natural soil, placed fill, sub-base)

Grey sandy gravelly clayey SILT.

Sample Ref No.

Depth m bgl



Gradient at 1.25 mm settlement intersection = 12
Modulus of subgrade reaction = 8 MPa/m
Correction factor applied = 0.64 as per HD 25-26/10

Equivalent CBR value in accordance with NRA HD25-26/10 0.3 %

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PLATE TEST REPORT SHEET (F3.1)

Applied Pressure/Settlement Curve

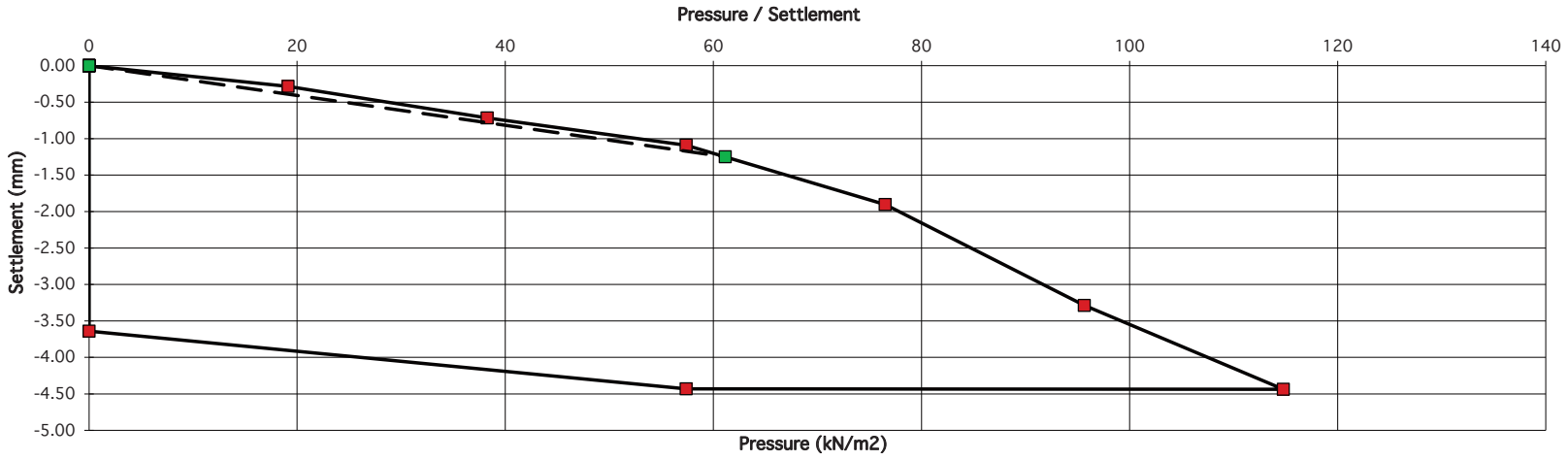
Reference No.	R139825
Contract	24330 Halverstown
Test No.	PBT06 (Reload)
Location	See Site Map
Depth	0.40
Client	DOBA
Plate Diameter:	450 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	M.Brown
Authorised by	
Date	18/10/2022

Description of soil under test
(natural soil, placed fill, sub-base)

Grey sandy gravelly clayey SILT.

Sample Ref No.

Depth m bgl



Gradient at 1.25 mm settlement intersection = 49
Modulus of subgrade reaction = 31 MPa/m
Correction factor applied = 0.64 as per HD 25-26/10

Equivalent CBR value in accordance with NRA HD25-26/10 3.8 %

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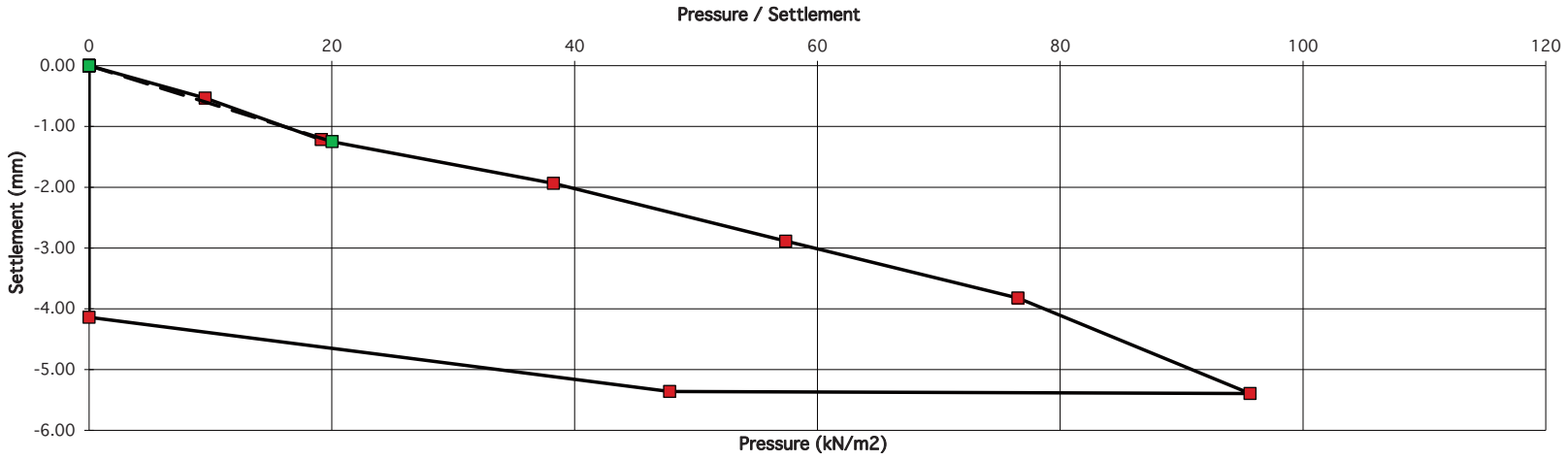
PLATE TEST REPORT SHEET (F3.1)

Applied Pressure/Settlement Curve

Reference No.	R139826
Contract	24330 Halverstown
Test No.	PBT07 (Load)
Location	See Site Map
Depth	0.60
Client	DOBA
Plate Diameter:	450 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	M.Brown
Authorised by	
Date	18/10/2022

Description of soil under test
(natural soil, placed fill, sub-base)
Brown sandy gravelly SILT.

Sample Ref No.
Depth m bgl



Gradient at 1.25 mm settlement intersection = 16
Modulus of subgrade reaction = 10 MPa/m
Correction factor applied = 0.64 as per HD 25-26/10

Equivalent CBR value in accordance with NRA HD25-26/10 0.5 %

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PLATE TEST REPORT SHEET (F3.1)

Applied Pressure/Settlement Curve

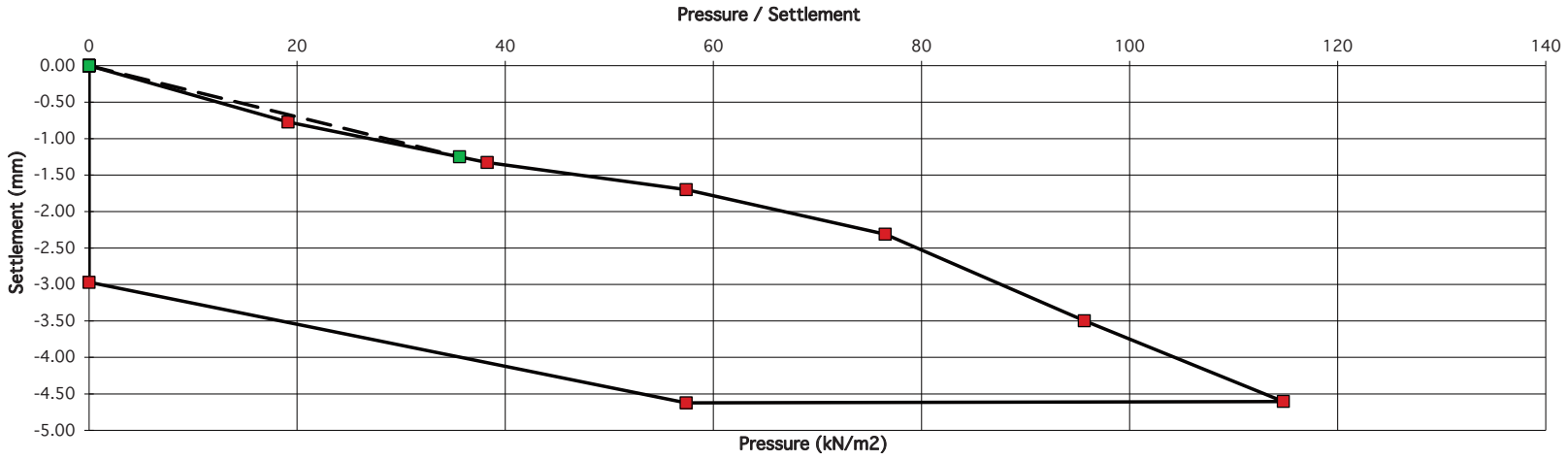
Reference No.	R139826
Contract	24330 Halverstown
Test No.	PBT07 (Reload)
Location	See Site Map
Depth	0.60
Client	DOBA
Plate Diameter:	450 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	M.Brown
Authorised by	
Date	18/10/2022

Description of soil under test
(natural soil, placed fill, sub-base)

Brown sandy gravelly SILT.

Sample Ref No.

Depth m bgl



Gradient at 1.25 mm settlement intersection = 28
Modulus of subgrade reaction = 18 MPa/m
Correction factor applied = 0.64 as per HD 25-26/10

Equivalent CBR value in accordance with NRA HD25-26/10 1.5 %

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PLATE TEST REPORT SHEET (F3.1)

Applied Pressure/Settlement Curve

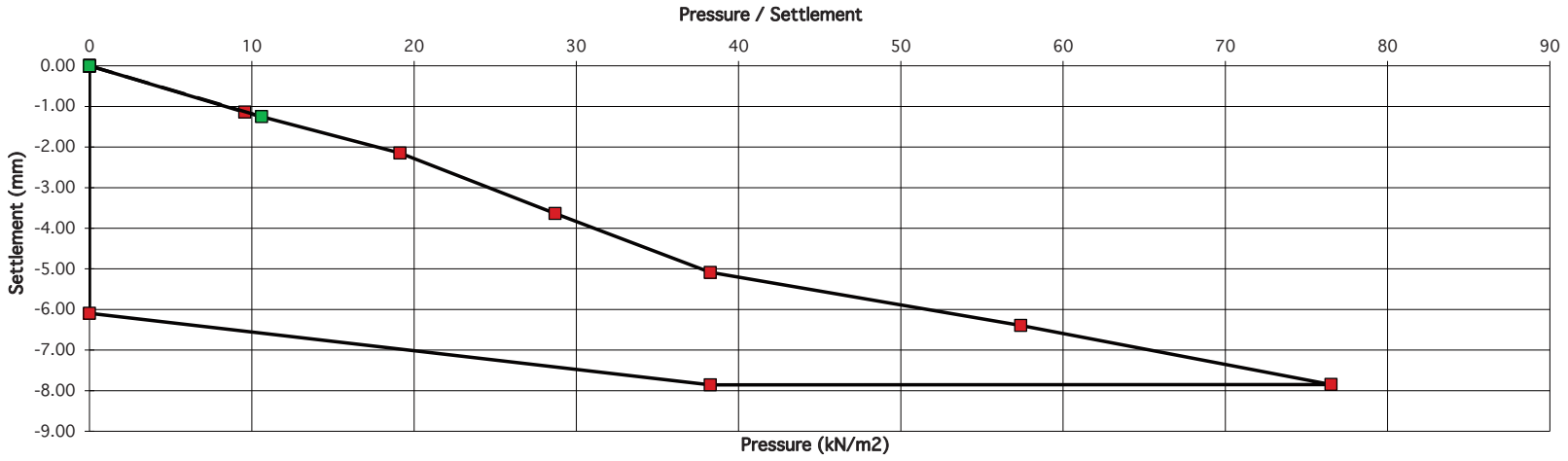
Reference No.	R139827
Contract	24330 Halverstown
Test No.	PBT08 (Load)
Location	See Site Map
Depth	0.50
Client	DOBA
Plate Diameter:	450 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	M.Brown
Authorised by	
Date	18/10/2022

Description of soil under test
(natural soil, placed fill, sub-base)

Brown sandy slightly gravelly silty CLAY.

Sample Ref No.

Depth m bgl



Gradient at 1.25 mm settlement intersection = 8
Modulus of subgrade reaction = 5 MPa/m
Correction factor applied = 0.64 as per HD 25-26/10

Equivalent CBR value in accordance with NRA HD25-26/10 0.2 %

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PLATE TEST REPORT SHEET (F3.1)

Applied Pressure/Settlement Curve

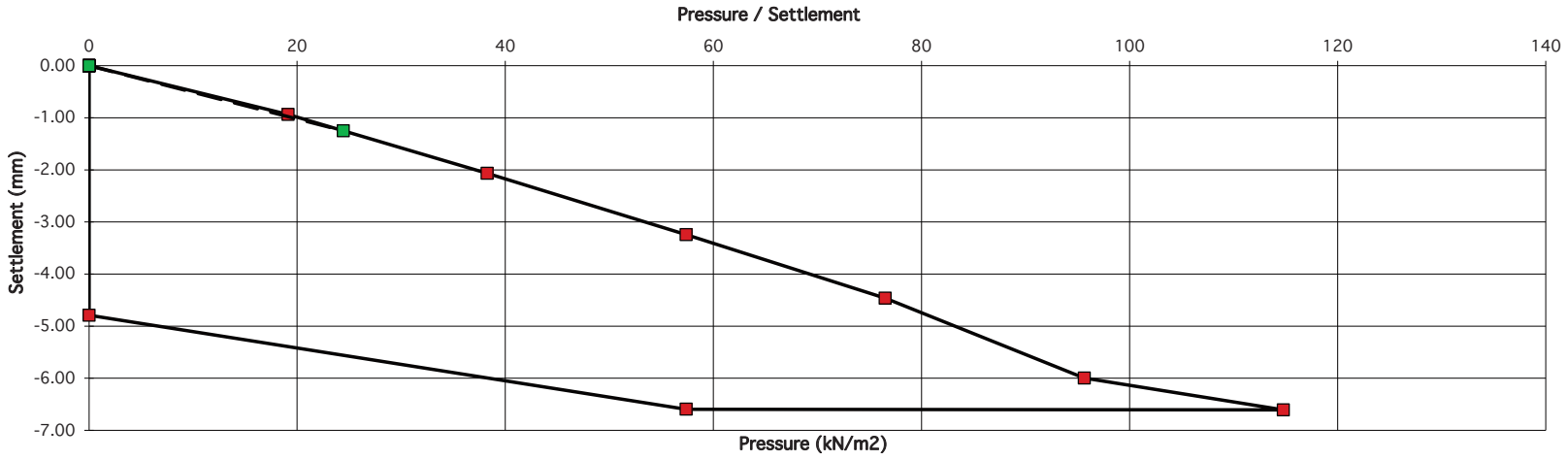
Reference No.	R139827
Contract	24330 Halverstown
Test No.	PBT08 (Reload)
Location	See Site Map
Depth	0.50
Client	DOBA
Plate Diameter:	450 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	M.Brown
Authorised by	
Date	18/10/2022

Description of soil under test
(natural soil, placed fill, sub-base)

Brown sandy slightly gravelly silty CLAY.

Sample Ref No.

Depth m bgl



Gradient at 1.25 mm settlement intersection = 20
Modulus of subgrade reaction = 13 MPa/m
Correction factor applied = 0.64 as per HD 25-26/10

Equivalent CBR value in accordance with NRA HD25-26/10 0.8 %

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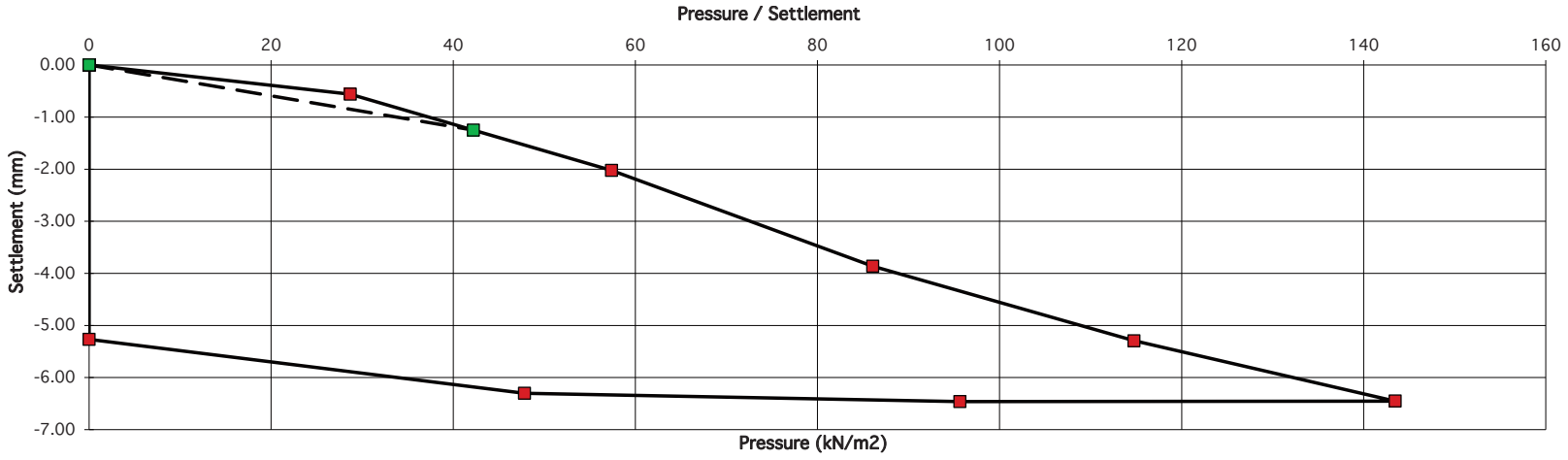
PLATE TEST REPORT SHEET (F3.1)

Applied Pressure/Settlement Curve

Reference No.	R139828
Contract	24330 Halverstown
Test No.	PBT09 (Load)
Location	See Site Map
Depth	0.40
Client	DOBA
Plate Diameter:	450 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	M.Brown
Authorised by	
Date	06/10/2022

Description of soil under test
(natural soil, placed fill, sub-base)
Grey gravelly sandy SILT

Sample Ref No.
Depth m bgl



Gradient at 1.25 mm settlement intersection = 34
Modulus of subgrade reaction = 22 MPa/m
Correction factor applied = 0.64 as per HD 25-26/10

Equivalent CBR value in accordance with NRA HD25-26/10 2.0 %

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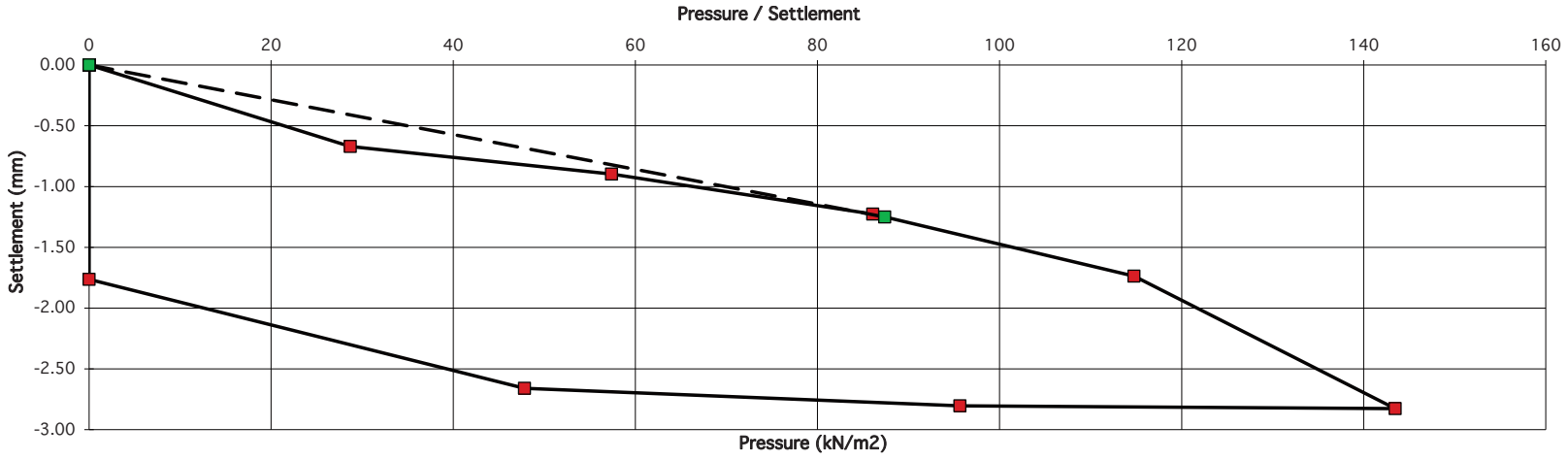
PLATE TEST REPORT SHEET (F3.1)

Applied Pressure/Settlement Curve

Reference No.	R139828
Contract	24330 Halverstown
Test No.	PBT09 (Reload)
Location	See Site Map
Depth	0.40
Client	DOBA
Plate Diameter:	450 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	M.Brown
Authorised by	
Date	06/10/2022

Description of soil under test
(natural soil, placed fill, sub-base)
Grey gravelly sandy SILT

Sample Ref No.
Depth m bgl



Gradient at 1.25 mm settlement intersection = 70
Modulus of subgrade reaction = 45 MPa/m
Correction factor applied = 0.64 as per HD 25-26/10

Equivalent CBR value in accordance with NRA HD25-26/10 7.1 %

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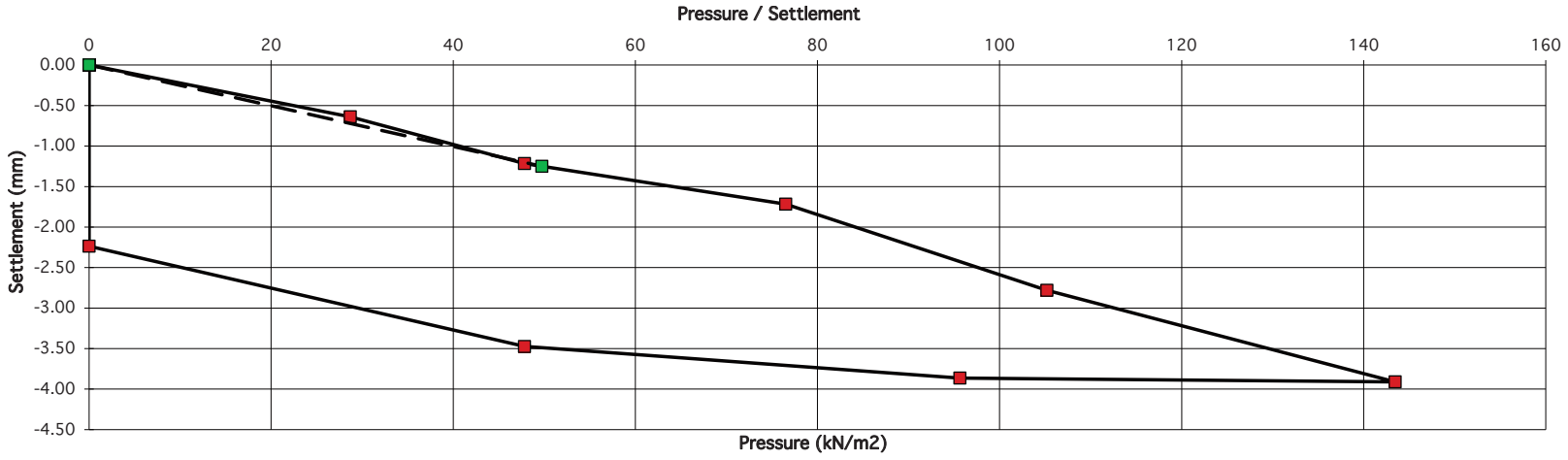
PLATE TEST REPORT SHEET (F3.1)

Applied Pressure/Settlement Curve

Reference No.	R139829
Contract	24330 Halverstown
Test No.	PBT10 (Load)
Location	See Site Map
Depth	0.50
Client	DOBA
Plate Diameter:	450 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	M.Brown
Authorised by	
Date	06/10/2022

Description of soil under test
(natural soil, placed fill, sub-base)
Grey gravelly sandy SILT

Sample Ref No.
Depth m bgl



Gradient at 1.25 mm settlement intersection = 40
Modulus of subgrade reaction = 26 MPa/m
Correction factor applied = 0.64 as per HD 25-26/10

Equivalent CBR value in accordance with NRA HD25-26/10 2.7 %

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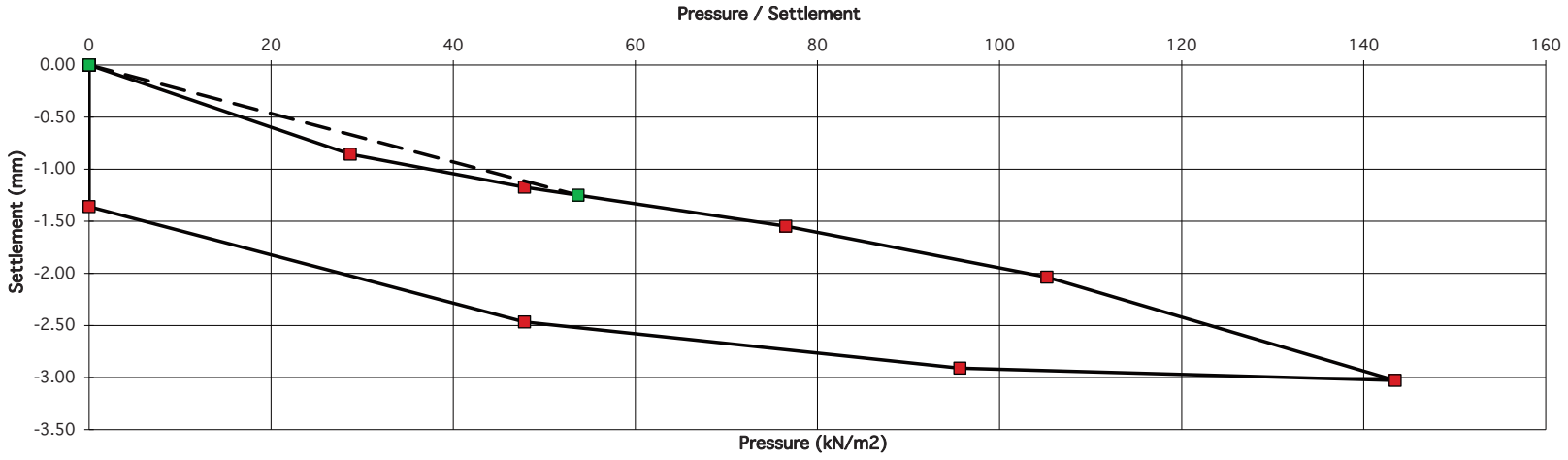
PLATE TEST REPORT SHEET (F3.1)

Reference No.	R139829
Contract	24330 Halverstown
Test No.	PBT10 (Reload)
Location	See Site Map
Depth	0.50
Client	DOBA
Plate Diameter:	450 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	M.Brown
Authorised by	
Date	06/10/2022

Description of soil under test
(natural soil, placed fill, sub-base)
Grey gravelly sandy SILT

Sample Ref No.
Depth m bgl

Applied Pressure/Settlement Curve



Gradient at 1.25 mm settlement intersection = 43
Modulus of subgrade reaction = 28 MPa/m
Correction factor applied = 0.64 as per HD 25-26/10

Equivalent CBR value in accordance with NRA HD25-26/10 3.0 %

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PLATE TEST REPORT SHEET (F3.1)

Applied Pressure/Settlement Curve

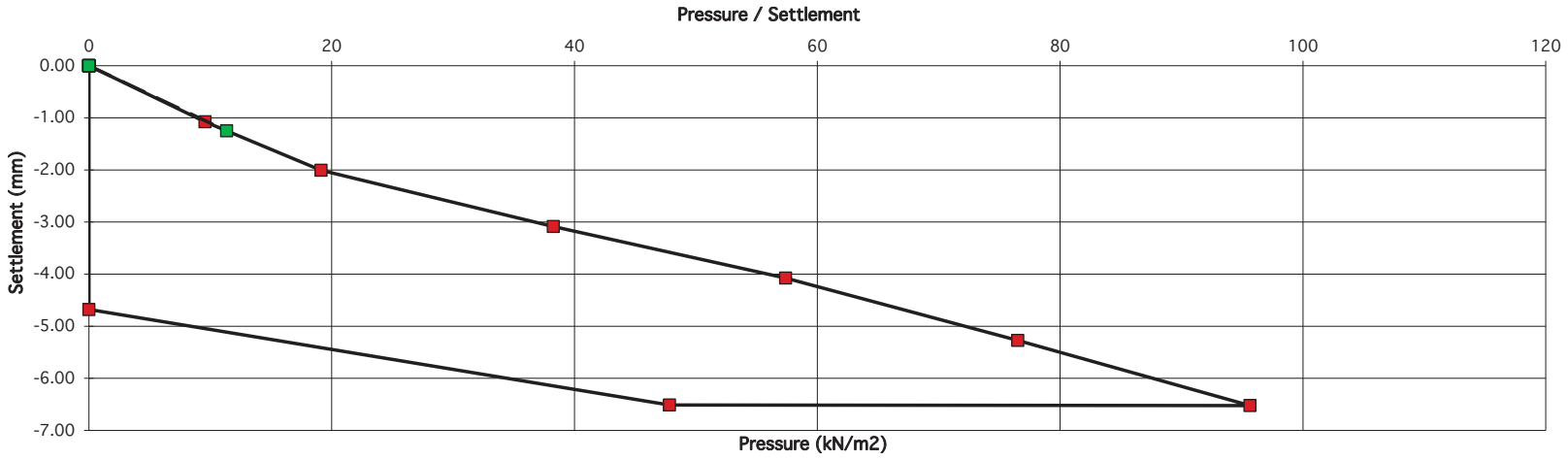
Reference No.	R139830
Contract	24330 Halverstown
Test No.	PBT11 (Load)
Location	See Site Map
Depth	0.50
Client	DOBA
Plate Diameter:	450 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	M.Brown
Authorised by	
Date	17/10/2022

Description of soil under test
(natural soil, placed fill, sub-base)

Brown sandy silty CLAY.

Sample Ref No.

Depth m bgl



Gradient at 1.25 mm settlement intersection = 9
Modulus of subgrade reaction = 6 MPa/m
Correction factor applied = 0.64 as per HD 25-26/10

Equivalent CBR value in accordance with NRA HD25-26/10 0.2 %

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PLATE TEST REPORT SHEET (F3.1)

Applied Pressure/Settlement Curve

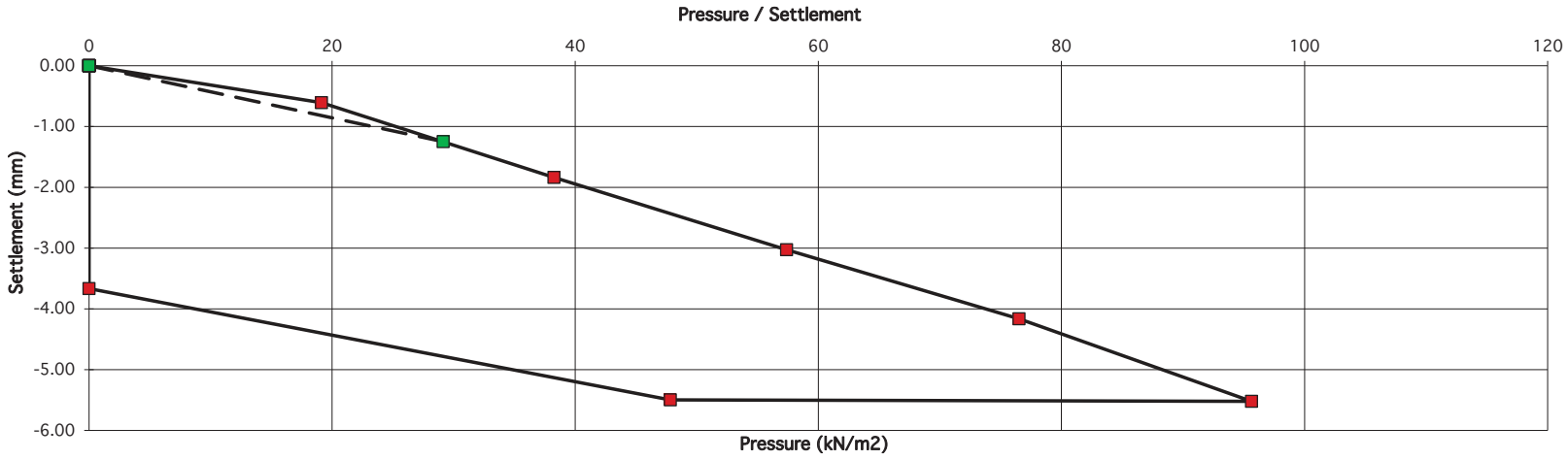
Reference No.	R139830
Contract	24330 Halverstown
Test No.	PBT11 (Reload)
Location	See Site Map
Depth	0.50
Client	DOBA
Plate Diameter:	450 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	M.Brown
Authorised by	
Date	17/10/2022

Description of soil under test
(natural soil, placed fill, sub-base)

Brown sandy silty CLAY.

Sample Ref No.

Depth m bgl



Gradient at 1.25 mm settlement intersection = 23
Modulus of subgrade reaction = 15 MPa/m
Correction factor applied = 0.64 as per HD 25-26/10

Equivalent CBR value in accordance with NRA HD25-26/10 1.1 %

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PLATE TEST REPORT SHEET (F3.1)

Applied Pressure/Settlement Curve

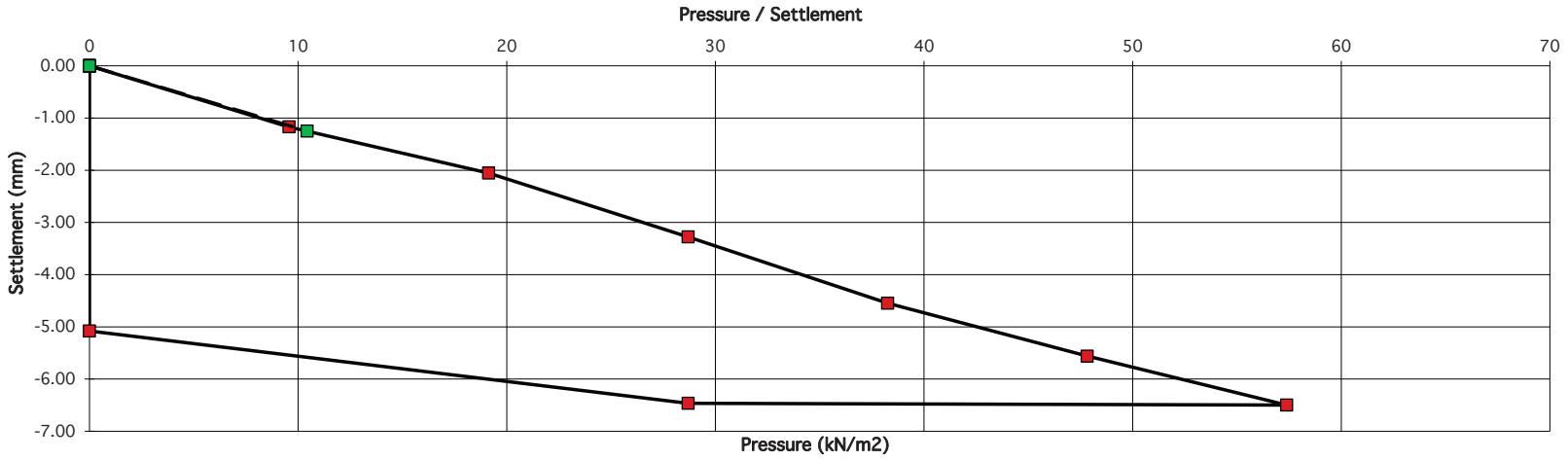
Reference No.	R139831
Contract	24330 Halverstown
Test No.	PBT12 (Load)
Location	See Site Map
Depth	0.50
Client	DOBA
Plate Diameter:	450 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	M.Brown
Authorised by	
Date	17/10/2022

Description of soil under test
(natural soil, placed fill, sub-base)

Brown sandy silty CLAY.

Sample Ref No.

Depth m bgl



Gradient at 1.25 mm settlement intersection = 8
Modulus of subgrade reaction = 5 MPa/m
Correction factor applied = 0.64 as per HD 25-26/10

Equivalent CBR value in accordance with NRA HD25-26/10 0.2 %

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PLATE TEST REPORT SHEET (F3.1)

Applied Pressure/Settlement Curve

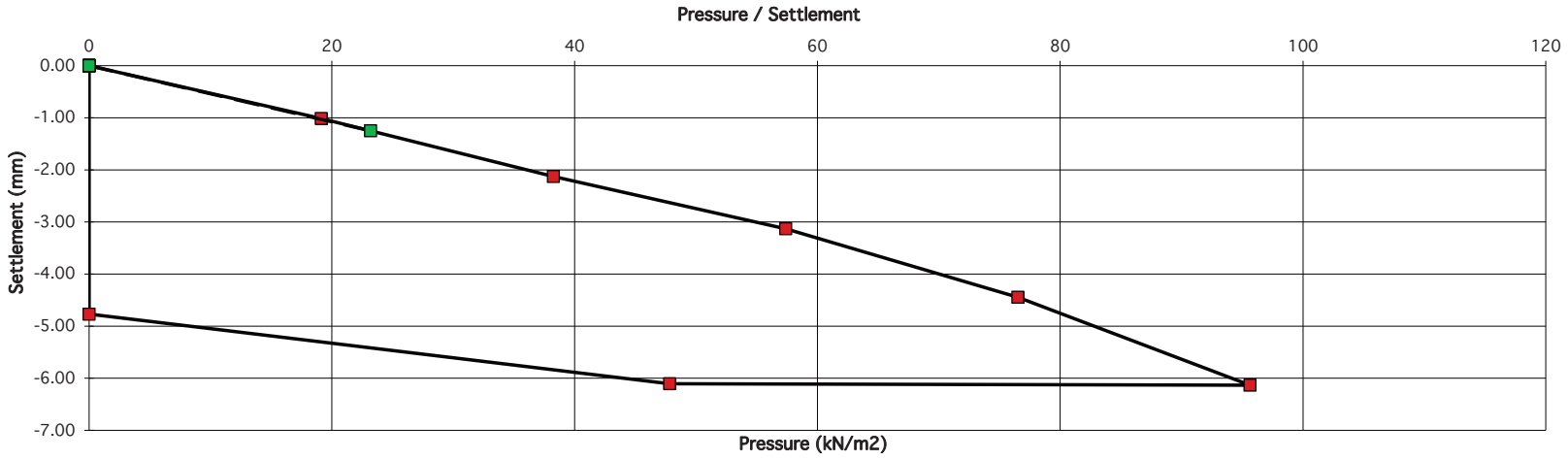
Reference No.	R139831
Contract	24330 Halverstown
Test No.	PBT12 (Reload)
Location	See Site Map
Depth	0.50
Client	DOBA
Plate Diameter:	450 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	M.Brown
Authorised by	
Date	17/10/2022

Description of soil under test
(natural soil, placed fill, sub-base)

Brown sandy silty CLAY.

Sample Ref No.

Depth m bgl



Gradient at 1.25 mm settlement intersection = 19
Modulus of subgrade reaction = 12 MPa/m
Correction factor applied = 0.64 as per HD 25-26/10

Equivalent CBR value in accordance with NRA HD25-26/10 0.7 %

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PLATE TEST REPORT SHEET (F3.1)

Applied Pressure/Settlement Curve

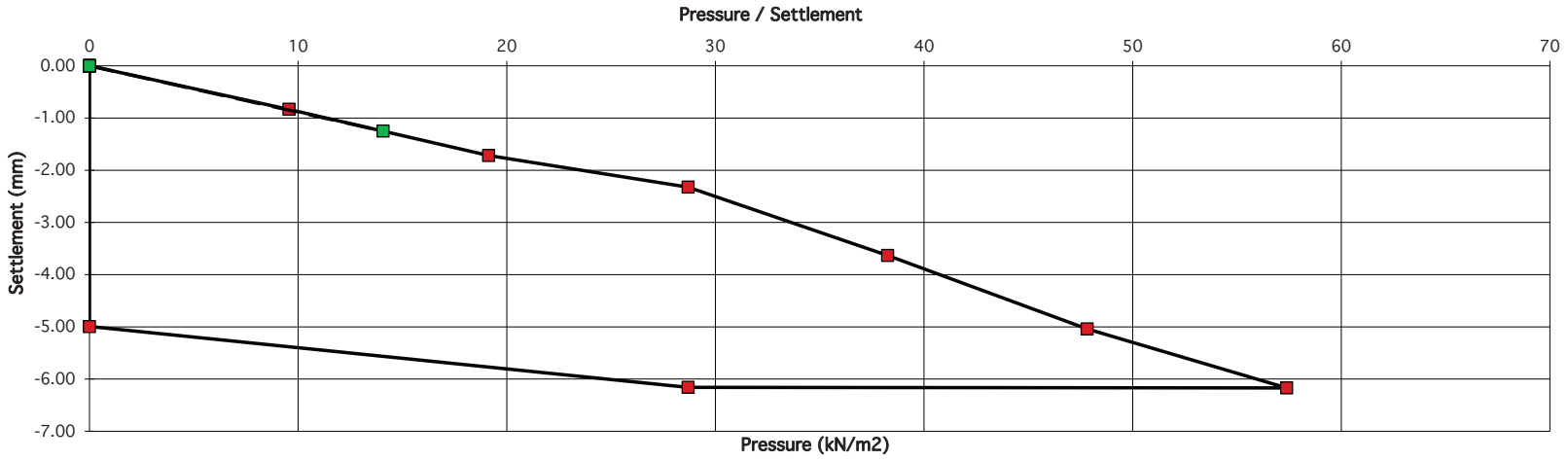
Reference No.	R139832
Contract	24330 Halverstown
Test No.	PBT13 (Load)
Location	See Site Map
Depth	0.50
Client	DOBA
Plate Diameter:	450 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	M.Brown
Authorised by	
Date	12/10/2022

Description of soil under test
(natural soil, placed fill, sub-base)

Brown sandy silty CLAY.

Sample Ref No.

Depth m bgl



Gradient at 1.25 mm settlement intersection = 11
Modulus of subgrade reaction = 7 MPa/m
Correction factor applied = 0.64 as per HD 25-26/10

Equivalent CBR value in accordance with NRA HD25-26/10 0.3 %

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PLATE TEST REPORT SHEET (F3.1)

Applied Pressure/Settlement Curve

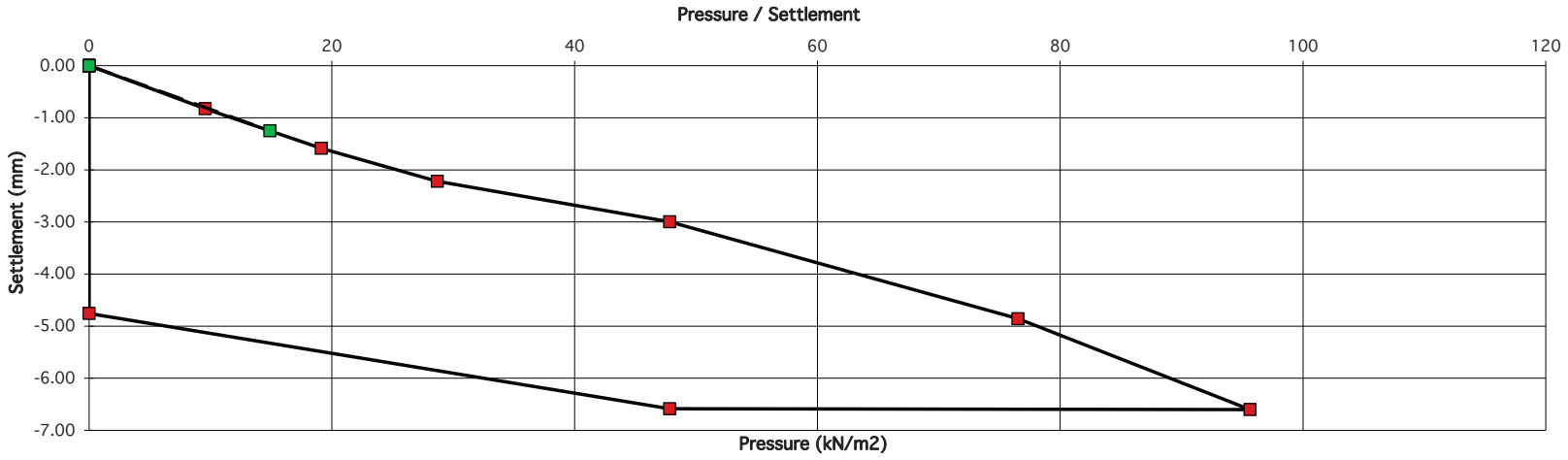
Reference No.	R139832
Contract	24330 Halverstown
Test No.	PBT13 (Reload)
Location	See Site Map
Depth	0.50
Client	DOBA
Plate Diameter:	450 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	M.Brown
Authorised by	
Date	12/10/2022

Description of soil under test
(natural soil, placed fill, sub-base)

Brown sandy silty CLAY.

Sample Ref No.

Depth m bgl



Gradient at 1.25 mm settlement intersection = 12
Modulus of subgrade reaction = 8 MPa/m
Correction factor applied = 0.64 as per HD 25-26/10

Equivalent CBR value in accordance with NRA HD25-26/10 0.3 %

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PLATE TEST REPORT SHEET (F3.1)

Applied Pressure/Settlement Curve

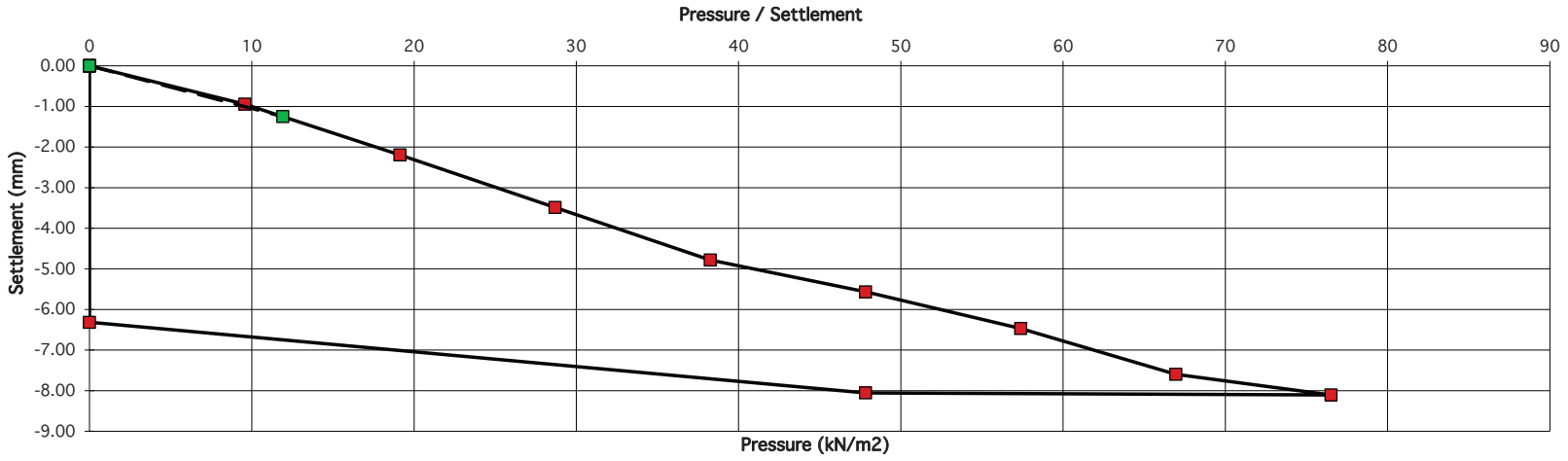
Reference No.	R139833
Contract	24330 Halverstown
Test No.	PBT14 (Load)
Location	See Site Map
Depth	0.40
Client	DOBA
Plate Diameter:	450 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	M.Brown
Authorised by	
Date	12/10/2022

Description of soil under test
(natural soil, placed fill, sub-base)

Brown sandy gravelly CLAY.

Sample Ref No.

Depth m bgl



Gradient at 1.25 mm settlement intersection = 10
Modulus of subgrade reaction = 6 MPa/m
Correction factor applied = 0.64 as per HD 25-26/10

Equivalent CBR value in accordance with NRA HD25-26/10 0.2 %

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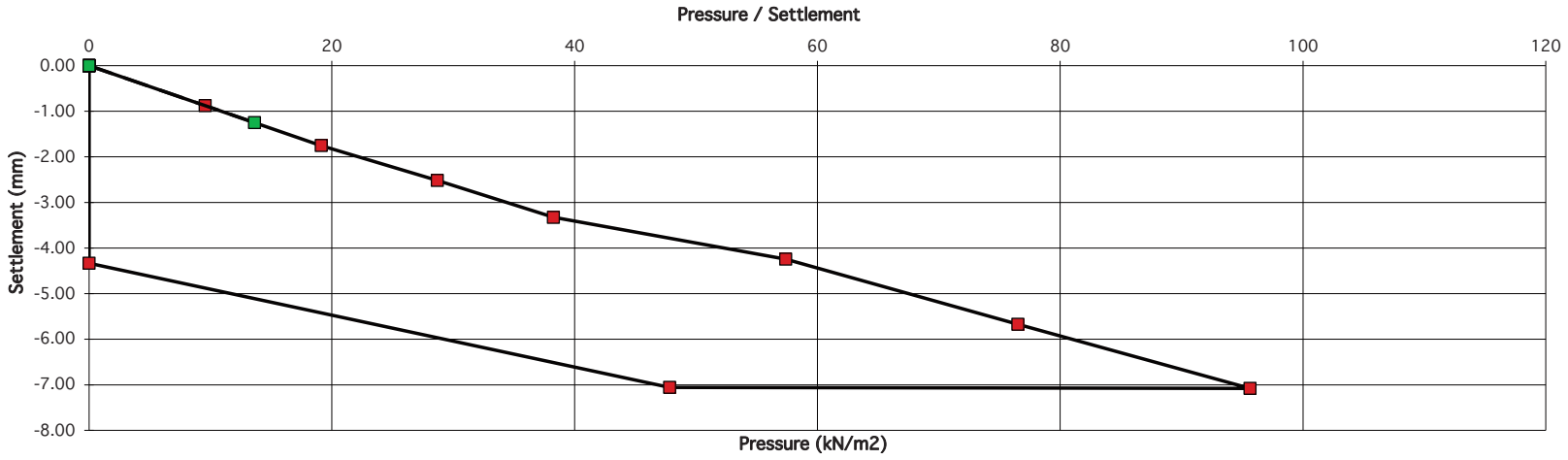
PLATE TEST REPORT SHEET (F3.1)

Applied Pressure/Settlement Curve

Reference No.	R139833
Contract	24330 Halverstown
Test No.	PBT14 (Reload)
Location	See Site Map
Depth	0.40
Client	DOBA
Plate Diameter:	450 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	M.Brown
Authorised by	
Date	12/10/2022

Description of soil under test
(natural soil, placed fill, sub-base)
Brown sandy gravelly CLAY.

Sample Ref No.
Depth m bgl



Gradient at 1.25 mm settlement intersection = 11
Modulus of subgrade reaction = 7 MPa/m
Correction factor applied = 0.64 as per HD 25-26/10

Equivalent CBR value in accordance with NRA HD25-26/10 0.3 %

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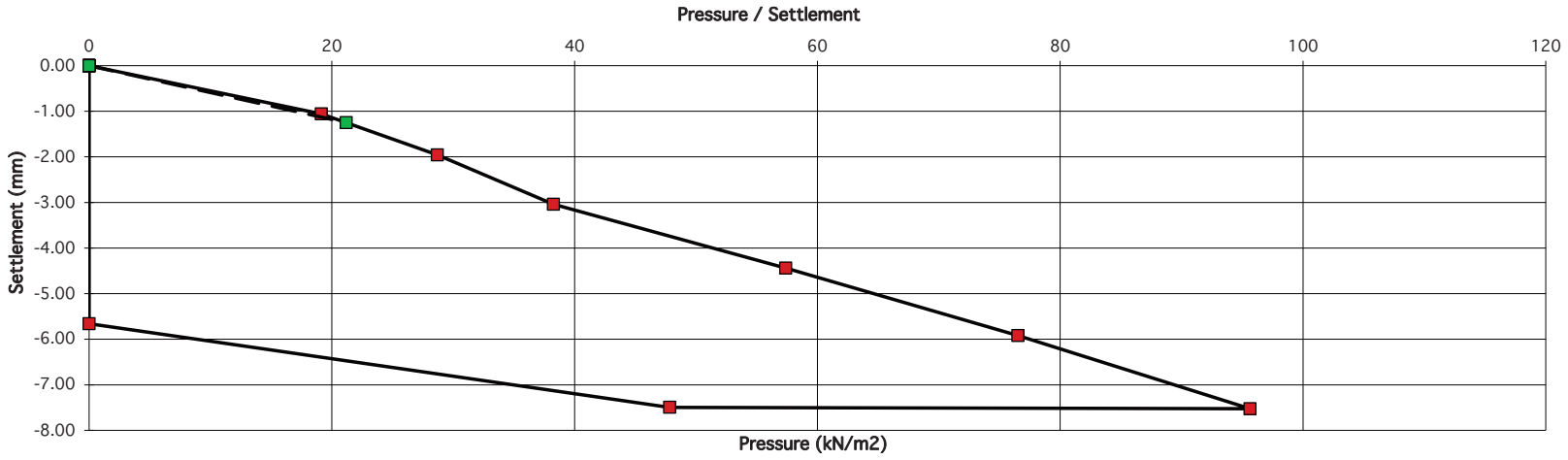
PLATE TEST REPORT SHEET (F3.1)

Applied Pressure/Settlement Curve

Reference No.	R139834
Contract	24330 Halverstown
Test No.	PBT15 (Load)
Location	See Site Map
Depth	0.50
Client	DOBA
Plate Diameter:	450 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	M.Brown
Authorised by	
Date	12/10/2022

Description of soil under test
(natural soil, placed fill, sub-base)
Brown sandy gravelly CLAY.

Sample Ref No.
Depth m bgl



Gradient at 1.25 mm settlement intersection = 17
Modulus of subgrade reaction = 11 MPa/m
Correction factor applied = 0.64 as per HD 25-26/10

Equivalent CBR value in accordance with NRA HD25-26/10 0.6 %

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PLATE TEST REPORT SHEET (F3.1)

Applied Pressure/Settlement Curve

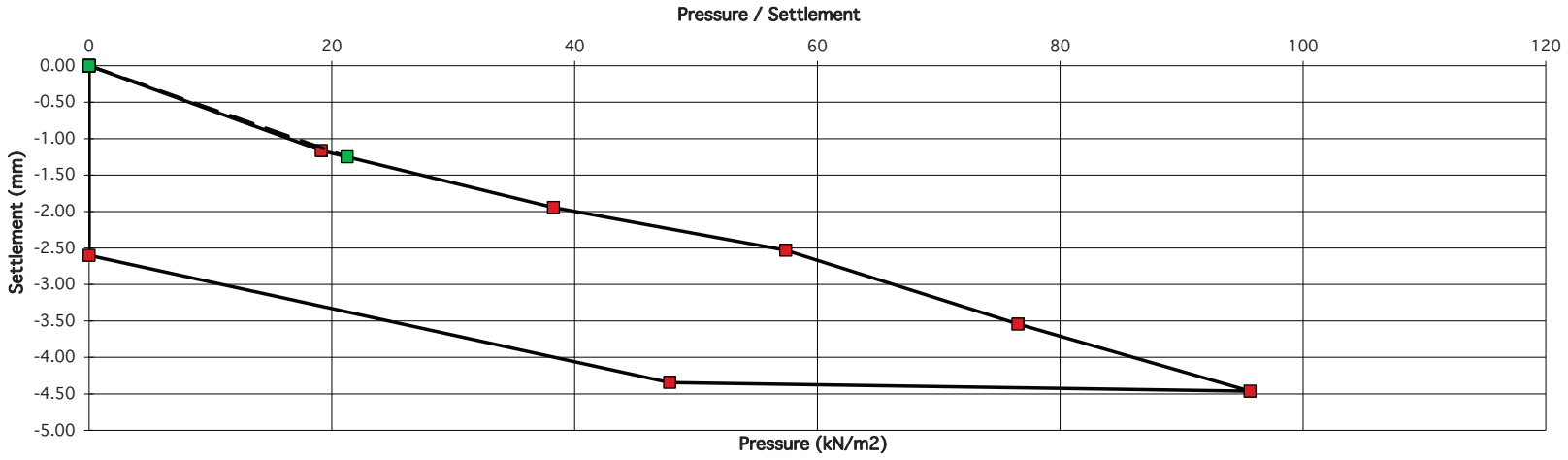
Reference No.	R139834
Contract	24330 Halverstown
Test No.	PBT15 (Reload)
Location	See Site Map
Depth	0.50
Client	DOBA
Plate Diameter:	450 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	M.Brown
Authorised by	
Date	12/10/2022

Description of soil under test
(natural soil, placed fill, sub-base)

Brown sandy gravelly CLAY.

Sample Ref No.

Depth m bgl



Gradient at 1.25 mm settlement intersection = 17
Modulus of subgrade reaction = 11 MPa/m
Correction factor applied = 0.64 as per HD 25-26/10

Equivalent CBR value in accordance with NRA HD25-26/10 0.6 %

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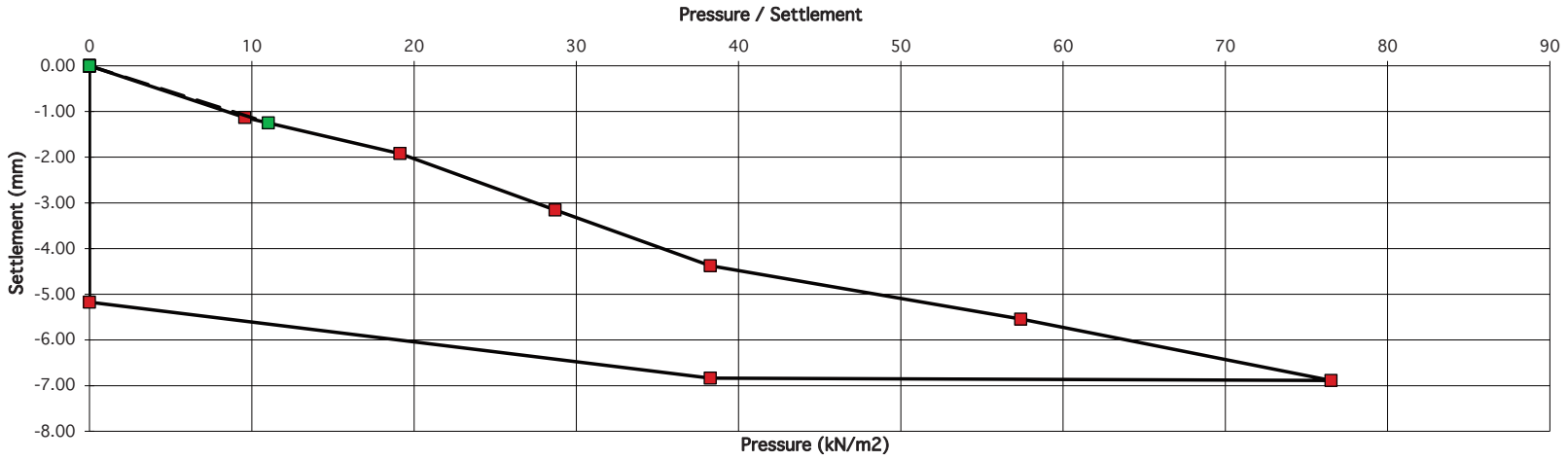
PLATE TEST REPORT SHEET (F3.1)

Applied Pressure/Settlement Curve

Reference No.	R139835
Contract	24330 Halverstown
Test No.	PBT16 (Load)
Location	See Site Map
Depth	0.60
Client	DOBA
Plate Diameter:	450 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	M.Brown
Authorised by	
Date	17/10/2022

Description of soil under test
(natural soil, placed fill, sub-base)
Brown sandy gravelly CLAY.

Sample Ref No.
Depth m bgl



Gradient at 1.25 mm settlement intersection = 9
Modulus of subgrade reaction = 6 MPa/m
Correction factor applied = 0.64 as per HD 25-26/10

Equivalent CBR value in accordance with NRA HD25-26/10 0.2 %

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PLATE TEST REPORT SHEET (F3.1)

Applied Pressure/Settlement Curve

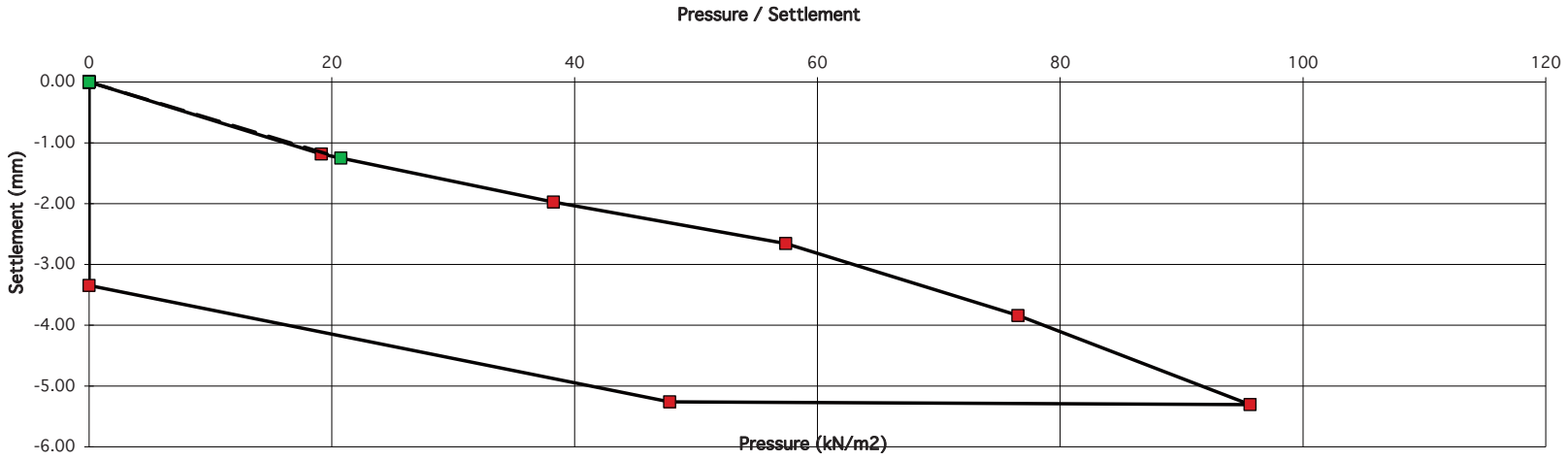
Reference No.	R139835
Contract	24330 Halverstown
Test No.	PBT16 (Reload)
Location	See Site Map
Depth	0.60
Client	DOBA
Plate Diameter:	450 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	M.Brown
Authorised by	
Date	17/10/2022

Description of soil under test
(natural soil, placed fill, sub-base)

Brown sandy gravelly CLAY.

Sample Ref No.

Depth m bgl



Gradient at 1.25 mm settlement intersection = 17
Modulus of subgrade reaction = 11 MPa/m
Correction factor applied = 0.64 as per HD 25-26/10

Equivalent CBR value in accordance with NRA HD25-26/10 0.6 %

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PLATE TEST REPORT SHEET (F3.1)

Applied Pressure/Settlement Curve

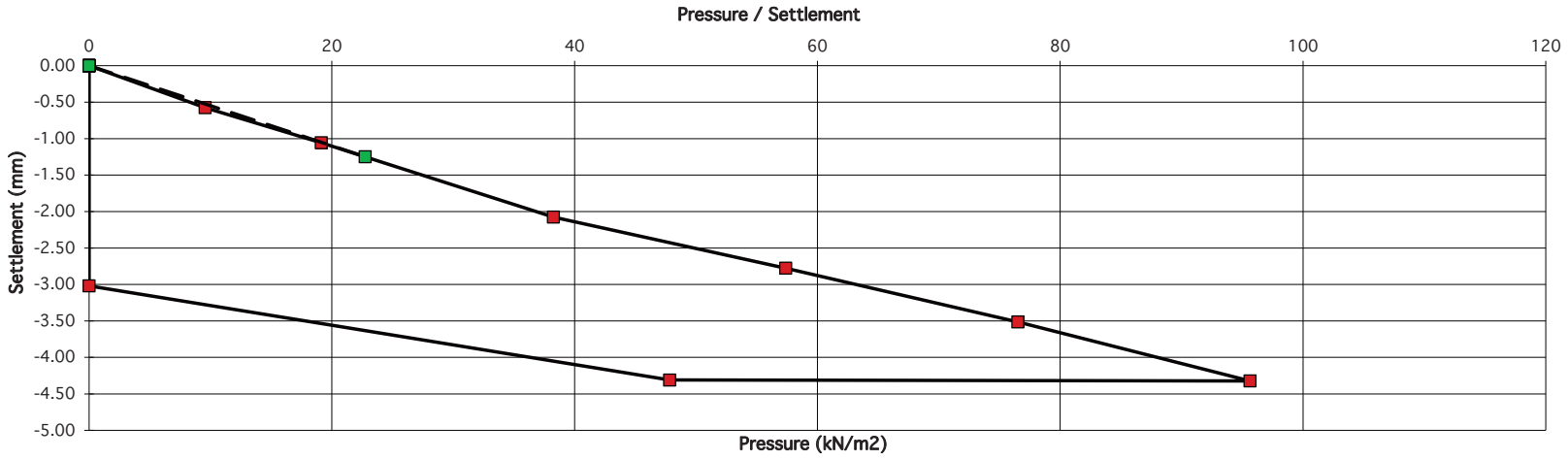
Reference No.	R139836
Contract	24330 Halverstown
Test No.	PBT17 (Load)
Location	See Site Map
Depth	0.40
Client	DOBA
Plate Diameter:	450 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	M.Brown
Authorised by	
Date	17/10/2022

Description of soil under test
(natural soil, placed fill, sub-base)

Brown sandy gravelly silty CLAY.

Sample Ref No.

Depth m bgl



Gradient at 1.25 mm settlement intersection = 18
Modulus of subgrade reaction = 12 MPa/m
Correction factor applied = 0.64 as per HD 25-26/10

Equivalent CBR value in accordance with NRA HD25-26/10 0.7 %

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PLATE TEST REPORT SHEET (F3.1)

Applied Pressure/Settlement Curve

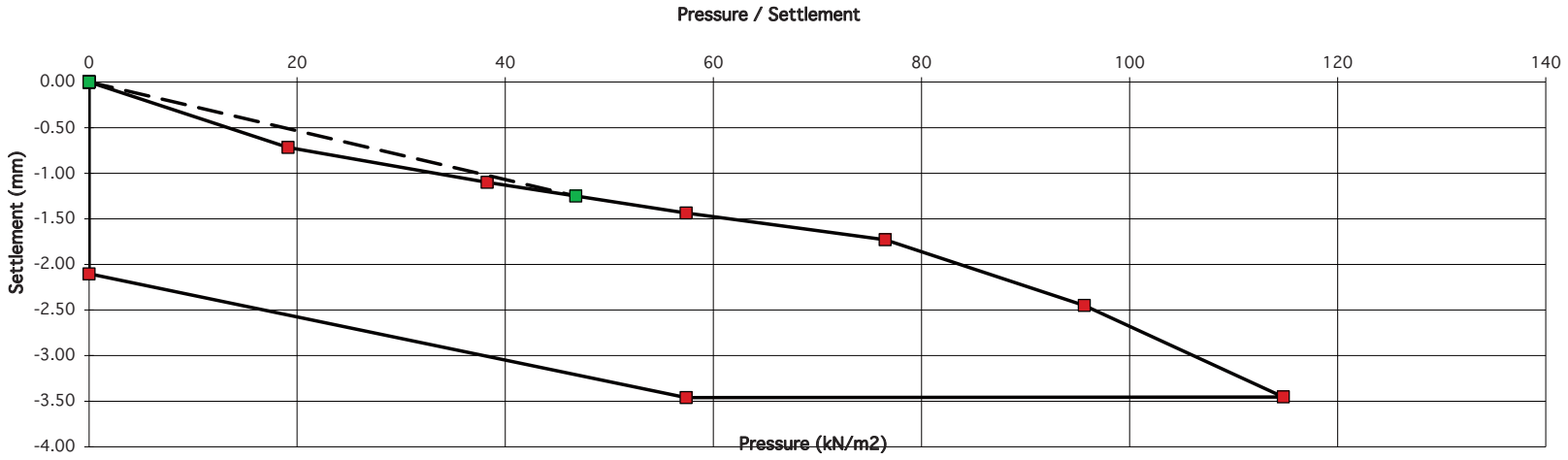
Reference No.	R139836
Contract	24330 Halverstown
Test No.	PBT17 (Reload)
Location	See Site Map
Depth	0.40
Client	DOBA
Plate Diameter:	450 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	M.Brown
Authorised by	
Date	17/10/2022

Description of soil under test
(natural soil, placed fill, sub-base)

Brown sandy gravelly silty CLAY.

Sample Ref No.

Depth m bgl



Gradient at 1.25 mm settlement intersection = 37
Modulus of subgrade reaction = 24 MPa/m
Correction factor applied = 0.64 as per HD 25-26/10

Equivalent CBR value in accordance with NRA HD25-26/10 2.4 %

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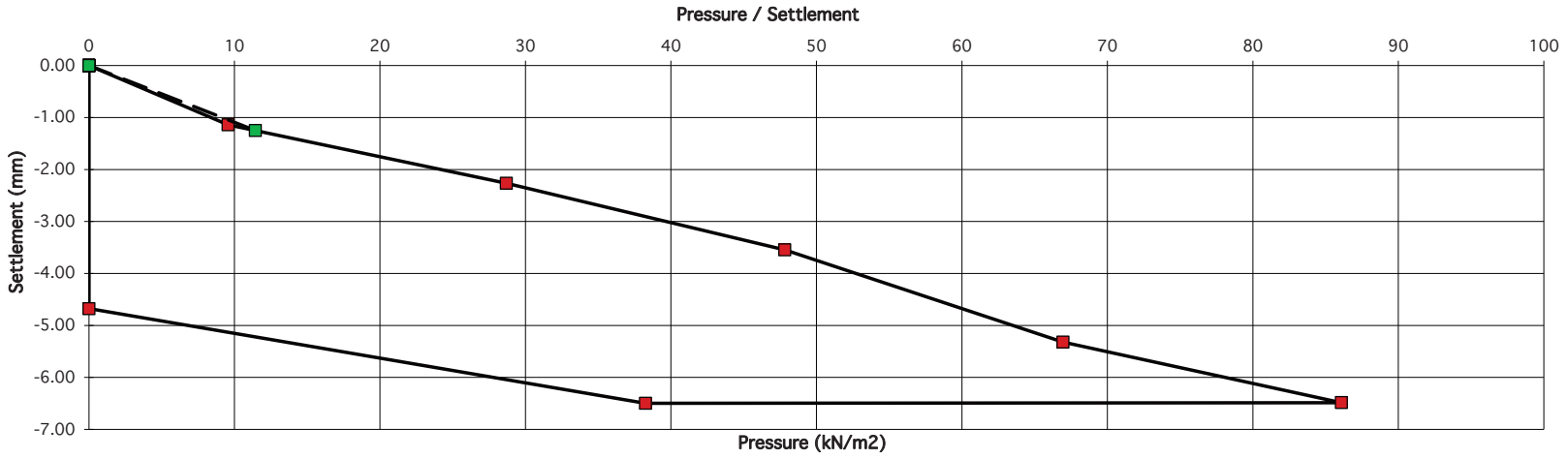
PLATE TEST REPORT SHEET (F3.1)

Applied Pressure/Settlement Curve

Reference No.	R139837
Contract	24330 Halverstown
Test No.	PBT18 (Load)
Location	See Site Map
Depth	0.50
Client	DOBA
Plate Diameter:	450 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	M.Brown
Authorised by	
Date	12/10/2022

Description of soil under test
(natural soil, placed fill, sub-base)
Brown sandy CLAY.

Sample Ref No.
Depth m bgl



Gradient at 1.25 mm settlement intersection = 9
Modulus of subgrade reaction = 6 MPa/m
Correction factor applied = 0.64 as per HD 25-26/10

Equivalent CBR value in accordance with NRA HD25-26/10 0.2 %

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PLATE TEST REPORT SHEET (F3.1)

Applied Pressure/Settlement Curve

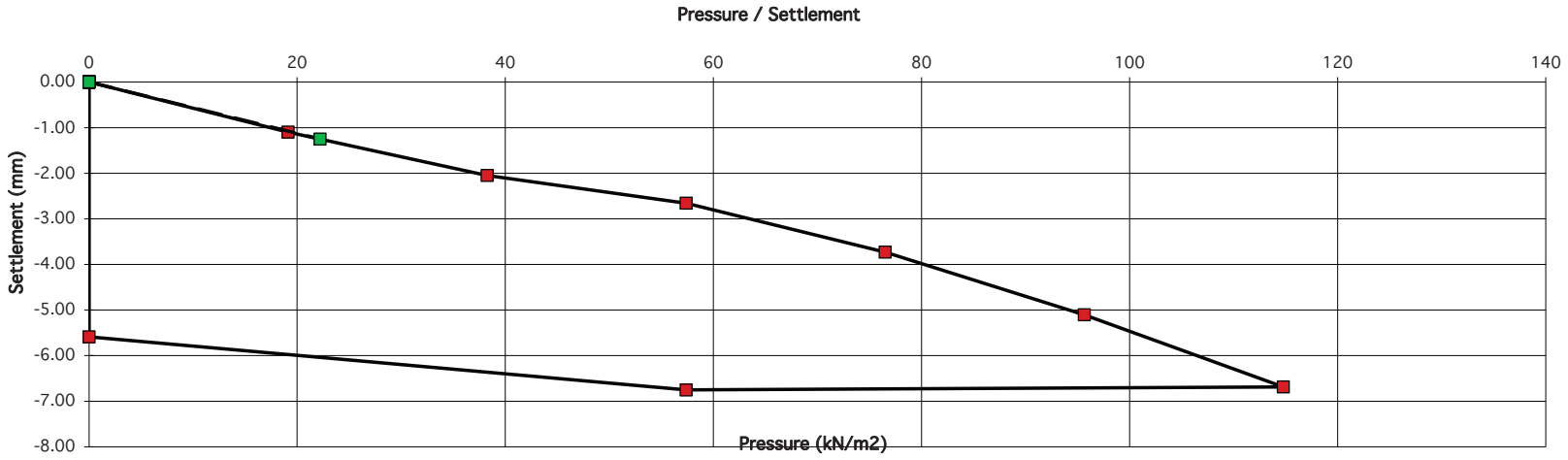
Reference No.	R139837
Contract	24330 Halverstown
Test No.	PBT18 (Reload)
Location	See Site Map
Depth	0.50
Client	DOBA
Plate Diameter:	450 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	M.Brown
Authorised by	
Date	12/10/2022

Description of soil under test
(natural soil, placed fill, sub-base)

Brown sandy CLAY.

Sample Ref No.

Depth m bgl



Gradient at 1.25 mm settlement intersection = 18
Modulus of subgrade reaction = 11 MPa/m
Correction factor applied = 0.64 as per HD 25-26/10

Equivalent CBR value in accordance with NRA HD25-26/10 0.7 %

RECEIVED: 13/08/2024

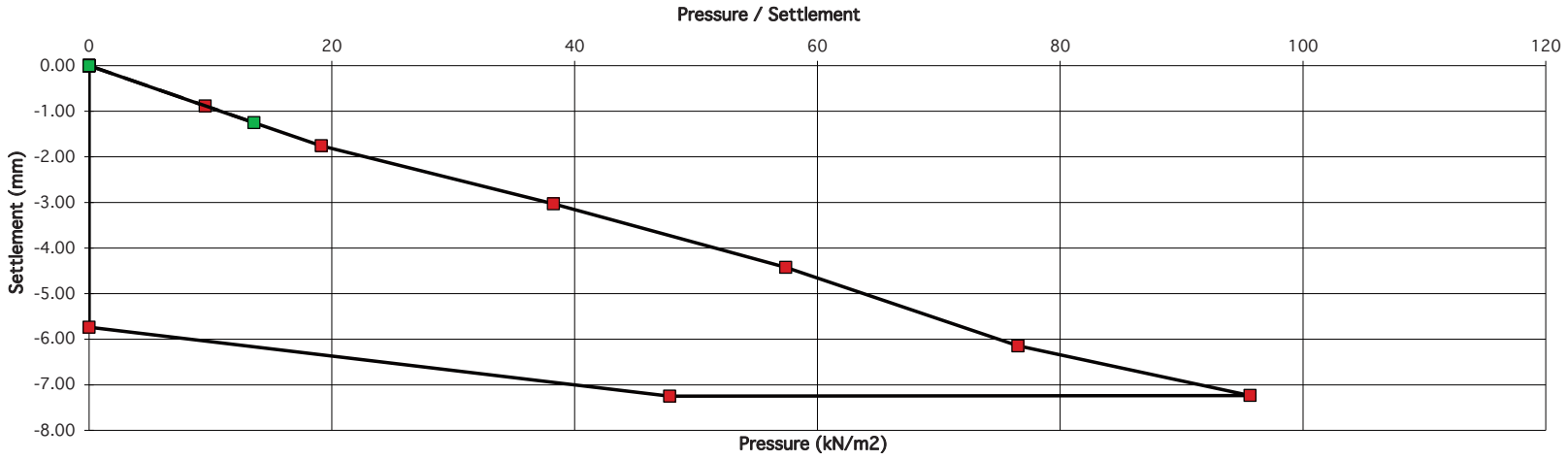
PLATE TEST REPORT SHEET (F3.1)

Applied Pressure/Settlement Curve

Reference No.	R139838
Contract	24330 Halverstown
Test No.	PBT19 (Load)
Location	See Site Map
Depth	0.60
Client	DOBA
Plate Diameter:	450 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	M.Brown
Authorised by	
Date	12/10/2022

Description of soil under test
(natural soil, placed fill, sub-base)
Brown sandy silty CLAY.

Sample Ref No.
Depth m bgl



Gradient at 1.25 mm settlement intersection = 11
Modulus of subgrade reaction = 7 MPa/m
Correction factor applied = 0.64 as per HD 25-26/10

Equivalent CBR value in accordance with NRA HD25-26/10 0.3 %

RECEIVED: 13/08/2024

PLATE TEST REPORT SHEET (F3.1)

Applied Pressure/Settlement Curve

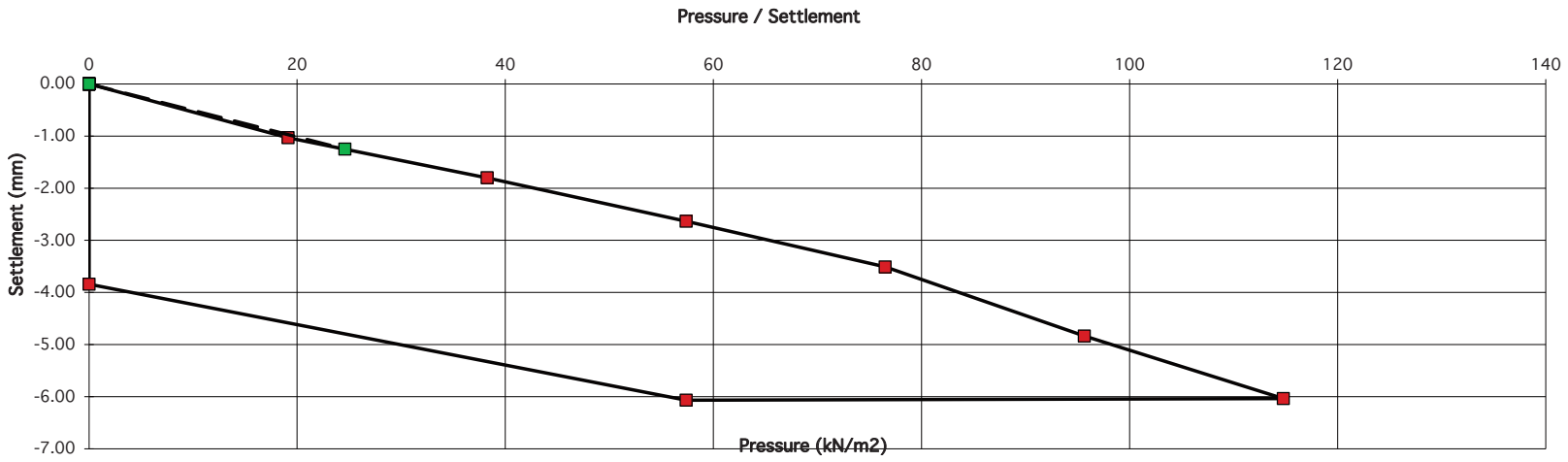
Reference No.	R139838
Contract	24330 Halverstown
Test No.	PBT19 (Reload)
Location	See Site Map
Depth	0.60
Client	DOBA
Plate Diameter:	450 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	M.Brown
Authorised by	
Date	12/10/2022

Description of soil under test
(natural soil, placed fill, sub-base)

Brown sandy silty CLAY.

Sample Ref No.

Depth m bgl



Gradient at 1.25 mm settlement intersection = 20
Modulus of subgrade reaction = 13 MPa/m
Correction factor applied = 0.64 as per HD 25-26/10

Equivalent CBR value in accordance with NRA HD25-26/10 0.8 %

RECEIVED: 13/08/2024

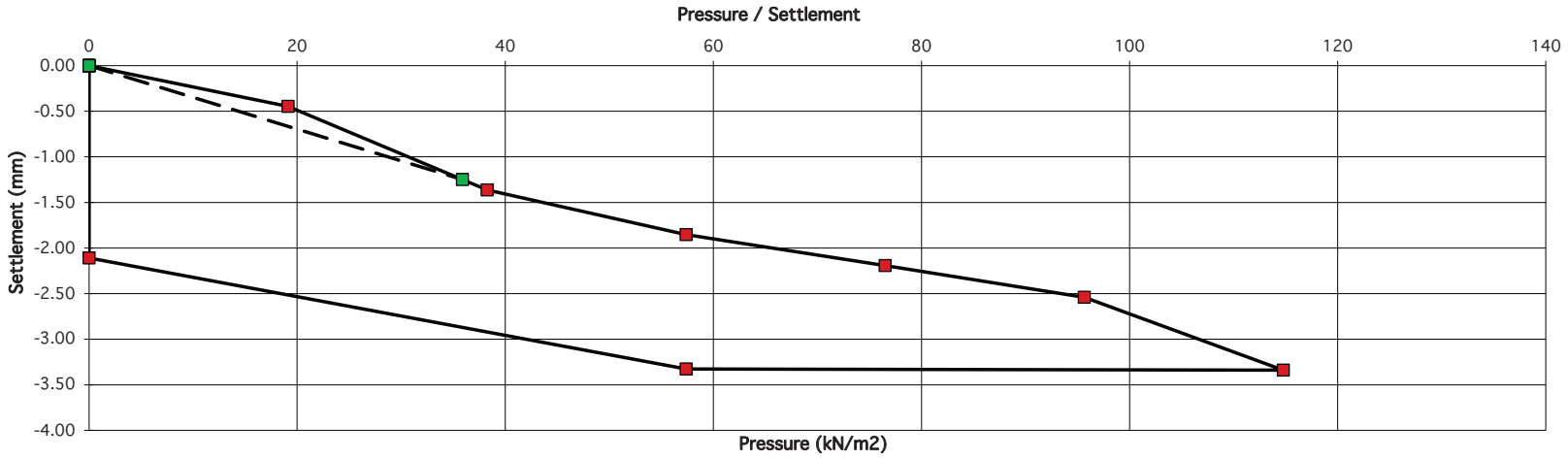
PLATE TEST REPORT SHEET (F3.1)

Applied Pressure/Settlement Curve

Reference No.	R139839
Contract	24330 Halverstown
Test No.	PBT20 (Load)
Location	See Site Map
Depth	0.40
Client	DOBA
Plate Diameter:	450 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	M.Brown
Authorised by	
Date	14/10/2022

Description of soil under test
(natural soil, placed fill, sub-base)
Brown sandy CLAY.

Sample Ref No.
Depth m bgl



Gradient at 1.25 mm settlement intersection = 29
Modulus of subgrade reaction = 18 MPa/m
Correction factor applied = 0.64 as per HD 25-26/10

Equivalent CBR value in accordance with NRA HD25-26/10 1.5 %

RECEIVED: 13/08/2024

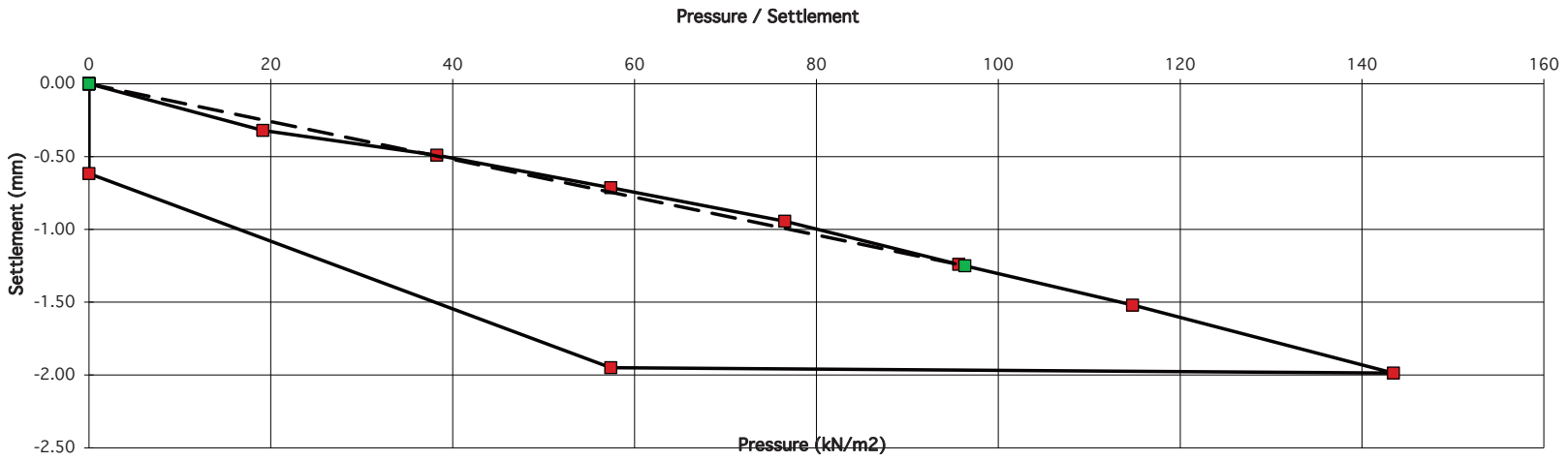
PLATE TEST REPORT SHEET (F3.1)

Applied Pressure/Settlement Curve

Reference No.	R139839
Contract	24330 Halverstown
Test No.	PBT20 (Reload)
Location	See Site Map
Depth	0.40
Client	DOBA
Plate Diameter:	450 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	M.Brown
Authorised by	
Date	14/10/2022

Description of soil under test
(natural soil, placed fill, sub-base)
Brown sandy CLAY.

Sample Ref No.
Depth m bgl



Gradient at 1.25 mm settlement intersection = 77
Modulus of subgrade reaction = 50 MPa/m
Correction factor applied = 0.64 as per HD 25-26/10

Equivalent CBR value in accordance with NRA HD25-26/10 8.3 %

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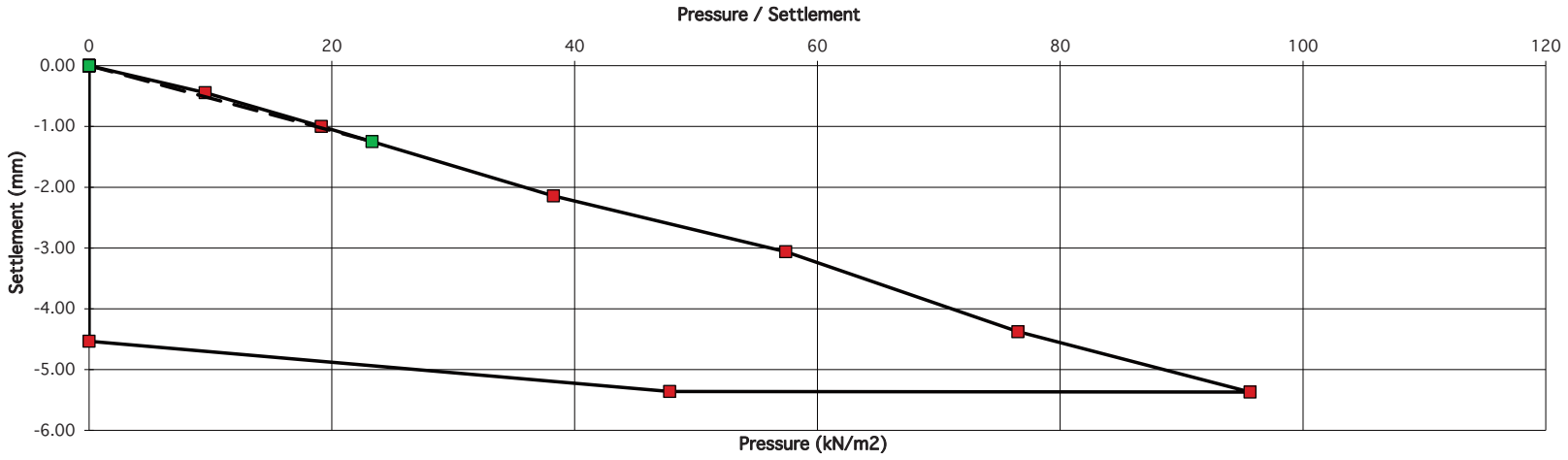
PLATE TEST REPORT SHEET (F3.1)

Applied Pressure/Settlement Curve

Reference No.	R139840
Contract	24330 Halverstown
Test No.	PBT21 (Load)
Location	See Site Map
Depth	0.40
Client	DOBA
Plate Diameter:	450 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	M.Brown
Authorised by	
Date	14/10/2022

Description of soil under test
(natural soil, placed fill, sub-base)
Grey clayey silty SAND.

Sample Ref No.
Depth m bgl



Gradient at 1.25 mm settlement intersection = 19
Modulus of subgrade reaction = 12 MPa/m
Correction factor applied = 0.64 as per HD 25-26/10

Equivalent CBR value in accordance with NRA HD25-26/10 0.7 %

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PLATE TEST REPORT SHEET (F3.1)

Applied Pressure/Settlement Curve

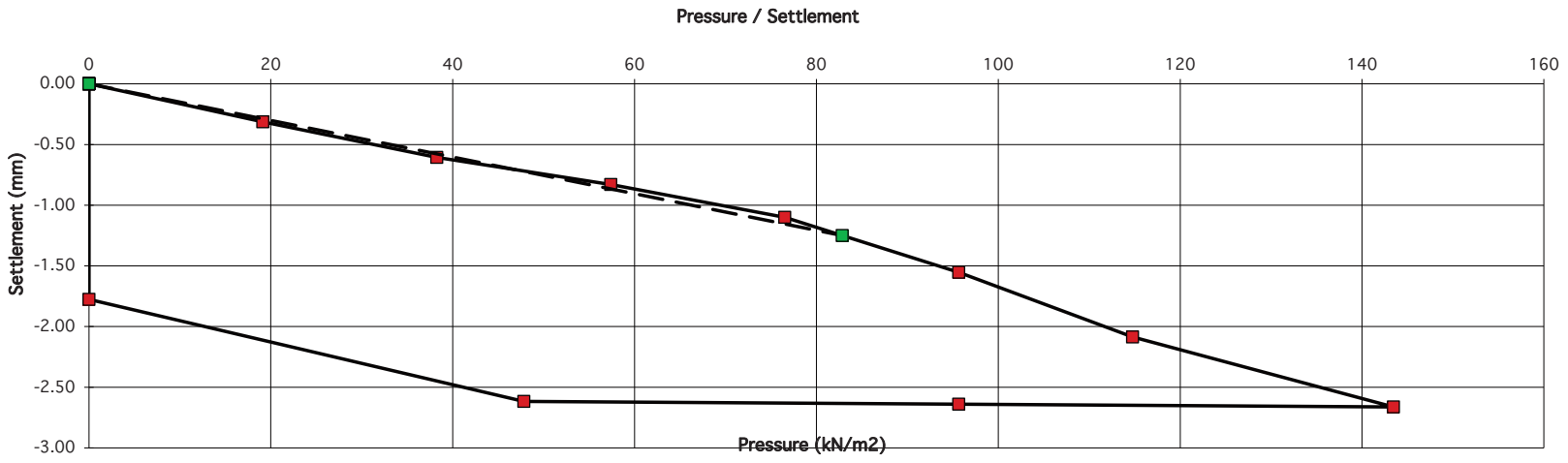
Reference No.	R139840
Contract	24330 Halverstown
Test No.	PBT21 (Reload)
Location	See Site Map
Depth	0.40
Client	DOBA
Plate Diameter:	450 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	M.Brown
Authorised by	
Date	14/10/2022

Description of soil under test
(natural soil, placed fill, sub-base)

Grey clayey silty SAND.

Sample Ref No.

Depth m bgl



Gradient at 1.25 mm settlement intersection = 66
Modulus of subgrade reaction = 43 MPa/m
Correction factor applied = 0.64 as per HD 25-26/10

Equivalent CBR value in accordance with NRA HD25-26/10 6.4 %

RECEIVED: 13/08/2024

PLATE TEST REPORT SHEET (F3.1)

Applied Pressure/Settlement Curve

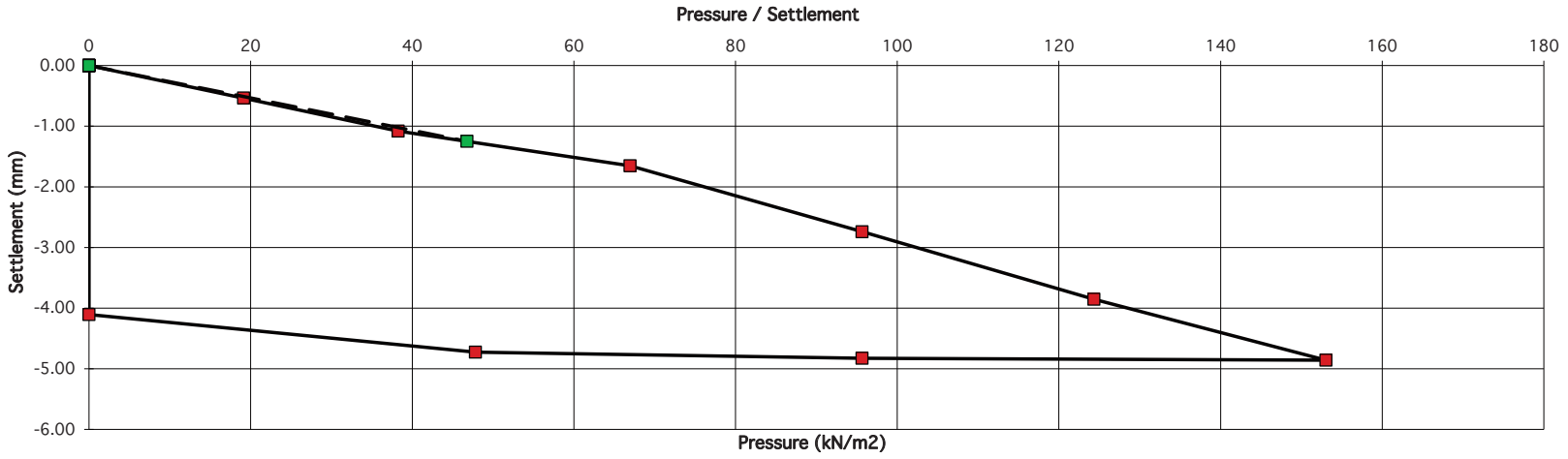
Reference No.	R139841
Contract	24330 Halverstown
Test No.	PBT22 (Load)
Location	See Site Map
Depth	0.50
Client	DOBA
Plate Diameter:	450 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	M.Brown
Authorised by	
Date	13/10/2022

Description of soil under test (natural soil, placed fill, sub-base)

Grey sandy gravelly SILT.

Sample Ref No.

Depth m bgl



Gradient at 1.25 mm settlement intersection = 37

Modulus of subgrade reaction = 24 MPa/m

Correction factor applied = 0.64 as per HD 25-26/10

Equivalent CBR value in accordance with NRA HD25-26/10 2.4 %

RECEIVED: 13/08/2024

PLATE TEST REPORT SHEET (F3.1)

Reference No.	R139841
Contract	24330 Halverstown
Test No.	PBT21 (Reload)
Location	See Site Map
Depth	0.50
Client	DOBA
Plate Diameter:	450 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	M.Brown
Authorised by	
Date	13/10/2022

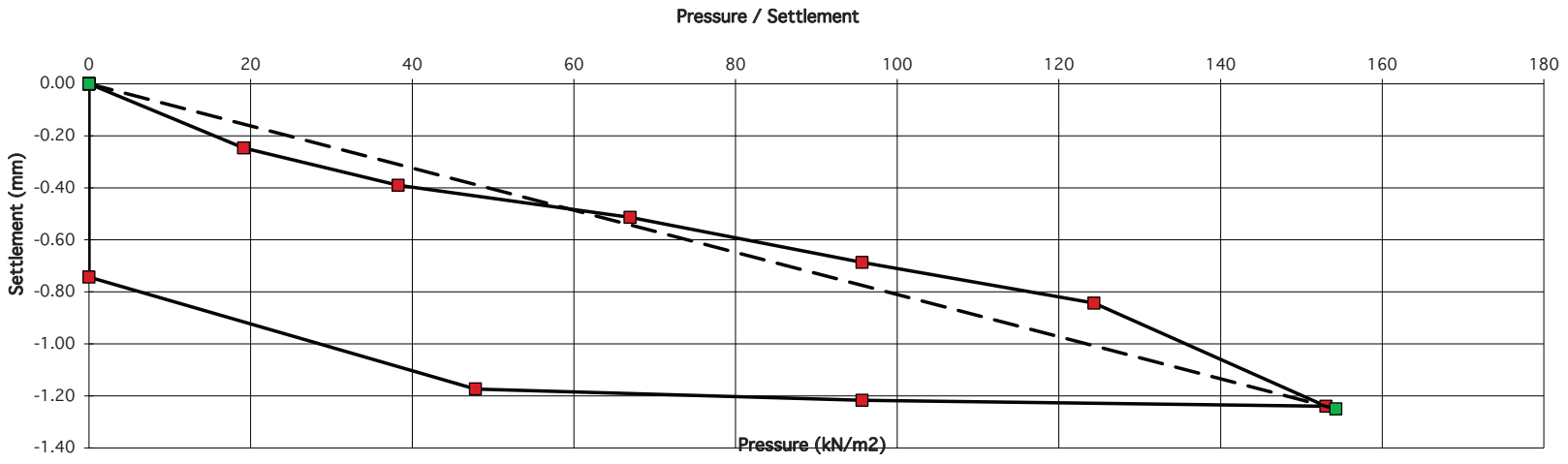
Description of soil under test
(natural soil, placed fill, sub-base)

Grey sandy gravelly SILT.

Sample Ref No.

Depth m bgl

Applied Pressure/Settlement Curve



Gradient at 1.25 mm settlement intersection = 123
Modulus of subgrade reaction = 79 MPa/m
Correction factor applied = 0.64 as per HD 25-26/10

Equivalent CBR value in accordance with NRA HD25-26/10 18.9 %

RECEIVED: 13/08/2024

PLATE TEST REPORT SHEET (F3.1)

Applied Pressure/Settlement Curve

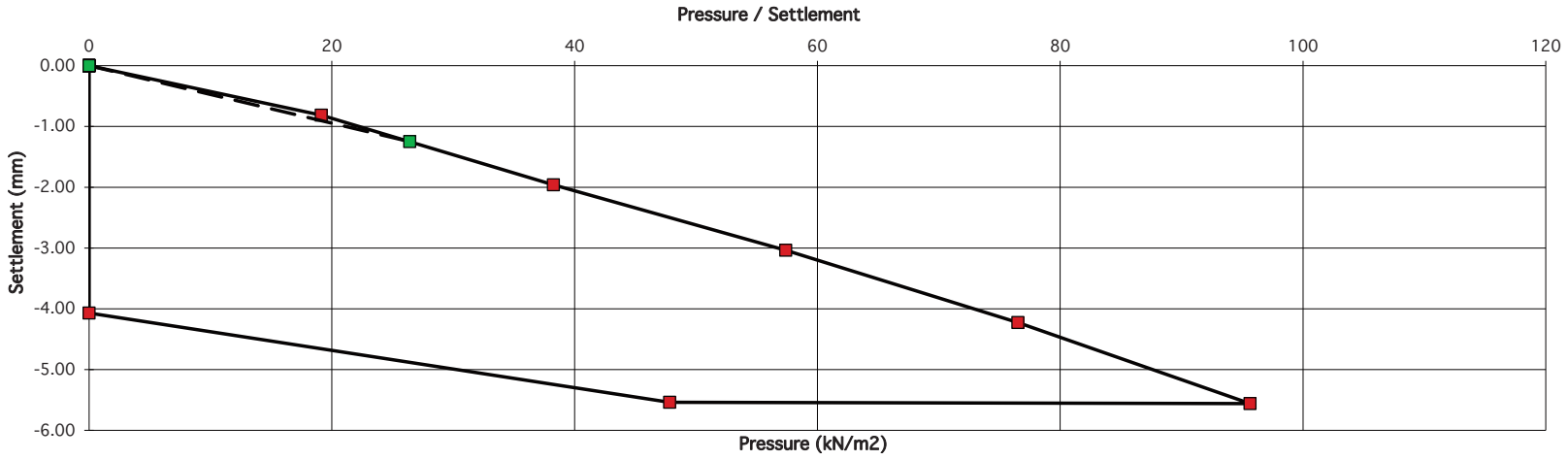
Reference No.	R139842
Contract	24330 Halverstown
Test No.	PBT23 (Load)
Location	See Site Map
Depth	0.50
Client	DOBA
Plate Diameter:	450 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	M.Brown
Authorised by	
Date	12/10/2022

Description of soil under test
(natural soil, placed fill, sub-base)

Brown sandy silty CLAY.

Sample Ref No.

Depth m bgl



Gradient at 1.25 mm settlement intersection = 21
Modulus of subgrade reaction = 14 MPa/m
Correction factor applied = 0.64 as per HD 25-26/10

Equivalent CBR value in accordance with NRA HD25-26/10 0.9 %

RECEIVED: 13/08/2024

PLATE TEST REPORT SHEET (F3.1)

Applied Pressure/Settlement Curve

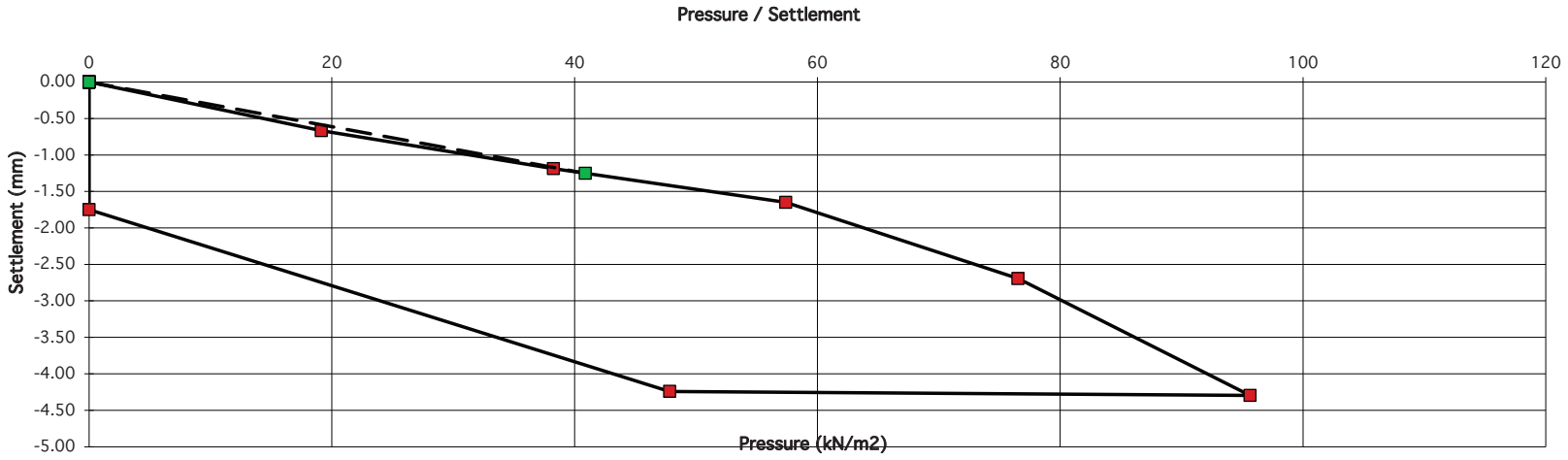
Reference No.	R139842
Contract	24330 Halverstown
Test No.	PBT23 (Reload)
Location	See Site Map
Depth	0.50
Client	DOBA
Plate Diameter:	450 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	M.Brown
Authorised by	
Date	12/10/2022

Description of soil under test
(natural soil, placed fill, sub-base)

Brown sandy silty CLAY.

Sample Ref No.

Depth m bgl



Gradient at 1.25 mm settlement intersection = 33
Modulus of subgrade reaction = 21 MPa/m
Correction factor applied = 0.64 as per HD 25-26/10

Equivalent CBR value in accordance with NRA HD25-26/10 1.9 %

PB04 – 1 of 2

RECEIVED: 13/08/2024



PB04 – 2 of 2



Report No: 24330
Halverstown – Plate Test Pit Photographs

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PB05 1 of 3



PB05 2 of 3



PB05 3 of 3

RECEIVED: 13/08/2024



PB06 1 of 1

RECEIVED: 13/08/2024



PB07 1 of 1

RECEIVED: 13/08/2024



PB08 1 of 1

RECEIVED: 13/08/2024



RECEIVED: 13/08/2024

PB09 1 of 2



PB09 2 of 2



PB10 1 of 1

RECEIVED: 13/08/2024



PB11 1 of 1

RECEIVED: 13/08/2024



PB12 1 of 1

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PB13 1 of 1

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PB14 1 of 1



RECEIVED: 13/08/2024

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PB21 1 of 1

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PB23 1 of 1



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Appendix 5

Soakaway Test Records (to BRE365)

Soakaway Test No.	Easting	Northing	Elevation (m OD)
SA01	686044.553	719690.913	79.582
SA02	686159.275	719597.49	79.558
SA03	686281.269	719515.46	79.22
SA04	686404	719434.018	78.346
SA05	686527.198	719353.119	78.611
SA06	686447.219	719668.69	83.453
SA07	686660.25	719566.88	82.861
SA08	686606.497	719388.773	78.995
SA09	686700.381	719648.213	81.639
SA10	686556.719	719845.828	83.877
SA11	686551.16	719788.98	84.239
SA12	686504.63	719684.437	84.324
SA13	686248.393	719737.264	81.662

Soakaway Design f -value from field tests (F2C) IGSL

Contract: Halverstown
Contract No. 24330
Test No. SA01
Client DOBA
Date: 20/10/2022

RECEIVED: 13/08/2024

Summary of ground conditions

from	to	Description	Ground water
0.00	0.40	TOPSOIL: Soft brown slightly gravelly sandy CLAY	
0.40	1.60	Firm grey mottled orange very sandy gravelly SILT with silty sand horizons	Dry

Notes:
Test terminated at 30 minutes. No soakage recorded.

Samples:

Field Data

Depth to Water (m)	Elapsed Time (min)
0.59	0.00
0.59	1.00
0.59	2.00
0.59	3.00
0.59	4.00
0.59	5.00
0.59	6.00
0.59	7.00
0.59	8.00
0.59	10.00
0.59	12.00
0.59	14.00
0.59	16.00
0.59	18.00
0.59	20.00
0.59	25.00
0.59	30.00

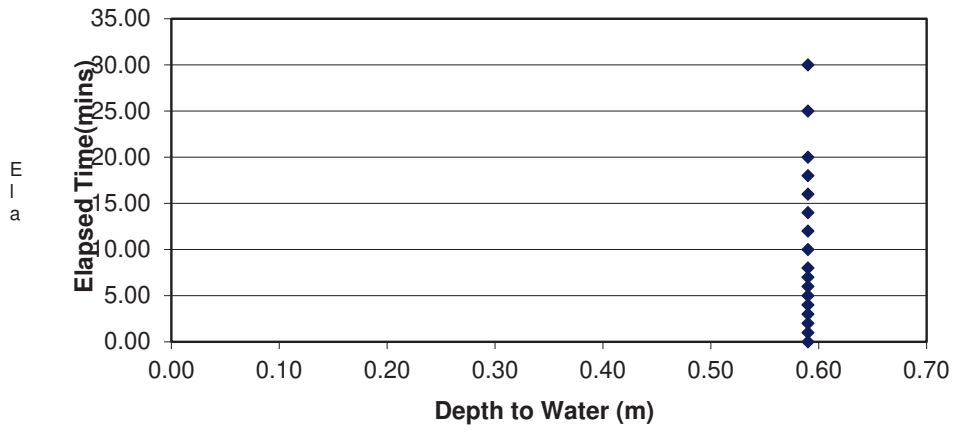
Field Test

Depth of Pit (D)	1.60	m
Width of Pit (B)	0.40	m
Length of Pit (L)	1.60	m
Initial depth to Water =	0.59	m
Final depth to water =	0.59	m
Elapsed time (mins)=	30.00	
Top of permeable soil		m
Base of permeable soil		m
Base area=	0.64	m2
*Av. side area of permeable stratum over test pe	4.04	m2
Total Exposed area =	4.68	m2

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

f= 0 m/min or 0 m/sec

Depth of water vs Elapsed Time (mins)



Soakaway Design f -value from field tests (F2C) IGSL

Contract: Halverstown
Test No. SA02
Client DOBA
Date: 20/10/2022

Contract No. 24330

RECEIVED: 13/08/2024

Summary of ground conditions

from	to	Description	Ground water
0.00	0.30	TOPSOIL: Soft brown slightly gravelly sandy CLAY	
0.30	1.50	Firm grey brown very sandy very gravelly CLAY with a low cobble content	Dry

Notes:

Samples:

Field Data

Depth to Water (m)	Elapsed Time (min)
0.55	0.00
0.55	1.00
0.55	2.00
0.55	3.00
0.56	4.00
0.56	5.00
0.56	6.00
0.56	7.00
0.57	8.00
0.57	10.00
0.57	12.00
0.58	14.00
0.58	16.00
0.58	18.00
0.58	20.00
0.59	25.00
0.59	30.00
0.59	35.00
0.60	40.00
0.6	50.00
0.61	60.00

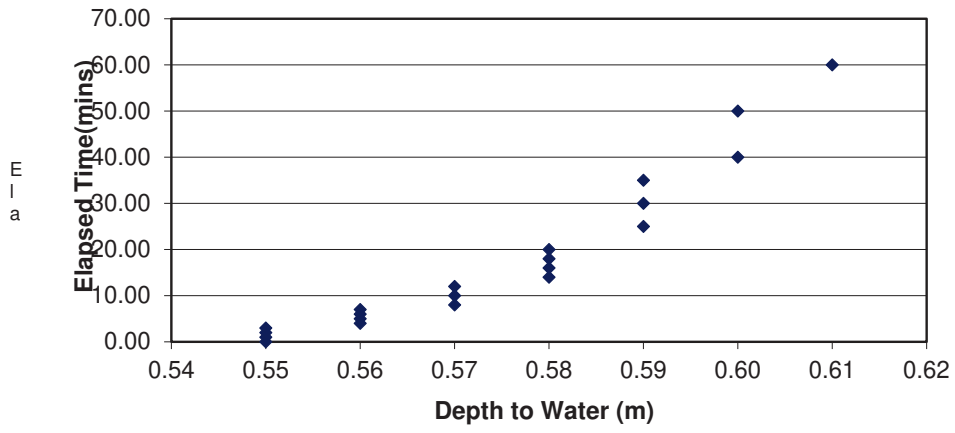
Field Test

Depth of Pit (D)	1.50	m
Width of Pit (B)	0.40	m
Length of Pit (L)	1.50	m
Initial depth to Water =	0.55	m
Final depth to water =	0.61	m
Elapsed time (mins)=	60.00	
Top of permeable soil		m
Base of permeable soil		m
Base area=	0.6	m2
*Av. side area of permeable stratum over test pe	3.496	m2
Total Exposed area =	4.096	m2

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

f= 0.00015 m/min or 2.441E-06 m/sec

Depth of water vs Elapsed Time (mins)



Soakaway Design f -value from field tests (F2C) IGSL

Contract: Halverstown
Test No. SA03
Client DOBA
Date: 20/10/2022

Contract No. 24330

RECEIVED: 13/08/2024

Summary of ground conditions

from	to	Description	Ground water
0.00	0.30	TOPSOIL: Soft brown slightly gravelly sandy CLAY	Dry
0.30	0.50	Firm brown sandy gravelly SILT	
0.50	1.70	Firm grey brown very sandy gravelly silty CLAY with a low cobble content	

Notes:

Samples:

Field Data

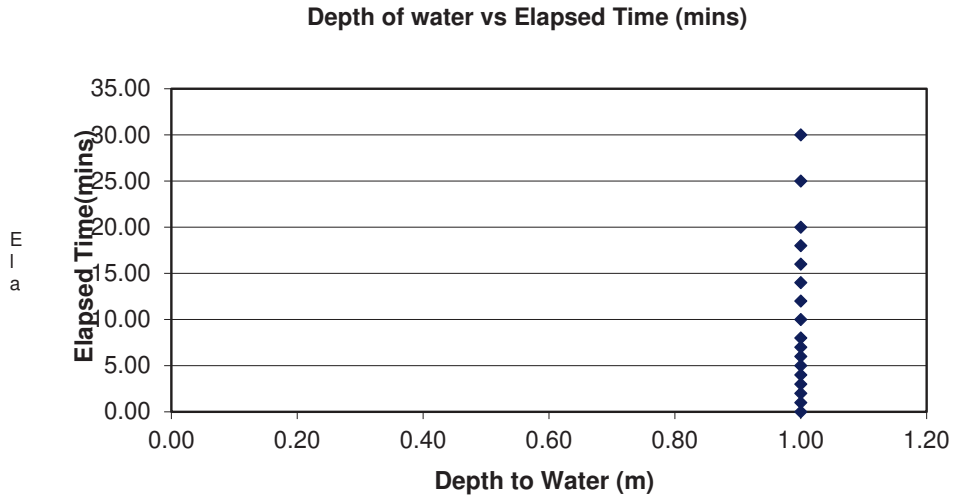
Depth to Water (m)	Elapsed Time (min)
1.00	0.00
1.00	1.00
1.00	2.00
1.00	3.00
1.00	4.00
1.00	5.00
1.00	6.00
1.00	7.00
1.00	8.00
1.00	10.00
1.00	12.00
1.00	14.00
1.00	16.00
1.00	18.00
1.00	20.00
1.00	25.00
1.00	30.00

Field Test

Depth of Pit (D)	1.80	m
Width of Pit (B)	0.40	m
Length of Pit (L)	1.60	m
Initial depth to Water =	1.00	m
Final depth to water =	1.00	m
Elapsed time (mins)=	30.00	
Top of permeable soil		m
Base of permeable soil		m
Base area=	0.64	m2
*Av. side area of permeable stratum over test pe	3.2	m2
Total Exposed area =	3.84	m2

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

f= 0 m/min or 0 m/sec



Soakaway Design f -value from field tests (F2C) IGSL

Contract: Halverstown
Test No. SA04
Client DOBA
Date: 10/10/2022

Contract No. 24330

RECEIVED: 13/08/2024

Summary of ground conditions

from	to	Description	Ground water
0.00	0.40	TOPSOIL: Soft brown slightly gravelly sandy CLAY	Dry
0.40	0.90	Grey silty gravelly SAND with low cobbles	
0.90	2.10	Firm to stiff light grey mottled orange slightly sandy gravelly SILT	

Notes: Samples:

Field Data

Depth to Water (m)	Elapsed Time (min)
1.13	0.00
1.13	1.00
1.13	2.00
1.13	3.00
1.13	4.00
1.13	5.00
1.13	6.00
1.13	7.00
1.13	8.00
1.13	10.00
1.14	12.00
1.14	14.00
1.14	16.00
1.14	18.00
1.14	20.00
1.14	25.00
1.14	30.00
1.15	35.00
1.15	40.00
1.15	50.00
1.15	60.00

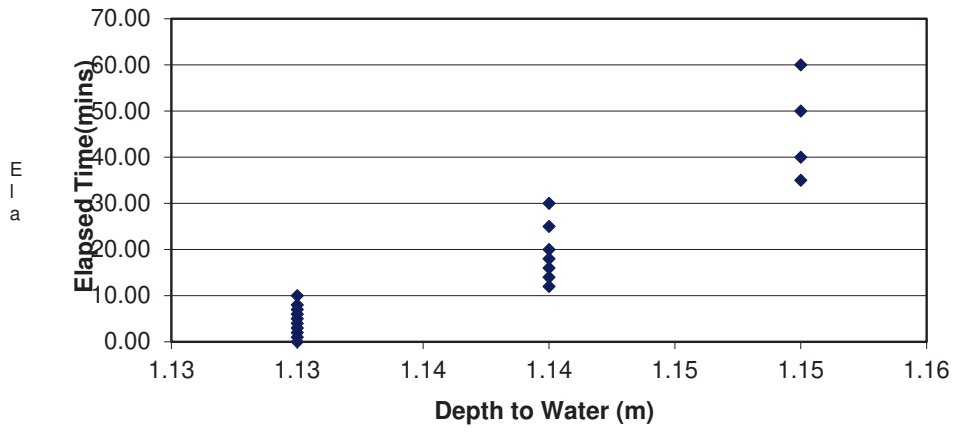
Field Test

Depth of Pit (D)	2.10	m
Width of Pit (B)	0.45	m
Length of Pit (L)	1.60	m
Initial depth to Water =	1.13	m
Final depth to water =	1.15	m
Elapsed time (mins)=	60.00	
Top of permeable soil		m
Base of permeable soil		m
Base area=	0.72	m2
*Av. side area of permeable stratum over test pe	3.936	m2
Total Exposed area =	4.656	m2

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

f= 5.2E-05 m/min or 8.591E-07 m/sec

Depth of water vs Elapsed Time (mins)



Soakaway Design f -value from field tests (F2C) IGSL

Contract: Halverstown Contract No. 24330
Test No. SA05 A
Client DOBA
Date: 04/10/2022

RECEIVED: 13/08/2024

Summary of ground conditions

from	to	Description	Ground water
0.00	0.50	TOPSOIL: Soft brown slightly gravelly sandy CLAY with a low cobble content and rootlets	Moderate flow at 1.7
0.50	1.10	(Medium dense) Grey very gravelly SAND with a medium cobble content	
1.10	1.70	(Medium dense) Grey sandy GRAVEL with a medium to high cobble content	

Notes: Samples: AA185472
Side wall collapse throughout test. AA185473

Field Data

Depth to Water (m)	Elapsed Time (min)
1.10	0.00
1.10	1.00
1.11	2.00
1.11	3.00
1.12	4.00
1.13	5.00
1.14	6.00
1.14	7.00
1.14	8.00
1.15	10.00
1.15	12.00
1.16	14.00
1.16	16.00
1.16	18.00
1.17	20.00
1.18	25.00
1.19	30.00
1.19	35.00
1.20	40.00
1.2	50.00
1.2	60.00

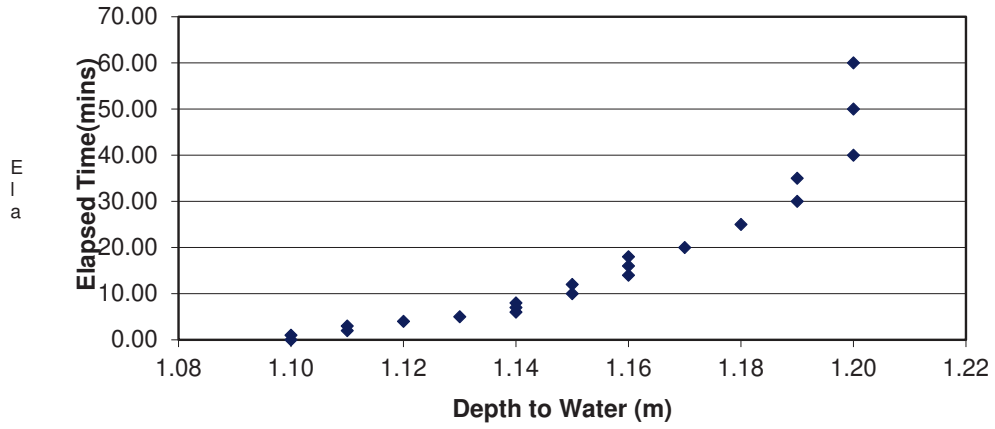
Field Test

Depth of Pit (D)	1.70	m
Width of Pit (B)	0.60	m
Length of Pit (L)	2.20	m
Initial depth to Water =	1.10	m
Final depth to water =	1.20	m
Elapsed time (mins)=	60.00	
Top of permeable soil		m
Base of permeable soil		m
Base area=	1.32	m2
*Av. side area of permeable stratum over test perioc	3.08	m2
Total Exposed area =	4.4	m2

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

f= 0.0005 m/min or 8.333E-06 m/sec

Depth of water vs Elapsed Time (mins)



Soakaway Design f -value from field tests (F2C) IGSL

Contract: Halverstown
Contract No. 24330
Test No. SA05 B (Cycle 1)
Client DOBA
Date: 04/10/2022

RECEIVED: 13/08/2024

Summary of ground conditions

from	to	Description	Ground water
0.00	0.50	TOPSOIL: Soft brown slightly gravelly sandy CLAY with a low cobble content and rootlets	Dry
0.50	1.20	(Medium dense) Grey very gravelly silty SAND with a medium cobble content	

Notes:
Side wall collapse throughout test

Samples:

Field Data

Depth to Water (m)	Elapsed Time (min)
0.60	0.00
0.61	1.00
0.62	2.00
0.62	3.00
0.62	4.00
0.63	5.00
0.63	6.00
0.63	7.00
0.63	8.00
0.64	10.00
0.64	12.00
0.64	14.00
0.65	16.00
0.65	18.00
0.66	20.00
0.67	25.00
0.68	30.00
0.69	35.00
0.70	40.00
0.71	50.00
0.72	60.00

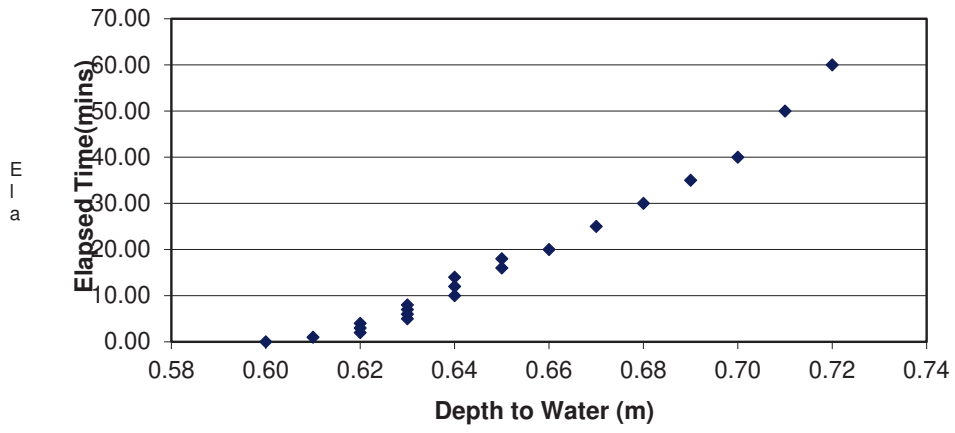
Field Test

Depth of Pit (D)	1.20	m
Width of Pit (B)	0.60	m
Length of Pit (L)	1.50	m
Initial depth to Water =	0.60	m
Final depth to water =	0.72	m
Elapsed time (mins)=	60.00	
Top of permeable soil		m
Base of permeable soil		m
Base area=	0.9	m2
*Av. side area of permeable stratum over test pe	2.268	m2
Total Exposed area =	3.168	m2

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

f= 0.00057 m/min or 9.47E-06 m/sec

Depth of water vs Elapsed Time (mins)



Soakaway Design f -value from field tests (F2C) IGSL

Contract: Halverstown
Contract No. 24330
Test No. SA05 B (Cycle 2)
Client DOBA
Date: 04/10/2022

RECEIVED: 13/08/2024

Summary of ground conditions

from	to	Description	Ground water
0.00	0.50	TOPSOIL: Soft brown slightly gravelly sandy CLAY with a low cobble content and rootlets	Dry
0.50	1.20	(Medium dense) Grey very gravelly silty SAND with a medium cobble content	

Notes:
Side wall collapse throughout test.

Samples:

Field Data

Depth to Water (m)	Elapsed Time (min)
0.50	0.00
0.50	1.00
0.51	2.00
0.51	3.00
0.51	4.00
0.52	5.00
0.52	6.00
0.52	7.00
0.52	8.00
0.53	10.00
0.53	12.00
0.53	14.00
0.54	16.00
0.54	18.00
0.55	20.00
0.57	25.00
0.57	30.00
0.58	35.00
0.59	40.00
0.59	50.00
0.6	60.00

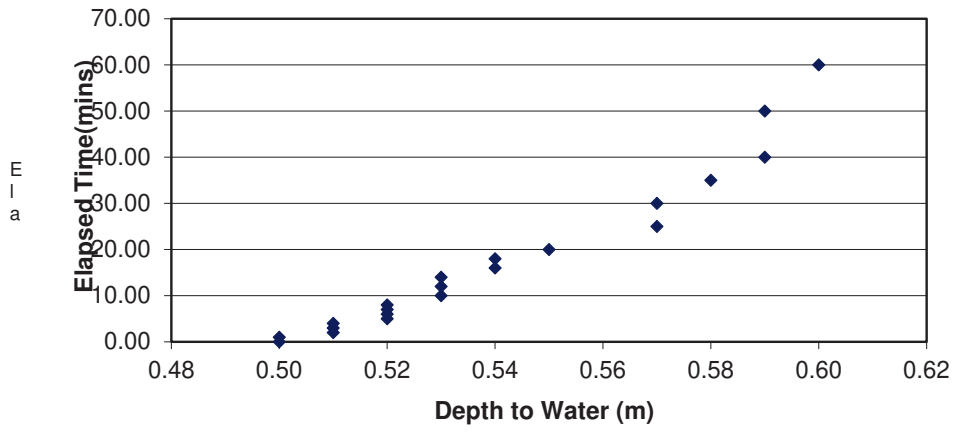
Field Test

Depth of Pit (D)	1.20	m
Width of Pit (B)	0.60	m
Length of Pit (L)	1.50	m
Initial depth to Water =	0.50	m
Final depth to water =	0.60	m
Elapsed time (mins)=	60.00	
Top of permeable soil		m
Base of permeable soil		m
Base area=	0.9	m2
*Av. side area of permeable stratum over test pe	2.73	m2
Total Exposed area =	3.63	m2

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

f= 0.00041 m/min or 6.887E-06 m/sec

Depth of water vs Elapsed Time (mins)



Soakaway Design f -value from field tests (F2C) IGSL

Contract: Halverstown
Test No. SA06 (Cycle 1)
Client DOBA
Date: 10/10/2022

Contract No. 24330

RECEIVED: 13/08/2024

Summary of ground conditions

from	to	Description	Ground water
0.00	0.40	TOPSOIL: Soft brown sandy CLAY with rootlets	Dry
0.30	1.20	Firm brown sandy gravelly CLAY	
1.20	2.00	Grey brown gravelly silty SAND with a low cobble content	

Notes:

Samples: AA181953
AA181954

Field Data

Depth to Water (m)	Elapsed Time (min)
1.12	0.00
1.13	1.00
1.14	2.00
1.14	3.00
1.15	4.00
1.15	5.00
1.16	6.00
1.16	7.00
1.17	8.00
1.17	10.00
1.17	12.00
1.18	14.00
1.18	16.00
1.18	18.00
1.19	20.00
1.19	25.00
1.19	30.00
1.20	35.00
1.20	40.00
1.21	50.00
1.22	60.00

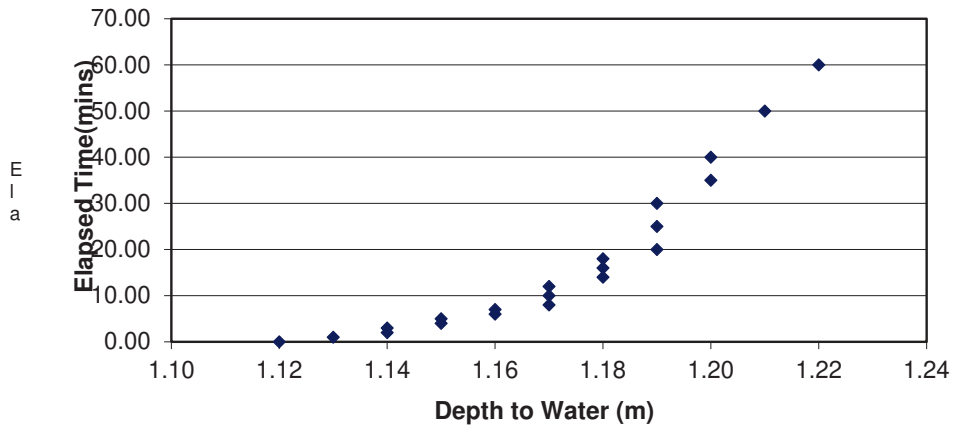
Field Test

Depth of Pit (D)	2.00	m
Width of Pit (B)	0.45	m
Length of Pit (L)	1.60	m
Initial depth to Water =	1.12	m
Final depth to water =	1.22	m
Elapsed time (mins)=	60.00	
Top of permeable soil		m
Base of permeable soil		m
Base area=	0.72	m2
*Av. side area of permeable stratum over test pe	3.403	m2
Total Exposed area =	4.123	m2

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

f= 0.00029 m/min or 4.851E-06 m/sec

Depth of water vs Elapsed Time (mins)



Soakaway Design f -value from field tests (F2C) IGSL

Contract: Halverstown
Contract No. 24330
Test No. SA06 (Cycle 2)
Client DOBA
Date: 10/10/2022

RECEIVED: 13/08/2024

Summary of ground conditions

from	to	Description	Ground water
0.00	0.40	TOPSOIL: Soft brown sandy CLAY with rootlets	Dry
0.30	1.20	Firm brown sandy gravelly CLAY	
1.20	2.00	Grey brown gravelly silty SAND with a low cobble content	

Notes: Samples: AA181953
AA181954

Field Data

Depth to Water (m)	Elapsed Time (min)
1.01	0.00
1.02	1.00
1.03	2.00
1.03	3.00
1.04	4.00
1.04	5.00
1.04	6.00
1.05	7.00
1.05	8.00
1.05	10.00
1.06	12.00
1.06	14.00
1.06	16.00
1.06	18.00
1.07	20.00
1.07	25.00
1.07	30.00
1.07	35.00
1.08	40.00
1.08	50.00
1.09	60.00

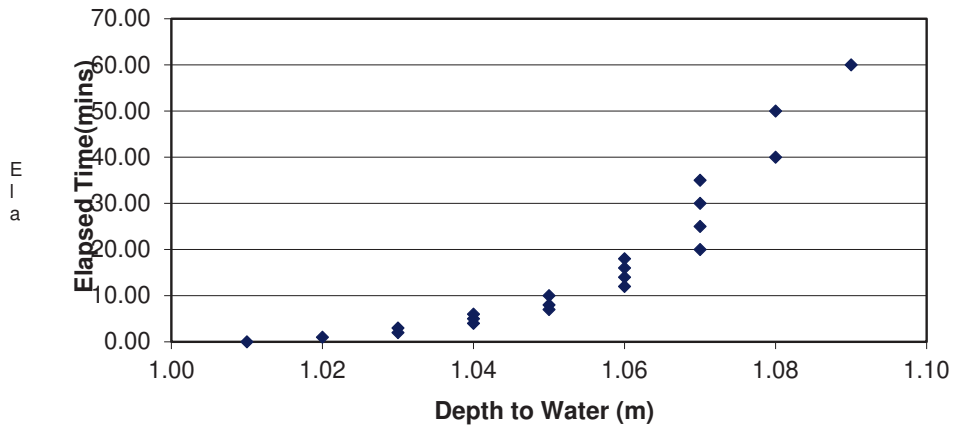
Field Test

Depth of Pit (D)	2.00	m
Width of Pit (B)	0.45	m
Length of Pit (L)	1.60	m
Initial depth to Water =	1.01	m
Final depth to water =	1.09	m
Elapsed time (mins)=	60.00	
Top of permeable soil		m
Base of permeable soil		m
Base area=	0.72	m2
*Av. side area of permeable stratum over test pe	3.895	m2
Total Exposed area =	4.615	m2

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

f= 0.00021 m/min or 3.467E-06 m/sec

Depth of water vs Elapsed Time (mins)



Soakaway Design f -value from field tests (F2C) IGSL

Contract: Halverstown
Test No. SA07
Client DOBA
Date: 11/10/2022

Contract No. 24330

RECEIVED: 13/08/2024

Summary of ground conditions

from	to	Description	Ground water
0.00	0.40	TOPSOIL: Soft brown sandy CLAY with rootlets	Dry
0.40	1.00	Stiff brown grey sandy slightly gravelly silty CLAY	
1.00	2.20	Firm brown sandy gravelly CLAY with a medium cobble content and occassional boulders	

Notes:

Samples: AA185492
AA185493

Field Data

Depth to Water (m)	Elapsed Time (min)
1.17	0.00
1.17	1.00
1.17	2.00
1.17	3.00
1.17	4.00
1.18	5.00
1.18	6.00
1.18	7.00
1.18	8.00
1.18	10.00
1.18	12.00
1.18	14.00
1.18	16.00
1.19	18.00
1.19	20.00
1.19	25.00
1.19	30.00
1.20	35.00
1.20	40.00
1.2	50.00
1.21	60.00

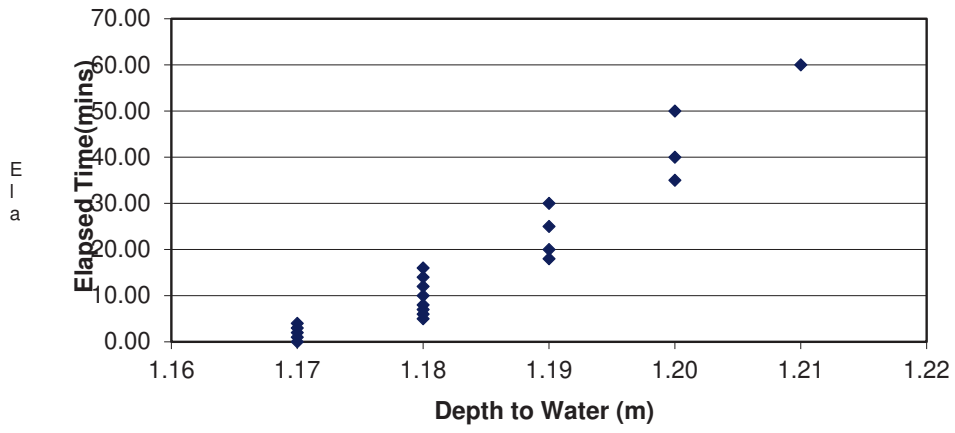
Field Test

Depth of Pit (D)	2.20	m
Width of Pit (B)	0.45	m
Length of Pit (L)	1.40	m
Initial depth to Water =	1.17	m
Final depth to water =	1.21	m
Elapsed time (mins)=	60.00	
Top of permeable soil		m
Base of permeable soil		m
Base area=	0.63	m2
*Av. side area of permeable stratum over test pe	3.737	m2
Total Exposed area =	4.367	m2

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

f= 9.6E-05 m/min or 1.603E-06 m/sec

Depth of water vs Elapsed Time (mins)



Soakaway Design f -value from field tests (F2C) IGSL

Contract: Halverstown
Contract No. 24330
Test No. SA08
Client DOBA
Date: 10/10/2022

RECEIVED: 13/08/2024

Summary of ground conditions

from	to	Description	Ground water
0.00	0.30	TOPSOIL: Soft dark brown very sandy slightly gravelly CLAY	Dry
0.30	0.80	Firm grey very sandy slightly gravelly SILT	
0.80	1.80	Firm to stiff light grey mottled orange slightly sandy gravelly SILT with a low cobble content	

Notes:
Terminated after 30 minutes. No soakage recorded

Samples: AA181951
AA181952

Field Data

Depth to Water (m)	Elapsed Time (min)
1.20	0.00
1.20	1.00
1.20	2.00
1.20	3.00
1.20	4.00
1.20	5.00
1.20	6.00
1.20	7.00
1.20	8.00
1.20	10.00
1.20	12.00
1.20	14.00
1.20	16.00
1.20	18.00
1.20	20.00
1.20	25.00
1.20	30.00

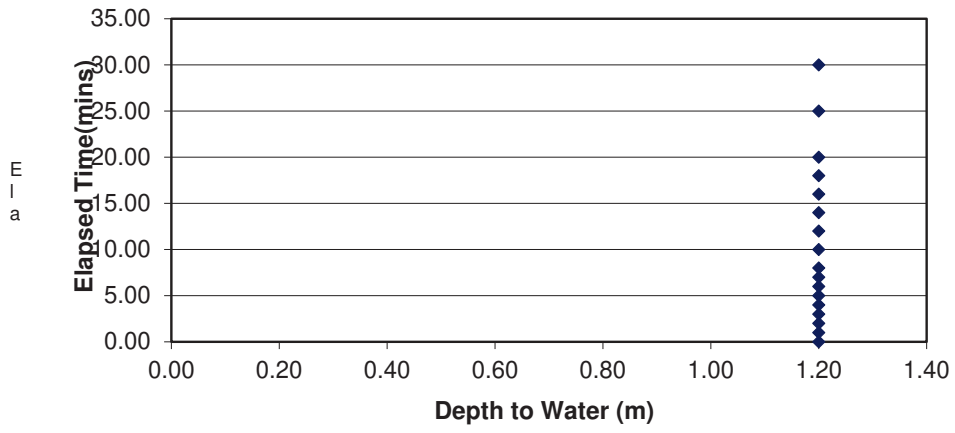
Field Test

Depth of Pit (D)	2.10	m
Width of Pit (B)	0.45	m
Length of Pit (L)	1.60	m
Initial depth to Water =	1.20	m
Final depth to water =	1.20	m
Elapsed time (mins)=	30.00	
Top of permeable soil		m
Base of permeable soil		m
Base area=	0.72	m2
*Av. side area of permeable stratum over test pe	3.69	m2
Total Exposed area =	4.41	m2

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

f= 0 m/min or 0 m/sec

Depth of water vs Elapsed Time (mins)



Soakaway Design f -value from field tests (F2C) IGSL

Contract: Halverstown
Test No. SA09 (Cycle 1)
Client DOBA
Date: 11/10/2022

Contract No. 24330

RECEIVED: 13/08/2024

Summary of ground conditions

from	to	Description	Ground water
0.00	0.30	TOPSOIL: Soft brown sandy CLAY with rootlets	Dry
0.30	0.80	Stiff grey mottled orange sandy slightly gravelly SILT	
0.80	1.80	Grey brown gravelly silty SAND with a low cobble content	
1.80	2.00	Stiff brown sandy gravelly SILT	

Notes:

Samples: AA185494
AA185495
AA185496

Field Data

Depth to Water (m)	Elapsed Time (min)
1.22	0.00
1.22	1.00
1.22	2.00
1.23	3.00
1.23	4.00
1.23	5.00
1.24	6.00
1.24	7.00
1.24	8.00
1.25	10.00
1.25	12.00
1.25	14.00
1.25	16.00
1.26	18.00
1.26	20.00
1.27	25.00
1.27	30.00
1.28	35.00
1.29	40.00
1.3	50.00
1.3	60.00

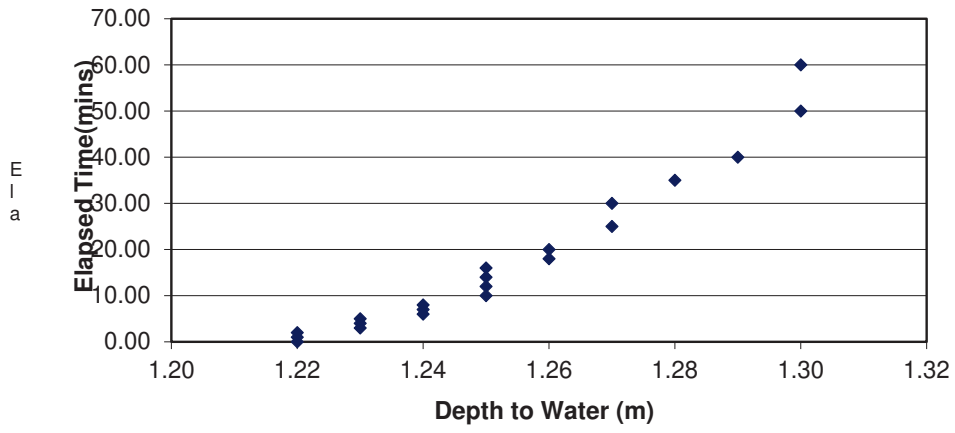
Field Test

Depth of Pit (D)	2.00	m
Width of Pit (B)	0.45	m
Length of Pit (L)	1.50	m
Initial depth to Water =	1.22	m
Final depth to water =	1.30	m
Elapsed time (mins)=	60.00	
Top of permeable soil		m
Base of permeable soil		m
Base area=	0.675	m2
*Av. side area of permeable stratum over test pe	2.886	m2
Total Exposed area =	3.561	m2

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

f= 0.00025 m/min or 4.212E-06 m/sec

Depth of water vs Elapsed Time (mins)



Soakaway Design f -value from field tests (F2C) IGSL

Contract: Halverstown
Contract No. 24330
Test No. SA09 (Cycle 2)
Client DOBA
Date: 11/10/2022

RECEIVED: 13/08/2024

Summary of ground conditions

from	to	Description	Ground water
0.00	0.30	TOPSOIL: Soft brown sandy CLAY with rootlets	Dry
0.30	0.80	Stiff grey mottled orange sandy slightly gravelly SILT	
0.80	1.80	Grey brown gravelly silty SAND with a low cobble content	
1.80	2.00	Stiff brown sandy gravelly SILT	

Notes:

Samples: AA185494
AA185495
AA185496

Field Data

Depth to Water (m)	Elapsed Time (min)
0.90	0.00
0.90	1.00
0.90	2.00
0.91	3.00
0.91	4.00
0.92	5.00
0.92	6.00
0.92	7.00
0.93	8.00
0.93	10.00
0.93	12.00
0.93	14.00
0.94	16.00
0.94	18.00
0.94	20.00
0.95	25.00
0.95	30.00
0.96	35.00
0.96	40.00
0.97	50.00
0.97	60.00

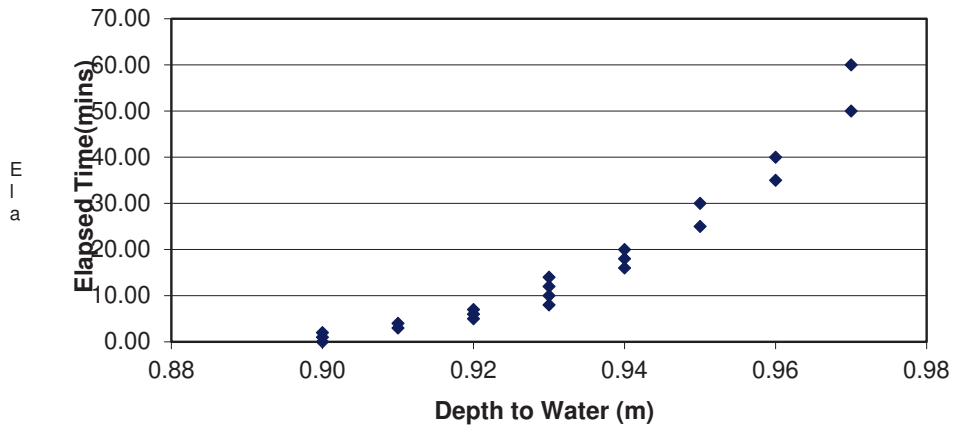
Field Test

Depth of Pit (D)	2.00	m
Width of Pit (B)	0.45	m
Length of Pit (L)	1.50	m
Initial depth to Water =	0.90	m
Final depth to water =	0.97	m
Elapsed time (mins)=	60.00	
Top of permeable soil		m
Base of permeable soil		m
Base area=	0.675	m2
*Av. side area of permeable stratum over test pe	4.1535	m2
Total Exposed area =	4.8285	m2

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

f= 0.00016 m/min or 2.718E-06 m/sec

Depth of water vs Elapsed Time (mins)



Soakaway Design f -value from field tests (F2C) IGSL

Contract: Halverstown
Contract No. 24330
Test No. SA10
Client DOBA
Date: 14/10/2022

RECEIVED 23/08/2024

Summary of ground conditions

from	to	Description	Ground water
0.00	0.30	TOPSOIL: Soft brown slightly gravelly sandy silty CLAY	
0.30	0.80	Stiff brown slightly gravelly sandy silty CLAY with a medium cobble content	Dry
1.00	1.60	Firm to stiff brown very sandy gravelly CLAY with a medium cobble content	

Notes: Samples:

Field Data

Depth to Water (m)	Elapsed Time (min)
1.08	0.00
1.08	1.00
1.08	2.00
1.09	3.00
1.09	4.00
1.09	5.00
1.09	6.00
1.10	7.00
1.10	8.00
1.10	10.00
1.10	12.00
1.11	14.00
1.11	16.00
1.11	18.00
1.11	20.00
1.11	25.00
1.12	30.00
1.12	35.00
1.12	40.00
1.13	50.00
1.13	60.00

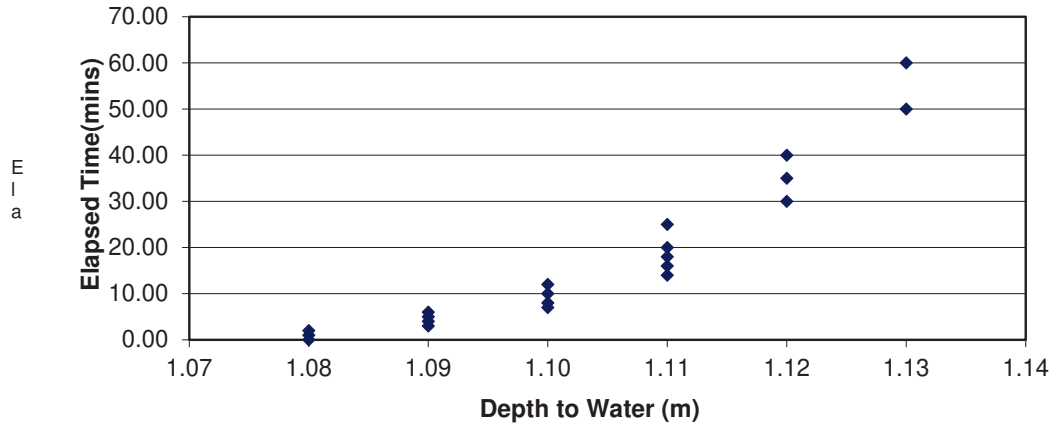
Field Test

Depth of Pit (D)	1.60	m
Width of Pit (B)	0.40	m
Length of Pit (L)	1.80	m
Initial depth to Water =	1.08	m
Final depth to water =	1.13	m
Elapsed time (mins)=	60.00	
Top of permeable soil		m
Base of permeable soil		m
Base area=	0.72	m2
*Av. side area of permeable stratum over test period=	2.178	m2
Total Exposed area =	2.898	m2

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

f= 0.000207039 m/min or 3.451E-06 m/sec

Depth of water vs Elapsed Time (mins)



Soakaway Design f -value from field tests (F2C) IGSL

Contract: Halverstown
Contract No. 24330
Test No. SA11
Client DOBA
Date: 14/10/2022

RECEIVED 23/08/2024

Summary of ground conditions

from	to	Description	Ground water
0.00	0.40	TOPSOIL: Soft brown sandy gravelly CLAY	
0.40	1.20	Firm brown sandy gravelly silty CLAY with a medium cobble content	Dry
1.20	1.80	Firm brown very sandy gravelly CLAY with a medium cobble content	

Notes: Samples:

Field Data

Depth to Water (m)	Elapsed Time (min)
1.00	0.00
1.00	1.00
1.00	2.00
1.00	3.00
1.00	4.00
1.00	5.00
1.00	6.00
1.00	7.00
1.01	8.00
1.01	10.00
1.01	12.00
1.01	14.00
1.01	16.00
1.01	18.00
1.02	20.00
1.02	25.00
1.02	30.00
1.02	35.00
1.02	40.00
1.03	50.00
1.03	60.00

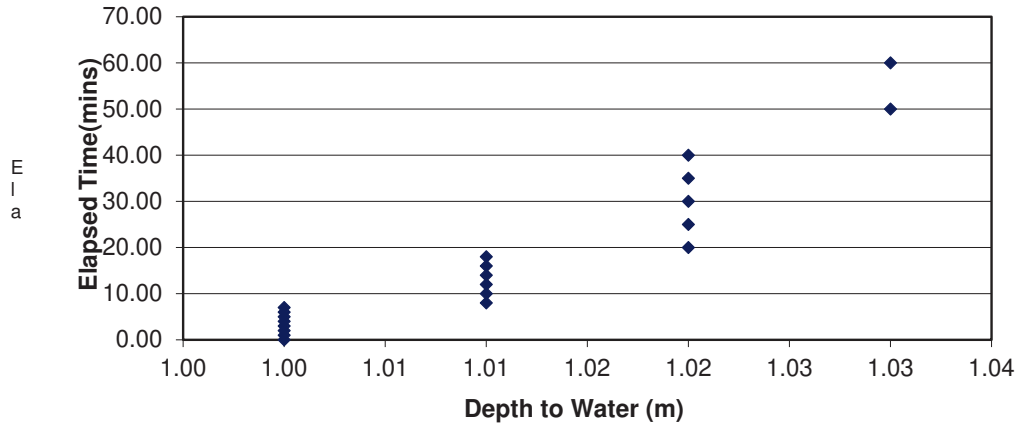
Field Test

Depth of Pit (D)	1.80	m
Width of Pit (B)	0.40	m
Length of Pit (L)	1.60	m
Initial depth to Water =	1.00	m
Final depth to water =	1.03	m
Elapsed time (mins)=	60.00	
Top of permeable soil		m
Base of permeable soil		m
Base area=	0.64	m2
*Av. side area of permeable stratum over test period=	3.14	m2
Total Exposed area =	3.78	m2

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

f= 8.46561E-05 m/min or 1.411E-06 m/sec

Depth of water vs Elapsed Time (mins)



Soakaway Design f -value from field tests (F2C) IGSL

Contract: Halverstown
Contract No. 24330
Test No. SA12 (Cycle 1)
Client DOBA
Date: 10/10/2022

RECEIVED: 13/08/2024

Summary of ground conditions

from	to	Description	Ground water
0.00	0.40	TOPSOIL: Soft brown sandy CLAY with rootlets	Dry
0.40	1.20	Firm brown sandy silty CLAY	
1.10	2.20	Grey brown gravelly silty SAND with a medium cobble content	

Notes:

Samples: AA181955
AA181956

Field Data

Depth to Water (m)	Elapsed Time (min)
1.34	0.00
1.35	1.00
1.35	2.00
1.36	3.00
1.36	4.00
1.37	5.00
1.37	6.00
1.37	7.00
1.38	8.00
1.38	10.00
1.38	12.00
1.39	14.00
1.39	16.00
1.40	18.00
1.40	20.00
1.40	25.00
1.41	30.00
1.41	35.00
1.42	40.00
1.43	50.00
1.44	60.00

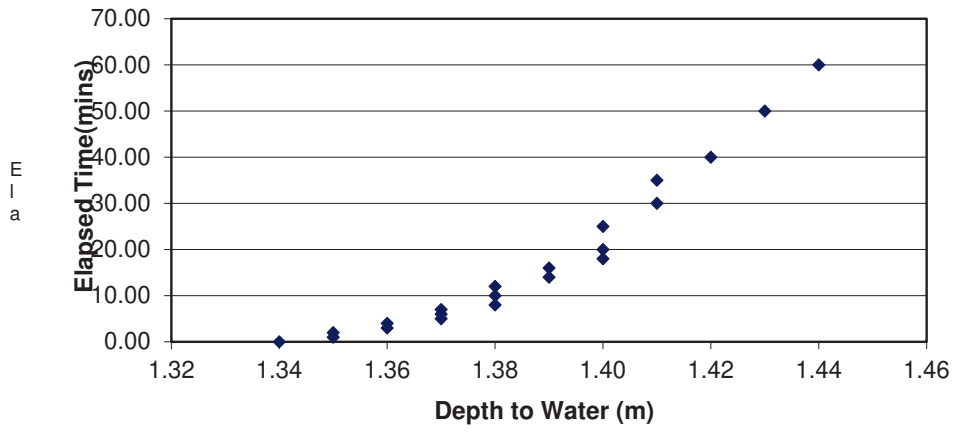
Field Test

Depth of Pit (D)	2.20	m
Width of Pit (B)	0.45	m
Length of Pit (L)	1.70	m
Initial depth to Water =	1.34	m
Final depth to water =	1.44	m
Elapsed time (mins)=	60.00	
Top of permeable soil		m
Base of permeable soil		m
Base area=	0.765	m2
*Av. side area of permeable stratum over test pe	3.483	m2
Total Exposed area =	4.248	m2

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

f= 0.0003 m/min or 5.002E-06 m/sec

Depth of water vs Elapsed Time (mins)



Soakaway Design f -value from field tests (F2C) IGSL

Contract: Halverstown
Contract No. 24330
Test No. SA12 (Cycle 2)
Client DOBA
Date: 10/10/2022

RECEIVED: 13/08/2024

Summary of ground conditions

from	to	Description	Ground water
0.00	0.40	TOPSOIL: Soft brown sandy CLAY with rootlets	Dry
0.40	1.20	Firm brown sandy silty CLAY	
1.10	2.20	Grey brown gravelly silty SAND with a medium cobble content	

Notes:

Samples: AA181955
AA181956

Field Data

Depth to Water (m)	Elapsed Time (min)
1.21	0.00
1.21	1.00
1.22	2.00
1.22	3.00
1.22	4.00
1.23	5.00
1.23	6.00
1.23	7.00
1.24	8.00
1.24	10.00
1.24	12.00
1.25	14.00
1.25	16.00
1.26	18.00
1.26	20.00
1.27	25.00
1.27	30.00
1.28	35.00
1.28	40.00
1.29	50.00
1.3	60.00

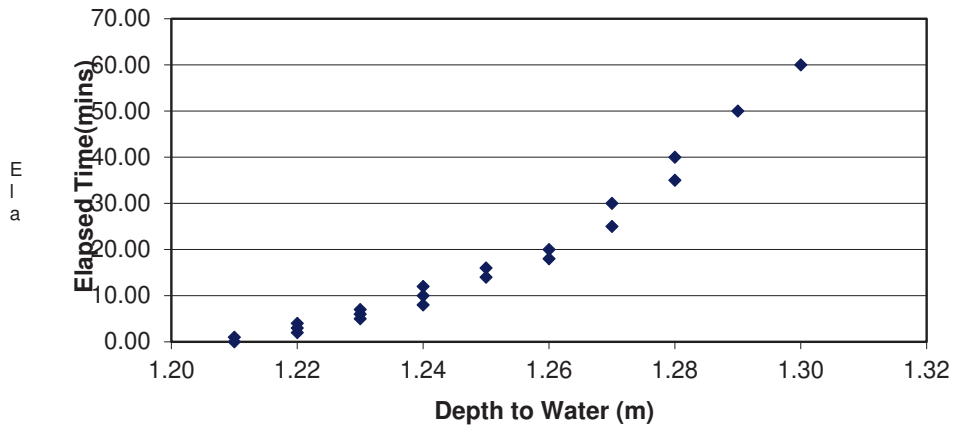
Field Test

Depth of Pit (D)	2.20	m
Width of Pit (B)	0.45	m
Length of Pit (L)	1.70	m
Initial depth to Water =	1.21	m
Final depth to water =	1.30	m
Elapsed time (mins)=	60.00	
Top of permeable soil		m
Base of permeable soil		m
Base area=	0.765	m2
*Av. side area of permeable stratum over test pe	4.0635	m2
Total Exposed area =	4.8285	m2

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

f= 0.00024 m/min or 3.961E-06 m/sec

Depth of water vs Elapsed Time (mins)



Soakaway Design f -value from field tests (F2C) IGSL

Contract: Halverstown
Test No. SA13
Client DOBA
Date: 14/10/2022

Contract No. 24330

RECEIVED: 13/08/2024

Summary of ground conditions

from	to	Description	Ground water
0.00	0.30	TOPSOIL: Soft brown slightly gravelly sandy silty CLAY	Dry
0.30	0.80	Stiff brown slightly gravelly sandy CLAY	
0.80	1.60	Firm to stiff brown very sandy gravelly CLAY with a medium cobble content	

Notes:

Samples: AA181981
AA181982

Field Data

Depth to Water (m)	Elapsed Time (min)
0.85	0.00
0.85	1.00
0.85	2.00
0.85	3.00
0.86	4.00
0.86	5.00
0.86	6.00
0.87	7.00
0.87	8.00
0.87	10.00
0.88	12.00
0.88	14.00
0.88	16.00
0.88	18.00
0.89	20.00
0.89	25.00
0.89	30.00
0.90	35.00
0.90	40.00
0.91	50.00
0.92	60.00

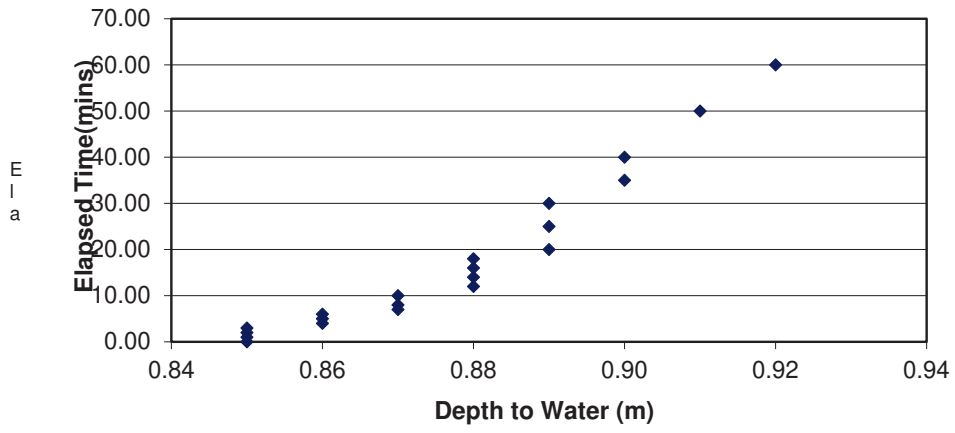
Field Test

Depth of Pit (D)	1.60	m
Width of Pit (B)	0.40	m
Length of Pit (L)	1.70	m
Initial depth to Water =	0.85	m
Final depth to water =	0.92	m
Elapsed time (mins)=	60.00	
Top of permeable soil		m
Base of permeable soil		m
Base area=	0.68	m2
*Av. side area of permeable stratum over test pe	3.003	m2
Total Exposed area =	3.683	m2

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

f= 0.00022 m/min or 3.59E-06 m/sec

Depth of water vs Elapsed Time (mins)



TRIAL PIT RECORD

REPORT NUMBER 24330

CONTRACT Halverstown

TRIAL PIT NO. SATP01
SHEET Sheet 1 of 1

LOGGED BY MB

CO-ORDINATES 686,044.55 E
719,690.91 N

DATE STARTED 20/10/2022
DATE COMPLETED 20/10/2022

GROUND LEVEL (m) 79.58

CLIENT
ENGINEER DOBA

EXCAVATION METHOD 7t Hitachi

RECEIVED: 13/08/2024

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0 TOPSOIL: Soft brown slightly gravelly sandy CLAY. Sand is fine to coarse. Gravel is fine to medium subrounded.									
		0.40	79.18						
Firm grey mottled orange very sandy gravelly SILT with silty sand horizons. Sand is fine to coarse. Gravel is fine to coarse subrounded.									
1.0									
		1.60	77.98						
End of Trial Pit at 1.60m									
2.0									
3.0									

Groundwater Conditions
Dry

Stability
Good

General Remarks
Pit footprint scanned using cable avoidance tool [CAT]. Pit backfilled with arisings. Soakaway test carried out in pit.

TRIAL PIT RECORD

REPORT NUMBER 24330

CONTRACT	Halverstown	**TRIAL PIT NO.**	**SATP02**
		SHEET	Sheet 1 of 1
LOGGED BY	MB	**CO-ORDINATES**	686,159.28 E 719,597.49 N
		DATE STARTED	20/10/2022
		DATE COMPLETED	20/10/2022
CLIENT		**GROUND LEVEL (m)**	79.56
ENGINEER	DOBA	**EXCAVATION METHOD**	7t Hitachi

RECEIVED: 13/08/2024

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
TOPSOIL: Soft brown slightly gravelly sandy CLAY. Sand is fine to coarse. Gravel is fine to medium subrounded.		0.30	79.26						
Firm grey brown very sandy very gravelly CLAY with a low cobble content. Sand is medium to coarse. Gravel is fine to coarse subrounded. Cobbles are subrounded to rounded of limestone.									
End of Trial Pit at 1.50m		1.50	78.06						

0.0
1.0
2.0
3.0

Groundwater Conditions
Dry

Stability
Good

General Remarks
Pit footprint scanned using cable avoidance tool [CAT]. Pit backfilled with arisings. Soakaway test carried out in pit.

TRIAL PIT RECORD

REPORT NUMBER 24330

CONTRACT Halverstown

TRIAL PIT NO. SATP03
SHEET Sheet 1 of 1

LOGGED BY MB

CO-ORDINATES 686,281.27 E
719,515.46 N

DATE STARTED 20/10/2022
DATE COMPLETED 20/10/2022

GROUND LEVEL (m) 79.22

CLIENT
ENGINEER DOBA

EXCAVATION METHOD 7t Hitachi

RECEIVED: 13/08/2024

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
TOPSOIL: Soft brown slightly gravelly sandy CLAY. Sand is fine to coarse. Gravel is fine to medium subrounded.		0.30	78.92						
Firm brown sandy gravelly SILT. Sand is fine to coarse. Gravel is fine to coarse subrounded.		0.50	78.72						
Firm grey brown very sandy gravelly silty CLAY with a low cobble content. Sand is medium to coarse. Gravel is fine to coarse subrounded. Cobbles are subrounded to rounded of limestone.									
End of Trial Pit at 1.80m		1.70	77.52						

0.0
1.0
2.0
3.0

Groundwater Conditions
Dry

Stability
Good

General Remarks
Pit footprint scanned using cable avoidance tool [CAT]. Pit backfilled with arisings. Soakaway test carried out in pit.

TRIAL PIT RECORD

REPORT NUMBER 24330

CONTRACT	Halverstown	**TRIAL PIT NO.**	**SATP04**
		SHEET	Sheet 1 of 1
LOGGED BY	MB	**CO-ORDINATES**	686,404.00 E 719,434.02 N
		DATE STARTED	10/10/2022
		DATE COMPLETED	10/10/2022
CLIENT		**GROUND LEVEL (m)**	78.35
		EXCAVATION METHOD	7t Hitachi
ENGINEER	DOBA		

RECEIVED: 13/08/2024

	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0	TOPSOIL: Soft brown slightly gravelly sandy CLAY. Sand is fine to coarse. Gravel is fine to medium subrounded.									
	Grey silty gravelly SAND with low cobbles. Sand is fine to coarse. Gravel is fine to coarse subrounded. Cobbles are subrounded to rounded of limestone.		0.40	77.95						
1.0	Firm to stiff light grey mottled orange slightly sandy gravelly SILT. Sand is fine to coarse. Gravel is fine to coarse subangular to subrounded.		0.90	77.45						
2.0	End of Trial Pit at 2.10m		2.10	76.25						
3.0										

Groundwater Conditions
Dry

Stability
Good

General Remarks
Pit footprint scanned using cable avoidance tool [CAT]. Pit backfilled with arisings. Soakaway test carried out in pit.

TRIAL PIT RECORD

REPORT NUMBER 24330

CONTRACT	Halverstown	**TRIAL PIT NO.**	**SATP05**
		SHEET	Sheet 1 of 1
LOGGED BY	MB	**CO-ORDINATES**	686,527.20 E 719,353.12 N
		DATE STARTED	04/10/2022
		DATE COMPLETED	04/10/2022
CLIENT		**GROUND LEVEL (m)**	78.61
ENGINEER	DOBA	**EXCAVATION METHOD**	7t Hitachi

RECEIVED: 13/08/2024

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
TOPSOIL: Soft brown slightly gravelly sandy CLAY with a low cobble content and rootlets. Sand is fine to coarse. Gravel is fine to medium subrounded. Cobbles are subrounded to rounded of limestone									
(Medium dense) Grey very gravelly SAND with a medium cobble content. Sand is medium to coarse. Gravel is fine to coarse subrounded. Cobbles are subrounded to rounded of limestone Side wall collapse from 0.70-1.70m		0.50	78.11		AA185472	B	0.70-0.80		
(Medium dense) Grey sandy GRAVEL with a medium to high cobble content. Sand is medium to coarse. Gravel is fine to coarse subrounded.		1.10	77.51		AA185473	B	1.40-1.50		
End of Trial Pit at 1.70m		1.70	76.91	(Moderate)					

Groundwater Conditions
Moderate flow at 1.70m

Stability
Unstable, side wall collapse from 0.70m

General Remarks
Pit footprint scanned using cable avoidance tool [CAT]. Pit backfilled with arisings. Soakaway test carried out in pit.

TRIAL PIT RECORD

REPORT NUMBER 24330

CONTRACT Halverstown

TRIAL PIT NO. SATP06
SHEET Sheet 1 of 1

LOGGED BY MB

CO-ORDINATES 686,447.22 E 719,668.69 N

DATE STARTED 10/10/2022
DATE COMPLETED 10/10/2022

GROUND LEVEL (m) 83.45

CLIENT
ENGINEER DOBA

EXCAVATION METHOD 7t Hitachi

RECEIVED: 13/08/2024

	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0	TOPSOIL: Soft brown sandy CLAY with rootlets. Sand is fine to coarse.									
	Firm brown sandy gravelly CLAY. Sand is fine to coarse. Gravel is fine to coarse subrounded.		0.30	83.15		AA181953	B	0.50-0.50		
1.0	Grey brown gravelly silty SAND with a low cobble content. Sand is fine to coarse. Gravel is fine to coarse subangular to subrounded. Cobbles are subrounded to rounded of limestone		1.20	82.25		AA181954	B	1.50-1.50		
2.0	End of Trial Pit at 2.00m		2.00	81.45						
3.0										

Groundwater Conditions
Dry

Stability
Good

General Remarks
Pit footprint scanned using cable avoidance tool [CAT]. Pit backfilled with arisings. Soakaway test carried out in pit.

TRIAL PIT RECORD

REPORT NUMBER 24330

CONTRACT Halverstown

TRIAL PIT NO. SATP07
SHEET Sheet 1 of 1

LOGGED BY MB

CO-ORDINATES 686,660.25 E
719,566.88 N

DATE STARTED 11/10/2022
DATE COMPLETED 11/10/2022

GROUND LEVEL (m) 82.86

CLIENT
ENGINEER DOBA

EXCAVATION METHOD 7t Hitachi

RECEIVED: 13/08/2024

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
TOPSOIL: Soft brown sandy CLAY with rootlets. Sand is fine to coarse.									
Firm to stiff brown grey sandy slightly gravelly silty CLAY. Sand is fine to coarse. Gravel is fine to coarse subrounded.		0.40	82.46		AA185492	B	0.50-0.60		
Firm to stiff brown sandy gravelly CLAY with a medium cobble content and low boulder content. Sand is fine to coarse. Gravel is fine to coarse subrounded. Cobbles and boulders are subrounded to rounded of limestone		1.00	81.86		AA185493	B	1.50-1.60		
End of Trial Pit at 2.20m		2.20	80.66						

Groundwater Conditions
Dry

Stability
Good

General Remarks
Pit footprint scanned using cable avoidance tool [CAT]. Pit backfilled with arisings. Soakaway test carried out in pit.

TRIAL PIT RECORD

REPORT NUMBER 24330

CONTRACT	Halverstown	**TRIAL PIT NO.**	**SATP08**
		SHEET	Sheet 1 of 1
LOGGED BY	MB	**CO-ORDINATES**	686,606.50 E 719,388.77 N
		DATE STARTED	10/10/2022
		DATE COMPLETED	10/10/2022
CLIENT		**GROUND LEVEL (m)**	79.00
		EXCAVATION METHOD	7t Hitachi
ENGINEER	DOBA		

RECEIVED: 13/08/2024

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
TOPSOIL: Soft dark brown very sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is fine to medium subrounded.		0.30	78.70						
Firm grey very sandy slightly gravelly SILT. Sand is fine to coarse. Gravel is fine to coarse subrounded.		0.80	78.20		AA181951	B	0.50-0.50		
Firm to stiff light grey mottled orange slightly sandy gravelly SILT with a low cobble content. Sand is fine to coarse. Gravel is fine to coarse subangular to subrounded. Cobbles are subrounded to rounded of limestone		1.80	77.20		AA181952	B	1.50-1.50		
End of Trial Pit at 1.80m									

Groundwater Conditions
Dry

Stability
Good

General Remarks
Pit footprint scanned using cable avoidance tool [CAT]. Pit backfilled with arisings. Soakaway test carried out in pit.

TRIAL PIT RECORD

REPORT NUMBER 24330

CONTRACT Halverstown

TRIAL PIT NO. SATP09
SHEET Sheet 1 of 1

LOGGED BY MB

CO-ORDINATES 686,700.38 E
719,648.21 N

DATE STARTED 11/10/2022
DATE COMPLETED 11/10/2022

GROUND LEVEL (m) 81.64

CLIENT
ENGINEER DOBA

EXCAVATION METHOD 7t Hitachi

RECEIVED: 13/08/2024

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0 TOPSOIL: Soft brown sandy CLAY with rootlets. Sand is fine to coarse.									
Stiff grey mottled orange sandy slightly gravelly SILT. Sand is fine to coarse. Gravel is fine to coarse subrounded.		0.30	81.34		AA185494	B	0.50-0.60		
1.0 Grey brown gravelly silty SAND with a low cobble content. Sand is fine to coarse. Gravel is fine to coarse subangular to subrounded. Cobbles are subrounded to rounded of limestone		0.80	80.84		AA185495	B	1.40-1.50		
Stiff brown sandy gravelly SILT. Sand is fine to coarse. Gravel is fine to coarse subangular to subrounded		1.80	79.84		AA185496	B	1.90-1.90		
2.0 End of Trial Pit at 2.00m		2.00	79.64						
3.0									

Groundwater Conditions
Dry

Stability
Good

General Remarks
Pit footprint scanned using cable avoidance tool [CAT]. Pit backfilled with arisings. Soakaway test carried out in pit.

TRIAL PIT RECORD

REPORT NUMBER 24330

CONTRACT Halverstown

TRIAL PIT NO. SATP10
SHEET Sheet 1 of 1

LOGGED BY MB

CO-ORDINATES 686,556.72 E
719,845.83 N

DATE STARTED 14/10/2022
DATE COMPLETED 14/10/2022

GROUND LEVEL (m) 83.88

CLIENT
ENGINEER DOBA

EXCAVATION METHOD 7t Hitachi

RECEIVED: 13/08/2024

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0 TOPSOIL: Soft brown slightly gravelly sandy silty CLAY. Sand is fine to coarse. Gravel is fine to medium subrounded.									
Stiff brown slightly gravelly sandy silty CLAY with a medium cobble content. Sand is fine to coarse. Gravel is fine to coarse subrounded. Cobbles are subrounded to rounded of limestone.		0.30	83.58						
1.0 Firm to stiff brown very sandy gravelly CLAY with a medium cobble content. Sand is fine to coarse. Gravel is fine to coarse subrounded. Cobbles are subrounded to rounded of limestone.		0.80	83.08						
End of Trial Pit at 1.60m		1.60	82.28						
2.0									
3.0									

Groundwater Conditions
Dry

Stability
Good

General Remarks
Pit footprint scanned using cable avoidance tool [CAT]. Pit backfilled with arisings.

TRIAL PIT RECORD

REPORT NUMBER 24330

CONTRACT Halverstown

TRIAL PIT NO. SATP11
SHEET Sheet 1 of 1

LOGGED BY MB

CO-ORDINATES 686,551.16 E
719,788.98 N

DATE STARTED 14/10/2022
DATE COMPLETED 14/10/2022

GROUND LEVEL (m) 84.24

CLIENT
ENGINEER DOBA

EXCAVATION METHOD 7t Hitachi

RECEIVED: 13/08/2024

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0 TOPSOIL: Soft brown sandy gravelly CLAY. Sand is fine to coarse. Gravel is fine to medium subrounded.									
Firm brown sandy gravelly silty CLAY with a medium cobble content. Sand is fine to coarse. Gravel is fine to coarse subrounded. Cobbles are subrounded to rounded of limestone.		0.40	83.84						
1.0 Firm brown very sandy gravelly CLAY with a medium cobble content. Sand is fine to coarse. Gravel is fine to coarse subrounded. Cobbles are subrounded to rounded of limestone.		1.20	83.04						
End of Trial Pit at 1.80m		1.80	82.44						
2.0									
3.0									

Groundwater Conditions
Dry

Stability
Good

General Remarks
Pit footprint scanned using cable avoidance tool [CAT]. Pit backfilled with arisings.

TRIAL PIT RECORD

REPORT NUMBER 24330

CONTRACT Halverstown

TRIAL PIT NO. SATP12
SHEET Sheet 1 of 1

LOGGED BY MB

CO-ORDINATES 686,504.63 E
719,684.44 N

DATE STARTED 10/10/2022
DATE COMPLETED 10/10/2022

GROUND LEVEL (m) 84.32

CLIENT
ENGINEER DOBA

EXCAVATION METHOD 7t Hitachi

RECEIVED: 13/08/2024

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
TOPSOIL: Soft brown sandy CLAY with rootlets. Sand is fine to coarse.									
Firm brown sandy silty CLAY. Sand is fine to coarse.		0.40	83.92		AA181955	B	0.70-0.70		
Grey brown gravelly silty SAND with a medium cobble content. Sand is fine to coarse. Gravel is fine to coarse subangular to subrounded. Cobbles are subrounded to rounded of limestone		1.20	83.12		AA181956	B	1.60-1.70		
End of Trial Pit at 2.20m		2.20	82.12						

Groundwater Conditions
Dry

Stability
Good

General Remarks
Pit footprint scanned using cable avoidance tool [CAT]. Pit backfilled with arisings. Soakaway test carried out in pit.

TRIAL PIT RECORD

REPORT NUMBER 24330

CONTRACT Halverstown

TRIAL PIT NO. SATP13
SHEET Sheet 1 of 1

LOGGED BY MB

CO-ORDINATES 686,248.39 E
719,737.26 N

DATE STARTED 14/10/2022
DATE COMPLETED 14/10/2022

GROUND LEVEL (m) 81.66

CLIENT
ENGINEER DOBA

EXCAVATION METHOD 7t Hitachi

RECEIVED: 13/08/2024

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
TOPSOIL: Soft brown slightly gravelly sandy silty CLAY. Sand is fine to coarse. Gravel is fine to medium subrounded.									
Stiff brown slightly gravelly sandy CLAY. Sand is fine to coarse. Gravel is fine to coarse subrounded.		0.30	81.36		AA181981	B	0.50-0.60		
Firm to stiff brown very sandy gravelly CLAY with a medium cobble content. Sand is fine to coarse. Gravel is fine to coarse subrounded.Cobbles are subrounded to rounded of limestone.		0.80	80.86						
End of Trial Pit at 1.50m		1.60	80.06		AA181982	B	1.50-1.60		

0.0
1.0
2.0
3.0

Groundwater Conditions
Dry

Stability
Good

General Remarks
Pit footprint scanned using cable avoidance tool [CAT]. Pit backfilled with arisings. Soakaway test carried out in pit.

Report No: 24330
Halverstown – Soakaway Test Photographs

RECEIVED: 13/08/2024

SA01 – 1 of 2



SA01 – 2 of 2



RECEIVED: 13/08/2024

SA02 – 1 of 2



SA02 – 2 of 2



RECEIVED: 13/08/2024

SA03 1 of 2



SA03 2 of 2



RECEIVED: 13/08/2024

SA04 1 of 2



SA04 2 of 2



Report No: 24330
Halverstown – Soakaway Test Photographs

RECEIVED: 13/08/2024

SA05 1 of 2



SA05 2 of 2



Report No: 24330
Halverstown – Soakaway Test Photographs

RECEIVED: 13/08/2024

SA06 1 of 2



SA06 2 of 2



Report No: 24330
Halverstown – Soakaway Test Photographs

RECEIVED: 13/08/2024

SA07 1 of 2



SA07 2 of 2



Report No: 24330
Halverstown – Soakaway Test Photographs

RECEIVED: 13/08/2024

SA08 1 of 2



SA08 2 of 2



Report No: 24330
Halverstown – Soakaway Test Photographs

RECEIVED: 13/08/2024

SA09 1 of 2



SA09 2 of 2



Report No: 24330
Halverstown – Soakaway Test Photographs

RECEIVED: 13/08/2024

SA10 1 of 2



SA10 2 of 2



RECEIVED: 13/08/2024

SA11 1 of 2



SA11 2 of 2



RECEIVED: 13/08/2024

SA12 1 of 2



SA12 2 of 2



RECEIVED: 13/08/2024

SA13 1 of 2



SA13 2 of 2



RECEIVED: 13/08/2024

Appendix 5A

Soakaway Test Records (BRE SA)

Soakaway Design f -value from field tests

(F2C) IGSL

Contract:	Halverstown	Contract No.	24330
Test No.	BRE SA01		
Client	DOBA		
Date:	28/04/2023		

RECEIVED: 13/09/2024

Summary of ground conditions

from	to	Description	Ground water
0.00	0.15	TOPSOIL: Firm light brown sandy clay with roolets.	
0.15	0.60	Firm light brown sandy slightly gravelly CLAY with occasional cobbles.	
0.60	1.00	Soft to firm brown slightly sandy gravelly CLAY with occ. cobbles.	water seepage at 2.8m
1.00	2.00	Firm to stiff brown gravelly CLAY with some cobbles, occ. boulders.	
2.00	2.40	Firm brown sandy very gravelly CLAY with many cobbles, some boulders.	
2.40	2.80	Grey sandy clayey GRAVEL with many cobbles and some boulders.	

Notes: For full strata description please see TP Logs.

Field Data

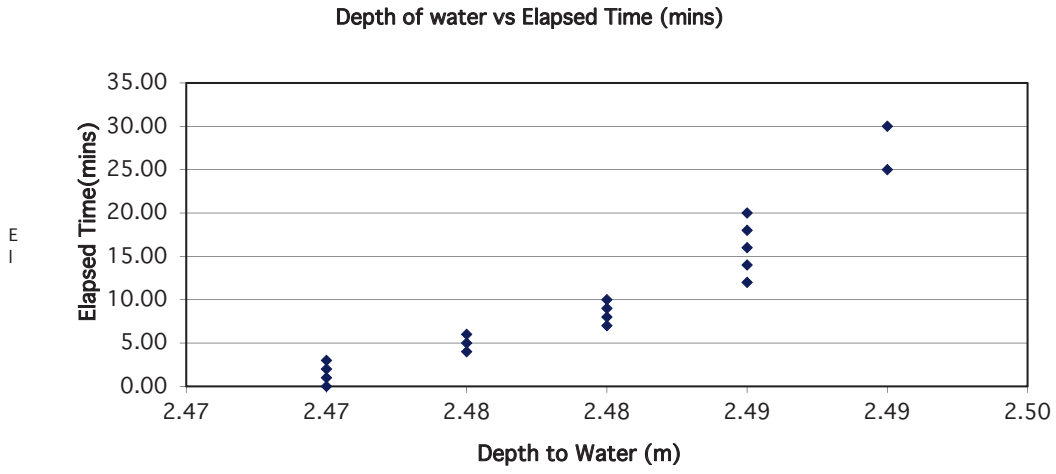
Depth to Water (m)	Elapsed Time (min)
2.47	0.00
2.47	1.00
2.47	2.00
2.47	3.00
2.48	4.00
2.48	5.00
2.48	6.00
2.48	7.00
2.48	8.00
2.48	9.00
2.48	10.00
2.49	12.00
2.49	14.00
2.49	16.00
2.49	18.00
2.49	20.00
2.49	25.00
2.49	30.00

Field Test

Depth of Pit (D)	2.80	m
Width of Pit (B)	0.70	m
Length of Pit (L)	2.20	m
Initial depth to Water =	2.47	m
Final depth to water =	2.49	m
Elapsed time (mins)=	30.00	
Top of permeable soil		m
Base of permeable soil		m
Base area=	1.54	m2
*Av. side area of permeable stratum over test perio	1.856	m2
Total Exposed area =	3.396	m2

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

f= 0.0003 m/min or 5.03861E-06 m/sec



Soakaway Design f -value from field tests (F2C) IGSL

Contract: Halverstown Contract No. 24330
Test No. BRE SA06_A
Client DOBA
Date: 26/04/2023

RECEIVED 13/08/2024

Summary of ground conditions

from	to	Description	Ground water
0.00	0.10	TOPSOIL: Soft brown sandy clay.	
0.10	0.65	Firm brown sandy CLAY.	
0.65	1.40	Firm to stiff sandy gravelly CLAY with low cobble content.	water seepage at 2.5m
1.40	2.25	Firm brown sandy gravelly CLAY with some cobbles and rare boulders.	
2.25	3.10	Stiff grey slightly sandy very gravelly CLAY with some cobbles.	
3.10	3.30	Very stiff grey sandy gravelly CALY with some cobbles occ. boulders.	

Notes: For full strata description please see TP Logs.
Due to the instability of the side walls, a new zero was set after six minutes (BRE SA6_A1).

Field Data

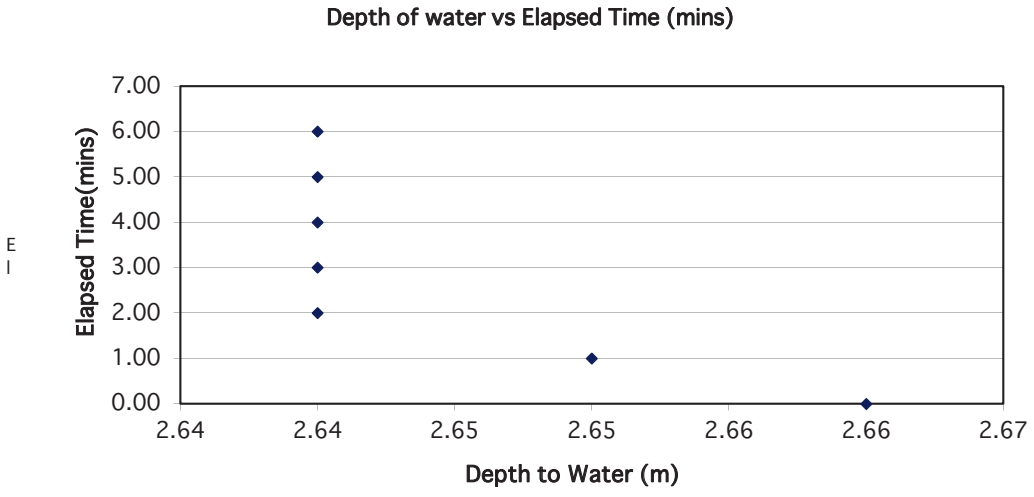
Depth to Water (m)	Elapsed Time (min)
2.66	0.00
2.65	1.00
2.64	2.00
2.64	3.00
2.64	4.00
2.64	5.00
2.64	6.00

Field Test

Depth of Pit (D)	3.30	m
Width of Pit (B)	0.70	m
Length of Pit (L)	2.40	m
Initial depth to Water =	2.66	m
Final depth to water =	2.64	m
Elapsed time (mins)=	6.00	
Top of permeable soil		m
Base of permeable soil		m
Base area=	1.68	m2
*Av. side area of permeable stratum over test perio	4.03	m2
Total Exposed area =	5.71	m2

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

f= -0.001 m/min or -1.635E-05 m/sec



Soakaway Design f -value from field tests (F2C) IGSL

Contract: Halverstown
Test No. BRE SA06_A1
Client DOBA
Date: 26/04/2023
Contract No. 24330

RECEIVED: 23/08/2024

Summary of ground conditions

from	to	Description	Ground water
0.00	0.10	TOPSOIL: Soft brown sandy clay.	
0.10	0.65	Firm brown sandy CLAY.	
0.65	1.40	Firm to stiff sandy gravelly CLAY with low cobble content.	water seepage at 2.5m
1.40	2.25	Firm brown sandy gravelly CLAY with some cobbles and rare boulders.	
2.25	3.10	Stiff grey slightly sandy very gravelly CLAY with some cobbles.	
3.10	3.30	Very stiff grey sandy gravelly CALY with some cobbles occ. boulders.	

Notes: For full strata description please see TP Logs.
Due to the instability of the side walls, a new zero was set after six minutes (BRE SA6_A1).

Field Data

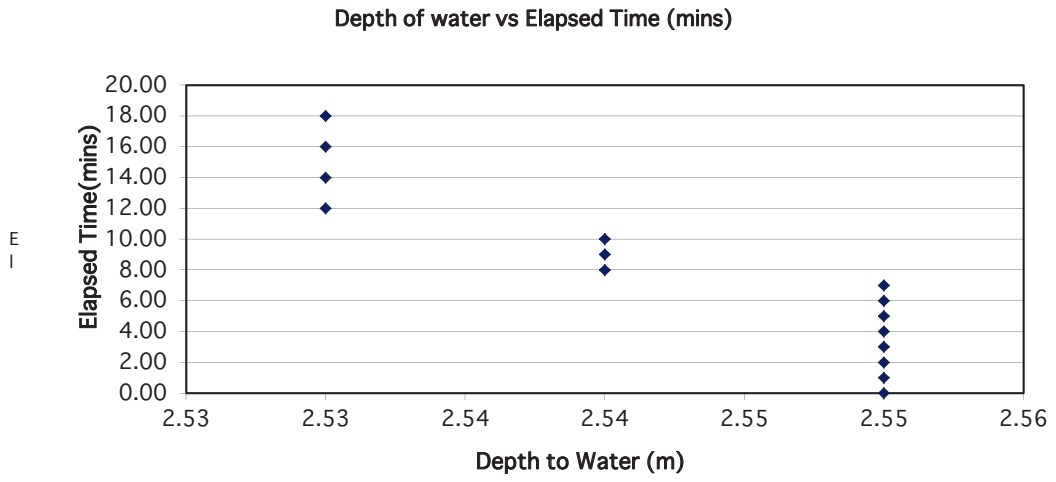
Depth to Water (m)	Elapsed Time (min)
2.55	0.00
2.55	1.00
2.55	2.00
2.55	3.00
2.55	4.00
2.55	5.00
2.55	6.00
2.55	7.00
2.54	8.00
2.54	9.00
2.54	10.00
2.53	12.00
2.53	14.00
2.53	16.00
2.53	18.00

Field Test

Depth of Pit (D)	3.30	m
Width of Pit (B)	0.70	m
Length of Pit (L)	2.40	m
Initial depth to Water =	2.55	m
Final depth to water =	2.53	m
Elapsed time (mins)=	18.00	
Top of permeable soil		m
Base of permeable soil		m
Base area=	1.68	m2
*Av. side area of permeable stratum over test period	4.712	m2
Total Exposed area =	6.392	m2

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

f= -0.0003 m/min or -4.867E-06 m/sec



TRIAL PIT RECORD

REPORT NUMBER 24330

CONTRACT	Halverstown	**TRIAL PIT NO.**	**BRE SA01**
		SHEET	Sheet 1 of 1
LOGGED BY	IC	**CO-ORDINATES**	686,287.89 E 719,888.50 N
		DATE STARTED	28/04/2023
		DATE COMPLETED	28/04/2023
CLIENT		**GROUND LEVEL (m)**	84.73
ENGINEER	DOBA	**EXCAVATION METHOD**	13t Tracked Excavator

RECEIVED: 15/08/2024

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0 TOPSOIL: Firm light brown sandy clay with roolets. Sand is fine to coarse.		0.15	84.58						
Firm light brown sandy slightly gravelly CLAY with occasional cobbles. Sand is fine to coarse. Gravel is fine to coarse rounded to subangular. Cobbles are rounded to subangular of limestone.								110	
					AA198241	B	0.50-0.50		
Soft to firm orangish brown mottled black slightly sandy gravelly CLAY with occasional cobbles. Sand is fine to coarse. Gravel is fine to coarse rounded to subangular. Cobbles are rounded to subangular of limestone.		0.60	84.13					95	
1.0 Firm to stiff light brown slightly sandy gravelly CLAY with medium cobble content and occasional boulders. Sand is fine to coarse. Gravel is fine to coarse rounded to subangular. Cobbles are rounded to subangular of limestone. Boulders are subrounded of limestone.		1.00	83.73						
					AA198242	B	1.50-1.50		
2.0 Firm greyish brown sandy very gravelly CLAY with high cobble and medium boulder content. Sand is fine to coarse. Gravel is fine to coarse rounded to subangular. Cobbles are rounded to subangular of limestone. Boulders are subrounded of limestone.		2.00	82.73						
Brownish grey sandy clayey GRAVEL with high cobble and medium boulder content. Sand is fine to coarse. Gravel is fine to coarse rounded to subangular. Cobbles are rounded to subangular of limestone. Boulders are subrounded of limestone (up to 500mm).		2.40	82.33						
					AA198243	B	2.50-2.50		
		2.80	81.93	(Seepage)	AA198244	B	2.80-2.80		
End of Trial Pit at 2.80m									
3.0									

Groundwater Conditions
Seepage at 2.80m

Stability
Unstable from 2.00m

General Remarks
Pit footprint scanned using cable avoidance tool [CAT]. Shear vanes (set of three) carried out at 0.30m & 0.70m bgl. Soakaway test undertaken in pit (BRE SA01). Pit backfilled with arisings.

TRIAL PIT RECORD

REPORT NUMBER 24330

CONTRACT	Halverstown	**TRIAL PIT NO.**	**BRE SA02**
		SHEET	Sheet 1 of 1
LOGGED BY	IC	**CO-ORDINATES**	686,134.44 E 719,803.48 N
		DATE STARTED	28/04/2023
		DATE COMPLETED	28/04/2023
CLIENT		**GROUND LEVEL (m)**	82.23
ENGINEER	DOBA	**EXCAVATION METHOD**	13t Tracked Excavator

RECEIVED: 15/08/2024

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0 TOPSOIL: Firm light brown sandy clay with roolets. Sand is fine to coarse.		0.15	82.08					80	
Firm light brown sandy slightly gravelly CLAY with occasional cobbles. Sand is fine to coarse. Gravel is fine to coarse rounded to subangular. Cobbles are rounded to subangular of limestone.		0.50	81.73		AA198245	B	0.50-0.50	90	
Firm orangish brown sandy gravelly CLAY with occasional cobbles. Sand is fine to coarse. Gravel is fine to coarse rounded to subangular. Cobbles are rounded to subangular of limestone.									
1.0									
Firm to stiff light brown slightly sandy very gravelly CLAY with medium cobble content and occasional boulders. Sand is fine to coarse. Gravel is fine to coarse rounded to subangular. Cobbles are rounded to subangular of limestone. Boulders are subrounded of limestone.		1.30	80.93		AA198246	B	1.50-1.50		
2.0					AA198247	B	2.30-2.30		
TP terminated due to rapid water flow End of Trial Pit at 2.60m		2.60	79.63	1 (Rapid)					
3.0									

Groundwater Conditions
Rapid water flow at 2.60m (rising 150mm after 14min)

Stability
Good

General Remarks
Pit footprint scanned using cable avoidance tool [CAT]. Shear vanes (set of three) carried out at 0.30m bgl. Pit backfilled with arisings.

TRIAL PIT RECORD

REPORT NUMBER 24330

CONTRACT	Halverstown	**TRIAL PIT NO.**	**BRE SA03**
		SHEET	Sheet 1 of 1
LOGGED BY	IC	**CO-ORDINATES**	686,050.77 E 719,689.75 N
		DATE STARTED	28/04/2023
		DATE COMPLETED	28/04/2023
CLIENT		**GROUND LEVEL (m)**	79.68
ENGINEER	DOBA	**EXCAVATION METHOD**	13t Tracked Excavator

RECEIVED: 15/08/2024

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
TOPSOIL: Firm brown sandy clay with roolets. Sand is fine to coarse.		0.15	79.53						
Firm brown sandy slightly gravelly CLAY with occasional cobbles. Sand is fine to coarse. Gravel is fine to coarse rounded to subangular. Cobbles are rounded to subangular of limestone.		0.30	79.38					87	
Brownish grey very sandy GRAVEL with high cobble and medium boulder content, occasional pockets of clay. Sand is fine to coarse. Gravel is fine to coarse rounded to subangular. Cobbles are rounded to subangular of limestone. Boulders are subrounded of limestone. (Possible gravelly sand).					AA198249	B	0.50-0.50		
Firm yellowish grey sandy very gravelly CLAYwith high cobble and medium boulder content, frequent pockets of sand. Sand is fine to coarse. Gravel is fine to coarse rounded to subangular. Cobbles are rounded to subangular of limestone.		1.10	78.58	1 (Seepage)	AA198248	B	1.50-1.50		
Grey sandy clayey GRAVEL with high cobble and medium boulder content. Sand is fine to coarse. Gravel is fine to coarse rounded to subangular. Cobbles are rounded to subangular of limestone. Boulders are subrounded of limestone.		2.00	77.68	2 (Rapid)	AA198250	B	2.30-2.30		
TP terminated due to rapid water flow End of Trial Pit at 2.50m		2.50	77.18						

Groundwater Conditions
Seepage at 1.40, rapid water flow at 2.40m (rising 150mm in 4min)

Stability
Unstable, sidewall collapse from 0.40m

General Remarks
Pit footprint scanned using cable avoidance tool [CAT]. Shear vanes (set of three) carried out at 0.30m & 0.70m bgl. Pit backfilled with arisings.

TRIAL PIT RECORD

REPORT NUMBER 24330

CONTRACT	Halverstown	**TRIAL PIT NO.**	**BRE SA04**
		SHEET	Sheet 1 of 1
LOGGED BY	IC	**CO-ORDINATES**	686,270.92 E 719,493.31 N
		DATE STARTED	28/04/2023
		DATE COMPLETED	28/04/2023
CLIENT		**GROUND LEVEL (m)**	78.31
ENGINEER	DOBA	**EXCAVATION METHOD**	13t Tracked Excavator

RECEIVED: 15/08/2024

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0 TOPSOIL: Firm brown sandy clay with roolets. Sand is fine to coarse.		0.15	78.16						
Firm brown sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is fine to coarse rounded to subangular.		0.30	78.01					90	
Grey sandy slightly clayey GRAVEL with high cobble content, some pockets of clay. Sand is fine to coarse. Gravel is fine to coarse rounded to subangular. Cobbles are rounded to subangular of limestone.				1 (Seepage)	AA198175	B	0.50-0.50	60	
1.0 Soft to firm dark grey slightly sandy very gravelly CLAY with high cobble content and occasional boulder. Sand is fine to coarse. Gravel is fine to coarse rounded to subangular. Cobbles are rounded to subangular of limestone. Boulders are subrounded of limestone.		1.20	77.11	2 (Seepage)					
				3 (Seepage)	AA198177	B	1.50-1.50		
2.0					AA198178	B	2.50-2.50		
3.0 End of Trial Pit at 3.00m		3.00	75.31						

Groundwater Conditions
Multiple seepages at 0.70m, 1.20m and 1.50m

Stability
Unstable, sidewall collapse from 0.70m

General Remarks
Pit footprint scanned using cable avoidance tool [CAT]. Shear vanes (set of three) carried out at 0.30m & 0.70m bgl. Pit backfilled with arisings.

TRIAL PIT RECORD

REPORT NUMBER 24330

CONTRACT	Halverstown	**TRIAL PIT NO.**	**BRE SA05**
		SHEET	Sheet 1 of 1
LOGGED BY	IC	**CO-ORDINATES**	686,525.81 E 719,367.00 N
		DATE STARTED	26/04/2023
		DATE COMPLETED	26/04/2023
CLIENT		**GROUND LEVEL (m)**	78.84
ENGINEER	DOBA	**EXCAVATION METHOD**	13t Tracked Excavator

RECEIVED: 15/08/2024

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
TOPSOIL: Firm brown sandy clay with roolets. Sand is fine to coarse.		0.15	78.69						
Firm brown sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is fine to coarse rounded to subangular.		0.40	78.44					68	
Brownish grey slightly gravelly slightly clayey SAND with occasional cobbles. Sand is fine to coarse. Gravel is fine to coarse rounded to subangular. Cobbles are rounded to subangular of limestone		0.80	78.04		AA193198	B	0.70-0.70		
Greyish brown SAND with occasional cobbles. Sand is fine to coarse. Cobbles are rounded to subangular of limestone.					AA193199	B	1.40-1.40		
TP terminated due to major instability End of Trial Pit at 1.70m		1.70	77.14	(Moderate)					

Groundwater Conditions
Moderate flow at 1.70m

Stability
Unstable from 0.60m

General Remarks
Pit footprint scanned using cable avoidance tool [CAT]. Shear vanes (set of three) carried out at 0.30m bgl. Pit backfilled with arisings.

TRIAL PIT RECORD

REPORT NUMBER 24330

CONTRACT	Halverstown	**TRIAL PIT NO.**	**BRE SA06**
		SHEET	Sheet 1 of 1
LOGGED BY	IC	**CO-ORDINATES**	686,644.85 E 719,561.07 N
		DATE STARTED	26/04/2023
		DATE COMPLETED	26/04/2023
CLIENT		**GROUND LEVEL (m)**	82.55
ENGINEER	DOBA	**EXCAVATION METHOD**	13t Tracked Excavator

RECEIVED: 15/08/2024

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
TOPSOIL: Soft brown sandy clay with roolets. Sand is fine to coarse.		0.10	82.45						
Firm brown sandy CLAY. Sand is fine to coarse.								78	
					AA198223	B	0.50-0.50		
Firm to stiff sandy gravelly CLAY with low cobble content. Sand is fine to medium. Gravel is fine to medium subrounded to subangular.		0.65	81.90					97	
					AA198224	B	0.90-0.90		
Soft to firm light brown mottled golden brown and grey sandy gravelly CLAY with occasional pockets of sand, medium cobble content and rare boulders. Sand is fine to coarse. Gravel is fine to medium subrounded to subangular. Cobbles are rounded to subangular of limestone. Boulders are subrounded of limestone (up to 300mm).		1.40	81.15						
					AA198225	B	1.70-1.70		
Stiff occasionally very stiff grey slightly sandy very gravelly CLAY with medium cobble content. Sand is fine to coarse. Gravel is fine to coarse subrounded to subangular. Cobbles are rounded to subangular of limestone and mudstone.		2.25	80.30	1 (Seepage)					
					AA198226	B	2.30-2.30		
Very stiff dark grey slightly sandy gravelly CLAY with medium cobble content and occasional boulders. Sand is fine to coarse. Gravel is fine to coarse subangular to angular. Cobbles are subangular of limestone. Boulder are subrounded of limestone (up to 500mm).		3.10	79.45						
					AA198227	B	3.20-3.20		
End of Trial Pit at 3.30m		3.30	79.25						

Groundwater Conditions
Seepage at 2.50m

Stability
Slightly unstable from 1.25m

General Remarks
Pit footprint scanned using cable avoidance tool [CAT]. Shear vanes (set of three) carried out at 0.30m & 0.90m bgl. Soakaway tests (BRE SA01) carried out in pit. Pit backfilled with arisings.

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BRE SA01 – 1 of 5



BRE SA01 – 2 of 5



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BRE SA01 – 3 of 5



BRE SA01 – 4 of 5



BRE SA01 – 5 of 5

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BRE SA02 – 1 of 4



BRE SA02 – 2 of 4



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BRE SA02 – 3 of 4



BRE SA02 – 4 of 4



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BRE SA03 – 1 of 5



BRE SA03 – 2 of 5



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BRE SA03 – 3 of 5



BRE SA03 – 4 of 5



BRE SA03 – 5 of 5



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BRE SA04 – 1 of 4



BRE SA04 – 2 of 4



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BRE SA04 – 3 of 4



BRE SA04 – 4 of 4



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BRE SA05 – 1 of 5



BRE SA05 – 2 of 5



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BRE SA05 – 3 of 5



BRE SA05 – 4 of 5



BRE SA05 – 5 of 5

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BRE SA06 – 1 of 4



BRE SA06 – 2 of 4



BRE SA06 – 3 of 4

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BRE SA06 – 4 of 4



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Appendix 6

Resistivity Survey

6659d-005-Report

RECEIVED: 13/08/2024

Halverstown Data Centre

Naas, Co. Kildare

Electrical Resistivity Testing

Report Status: Draft

MGX Project Number: 6659

MGX File Ref: 6659d-005.doc

21st of November 2022

Confidential Report To:

IGSL
Unit F
M7 Business Park
Newhall
Naas, Co. Kildare

Report submitted by:
Minerex Geophysics Limited

Unit F4, Maynooth Business Campus
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Hartmut Krahn (Senior Geophysicist)

Minerex Geophysics Limited

Subsurface Geophysical Investigations

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List of Tables, Maps and Figures:

Title	Pages	Document Reference
Table 1: VES Ground Resistivity Testing Results	4 x A4	6659d-Tab1.xls
Table 2: Soil Resistivity Testing Results	4 x A4	6659d-Tab2.xls
Map 1: Location Map	1 x A3	6659d_Map.dwg
Figure 1: Resistivity Testing using the Wenner Array	In Text	In Text

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1. INTRODUCTION

1.1 Background

Minerex Geophysics Ltd. (MGX) carried out Resistivity Testing using the Wenner electrode configuration with two different methods for the Halverstown Data Center in Naas, Co. Kildare. The survey was commissioned by IGSL who are the main ground investigation contractor for the project. Eight deep vertical electrical sounding (VES) and 18 shallow soil resistivity (SR) tests were carried out. The coordinate system used on this site was Irish Transverse Mercator (ITM).

The test sequence was conducted as part of the overall ground investigation programme for the development of the data center. The purpose of the survey was to provide information to be used in the design and construction phases of the project.

These tests are conducted in order to increase the knowledge of the resistivity of the soil and rock and to assist with the design and installation of earthing systems and underground cabling systems. Soil resistivity depends on a number of factors like soil type, mineral content, temperature, moisture, salt content and compaction.

The methodology specified here encompasses onsite in–situ measurements and the presentation of the results, but does not include the design of the earthing or cabling system.

1.2 Objectives

The main objective of the geophysical survey was:

- To determine the electrical resistivity at a range of depths for each location

1.3 Site Description

The site is shown on Map 1 and the area consists of unused agricultural land.

1.4 Report

This report includes a location map of the resistivity testing locations and two tables of results. The client provided maps of the site and the digital versions were used as the background map in this report.

The indirect nature and the non-invasive survey methods must be taken into account when considering the results of this survey and Minerex Geophysics Limited, while using appropriate practice to execute the measurements and to present the data, give no guarantees in relation to the existing subsurface.

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2. TESTING ON SITE

2.1 Methodology

The methodology consisted of using Vertical Electrical Sounding (VES) and Soil Resistivity (SR) in the Wenner electrode configuration at a range of electrode spacing agreed with the client prior to the fieldwork. The increase in the electrode spacing leads to an increase in the depth.

Two different electrical resistivity tests were used:

1 VES - Vertical Electrical Sounding – Deep

Objective: Determine the resistivity for ground, soil and rock to a depth around 50m below ground level (bgl) and also as two tests in two directions (check for anisotropy).

Purpose: This test is generally done to deliver values for the design of an earthing or grounding system

Test Method: Four probe array in Wenner electrode configuration with expanding electrode spacing

Spacings: 1, 2, 3, 4, 5, 7, 10, 15, 20, 30, 40 and 50m

Directions: There are two tests done at each location in two orthogonal directions

Instrument: Tigre Resistivity Meter (high power)

Comment: This test includes the 'Soil Resistivity Test – Shallow' intrinsically

2 SR - Soil Resistivity Test – Shallow

Objective: Determine the shallow soil around 1 – 3m bgl. In one direction

Purpose: This test is generally done to deliver values for the design of the cable system

Test Method: Four probe array in Wenner electrode configuration with three electrode spacings

Spacings: 1, 2 and 3m

Directions: The test is done in one direction

Instrument: Tigre or Megger Resistivity Meter

2.2 Measurements

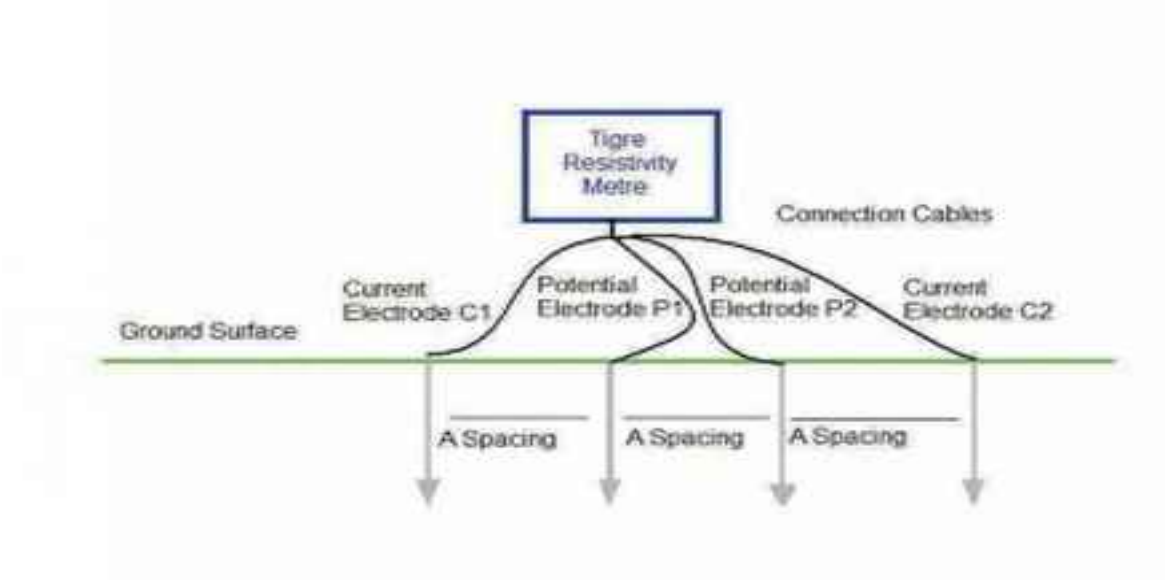
Eight Vertical Electrical Soundings were conducted at four locations on the site.

All measurements were acquired in accordance with Minerex Geophysics Ltd. procedures, protocols, QC procedures and in compliance with appropriate IEEE and British Standards. The relevant IEEE standards are 81-1983 part 1 – Guide to Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of Ground Systems (ANSI/IEEE Std 81-1983) for the resistivity testing (IEEE 1983).

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The Vertical Electrical Sounding (VES) and the soil resistivity (SR) was conducted using a Tigre Resistivity Meter with variable current input, a suite of four cables and four stainless steel electrodes. This 'four probe array' is called a Wenner Array as the spacing (A) between the four electrodes was the same for each measurement. At each electrode spacing, the test resistance in Ohms (Ω) was recorded in a detailed field sheet for later office-based computing of ground resistivities.

Figure 1: Resistivity Testing using the Wenner Array.



2.3 Testing Equipment

All equipment used was portable and intrinsically safe. The methods were non-destructive and non-intrusive. Only low voltage power requirements of 12 Volts or less were needed on site and were supplied by batteries. The following equipment was used:

- An ALLIED Tigre Resistivity Meter
- A suite of cables with 4 reels and distance marks for resistivity readings
- Stainless Steel Electrodes
- Measuring tapes
- Handheld GPS

Equipment checks and QC procedures were applied prior to the commencement of data acquisition.

2.4 Site Work

The data acquisition was carried out on the 9th – 10th of November 2022 in good weather conditions. Health and safety standards were adhered to at all times.

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3. RESULTS

The recorded test resistance in Ω allows for the calculation of the resistivity value in Ωm for each individual electrode spacing.

The resistivity at a given electrode spacing was calculated using the following formula:

$\rho = 2*\pi*A*R$

Where;

ρ = Resistivity in Ωm

π = Pi = 3.141592

A = electrode spacing in m

R = Measured Resistance value in Ω

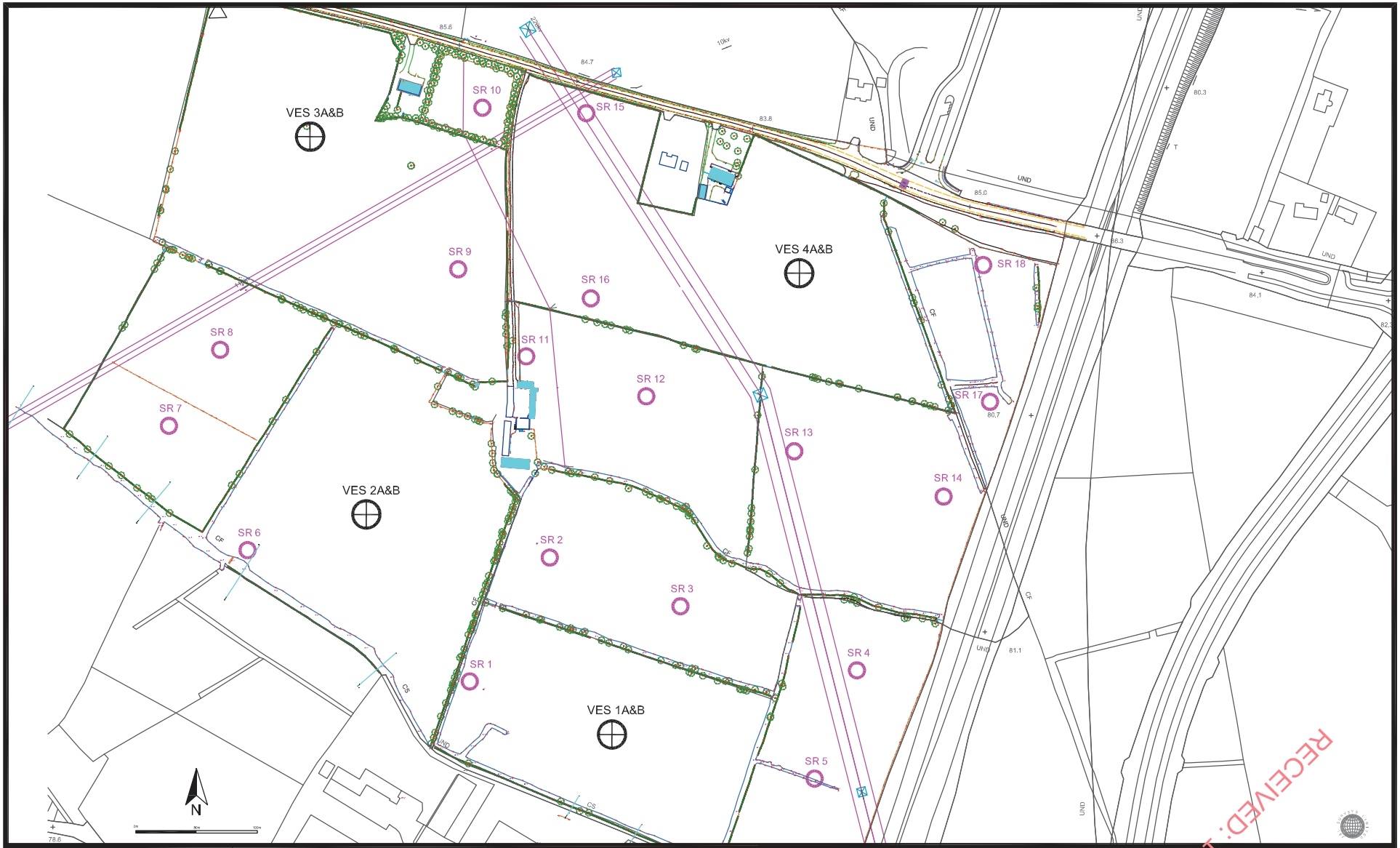
The survey results with electrode spacing, resistances and resistivities are displayed in Table 1 for the VES and in Table 2 for the SR.

The resistivity values recorded at given electrode spacing can be allocated to approximate depth values. For the Wenner array the average resistivity taken at a particular A-spacing is equal to the average resistivity for a depth range between the ground surface and the A-spacing. Therefore, the average resistivity value recorded in the last column of Table 1 and 2 corresponds to the depth range between 0m bgl and the value in the first column. The depth mentioned in this report is given for visualisation purpose but may change when using the resistivity values in the design of the earthing system.

4. REFERENCES

1. **IEEE, 1983.** ANSI/IEEE Std. 83-1983. IEEE Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potential of a Ground System. The Institute of Electrical and Electronics Engineers Inc.

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CLIENT	IGSL
PROJECT	Halverstown Data Centre Electrical Resistivity Testing
TITLE	Map 1: Location Map

SCALE:	1:3000 @ A3
PROJECT:	6659
DRAWN:	JS
DATE:	11/11/2022
MGX FILE:	6659d_Map.dwg
STATUS:	Draft

LEGEND:

⊕ VES 1 — Vertical Electrical Sounding In Wenner Electrode Configuration

○ SR 1 — Soil Resistivity Testing in Wenner Electrode Configuration with A = 1, 2 and 3m

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Table 1: VES Ground Resistivity Testing Results

Location:	Direction:	**ITM** Coordinates East:	**ITM** Coordinates North:	Elevation:	Date:
VES 1A	**SW-NE**	**686430.5**	**719396.9**	**78.3 mOD**	**09/11/2022**
Wenner Electrode Spacing a (m)	Inner Electrode P Distance to Centre (m)	Outer Electrode C Distance to Centre (m)	Total Distance (m)	Measured Resistance (Ω)	Apparent Resistivity (Ωm)
1	0.5	1.5	3	10.38	65
2	1	3	6	5.718	72
3	1.5	4.5	9	4.165	79
4	2	6	12	3.287	83
5	2.5	7.5	15	3.106	98
7	3.5	10.5	21	2.743	121
10	5	15	30	2.339	147
15	7.5	22.5	45	2.057	194
20	10	30	60	1.956	246
30	15	45	90	1.845	348
40	20	60	120	1.583	398
50	25	75	150	1.432	450

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Table 1: VES Ground Resistivity Testing Results

Location:	Direction:	**ITM** Coordinates East:	**ITM** Coordinates North:	Elevation:	Date:
VES 1B	**NW-SE**	**686430.5**	**719396.9**	**78.3 mOD**	**09/11/2022**
Wenner Electrode Spacing a (m)	Inner Electrode P Distance to Centre (m)	Outer Electrode C Distance to Centre (m)	Total Distance (m)	Measured Resistance (Ω)	Apparent Resistivity (Ωm)
1	0.5	1.5	3	11.79	74
2	1	3	6	5.254	66
3	1.5	4.5	9	4.215	79
4	2	6	12	3.66	92
5	2.5	7.5	15	3.106	98
7	3.5	10.5	21	2.622	115
10	5	15	30	2.339	147
15	7.5	22.5	45	2.198	207
20	10	30	60	2.148	270
30	15	45	90	1.95	368
40	20	60	120	1.625	408
50	25	75	150	1.411	443

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Table 1: VES Ground Resistivity Testing Results

Location:	Direction:	**ITM** Coordinates East:	**ITM** Coordinates North:	Elevation:	Date:
VES 2A	**SW-NE**	**686228.8**	**719577.5**	**79.8 mOD**	**09/11/2022**
Wenner Electrode Spacing a (m)	Inner Electrode P Distance to Centre (m)	Outer Electrode C Distance to Centre (m)	Total Distance (m)	Measured Resistance (Ω)	Apparent Resistivity (Ωm)
1	0.5	1.5	3	16.03	101
2	1	3	6	9.308	117
3	1.5	4.5	9	7.14	135
4	2	6	12	5.849	147
5	2.5	7.5	15	5.123	161
7	3.5	10.5	21	4.316	190
10	5	15	30	3.67	231
15	7.5	22.5	45	3.156	297
20	10	30	60	2.833	356
30	15	45	90	2.559	482
40	20	60	120	2.289	575
50	25	75	150	2.017	634

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Table 1: VES Ground Resistivity Testing Results

Location:	Direction:	**ITM** Coordinates East:	**ITM** Coordinates North:	Elevation:	Date:
VES 2B	**NW-SE**	**686228.8**	**719577.5**	**79.8 mOD**	**09/11/2022**
Wenner Electrode Spacing a (m)	Inner Electrode P Distance to Centre (m)	Outer Electrode C Distance to Centre (m)	Total Distance (m)	Measured Resistance (Ω)	Apparent Resistivity (Ωm)
1	0.5	1.5	3	16.74	105
2	1	3	6	9.368	118
3	1.5	4.5	9	7.21	136
4	2	6	12	5.899	148
5	2.5	7.5	15	5.123	161
7	3.5	10.5	21	4.235	186
10	5	15	30	3.66	230
15	7.5	22.5	45	2.874	271
20	10	30	60	2.561	322
30	15	45	90	2.208	416
40	20	60	120	1.919	482
50	25	75	150	1.734	545

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Table 1: VES Ground Resistivity Testing Results

Location:	Direction:	**ITM** Coordinates East:	**ITM** Coordinates North:	Elevation:	Date:
VES 3A	**NW-SE**	**686182.6**	**719887.4**	**84.1 mOD**	**09/11/2022**
Wenner Electrode Spacing a (m)	Inner Electrode P Distance to Centre (m)	Outer Electrode C Distance to Centre (m)	Total Distance (m)	Measured Resistance (Ω)	Apparent Resistivity (Ωm)
1	0.5	1.5	3	26.01	163
2	1	3	6	10.08	127
3	1.5	4.5	9	7.048	133
4	2	6	12	6.192	156
5	2.5	7.5	15	5.375	169
7	3.5	10.5	21	4.175	184
10	5	15	30	3.096	195
15	7.5	22.5	45	2.087	197
20	10	30	60	1.653	208
30	15	45	90	1.28	241
40	20	60	120	1.21	304
50	25	75	150	1.159	364

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Table 1: VES Ground Resistivity Testing Results

Location:	Direction:	**ITM** Coordinates East:	**ITM** Coordinates North:	Elevation:	Date:
VES 3B	**SW-NE**	**686182.6**	**719887.4**	**84.1 mOD**	**09/11/2022**
Wenner Electrode Spacing a (m)	Inner Electrode P Distance to Centre (m)	Outer Electrode C Distance to Centre (m)	Total Distance (m)	Measured Resistance (Ω)	Apparent Resistivity (Ωm)
1	0.5	1.5	3	25.29	159
2	1	3	6	10.38	130
3	1.5	4.5	9	6.815	128
4	2	6	12	5.546	139
5	2.5	7.5	15	4.921	155
7	3.5	10.5	21	4.134	182
10	5	15	30	3.136	197
15	7.5	22.5	45	2.168	204
20	10	30	60	1.593	200
30	15	45	90	1.23	232
40	20	60	120	1.149	289
50	25	75	150	1.139	358

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Table 1: VES Ground Resistivity Testing Results

Location:	Direction:	**ITM** Coordinates East:	**ITM** Coordinates North:	Elevation:	Date:
VES 4A	**S-N**	**686584.2**	**719775.4**	**83.7 mOD**	**10/11/2022**
Wenner Electrode Spacing a (m)	Inner Electrode P Distance to Centre (m)	Outer Electrode C Distance to Centre (m)	Total Distance (m)	Measured Resistance (Ω)	Apparent Resistivity (Ωm)
1	0.5	1.5	3	16.14	101
2	1	3	6	10.28	129
3	1.5	4.5	9	7.5	141
4	2	6	12	6.373	160
5	2.5	7.5	15	5.38	169
7	3.5	10.5	21	4.397	193
10	5	15	30	3.72	234
15	7.5	22.5	45	3.108	293
20	10	30	60	2.64	332
30	15	45	90	2.117	399
40	20	60	120	1.93	485
50	25	75	150	1.835	576

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Table 1: VES Ground Resistivity Testing Results

Location:	Direction:	**ITM** Coordinates East:	**ITM** Coordinates North:	Elevation:	Date:
VES 4B	**E-W**	**686584.2**	**719775.4**	**83.7 mOD**	**10/11/2022**
Wenner Electrode Spacing a (m)	Inner Electrode P Distance to Centre (m)	Outer Electrode C Distance to Centre (m)	Total Distance (m)	Measured Resistance (Ω)	Apparent Resistivity (Ωm)
1	0.5	1.5	3	17.44	110
2	1	3	6	10.8	136
3	1.5	4.5	9	7.957	150
4	2	6	12	6.55	165
5	2.5	7.5	15	5.677	178
7	3.5	10.5	21	4.42	194
10	5	15	30	3.64	229
15	7.5	22.5	45	3.065	289
20	10	30	60	2.62	329
30	15	45	90	2.218	418
40	20	60	120	1.936	487
50	25	75	150	1.79	562

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Table 2: Soil Resistivity Testing Results

Test Name:	Elevation:	**ITM** Coordinates East:	**ITM** Coordinates North:	Date:	Instrument:
SR1	**77.3**	**686313.7**	**719440.5**	**09/11/2022**	**Tigre**
Wenner Electrode Spacing a (m)	Inner Electrode P Distance to Centre (m)	Outer Electrode C Distance to Centre (m)	Total Distance (m)	Measured Resistance (Ω)	Apparent Resistivity (Ωm)
1	0.5	1.5	3	9.328	59
2	1	3	6	5.506	69
3	1.5	4.5	9	4.044	76
Test Name:	Elevation:	**ITM** Coordinates East:	**ITM** Coordinates North:	Date:	Instrument:
SR2	**80.2**	**686379.4**	**719542.2**	**09/11/2022**	**Tigre**
Wenner Electrode Spacing a (m)	Inner Electrode P Distance to Centre (m)	Outer Electrode C Distance to Centre (m)	Total Distance (m)	Measured Resistance (Ω)	Apparent Resistivity (Ωm)
1	0.5	1.5	3	17.54	110
2	1	3	6	7.866	99
3	1.5	4.5	9	5.748	108
Test Name:	Elevation:	**ITM** Coordinates East:	**ITM** Coordinates North:	Date:	Instrument:
SR3	**80.2**	**686486.7**	**719502.1**	**09/11/2022**	**Tigre**
Wenner Electrode Spacing a (m)	Inner Electrode P Distance to Centre (m)	Outer Electrode C Distance to Centre (m)	Total Distance (m)	Measured Resistance (Ω)	Apparent Resistivity (Ωm)
1	0.5	1.5	3	18.35	115
2	1	3	6	9.681	122
3	1.5	4.5	9	6.363	120
Test Name:	Elevation:	**ITM** Coordinates East:	**ITM** Coordinates North:	Date:	Instrument:
SR4	**80**	**686631.5**	**719449.5**	**09/11/2022**	**Tigre**
Wenner Electrode Spacing a (m)	Inner Electrode P Distance to Centre (m)	Outer Electrode C Distance to Centre (m)	Total Distance (m)	Measured Resistance (Ω)	Apparent Resistivity (Ωm)
1	0.5	1.5	3	15.02	94
2	1	3	6	9.293	117
3	1.5	4.5	9	6.595	124

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Table 2: Soil Resistivity Testing Results

Test Name:	Elevation:	**ITM** Coordinates East:	**ITM** Coordinates North:	Date:	Instrument:
SR5	**79.1**	**686596.8**	**719360.7**	**09/11/2022**	**Tigre**
Wenner Electrode Spacing a (m)	Inner Electrode P Distance to Centre (m)	Outer Electrode C Distance to Centre (m)	Total Distance (m)	Measured Resistance (Ω)	Apparent Resistivity (Ωm)
1	0.5	1.5	3	13.21	83
2	1	3	6	6.686	84
3	1.5	4.5	9	4.366	82
Test Name:	Elevation:	**ITM** Coordinates East:	**ITM** Coordinates North:	Date:	Instrument:
SR6	**77.8**	**686131.3**	**719548.2**	**09/11/2022**	**Tigre**
Wenner Electrode Spacing a (m)	Inner Electrode P Distance to Centre (m)	Outer Electrode C Distance to Centre (m)	Total Distance (m)	Measured Resistance (Ω)	Apparent Resistivity (Ωm)
1	0.5	1.5	3	20.27	127
2	1	3	6	11.69	147
3	1.5	4.5	9	8.531	161
Test Name:	Elevation:	**ITM** Coordinates East:	**ITM** Coordinates North:	Date:	Instrument:
SR7	**79.3**	**686066.8**	**719650.2**	**09/11/2022**	**Tigre**
Wenner Electrode Spacing a (m)	Inner Electrode P Distance to Centre (m)	Outer Electrode C Distance to Centre (m)	Total Distance (m)	Measured Resistance (Ω)	Apparent Resistivity (Ωm)
1	0.5	1.5	3	17.74	111
2	1	3	6	11.88	149
3	1.5	4.5	9	8.884	167
Test Name:	Elevation:	**ITM** Coordinates East:	**ITM** Coordinates North:	Date:	Instrument:
SR8	**81**	**686108.8**	**719712.6**	**09/11/2022**	**Tigre**
Wenner Electrode Spacing a (m)	Inner Electrode P Distance to Centre (m)	Outer Electrode C Distance to Centre (m)	Total Distance (m)	Measured Resistance (Ω)	Apparent Resistivity (Ωm)
1	0.5	1.5	3	15.93	100
2	1	3	6	9.651	121
3	1.5	4.5	9	7.362	139

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Table 2: Soil Resistivity Testing Results

Test Name:	Elevation:	**ITM** Coordinates East:	**ITM** Coordinates North:	Date:	Instrument:
SR9	**83.2**	**686304.3**	**719778.6**	**09/11/2022**	**Tigre**
Wenner Electrode Spacing a (m)	Inner Electrode P Distance to Centre (m)	Outer Electrode C Distance to Centre (m)	Total Distance (m)	Measured Resistance (Ω)	Apparent Resistivity (Ωm)
1	0.5	1.5	3	24.7	155
2	1	3	6	12.2	153
3	1.5	4.5	9	8.632	163
Test Name:	Elevation:	**ITM** Coordinates East:	**ITM** Coordinates North:	Date:	Instrument:
SR10	**85**	**686324.1**	**719911.2**	**09/11/2022**	**Tigre**
Wenner Electrode Spacing a (m)	Inner Electrode P Distance to Centre (m)	Outer Electrode C Distance to Centre (m)	Total Distance (m)	Measured Resistance (Ω)	Apparent Resistivity (Ωm)
1	0.5	1.5	3	21.73	137
2	1	3	6	11.39	143
3	1.5	4.5	9	9.389	177
Test Name:	Elevation:	**ITM** Coordinates East:	**ITM** Coordinates North:	Date:	Instrument:
SR11	**82.9**	**686360.1**	**719707.1**	**10/11/2022**	**Tigre**
Wenner Electrode Spacing a (m)	Inner Electrode P Distance to Centre (m)	Outer Electrode C Distance to Centre (m)	Total Distance (m)	Measured Resistance (Ω)	Apparent Resistivity (Ωm)
1	0.5	1.5	3	14.11	89
2	1	3	6	9.681	122
3	1.5	4.5	9	7.311	138
Test Name:	Elevation:	**ITM** Coordinates East:	**ITM** Coordinates North:	Date:	Instrument:
SR12	**83.7**	**686458.6**	**719674.4**	**10/11/2022**	**Tigre**
Wenner Electrode Spacing a (m)	Inner Electrode P Distance to Centre (m)	Outer Electrode C Distance to Centre (m)	Total Distance (m)	Measured Resistance (Ω)	Apparent Resistivity (Ωm)
1	0.5	1.5	3	18.48	116
2	1	3	6	9.82	123
3	1.5	4.5	9	6.9	130

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Table 2: Soil Resistivity Testing Results

Test Name:	Elevation:	**ITM** Coordinates East:	**ITM** Coordinates North:	Date:	Instrument:
SR13	**83.7**	**686580.1**	**719629.3**	**10/11/2022**	**Tigre**
Wenner Electrode Spacing a (m)	Inner Electrode P Distance to Centre (m)	Outer Electrode C Distance to Centre (m)	Total Distance (m)	Measured Resistance (Ω)	Apparent Resistivity (Ωm)
1	0.5	1.5	3	16.08	101
2	1	3	6	9.03	113
3	1.5	4.5	9	6.04	114
Test Name:	Elevation:	**ITM** Coordinates East:	**ITM** Coordinates North:	Date:	Instrument:
SR14	**82.2**	**686702.7**	**719592.2**	**10/11/2022**	**Tigre**
Wenner Electrode Spacing a (m)	Inner Electrode P Distance to Centre (m)	Outer Electrode C Distance to Centre (m)	Total Distance (m)	Measured Resistance (Ω)	Apparent Resistivity (Ωm)
1	0.5	1.5	3	13.71	86
2	1	3	6	8.219	103
3	1.5	4.5	9	6.287	119
Test Name:	Elevation:	**ITM** Coordinates East:	**ITM** Coordinates North:	Date:	Instrument:
SR15	**85.1**	**686409.3**	**719906.7**	**10/11/2022**	**Tigre**
Wenner Electrode Spacing a (m)	Inner Electrode P Distance to Centre (m)	Outer Electrode C Distance to Centre (m)	Total Distance (m)	Measured Resistance (Ω)	Apparent Resistivity (Ωm)
1	0.5	1.5	3	13	82
2	1	3	6	7.64	96
3	1.5	4.5	9	6.353	120
Test Name:	Elevation:	**ITM** Coordinates East:	**ITM** Coordinates North:	Date:	Instrument:
SR16	**84.8**	**686413.1**	**719754.8**	**10/11/2022**	**Tigre**
Wenner Electrode Spacing a (m)	Inner Electrode P Distance to Centre (m)	Outer Electrode C Distance to Centre (m)	Total Distance (m)	Measured Resistance (Ω)	Apparent Resistivity (Ωm)
1	0.5	1.5	3	26.2	165
2	1	3	6	13.4	168
3	1.5	4.5	9	8.85	167

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Table 2: Soil Resistivity Testing Results

Test Name:	Elevation:	**ITM** Coordinates East:	**ITM** Coordinates North:	Date:	Instrument:
SR17	**80.6**	**686740.8**	**719669.9**	**10/11/2022**	**Tigre**
Wenner Electrode Spacing a (m)	Inner Electrode P Distance to Centre (m)	Outer Electrode C Distance to Centre (m)	Total Distance (m)	Measured Resistance (Ω)	Apparent Resistivity (Ωm)
1	0.5	1.5	3	15.02	94
2	1	3	6	8.54	107
3	1.5	4.5	9	6.13	116
Test Name:	Elevation:	**ITM** Coordinates East:	**ITM** Coordinates North:	Date:	Instrument:
SR18	**80.6**	**686735.2**	**719782.1**	**10/11/2022**	**Tigre**
Wenner Electrode Spacing a (m)	Inner Electrode P Distance to Centre (m)	Outer Electrode C Distance to Centre (m)	Total Distance (m)	Measured Resistance (Ω)	Apparent Resistivity (Ωm)
1	0.5	1.5	3	20.77	130
2	1	3	6	8.75	110
3	1.5	4.5	9	6.646	125

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Appendix 7

Rotary Drillhole Logs & Photographs

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 24330

CONTRACT Halverstown

DRILLHOLE NO RC01
SHEET Sheet 1 of 3

CO-ORDINATES 686,380.19 E
719,855.77 N
GROUND LEVEL (mOD) 85.33

RIG TYPE GEO-205
FLUSH Air/Mist
INCLINATION (deg) -90
CORE DIAMETER (mm)

DATE DRILLED 16/05/2023
DATE LOGGED 17/05/2023

CLIENT
ENGINEER DOBA

DRILLED BY IGSL -DH
LOGGED BY D. O'Shea

RECEIVED: 13/08/2024

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing Log (mm) 0 250 500	Non-intact Zone	Legend	Description	Depth (m)	Elevation	Standpipe Details	SPT (N Value)
0								SYMMETRIX DRILLING: No recovery, observed by driller as returns of grey brown, gravellly silty sandy CLAY with boulders				
1												N = 13 (1, 2, 3, 3, 4, 3)
2												
3												N = 22 (3, 4, 3, 5, 6, 8)
4												
5									5.00	80.33		N = 49 (4, 6, 8, 11, 14, 16)
6								SYMMETRIX DRILLING: No recovery, observed by driller as returns of grey brown, sandy gravelly CLAY with boulders				N = 28 (3, 3, 5, 7, 7, 9)
7									7.50	77.83		
8								SYMMETRIX DRILLING: No recovery, observed by driller as returns of damp grey/brown sandy, silty clayey GRAVEL				N = 16 (2, 3, 3, 3, 4, 6)
9												N = 50 (4, 7, 10, 13, 12, 15)
									9.60	75.73		
								SYMMETRIX DRILLING: No recovery, observed by driller as returns of grey/brown gravelly sandy SILT.				

REMARKS

Hole cased 0.00-14.80m

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
14.50	14.50	N/S			Seepage

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

IGSL RC FI 10M 24330.GPJ IGSL.GDT 7/7/23

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 24330

CONTRACT Halverstown

DRILLHOLE NO RC01
SHEET Sheet 2 of 3

CO-ORDINATES 686,380.19 E
719,855.77 N
GROUND LEVEL (mOD) 85.33

RIG TYPE GEO-205
FLUSH Air/Mist
INCLINATION (deg) -90
CORE DIAMETER (mm)

DATE DRILLED 16/05/2023
DATE LOGGED 17/05/2023

CLIENT
ENGINEER DOBA

DRILLED BY IGSL -DH
LOGGED BY D. O'Shea

RECEIVED: 13/08/2024

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing Log (mm) 0 250 500	Non-intact Zone	Legend	Description	Depth (m)	Elevation	Standpipe Details	SPT (N Value)
10									10.40	74.93		
								SYMMETRIX DRILLING: No recovery, observed by driller as returns of grey/brown clayey sandy coarse GRAVEL.				N = 65 (3, 5, 11, 14, 17, 23)
11												
12												N = 20/35 mm (7, 31, 20)
13												
												N = 17/10 mm (33, 17)
14									14.80	70.53		
15								Returns of brown, slightly sandy, clayey, medium to coarse GRAVEL with occassional cobble. Sand is fine to coarse, gravel is subangular.				
16									16.30	69.03		
								SYMMETRIX DRILLING: No recovery, observed by driller as returns of possible weathered / dolomitised rock / crystalline calcite				
17												
18												
19												

REMARKS

Hole cased 0.00-14.80m

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
14.50	14.50	N/S			Seepage

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 24330

CONTRACT Halverstown

DRILLHOLE NO RC01
SHEET Sheet 3 of 3

CO-ORDINATES 686,380.19 E
719,855.77 N
GROUND LEVEL (mOD) 85.33

RIG TYPE GEO-205
FLUSH Air/Mist
INCLINATION (deg) -90
CORE DIAMETER (mm)

DATE DRILLED 16/05/2023
DATE LOGGED 17/05/2023

CLIENT
ENGINEER DOBA

DRILLED BY IGSL -DH
LOGGED BY D. O'Shea

RECEIVED: 13/08/2024

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing Log (mm) 0 250 500	Non-intact Zone	Legend	Description	Depth (m)	Elevation	Standpipe Details	SPT (N Value)
20								SYMMETRIX DRILLING: No recovery, observed by driller as returns of possible weathered / dolomitised rock / crystalline calcite *(continued)*				
21												
22												
23												
24												
25												
									25.60	59.73		
26								End of Borehole at 25.60 m				
27												
28												
29												

REMARKS

Hole cased 0.00-14.80m

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
14.50	14.50	N/S			Seepage

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments
17-05-23	25.60	14.80	3.50	Water level recorded 5 mins after end of drilling.

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 24330

CONTRACT Halverstown

DRILLHOLE NO RC01A
SHEET Sheet 1 of 3

CO-ORDINATES 686,381.78 E
719,859.74 N
GROUND LEVEL (mOD) 85.33

RIG TYPE GEO-205
FLUSH Air/Mist
INCLINATION (deg) -90
CORE DIAMETER (mm)

DATE DRILLED 18/05/2023
DATE LOGGED 19/05/2023

CLIENT
ENGINEER DOBA

DRILLED BY IGSL -DH
LOGGED BY D. O'Shea

RECEIVED: 13/08/2024

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing Log (mm) 0 250 500	Non-intact Zone	Legend	Description	Depth (m)	Elevation	Standpipe Details	SPT (N Value)
0								SYMMETRIX DRILLING: No recovery, observed by driller as returns of grey brown, gravellly silty sandy CLAY with boulders				
1												
2												
3												
4												
5									5.00	80.33		
5								SYMMETRIX DRILLING: No recovery, observed by driller as returns of grey brown, sandy gravelly CLAY with boulders				
6												
7									7.50	77.83		
8								SYMMETRIX DRILLING: No recovery, observed by driller as returns of damp grey/brown sandy, silty clayey GRAVEL				
9									9.60	75.73		
								SYMMETRIX DRILLING: No recovery, observed by driller as returns of grey/brown gravelly sandy SILT.				

REMARKS

Hole cased 0.00-17.10m

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
16.80	16.80	N/S			Seepage

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type
19-05-23	19.60	5.00	19.60	50mm SP

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 24330

CONTRACT Halverstown

DRILLHOLE NO RC01A
SHEET Sheet 2 of 3

CO-ORDINATES 686,381.78 E
719,859.74 N
GROUND LEVEL (mOD) 85.33

RIG TYPE GEO-205
FLUSH Air/Mist
INCLINATION (deg) -90
CORE DIAMETER (mm)

DATE DRILLED 18/05/2023
DATE LOGGED 19/05/2023

CLIENT
ENGINEER DOBA

DRILLED BY IGSL -DH
LOGGED BY D. O'Shea

RECEIVED: 13/08/2024

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing Log (mm) 0 250 500	Non-intact Zone	Legend	Description	Depth (m)	Elevation	Standpipe Details	SPT (N Value)
10									10.40	74.93		
11								SYMMETRIX DRILLING: No recovery, observed by driller as returns of grey/brown clayey sandy coarse GRAVEL.				
12												
13												
14									14.80	70.53		
15								SYMMETRIX DRILLING: No recovery, observed by driller as returns of grey brown, slightly clayey, sandy, GRAVEL with some boulders. Sand is fine to coarse, gravel is coarse.				N = 28/40 mm (10, 22, 28)
16												N = 23/20 mm (16, 27, 23)
17									17.10	68.23		N = 30/50 mm (13, 22, 30)
18								Returns of orange/brown, sandy, gravelly CLAY to clayey GRAVEL. Sand is fine to coarse. Gravel is angular to subangular fine to coarse of highly weathered limestone / crystalline calcite. Possible calcite-filled fault.				
19									18.70	66.63		
								SYMMETRIX DRILLING: No recovery, observed by driller as returns of possible weathered rock / dolomitised rock / crystalline calcite				

REMARKS

Hole cased 0.00-17.10m

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
16.80	16.80	N/S			Seepage

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type
19-05-23	19.60	5.00	19.60	50mm SP

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 24330

CONTRACT Halverstown

DRILLHOLE NO RC01A
SHEET Sheet 3 of 3

CO-ORDINATES 686,381.78 E
719,859.74 N
GROUND LEVEL (mOD) 85.33

RIG TYPE GEO-205
FLUSH Air/Mist
INCLINATION (deg) -90
CORE DIAMETER (mm)

DATE DRILLED 18/05/2023
DATE LOGGED 19/05/2023

CLIENT
ENGINEER DOBA

DRILLED BY IGSL -DH
LOGGED BY D. O'Shea

RECEIVED: 13/08/2024

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing Log (mm) 0 250 500	Non-intact Zone	Legend	Description	Depth (m)	Elevation	Standpipe Details	SPT (N Value)
20								SYMMETRIX DRILLING: No recovery, observed by driller as returns of possible weathered rock / dolomitised rock / crystalline calcite *(continued)*				
21												
22									22.00	63.33		
								End of Borehole at 22.00 m				
23												
24												
25												
26												
27												
28												
29												

REMARKS

Hole cased 0.00-17.10m

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
16.80	16.80	N/S			Seepage

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments
19-05-23	22.00	17.10	6.00	Water level recorded 5 mins after end of drilling.

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type
19-05-23	19.60	5.00	19.60	50mm SP

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 24330

CONTRACT Halverstown

DRILLHOLE NO RC02
SHEET Sheet 1 of 2

CO-ORDINATES 686,605.34 E
719,802.34 N
GROUND LEVEL (mOD) 82.92

RIG TYPE GEO-205
FLUSH Air/Mist
INCLINATION (deg) -90
CORE DIAMETER (mm) 78

DATE DRILLED 11/05/2023
DATE LOGGED 12/05/2023

CLIENT
ENGINEER DOBA

DRILLED BY IGSL -DH
LOGGED BY D. O'Shea

RECEIVED: 13/08/2024

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing Log (mm) 0 250 500	Non-intact Zone	Legend	Description	Depth (m)	Elevation	Standpipe Details	SPT (N Value)
0								SYMMETRIX DRILLING: No recovery, observed by driller as returns of grey brown sandy, clayey GRAVEL.				
1												N = 12 (1, 1, 2, 3, 3, 4)
2												
3												N = 21 (2, 3, 4, 5, 5, 7)
4												
5												N = 30 (3, 3, 5, 8, 9, 8)
6												N = 44 (4, 5, 8, 11, 11, 14)
7		0	0	0								N = 60/135 mm (7, 13, 28, 32)
8												
9												N = 33/45 mm (16, 27, 33)

REMARKS

Hole cased 0.00-15.10m

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
11.80	11.80	N/S			Seepage

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type
12-05-23	19.70	5.00	19.70	50mm SP

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 24330

CONTRACT Halverstown

DRILLHOLE NO RC02
SHEET Sheet 2 of 2

CO-ORDINATES 686,605.34 E
719,802.34 N
GROUND LEVEL (mOD) 82.92

RIG TYPE GEO-205
FLUSH Air/Mist
INCLINATION (deg) -90
CORE DIAMETER (mm) 78

DATE DRILLED 11/05/2023
DATE LOGGED 12/05/2023

CLIENT
ENGINEER DOBA

DRILLED BY IGSL -DH
LOGGED BY D. O'Shea

RECEIVED: 13/08/2024

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing Log (mm) 0 250 500	Non-intact Zone	Legend	Description	Depth (m)	Elevation	Standpipe Details	SPT (N Value)
10								SYMMETRIX DRILLING: No recovery, observed by driller as returns of grey brown sandy, clayey GRAVEL. *(continued)*				N = 60/125 mm (8, 14, 31, 29)
11												
12												N = 10/25 mm (15, 40, 10)
13												N = 50/60 mm (50, 50)
									13.90	69.02		
14								SYMMETRIX DRILLING: No recovery, observed by driller as returns of grey/brown gravelly CLAY.				
15	15.10								15.10	67.82		
16		100	65	65				Strong to very strong, thickly to medium bedded, light blue/grey, sandy, fine grained LIMESTONE (possibly locally slightly dolomitised, stromatactic structure with abundant calcite veining), slightly weathered. Discontinuities are medium to closely spaced, smooth to very locally rough, planar. Apertures are tight to locally moderately open, locally clay smeared (at 16.36m), calcite veined (1-10mm thick), and slight iron oxide staining. Dips are subhorizontal to locally 30°				
	16.60											
17		100	73	73								
	17.35											
		100	94	94								
18	18.15											
		100	92	92								
19												
	19.70								19.70	63.22		
								End of Borehole at 19.70 m				

REMARKS

Hole cased 0.00-15.10m

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
11.80	11.80	N/S			Seepage

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments
12-05-23	19.70	15.10	3.40	Water level recorded 5 mins after end of drilling.

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type
12-05-23	19.70	5.00	19.70	50mm SP

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 24330

CONTRACT Halverstown

DRILLHOLE NO RC03
SHEET Sheet 1 of 2

CO-ORDINATES 686,184.03 E
719,576.09 N
GROUND LEVEL (mOD) 79.37

RIG TYPE GEO-205
FLUSH Air/Mist
INCLINATION (deg) -90
CORE DIAMETER (mm) 78

DATE DRILLED 15/05/2023
DATE LOGGED 16/05/2023

CLIENT
ENGINEER DOBA

DRILLED BY IGSL -DH
LOGGED BY D. O'Shea

RECEIVED: 13/08/2024

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing Log (mm) 0 250 500	Non-intact Zone	Legend	Description	Depth (m)	Elevation	Standpipe Details	SPT (N Value)
0								SYMMETRIX DRILLING: No recovery, observed by driller as reutrns of grey/brown sandy silty clayey GRAVEL				N = 7 (1, 0, 1, 2, 2, 2)
1												
2												
3												N = 51/225 mm (1, 2, 3, 3, 45)
4		0	0	0								
5												N = 47 (2, 4, 7, 11, 13, 16)
6												N = 63 (5, 8, 11, 15, 17, 20)
7												
8	8.80								8.80	70.57		N = 69 (4, 9, 13, 14, 20, 22)
9	9.60	100	60	60								

REMARKS
Hole cased 0.00-8.80m

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
5.90	5.90	6.40			Seepage

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type
16-05-23	14.10	5.00	14.10	50mm SP

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 24330

CONTRACT Halverstown

DRILLHOLE NO RC03
SHEET Sheet 2 of 2

CO-ORDINATES 686,184.03 E
719,576.09 N
GROUND LEVEL (mOD) 79.37

RIG TYPE GEO-205
FLUSH Air/Mist
INCLINATION (deg) -90
CORE DIAMETER (mm) 78

DATE DRILLED 15/05/2023
DATE LOGGED 16/05/2023

CLIENT
ENGINEER DOBA

DRILLED BY IGSL -DH
LOGGED BY D. O'Shea

RECEIVED: 13/08/2024

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Description	Depth (m)	Elevation	Standpipe Details	SPT (N Value)
10		100	67	59	Weak to strong, thickly to thinly bedded, light blue/grey, fine-grained, LIMESTONE (possibly locally slightly dolomitised, stromatactic structure with abundant calcite veining), slightly weathered. Discontinuities are widely to closely spaced, smooth to very locally rough, planar. Apertures are tight to locally moderately open, locally clay smeared (at 9.38m), calcite veined (1-10mm thick), and slight iron oxide staining. Dips are subhorizontal to locally 30° and 45°. *(continued)*				
11	11.30	100	64	62					
12	12.60	100	38	38					
13	13.40	100	60	60					
14	14.10				End of Borehole at 14.10 m	14.10	65.27		
15									
16									
17									
18									
19									

Fracture Spacing Log (mm): 0 250 500

Non-intact Zone

Legend

REMARKS

Hole cased 0.00-8.80m

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
5.90	5.90	6.40			Seepage

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments
16-05-23	14.10	8.80	1.70	Water level recorded 5 mins after end of drilling.

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type
16-05-23	14.10	5.00	14.10	50mm SP

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 24330

CONTRACT Halverstown

DRILLHOLE NO RC04
SHEET Sheet 1 of 2

CO-ORDINATES 686,446.74 E
719,398.98 N
GROUND LEVEL (mOD) 78.32

RIG TYPE GEO-205
FLUSH Air/Mist
INCLINATION (deg) -90
CORE DIAMETER (mm) 78

DATE DRILLED 09/05/2023
DATE LOGGED 10/05/2023

CLIENT
ENGINEER DOBA

DRILLED BY IGSL -DH
LOGGED BY D. O'Shea

RECEIVED: 13/08/2024

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing Log (mm) 0 250 500	Non-intact Zone	Legend	Description	Depth (m)	Elevation	Standpipe Details	SPT (N Value)
0								SYMMETRIX DRILLING: No recovery, observed by driller as returns of grey/brown, sandy silty, clayey GRAVEL				
1												N = 9 (1, 1, 2, 2, 2, 3)
2												
3												N = 16 (1, 2, 3, 4, 4, 5)
4												
5												N = 33 (2, 5, 6, 8, 8, 11)
6		0	0	0								N = 54 (5, 6, 9, 13, 16, 16)
7												
8												N = 52 (7, 13, 11, 11, 14, 16)
9												N = 62 (6, 6, 9, 12, 18, 23)

REMARKS

Hole cased 0.00-11.60m

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
5.40	5.40	6.40			Seepage

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type
10-05-23	16.90	5.00	16.90	50mm SP

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 24330

CONTRACT Halverstown

DRILLHOLE NO RC04
SHEET Sheet 2 of 2

CO-ORDINATES 686,446.74 E
719,398.98 N
GROUND LEVEL (mOD) 78.32

RIG TYPE GEO-205
FLUSH Air/Mist
INCLINATION (deg) -90
CORE DIAMETER (mm) 78

DATE DRILLED 09/05/2023
DATE LOGGED 10/05/2023

CLIENT
ENGINEER DOBA

DRILLED BY IGSL -DH
LOGGED BY D. O'Shea

RECEIVED: 13/08/2024

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Description	Depth (m)	Elevation	SPT (N Value)
10					SYMMETRIX DRILLING: No recovery, observed by driller as returns of grey/brown, sandy silty, clayey GRAVEL *(continued)*	10.60	67.72	N = 50/90 mm (8, 18, 30, 20)
11					SYMMETRIX DRILLING: No recovery, observed by driller as returns of possible weathered rock.	11.60	66.72	
	11.60							
12		100	30	30	Weak to very strong, thickly to thinly bedded, dark blue/grey, fine-grained LIMESTONE (interbedded calcisiltite and argillaceous layers), slightly weathered.			
	12.60							
13	13.10	100	46	28	Discontinuities are widely to closely spaced, smooth to very locally rough, planar. Apertures are tight to locally moderately open, locally clay smeared, calcite layered (at 15.12-15.26m), clay/gravel-filled (at 13.29-13.34m and 15.37-15.68m). Dips are subhoriztonal to locally 30° and 45°.			
		100	54	45				
14	14.10							
		100	59	47				
15								
	15.60							
16		100	58	58				
	16.90					16.90	61.42	
17					End of Borehole at 16.90 m			
18								
19								

Fracture Spacing Log (mm): 0 – 250 – 500

Non-intact Zone / Legend

Standpipe Details

REMARKS

Hole cased 0.00-11.60m

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
5.40	5.40	6.40			Seepage

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments
10-05-23	16.90	11.60	3.50	Water level recorded 5 mins after end of drilling.

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type
10-05-23	16.90	5.00	16.90	50mm SP

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RC01 Box 1 of 1 – 14.80-16.30m



RC01A Box 1 of 1 – 17.30-18.70m



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RC02 Box 1 of 2 – 15.10-17.35m

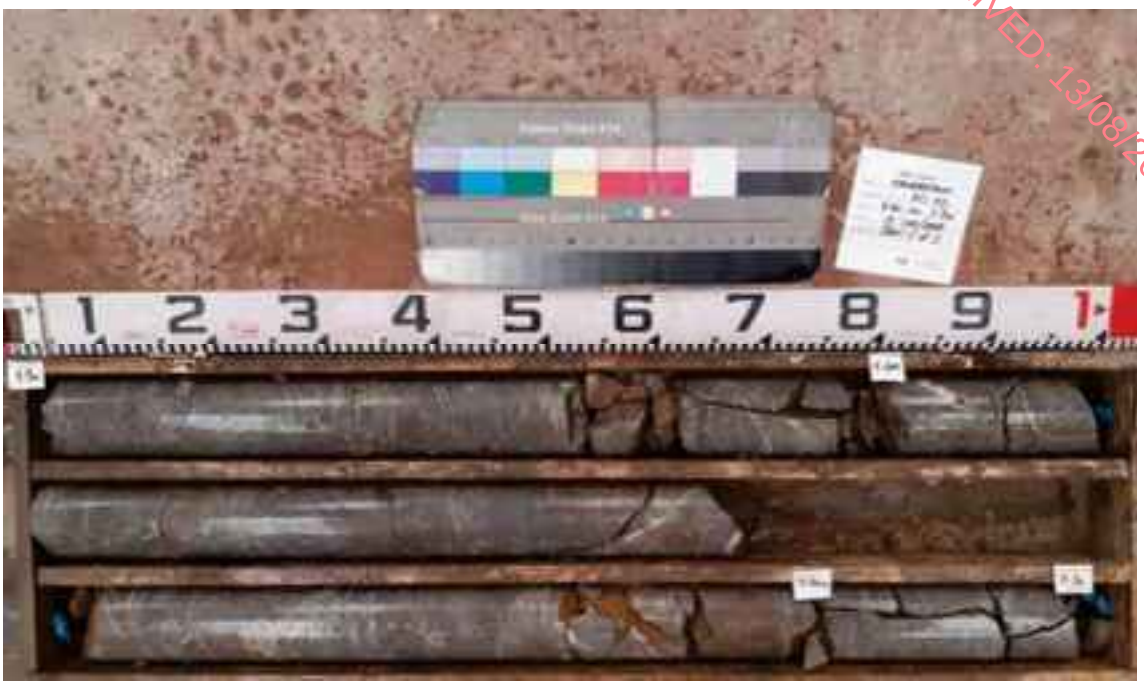


RC02 Box 2 of 2 – 17.35-19.70m



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RC03 Box 1 of 3 – 8.80-11.30m



RC03 Box 2 of 3 – 11.30-13.40m



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RC03 Box 3 of 3 – 13.40-14.10m



RC04 Box 1 of 2 – 11.60-14.10m



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RC04 Box 2 of 2 – 14.10-16.90m



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Appendix 8

Rotary Openhole Drilling Records

OPEN HOLE DRILLING RECORD

REPORT NUMBER 24330

CONTRACT Halverstown

DRILLHOLE NO TPRO-01
SHEET Sheet 1 of 1

CO-ORDINATES 686,146.21 E
719,928.64 N
GROUND LEVEL (mOD) 84.06

RIG TYPE GEO-205
INCLINATION (deg) -90
HOLE DIAMETER (mm) 78

DATE DRILLED 28/04/2023
DATE LOGGED 28/04/2023

CLIENT
ENGINEER DOBA

DRILLED BY IGSL -DH

RECEIVED: 15/08/2024

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Zones (m)	Fracture Spacing Min Avg Max (mm)	Description	Depth (m)	Elevation	Standpipe Details	SPT (N Value)
0							SYMMETRIX DRILLING: No recovery, observed by driller as returns of grey brown sandy gravelly CLAY				
1	1.50	0	0	0							N = 33 (19, 13, 11, 9, 8, 5)
2		0	0	0				2.20	81.86		
							SYMMETRIX DRILLING: No recovery, observed by driller as returns of grey brown clayey sandy GRAVEL	2.80			
3	3.00	0	0	0			SYMMETRIX DRILLING: No recovery, observed by driller as returns of grey brown sandy gravelly CLAY	3.50	81.26		N = 19 (7, 4, 3, 5, 6, 5)
4	4.50	0	0	0			SYMMETRIX DRILLING: No recovery, observed by driller as returns of grey brown slightly clayey sandy GRAVEL	4.30	80.56		
5	5.00	0	0	0			SYMMETRIX DRILLING: No recovery, observed by driller as returns of grey brown sandy gravelly CLAY	5.00	79.76		N = 26 (4, 5, 7, 6, 6, 7)
							End of Borehole at 5.00 m		79.06		N = 28 (3, 6, 5, 6, 8, 9)

REMARKS

Rock and soil descriptions are based on examination of drilling returns. These samples can be heavily disturbed and fragmented, with a loss of fines. Typical fragments of 2 to 3 mm are recovered. Accurate descriptions are not, therefore, possible. Similarly, it is not possible to accurately assess soil stratification or rock condition/structure.

Hole cased 0.00-5.00m

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
3.50	3.50	N/S			Seepage

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments
28-04-23	5.00	5.00	4.90	Water level recorded 5 mins after end of drilling.

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type
28-04-23	5.00	1.00	5.00	50mm SP

IGSL RC OPEN HOLE 24330.GPJ IGSL.GDT 3/7/23

OPEN HOLE DRILLING RECORD

REPORT NUMBER 24330

CONTRACT Halverstown

DRILLHOLE NO TPRO-02
SHEET Sheet 1 of 1

CO-ORDINATES 686,088.11 E
719,822.59 N
GROUND LEVEL (mOD) 82.52

RIG TYPE GEO-205
INCLINATION (deg) -90
HOLE DIAMETER (mm) 78

DATE DRILLED 02/05/2023
DATE LOGGED 02/05/2023

CLIENT
ENGINEER DOBA

DRILLED BY IGSL -DH

RECEIVED: 15/08/2024

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Zones (m)	Fracture Spacing Min Avg Max (mm)	Fracture Spacing Log (mm) 0 250 500	Legend	Description	Depth (m)	Elevation	Standpipe Details	SPT (N Value)
0									SYMMETRIX DRILLING: No recovery, observed by driller as returns of grey brown sandy gravelly CLAY				
1		0	0	0									
	1.50												
2		0	0	0						2.50			
	3.00								SYMMETRIX DRILLING: No recovery, observed by driller as returns of grey brown silty sandy gravelly CLAY		80.02		N = 26 (2, 3, 5, 7, 6, 8)
3		0	0	0									
										3.90			
4									SYMMETRIX DRILLING: No recovery, observed by driller as returns of grey brown clayey sandy GRAVEL		78.62		N = 21 (1, 3, 6, 4, 5, 6)
	4.50	0	0	0									N = 31 (2, 3, 6, 7, 9, 9)
	5.00									5.00			
5									End of Borehole at 5.00 m		77.52		N = 36 (3, 5, 8, 8, 9, 11)

REMARKS

Rock and soil descriptions are based on examination of drilling returns. These samples can be heavily disturbed and fragmented, with a loss of fines. Typical fragments of 2 to 3 mm are recovered. Accurate descriptions are not, therefore, possible. Similarly, it is not possible to accurately assess soil stratification or rock condition/structure.

Hole cased 0.00-5.00m

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
4.40	4.40	N/S			Seepage

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type
02-05-23	5.00	1.00	5.00	50mm SP

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments
02-05-23	5.00	5.00	4.80	Water level recorded 5 mins after end of drilling.

IGSL RC OPEN HOLE 24330.GPJ IGSL.GDT 3/7/23

OPEN HOLE DRILLING RECORD

REPORT NUMBER 24330

CONTRACT Halverstown

DRILLHOLE NO TPRO-03
SHEET Sheet 1 of 1

CO-ORDINATES 686,271.71 E
719,722.30 N
GROUND LEVEL (mOD) 81.63

RIG TYPE GEO-205
INCLINATION (deg) -90
HOLE DIAMETER (mm) 78

DATE DRILLED 02/05/2023
DATE LOGGED 02/05/2023

CLIENT
ENGINEER DOBA

DRILLED BY IGSL -DH

RECEIVED: 15/08/2024

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Zones (m)	Fracture Spacing Min Avg Max (mm)	Description	Depth (m)	Elevation	Standpipe Details	SPT (N Value)
0							SYMMETRIX DRILLING: No recovery, observed by driller as returns of grey brown sandy gravelly CLAY				
1	1.50	0	0	0							N = 16 (1, 3, 3, 4, 5, 4)
2		0	0	0			SYMMETRIX DRILLING: No recovery, observed by driller as returns of grey brown silty sandy gravelly CLAY	2.20	79.43		
3	3.00	0	0	0			SYMMETRIX DRILLING: No recovery, observed by driller as returns of grey brown sandy gravelly CLAY	3.60	78.03		N = 16 (1, 1, 3, 2, 5, 6)
4	4.50	0	0	0			SYMMETRIX DRILLING: No recovery, observed by driller as returns of grey brown silty sandy gravelly CLAY	4.50	77.13		N = 31 (2, 3, 6, 7, 9, 9)
5	5.20						End of Borehole at 5.20 m	5.20	76.43		N = 36 (3, 5, 8, 8, 9, 11)

REMARKS

Rock and soil descriptions are based on examination of drilling returns. These samples can be heavily disturbed and fragmented, with a loss of fines. Typical fragments of 2 to 3 mm are recovered. Accurate descriptions are not, therefore, possible. Similarly, it is not possible to accurately assess soil stratification or rock condition/structure.

Hole cased 0.00-5.20m

WATER STRIKE DETAILS

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

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type
02-05-23	5.20	1.00	5.20	50mm SP

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments
02-05-23	5.20	5.20	Dry	Water level recorded 5 mins after end of drilling.

IGSL RC OPEN HOLE 24330.GPJ IGSL.GDT 3/7/23

OPEN HOLE DRILLING RECORD

REPORT NUMBER 24330

CONTRACT Halverstown

DRILLHOLE NO TPRO-04
SHEET Sheet 1 of 1

CO-ORDINATES 686,162.93 E
719,657.11 N
GROUND LEVEL (mOD) 80.28

RIG TYPE GEO-205
INCLINATION (deg) -90
HOLE DIAMETER (mm) 78

DATE DRILLED 03/05/2023
DATE LOGGED 03/05/2023

CLIENT
ENGINEER DOBA

DRILLED BY IGSL -DH

RECEIVED: 15/08/2024

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Zones (m)	Fracture Spacing Min Avg Max (mm)	Fracture Spacing Log (mm) 0 250 500	Legend	Description	Depth (m)	Elevation	Standpipe Details	SPT (N Value)
0									SYMMETRIX DRILLING: No recovery, observed by driller as returns of grey brown sandy gravelly CLAY	1.30			
1	1.50	0	0	0					SYMMETRIX DRILLING: No recovery, observed by driller as returns of grey brown silty sandy gravelly CLAY	1.80	78.98		N = 11 (2, 1, 2, 3, 3, 3)
2		0	0	0					SYMMETRIX DRILLING: No recovery, observed by driller as returns of grey brown sandy gravelly CLAY	2.40	78.48		
3	3.00	0	0	0					SYMMETRIX DRILLING: No recovery, observed by driller as returns of grey brown silty sandy gravelly CLAY	3.70	77.88		N = 20 (3, 5, 3, 5, 6, 6)
4	4.50	0	0	0					SYMMETRIX DRILLING: No recovery, observed by driller as returns of dark grey slightly clayey sandy GRAVEL	5.00	76.58		N = 44 (2, 6, 7, 11, 12, 14)
5	5.00								End of Borehole at 5.00 m		75.28		N = 39 (5, 6, 9, 8, 9, 13)

REMARKS

Rock and soil descriptions are based on examination of drilling returns. These samples can be heavily disturbed and fragmented, with a loss of fines. Typical fragments of 2 to 3 mm are recovered. Accurate descriptions are not, therefore, possible. Similarly, it is not possible to accurately assess soil stratification or rock condition/structure.

Hole cased 0.00-5.00m

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
4.50	4.50	N/S			Seepage

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments
03-05-23	5.00	5.00	4.70	Water level recorded 5 mins after end of drilling.

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type
03-05-23	5.00	1.00	5.00	50mm SP

IGSL RC OPEN HOLE 24330.GPJ IGSL.GDT 3/7/23

OPEN HOLE DRILLING RECORD

REPORT NUMBER 24330

CONTRACT Halverstown

DRILLHOLE NO TPRO-05
SHEET Sheet 1 of 1

CO-ORDINATES 686,383.86 E
719,788.02 N
GROUND LEVEL (mOD) 84.64

RIG TYPE GEO-205
INCLINATION (deg) -90
HOLE DIAMETER (mm) 78

DATE DRILLED 05/05/2023
DATE LOGGED 05/05/2023

CLIENT
ENGINEER DOBA

DRILLED BY IGSL -DH

RECEIVED: 15/08/2024

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Zones (m)	Fracture Spacing Min Avg Max (mm)	Fracture Spacing Log (mm) 0 250 500	Legend	Description	Depth (m)	Elevation	Standpipe Details	SPT (N Value)
0									SYMMETRIX DRILLING: No recovery, observed by driller as returns of grey brown silty sandy gravelly CLAY				
1	1.50	0	0	0						1.60	83.04		N = 12 (1, 2, 3, 2, 4, 3)
									SYMMETRIX DRILLING: No recovery, observed by driller as returns of grey brown clayey sandy GRAVEL	2.00			
2		0	0	0					SYMMETRIX DRILLING: No recovery, observed by driller as returns of grey brown sandy gravelly CLAY		82.64		
3	3.00	0	0	0									N = 27 (2, 4, 5, 7, 7, 8)
4	4.50	0	0	0						4.60	80.04		N = 47 (3, 6, 7, 9, 14, 17)
5	5.10								SYMMETRIX DRILLING: No recovery, observed by driller as returns of grey brown clayey sandy GRAVEL	5.10			N = 64 (5, 9, 11, 16, 17, 20)
									End of Borehole at 5.10 m		79.54		

REMARKS

Rock and soil descriptions are based on examination of drilling returns. These samples can be heavily disturbed and fragmented, with a loss of fines. Typical fragments of 2 to 3 mm are recovered. Accurate descriptions are not, therefore, possible. Similarly, it is not possible to accurately assess soil stratification or rock condition/structure.

Hole cased 0.00-5.10m

WATER STRIKE DETAILS

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

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type
05-05-23	5.10	1.00	5.10	50mm SP

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments
05-05-23	5.10	5.10	Dry	Water level recorded 5 mins after end of drilling.

IGSL RC OPEN HOLE 24330.GPJ IGSL.GDT 3/7/23

OPEN HOLE DRILLING RECORD

REPORT NUMBER 24330

RECEIVED: 15/08/2024

CONTRACT	Halverstown	**DRILLHOLE NO**	**TPRO-06**
		SHEET	Sheet 1 of 1
CO-ORDINATES	686,487.53 E 719,815.50 N	**DATE DRILLED**	04/05/2023
GROUND LEVEL (mOD)	85.03	**DATE LOGGED**	04/05/2023
RIG TYPE	GEO-205		
INCLINATION (deg)	-90	**DRILLED BY**	IGSL -DH
CLIENT			
ENGINEER	DOBA	**HOLE DIAMETER (mm)**	78

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Zones (m)	Fracture Spacing Min Avg Max (mm)	Fracture Spacing Log (mm) 0 250 500	Legend	Description	Depth (m)	Elevation	Standpipe Details	SPT (N Value)
0									SYMMETRIX DRILLING: No recovery, observed by driller as returns of grey brown sandy gravelly CLAY				
1		0	0	0									
	1.50												N = 15 (1, 2, 2, 4, 5, 4)
2										2.20			
		0	0	0					SYMMETRIX DRILLING: No recovery, observed by driller as returns of grey brown silty sandy gravelly CLAY		82.83		
	3.00												N = 19 (2, 3, 3, 4, 5, 7)
3										3.70			
		0	0	0					SYMMETRIX DRILLING: No recovery, observed by driller as returns of grey brown silty clayey sandy GRAVEL	4.10	81.33		
4									SYMMETRIX DRILLING: No recovery, observed by driller as returns of grey brown clayey sandy GRAVEL		80.93		
	4.50												N = 30 (2, 2, 5, 7, 8, 10)
		0	0	0						5.00			
5	5.00								End of Borehole at 5.00 m		80.03		N = 56 (4, 7, 13, 14, 14, 15)

REMARKS

Rock and soil descriptions are based on examination of drilling returns. These samples can be heavily disturbed and fragmented, with a loss of fines. Typical fragments of 2 to 3 mm are recovered. Accurate descriptions are not, therefore, possible. Similarly, it is not possible to accurately assess soil stratification or rock condition/structure.

Hole cased 0.00-5.00m

WATER STRIKE DETAILS

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

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type
04-05-23	5.00	1.00	5.00	50mm SP

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments
04-05-23	5.00	5.00	Dry	Water level recorded 5 mins after end of drilling.

IGSL RC OPEN HOLE 24330.GPJ IGSL.GDT 3/7/23

OPEN HOLE DRILLING RECORD

REPORT NUMBER 24330

CONTRACT Halverstown

DRILLHOLE NO TPRO-07
SHEET Sheet 1 of 1

CO-ORDINATES 686,613.61 E
719,733.59 N
GROUND LEVEL (mOD) 82.86

RIG TYPE GEO-205
INCLINATION (deg) -90
HOLE DIAMETER (mm) 78

DATE DRILLED 05/05/2023
DATE LOGGED 05/05/2023

CLIENT
ENGINEER DOBA

DRILLED BY IGSL -DH

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Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Zones (m)	Fracture Spacing Min Avg Max (mm)	Fracture Spacing Log (mm) 0 250 500	Legend	Description	Depth (m)	Elevation	Standpipe Details	SPT (N Value)
0		0	0	0					SYMMETRIX DRILLING: No recovery, observed by driller as returns of grey brown sandy gravelly CLAY	1.30	81.56		N = 11 (1, 1, 2, 3, 3, 3)
1	1.50	0	0	0					SYMMETRIX DRILLING: No recovery, observed by driller as returns of grey brown silty sandy gravelly CLAY	2.70	80.16		N = 25 (2, 4, 3, 5, 7, 10)
2		0	0	0					SYMMETRIX DRILLING: No recovery, observed by driller as returns of grey brown sandy gravelly CLAY	4.60	78.26		N = 34 (3, 5, 5, 8, 9, 12)
3	3.00	0	0	0					SYMMETRIX DRILLING: No recovery, observed by driller as returns of grey brown silty clayey sandy GRAVEL	5.10	77.76		N = 56 (6, 7, 10, 13, 16, 17)
4	4.50	0	0	0					End of Borehole at 5.10 m				
5	5.10												

REMARKS

Rock and soil descriptions are based on examination of drilling returns. These samples can be heavily disturbed and fragmented, with a loss of fines. Typical fragments of 2 to 3 mm are recovered. Accurate descriptions are not, therefore, possible. Similarly, it is not possible to accurately assess soil stratification or rock condition/structure.

Hole cased 0.00-5.10m

WATER STRIKE DETAILS

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

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments
05-05-23	5.10	5.10	Dry	Water level recorded 5 mins after end of drilling.

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type
05-05-23	5.10	1.00	5.10	50mm SP

IGSL RC OPEN HOLE 24330.GPJ IGSL.GDT 3/7/23

OPEN HOLE DRILLING RECORD

REPORT NUMBER 24330

CONTRACT Halverstown

DRILLHOLE NO TPRO-08
SHEET Sheet 1 of 1

CO-ORDINATES 686,443.99 E
719,589.92 N
GROUND LEVEL (mOD) 81.40

RIG TYPE GEO-205
INCLINATION (deg) -90
HOLE DIAMETER (mm) 78

DATE DRILLED 08/05/2023
DATE LOGGED 08/05/2023

CLIENT
ENGINEER DOBA

DRILLED BY IGSL -DH

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Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Zones (m)	Fracture Spacing Min Avg Max (mm)	Description	Depth (m)	Elevation	Standpipe Details	SPT (N Value)
0							SYMMETRIX DRILLING: No recovery, observed by driller as returns of grey brown sandy gravelly CLAY	1.20	80.20		
1	1.50	0	0	0			SYMMETRIX DRILLING: No recovery, observed by driller as returns of grey brown silty sandy gravelly CLAY	2.40	79.00		N = 13 (1, 1, 2, 3, 3, 5)
2	3.00	0	0	0			SYMMETRIX DRILLING: No recovery, observed by driller as returns of grey brown sandy gravelly CLAY	3.20	78.20		N = 51 (2, 4, 7, 13, 15, 16)
3	4.50	0	0	0			SYMMETRIX DRILLING: No recovery, observed by driller as returns of grey black gravelly CLAY	5.20	76.20		N = 59 (3, 7, 10, 12, 18, 19)
4	5.20	0	0	0			End of Borehole at 5.20 m				N = 34/40 mm (6, 15, 34)
5											

REMARKS

Rock and soil descriptions are based on examination of drilling returns. These samples can be heavily disturbed and fragmented, with a loss of fines. Typical fragments of 2 to 3 mm are recovered. Accurate descriptions are not, therefore, possible. Similarly, it is not possible to accurately assess soil stratification or rock condition/structure.

Hole cased 0.00-5.20m

WATER STRIKE DETAILS

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

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments
08-05-23	5.20	5.20	Dry	Water level recorded 5 mins after end of drilling.

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type
08-05-23	5.20	1.00	5.20	50mm SP

IGSL RC OPEN HOLE 24330.GPJ IGSL.GDT 3/7/23

OPEN HOLE DRILLING RECORD

REPORT NUMBER 24330

RECEIVED: 15/08/2024

CONTRACT	Halverstown	**DRILLHOLE NO**	**TPRO-09**
		SHEET	Sheet 1 of 1
CO-ORDINATES	686,263.95 E 719,467.48 N	**DATE DRILLED**	03/05/2023
GROUND LEVEL (mOD)	77.31	**DATE LOGGED**	03/05/2023
RIG TYPE	GEO-205		
INCLINATION (deg)	-90	**DRILLED BY**	IGSL -DH
CLIENT			
ENGINEER	DOBA	**HOLE DIAMETER (mm)**	78

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Zones (m)	Fracture Spacing Min Avg Max (mm)	Fracture Spacing Log (mm) 0 250 500	Legend	Description	Depth (m)	Elevation	Standpipe Details	SPT (N Value)
0									SYMMETRIX DRILLING: No recovery, observed by driller as returns of brown PEAT				
1		0	0	0						1.20			
	1.50								SYMMETRIX DRILLING: No recovery, observed by driller as returns of grey silty SAND (Blowing)		76.11		N = 7 (1, 0, 1, 1, 2, 3)
2		0	0	0									
3	3.00									3.40			N = 7 (0, 1, 0, 1, 2, 4)
		0	0	0					SYMMETRIX DRILLING: No recovery, observed by driller as returns of grey silty gravelly SAND (Blowing)		73.91		
4										4.20			
	4.50								SYMMETRIX DRILLING: No recovery, observed by driller as returns of grey silty sandy GRAVEL		73.11		N = 41 (2, 3, 6, 11, 12, 12)
5		0	0	0									
	5.20									5.20			
									End of Borehole at 5.20 m		72.11		N = 39 (5, 6, 9, 8, 9, 13)

REMARKS

Rock and soil descriptions are based on examination of drilling returns. These samples can be heavily disturbed and fragmented, with a loss of fines. Typical fragments of 2 to 3 mm are recovered. Accurate descriptions are not, therefore, possible. Similarly, it is not possible to accurately assess soil stratification or rock condition/structure.

Hole cased 0.00-5.20m

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
4.00	4.00	N/S			Seepage

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type
03-05-23	5.20	1.00	5.20	50mm SP

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments
03-05-23	5.20	5.20	4.80	Water level recorded 5 mins after end of drilling.

OPEN HOLE DRILLING RECORD

REPORT NUMBER 24330

CONTRACT Halverstown

DRILLHOLE NO TPRO-10
SHEET Sheet 1 of 1

CO-ORDINATES 686,489.99 E
719,460.74 N
GROUND LEVEL (mOD) 79.60

RIG TYPE GEO-205
INCLINATION (deg) -90
HOLE DIAMETER (mm) 78

DATE DRILLED 08/05/2023
DATE LOGGED 08/05/2023

CLIENT
ENGINEER DOBA

DRILLED BY IGSL -DH

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Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Zones (m)	Fracture Spacing Min Avg Max (mm)	Description	Depth (m)	Elevation	Standpipe Details	SPT (N Value)
0							SYMMETRIX DRILLING: No recovery, observed by driller as returns of grey brown sandy gravelly CLAY				
1	1.50	0	0	0							N = 16 (2, 3, 4, 4, 3, 5)
2		0	0	0				2.30	77.30		
							SYMMETRIX DRILLING: No recovery, observed by driller as returns of grey silty sandy CLAY	2.70			
3	3.00	0	0	0			SYMMETRIX DRILLING: No recovery, observed by driller as returns of grey black gravelly CLAY		76.90		N = 48 (4, 5, 8, 9, 14, 17)
4	4.50	0	0	0							N = 50/105 mm (6, 8, 22, 28)
5	5.10							5.10			
							End of Borehole at 5.10 m		74.50		N = 25/25 mm (12, 25, 25)

REMARKS

Rock and soil descriptions are based on examination of drilling returns. These samples can be heavily disturbed and fragmented, with a loss of fines. Typical fragments of 2 to 3 mm are recovered. Accurate descriptions are not, therefore, possible. Similarly, it is not possible to accurately assess soil stratification or rock condition/structure.

Hole cased 0.00-5.10m

WATER STRIKE DETAILS

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

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type
08-05-23	5.10	1.00	5.10	50mm SP

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments
08-05-23	5.10	5.10	Dry	Water level recorded 5 mins after end of drilling.

IGSL RC OPEN HOLE 24330.GPJ IGSL.GDT 3/7/23

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Appendix 9

Groundwater Monitoring

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Groundwater Monitoring

Site Location	Halverstown
Project No.	24330
Engineer	DOBA

		Date of Reading							
		02/12/2022		19/12/2022		10/07/2023			
	Ground Elevation (m OD)	m bgl	m OD	m bgl	m OD	m bgl	m OD	m bgl	m OD
BH03	78.62	1.30	77.32	1.80	76.82	2.05	76.57		
BH10	84.79	Dry	-	Dry	-	Dry	-		
BH12	80.50	0.98	79.52	1.0	79.50	1.54	78.96		
BH13	82.80	2.20	80.6	2.38	80.42	Dry	-		
BH05	77.88	-	-	-	-	0.87	77.01		
RC01A	85.33	-	-	-	-	Dry*	-		
RC02	82.92	-	-	-	-	2.85	80.07		
RC03	79.37	-	-	-	-	3.33	76.04		
RC04	78.32	-	-	-	-	1.12	77.20		
TPRO-01	84.06	-	-	-	-	3.63	80.43		
TPRO-02	82.52	-	-	-	-	3.16	79.36		
TPRO-03	81.63	-	-	-	-	1.49	80.14		
TPRO-04	80.28	-	-	-	-	2.27	78.01		
TPRO-05	84.64	-	-	-	-	3.79	80.85		
TPRO-06	85.03	-	-	-	-	3.76	81.27		
TPRO-07	82.86	-	-	-	-	2.43	80.43		
TPRO-08	81.40	-	-	-	-	1.22	80.18		
TPRO-09	77.31	-	-	-	-	0.64	76.67		
TPRO-10	79.60	-	-	-	-	1.4	78.20		

COMMENTS	*RC01A found to be silted up to 5.0m bgl (10-07-23)

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Appendix 10

Gas Monitoring

Gas & Groundwater Monitoring

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Site Location	Halverstown				
Project No.	24330				
Date	19-Dec-22				
Engineer	DOBA				
Equipment	Geotech GA5000				
	Peak / Steady State Readings				
Location ID	**BH10**				
Time (sec)	**10**	**30**	**60**	**90**	**Peak**
Water Level (mbgl)	Dry				
Gas Flow (l/hr)	0.0	0.1	0.1	0.1	0.1
CH4 (%)	0.0	0.0	0.0	0.0	0
CO2 (%)	2.3	2.3	2.3	2.3	2.3
O2 (%)	15.9	15.5	15.5	15.4	15.9
CO (ppm)	0	0	0	0	0
H2S (ppm)	0	0	0	0	0
Balance (%)	82.1	82.2	82.3	81.8	82.3
Barometric Pressure (mba	978				
Weather/Temp.	Wet, Windy, Rain/ 12º				
Location ID	**BH12**				
Time (sec)	**10**	**30**	**60**	**90**	**Peak**
Water Level (mbgl)	1.0m				
Gas Flow (l/hr)	0.0	0.1	0.1	0.1	0.1
CH4 (%)	0.0	0.0	0.0	0.0	0.0
CO2 (%)	1.1	1.1	1.1	1.1	1.1
O2 (%)	15.9	15.4	15.3	15.3	15.9
CO (ppm)	0.0	0.0	0.0	0.0	0.0
H2S (ppm)	0.0	0.0	0.0	0.0	0.0
Balance (%)	83.0	83.5	83.6	83.6	83.6
Barometric Pressure (mba	978				
Weather/Temp.	Wet, Windy, Rain/ 12º				
Location ID	**BH03**				
Time (sec)	**10**	**30**	**60**	**90**	**Peak**
Water Level (mbgl)	1.80m				
Gas Flow (l/hr)	0.0	0.1	0.1	0.1	0.1
CH4 (%)	0.0	0.0	0.0	0.0	0.0
CO2 (%)	0.6	0.6	0.6	0.6	0.6
O2 (%)	20.6	15.9	15.6	15.6	20.6
CO (ppm)	0	0	0	0	0
H2S (ppm)	0	0	0	0	0
Balance (%)	78.8	83.4	83.8	83.8	83.8
Barometric Pressure (mba	978				
Weather/Temp.	Wet, Windy, Rain/ 12º				
Comments					

Gas & Groundwater Monitoring

RECEIVED: 13/08/2024

Site Location	Halverstown					
Project No.	24330					
Date	19-Dec-22					
Engineer	DOBA					
Equipment	Geotech GA5000					
	Peak / Steady State Readings					
Location ID	**BH13**					
Time (sec)	**30**	**60**	**90**	**120**	**180**	**Peak**
Water Level (mbgl)	2.38m					
Gas Flow (l/hr)	0.1	0.1	0.1	0.1	0.1	0.1
CH4 (%)	0.0	0.0	0.0	0.0	0.0	0.0
CO2 (%)	0.6	0.8	0.8	0.8	0.8	0.8
O2 (%)	16.3	18.8	18.9	18.9	18.9	18.9
CO (ppm)	0.0	0.0	0.0	0.0	0.0	0.0
H2S (ppm)	0.0	0.0	0.0	0.0	0.0	0.0
Balance (%)	83.1	80.4	80.2	80.2	80.2	83.1
Barometric Pressure (mbar	978					
Weather/Temp.	Wet, Windy, Rain/ 12º					
Location ID						
Time (sec)	**30**	**60**	**90**	**120**	**180**	**Peak**
Water Level (mbgl)						
Gas Flow (l/hr)						
CH4 (%)						
CO2 (%)						
O2 (%)						
CO (ppm)						
H2S (ppm)						
Balance (%)						
Barometric Pressure (mbar						
Weather/Temp.						
Location ID						
Time (sec)	**30**	**60**	**90**	**120**	**180**	**Peak**
Water Level (mbgl)						
Gas Flow (l/hr)						
CH4 (%)						
CO2 (%)						
O2 (%)						
CO (ppm)						
H2S (ppm)						
Balance (%)						
Barometric Pressure (mbar						
Weather/Temp.						
Comments						

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Appendix 11

Geotechnical Laboratory Results (Soil)

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

Test Report

Determination of Moisture Content, Liquid & Plastic Limits

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

RECEIVED: 13/08/2024

Report No. **R142005** Contract No. 24330 Contract Name: Halverstown , Naas - Proposed Data Centres

Customer DOBA

Samples Received: 24/01/23 Date Tested: 24/01/23

BH/TP*	Sample No.	Depth* (m)	Lab. Ref	Sample Type*	Moisture Content %	Liquid Limit %	Plastic Limit %	Plasticity Index	% <425µm	Preparation	Liquid Limit Clause	Classification (BS5930)	Description
BH01	AA184687	1.0	A22/7546	B	19	25	15	10	55	WS	4.4	C L	Brown sandy gravelly CLAY
BH01	AA184688	2.0	A22/7547	B	8.6	22	NP	NP	58	WS	4.4		Brown slightly sandy, gravelly, SILT with some cobbles
BH03	AA184690	1.0	A22/7548	B	13	27	NP	NP	69	WS	4.4		Brown sandy gravelly SILT
BH03	AA184692	3.0	A22/7549	B	6.5	19	NP	NP	45	WS	4.4		Brown silty, sandy, GRAVEL with many cobbles
BH04	AA184694	2.0	A22/7550	B	16	28	NP	NP	49	WS	4.4		Brown sandy gravelly SILT
BH05	AA184670	1.0	A22/7551	B	11	23	NP	NP	44	WS	4.4		Brown sandy gravelly SILT
BH05	AA184672	3.0	A22/7552	B	7.0	24	14	10	39	WS	4.4	C L	Grey/brown clayey, sandy, GRAVEL with many cobble
BH07	AA184673	1.0	A22/7553	B	51	36	NP	NP	89	WS	4.4		Brown sandy gravelly SILT
BH07	AA184674	2.0	A22/7554	B	17	37	20	17	70	WS	4.4	C I	Brown slightly sandy, slightly gravelly, CLAY
BH09	AA184679	1.0	A22/7555	B	14	29	16	13	66	WS	4.4	C L	Brown sandy gravelly CLAY
BH11	AA184677	1.0	A22/7557	B	24	29	14	15	60	WS	4.4	C L	Brown sandy gravelly CLAY
BH11	AA184679	3.0	A22/7558	B	13	25	13	12	64	WS	4.4	C L	Brown slightly sandy, gravelly, CLAY
BH12	AA184675	1.0	A22/7559	B	18	29	16	13	59	WS	4.4	C L	Brown sandy gravelly CLAY
BH13	AA184685	1.0	A22/7560	B	15	27	15	12	55	WS	4.4	C L	Brown sandy gravelly CLAY

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

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

Sample Type: B - Bulk Disturbed
U - Undisturbed

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

Persons authorized to approve reports
H Byrne (Laboratory Manager)

Approved by | Date: 20/02/23 | Page: 1 of 1

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

Test Report

Determination of Moisture Content, Liquid & Plastic Limits

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

RECEIVED: 13/08/2024

Report No. **R142006** Contract No. 24330 Contract Name: Halverstown , Naas - Proposed Data Centres

Customer DOBA

Samples Received: 24/01/23 Date Tested: 24/01/23

BH/TP*	Sample No.	Depth* (m)	Lab. Ref	Sample Type*	Moisture Content %	Liquid Limit %	Plastic Limit %	Plasticity Index	% <425µm	Preparation	Liquid Limit Clause	Classification (BS5930)	Description
TP04	AA186982	0.6	A22/7562	B	12	24	14	10	79	WS	4.4	C L	Brown slightly sandy, slightly gravelly, CLAY
TP12	AA185482	0.8	A22/7563	B	13	36	18	18	70	WS	4.4	C I	Brown slightly sandy, slightly gravelly, CLAY
TP15	AA185479	1.5	A22/7565	B	13	27	16	11	69	WS	4.4	C L	Brown slightly sandy, slightly gravelly, CLAY
TP16	AA185461	1.0	A22/7566	B	19	23	13	10	71	WS	4.4	C L	Mottled brown slightly sandy, slightly gravelly, CLAY
TP19	AA185468	0.5	A22/7568	B	12	22	13	9	73	WS	4.4	C L	Mottled brown slightly sandy, slightly gravelly, CLAY
TP22	AA185497	0.6	A22/7571	B	19	28	NP	NP	70	WS	4.4		Brown sandy gravelly SILT
TP24	AA181961	1.5	A22/7574	B	17	31	17	14	77	WS	4.4	C L	Brown slightly sandy, slightly gravelly, CLAY
TP26	AA181975	0.5	A22/7575	B	18	35	19	16	61	WS	4.4	C L	Brown slightly sandy, slightly gravelly, CLAY
TP28	AA181969	0.6	A22/7576	B	25	35	18	17	78	WS	4.4	C L	Mottled brown slightly sandy, slightly gravelly, CLAY
TP31	AA181992	0.5	A22/7578	B	17	31	17	14	74	WS	4.4	C L	Brown slightly sandy, slightly gravelly, CLAY
TP33	AA181989	0.5	A22/7579	B	20	37	18	19	55	WS	4.4	C I	Brown slightly sandy, slightly gravelly, CLAY
TP34	AA181986	0.5	A22/7580	B	19	34	18	16	62	WS	4.4	C L	Brown sandy gravelly CLAY

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

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

Sample Type: B - Bulk Disturbed
U - Undisturbed

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

Persons authorized to approve reports
H Byrne (Laboratory Manager)

Approved by: H Byrne

Date: 20/02/23

TEST REPORT
Determination of Particle Size Distribution

Tested in accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5**
(note: Sedimentation stage not accredited)

RECEIVED: 13/09/2024

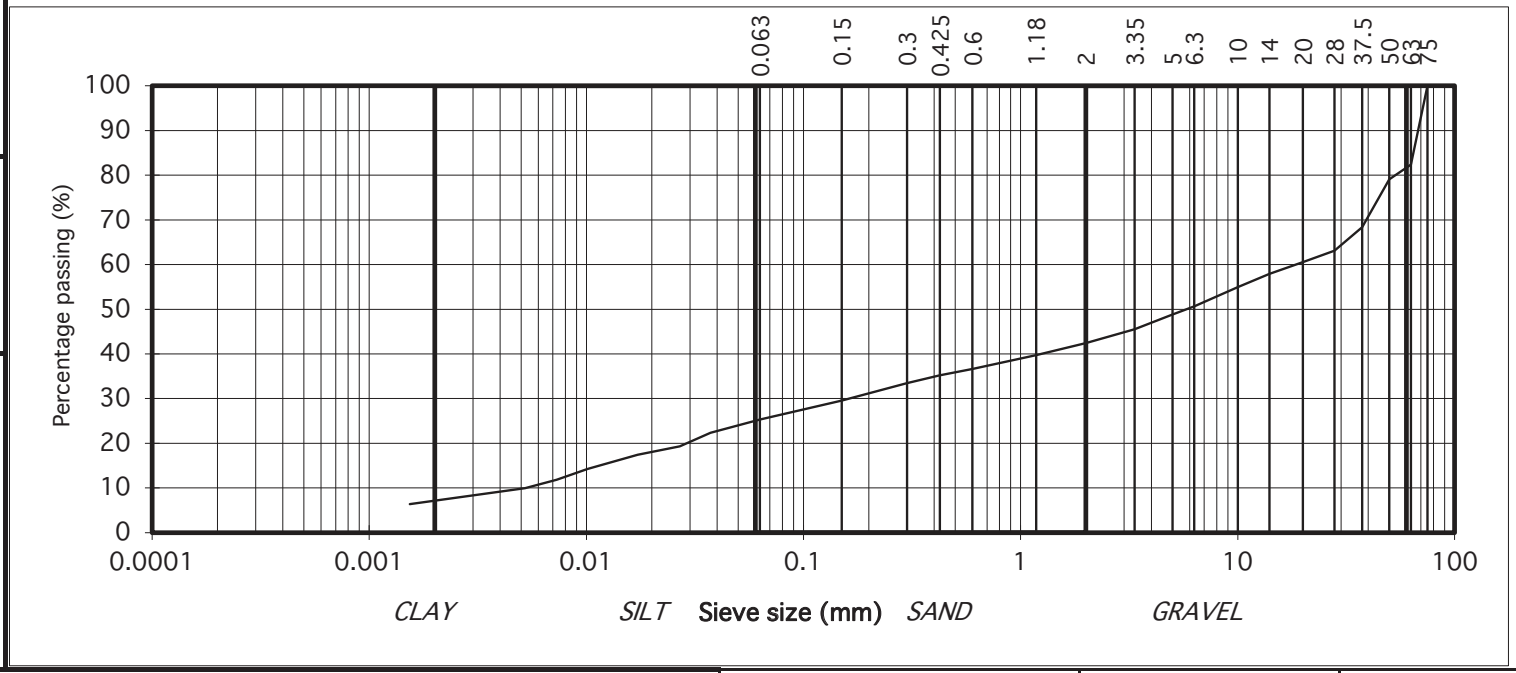
ISO 17025 INAB ACCREDITED TESTING DETAILED IN SCOPE REG NO. 133T

particle size	% passing	
75	100	COBBLES
63	82	
50	79	GRAVEL
37.5	68	
28	63	
20	61	
14	58	
10	55	
6.3	51	
5	49	
3.35	46	
2	42	
1.18	40	SAND
0.6	37	
0.425	35	
0.3	33	
0.15	30	
0.063	25	SILT/CLAY
0.037	22	
0.027	19	
0.017	17	
0.010	14	
0.007	12	
0.005	10	
0.002	6	

Contract No.	24330	Report No.	R142643
Contract Name :	Halverstown , Naas , Proposed Data Centre Sites		
BH/TP No.	BH01		
Sample No.*	AA184688	Lab. Sample No.	A22/7547
Sample Type:	B		
Depth* (m)	2.00	Customer:	DOBA
Date Received	24/01/2023	Date Testing started	26/01/2023
Description:	Brown slightly sandy, gravelly, SILT with some cobbles		
Remarks	Note: **Clause 9.2 and Clause 9.5 of BS1377:Part 2:1990 have been superseded by ISO17892-4:2 Sample size did not meet the requirements of BS1377		

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

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H Byrne	15/02/23	1 of 1

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

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

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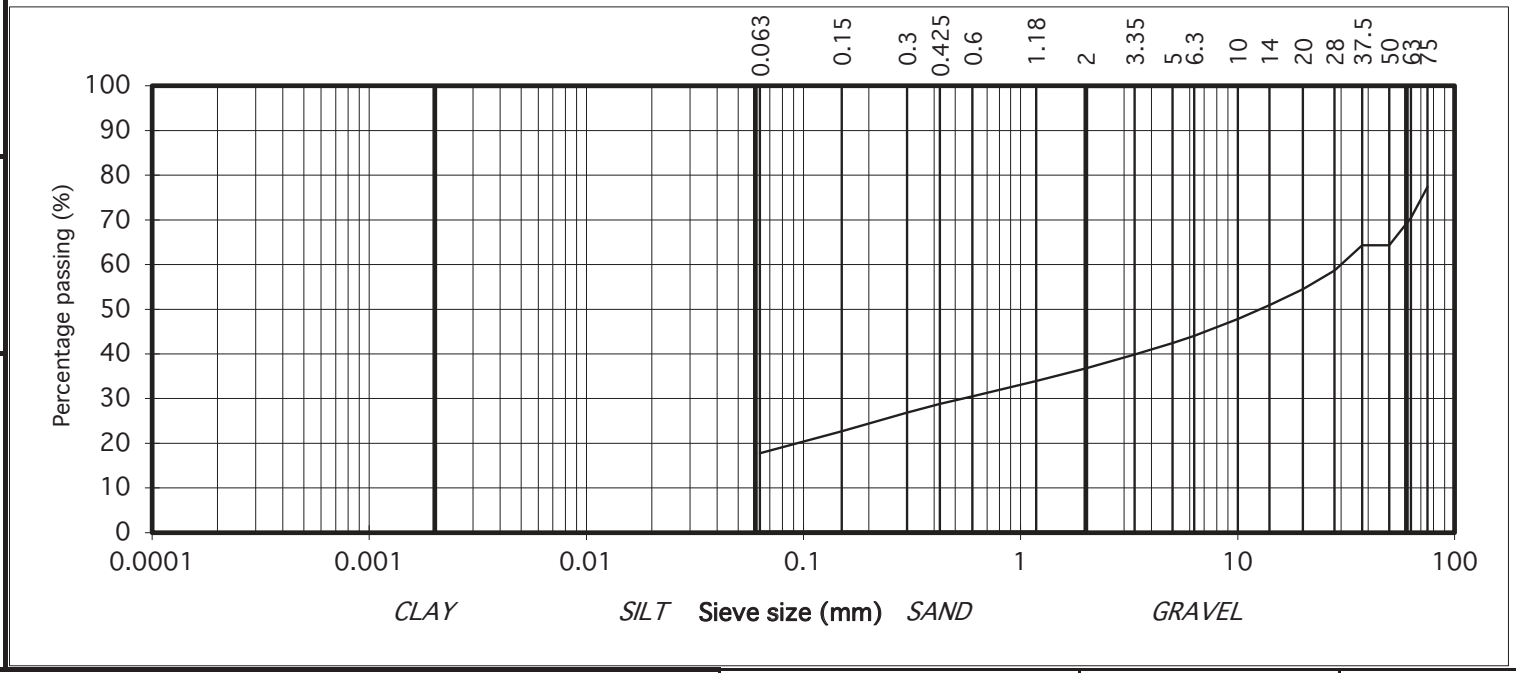
ISO 17025 INAB ACCREDITED TESTING DETAILED IN SCOPE REG NO. 133T

particle size	% passing	
75	77	COBBLES
63	70	
50	64	GRAVEL
37.5	64	
28	59	
20	54	
14	51	
10	48	
6.3	44	
5	42	
3.35	40	
2	37	
1.18	34	SAND
0.6	30	
0.425	29	
0.3	27	
0.15	23	
0.063	18	SILT/CLAY

Contract No. 24330 Report No. R142644
Contract Name : Halverstown , Naas 0 Proposed Data Centre Sites
BH/TP No. BH03
Sample No.* AA184692 Lab. Sample No. A22/7549
Sample Type: B
Depth* (m) 3.00 Customer: DOBA
Date Received 24/01/2023 Date Testing started 26/01/2023
Description: Brown silty, sandy, GRAVEL with many cobbles

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

Results relate only to the specimen tested in as received condition unless otherwise noted. * denotes Customer supplied information. Opinions and interpretations are outside the scope of accreditation.
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Approved by:	Date:	Page no:
H Byrne	15/02/23	1 of 1

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

TEST REPORT
Determination of Particle Size Distribution

Tested in accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5**
(note: Sedimentation stage not accredited)

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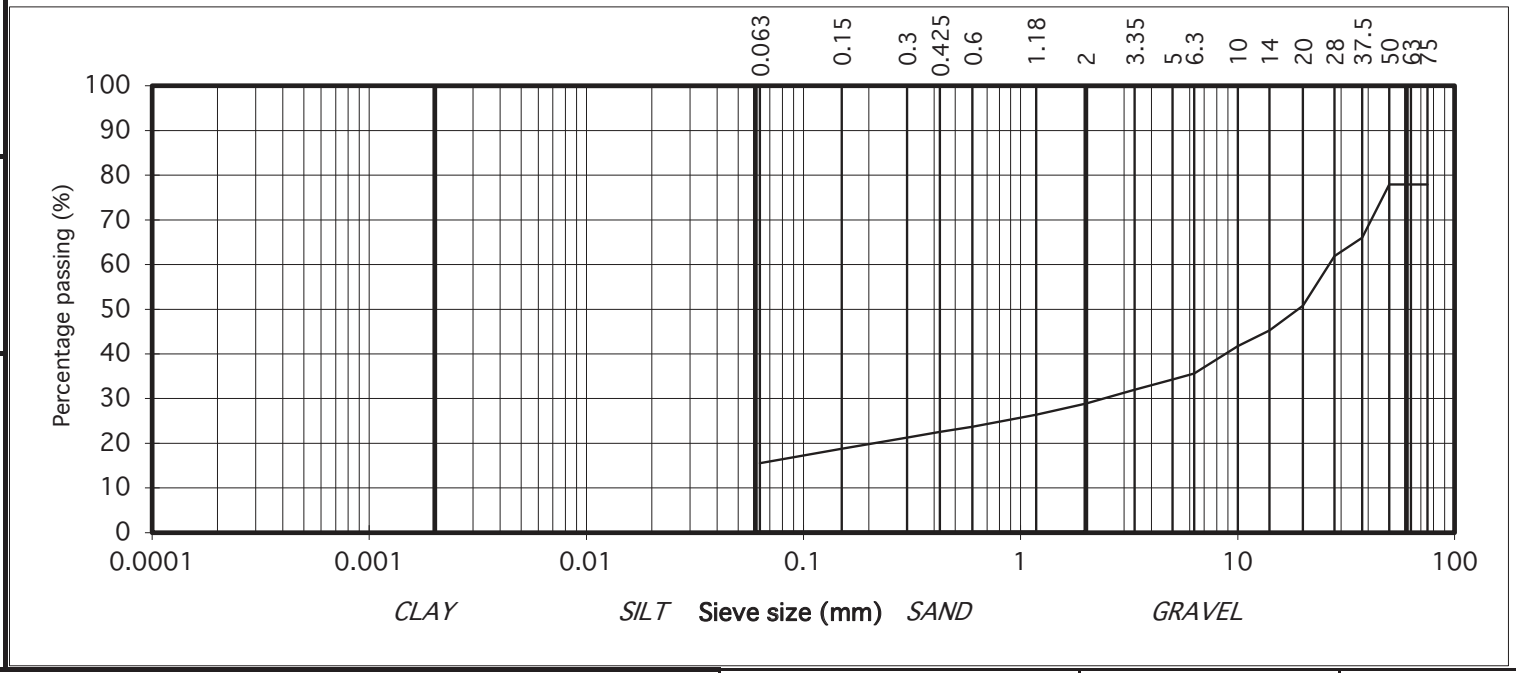
ISO 17025 INAB ACCREDITED TESTING DETAILED IN SCOPE REG NO. 133T

particle size	% passing	
75	78	COBBLES
63	78	
50	78	GRAVEL
37.5	66	
28	62	
20	51	
14	45	
10	42	
6.3	36	
5	34	
3.35	32	
2	29	
1.18	26	SAND
0.6	24	
0.425	23	
0.3	21	
0.15	19	
0.063	16	SILT/CLAY

Contract No. 24330 Report No. R142645
Contract Name : Halverstown , Naas , Proposed Data Centre Sites
BH/TP No. BH05
Sample No.* AA184672 Lab. Sample No. A22/7552
Sample Type: B
Depth* (m) 3.00 Customer: DOBA
Date Received 24/01/2023 Date Testing started 24/01/2023
Description: Grey/brown clayey, sandy, GRAVEL with many cobbles

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

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Approved by:	Date:	Page no:
H Byrne	15/02/23	1 of 1

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

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

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

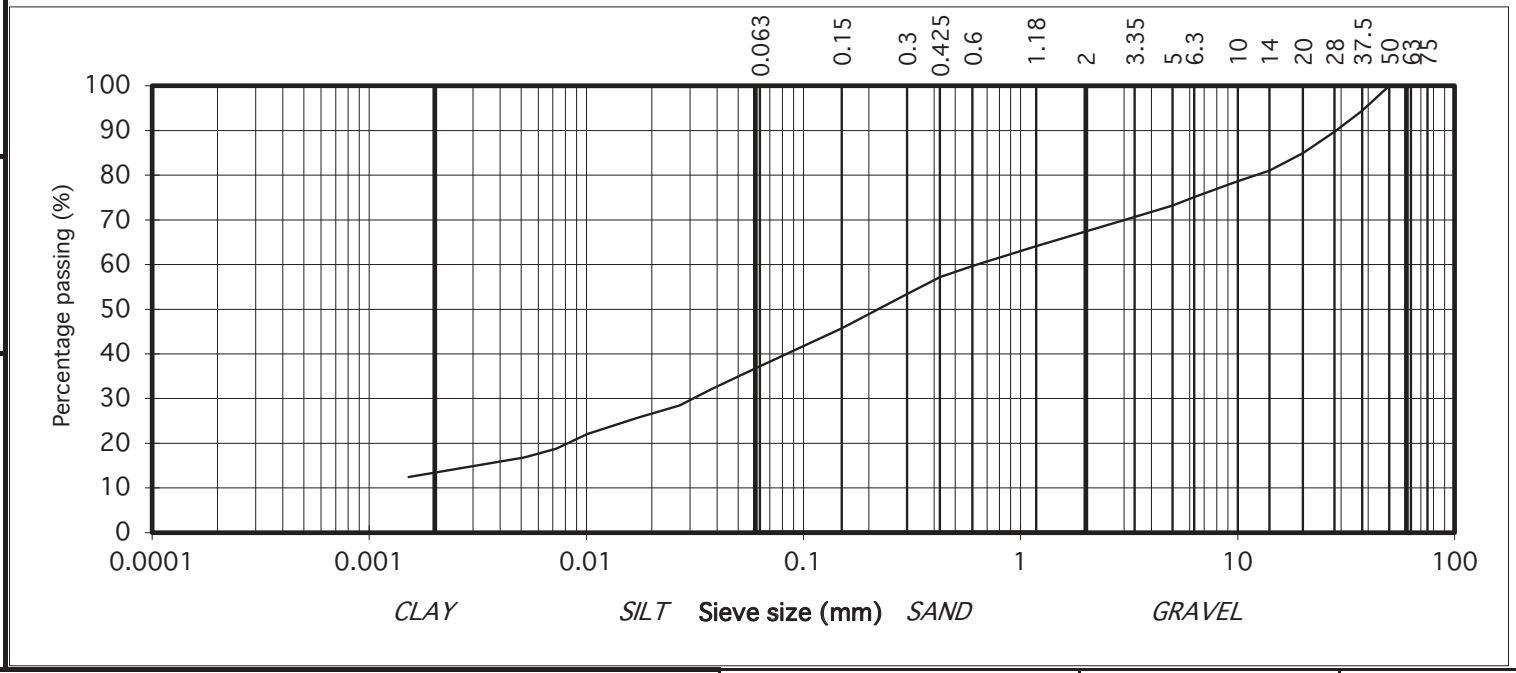
particle size	% passing	
75	100	COBBLES
63	100	
50	100	GRAVEL
37.5	94	
28	90	
20	85	
14	81	
10	79	
6.3	75	
5	73	
3.35	71	
2	67	
1.18	64	SAND
0.6	60	
0.425	57	
0.3	53	
0.15	46	
0.063	37	SILT/CLAY
0.037	32	
0.027	28	
0.017	26	
0.010	22	
0.007	19	
0.005	17	
0.002	12	

Contract No.	24330	Report No.	R142646
Contract Name :	Halverstown , Naas , Proposed Data Centre Sites		
BH/TP No.	BH07		
Sample No.*	AA184674	Lab. Sample No.	A22/7554
Sample Type:	B		
Depth* (m)	2.00	Customer:	DOBA
Date Received	24/01/2023	Date Testing started	26/01/2023
Description:	Brown slightly sandy, slightly gravelly, CLAY		

Remarks Note: **Clause 9.2 and Clause 9.5 of BS1377:Part 2:1990 have been superseded by ISO17892-4:2016 .

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

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Approved by:	Date:	Page no:
H Byrne	20/02/23	1 of 1

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

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

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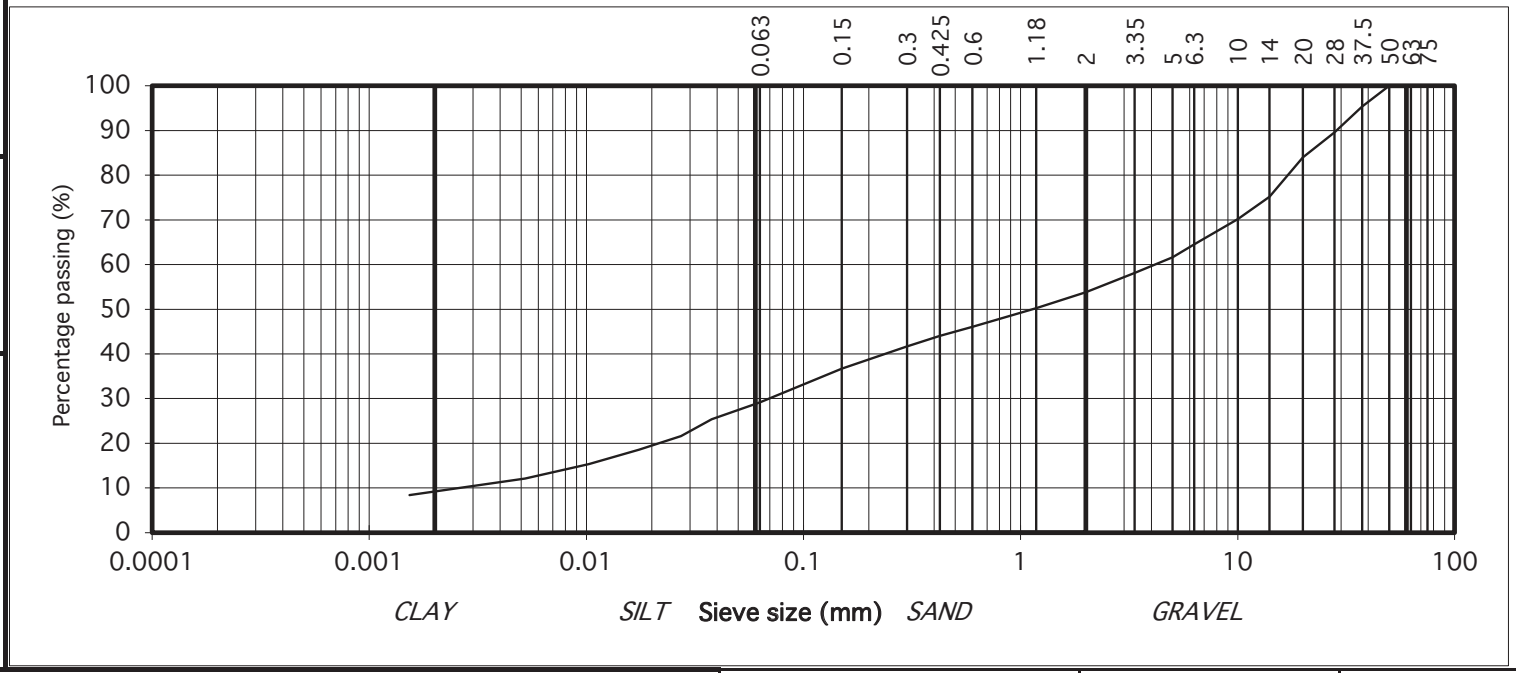
ISO 17025 INAB ACCREDITED TESTING DETAILED IN SCOPE REG NO. 133T

particle size	% passing	
75	100	COBBLES
63	100	
50	100	GRAVEL
37.5	95	
28	90	
20	84	
14	75	
10	70	
6.3	64	
5	62	
3.35	58	
2	54	
1.18	50	SAND
0.6	46	
0.425	44	
0.3	42	
0.15	37	
0.063	29	SILT/CLAY
0.038	25	
0.027	22	
0.018	19	
0.010	15	
0.007	14	
0.005	12	
0.002	8	

Contract No. 24330 Report No. R142647
Contract Name : Halverstown , Naas , Proposed Data Centre Sites
BH/TP No. BH09
Sample No.* AA184681 Lab. Sample No. A22/7556
Sample Type: B
Depth* (m) 3.00 Customer: DOBA
Date Received 24/01/2023 Date Testing started 24/01/2023
Description: Brown slightly sandy, gravelly, SILT/CLAY

Remarks Note: **Clause 9.2 and Clause 9.5 of BS1377:Part 2:1990 have been superseded by ISO17892-4:2016 .

Results relate only to the specimen tested in as received condition unless otherwise noted. * denotes Customer supplied information. Opinions and interpretations are outside the scope of accreditation.
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Approved by:	Date:	Page no:
H Byrne	20/02/23	1 of 1

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

TEST REPORT
Determination of Particle Size Distribution

Tested in accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5**
(note: Sedimentation stage not accredited)

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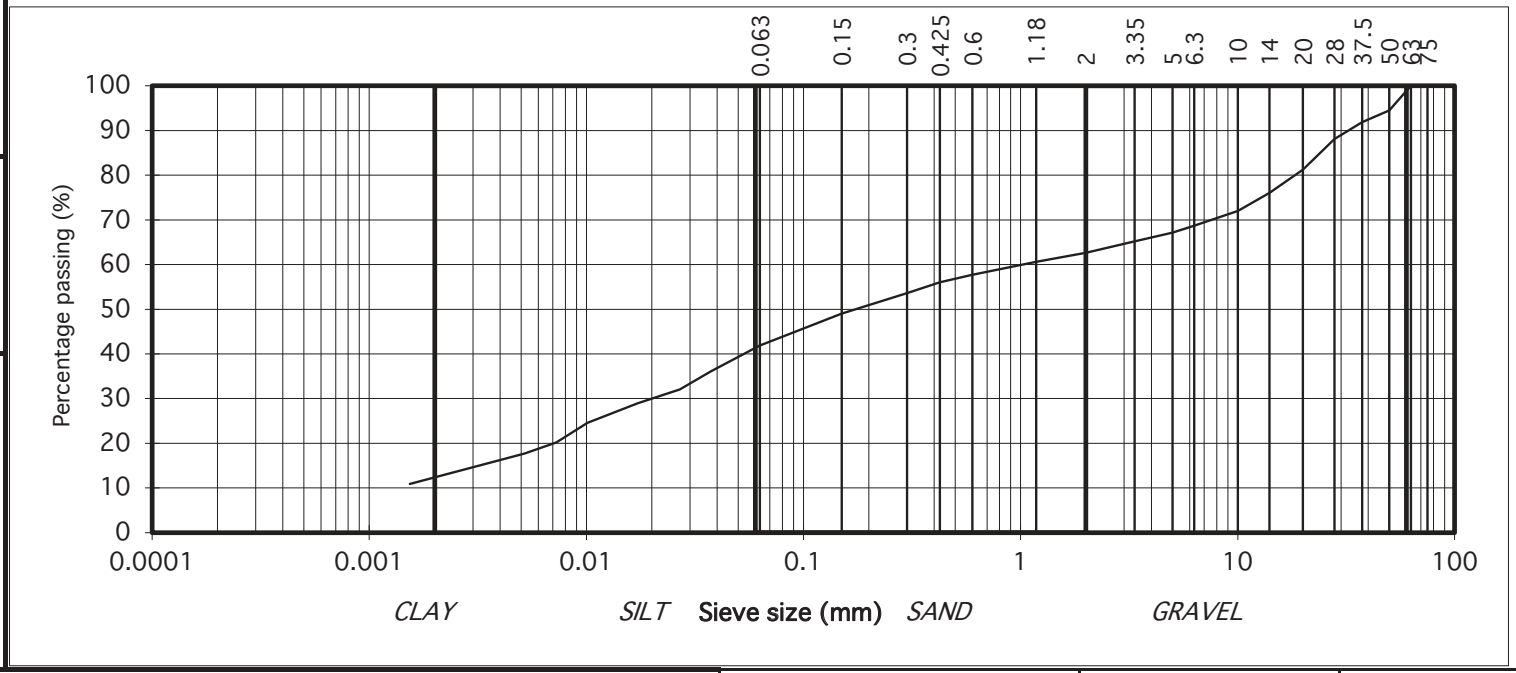
ISO 17025 IVNAB ACCREDITED TESTING DETAILED IN SCOPE REG NO. 133T

particle size	% passing	
75	100	COBBLES
63	100	
50	94	GRAVEL
37.5	92	
28	88	
20	81	
14	76	
10	72	
6.3	69	
5	67	
3.35	65	
2	63	
1.18	61	SAND
0.6	58	
0.425	56	
0.3	54	
0.15	49	
0.063	42	SILT/CLAY
0.037	36	
0.027	32	
0.017	29	
0.010	25	
0.007	20	
0.005	18	
0.002	11	

Contract No. 24330 Report No. R142648
Contract Name : Halverstown , Naas , Proposed Data Centre Sites
BH/TP No. BH11
Sample No.* AA184673 Lab. Sample No. A22/7558
Sample Type: B
Depth* (m) 3.00 Customer: DOBA
Date Received 24/01/2023 Date Testing started 26/01/2023
Description: Brown slightly sandy, gravelly, CLAY

Remarks Note: **Clause 9.2 and Clause 9.5 of BS1377:Part 2:1990 have been superseded by ISO17892-4:2016 .

Results relate only to the specimen tested in as received condition unless otherwise noted. * denotes Customer supplied information. Opinions and interpretations are outside the scope of accreditation.
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H Byrne	20/02/23	1 of 1

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

TEST REPORT
Determination of Particle Size Distribution

Tested in accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5**
(note: Sedimentation stage not accredited)

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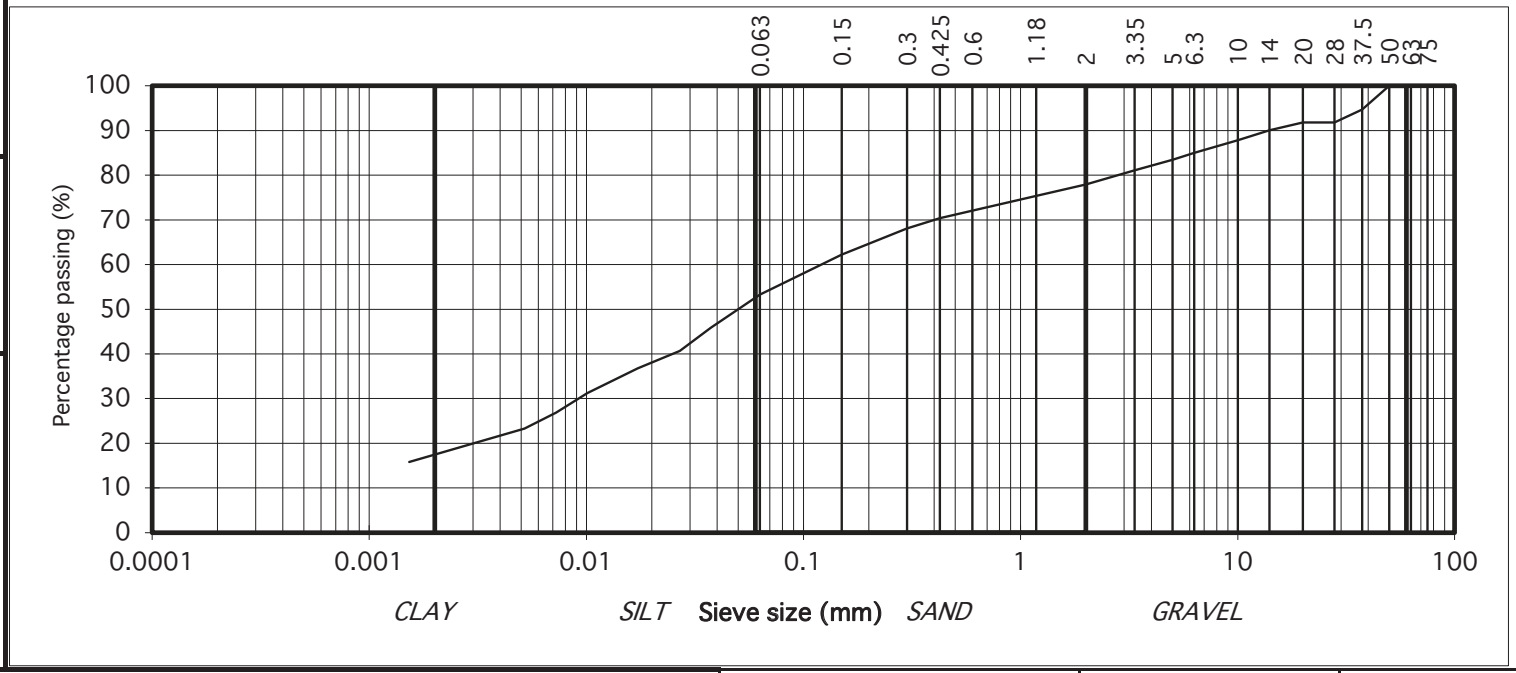
ISO 17025 INAB ACCREDITED TESTING DETAILED IN SCOPE REG NO. 133T

particle size	% passing	
75	100	COBBLES
63	100	
50	100	GRAVEL
37.5	95	
28	92	
20	92	
14	90	
10	88	
6.3	85	
5	83	
3.35	81	
2	78	
1.18	75	SAND
0.6	72	
0.425	70	
0.3	68	
0.15	62	
0.063	53	SILT/CLAY
0.037	46	
0.027	41	
0.017	37	
0.010	31	
0.007	27	
0.005	23	
0.002	16	

Contract No. 24330 Report No. R142649
Contract Name : Halverstown , Naas , Proposed Data Centre Sites
BH/TP No. BH13
Sample No.* AA184686 Lab. Sample No. A22/7561
Sample Type: B
Depth* (m) 2.00 Customer: DOBA
Date Received 24/01/2023 Date Testing started 26/01/2023
Description: Brown slightly sandy, slightly gravelly, SILT/CLAY

Remarks Note: **Clause 9.2 and Clause 9.5 of BS1377:Part 2:1990 have been superseded by ISO17892-4:2016 .

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

Approved by:	Date:	Page no:
H Byrne	20/02/23	1 of 1

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

TEST REPORT
Determination of Particle Size Distribution

Tested in accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5**
(note: Sedimentation stage not accredited)

RECEIVED: 13/09/2024

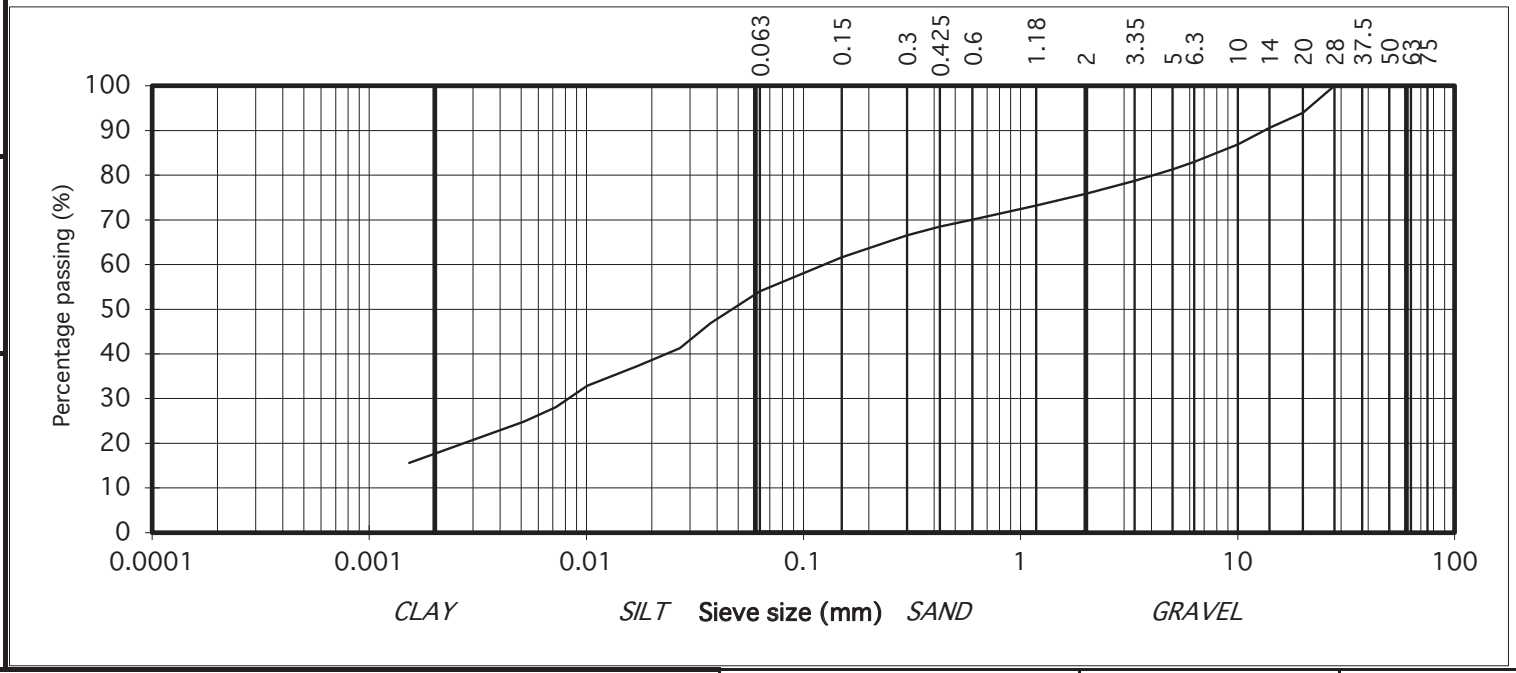
ISO 17025 IVNAB ACCREDITED TESTING DETAILED IN SCOPE REG NO. 133T

particle size	% passing	
75	100	COBBLES
63	100	
50	100	GRAVEL
37.5	100	
28	100	
20	94	
14	91	
10	87	
6.3	83	
5	81	
3.35	79	
2	76	
1.18	73	SAND
0.6	70	
0.425	68	
0.3	67	
0.15	62	
0.063	54	SILT/CLAY
0.037	47	
0.027	41	
0.017	37	
0.010	33	
0.007	28	
0.005	25	
0.002	16	

Contract No. 24330 Report No. R142650
Contract Name : Halverstown , Naas , Proposed Data Centre Sites
BH/TP No. TP04
Sample No.* AA186982 Lab. Sample No. A22/7562
Sample Type: B
Depth* (m) 0.60 Customer: DOBA
Date Received 24/01/2023 Date Testing started 24/01/2023
Description: Brown slightly sandy, slightly gravelly, CLAY

Remarks Note: **Clause 9.2 and Clause 9.5 of BS1377:Part 2:1990 have been superseded by ISO17892-4:2016 .

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

Approved by:	Date:	Page no:
H Byrne	20/02/23	1 of 1

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

TEST REPORT
Determination of Particle Size Distribution

Tested in accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5**
(note: Sedimentation stage not accredited)

RECEIVED: 13/09/2024

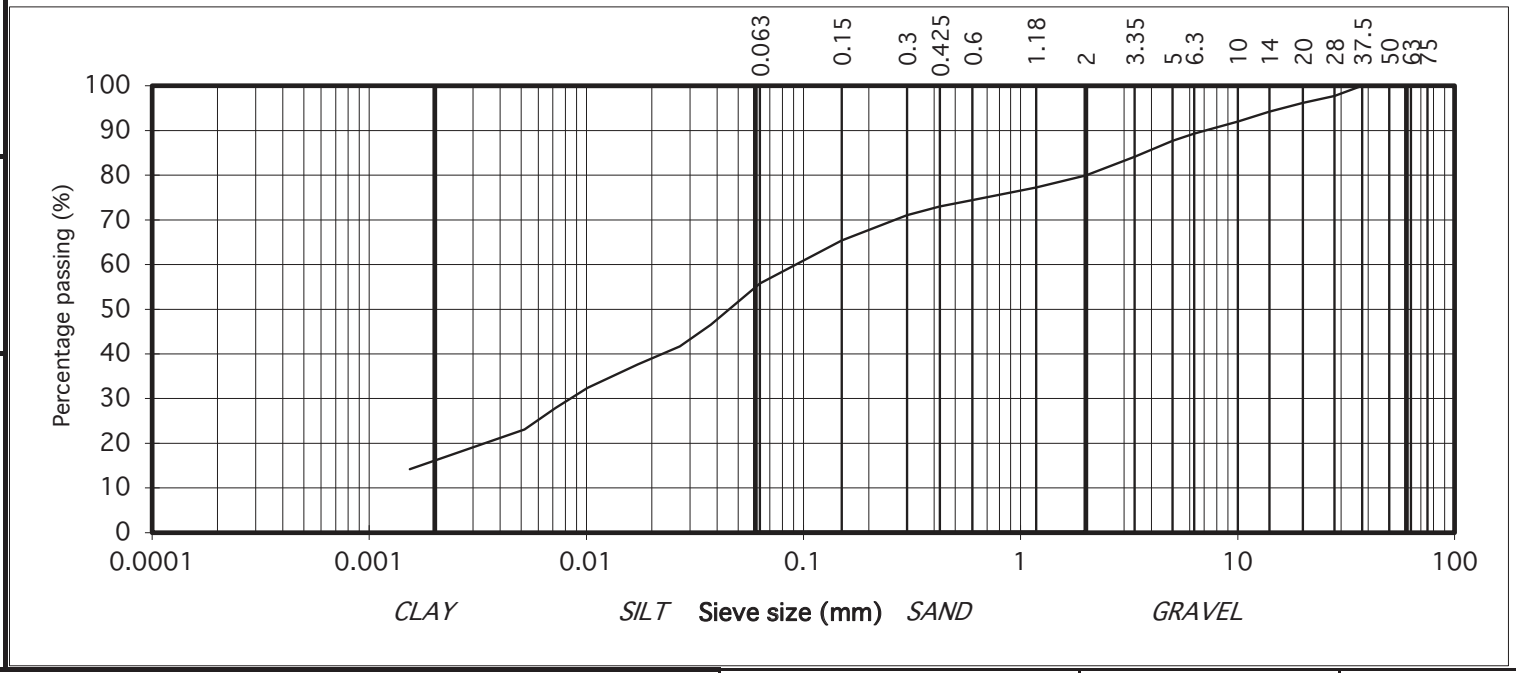
ISO 17025 INAB ACCREDITED TESTING DETAILED IN SCOPE REG NO. 133T

particle size	% passing	
75	100	COBBLES
63	100	
50	100	GRAVEL
37.5	100	
28	98	
20	96	
14	94	
10	92	
6.3	89	
5	88	
3.35	84	
2	80	
1.18	77	SAND
0.6	74	
0.425	73	
0.3	71	
0.15	65	
0.063	56	SILT/CLAY
0.037	47	
0.027	42	
0.017	38	
0.010	32	
0.007	28	
0.005	23	
0.002	14	

Contract No.	24330	Report No.	R142651
Contract Name :	Halverstown , Naas , Proposed Data Centre Sites		
BH/TP No.	TP12		
Sample No.*	AA185481	Lab. Sample No.	A22/7563
Sample Type:	B		
Depth* (m)	0.50	Customer:	DOBA
Date Received	24/01/2023	Date Testing started	24/01/2023
Description:	Brown slightly sandy, slightly gravelly, CLAY		

Remarks: Note: **Clause 9.2 and Clause 9.5 of BS1377:Part 2:1990 have been superseded by ISO17892-4:2016 .

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Approved by:	Date:	Page no:
H Byrne	20/02/23	1 of 1

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

TEST REPORT
Determination of Particle Size Distribution

Tested in accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5**
(note: Sedimentation stage not accredited)

RECEIVED: 13/09/2024

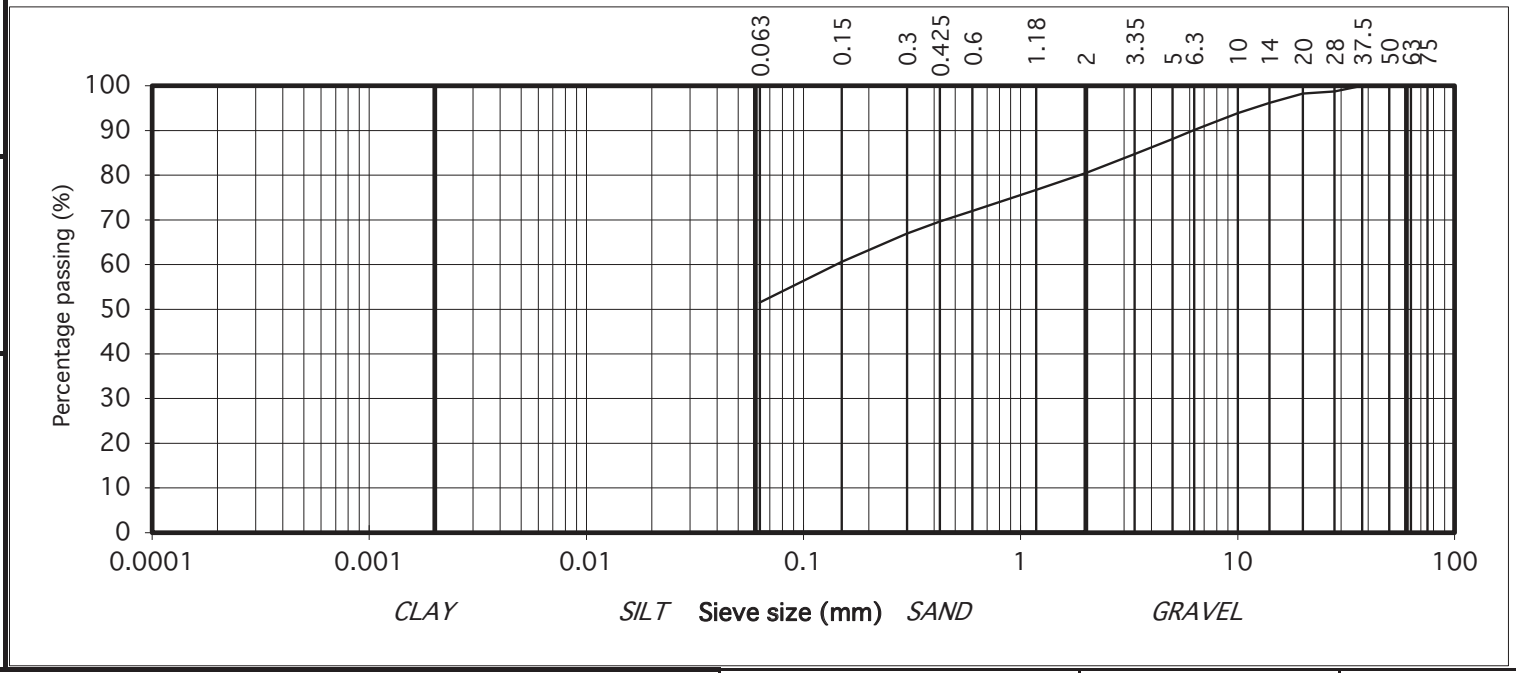
ISO 17025 INAB ACCREDITED TESTING DETAILED IN SCOPE REG NO. 133T

particle size	% passing	
75	100	COBBLES
63	100	
50	100	GRAVEL
37.5	100	
28	99	
20	98	
14	96	
10	94	
6.3	90	
5	88	
3.35	85	
2	80	
1.18	77	SAND
0.6	72	
0.425	70	
0.3	67	
0.15	61	
0.063	52	SILT/CLAY

Contract No. 24330 Report No. R142652
Contract Name : Halverstown , Naas , Proposed Data Centre Sites
AA185479 TP15
Sample No.* AA186982 Lab. Sample No. A22/7565
Sample Type: B
Depth* (m) 1.50 Customer: DOBA
Date Received 24/01/2023 Date Testing started 24/01/2023
Description: Brown slightly sandy, slightly gravelly, CLAY

Remarks Note: **Clause 9.2 and Clause 9.5 of BS1377:Part 2:1990 have been superseded by ISO17892-4:2016 .

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

TEST REPORT
Determination of Particle Size Distribution

Tested in accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5**
(note: Sedimentation stage not accredited)

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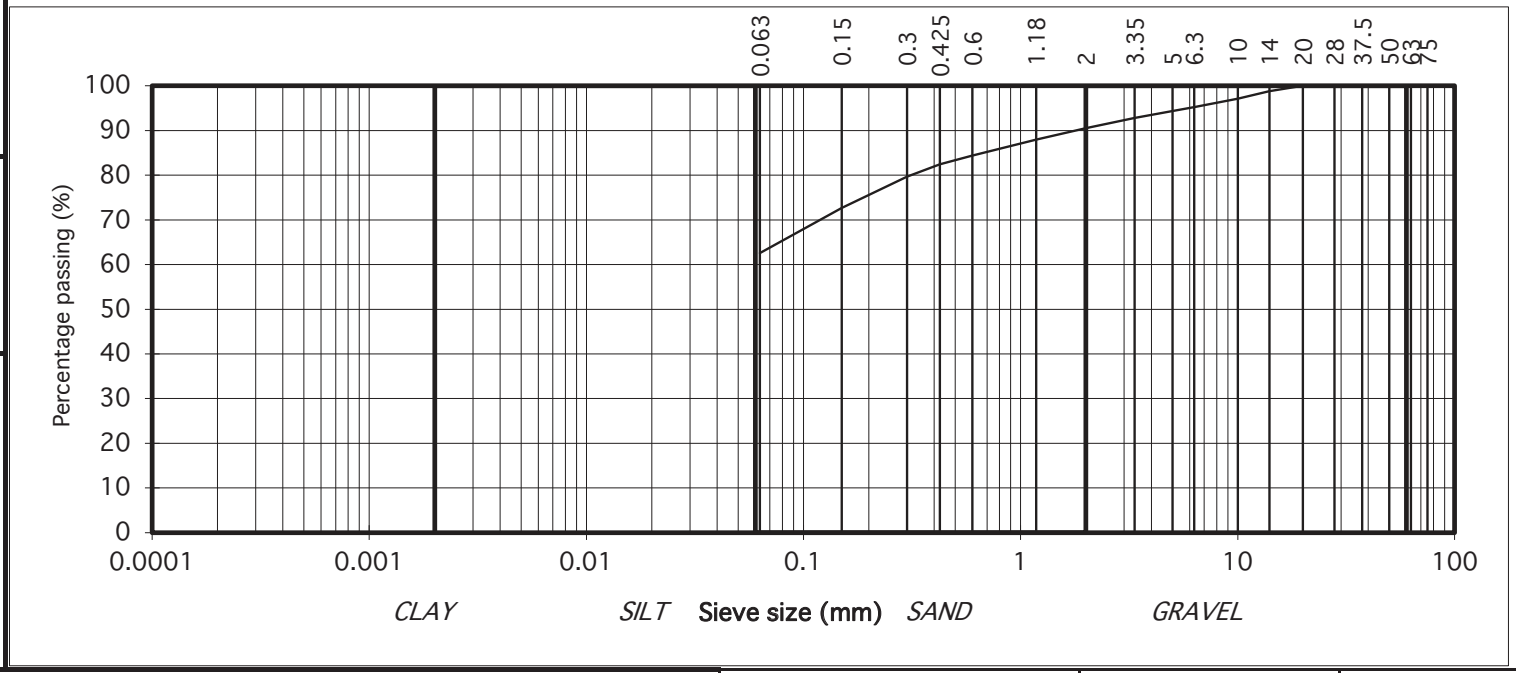
ISO 17025 INAB ACCREDITED TESTING DETAILED IN SCOPE REG NO. 133T

particle size	% passing	
75	100	COBBLES
63	100	
50	100	GRAVEL
37.5	100	
28	100	
20	100	
14	99	
10	97	
6.3	95	
5	94	
3.35	93	
2	90	
1.18	88	SAND
0.6	84	
0.425	82	
0.3	80	
0.15	73	
0.063	63	SILT/CLAY

Contract No. 24330 Report No. R142653
Contract Name : Halverstown , Naas , Proposed Data Centre Sites
AA185479 TP16
Sample No.* AA185481 Lab. Sample No. A22/7566
Sample Type: B
Depth* (m) 1.00 Customer: DOBA
Date Received 24/01/2023 Date Testing started 24/01/2023
Description: Mottled brown slightly sandy, slightly gravelly, CLAY

Remarks Note: **Clause 9.2 and Clause 9.5 of BS1377:Part 2:1990 have been superseded by ISO17892-4:2016 .

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H Byrne	21/02/23	1 of 1

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

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

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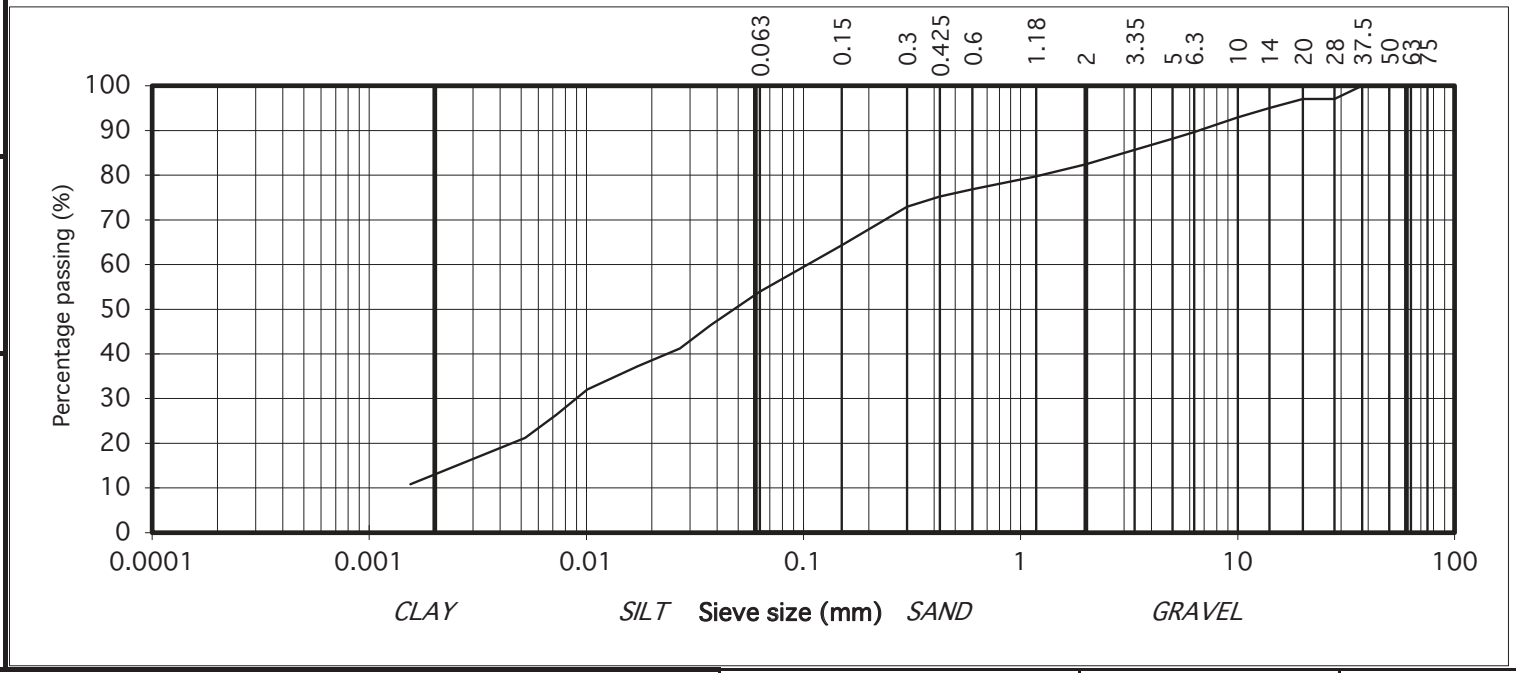
ISO 17025 INAB ACCREDITED TESTING DETAILED IN SCOPE REG NO. 133T

particle size	% passing	
75	100	COBBLES
63	100	
50	100	GRAVEL
37.5	100	
28	97	
20	97	
14	95	
10	93	
6.3	90	
5	88	
3.35	86	
2	82	
1.18	80	SAND
0.6	77	
0.425	75	
0.3	73	
0.15	64	
0.063	54	SILT/CLAY
0.037	46	
0.027	41	
0.017	37	
0.010	32	
0.007	26	
0.005	21	
0.002	11	

Contract No.	24330	Report No.	R142654
Contract Name :	Halverstown , Naas , Proposed Data Centre Sites		
AA185479	TP19		
Sample No.*	AA185468	Lab. Sample No.	A22/7568
Sample Type:	B		
Depth* (m)	0.50	Customer:	DOBA
Date Received	24/01/2023	Date Testing started	24/01/2023
Description:	Mottled brown slightly sandy, slightly gravelly, CLAY		

Remarks: Note: **Clause 9.2 and Clause 9.5 of BS1377:Part 2:1990 have been superseded by ISO17892-4:2016 .

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

TEST REPORT
Determination of Particle Size Distribution

Tested in accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5**
(note: Sedimentation stage not accredited)

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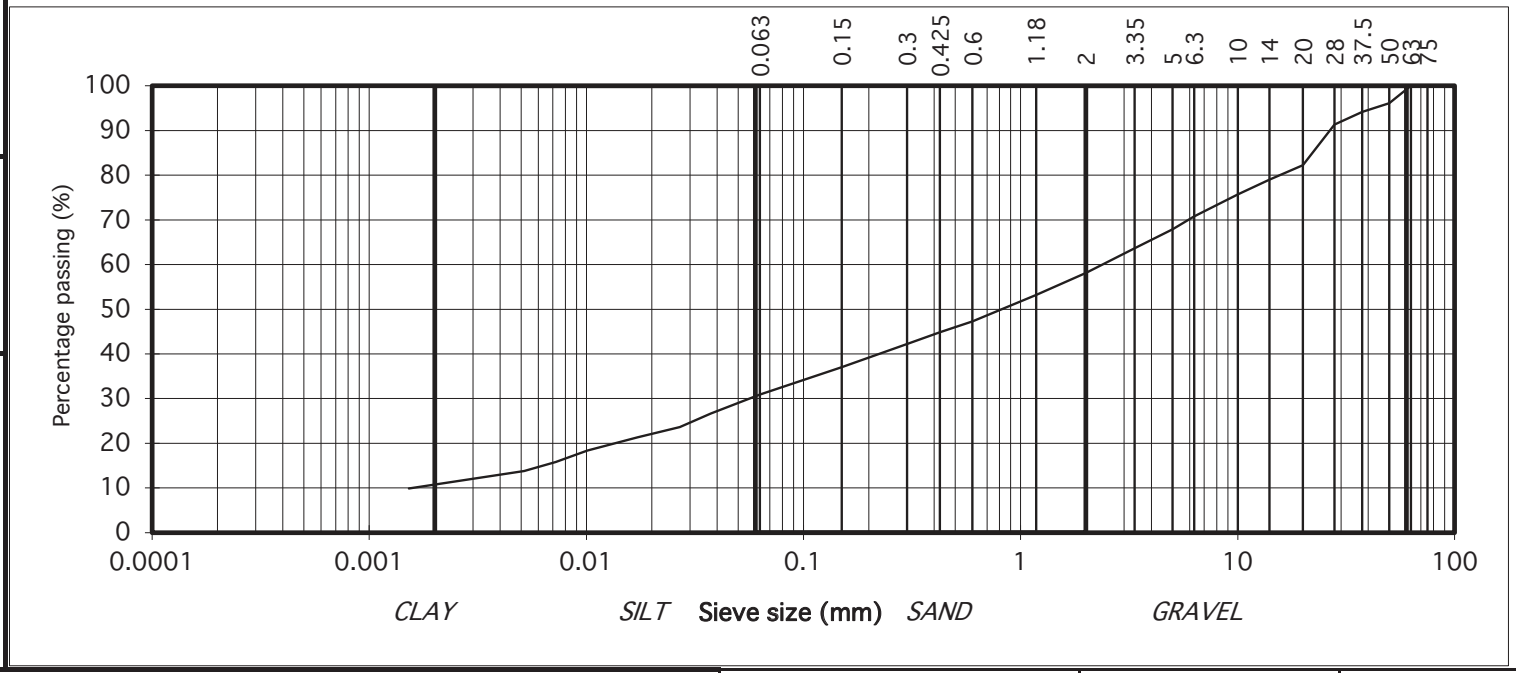
ISO 17025 IVNAB ACCREDITED TESTING DETAILED IN SCOPE REG NO. 133T

particle size	% passing	
75	100	COBBLES
63	100	
50	96	GRAVEL
37.5	94	
28	91	
20	82	
14	79	
10	76	
6.3	71	
5	68	
3.35	64	
2	58	
1.18	53	SAND
0.6	47	
0.425	45	
0.3	42	
0.15	37	
0.063	31	SILT/CLAY
0.037	27	
0.027	24	
0.017	21	
0.010	18	
0.007	16	
0.005	14	
0.002	10	

Contract No. 24330 Report No. R142655
Contract Name : Halverstown , Naas , Proposed Data Centre Sites
AA185479 TP22
Sample No.* AA185500 Lab. Sample No. A22/7572
Sample Type: B
Depth* (m) 2.40 Customer: DOBA
Date Received 24/01/2023 Date Testing started 24/01/2023
Description: Brown slightly sandy, gravelly, SILT/CLAY

Remarks Note: **Clause 9.2 and Clause 9.5 of BS1377:Part 2:1990 have been superseded by ISO17892-4:2016 .

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

TEST REPORT
Determination of Particle Size Distribution

Tested in accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5**
(note: Sedimentation stage not accredited)

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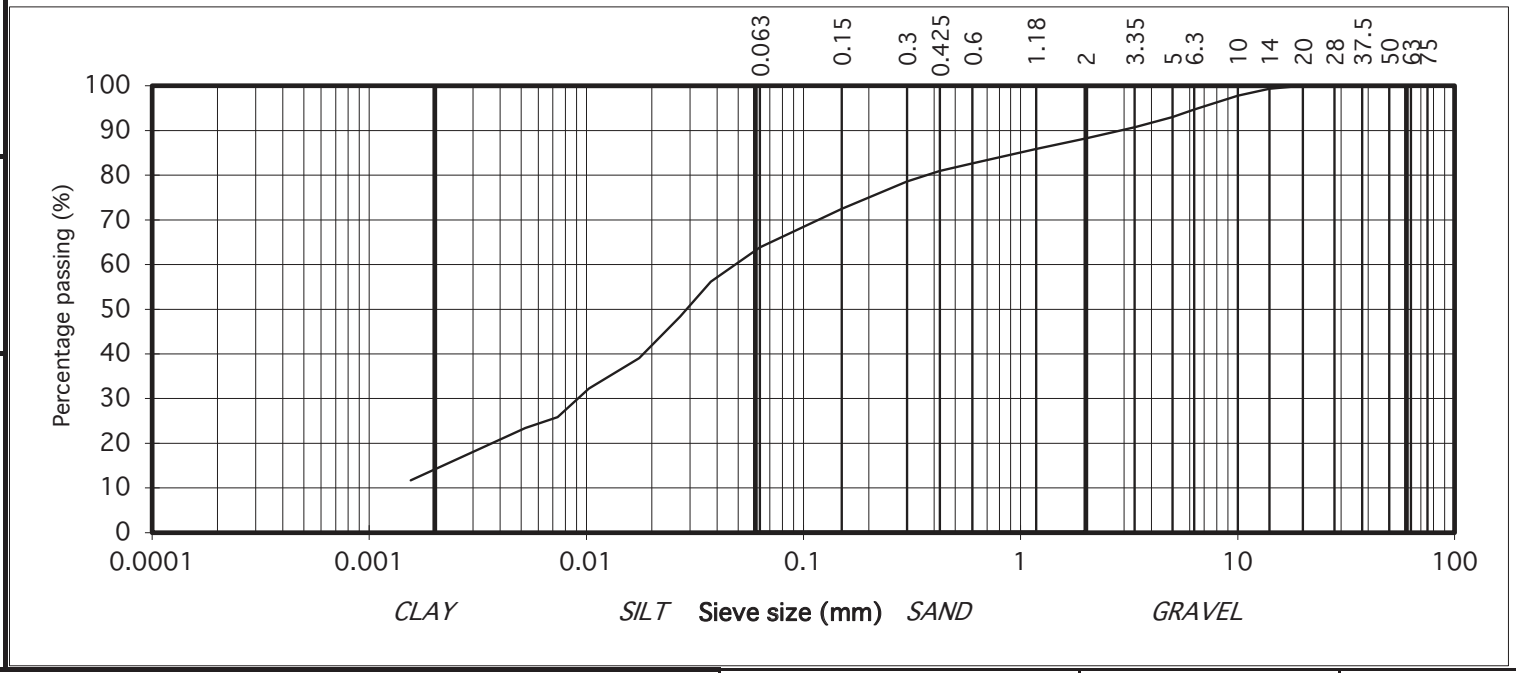
ISO 17025 IVNAB ACCREDITED TESTING DETAILED IN SCOPE REG NO. 133T

particle size	% passing	
75	100	COBBLES
63	100	
50	100	GRAVEL
37.5	100	
28	100	
20	100	
14	99	
10	98	
6.3	95	
5	93	
3.35	91	
2	88	
1.18	86	SAND
0.6	83	
0.425	81	
0.3	79	
0.15	72	
0.063	64	SILT/CLAY
0.037	56	
0.027	48	
0.018	39	
0.010	32	
0.007	26	
0.005	23	
0.002	12	

Contract No. 24330 Report No. R142656
Contract Name : Halverstown , Naas , Proposed Data Centre Sites
AA185479 TP24
Sample No.* AA181981 Lab. Sample No. A22/7574
Sample Type: B
Depth* (m) 1.50 Customer: DOBA
Date Received 24/01/2023 Date Testing started 24/01/2023
Description: Brown slightly sandy, slightly gravelly, CLAY

Remarks Note: **Clause 9.2 and Clause 9.5 of BS1377:Part 2:1990 have been superseded by ISO17892-4:2016 .

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TEST REPORT
Determination of Particle Size Distribution

Tested in accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5**
(note: Sedimentation stage not accredited)

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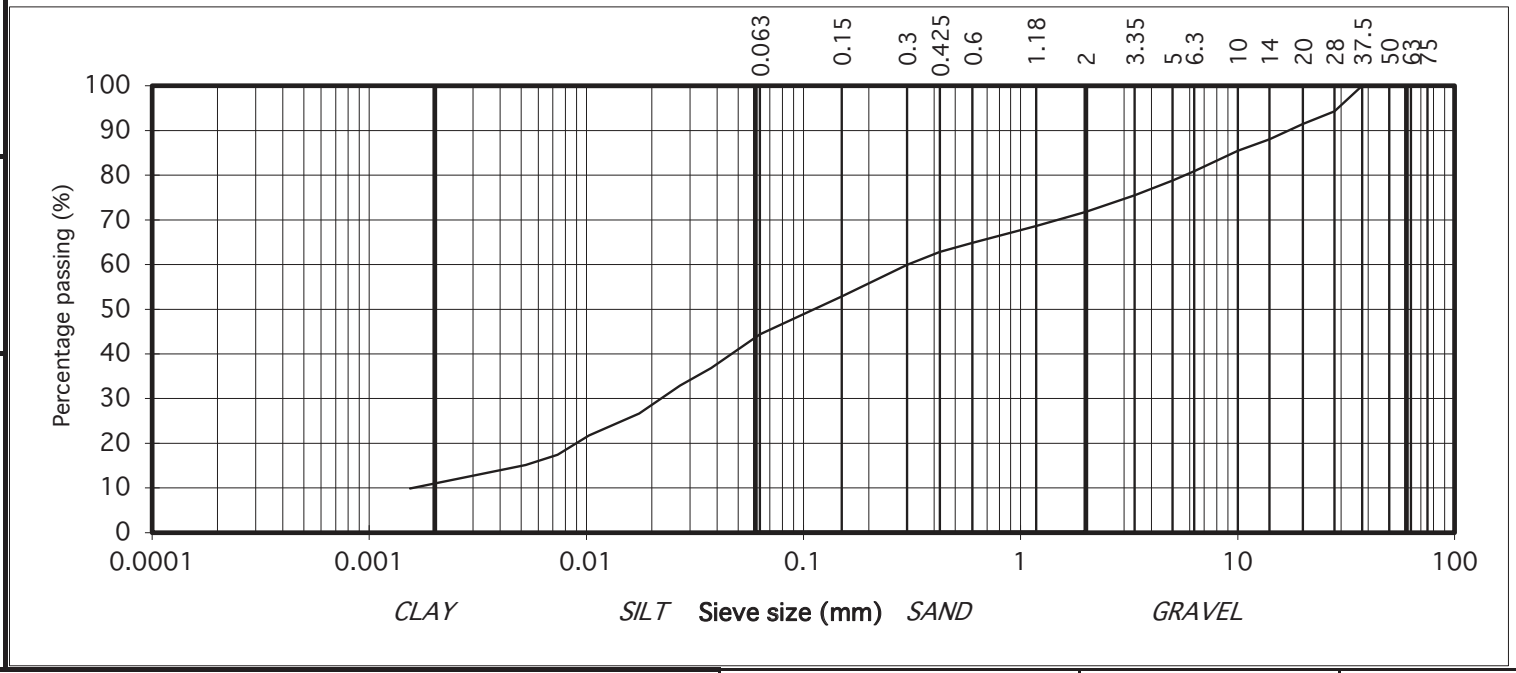
ISO 17025 INAB ACCREDITED TESTING DETAILED IN SCOPE REG NO. 133T

particle size	% passing	
75	100	COBBLES
63	100	
50	100	GRAVEL
37.5	100	
28	94	
20	91	
14	88	
10	85	
6.3	81	
5	79	
3.35	75	
2	72	
1.18	69	SAND
0.6	65	
0.425	63	
0.3	60	
0.15	53	
0.063	44	SILT/CLAY
0.038	37	
0.027	33	
0.017	27	
0.010	22	
0.007	17	
0.005	15	
0.002	10	

Contract No. 24330 Report No. R142657
Contract Name : Halverstown , Naas , Proposed Data Centre Sites
AA185479 TP26
Sample No.* AA181975 Lab. Sample No. A22/7575
Sample Type: B
Depth* (m) 0.50 Customer: DOBA
Date Received 24/01/2023 Date Testing started 24/01/2023
Description: Brown slightly sandy, slightly gravelly, CLAY

Remarks Note: **Clause 9.2 and Clause 9.5 of BS1377:Part 2:1990 have been superseded by ISO17892-4:2016 .

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

TEST REPORT
Determination of Particle Size Distribution

Tested in accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5**
(note: Sedimentation stage not accredited)

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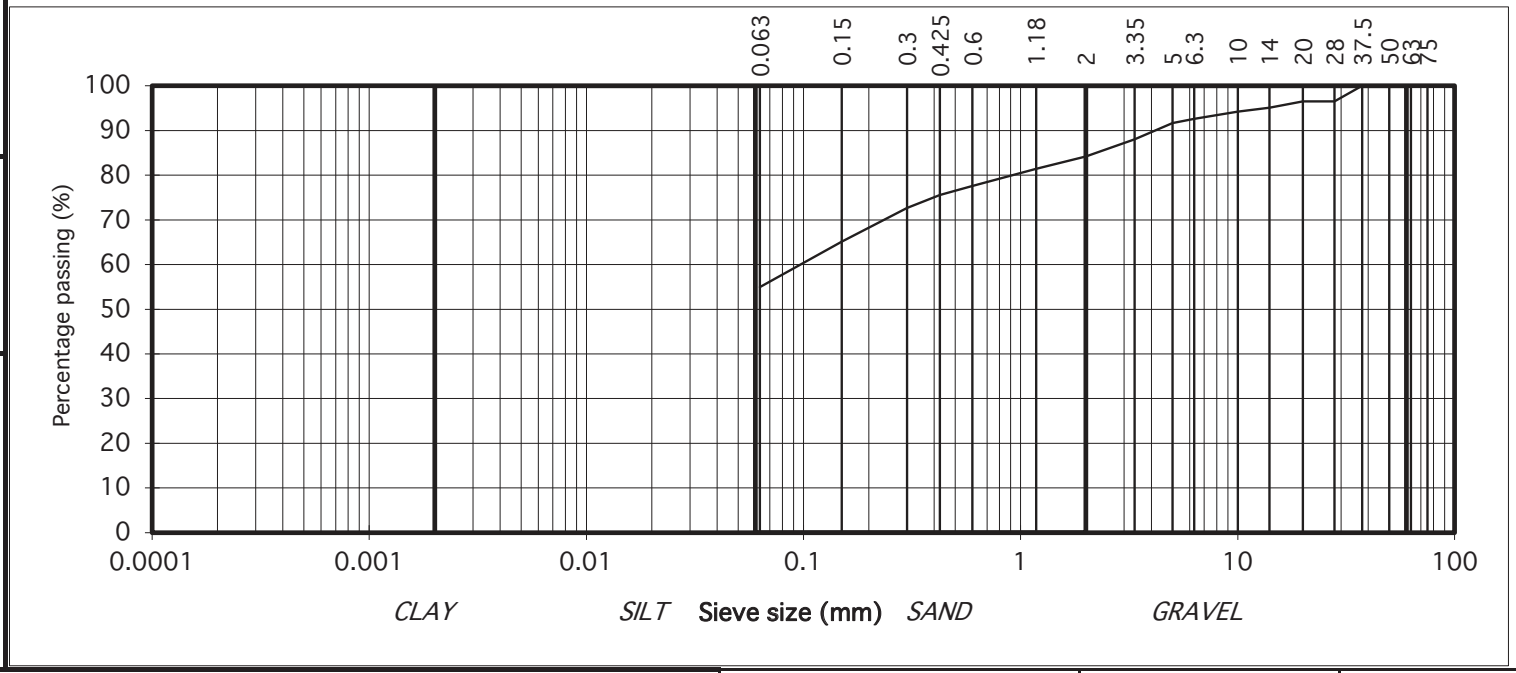
particle size	% passing	
75	100	COBBLES
63	100	
50	100	GRAVEL
37.5	100	
28	97	
20	97	
14	95	
10	94	
6.3	93	
5	92	
3.35	88	
2	84	
1.18	81	SAND
0.6	78	
0.425	76	
0.3	73	
0.15	65	
0.063	55	SILT/CLAY

Contract No. 24330 Report No. R142658
Contract Name : Halverstown , Naas , Proposed Data Centre Sites
AA185479 TP28
Sample No.* AA181969 Lab. Sample No. A22/7576
Sample Type: B
Depth* (m) 0.60 Customer: DOBA
Date Received 24/01/2023 Date Testing started 24/01/2023
Description: Mottled brown slightly sandy, slightly gravelly, CLAY

Remarks Note: **Clause 9.2 and Clause 9.5 of BS1377:Part 2:1990 have been superseded by ISO17892-4:2016 .

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H Byrne	21/02/23	1 of 1

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

TEST REPORT
Determination of Particle Size Distribution

Tested in accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5**
(note: Sedimentation stage not accredited)

RECEIVED: 13/09/2024

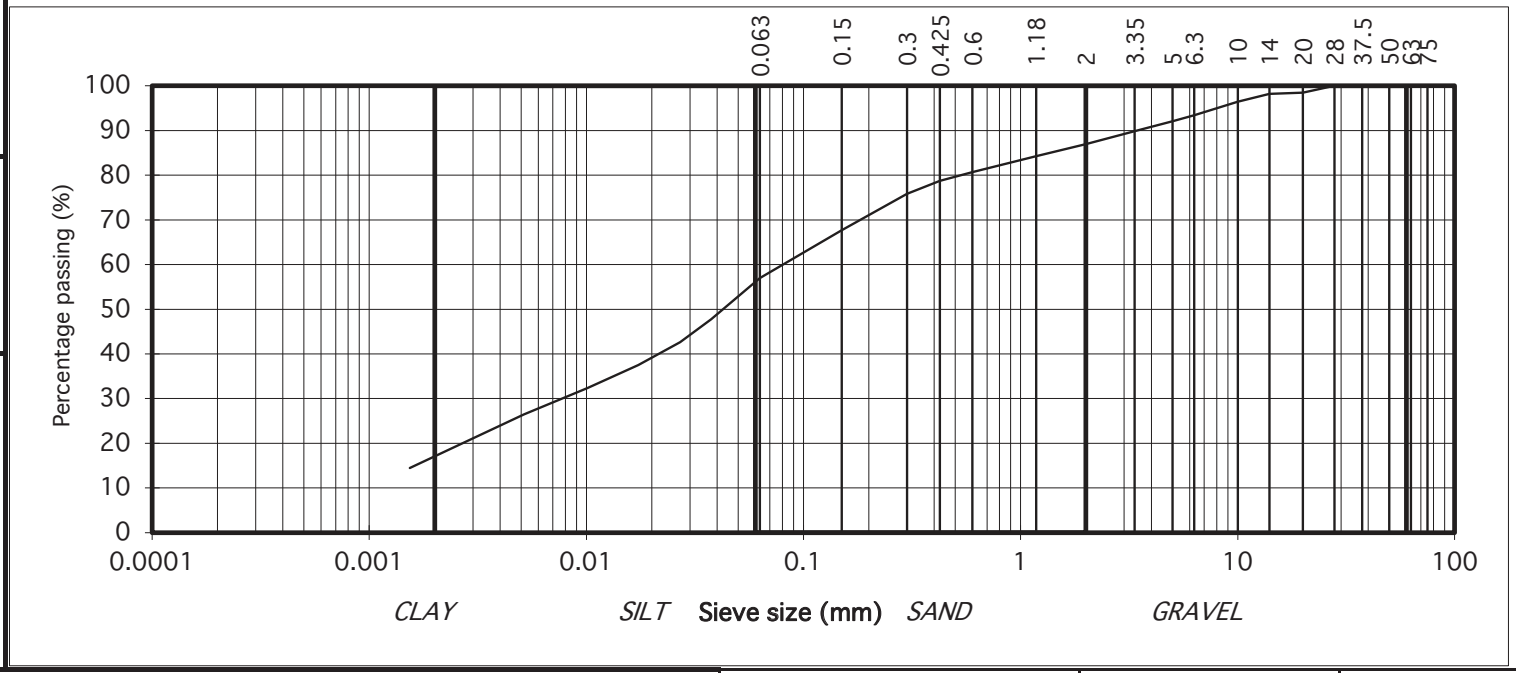
ISO 17025 INAB ACCREDITED TESTING DETAILED IN SCOPE REG NO. 133T

particle size	% passing	
75	100	COBBLES
63	100	
50	100	GRAVEL
37.5	100	
28	100	
20	98	
14	98	
10	96	
6.3	93	
5	92	
3.35	90	
2	87	
1.18	84	SAND
0.6	81	
0.425	79	
0.3	76	
0.15	68	
0.063	57	SILT/CLAY
0.038	48	
0.027	43	
0.017	38	
0.010	32	
0.007	29	
0.005	26	
0.002	14	

Contract No. 24330 Report No. R142751
Contract Name : Halverstown , Naas , Proposed Data Centre Sites
AA185479 TP31
Sample No.* AA181992 Lab. Sample No. A22/7578
Sample Type: B
Depth* (m) 0.50 Customer: DOBA
Date Received 24/01/2023 Date Testing started 24/01/2023
Description: Brown slightly sandy, slightly gravelly, CLAY

Remarks Note: **Clause 9.2 and Clause 9.5 of BS1377:Part 2:1990 have been superseded by ISO17892-4:2016 .

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

TEST REPORT
Determination of Particle Size Distribution

Tested in accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5**
(note: Sedimentation stage not accredited)

RECEIVED: 13/09/2024

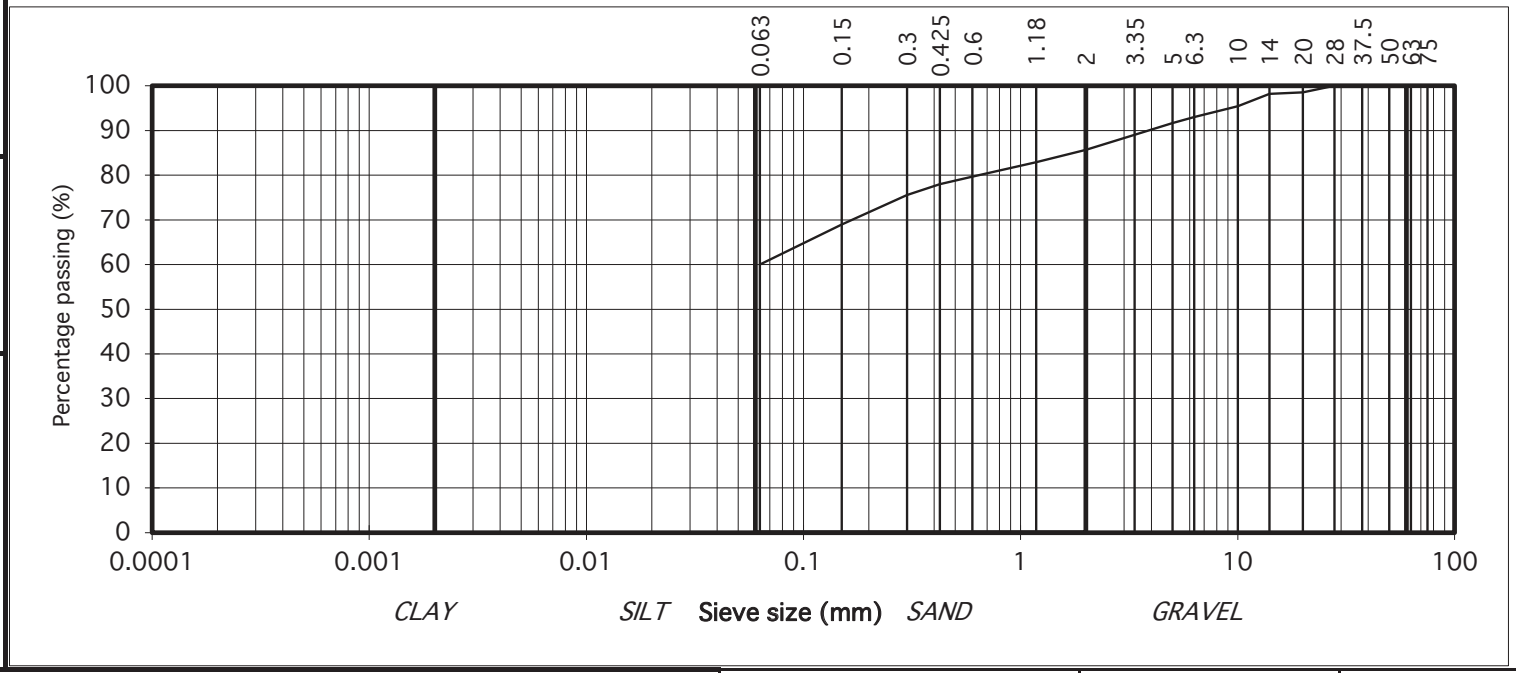
ISO 17025 IVNAB ACCREDITED TESTING DETAILED IN SCOPE REG NO. 133T

particle size	% passing	
75	100	COBBLES
63	100	
50	100	GRAVEL
37.5	100	
28	100	
20	99	
14	98	
10	95	
6.3	93	
5	92	
3.35	89	
2	86	
1.18	83	SAND
0.6	80	
0.425	78	
0.3	76	
0.15	69	
0.063	60	SILT/CLAY

Contract No. 24330 Report No. R142659
Contract Name : Halverstown , Naas , Proposed Data Centre Sites
AA185479 TP33
Sample No.* AA181989 Lab. Sample No. A22/7579
Sample Type: B
Depth* (m) 0.50 Customer: DOBA
Date Received 24/01/2023 Date Testing started 24/01/2023
Description: Brown slightly sandy, slightly gravelly, CLAY

Remarks Note: **Clause 9.2 and Clause 9.5 of BS1377:Part 2:1990 have been superseded by ISO17892-4:2016 .

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

IGSL Ltd
Materials Laboratory
Unit J5,M7 Business Park
Naas
Co. Kildare
045 899324

Test Report

Determination of Moisture Condition Value at Natural Moisture Content

Tested in accordance with BS1377:Part 4:1990, clause 5.4

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

RECEIVED: 13/08/2024

Report No.	**R142007**
Contract No.	24330
Contract Name:	Halverstown , Naas - Proposed Data Centres
Customer:	DOBA
BH/TP*	TP04
Sample No.*	AA186982
Depth* (m)	0.60
Sample Type:	B
Lab Sample No.	A22/7562
Source* (if applicable)	N/A
Material Type* (if applicable):	B
Sample Received:	24/01/23
Date Tested:	25/01/23
Sample Cert:	Not Provided
Moisture Content (%):	13
% Particles > 20mm (By dry mass):	14
MCV:	4.6
Interpretation of Plot:	Steepest Straight Line
Description of Soil:	Brown slightly sandy slightly gravelly CLAY

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Persons authorised to approve reports
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H Byrne (Laboratory Manager)

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IGSL Ltd
Materials Laboratory
Unit J5,M7 Business Park
Naas
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045 899324

Test Report

Determination of Moisture Condition Value at Natural Moisture Content

Tested in accordance with BS1377:Part 4:1990, clause 5.4

ISO 17025 IVNAB ACCREDITED TESTING DETAILED IN SCOPE REG NO.1337

RECEIVED: 13/08/2024

Report No.	**R142008**
Contract No.	24330
Contract Name:	Halverstown , Naas - Proposed Data Centres
Customer:	DOBA
BH/TP*	TP04
Sample No.*	AA186982
Depth* (m)	0.60
Sample Type:	B
Lab Sample No.	A22/7562
Source* (if applicable)	0
Material Type* (if applicable):	B
Sample Received:	24/01/23
Date Tested:	25/01/23
Sample Cert:	Not Provided
Moisture Content (%):	10
% Particles > 20mm (By dry mass):	14
MCV:	7.2
Interpretation of Plot:	Steepest Straight Line
Description of Soil:	Brown slightly sandy slightly gravelly CLAY - 1% Lime Added

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Persons authorised to approve reports
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H Byrne (Laboratory Manager)

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Unit J5,M7 Business Park
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Test Report

Determination of Moisture Condition Value at Natural Moisture Content

Tested in accordance with BS1377:Part 4:1990, clause 5.4

ISO 17025 INAB ACCREDITED TESTING DETAILED IN SCOPE REG NO.1337

RECEIVED: 13/08/2024

Report No.	**R142685**
Contract No.	24330
Contract Name:	Halverstown , Naas - Proposed Data Centres
Customer:	DOBA
BH/TP*	TP04
Sample No.*	AA186982
Depth* (m)	0.60
Sample Type:	B
Lab Sample No.	A22/7562
Source* (if applicable)	N/A
Material Type* (if applicable):	B
Sample Received:	24/01/23
Date Tested:	08/02/23
Sample Cert:	Not Provided
Moisture Content (%):	14
% Particles > 20mm (By dry mass):	14
MCV:	8.6
Interpretation of Plot:	Steepest Straight Line
Description of Soil:	Brown slightly sandy slightly gravelly CLAY - 1% Lime/2% Cement

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IGSL Ltd
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Unit J5,M7 Business Park
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045 899324

Test Report

Determination of Moisture Condition Value at Natural Moisture Content

Tested in accordance with BS1377:Part 4:1990, clause 5.4

ISO 17025 INAB ACCREDITED TESTING DETAILED IN SCOPE REG NO.1337

RECEIVED: 13/08/2024

Report No.	**R142009**
Contract No.	24330
Contract Name:	Halverstown , Naas - Proposed Data Centres
Customer:	DOBA
BH/TP*	TP04
Sample No.*	AA186982
Depth* (m)	0.60
Sample Type:	B
Lab Sample No.	A22/7562
Source* (if applicable)	N/A
Material Type* (if applicable):	B
Sample Received:	24/01/23
Date Tested:	25/01/23
Sample Cert:	Not Provided
Moisture Content (%):	11
% Particles > 20mm (By dry mass):	14
MCV:	13.6
Interpretation of Plot:	Steepest Straight Line
Description of Soil:	Brown slightly sandy slightly gravelly CLAY - 3% Lime Added

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H Byrne (Laboratory Manager)

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Materials Laboratory
Unit J5,M7 Business Park
Naas
Co. Kildare
045 899324

Test Report

Determination of Moisture Condition Value at Natural Moisture Content

Tested in accordance with BS1377:Part 4:1990, clause 5.4

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

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Report No.	**R142010**
Contract No.	24330
Contract Name:	Halverstown , Naas - Proposed Data Centres
Customer:	DOBA
BH/TP*	TP12
Sample No.*	AA185481
Depth* (m)	0.50
Sample Type:	B
Lab Sample No.	A22/7563
Source* (if applicable)	N/A
Material Type* (if applicable):	B
Sample Received:	24/01/23
Date Tested:	25/01/23
Sample Cert:	Not Provided
Moisture Content (%):	13
% Particles > 20mm (By dry mass):	6.4
MCV:	6.0
Interpretation of Plot:	Steepest Straight Line
Description of Soil:	Brown slightly sandy slightly gravelly CLAY

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Report No.	**R142011**
Contract No.	24330
Contract Name:	Halverstown , Naas - Proposed Data Centres
Customer:	DOBA
BH/TP*	TP12
Sample No.*	AA185481
Depth* (m)	0.50
Sample Type:	B
Lab Sample No.	A22/7563
Source* (if applicable)	N/A
Material Type* (if applicable):	B
Sample Received:	24/01/23
Date Tested:	25/01/23
Sample Cert:	Not Provided
Moisture Content (%):	13
% Particles > 20mm (By dry mass):	6.4
MCV:	8.0
Interpretation of Plot:	Steepest Straight Line
Description of Soil:	Brown slightly sandy slightly gravelly CLAY - 1% Lime Added

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Report No.	**R142686**
Contract No.	24330
Contract Name:	Halverstown , Naas - Proposed Data Centres
Customer:	DOBA
BH/TP*	TP12
Sample No.*	AA185481
Depth* (m)	0.50
Sample Type:	B
Lab Sample No.	A22/7563
Source* (if applicable)	N/A
Material Type* (if applicable):	B
Sample Received:	24/01/23
Date Tested:	25/01/23
Sample Cert:	Not Provided
Moisture Content (%):	14
% Particles > 20mm (By dry mass):	6.4
MCV:	8.9
Interpretation of Plot:	Steepest Straight Line
Description of Soil:	Brown slightly sandy slightly gravelly CLAY - 1%Lime / 2% Cement

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Report No.	**R142012**
Contract No.	24330
Contract Name:	Halverstown , Naas - Proposed Data Centres
Customer:	DOBA
BH/TP*	TP12
Sample No.*	AA185481
Depth* (m)	0.50
Sample Type:	B
Lab Sample No.	A22/7563
Source* (if applicable)	N/A
Material Type* (if applicable):	B
Sample Received:	24/01/23
Date Tested:	25/01/23
Sample Cert:	Not Provided
Moisture Content (%):	12
% Particles > 20mm (By dry mass):	6.4
MCV:	11.7
Interpretation of Plot:	Steepest Straight Line
Description of Soil:	Brown slightly sandy slightly gravelly CLAY - 3% Lime Added

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Report No.	**R142013**
Contract No.	24330
Contract Name:	Halverstown , Naas - Proposed Data Centres
Customer:	DOBA
BH/TP*	TP13
Sample No.*	AA185455
Depth* (m)	1.00
Sample Type:	B
Lab Sample No.	A22/7560
Source* (if applicable)	N/A
Material Type* (if applicable):	B
Sample Received:	24/01/23
Date Tested:	26/01/23
Sample Cert:	Not Provided
Moisture Content (%):	12
% Particles > 20mm (By dry mass):	9.3
MCV:	8.8
Interpretation of Plot:	Steepest Straight Line
Description of Soil:	Grey/brown sandy gravelly SILT/CLAY

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Report No.	**R142014**
Contract No.	24330
Contract Name:	Halverstown , Naas - Proposed Data Centres
Customer:	DOBA
BH/TP*	TP15
Sample No.*	AA185479
Depth* (m)	1.50
Sample Type:	B
Lab Sample No.	A22/7565
Source* (if applicable)	N/A
Material Type* (if applicable):	B
Sample Received:	24/01/23
Date Tested:	26/01/23
Sample Cert:	Not Provided
Moisture Content (%):	13
% Particles > 20mm (By dry mass):	3.3
MCV:	7.1
Interpretation of Plot:	Steepest Straight Line
Description of Soil:	Brown slightly sandy, slightly gravelly, CLAY

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Report No.	**R142015**
Contract No.	24330
Contract Name:	Halverstown , Naas - Proposed Data Centres
Customer:	DOBA
BH/TP*	TP16
Sample No.*	AA185461
Depth* (m)	1.00
Sample Type:	B
Lab Sample No.	A22/7566
Source* (if applicable)	N/A
Material Type* (if applicable):	B
Sample Received:	24/01/23
Date Tested:	24/01/23
Sample Cert:	Not Provided
Moisture Content (%):	14
% Particles > 20mm (By dry mass):	12
MCV:	0.2
Interpretation of Plot:	Steepest Straight Line
Description of Soil:	Mottled brown slightly sandy, slightly gravelly, CLAY

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Report No.	**R142687**
Contract No.	24330
Contract Name:	Halverstown , Naas - Proposed Data Centres
Customer:	DOBA
BH/TP*	TP18
Sample No.*	AA185468
Depth* (m)	0.50
Sample Type:	B
Lab Sample No.	A22/7567
Source* (if applicable)	N/A
Material Type* (if applicable):	B
Sample Received:	24/01/23
Date Tested:	25/01/23
Sample Cert:	Not Provided
Moisture Content (%):	9.2
% Particles > 20mm (By dry mass):	14
MCV:	12.3
Interpretation of Plot:	Steepest Straight Line
Description of Soil:	Mottled brown sandy gravelly SILT/CLAY

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Report No.	**R142016**
Contract No.	24330
Contract Name:	Halverstown , Naas - Proposed Data Centres
Customer:	DOBA
BH/TP*	TP19
Sample No.*	AA185468
Depth* (m)	0.50
Sample Type:	B
Lab Sample No.	A22/7568
Source* (if applicable)	N/A
Material Type* (if applicable):	B
Sample Received:	24/01/23
Date Tested:	25/01/23
Sample Cert:	Not Provided
Moisture Content (%):	13
% Particles > 20mm (By dry mass):	8.9
MCV:	8.2
Interpretation of Plot:	Steepest Straight Line
Description of Soil:	Brown sandy gravelly SILT/CLAY

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Report No.	**R142017**
Contract No.	24330
Contract Name:	Halverstown , Naas - Proposed Data Centres
Customer:	DOBA
BH/TP*	TP19
Sample No.*	AA185468
Depth* (m)	0.50
Sample Type:	B
Lab Sample No.	A22/7568
Source* (if applicable)	N/A
Material Type* (if applicable):	B
Sample Received:	24/01/23
Date Tested:	25/01/23
Sample Cert:	Not Provided
Moisture Content (%):	13
% Particles > 20mm (By dry mass):	8.9
MCV:	11.2
Interpretation of Plot:	Steepest Straight Line
Description of Soil:	Mottled brown slightly sandy slightly gravelly CLAY - 1% Lime Added

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Report No.	**R142688**
Contract No.	24330
Contract Name:	Halverstown , Naas - Proposed Data Centres
Customer:	DOBA
BH/TP*	TP19
Sample No.*	AA185468
Depth* (m)	0.50
Sample Type:	B
Lab Sample No.	A22/7568
Source* (if applicable)	N/A
Material Type* (if applicable):	B
Sample Received:	24/01/23
Date Tested:	08/02/23
Sample Cert:	Not Provided
Moisture Content (%):	12
% Particles > 20mm (By dry mass):	8.8
MCV:	11.5
Interpretation of Plot:	Steepest Straight Line
Description of Soil:	Mottled brown slightly sandy slightly gravelly CLAY - 1% Lime / 2% Cement

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Report No.	**R142018**
Contract No.	24330
Contract Name:	Halverstown , Naas - Proposed Data Centres
Customer:	DOBA
BH/TP*	TP19
Sample No.*	AA185468
Depth* (m)	0.50
Sample Type:	B
Lab Sample No.	A22/7568
Source* (if applicable)	N/A
Material Type* (if applicable):	B
Sample Received:	24/01/23
Date Tested:	25/01/23
Sample Cert:	Not Provided
Moisture Content (%):	12
% Particles > 20mm (By dry mass):	8.9
MCV:	12.9
Interpretation of Plot:	Steepest Straight Line
Description of Soil:	Mottled brown slightly sandy slightly gravelly CLAY - 3% Lime Added

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Report No.	**R142019**
Contract No.	24330
Contract Name:	Halverstown , Naas - Proposed Data Centres
Customer:	DOBA
BH/TP*	TP20
Sample No.*	AA185488
Depth* (m)	0.60
Sample Type:	B
Lab Sample No.	A22/7569
Source* (if applicable)	N/A
Material Type* (if applicable):	B
Sample Received:	24/01/23
Date Tested:	26/01/23
Sample Cert:	Not Provided
Moisture Content (%):	18
% Particles > 20mm (By dry mass):	10
MCV:	2.4
Interpretation of Plot:	Steepest Straight Line
Description of Soil:	Grey/brown sandy gravelly SILT/CLAY

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Report No.	**R142020**
Contract No.	24330
Contract Name:	Halverstown , Naas - Proposed Data Centres
Customer:	DOBA
BH/TP*	TP21
Sample No.*	AA181983
Depth* (m)	0.50
Sample Type:	B
Lab Sample No.	A22/7570
Source* (if applicable)	N/A
Material Type* (if applicable):	B
Sample Received:	24/01/23
Date Tested:	26/01/23
Sample Cert:	Not Provided
Moisture Content (%):	20
% Particles > 20mm (By dry mass):	3.5
MCV:	7.6
Interpretation of Plot:	Steepest Straight Line
Description of Soil:	Brown sandy gravelly SILT/CLAY

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Report No.	**R142021**
Contract No.	24330
Contract Name:	Halverstown , Naas - Proposed Data Centres
Customer:	DOBA
BH/TP*	TP22
Sample No.*	AA185497
Depth* (m)	0.60
Sample Type:	B
Lab Sample No.	A22/7571
Source* (if applicable)	N/A
Material Type* (if applicable):	B
Sample Received:	24/01/23
Date Tested:	26/01/23
Sample Cert:	Not Provided
Moisture Content (%):	20
% Particles > 20mm (By dry mass):	7.0
MCV:	5.7
Interpretation of Plot:	Steepest Straight Line
Description of Soil:	Brown sandy gravelly SILT/CLAY

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Report No.	**R143243**
Contract No.	24330
Contract Name:	Halverstown , Naas - Proposed Data Centres
Customer:	DOBA
BH/TP*	TP24
Sample No.*	AA181960
Depth* (m)	0.60
Sample Type:	B
Lab Sample No.	A22/7573
Source* (if applicable)	N/A
Material Type* (if applicable):	B
Sample Received:	24/01/23
Date Tested:	15/02/23
Sample Cert:	Not Provided
Moisture Content (%):	14
% Particles > 20mm (By dry mass):	8.6
MCV:	11.2
Interpretation of Plot:	Steepest Straight Line
Description of Soil:	Brown sandy gravelly SILT/CLAY

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Report No.	**R142022**
Contract No.	24330
Contract Name:	Halverstown , Naas - Proposed Data Centres
Customer:	DOBA
BH/TP*	TP26
Sample No.*	AA181975
Depth* (m)	0.50
Sample Type:	B
Lab Sample No.	A22/7575
Source* (if applicable)	N/A
Material Type* (if applicable):	B
Sample Received:	24/01/23
Date Tested:	26/01/23
Sample Cert:	Not Provided
Moisture Content (%):	14
% Particles > 20mm (By dry mass):	7.6
MCV:	6.4
Interpretation of Plot:	Steepest Straight Line
Description of Soil:	Brown slightly sandy, slightly gravelly, CLAY

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Contract No.	24330
Contract Name:	Halverstown , Naas - Proposed Data Centres
Customer:	DOBA
BH/TP*	TP26
Sample No.*	AA181975
Depth* (m)	0.50
Sample Type:	B
Lab Sample No.	A22/7575
Source* (if applicable)	N/A
Material Type* (if applicable):	B
Sample Received:	24/01/23
Date Tested:	26/01/23
Sample Cert:	Not Provided
Moisture Content (%):	11
% Particles > 20mm (By dry mass):	7.6
MCV:	8.4
Interpretation of Plot:	Steepest Straight Line
Description of Soil:	Brown slightly sandy slightly gravelly CLAY - 1% Lime Added

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Report No.	**R142689**
Contract No.	24330
Contract Name:	Halverstown , Naas - Proposed Data Centres
Customer:	DOBA
BH/TP*	TP26
Sample No.*	AA181975
Depth* (m)	0.50
Sample Type:	B
Lab Sample No.	A22/7575
Source* (if applicable)	N/A
Material Type* (if applicable):	B
Sample Received:	24/01/23
Date Tested:	10/02/23
Sample Cert:	Not Provided
Moisture Content (%):	12
% Particles > 20mm (By dry mass):	7.6
MCV:	9.8
Interpretation of Plot:	Steepest Straight Line
Description of Soil:	Brown slightly sandy, slightly gravelly CLAY - 1% Lime / 2% Cement

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Test Report

Determination of Moisture Condition Value at Natural Moisture Content

Tested in accordance with BS1377:Part 4:1990, clause 5.4

ISO 17025 IVNAB ACCREDITED TESTING DETAILED IN SCOPE REG NO.1337

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Report No.	**R142024**
Contract No.	24330
Contract Name:	Halverstown , Naas - Proposed Data Centres
Customer:	DOBA
BH/TP*	TP26
Sample No.*	AA181975
Depth* (m)	0.50
Sample Type:	B
Lab Sample No.	A22/7575
Source* (if applicable)	N/A
Material Type* (if applicable):	B
Sample Received:	24/01/23
Date Tested:	26/01/23
Sample Cert:	Not Provided
Moisture Content (%):	12
% Particles > 20mm (By dry mass):	7.6
MCV:	11.9
Interpretation of Plot:	Steepest Straight Line
Description of Soil:	Brown slightly sandy slightly gravelly CLAY - 3% Lime Added

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

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Report No.	**R142025**
Contract No.	24330
Contract Name:	Halverstown , Naas - Proposed Data Centres
Customer:	DOBA
BH/TP*	TP28
Sample No.*	AA181969
Depth* (m)	0.70
Sample Type:	B
Lab Sample No.	A22/7576
Source* (if applicable)	N/A
Material Type* (if applicable):	B
Sample Received:	24/01/23
Date Tested:	26/01/23
Sample Cert:	Not Provided
Moisture Content (%):	25
% Particles > 20mm (By dry mass):	3.4
MCV:	2.8
Interpretation of Plot:	Steepest Straight Line
Description of Soil:	Mottled brown slightly sandy, slightly gravelly, CLAY

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Test Report

Determination of Moisture Condition Value at Natural Moisture Content

Tested in accordance with BS1377:Part 4:1990, clause 5.4

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RECEIVED: 13/08/2024

Report No.	**R142494**
Contract No.	24330
Contract Name:	Halverstown , Naas - Proposed Data Centres
Customer:	DOBA
BH/TP*	TP29
Sample No.*	AA181986
Depth* (m)	0.50
Sample Type:	B
Lab Sample No.	A22/7577
Source* (if applicable)	N/A
Material Type* (if applicable):	B
Sample Received:	24/01/23
Date Tested:	26/01/23
Sample Cert:	Not Provided
Moisture Content (%):	9.9
% Particles > 20mm (By dry mass):	12
MCV:	16
Interpretation of Plot:	Steepest Straight Line
Description of Soil:	Brown sandy gravelly SILT/CLAY

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Report No.	**R142495**
Contract No.	24330
Contract Name:	Halverstown , Naas - Proposed Data Centres
Customer:	DOBA
BH/TP*	TP31
Sample No.*	AA181992
Depth* (m)	0.50
Sample Type:	B
Lab Sample No.	A22/7578
Source* (if applicable)	N/A
Material Type* (if applicable):	B
Sample Received:	24/01/23
Date Tested:	26/01/23
Sample Cert:	Not Provided
Moisture Content (%):	11
% Particles > 20mm (By dry mass):	7.2
MCV:	12.7
Interpretation of Plot:	Steepest Straight Line
Description of Soil:	Brown slightly sandy slightly gravelly CLAY

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Report No.	**R142496**
Contract No.	24330
Contract Name:	Halverstown , Naas - Proposed Data Centres
Customer:	DOBA
BH/TP*	TP31
Sample No.*	AA181992
Depth* (m)	0.50
Sample Type:	B
Lab Sample No.	A22/7578
Source* (if applicable)	N/A
Material Type* (if applicable):	B
Sample Received:	24/01/23
Date Tested:	26/01/23
Sample Cert:	Not Provided
Moisture Content (%):	9.5
% Particles > 20mm (By dry mass):	7.2
MCV:	15.4
Interpretation of Plot:	Steepest Straight Line
Description of Soil:	Brown slightly sandy slightly gravelly SILT/CLAY - 1% Lime Added

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Determination of Moisture Condition Value at Natural Moisture Content

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Report No.	**R142690**
Contract No.	24330
Contract Name:	Halverstown , Naas - Proposed Data Centres
Customer:	DOBA
BH/TP*	TP31
Sample No.*	AA181992
Depth* (m)	0.50
Sample Type:	B
Lab Sample No.	A22/7578
Source* (if applicable)	N/A
Material Type* (if applicable):	B
Sample Received:	24/01/23
Date Tested:	08/02/23
Sample Cert:	Not Provided
Moisture Content (%):	10
% Particles > 20mm (By dry mass):	7.2
MCV:	15.4
Interpretation of Plot:	Steepest Straight Line
Description of Soil:	Brown slightly sandy slightly gravelly SILT/CLAY - 1% Lime / 2% Cement

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Report No.	**R142497**
Contract No.	24330
Contract Name:	Halverstown , Naas - Proposed Data Centres
Customer:	DOBA
BH/TP*	TP31
Sample No.*	AA181992
Depth* (m)	0.50
Sample Type:	B
Lab Sample No.	A22/7578
Source* (if applicable)	N/A
Material Type* (if applicable):	B
Sample Received:	24/01/23
Date Tested:	26/01/23
Sample Cert:	Not Provided
Moisture Content (%):	9.2
% Particles > 20mm (By dry mass):	7.2
MCV:	16.1
Interpretation of Plot:	Steepest Straight Line
Description of Soil:	Brown slightly sandy slightly gravelly SILT/CLAY - 3% Lime Added

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Report No.	**R142498**
Contract No.	24330
Contract Name:	Halverstown , Naas - Proposed Data Centres
Customer:	DOBA
BH/TP*	TP33
Sample No.*	AA181989
Depth* (m)	0.60
Sample Type:	B
Lab Sample No.	A22/7579
Source* (if applicable)	N/A
Material Type* (if applicable):	B
Sample Received:	24/01/23
Date Tested:	24/01/22
Sample Cert:	Not Provided
Moisture Content (%):	21
% Particles > 20mm (By dry mass):	2.7
MCV:	6.9
Interpretation of Plot:	Steepest Straight Line
Description of Soil:	Brown slightly sandy, slightly gravelly, CLAY

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Report No.	**R142499**
Contract No.	24330
Contract Name:	Halverstown , Naas - Proposed Data Centres
Customer:	DOBA
BH/TP*	TP34
Sample No.*	AA181986
Depth* (m)	0.60
Sample Type:	B
Lab Sample No.	A22/7580
Source* (if applicable)	N/A
Material Type* (if applicable):	B
Sample Received:	24/01/23
Date Tested:	24/01/22
Sample Cert:	Not Provided
Moisture Content (%):	19
% Particles > 20mm (By dry mass):	5.0
MCV:	6.8
Interpretation of Plot:	Steepest Straight Line
Description of Soil:	Brown sandy gravelly CLAY

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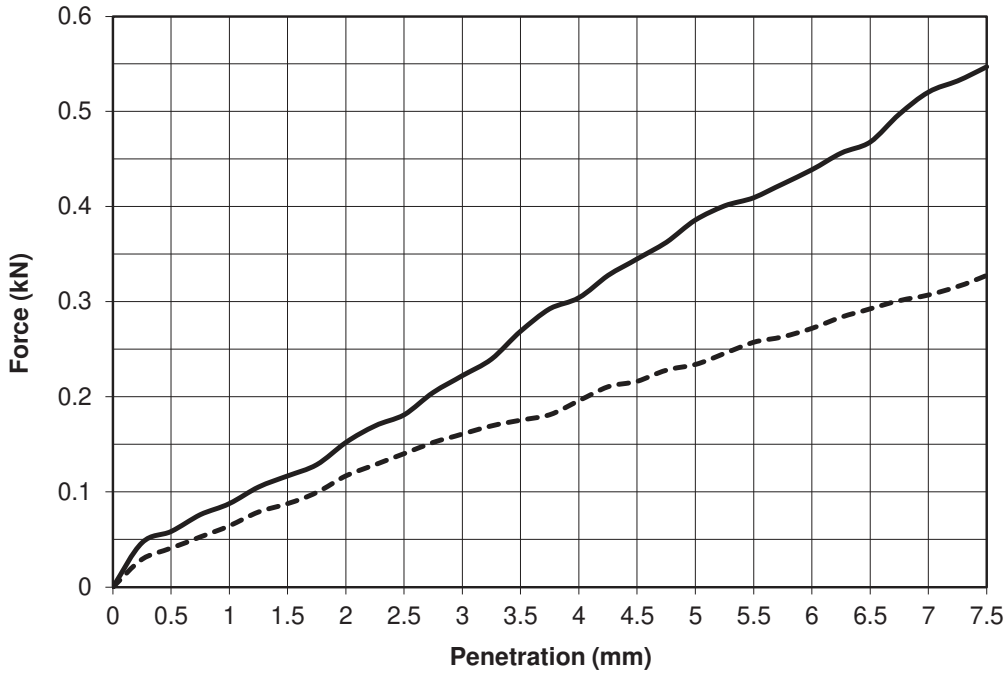
TEST REPORT
Determination of California Bearing Ratio (CBR)

Tested in accordance with BS1377:Part 4:1990, clause 7

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Report No.	R142500	Contract	Halverstown , Naas - Proposed Data Centres
Contract No.	24330	Customer	DOBA
Date received	24/01/23	Date Tested	06/01/23
BH/TP No.*	TP04	Sample No.*	AA186982 Type: B
Depth* (m)	0.60	Lab sample No.	A22/7562



Key: ———— Top ---------- Base

Description:	Mottled brown slightly sandy slightly gravelly CLAY		
Initial Condition:	Unsoaked		
Moisture Content (%):	15	Bulk Density (Mg/m^3):	2.13
Surcharge (kg):	4	Dry Density (Mg/m^3):	1.85
% Material >20mm:	14		
Method of compaction:	Static Compaction Method 2		

Test Result	Top	Base
CBR %	**1.9**	**1.2**
Moisture Content %	15	15

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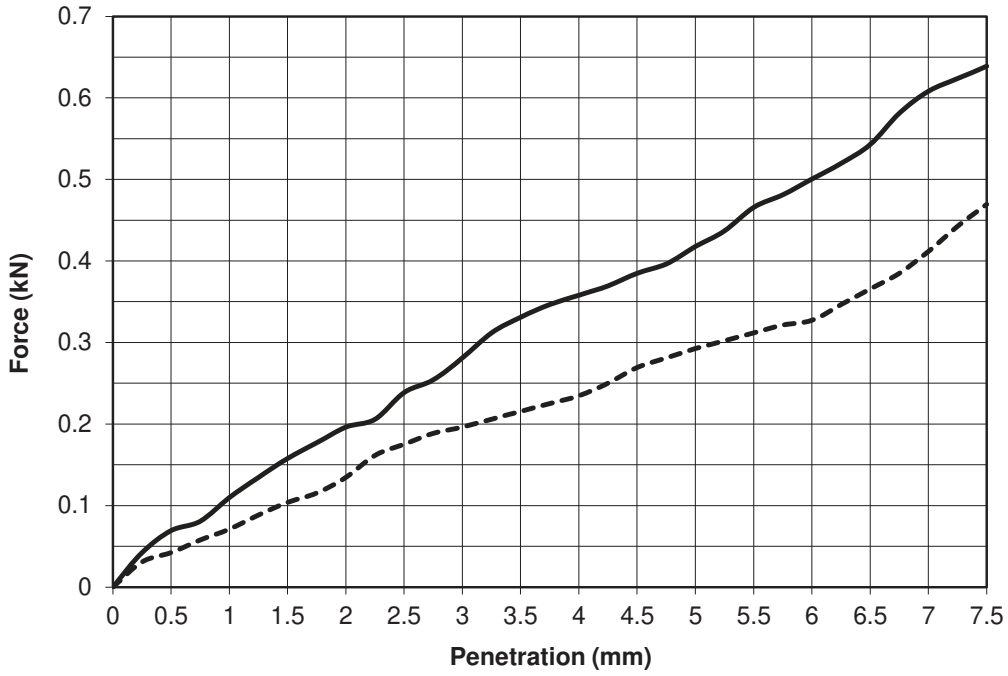
TEST REPORT
Determination of California Bearing Ratio (CBR)

Tested in accordance with BS1377:Part 4:1990, clause 7

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RECEIVED: 13/08/2024

Report No.	R145770	Contract	Halverstown , Naas - Proposed Data Centres
Contract No.	24330	Customer	DOBA
Date received	24/01/23	Date Tested	01/02/23
BH/TP No.*	TP12	Sample No.*	AA195481 Type: B
Depth* (m)	0.50	Lab sample No.	A22/7563



Key: ———— Top ---------- Base

Description:	Brown slightly sandy slightly gravelly CLAY		
Initial Condition:	Unsoaked		
Moisture Content (%):	17	Bulk Density (Mg/m^3):	2.15
Surcharge (kg):	4	Dry Density (Mg/m^3):	1.84
% Material >20mm:	3.9		
Method of compaction:	Static Compaction Method 2		

Test Result	Top	Base
CBR %	**2.1**	**1.7**
Moisture Content %	17	17

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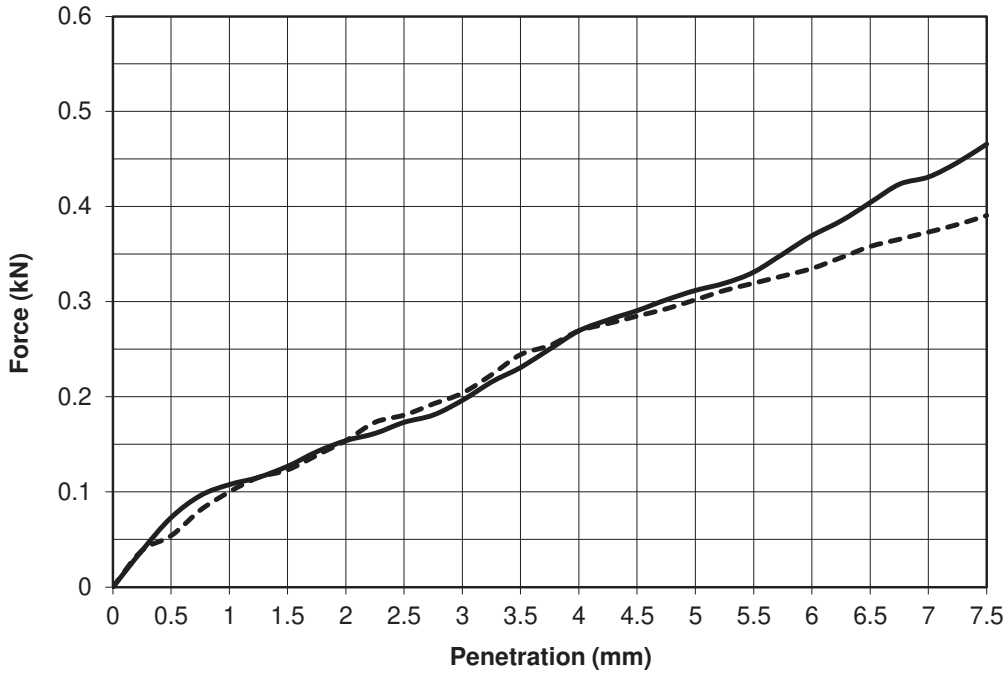
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Determination of California Bearing Ratio (CBR)

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Report No.	R142501	Contract	Halverstown , Naas - Proposed Data Centres
Contract No.	24330	Customer	DOBA
Date received	24/01/23	Date Tested	25/01/23
BH/TP No.*	TP13	Sample No.*	AA185455 Type: B
Depth* (m)	1.00	Lab sample No.	A22/7564



Key: ———— Top ---------- Base

Description:	Mottled brown sandy gravelly SILT/CLAY		
Initial Condition:	Unsoaked		
Moisture Content (%):	13	Bulk Density (Mg/m^3):	2.20
Surcharge (kg):	4	Dry Density (Mg/m^3):	1.95
% Material >20mm:	8.4		
Method of compaction:	Static Compaction Method 2		

Test Result	Top	Base
CBR %	**1.6**	**1.5**
Moisture Content %	13	13

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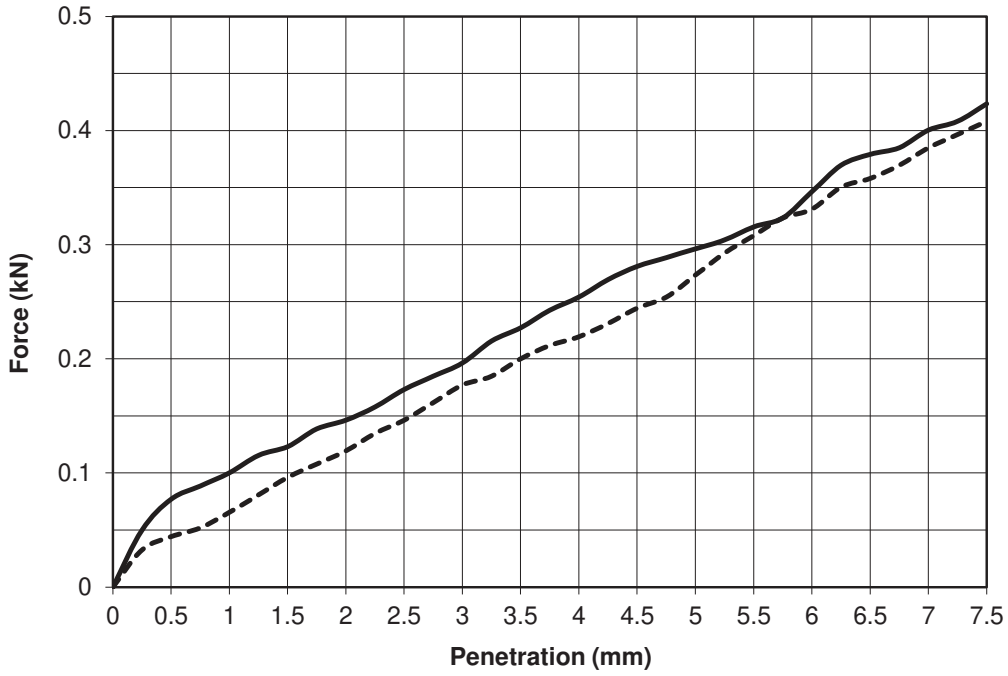
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Report No.	R142502	Contract	Halverstown , Naas - Proposed Data Centres
Contract No.	24330	Customer	DOBA
Date received	24/01/23	Date Tested	26/01/23
BH/TP No.*	TP15	Sample No.*	AA185479 Type: B
Depth* (m)	1.50	Lab sample No.	A22/7565



Key: ———— Top ---------- Base

Description:	Brown slightly sandy, slightly gravelly, CLAY		
Initial Condition:	Unsoaked		
Moisture Content (%):	13	Bulk Density (Mg/m^3):	2.20
Surcharge (kg):	4	Dry Density (Mg/m^3):	1.95
% Material >20mm:	2.9		
Method of compaction:	Static Compaction Method 2		

Test Result	Top	Base
CBR %	**1.5**	**1.4**
Moisture Content %	13	13

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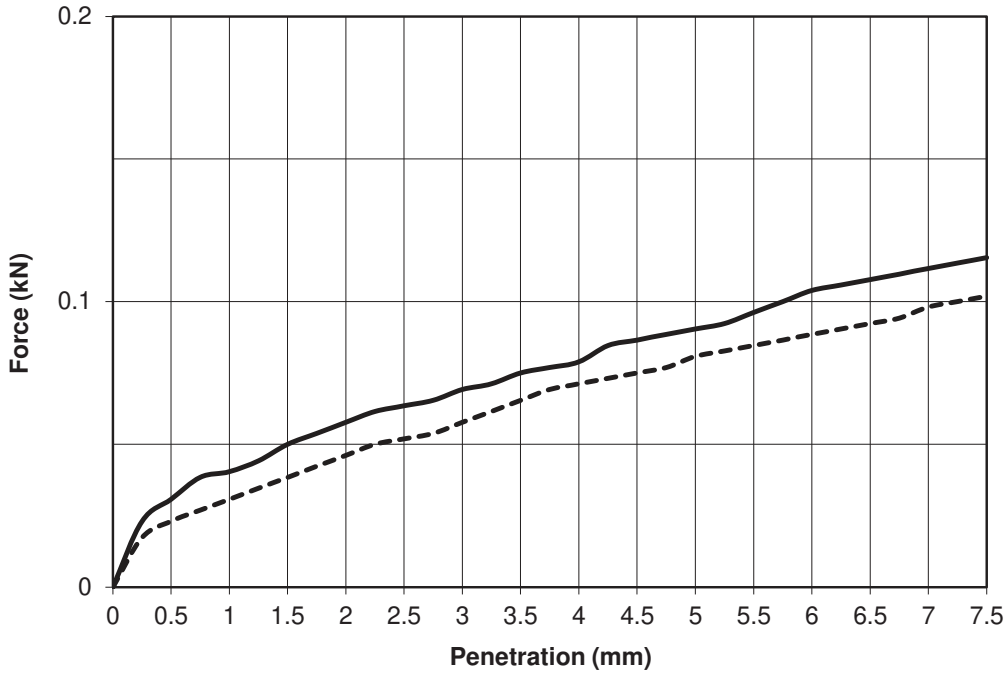
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Determination of California Bearing Ratio (CBR)

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RECEIVED: 13/08/2024

Report No.	R142503	Contract	Halverstown , Naas - Proposed Data Centres
Contract No.	24330	Customer	DOBA
Date received	24/01/23	Date Tested	24/01/23
BH/TP No.*	TP16	Sample No.*	AA185461 Type: B
Depth* (m)	1.00	Lab sample No.	A22/7566



Key: ———— Top ---------- Base

Description:	Mottled brown slightly sandy, slightly gravelly, CLAY		
Initial Condition:	Unsoaked		
Moisture Content (%):	14	Bulk Density (Mg/m^3):	2.20
Surcharge (kg):	4	Dry Density (Mg/m^3):	1.92
% Material >20mm:	11		
Method of compaction:	Static Compaction Method 2		

Test Result	Top	Base
CBR %	**0.5**	**0.4**
Moisture Content %	14	14

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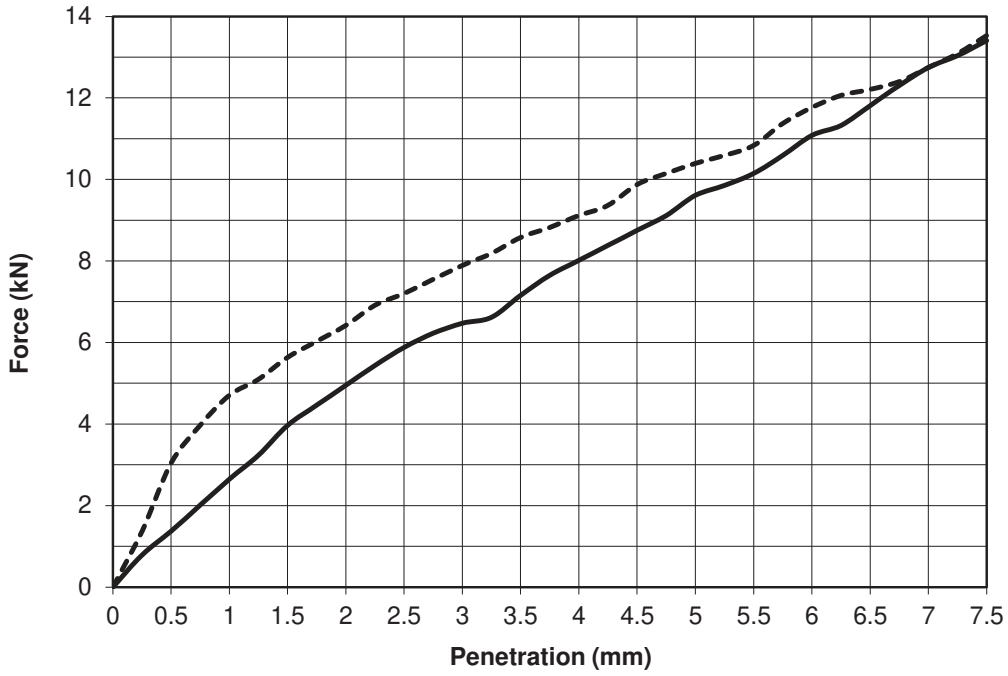
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Report No.	R142504	Contract	Halverstown , Naas - Proposed Data Centres
Contract No.	24330	Customer	DOBA
Date received	24/01/23	Date Tested	24/01/23
BH/TP No.*	TP18	Sample No.*	AA185484 Type: B
Depth* (m)	0.50	Lab sample No.	A22/7567



Key: ———— Top ---------- Base

Description:	Mottled brown sandy gravelly SILT/CLAY		
Initial Condition:	Unsoaked		
Moisture Content (%):	10	Bulk Density (Mg/m^3):	2.10
Surcharge (kg):	4	Dry Density (Mg/m^3):	1.92
% Material >20mm:	13		
Method of compaction:	Static Compaction Method 2		

Test Result	Top	Base
CBR %	**48**	**54**
Moisture Content %	10	9.3

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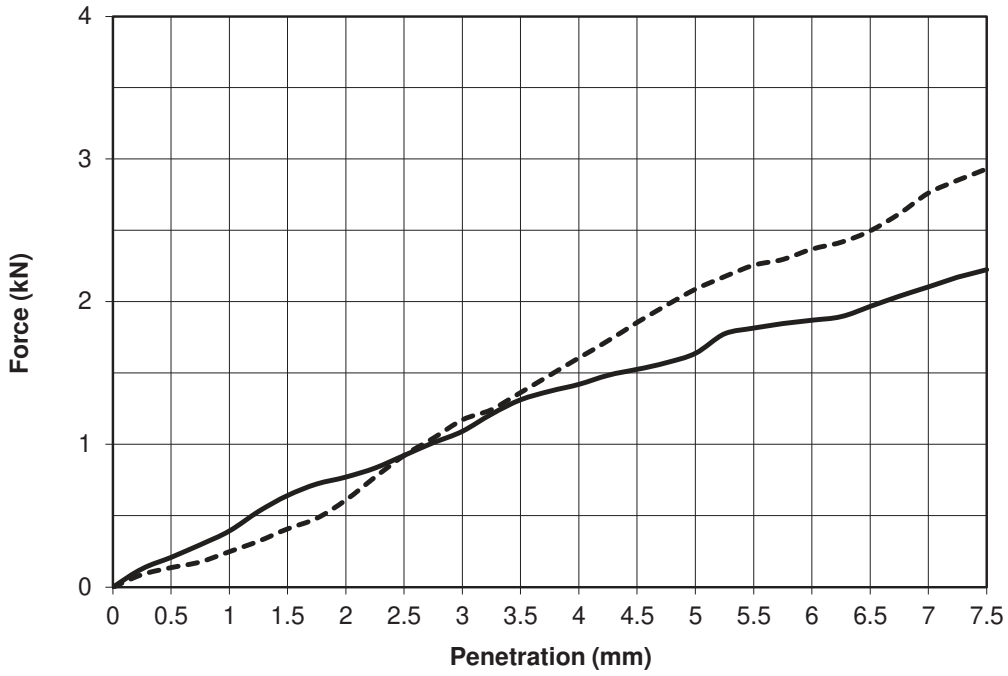
TEST REPORT
Determination of California Bearing Ratio (CBR)

Tested in accordance with BS1377:Part 4:1990, clause 7

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Report No.	R145760	Contract	Halverstown , Naas - Proposed Data Centres
Contract No.	24330	Customer	DOBA
Date received	24/01/23	Date Tested	18/02/23
BH/TP No.*	TP19	Sample No.*	AA185468 Type: B
Depth* (m)	0.50	Lab sample No.	A22/7568



Key: ———— Top ---------- Base

Description:	Brown sandy gravelly SILT/CLAY		
Initial Condition:	Unsoaked		
Moisture Content (%):	13	Bulk Density (Mg/m^3):	2.17
Surcharge (kg):	4	Dry Density (Mg/m^3):	1.92
% Material >20mm:	6.4		
Method of compaction:	Static Compaction Method 2		

Test Result	Top	Base
CBR %	**8**	**10**
Moisture Content %	13	13

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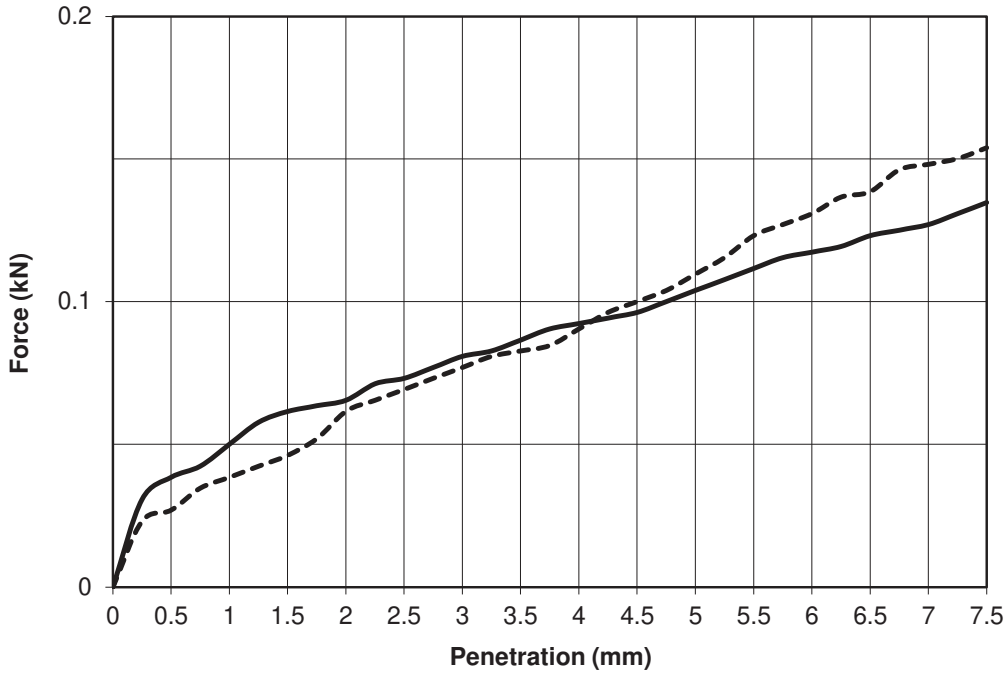
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Report No.	R142505	Contract	Halverstown , Naas - Proposed Data Centres
Contract No.	24330	Customer	DOBA
Date received	24/01/23	Date Tested	26/01/23
BH/TP No.*	TP20	Sample No.*	AA185488 Type: B
Depth* (m)	1.00	Lab sample No.	A22/7569



Key: ———— Top ---------- Base

Description:	Mottled brown sandy slightly gravelly SILT/CLAY		
Initial Condition:	Unsoaked		
Moisture Content (%):	19	Bulk Density (Mg/m^3):	2.08
Surcharge (kg):	4	Dry Density (Mg/m^3):	1.75
% Material >20mm:	12		
Method of compaction:	Static Compaction Method 2		

Test Result	Top	Base
CBR %	**0.6**	**0.6**
Moisture Content %	19	18

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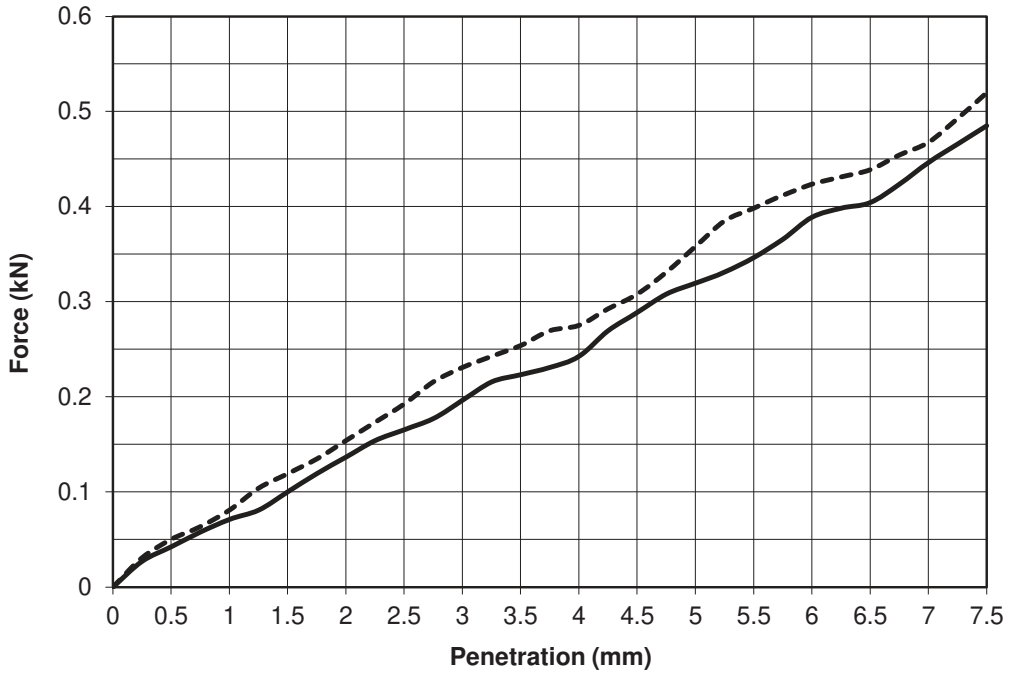
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Report No.	R142506	Contract	Halverstown , Naas - Proposed Data Centres
Contract No.	24330	Customer	DOBA
Date received	24/01/23	Date Tested	26/01/23
BH/TP No.*	TP21	Sample No.*	AA181983 Type: B
Depth* (m)	0.50	Lab sample No.	A22/7570



Key: ———— Top ---------- Base

Description:	Orange/brown slightly sandy slightly gravelly SILT/CLAY		
Initial Condition:	Unsoaked		
Moisture Content (%):	20	Bulk Density (Mg/m^3):	2.02
Surcharge (kg):	4	Dry Density (Mg/m^3):	1.69
% Material >20mm:	36		
Method of compaction:	Static Compaction Method 2		

Test Result	Top	Base
CBR %	**1.6**	**1.8**
Moisture Content %	20	20

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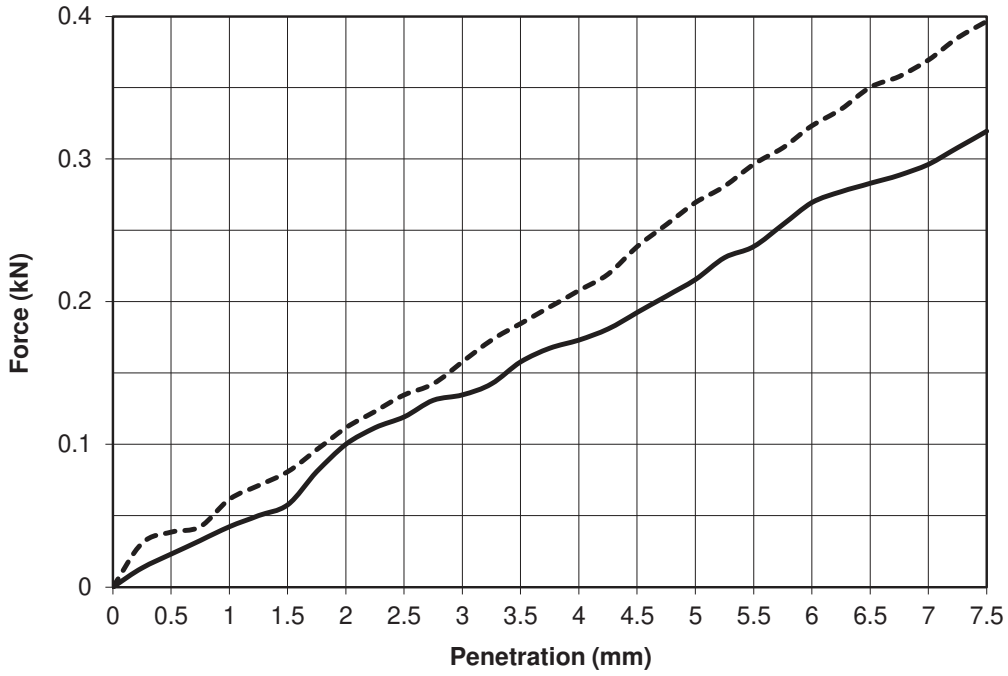
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Report No.	R142507	Contract	Halverstown , Naas - Proposed Data Centres
Contract No.	24330	Customer	DOBA
Date received	24/01/23	Date Tested	26/01/23
BH/TP No.*	TP22	Sample No.*	AA185497 Type: B
Depth* (m)	0.60	Lab sample No.	A22/7571



Key: ———— Top ---------- Base

Description:	Brown sandy gravelly SILT/CLAY		
Initial Condition:	Unsoaked		
Moisture Content (%):	20	Bulk Density (Mg/m^3):	1.99
Surcharge (kg):	4	Dry Density (Mg/m^3):	1.65
% Material >20mm:	5.9		
Method of compaction:	Static Compaction Method 2		

Test Result	Top	Base
CBR %	**1.1**	**1.4**
Moisture Content %	20	20

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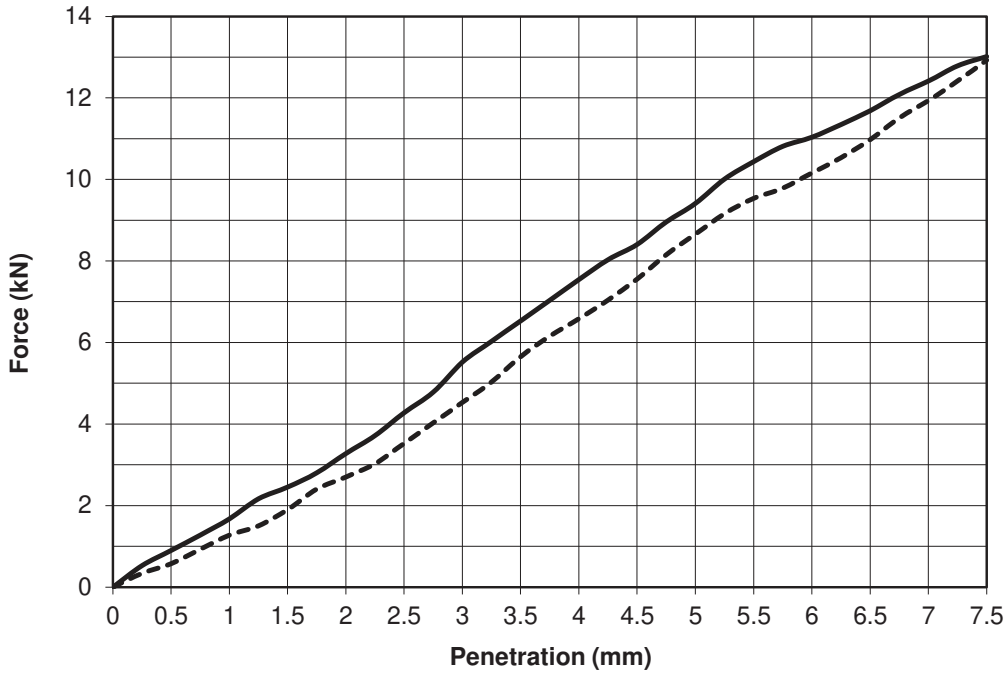
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Report No.	R143188	Contract	Halverstown , Naas - Proposed Data Centres
Contract No.	24330	Customer	DOBA
Date received	24/01/23	Date Tested	15/02/23
BH/TP No.*	TP24	Sample No.*	AA181960 Type: B
Depth* (m)	0.60	Lab sample No.	A22/7573



Key: ———— Top ---------- Base

Description:	Brown sandy gravelly SILT/CLAY		
Initial Condition:	Unsoaked		
Moisture Content (%):	13	Bulk Density (Mg/m^3):	2.21
Surcharge (kg):	4	Dry Density (Mg/m^3):	1.95
% Material >20mm:	7.6		
Method of compaction:	Static Compaction Method 2		

Test Result	Top	Base
CBR %	**47**	**43**
Moisture Content %	13	13

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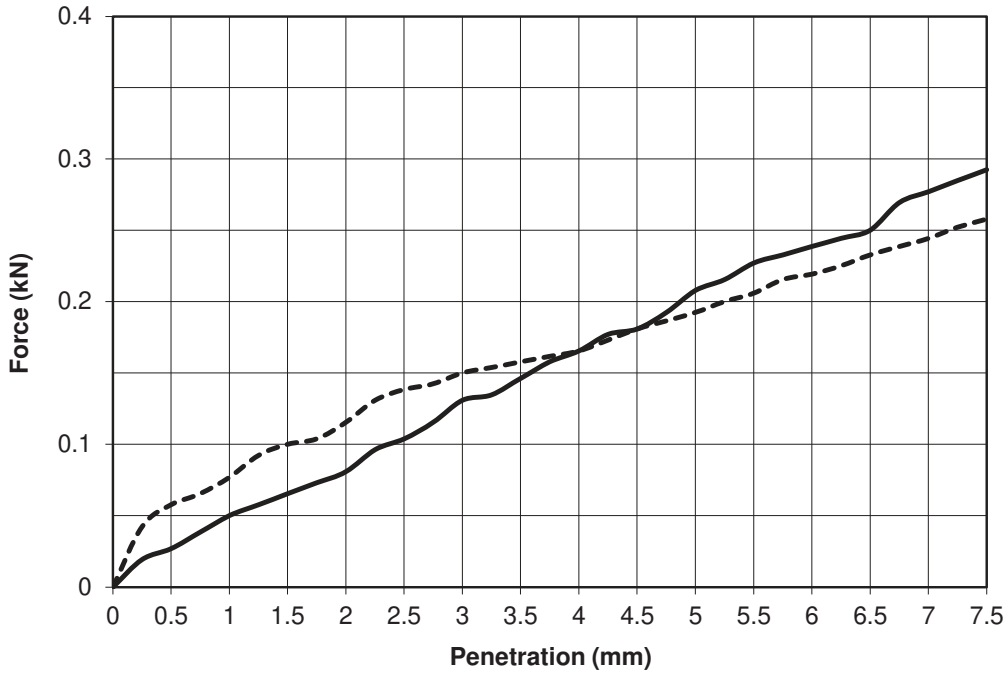
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Report No.	R142508	Contract	Halverstown , Naas - Proposed Data Centres
Contract No.	24330	Customer	DOBA
Date received	24/01/23	Date Tested	26/01/23
BH/TP No.*	TP26	Sample No.*	AA181975 Type: B
Depth* (m)	0.50	Lab sample No.	A22/7575



Key: ———— Top ---------- Base

Description:	Mottled brown slightly sandy slightly gravelly SILT/CLAY		
Initial Condition:	Unsoaked		
Moisture Content (%):	13	Bulk Density (Mg/m^3):	2.19
Surcharge (kg):	4	Dry Density (Mg/m^3):	1.93
% Material >20mm:	7.6		
Method of compaction:	Static Compaction Method 2		

Test Result	Top	Base
CBR %	**1.0**	**1.1**
Moisture Content %	13	13

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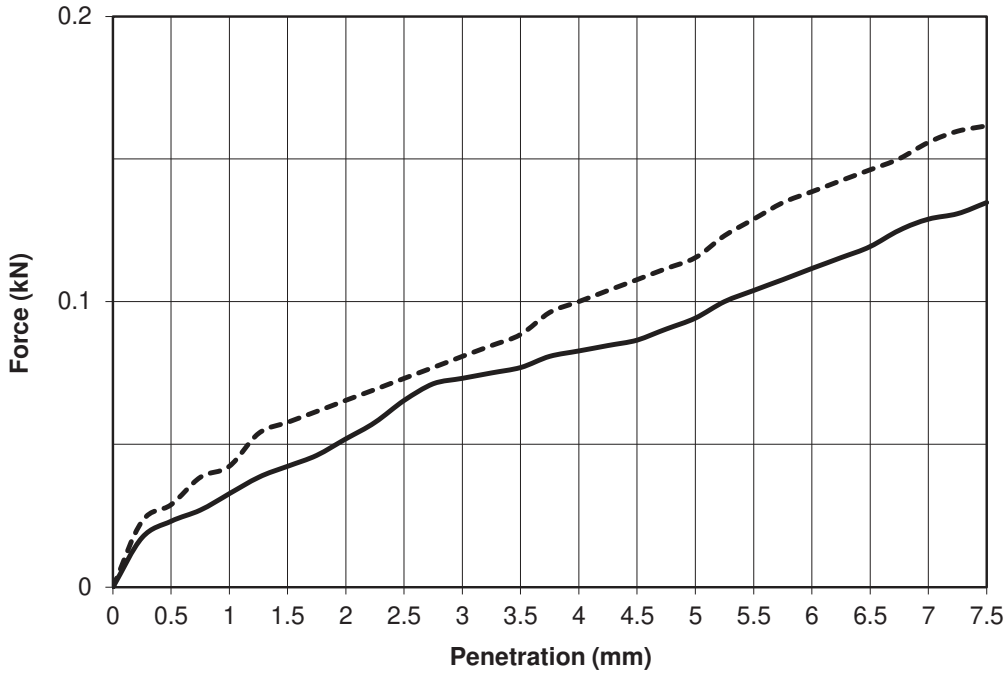
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Report No.	R142509	Contract	Halverstown , Naas - Proposed Data Centres
Contract No.	24330	Customer	DOBA
Date received	24/01/23	Date Tested	24/01/24
BH/TP No.*	TP28	Sample No.*	AA181969 Type: B
Depth* (m)	0.60	Lab sample No.	A22/7576



Key: ———— Top ---------- Base

Description:	Mottled brown slightly sandy, slightly gravelly, CLAY		
Initial Condition:	Unsoaked		
Moisture Content (%):	26	Bulk Density (Mg/m^3):	1.95
Surcharge (kg):	4	Dry Density (Mg/m^3):	1.55
% Material >20mm:	2.8		
Method of compaction:	Static Compaction Method 2		

Test Result	Top	Base
CBR %	**0.5**	**0.6**
Moisture Content %	26	26

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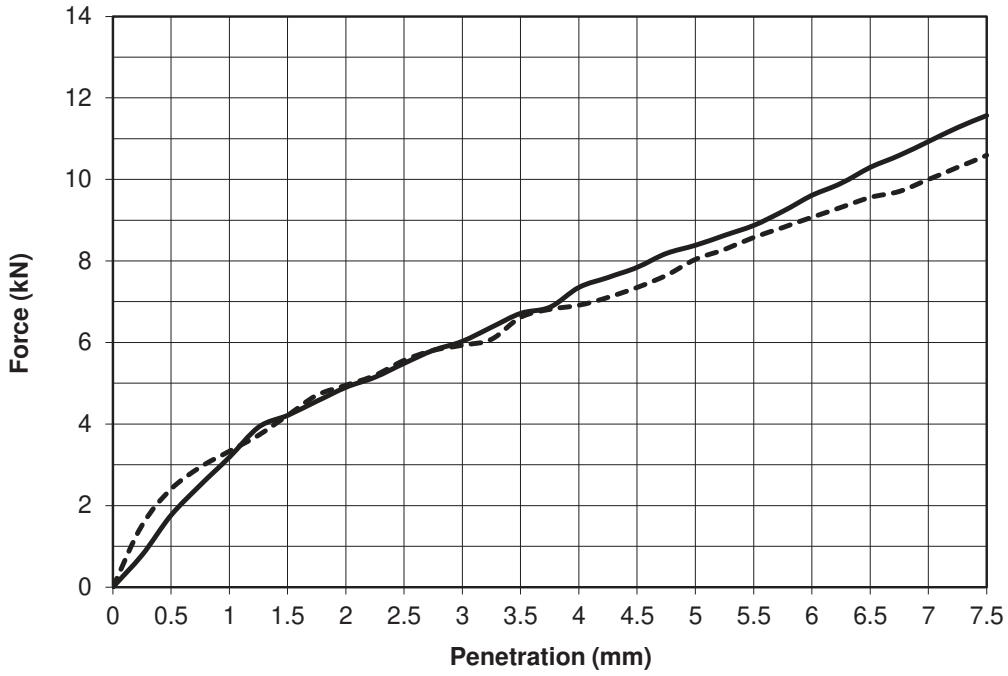
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Report No.	R142510	Contract	Halverstown , Naas - Proposed Data Centres
Contract No.	24330	Customer	DOBA
Date received	24/01/23	Date Tested	26/01/23
BH/TP No.*	TP29	Sample No.*	AA181986 Type: B
Depth* (m)	0.50	Lab sample No.	A22/7577



Key: ———— Top ---------- Base

Description:	Brown sandy gravelly SILT/CLAY		
Initial Condition:	Unsoaked		
Moisture Content (%):	9	Bulk Density (Mg/m^3):	2.07
Surcharge (kg):	4	Dry Density (Mg/m^3):	1.89
% Material >20mm:	11		
Method of compaction:	Static Compaction Method 2		

Test Result	Top	Base
CBR %	**42**	**42**
Moisture Content %	9.2	9.3

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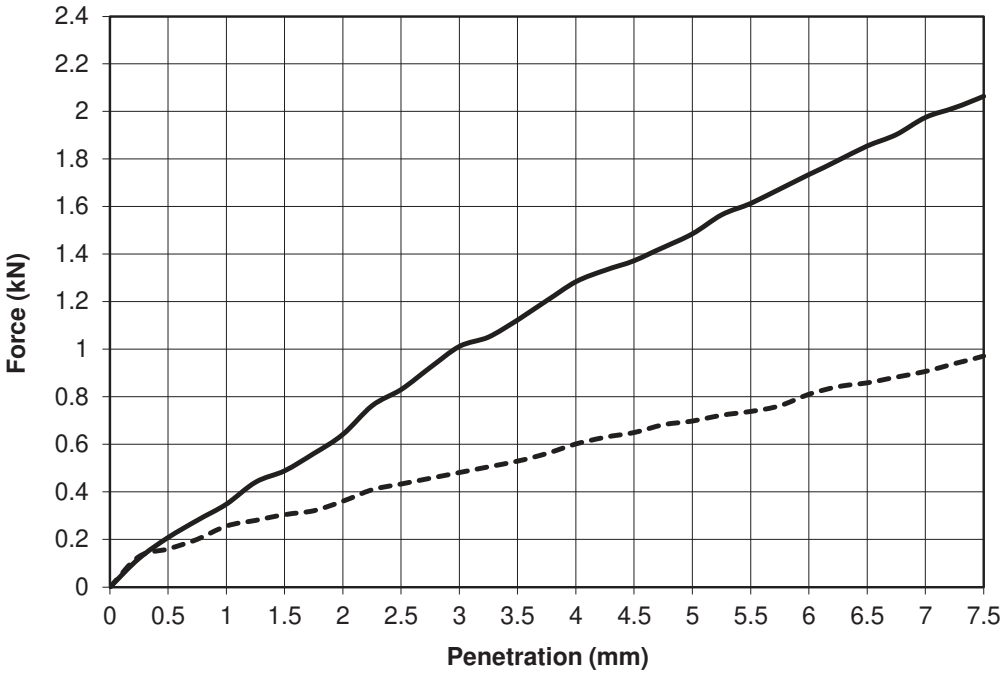
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Report No.	R145766	Contract	Halverstown , Naas - Proposed Data Centres
Contract No.	24330	Customer	DOBA
Date received	24/01/23	Date Tested	18/02/23
BH/TP No.*	TP31	Sample No.*	AA181992 Type: B
Depth* (m)	0.50	Lab sample No.	A22/7578



Key: ———— Top ---------- Base

Description:	Brown slightly sandy, slightly gravelly, CLAY		
Initial Condition:	Unsoaked		
Moisture Content (%):	13	Bulk Density (Mg/m^3):	2.17
Surcharge (kg):	4	Dry Density (Mg/m^3):	1.92
% Material >20mm:	6.9		
Method of compaction:	Static Compaction Method 2		

Test Result	Top	Base
CBR %	**7.4**	**3.5**
Moisture Content %	13	13

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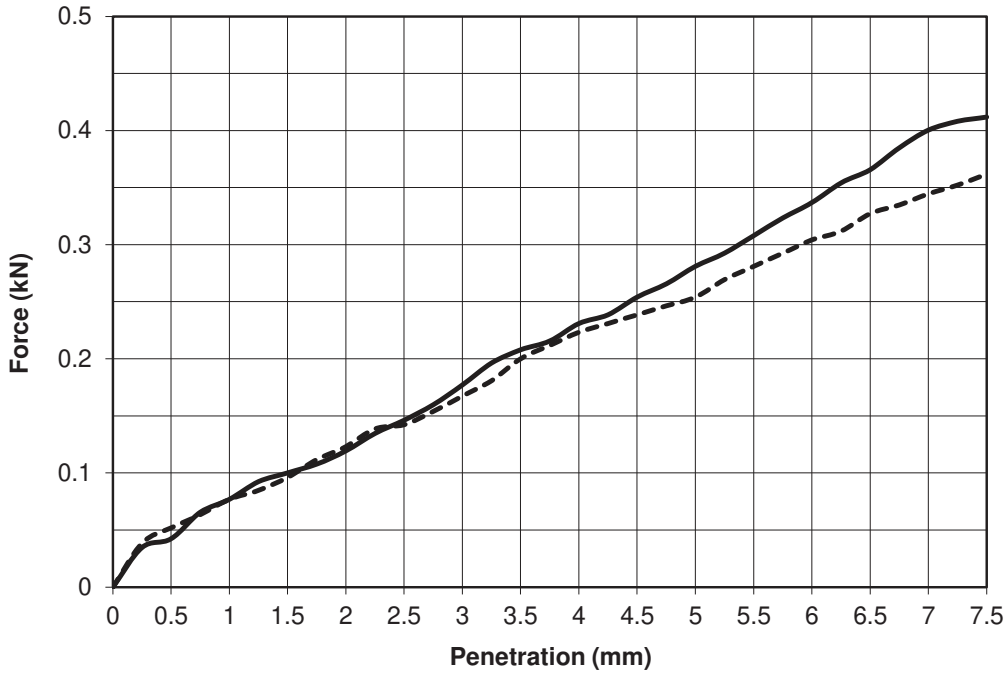
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Report No.	R142511	Contract	Halverstown , Naas - Proposed Data Centres
Contract No.	24330	Customer	DOBA
Date received	24/01/23	Date Tested	24/01/23
BH/TP No.*	TP33	Sample No.*	AA181989 Type: B
Depth* (m)	0.60	Lab sample No.	A22/7579



Key: ———— Top ---------- Base

Description:	Brown slightly sandy, slightly gravelly, CLAY		
Initial Condition:	Unsoaked		
Moisture Content (%):	21	Bulk Density (Mg/m^3):	2.02
Surcharge (kg):	4	Dry Density (Mg/m^3):	1.67
% Material >20mm:	2.2		
Method of compaction:	Static Compaction Method 2		

Test Result	Top	Base
CBR %	**1.4**	**1.3**
Moisture Content %	21	21

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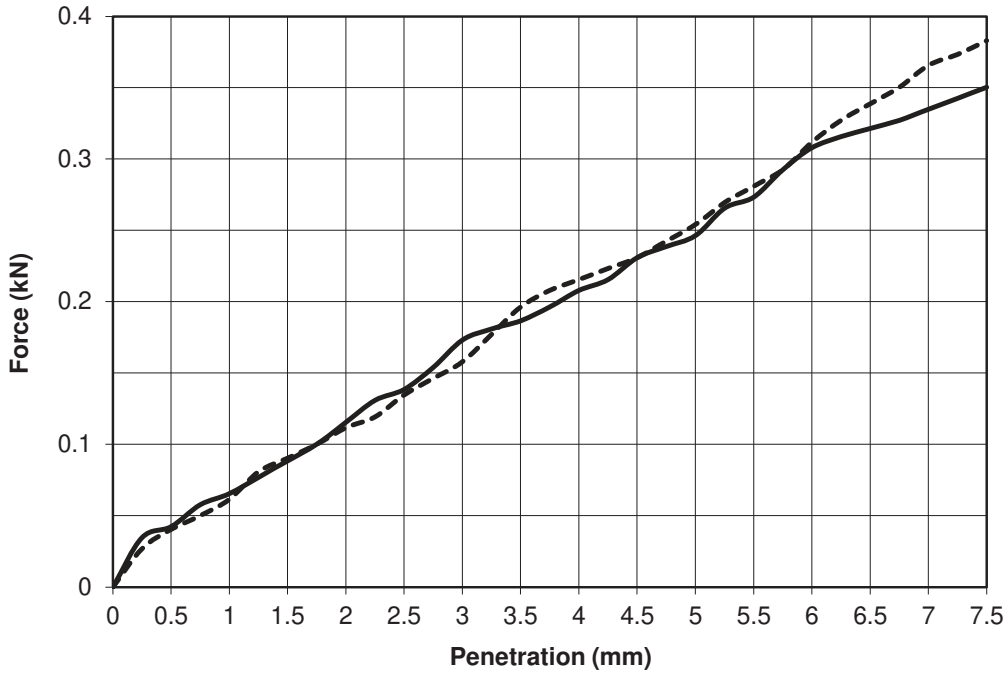
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Report No.	R142512	Contract	Halverstown , Naas - Proposed Data Centres
Contract No.	24330	Customer	DOBA
Date received	24/01/23	Date Tested	24/01/23
BH/TP No.*	TP34	Sample No.*	AA181986 Type: B
Depth* (m)	0.60	Lab sample No.	A22/7580



Key: ———— Top ---------- Base

Description:	Brown sandy slightly gravelly SILT/CLAY		
Initial Condition:	Unsoaked		
Moisture Content (%):	20	Bulk Density (Mg/m^3):	2.04
Surcharge (kg):	4	Dry Density (Mg/m^3):	1.70
% Material >20mm:	4.2		
Method of compaction:	Static Compaction Method 2		

Test Result	Top	Base
CBR %	**1.2**	**1.3**
Moisture Content %	20	20

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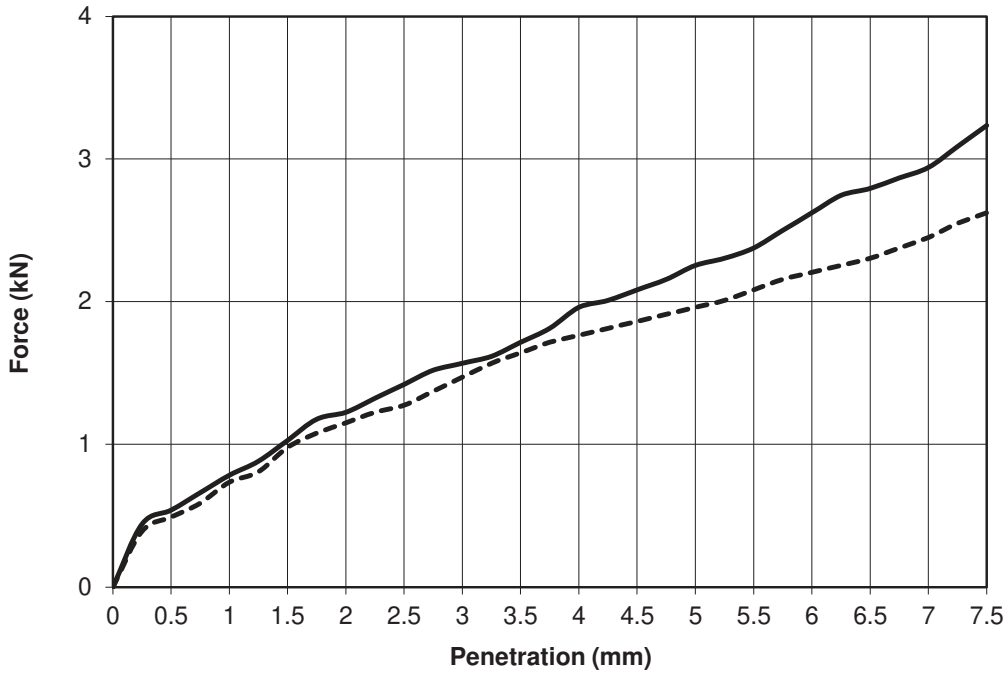
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Report No.	R145768	Contract	Halverstown , Naas - Proposed Data Centres
Contract No.	24330	Customer	DOBA
Date received	24/01/23	Date Tested	18/02/23
BH/TP No.*	TP04	Sample No.*	AA186982 Type: B
Depth* (m)	0.60	Lab sample No.	A22/7562



Key: ———— Top ---------- Base

Description:	Mottled brown slightly sandy slightly gravelly CLAY		
Initial Condition:	1% Lime/ 3 Days Soaked		
Moisture Content (%):	14	Bulk Density (Mg/m^3):	2.19
Surcharge (kg):	4	Dry Density (Mg/m^3):	1.91
% Material >20mm:	14		
Method of compaction:	Static Compaction Method 2		

Test Result	Top	Base
CBR %	**11**	**10**
Moisture Content %	14	15

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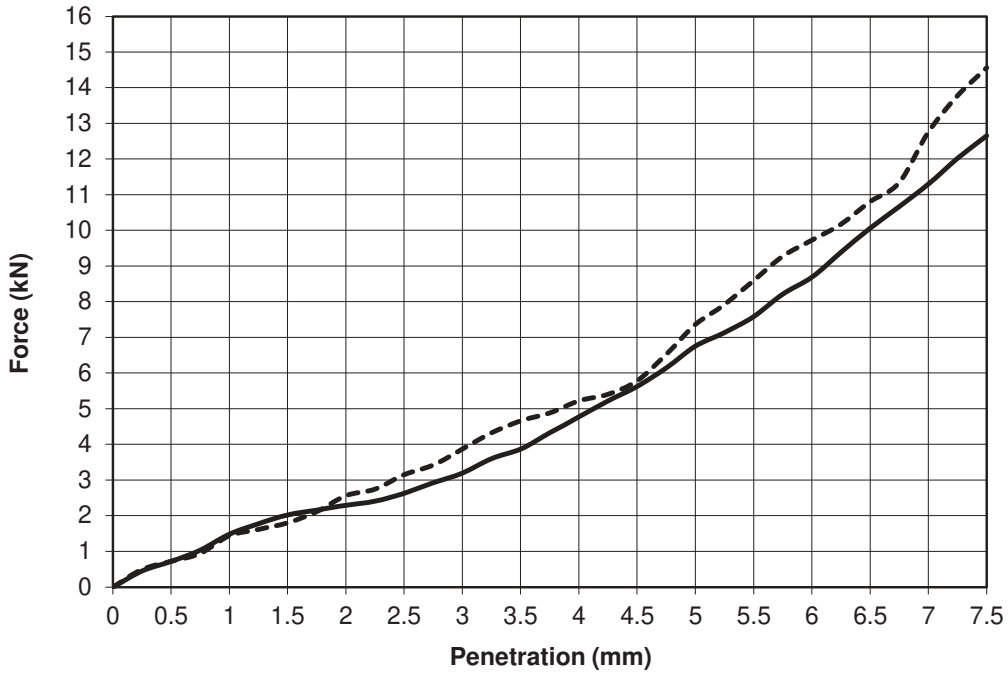
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Report No.	R145769	Contract	Halverstown , Naas - Proposed Data Centres
Contract No.	24330	Customer	DOBA
Date received	24/01/23	Date Tested	18/02/23
BH/TP No.*	TP04	Sample No.*	AA186982 Type: B
Depth* (m)	0.60	Lab sample No.	A22/7562



Key: ———— Top ---------- Base

Description:	Mottled brown slightly sandy slightly gravelly CLAY		
Initial Condition:	1% Lime/ 5 Days Soaked		
Moisture Content (%):	12	Bulk Density (Mg/m^3):	2.16
Surcharge (kg):	4	Dry Density (Mg/m^3):	1.93
% Material >20mm:	14		
Method of compaction:	Static Compaction Method 2		

Test Result	Top	Base
CBR %	**34**	**37**
Moisture Content %	12	12

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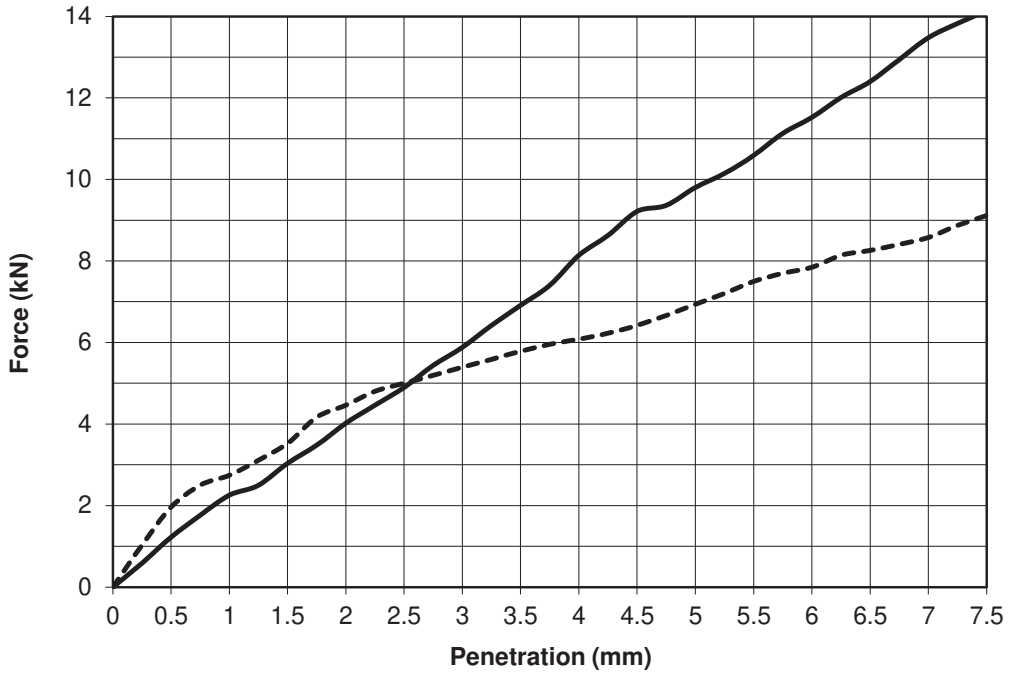
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Determination of California Bearing Ratio (CBR)

Tested in accordance with BS1377:Part 4:1990, clause 7

ISO 17025 IVNAB ACCREDITED TESTING DETAILED IN SCOPE REG NO. 1331

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Report No.	R143174	Contract	Halverstown , Naas - Proposed Data Centres
Contract No.	24330	Customer	DOBA
Date received	24/01/23	Date Tested	18/02/23
BH/TP No.*	TP04	Sample No.*	AA186982 Type: B
Depth* (m)	0.60	Lab sample No.	A22/7562



Key: ———— Top ---------- Base

Description:	Mottled brown slightly sandy slightly gravelly CLAY		
Initial Condition:	1% Lime/ 7 Days Soaked		
Moisture Content (%):	12	Bulk Density (Mg/m^3):	2.17
Surcharge (kg):	4	Dry Density (Mg/m^3):	1.94
% Material >20mm:	14		
Method of compaction:	Static Compaction Method 2		

Test Result	Top	Base
CBR %	**49**	**38**
Moisture Content %	12	12

Results relate only to the specimen tested, in as received condition unless otherwise noted

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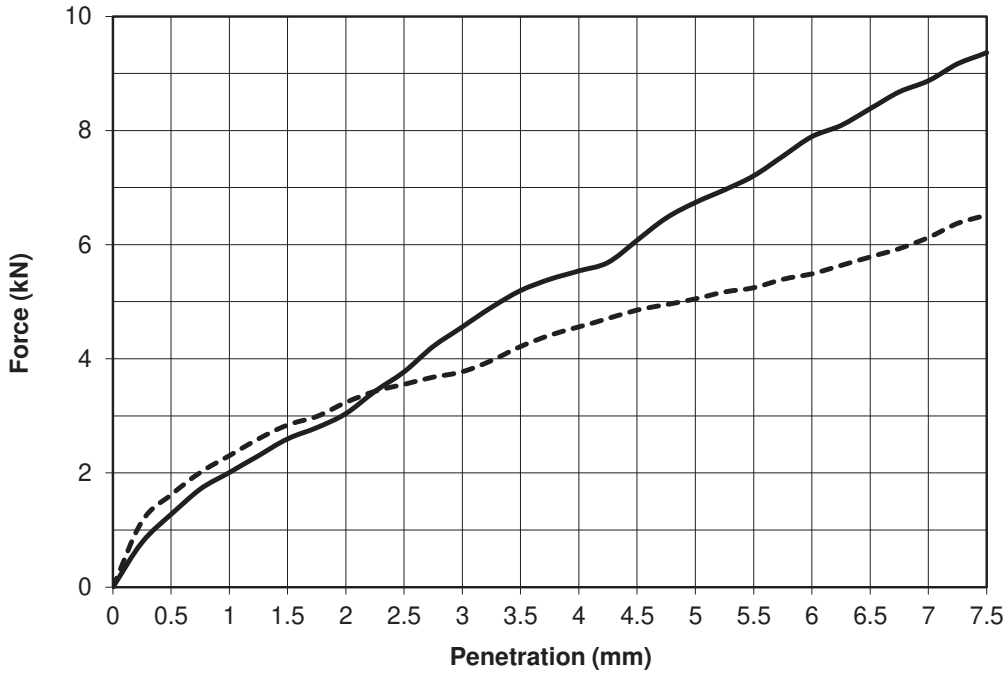
TEST REPORT
Determination of California Bearing Ratio (CBR)

Tested in accordance with BS1377:Part 4:1990, clause 7

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

RECEIVED: 13/08/2024

Report No.	R142662	Contract	Halverstown , Naas - Proposed Data Centres
Contract No.	24330	Customer	DOBA
Date received	24/01/23	Date Tested	01/02/23
BH/TP No.*	TP04	Sample No.*	AA186982 Type: B
Depth* (m)	0.60	Lab sample No.	A22/7562



Key: ———— Top ---------- Base

Description:	Mottled brown slightly sandy slightly gravelly CLAY		
Initial Condition:	2% Lime/3 Days Soaked		
Moisture Content (%):	13	Bulk Density (Mg/m^3):	2.16
Surcharge (kg):	4	Dry Density (Mg/m^3):	1.92
% Material >20mm:	14		
Method of compaction:	Static Compaction Method 2		

Test Result	Top	Base
CBR %	**34**	**27**
Moisture Content %	13	13

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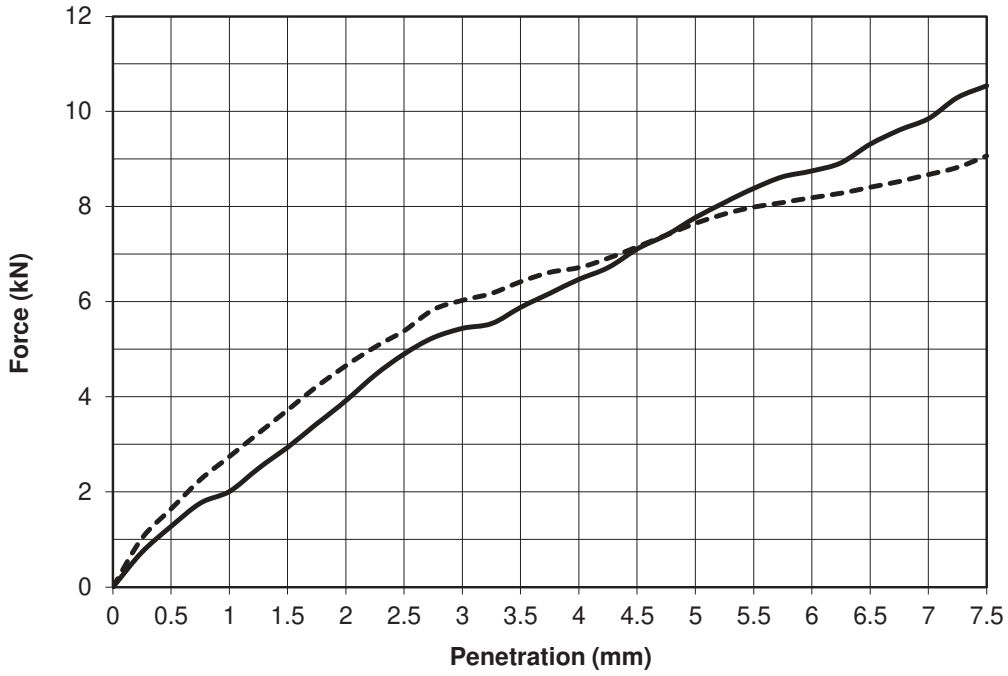
TEST REPORT
Determination of California Bearing Ratio (CBR)

Tested in accordance with BS1377:Part 4:1990, clause 7

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

RECEIVED: 13/08/2024

Report No.	R142752	Contract	Halverstown , Naas - Proposed Data Centres
Contract No.	24330	Customer	DOBA
Date received	24/01/23	Date Tested	16/02/23
BH/TP No.*	TP04	Sample No.*	AA186982 Type: B
Depth* (m)	0.60	Lab sample No.	A22/7562



Key: ———— Top ---------- Base

Description:	Mottled brown slightly sandy slightly gravelly CLAY		
Initial Condition:	2% Lime/5 Day Soaked		
Moisture Content (%):	13	Bulk Density (Mg/m^3):	2.16
Surcharge (kg):	4	Dry Density (Mg/m^3):	1.90
% Material >20mm:	14		
Method of compaction:	Static Compaction Method 2		

Test Result	Top	Base
CBR %	**41**	**39**
Moisture Content %	13	14

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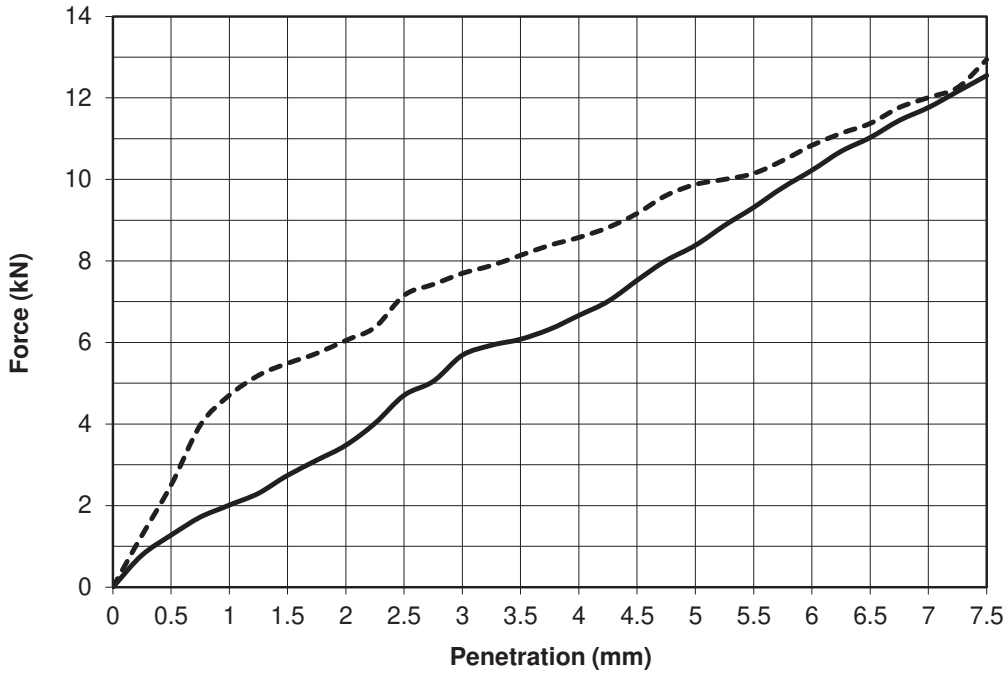
TEST REPORT
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RECEIVED: 13/08/2024

Report No.	R142661	Contract	Halverstown , Naas - Proposed Data Centres
Contract No.	24330	Customer	DOBA
Date received	24/01/23	Date Tested	13/02/23
BH/TP No.*	TP04	Sample No.*	AA186982 Type: B
Depth* (m)	0.60	Lab sample No.	A22/7562



Key: ———— Top ---------- Base

Description:	Mottled brown slightly sandy slightly gravelly CLAY		
Initial Condition:	2% Lime/ Soaked 7 Days		
Moisture Content (%):	14	Bulk Density (Mg/m^3):	2.15
Surcharge (kg):	4	Dry Density (Mg/m^3):	1.89
% Material >20mm:	14		
Method of compaction:	Static Compaction Method 2		

Test Result	Top	Base
CBR %	**42**	**54**
Moisture Content %	14	14

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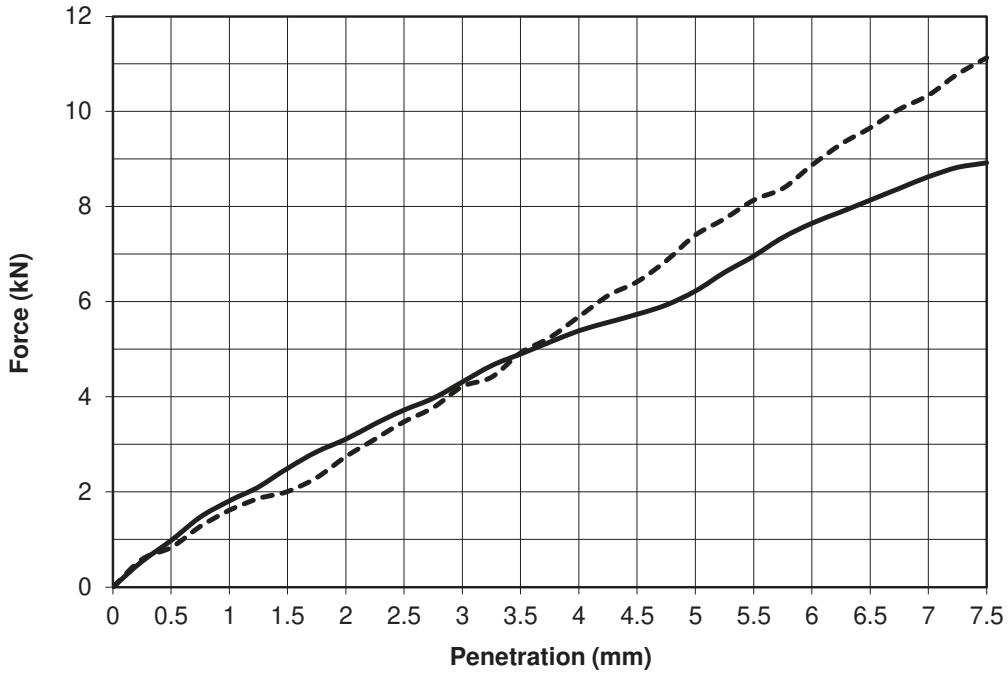
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Report No.	R142663	Contract	Halverstown , Naas - Proposed Data Centres
Contract No.	24330	Customer	DOBA
Date received	24/01/23	Date Tested	01/02/23
BH/TP No.*	TP04	Sample No.*	AA186982 Type: B
Depth* (m)	0.60	Lab sample No.	A22/7562



Key: ———— Top ---------- Base

Description:	Mottled brown slightly sandy slightly gravelly CLAY		
Initial Condition:	3% Lime/ 3 Days Soaked		
Moisture Content (%):	13	Bulk Density (Mg/m^3):	2.20
Surcharge (kg):	4	Dry Density (Mg/m^3):	1.94
% Material >20mm:	14		
Method of compaction:	Static Compaction Method 2		

Test Result	Top	Base
CBR %	**31**	**37**
Moisture Content %	14	13

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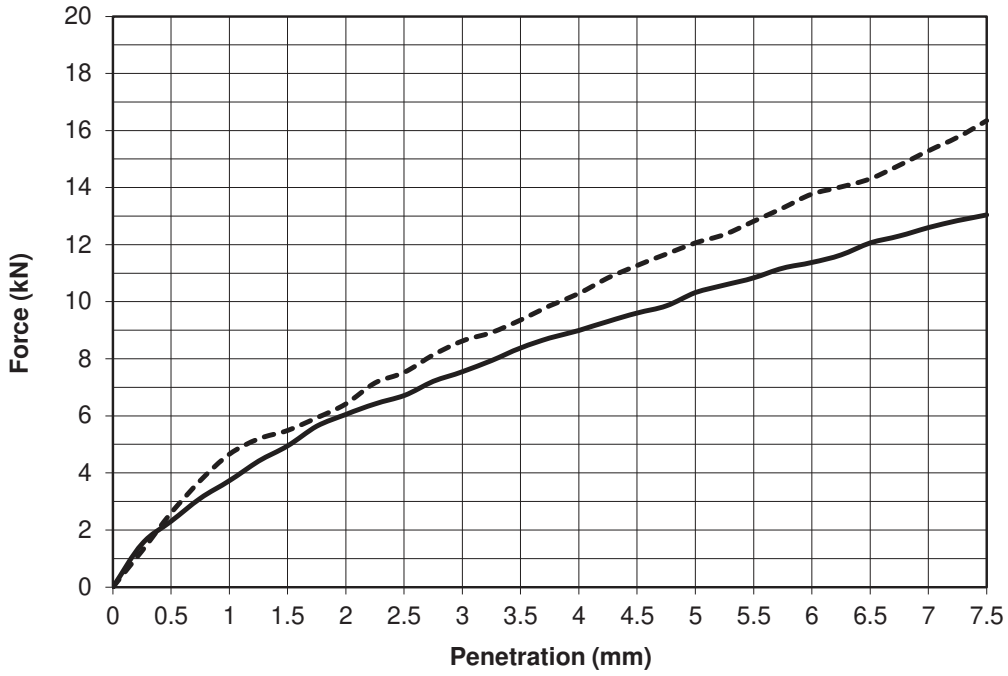
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Report No.	R143176	Contract	Halverstown , Naas - Proposed Data Centres
Contract No.	24330	Customer	DOBA
Date received	24/01/23	Date Tested	13/02/23
BH/TP No.*	TP04	Sample No.*	AA186982 Type: B
Depth* (m)	0.60	Lab sample No.	A22/7562



Key: ———— Top ---------- Base

Description:	Mottled brown slightly sandy slightly gravelly CLAY		
Initial Condition:	Unsoaked		
Moisture Content (%):	14	Bulk Density (Mg/m^3):	2.16
Surcharge (kg):	4	Dry Density (Mg/m^3):	1.90
% Material >20mm:	14		
Method of compaction:	Static Compaction Method 2		

Test Result	Top	Base
CBR %	**52**	**60**
Moisture Content %	14	14

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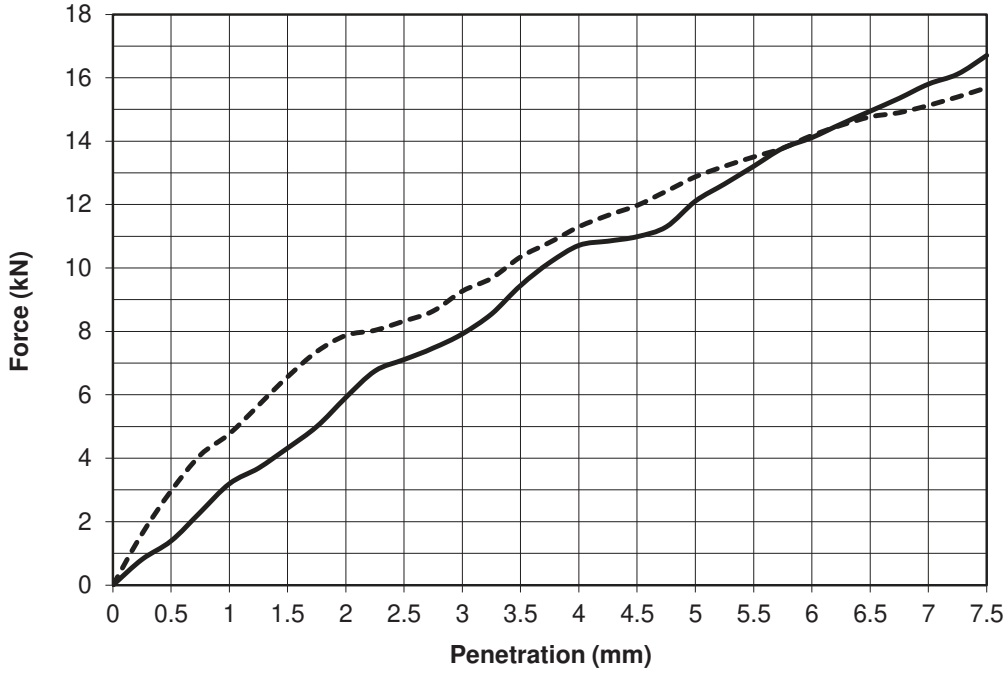
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Report No.	R142753	Contract	Halverstown , Naas - Proposed Data Centres
Contract No.	24330	Customer	DOBA
Date received	24/01/23	Date Tested	16/02/23
BH/TP No.*	TP04	Sample No.*	AA186982 Type: B
Depth* (m)	0.60	Lab sample No.	A22/7562



Key: ———— Top ---------- Base

Description:	Mottled brown slightly sandy slightly gravelly CLAY		
Initial Condition:	3 % Lime/ 7 Days Soaked		
Moisture Content (%):	12	Bulk Density (Mg/m^3):	2.18
Surcharge (kg):	4	Dry Density (Mg/m^3):	1.95
% Material >20mm:	14		
Method of compaction:	Static Compaction Method 2		

Test Result	Top	Base
CBR %	**61**	**65**
Moisture Content %	12	12

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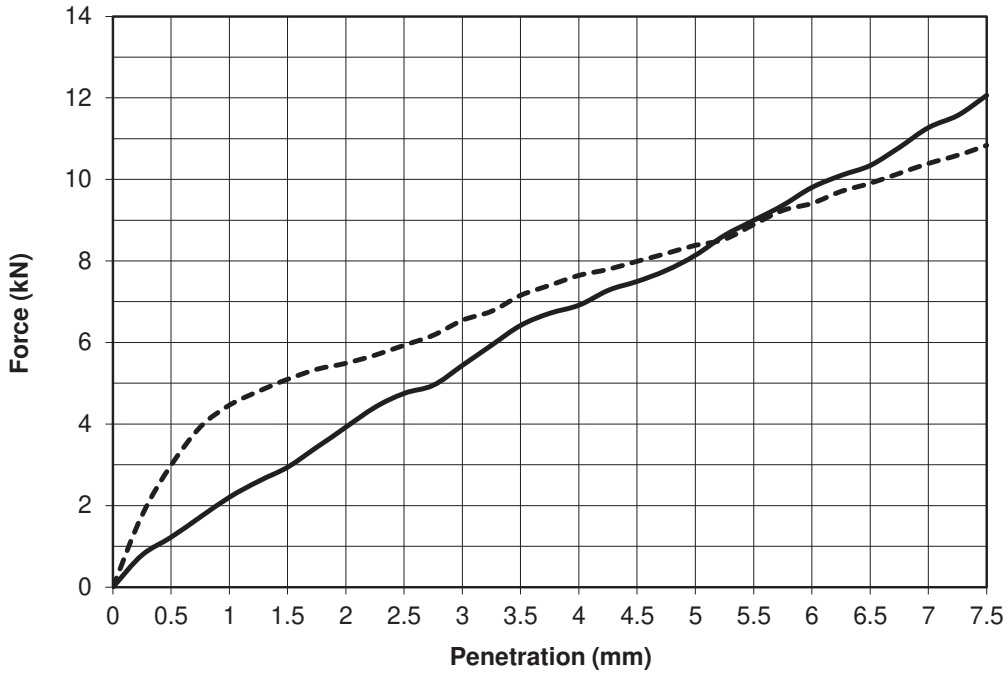
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Report No.	R142660	Contract	Halverstown , Naas - Proposed Data Centres
Contract No.	24330	Customer	DOBA
Date received	24/01/23	Date Tested	13/02/23
BH/TP No.*	TP04	Sample No.*	AA186982 Type: B
Depth* (m)	0.60	Lab sample No.	A22/7562



Key: ———— Top ---------- Base

Description:	Brown slightly sandy slightly gravelly CLAY		
Initial Condition:	1% Lime 2% Cement/ 3 Days Soaked		
Moisture Content (%):	14	Bulk Density (Mg/m^3):	2.16
Surcharge (kg):	4	Dry Density (Mg/m^3):	1.90
% Material >20mm:	14		
Method of compaction:	Static Compaction Method 2		

Test Result	Top	Base
CBR %	**41**	**45**
Moisture Content %	14	14

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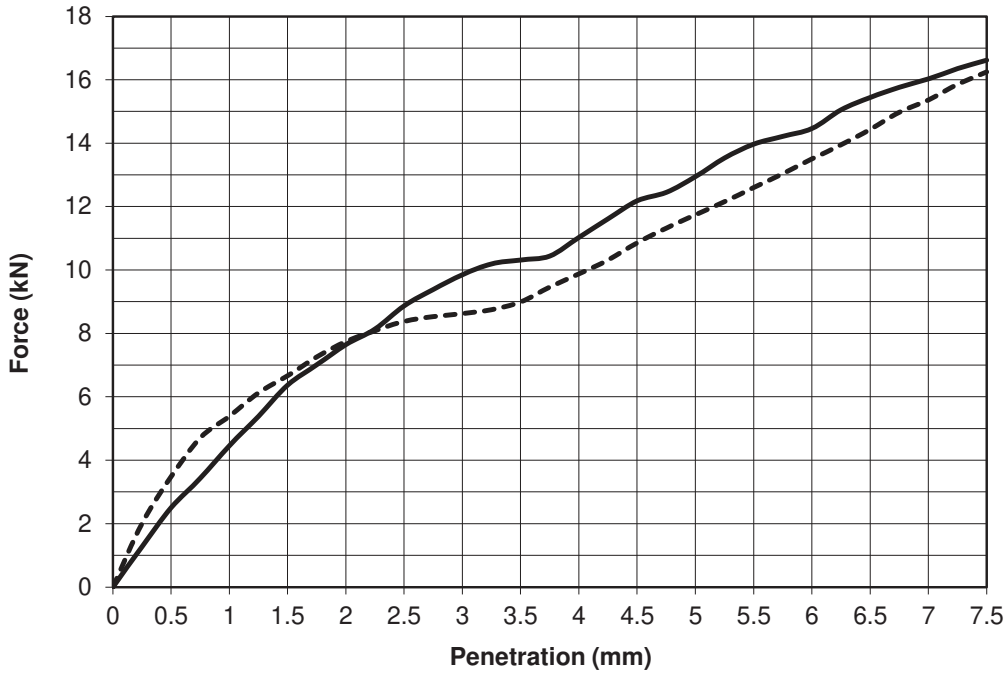
TEST REPORT
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RECEIVED: 13/08/2024

Report No.	R142664	Contract	Halverstown , Naas - Proposed Data Centres
Contract No.	24330	Customer	DOBA
Date received	24/01/23	Date Tested	01/02/23
BH/TP No.*	TP04	Sample No.*	AA186982 Type: B
Depth* (m)	0.60	Lab sample No.	A22/7562



Key: ———— Top ---------- Base

Description:	Mottled brown slightly sandy slightly gravelly CLAY		
Initial Condition:	1% Lime 2% Cement/ 5 Days Soaked		
Moisture Content (%):	13	Bulk Density (Mg/m^3):	2.23
Surcharge (kg):	4	Dry Density (Mg/m^3):	1.98
% Material >20mm:	14		
Method of compaction:	Static Compaction Method 2		

Test Result	Top	Base
CBR %	**67**	**63**
Moisture Content %	13	13

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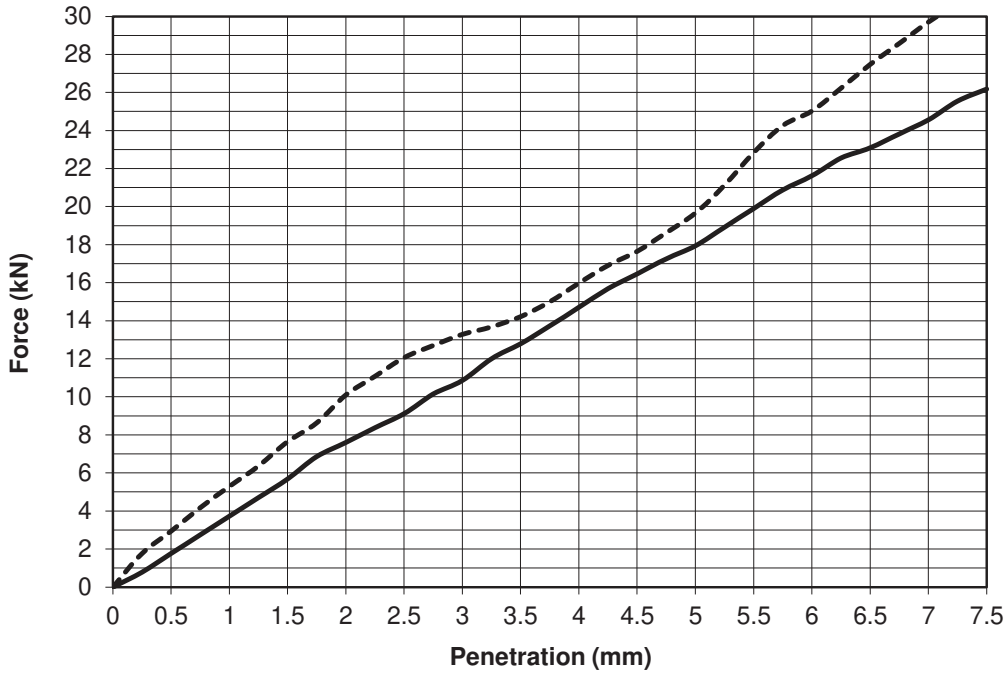
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Report No.	R143175	Contract	Halverstown , Naas - Proposed Data Centres
Contract No.	24330	Customer	DOBA
Date received	24/01/23	Date Tested	16/02/23
BH/TP No.*	TP04	Sample No.*	AA186982 Type: B
Depth* (m)	0.60	Lab sample No.	A22/7562



Key: ———— Top ---------- Base

Description:	Mottled brown slightly sandy slightly gravelly CLAY		
Initial Condition:	1% Lime 2% Cement/7 Days Soaked		
Moisture Content (%):	12	Bulk Density (Mg/m^3):	2.14
Surcharge (kg):	4	Dry Density (Mg/m^3):	1.91
% Material >20mm:	14		
Method of compaction:	Static Compaction Method 2		

Test Result	Top	Base
CBR %	**90**	**99**
Moisture Content %	12	12

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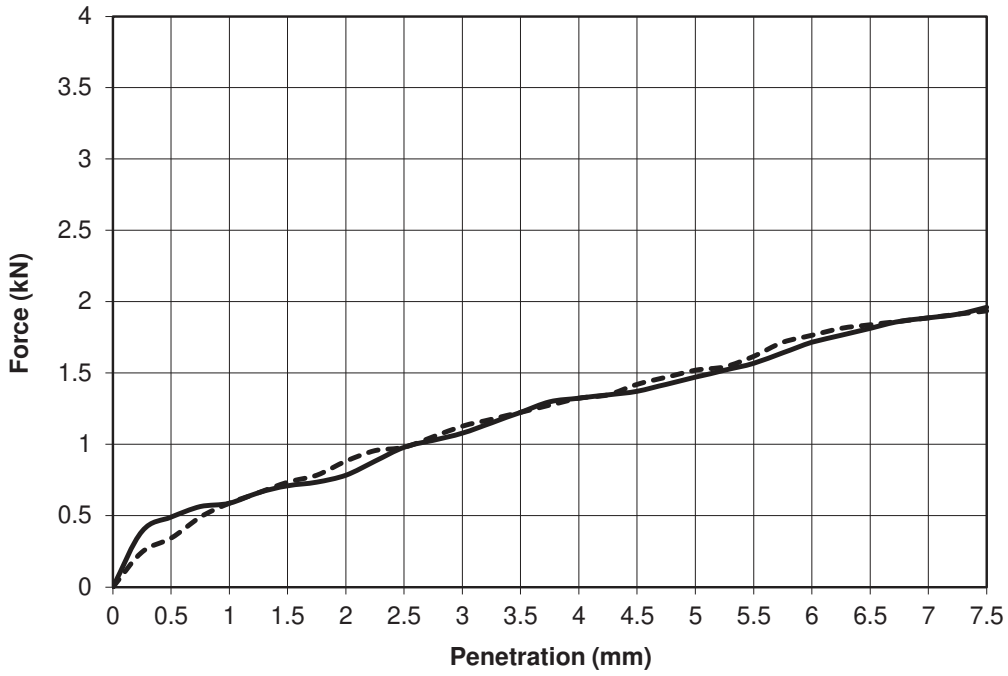
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Report No.	R145771	Contract	Halverstown , Naas - Proposed Data Centres
Contract No.	24330	Customer	DOBA
Date received	24/01/23	Date Tested	21/02/23
BH/TP No.*	TP12	Sample No.*	AA195481 Type: B
Depth* (m)	0.50	Lab sample No.	A22/7563



Key: ———— Top ---------- Base

Description:	Brown slightly sandy slightly gravelly CLAY		
Initial Condition:	1% Lime/ 3 Days soaked		
Moisture Content (%):	18	Bulk Density (Mg/m^3):	2.08
Surcharge (kg):	4	Dry Density (Mg/m^3):	1.77
% Material >20mm:	6.4		
Method of compaction:	Static Compaction Method 2		

Test Result	Top	Base
CBR %	**7.4**	**7.6**
Moisture Content %	18	18

Results relate only to the specimen tested, in as received condition unless otherwise noted

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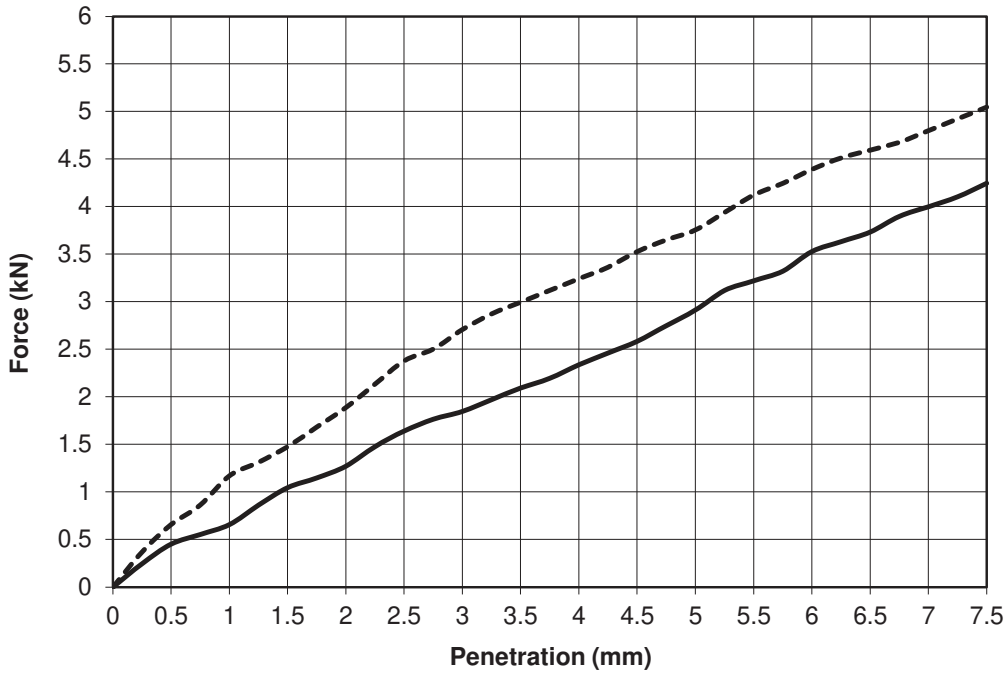
TEST REPORT
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RECEIVED: 13/08/2024

Report No.	R145772	Contract	Halverstown , Naas - Proposed Data Centres
Contract No.	24330	Customer	DOBA
Date received	24/01/23	Date Tested	21/02/23
BH/TP No.*	TP12	Sample No.*	AA195481 Type: B
Depth* (m)	0.50	Lab sample No.	A22/7563



Key: ———— Top ---------- Base

Description:	Brown slightly sandy slightly gravelly CLAY		
Initial Condition:	1% Lime/ 5 Days soaked		
Moisture Content (%):	17	Bulk Density (Mg/m^3):	2.11
Surcharge (kg):	4	Dry Density (Mg/m^3):	1.81
% Material >20mm:	6.4		
Method of compaction:	Static Compaction Method 2		

Test Result	Top	Base
CBR %	**14.6**	**18.8**
Moisture Content %	17	17

Results relate only to the specimen tested, in as received condition unless otherwise noted

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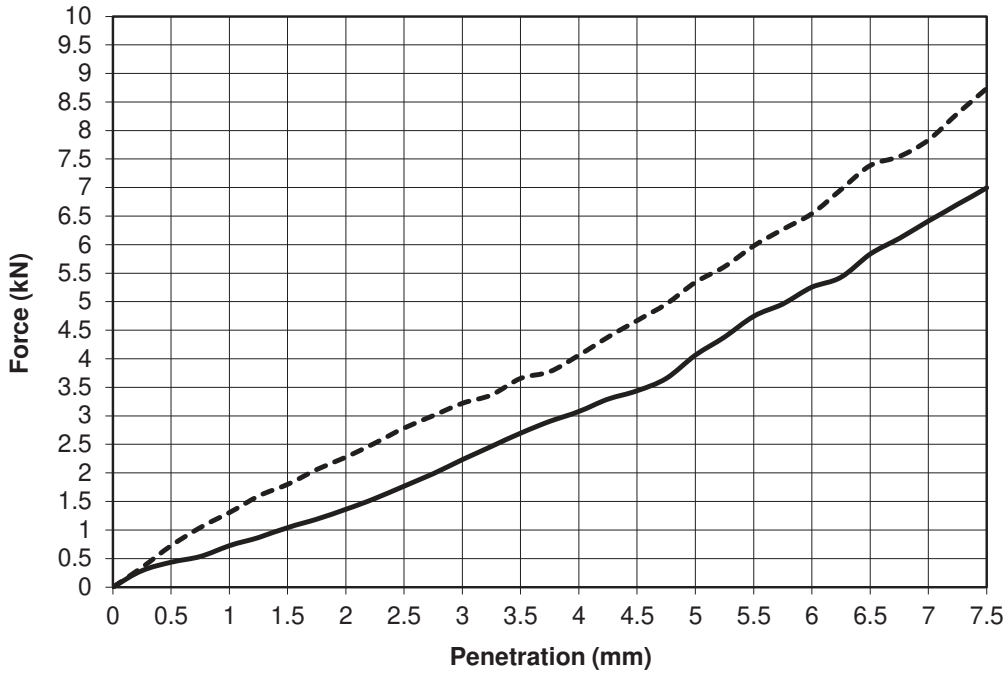
TEST REPORT
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Report No.	R145773	Contract	Halverstown , Naas - Proposed Data Centres
Contract No.	24330	Customer	DOBA
Date received	24/01/23	Date Tested	21/02/23
BH/TP No.*	TP12	Sample No.*	AA195481 Type: B
Depth* (m)	0.50	Lab sample No.	A22/7563



Key: ———— Top ---------- Base

Description:	Brown slightly sandy slightly gravelly CLAY		
Initial Condition:	1% Lime/ 7 Days soaked		
Moisture Content (%):	14	Bulk Density (Mg/m^3):	2.13
Surcharge (kg):	4	Dry Density (Mg/m^3):	1.86
% Material >20mm:	6.4		
Method of compaction:	Static Compaction Method 2		

Test Result	Top	Base
CBR %	**20.4**	**26.7**
Moisture Content %	14	14

Results relate only to the specimen tested, in as received condition unless otherwise noted

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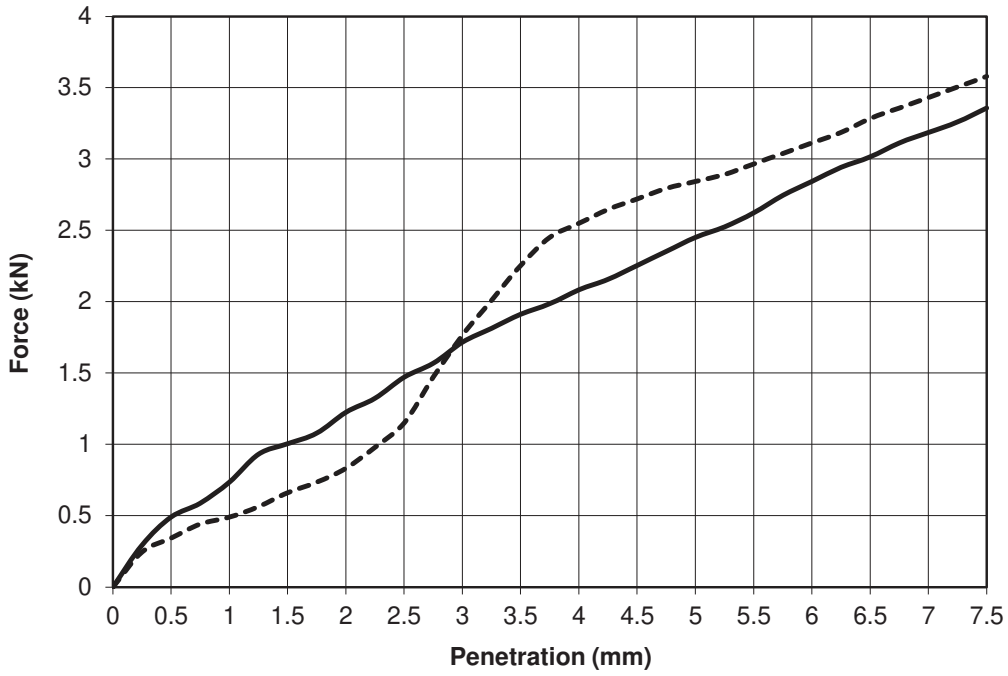
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Report No.	R142668	Contract	Halverstown , Naas - Proposed Data Centres
Contract No.	24330	Customer	DOBA
Date received	24/01/23	Date Tested	21/02/23
BH/TP No.*	TP12	Sample No.*	AA195481 Type: B
Depth* (m)	0.50	Lab sample No.	A22/7563



Key: ———— Top ---------- Base

Description:	Brown slightly sandy slightly gravelly CLAY		
Initial Condition:	2% Lime/ 3 Days soaked		
Moisture Content (%):	18	Bulk Density (Mg/m^3):	2.07
Surcharge (kg):	4	Dry Density (Mg/m^3):	1.76
% Material >20mm:	6.4		
Method of compaction:	Static Compaction Method 2		

Test Result	Top	Base
CBR %	**12**	**14**
Moisture Content %	19	16

Results relate only to the specimen tested, in as received condition unless otherwise noted

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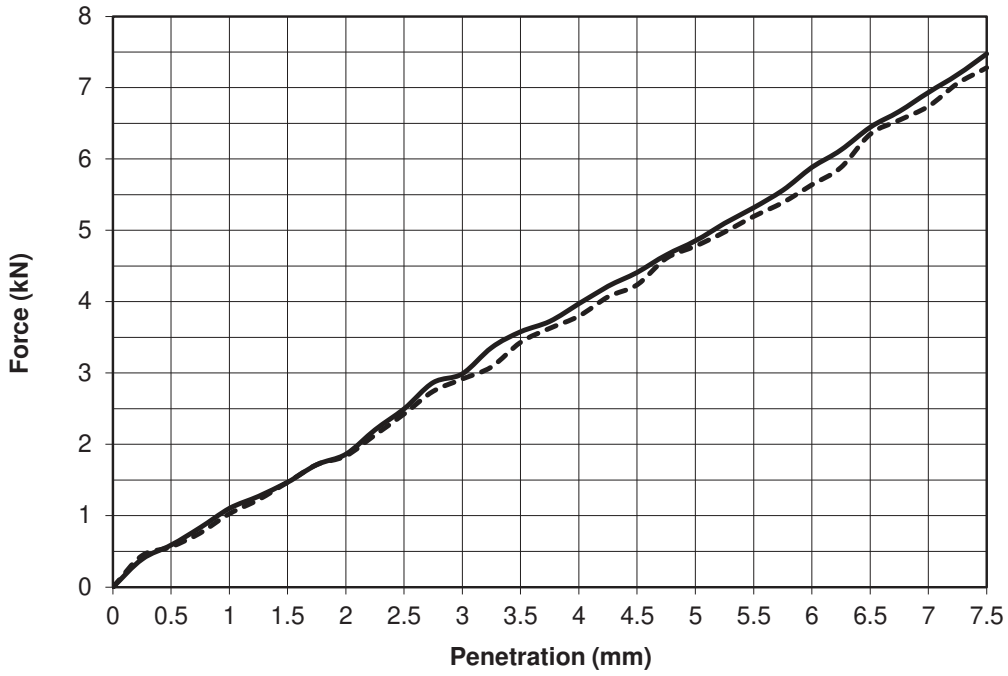
TEST REPORT
Determination of California Bearing Ratio (CBR)

Tested in accordance with BS1377:Part 4:1990, clause 7

ISO 17025 IVNAB ACCREDITED TESTING DETAILED IN SCOPE REG NO. 1331

RECEIVED: 13/08/2024

Report No.	R142666	Contract	Halverstown , Naas - Proposed Data Centres
Contract No.	24330	Customer	DOBA
Date received	24/01/23	Date Tested	13/02/23
BH/TP No.*	TP12	Sample No.*	AA195481 Type: B
Depth* (m)	0.50	Lab sample No.	A22/7563



Key: ———— Top ---------- Base

Description:	Brown slightly sandy slightly gravelly CLAY		
Initial Condition:	2% Lime /5 Days Soaked		
Moisture Content (%):	15	Bulk Density (Mg/m^3):	2.40
Surcharge (kg):	4	Dry Density (Mg/m^3):	0.80
% Material >20mm:	6.4		
Method of compaction:	Static Compaction Method 2		

Test Result	Top	Base
CBR %	**24**	**24**
Moisture Content %	15	15

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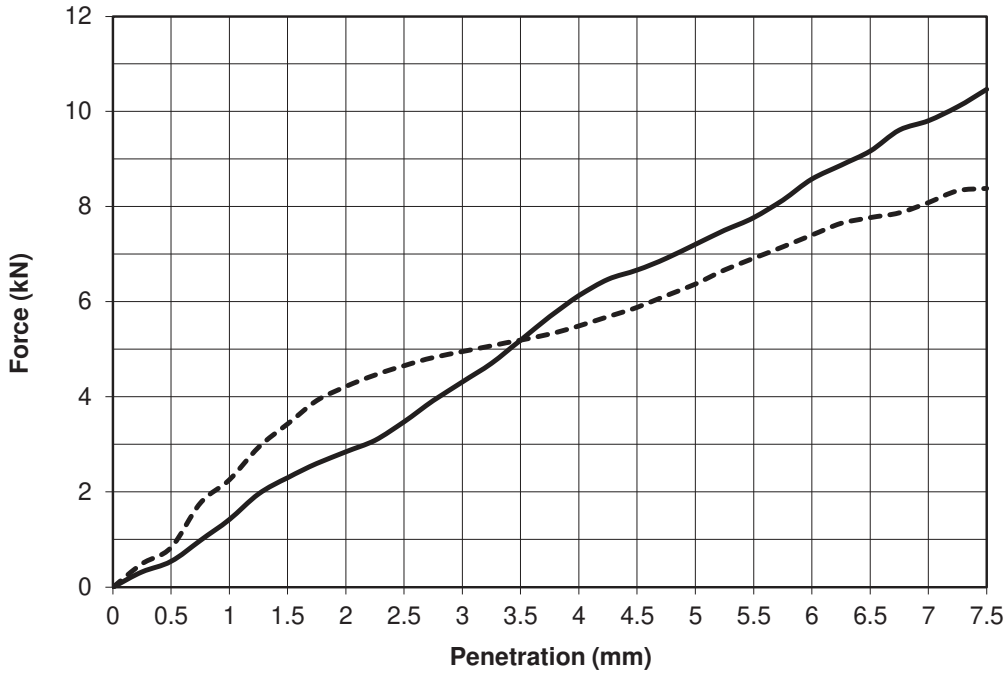
TEST REPORT
Determination of California Bearing Ratio (CBR)

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RECEIVED: 13/08/2024

Report No.	R143177	Contract	Halverstown , Naas - Proposed Data Centres
Contract No.	24330	Customer	DOBA
Date received	24/01/23	Date Tested	17/02/23
BH/TP No.*	TP12	Sample No.*	AA185481 Type: B
Depth* (m)	0.50	Lab sample No.	A22/7563



Key: ———— Top ---------- Base

Description:	Brown slightly sandy slightly gravelly CLAY		
Initial Condition:	2 % Lime/ 7 Days Soaked		
Moisture Content (%):	13	Bulk Density (Mg/m^3):	2.17
Surcharge (kg):	4	Dry Density (Mg/m^3):	1.93
% Material >20mm:	6.4		
Method of compaction:	Static Compaction Method 2		

Test Result	Top	Base
CBR %	**36**	**35**
Moisture Content %	13	12

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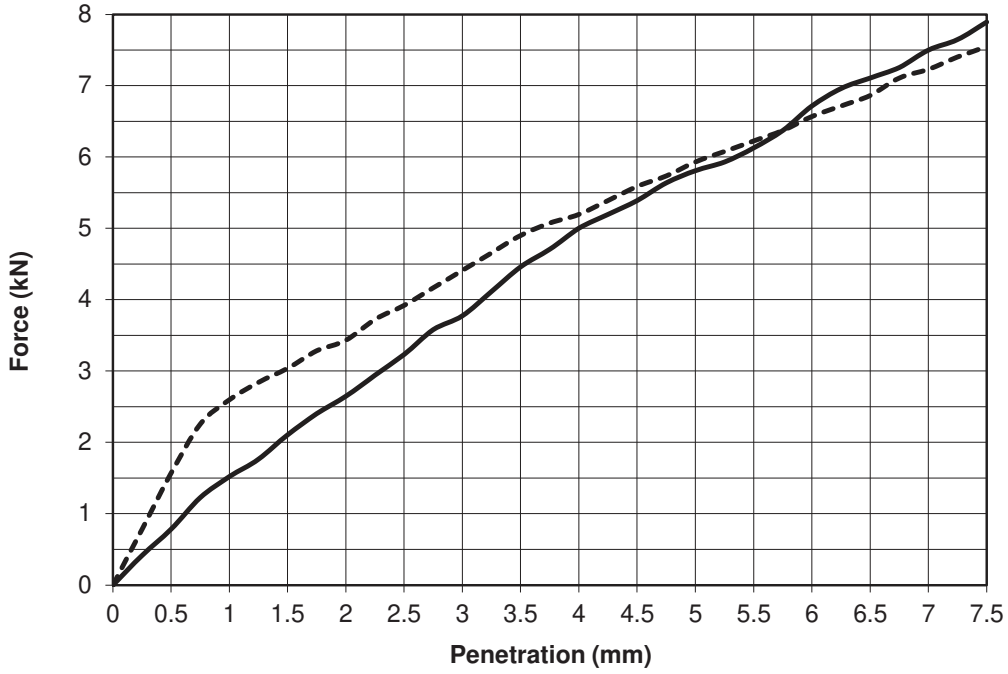
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Report No.	R142665	Contract	Halverstown , Naas - Proposed Data Centres
Contract No.	24330	Customer	DOBA
Date received	24/01/23	Date Tested	13/02/23
BH/TP No.*	TP12	Sample No.*	AA195481 Type: B
Depth* (m)	0.50	Lab sample No.	A22/7563



Key: ———— Top ---------- Base

Description:	Brown slightly sandy slightly gravelly CLAY		
Initial Condition:	2% Lime/Soaked 3 Days		
Moisture Content (%):	14	Bulk Density (Mg/m^3):	2.17
Surcharge (kg):	4	Dry Density (Mg/m^3):	1.89
% Material >20mm:	6.4		
Method of compaction:	Static Compaction Method 2		

Test Result	Top	Base
CBR %	**29**	**30**
Moisture Content %	15	15

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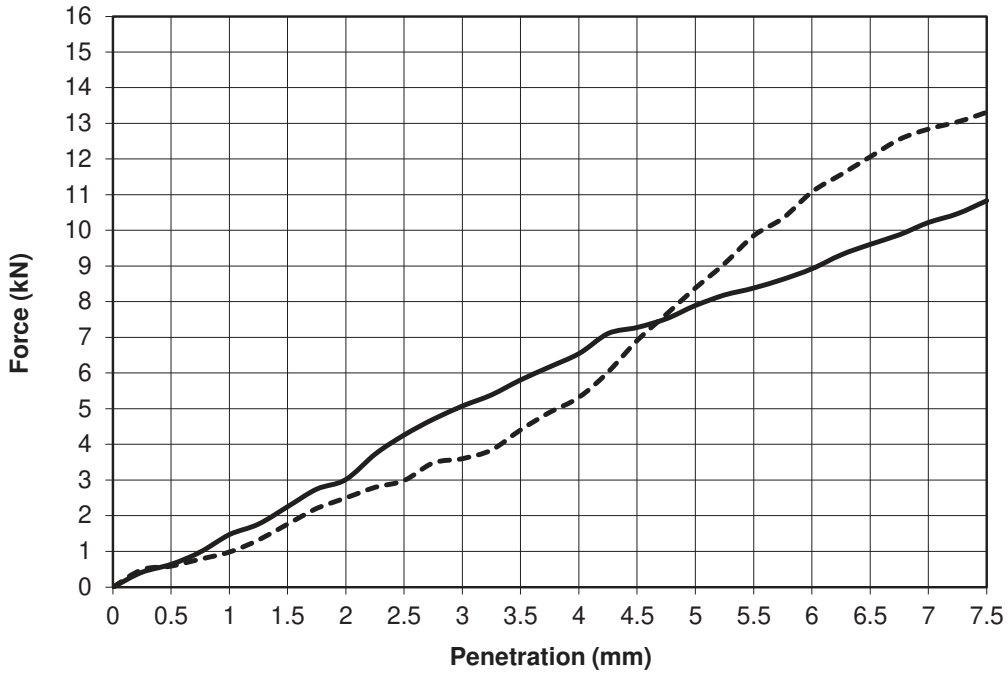
TEST REPORT
Determination of California Bearing Ratio (CBR)

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

RECEIVED: 13/08/2024

Report No.	R142670	Contract	Halverstown , Naas - Proposed Data Centres
Contract No.	24330	Customer	DOBA
Date received	24/01/23	Date Tested	01/02/23
BH/TP No.*	TP12	Sample No.*	AA195481 Type: B
Depth* (m)	0.50	Lab sample No.	A22/7563



Key: ———— Top ---------- Base

Description:	Brown slightly sandy slightly gravelly CLAY		
Initial Condition:	2% Lime /5 Days Soaked		
Moisture Content (%):	16	Bulk Density (Mg/m^3):	2.15
Surcharge (kg):	4	Dry Density (Mg/m^3):	1.86
% Material >20mm:	6.4		
Method of compaction:	Static Compaction Method 2		

Test Result	Top	Base
CBR %	**40**	**42**
Moisture Content %	16	16

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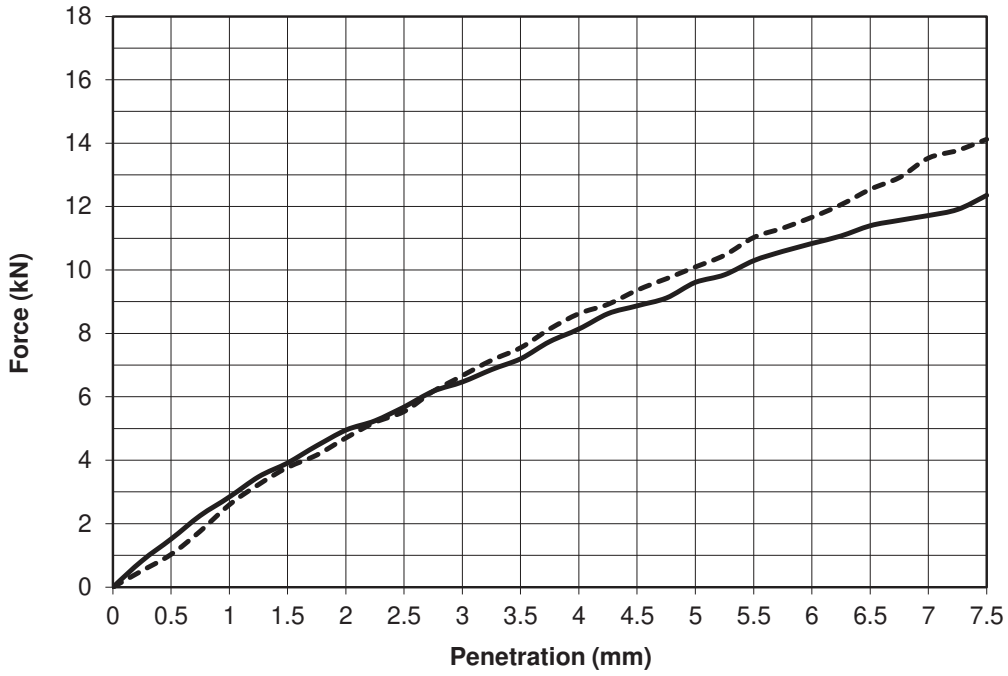
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TEST REPORT
Determination of California Bearing Ratio (CBR)

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Report No.	R143178	Contract	Halverstown , Naas - Proposed Data Centres
Contract No.	24330	Customer	DOBA
Date received	24/01/23	Date Tested	17/02/23
BH/TP No.*	TP12	Sample No.*	AA185481 Type: B
Depth* (m)	0.50	Lab sample No.	A22/7563



Key: ———— Top ---------- Base

Description:	Brown slightly sandy slightly gravelly CLAY		
Initial Condition:	3% Lime/ 7 Days Soaked		
Moisture Content (%):	15	Bulk Density (Mg/m^3):	2.17
Surcharge (kg):	4	Dry Density (Mg/m^3):	1.90
% Material >20mm:	14		
Method of compaction:	Static Compaction Method 2		

Test Result	Top	Base
CBR %	**48**	**51**
Moisture Content %	15	14

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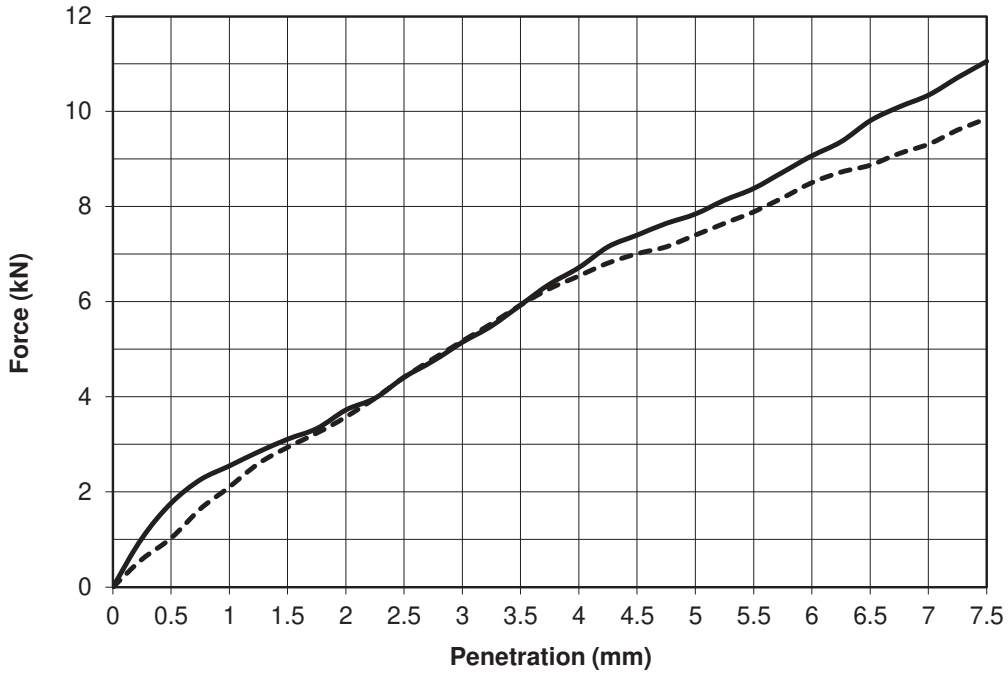
TEST REPORT
Determination of California Bearing Ratio (CBR)

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Report No.	R142667	Contract	Halverstown , Naas - Proposed Data Centres
Contract No.	24330	Customer	DOBA
Date received	24/01/23	Date Tested	13/02/23
BH/TP No.*	TP12	Sample No.*	AA195481 Type: B
Depth* (m)	0.50	Lab sample No.	A22/7563



Key: ———— Top ---------- Base

Description:	Brown slightly sandy slightly gravelly CLAY		
Initial Condition:	1% Lime 2% Cement 3 Days Soaked		
Moisture Content (%):	14	Bulk Density (Mg/m^3):	2.16
Surcharge (kg):	4	Dry Density (Mg/m^3):	1.89
% Material >20mm:	6.4		
Method of compaction:	Static Compaction Method 2		

Test Result	Top	Base
CBR %	**39**	**37**
Moisture Content %	14	15

Results relate only to the specimen tested, in as received condition unless otherwise noted

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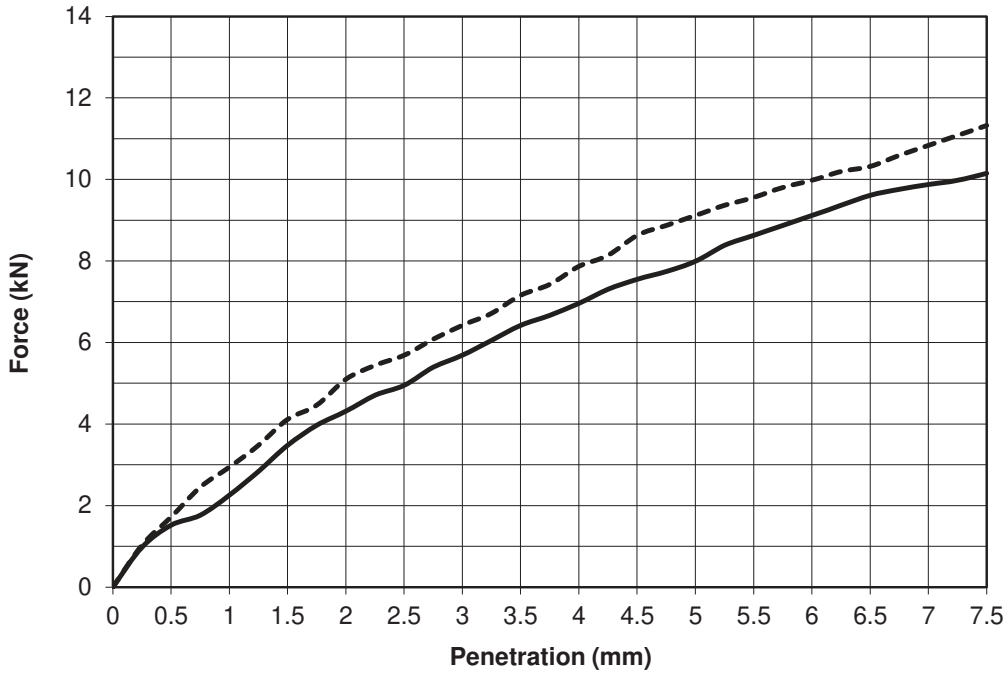
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Report No.	R143179	Contract	Halverstown , Naas - Proposed Data Centres
Contract No.	24330	Customer	DOBA
Date received	24/01/23	Date Tested	17/02/23
BH/TP No.*	TP12	Sample No.*	AA185481 Type: B
Depth* (m)	0.50	Lab sample No.	A22/7563



Key: ———— Top ---------- Base

Description:	Brown slightly sandy slightly gravelly CLAY		
Initial Condition:	1% Lime 2% Cement/5 Days Soaked		
Moisture Content (%):	16	Bulk Density (Mg/m^3):	2.17
Surcharge (kg):	4	Dry Density (Mg/m^3):	1.87
% Material >20mm:	14		
Method of compaction:	Static Compaction Method 2		

Test Result	Top	Base
CBR %	**40**	**46**
Moisture Content %	16	16

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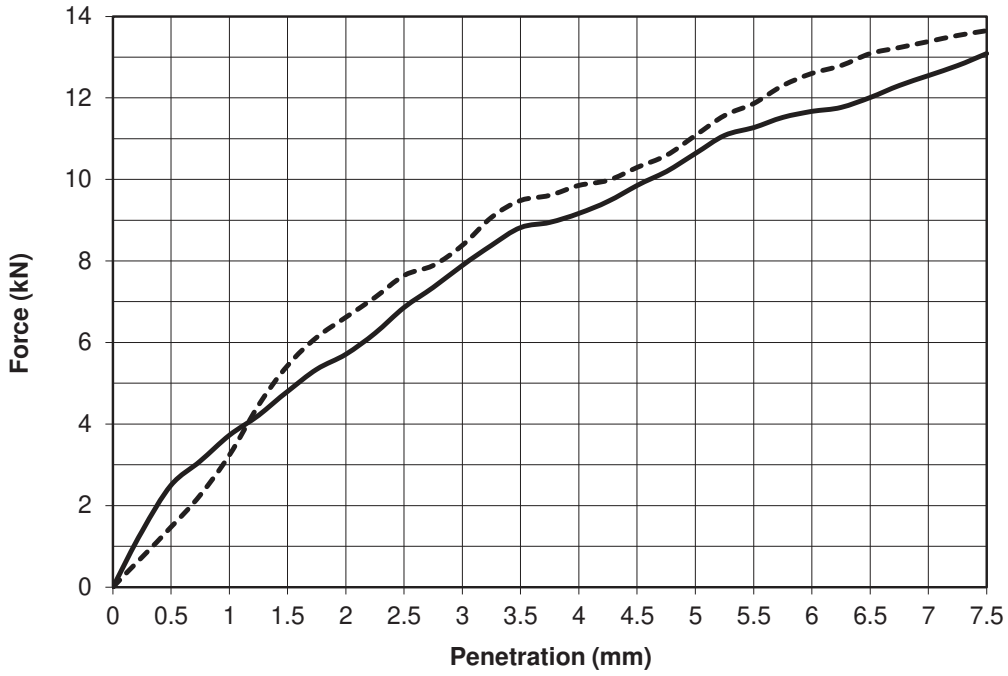
TEST REPORT
Determination of California Bearing Ratio (CBR)

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Report No.	R142669	Contract	Halverstown , Naas - Proposed Data Centres
Contract No.	24330	Customer	DOBA
Date received	24/01/23	Date Tested	01/02/23
BH/TP No.*	TP12	Sample No.*	AA195481 Type: B
Depth* (m)	0.50	Lab sample No.	A22/7563



Key: ———— Top ---------- Base

Description:	Brown slightly sandy slightly gravelly CLAY		
Initial Condition:	1% Lime 2% Cement/7 Days Soaked		
Moisture Content (%):	15	Bulk Density (Mg/m^3):	2.17
Surcharge (kg):	4	Dry Density (Mg/m^3):	1.89
% Material >20mm:	6.4		
Method of compaction:	Static Compaction Method 2		

Test Result	Top	Base
CBR %	**53**	**58**
Moisture Content %	16	15

Results relate only to the specimen tested, in as received condition unless otherwise noted

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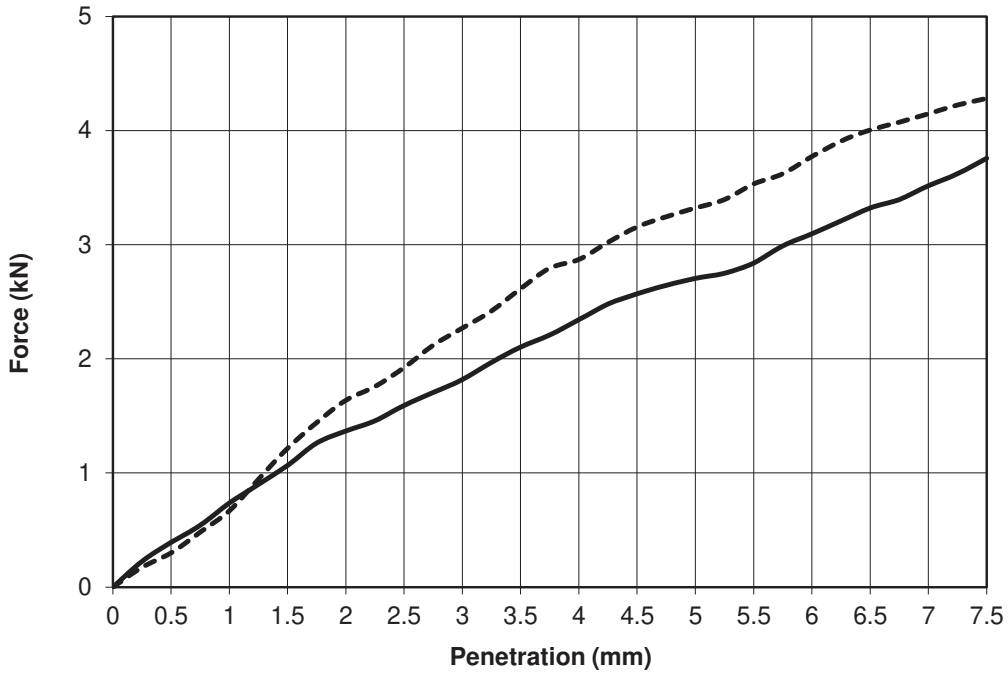
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Report No.	R145763	Contract	Halverstown , Naas - Proposed Data Centres
Contract No.	24330	Customer	DOBA
Date received	24/01/23	Date Tested	18/02/23
BH/TP No.*	TP19	Sample No.*	AA185468 Type: B
Depth* (m)	0.50	Lab sample No.	A22/7568



Key: ———— Top ---------- Base

Description:	Mottled brown slightly sandy slightly gravelly CLAY		
Initial Condition:	1 % Lime/ 3 Days Soaked		
Moisture Content (%):	16	Bulk Density (Mg/m^3):	2.16
Surcharge (kg):	4	Dry Density (Mg/m^3):	1.86
% Material >20mm:	9		
Method of compaction:	Static Compaction Method 2		

Test Result	Top	Base
CBR %	**14**	**17**
Moisture Content %	16	16

Results relate only to the specimen tested, in as received condition unless otherwise noted

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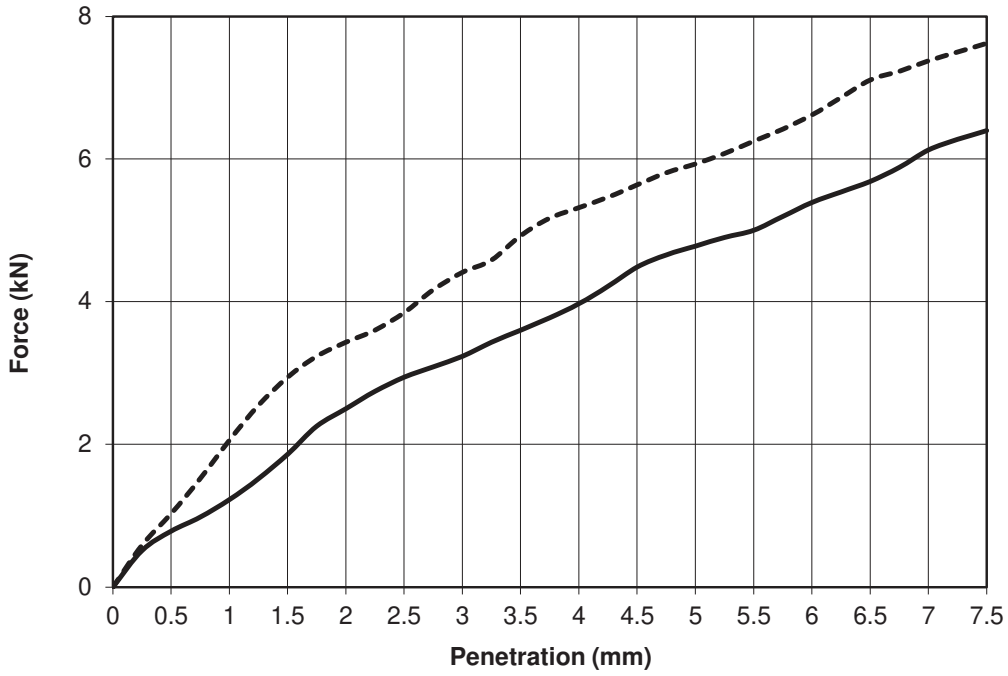
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TEST REPORT
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Report No.	R143180	Contract	Halverstown , Naas - Proposed Data Centres
Contract No.	24330	Customer	DOBA
Date received	24/01/23	Date Tested	18/02/23
BH/TP No.*	TP19	Sample No.*	AA185468 Type: B
Depth* (m)	0.50	Lab sample No.	A22/7568



Key: ———— Top ---------- Base

Description:	Mottled brown slightly sandy slightly gravelly CLAY		
Initial Condition:	1 % Lime/ 5 Days Soaked		
Moisture Content (%):	16	Bulk Density (Mg/m^3):	2.18
Surcharge (kg):	4	Dry Density (Mg/m^3):	1.88
% Material >20mm:	9		
Method of compaction:	Static Compaction Method 2		

Test Result	Top	Base
CBR %	**24**	**30**
Moisture Content %	16	16

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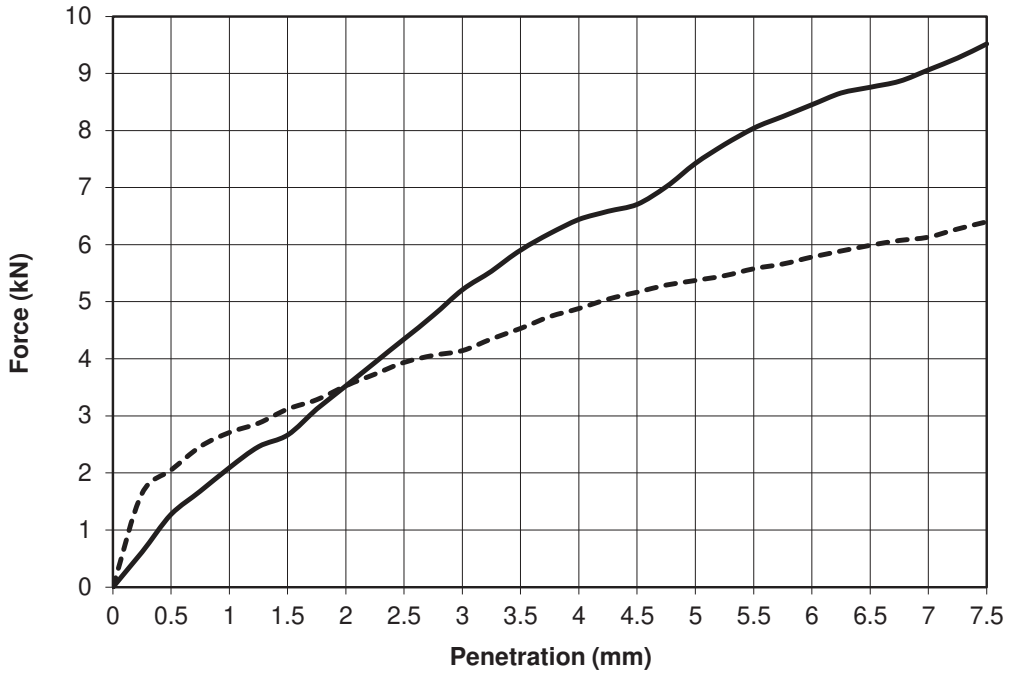
TEST REPORT
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Report No.	R145764	Contract	Halverstown , Naas - Proposed Data Centres
Contract No.	24330	Customer	DOBA
Date received	24/01/23	Date Tested	24/02/23
BH/TP No.*	TP19	Sample No.*	AA185468 Type: B
Depth* (m)	0.50	Lab sample No.	A22/7568



Key: ———— Top ---------- Base

Description:	Mottled brown slightly sandy slightly gravelly CLAY		
Initial Condition:	1 % Lime/ 7 Days Soaked		
Moisture Content (%):	12	Bulk Density (Mg/m^3):	2.18
Surcharge (kg):	4	Dry Density (Mg/m^3):	1.94
% Material >20mm:	9		
Method of compaction:	Static Compaction Method 2		

Test Result	Top	Base
CBR %	**37**	**30**
Moisture Content %	12	13

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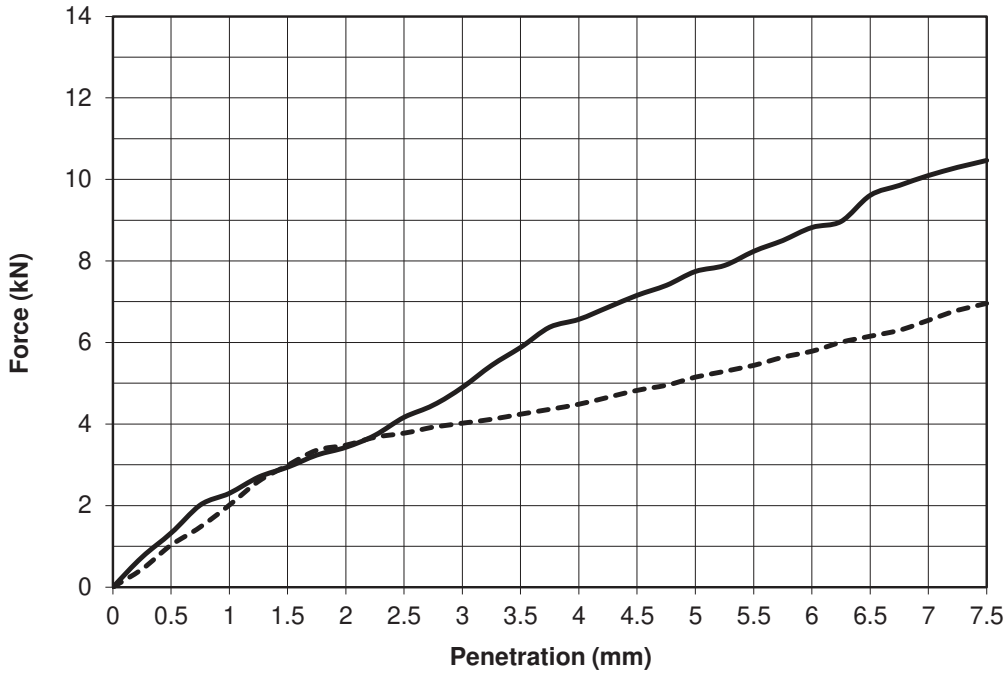
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Report No.	R142672	Contract	Halverstown , Naas - Proposed Data Centres
Contract No.	24330	Customer	DOBA
Date received	24/01/23	Date Tested	01/02/23
BH/TP No.*	TP19	Sample No.*	AA185498 Type: B
Depth* (m)	0.50	Lab sample No.	A22/7568



Key: ———— Top ---------- Base

Description:	Mottled brown slightly sandy slightly gravelly CLAY		
Initial Condition:	2 % Lime/3 Days Soaked		
Moisture Content (%):	14	Bulk Density (Mg/m^3):	2.20
Surcharge (kg):	4	Dry Density (Mg/m^3):	1.93
% Material >20mm:	9		
Method of compaction:	Static Compaction Method 2		

Test Result	Top	Base
CBR %	**39**	**29**
Moisture Content %	14	15

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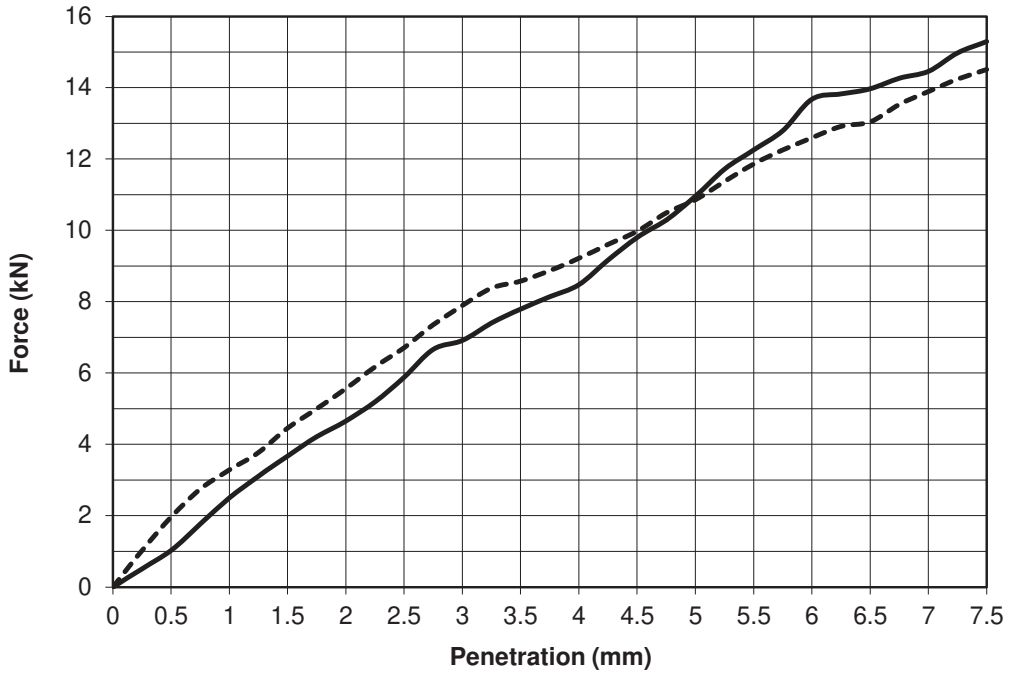
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Report No.	R142671	Contract	Halverstown , Naas - Proposed Data Centres
Contract No.	24330	Customer	DOBA
Date received	24/01/23	Date Tested	13/02/23
BH/TP No.*	TP19	Sample No.*	AA185498 Type: B
Depth* (m)	0.50	Lab sample No.	A22/7568



Key: ———— Top ---------- Base

Description:	Mottled brown slightly sandy slightly gravelly CLAY		
Initial Condition:	2% Lime added 5 Days Soaked		
Moisture Content (%):	13	Bulk Density (Mg/m^3):	2.17
Surcharge (kg):	4	Dry Density (Mg/m^3):	1.92
% Material >20mm:	9		
Method of compaction:	Static Compaction Method 2		

Test Result	Top	Base
CBR %	**55**	**54**
Moisture Content %	13	13

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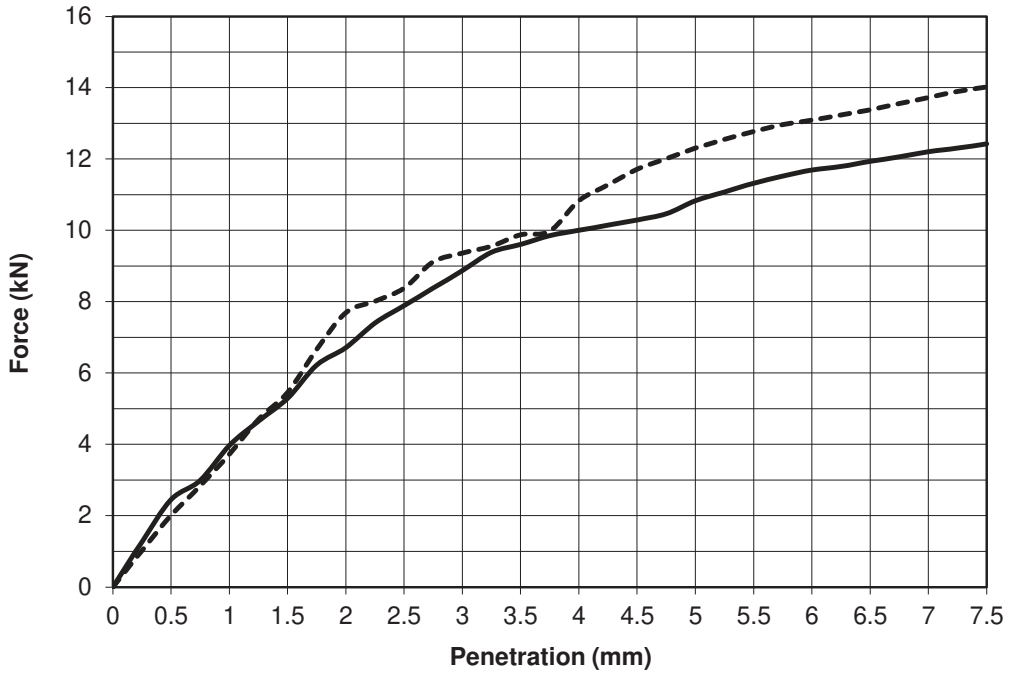
TEST REPORT
Determination of California Bearing Ratio (CBR)

Tested in accordance with BS1377:Part 4:1990, clause 7

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

RECEIVED: 13/08/2024

Report No.	R143181	Contract	Halverstown , Naas - Proposed Data Centres
Contract No.	24330	Customer	DOBA
Date received	24/01/23	Date Tested	16/02/23
BH/TP No.*	TP19	Sample No.*	AA185468 Type: B
Depth* (m)	0.50	Lab sample No.	A22/7568



Key: ———— Top ---------- Base

Description:	Mottled brown slightly sandy slightly gravelly CLAY		
Initial Condition:	2 % Lime/ 7 Days Soaked		
Moisture Content (%):	12	Bulk Density (Mg/m^3):	2.17
Surcharge (kg):	4	Dry Density (Mg/m^3):	1.93
% Material >20mm:	9		
Method of compaction:	Static Compaction Method 2		

Test Result	Top	Base
CBR %	**60**	**63**
Moisture Content %	12	12

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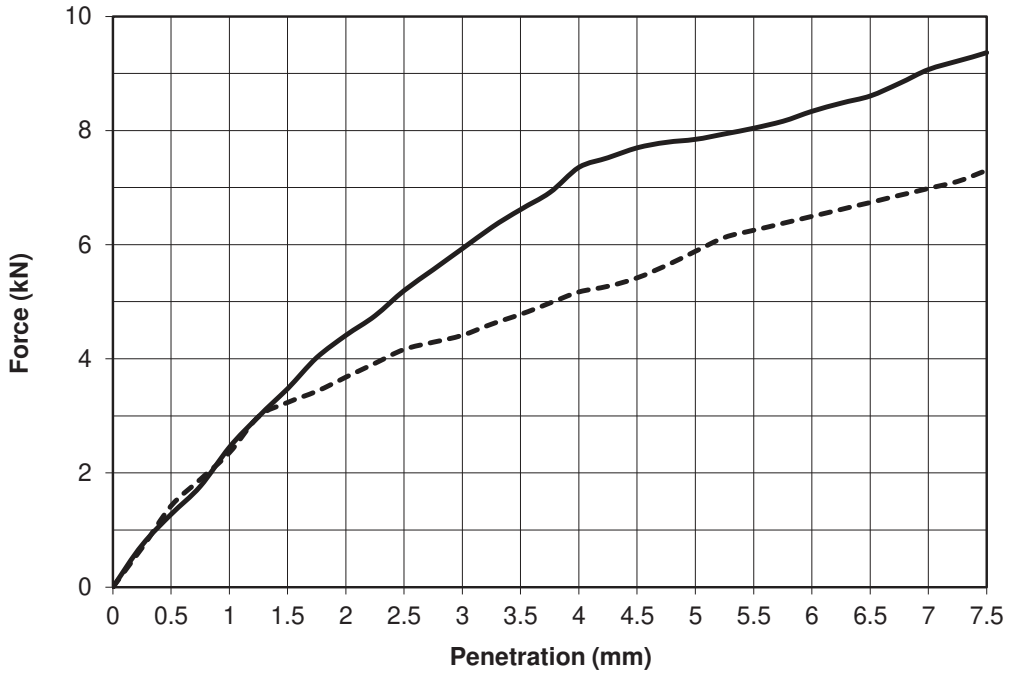
TEST REPORT
Determination of California Bearing Ratio (CBR)

Tested in accordance with BS1377:Part 4:1990, clause 7

ISO 17025 IVNAB ACCREDITED TESTING DETAILED IN SCOPE REG NO. 1331

RECEIVED: 13/08/2024

Report No.	R143186	Contract	Halverstown , Naas - Proposed Data Centres
Contract No.	24330	Customer	DOBA
Date received	24/01/23	Date Tested	03/02/23
BH/TP No.*	TP19	Sample No.*	AA185468 Type: B
Depth* (m)	0.50	Lab sample No.	A22/7568



Key: ———— Top ---------- Base

Description:	Mottled brown slightly sandy slightly gravelly CLAY		
Initial Condition:	3% Lime 3 Days Soaked		
Moisture Content (%):	13	Bulk Density (Mg/m^3):	2.09
Surcharge (kg):	4	Dry Density (Mg/m^3):	1.84
% Material >20mm:	9		
Method of compaction:	Static Compaction Method 2		

Test Result	Top	Base
CBR %	**39**	**32**
Moisture Content %	14	13

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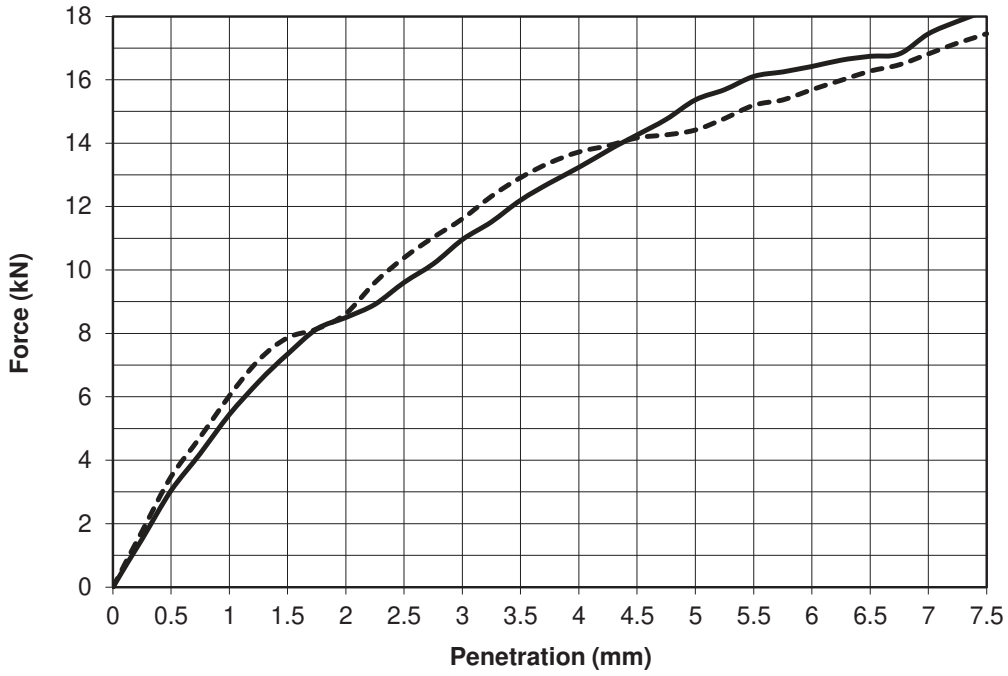
TEST REPORT
Determination of California Bearing Ratio (CBR)

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

RECEIVED: 13/08/2024

Report No.	R143184	Contract	Halverstown , Naas - Proposed Data Centres
Contract No.	24330	Customer	DOBA
Date received	24/01/23	Date Tested	17/02/23
BH/TP No.*	TP19	Sample No.*	AA185468 Type: B
Depth* (m)	0.50	Lab sample No.	A22/7568



Key: ———— Top ---------- Base

Description:	Mottled brown slightly sandy slightly gravelly CLAY		
Initial Condition:	3 % Lime /5 Days soaked		
Moisture Content (%):	13	Bulk Density (Mg/m^3):	2.20
Surcharge (kg):	4	Dry Density (Mg/m^3):	1.95
% Material >20mm:	9		
Method of compaction:	Static Compaction Method 2		

Test Result	Top	Base
CBR %	**77**	**79**
Moisture Content %	14	13

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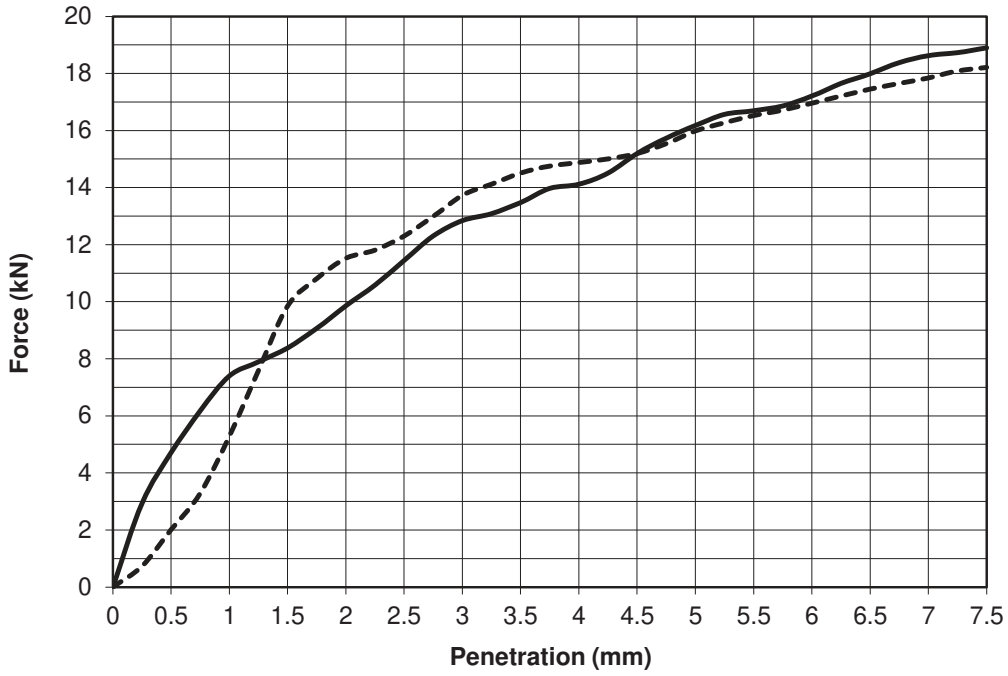
TEST REPORT
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Tested in accordance with BS1377:Part 4:1990, clause 7

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RECEIVED: 13/08/2024

Report No.	R142673	Contract	Halverstown , Naas - Proposed Data Centres
Contract No.	24330	Customer	DOBA
Date received	24/01/23	Date Tested	01/02/23
BH/TP No.*	TP19	Sample No.*	AA185498 Type: B
Depth* (m)	0.50	Lab sample No.	A22/7568



Key: ———— Top ---------- Base

Description:	Mottled brown slightly sandy slightly gravelly CLAY		
Initial Condition:	3 % Lime /7 Days soaked		
Moisture Content (%):	14	Bulk Density (Mg/m^3):	2.20
Surcharge (kg):	4	Dry Density (Mg/m^3):	1.93
% Material >20mm:	9		
Method of compaction:	Static Compaction Method 2		

Test Result	Top	Base
CBR %	**86**	**93**
Moisture Content %	15	14

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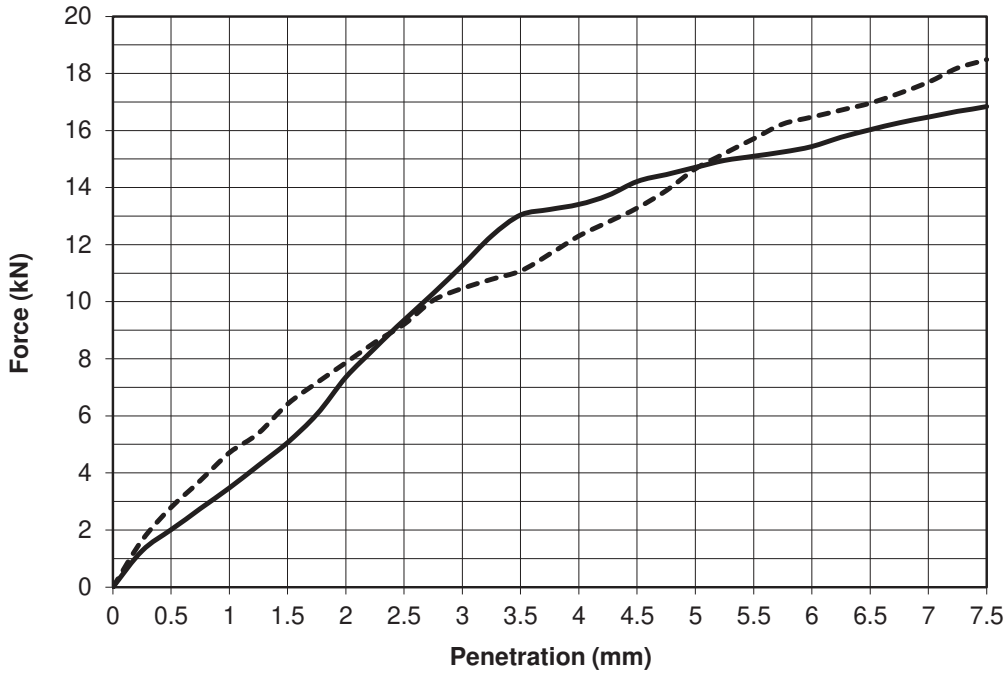
TEST REPORT
Determination of California Bearing Ratio (CBR)

Tested in accordance with BS1377:Part 4:1990, clause 7

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RECEIVED: 13/08/2024

Report No.	R142674	Contract	Halverstown , Naas - Proposed Data Centres
Contract No.	24330	Customer	DOBA
Date received	24/01/23	Date Tested	01/02/23
BH/TP No.*	TP19	Sample No.*	AA185498 Type: B
Depth* (m)	0.50	Lab sample No.	A22/7568



Key: ———— Top ---------- Base

Description:	Mottle brown slightly sandy slightly gravelly CLAY		
Initial Condition:	1% Lime /2% Cement 3 Days Soaked		
Moisture Content (%):	14	Bulk Density (Mg/m^3):	2.15
Surcharge (kg):	4	Dry Density (Mg/m^3):	1.89
% Material >20mm:	9		
Method of compaction:	Static Compaction Method 2		

Test Result	Top	Base
CBR %	**74**	**73**
Moisture Content %	14	14

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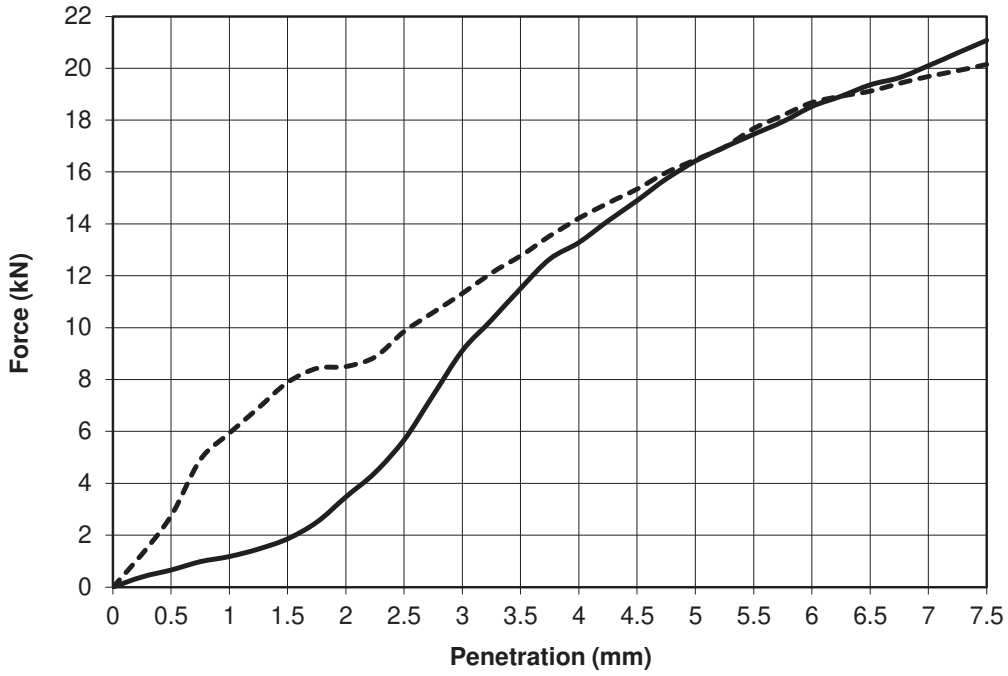
TEST REPORT
Determination of California Bearing Ratio (CBR)

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Report No.	R143185	Contract	Halverstown , Naas - Proposed Data Centres
Contract No.	24330	Customer	DOBA
Date received	24/01/23	Date Tested	17/02/23
BH/TP No.*	TP19	Sample No.*	AA185468 Type: B
Depth* (m)	0.50	Lab sample No.	A22/7568



Key: ———— Top ---------- Base

Description:	Mottled brown slightly sandy slightly gravelly CLAY		
Initial Condition:	1% Lime/2 Cement 5 Days Soaked		
Moisture Content (%):	13	Bulk Density (Mg/m^3):	2.18
Surcharge (kg):	4	Dry Density (Mg/m^3):	1.94
% Material >20mm:	9		
Method of compaction:	Static Compaction Method 2		

Test Result	Top	Base
CBR %	**82**	**83**
Moisture Content %	13	12

Results relate only to the specimen tested, in as received condition unless otherwise noted

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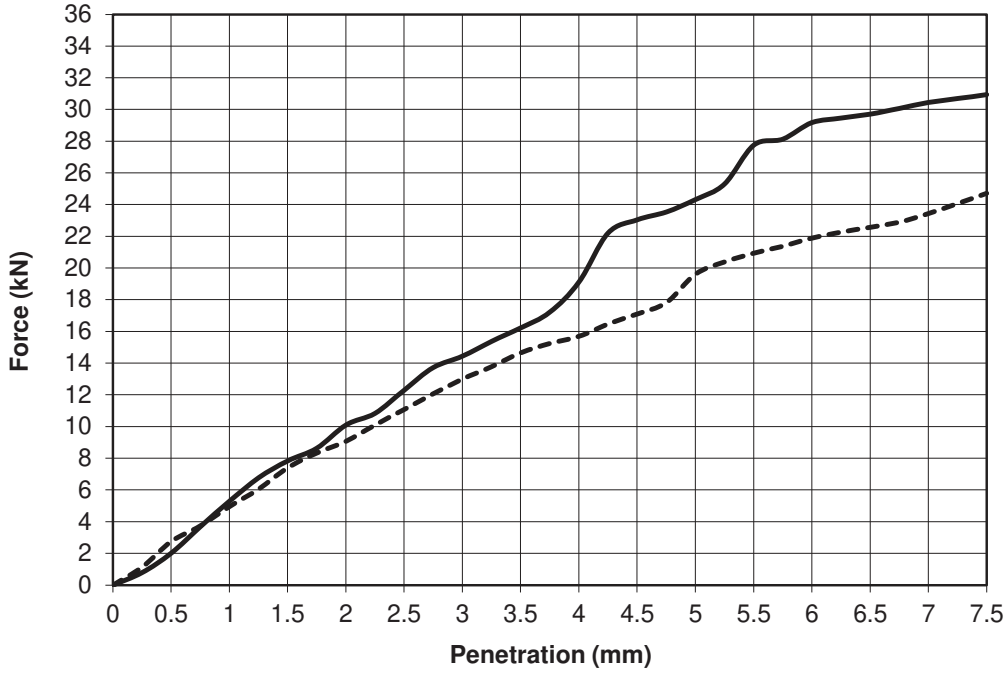
TEST REPORT
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Report No.	R143187	Contract	Halverstown , Naas - Proposed Data Centres
Contract No.	24330	Customer	DOBA
Date received	24/01/23	Date Tested	03/02/23
BH/TP No.*	TP19	Sample No.*	AA185468 Type: B
Depth* (m)	0.50	Lab sample No.	A22/7568



Key: ———— Top ---------- Base

Description:	Mottled brown slightly sandy slightly gravelly CLAY		
Initial Condition:	1% Lime/2% Cement /7 Days soaked		
Moisture Content (%):	13	Bulk Density (Mg/m^3):	2.18
Surcharge (kg):	4	Dry Density (Mg/m^3):	1.93
% Material >20mm:	9		
Method of compaction:	Static Compaction Method 2		

Test Result	Top	Base
CBR %	**122**	**98**
Moisture Content %	13	13

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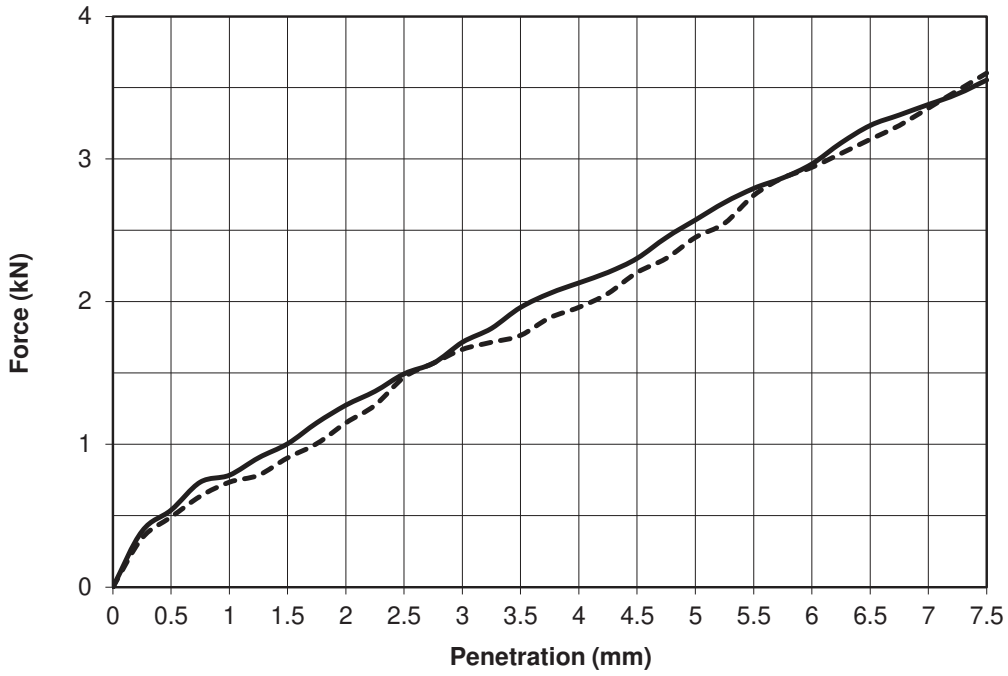
TEST REPORT
Determination of California Bearing Ratio (CBR)

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Report No.	R145765	Contract	Halverstown , Naas - Proposed Data Centres
Contract No.	24330	Customer	DOBA
Date received	24/01/23	Date Tested	18/02/23
BH/TP No.*	TP26	Sample No.*	AA181975 Type: B
Depth* (m)	0.50	Lab sample No.	A22/7575



Key: ———— Top ---------- Base

Description:	Mottled brown slightly sandy slightly gravelly CLAY		
Initial Condition:	1% Lime /3 Days Soaked		
Moisture Content (%):	16	Bulk Density (Mg/m^3):	2.16
Surcharge (kg):	4	Dry Density (Mg/m^3):	1.87
% Material >20mm:	7.6		
Method of compaction:	Static Compaction Method 2		

Test Result	Top	Base
CBR %	**13**	**12**
Moisture Content %	16	16

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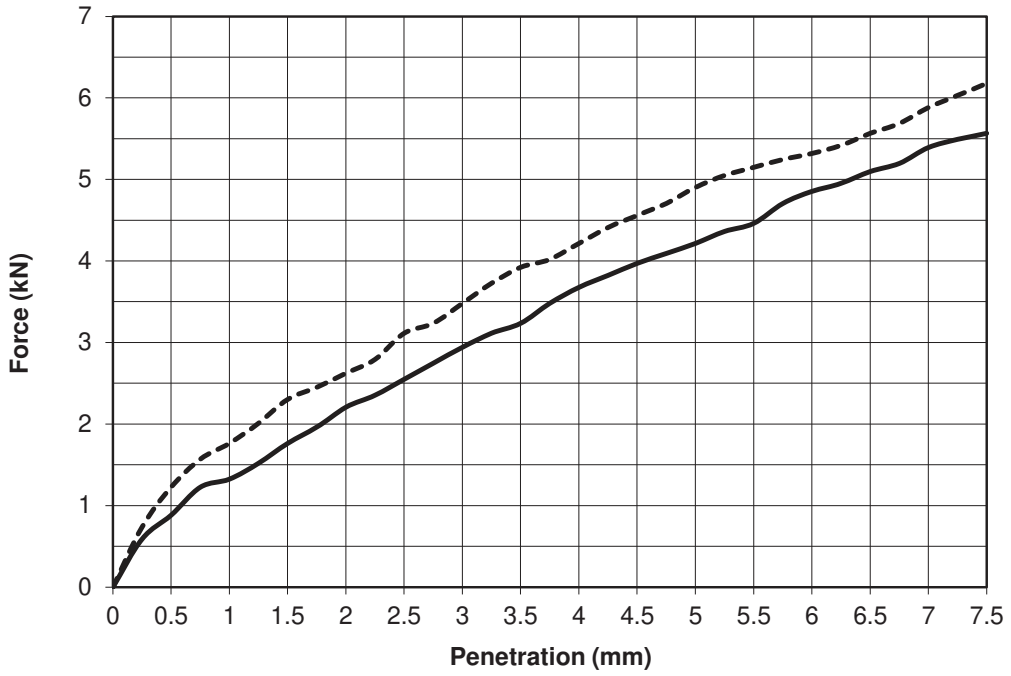
TEST REPORT
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Report No.	R143182	Contract	Halverstown , Naas - Proposed Data Centres
Contract No.	24330	Customer	DOBA
Date received	24/01/23	Date Tested	18/02/23
BH/TP No.*	TP26	Sample No.*	AA181975 Type: B
Depth* (m)	0.50	Lab sample No.	A22/7575



Key: ———— Top ---------- Base

Description:	Mottled brown slightly sandy slightly gravelly CLAY		
Initial Condition:	1% Lime /5 Days Soaked		
Moisture Content (%):	17	Bulk Density (Mg/m^3):	2.17
Surcharge (kg):	4	Dry Density (Mg/m^3):	1.86
% Material >20mm:	7.6		
Method of compaction:	Static Compaction Method 2		

Test Result	Top	Base
CBR %	**21**	**25**
Moisture Content %	16	17

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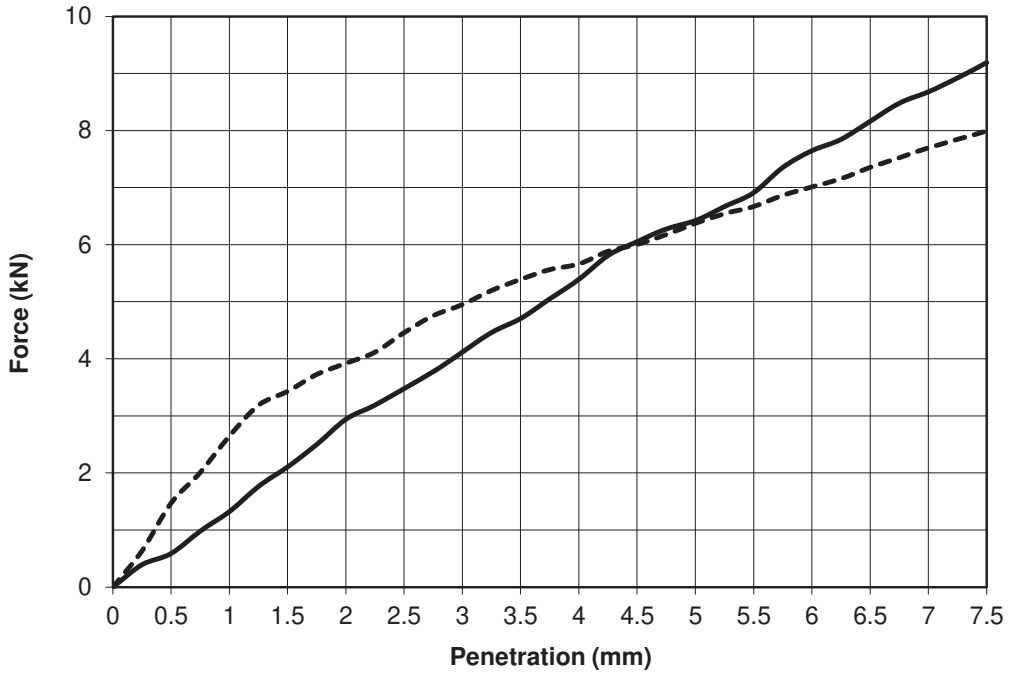
TEST REPORT
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RECEIVED: 13/08/2024

Report No.	R142676	Contract	Halverstown , Naas - Proposed Data Centres
Contract No.	24330	Customer	DOBA
Date received	24/01/23	Date Tested	13/02/23
BH/TP No.*	TP26	Sample No.*	AA181975 Type: B
Depth* (m)	0.50	Lab sample No.	A22/7575



Key: ———— Top ---------- Base

Description:	Mottled brown slightly sandy slightly gravelly CLAY		
Initial Condition:	1 % Lime /7 Day Soaked		
Moisture Content (%):	12	Bulk Density (Mg/m^3):	2.17
Surcharge (kg):	4	Dry Density (Mg/m^3):	1.93
% Material >20mm:	7.6		
Method of compaction:	Static Compaction Method 2		

Test Result	Top	Base
CBR %	**32**	**34**
Moisture Content %	13	12

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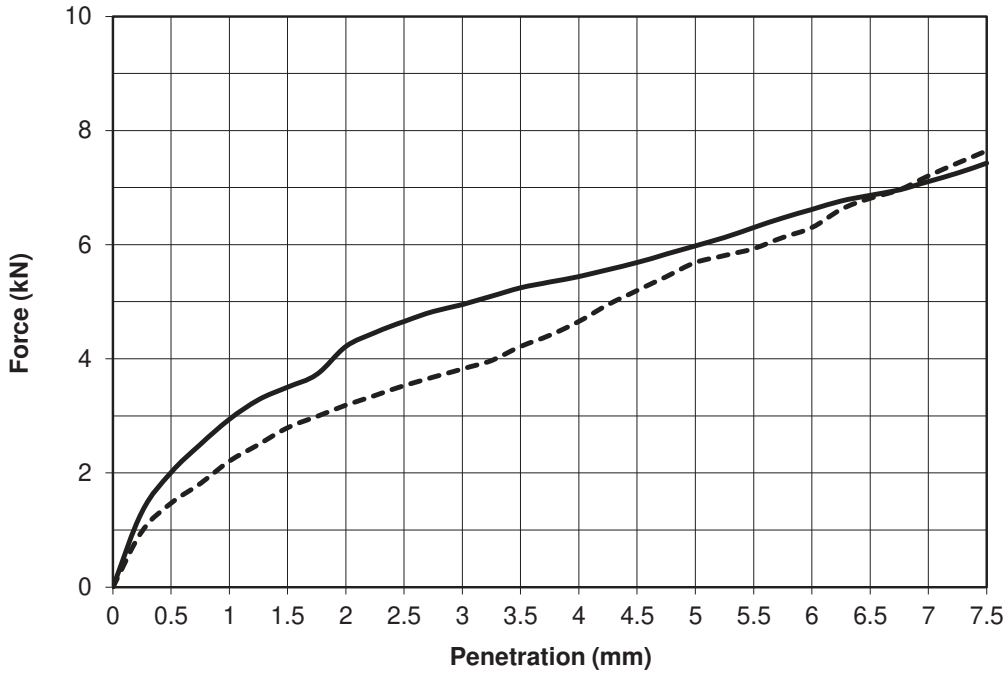
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RECEIVED: 13/08/2024

Report No.	R143183	Contract	Halverstown , Naas - Proposed Data Centres
Contract No.	24330	Customer	DOBA
Date received	24/01/23	Date Tested	18/02/23
BH/TP No.*	TP26	Sample No.*	AA181975 Type: B
Depth* (m)	0.50	Lab sample No.	A22/7575



Key: ———— Top ---------- Base

Description:	Mottled brown slightly sandy slightly gravelly CLAY		
Initial Condition:	2% Lime/ 3 Days Soaked		
Moisture Content (%):	13	Bulk Density (Mg/m^3):	2.18
Surcharge (kg):	4	Dry Density (Mg/m^3):	1.94
% Material >20mm:	7.6		
Method of compaction:	Static Compaction Method 2		

Test Result	Top	Base
CBR %	**35**	**28**
Moisture Content %	12	13

Results relate only to the specimen tested, in as received condition unless otherwise noted

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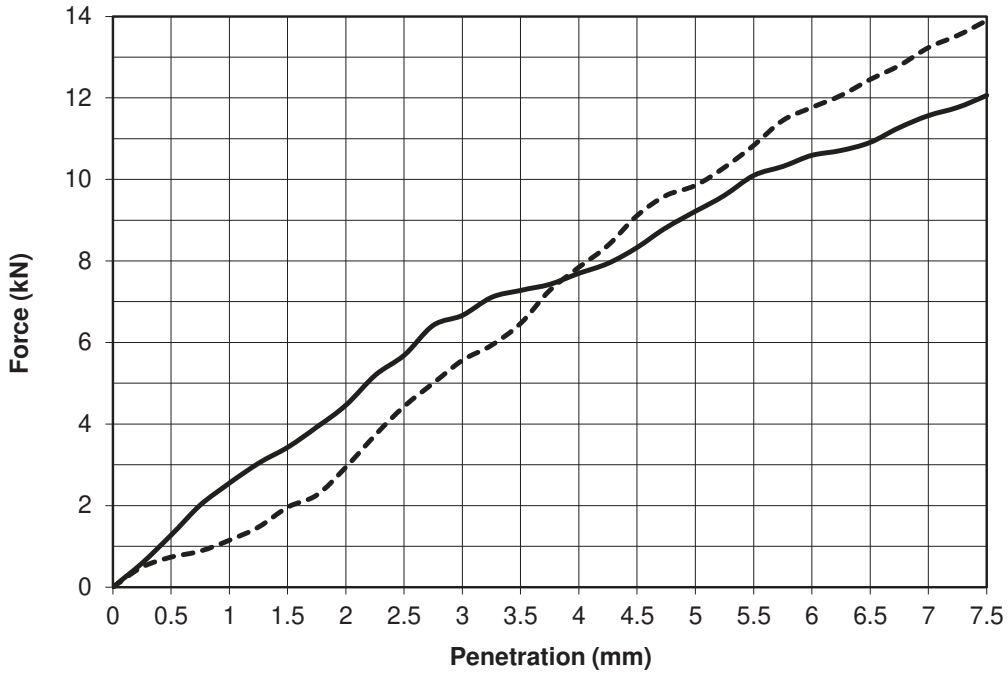
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Report No.	R142678	Contract	Halverstown , Naas - Proposed Data Centres
Contract No.	24330	Customer	DOBA
Date received	24/01/23	Date Tested	01/02/23
BH/TP No.*	TP26	Sample No.*	AA181975 Type: B
Depth* (m)	0.50	Lab sample No.	A22/7575



Key: ———— Top ---------- Base

Description:	Mottled brown slightly sandy slightly gravelly CLAY		
Initial Condition:	2 % Lime/5 Day Soaked		
Moisture Content (%):	14	Bulk Density (Mg/m^3):	2.24
Surcharge (kg):	4	Dry Density (Mg/m^3):	1.97
% Material >20mm:	7.6		
Method of compaction:	Static Compaction Method 2		

Test Result	Top	Base
CBR %	**46**	**49**
Moisture Content %	13	14

Results relate only to the specimen tested, in as received condition unless otherwise noted

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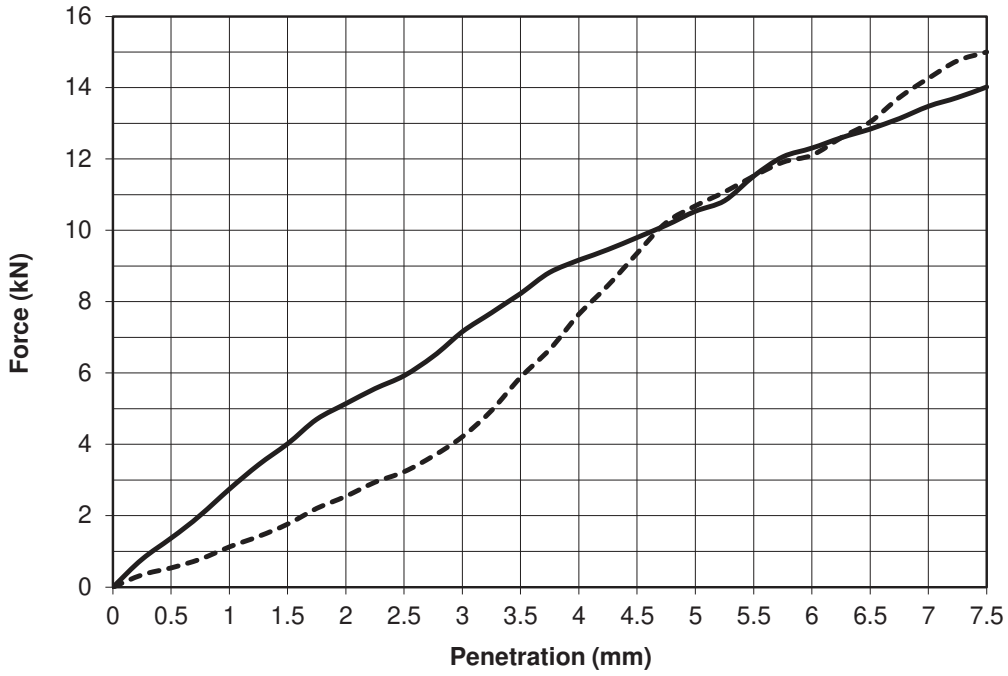
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RECEIVED: 13/08/2024

Report No.	R142679	Contract	Halverstown , Naas - Proposed Data Centres
Contract No.	24330	Customer	DOBA
Date received	24/01/23	Date Tested	01/02/23
BH/TP No.*	TP26	Sample No.*	AA181975 Type: B
Depth* (m)	0.50	Lab sample No.	A22/7575



Key: ———— Top ---------- Base

Description:	Mottled brown slightly sandy slightly gravelly CLAY		
Initial Condition:	2% Lime/7 Days Soaked		
Moisture Content (%):	13	Bulk Density (Mg/m^3):	2.16
Surcharge (kg):	4	Dry Density (Mg/m^3):	1.91
% Material >20mm:	7.6		
Method of compaction:	Static Compaction Method 2		

Test Result	Top	Base
CBR %	**53**	**54**
Moisture Content %	13	14

Results relate only to the specimen tested, in as received condition unless otherwise noted

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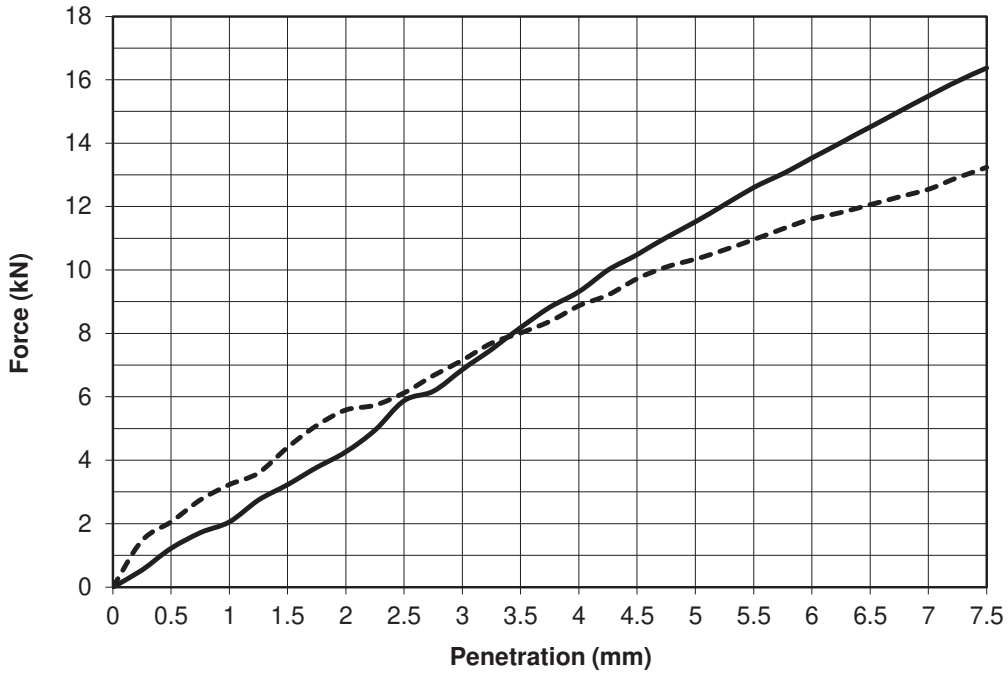
TEST REPORT
Determination of California Bearing Ratio (CBR)

Tested in accordance with BS1377:Part 4:1990, clause 7

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

RECEIVED: 13/08/2024

Report No.	R142677	Contract	Halverstown , Naas - Proposed Data Centres
Contract No.	24330	Customer	DOBA
Date received	24/01/23	Date Tested	13/02/23
BH/TP No.*	TP26	Sample No.*	AA181975 Type: B
Depth* (m)	0.50	Lab sample No.	A22/7575



Key: ———— Top ---------- Base

Description:	Mottled brown slightly sandy slightly gravelly CLAY		
Initial Condition:	3 % Lime /3 Day Soaked		
Moisture Content (%):	13	Bulk Density (Mg/m^3):	2.17
Surcharge (kg):	4	Dry Density (Mg/m^3):	1.90
% Material >20mm:	7.6		
Method of compaction:	Static Compaction Method 2		

Test Result	Top	Base
CBR %	**58**	**52**
Moisture Content %	13	12

Results relate only to the specimen tested, in as received condition unless otherwise noted

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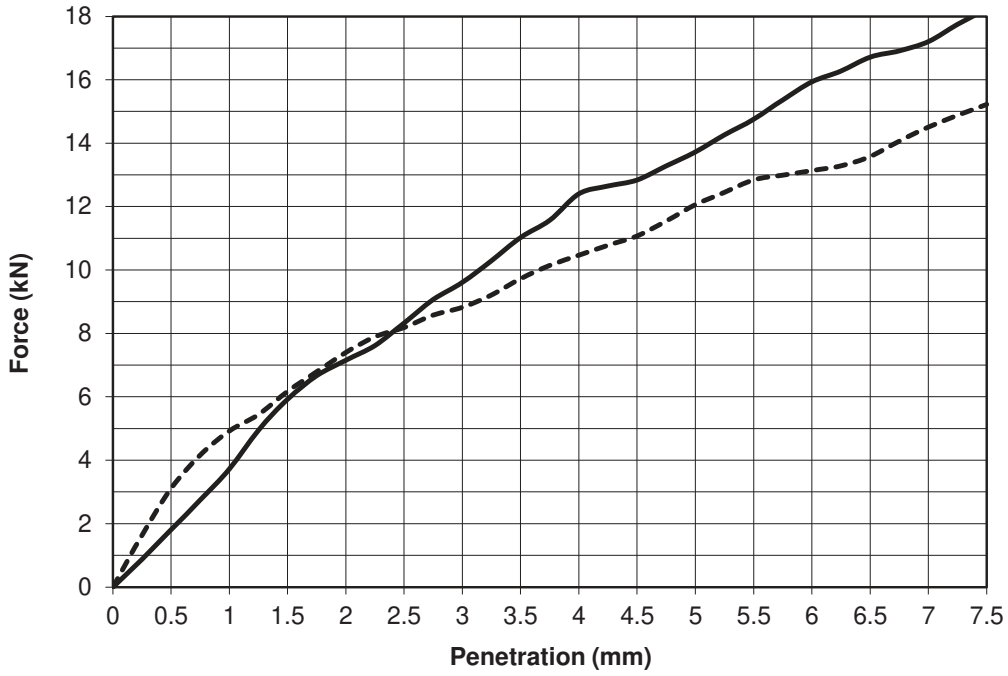
TEST REPORT
Determination of California Bearing Ratio (CBR)

Tested in accordance with BS1377:Part 4:1990, clause 7

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

RECEIVED: 13/08/2024

Report No.	R143189	Contract	Halverstown , Naas - Proposed Data Centres
Contract No.	24330	Customer	DOBA
Date received	24/01/23	Date Tested	17/02/23
BH/TP No.*	TP26	Sample No.*	AA181975 Type: B
Depth* (m)	0.50	Lab sample No.	A22/7575



Key: ———— Top ---------- Base

Description:	Mottled brown slightly sandy slightly gravelly CLAY		
Initial Condition:	3 % Lime / 5 Days soaked		
Moisture Content (%):	12	Bulk Density (Mg/m^3):	2.18
Surcharge (kg):	4	Dry Density (Mg/m^3):	1.95
% Material >20mm:	7.6		
Method of compaction:	Static Compaction Method 2		

Test Result	Top	Base
CBR %	**69**	**62**
Moisture Content %	12	12

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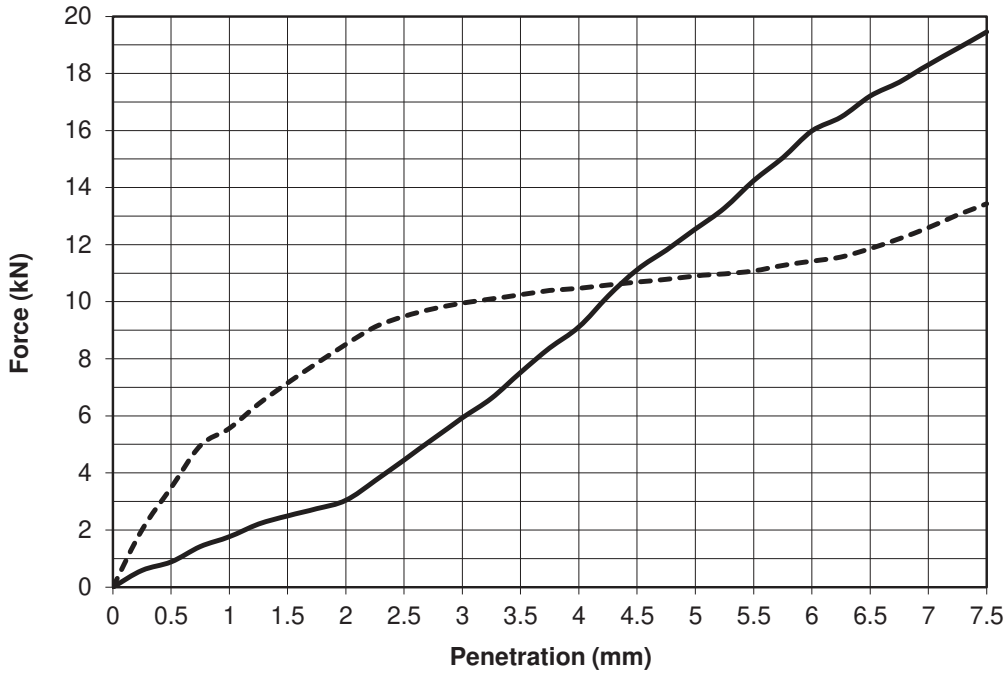
TEST REPORT
Determination of California Bearing Ratio (CBR)

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ISO 17025 IVNAB ACCREDITED TESTING DETAILED IN SCOPE REG NO. 1331

RECEIVED: 13/08/2024

Report No.	R143191	Contract	Halverstown , Naas - Proposed Data Centres
Contract No.	24330	Customer	DOBA
Date received	24/01/23	Date Tested	17/02/23
BH/TP No.*	TP26	Sample No.*	AA181975 Type: B
Depth* (m)	0.50	Lab sample No.	A22/7575



Key: ———— Top ---------- Base

Description:	Mottled brown slightly sandy slightly gravelly CLAY		
Initial Condition:	3% Lime/7 Days Soaked		
Moisture Content (%):	12	Bulk Density (Mg/m^3):	2.17
Surcharge (kg):	4	Dry Density (Mg/m^3):	1.93
% Material >20mm:	7.6		
Method of compaction:	Static Compaction Method 2		

Test Result	Top	Base
CBR %	**63**	**72**
Moisture Content %	12	12

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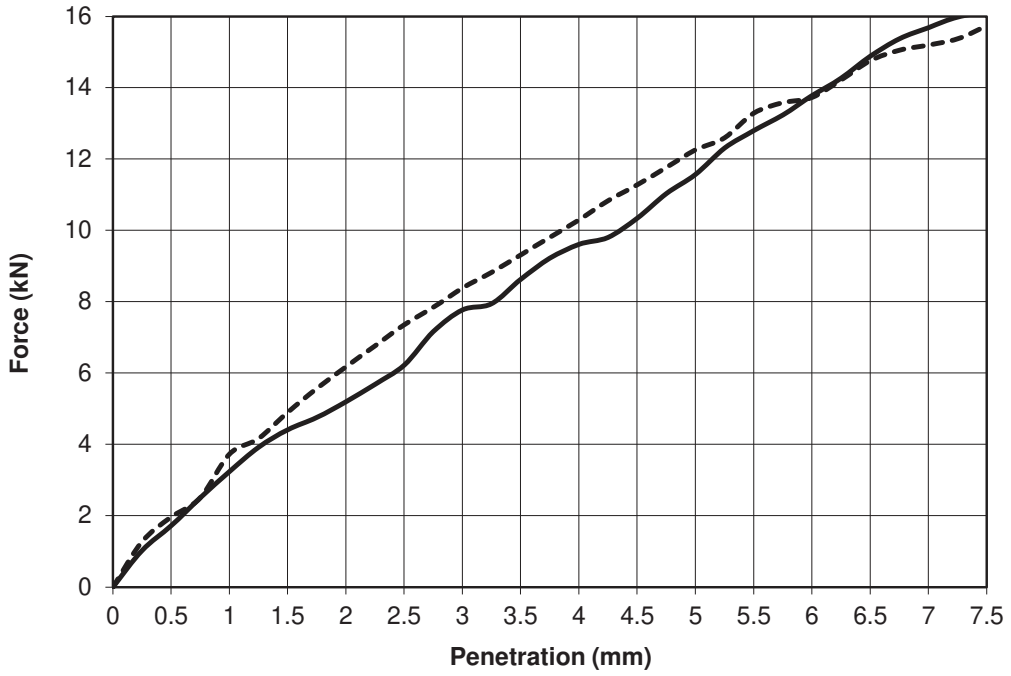
TEST REPORT
Determination of California Bearing Ratio (CBR)

Tested in accordance with BS1377:Part 4:1990, clause 7

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RECEIVED: 13/08/2024

Report No.	R142675	Contract	Halverstown , Naas - Proposed Data Centres
Contract No.	24330	Customer	DOBA
Date received	24/01/23	Date Tested	13/02/23
BH/TP No.*	TP26	Sample No.*	AA181975 Type: B
Depth* (m)	0.50	Lab sample No.	A22/7575



Key: ———— Top ---------- Base

Description:	Mottled brown slightly sandy slightly gravelly CLAY		
Initial Condition:	1% Lime/2% Cement /3 Days Soaked		
Moisture Content (%):	12	Bulk Density (Mg/m^3):	2.17
Surcharge (kg):	4	Dry Density (Mg/m^3):	1.93
% Material >20mm:	7.6		
Method of compaction:	Static Compaction Method 2		

Test Result	Top	Base
CBR %	**58**	**61**
Moisture Content %	13	12

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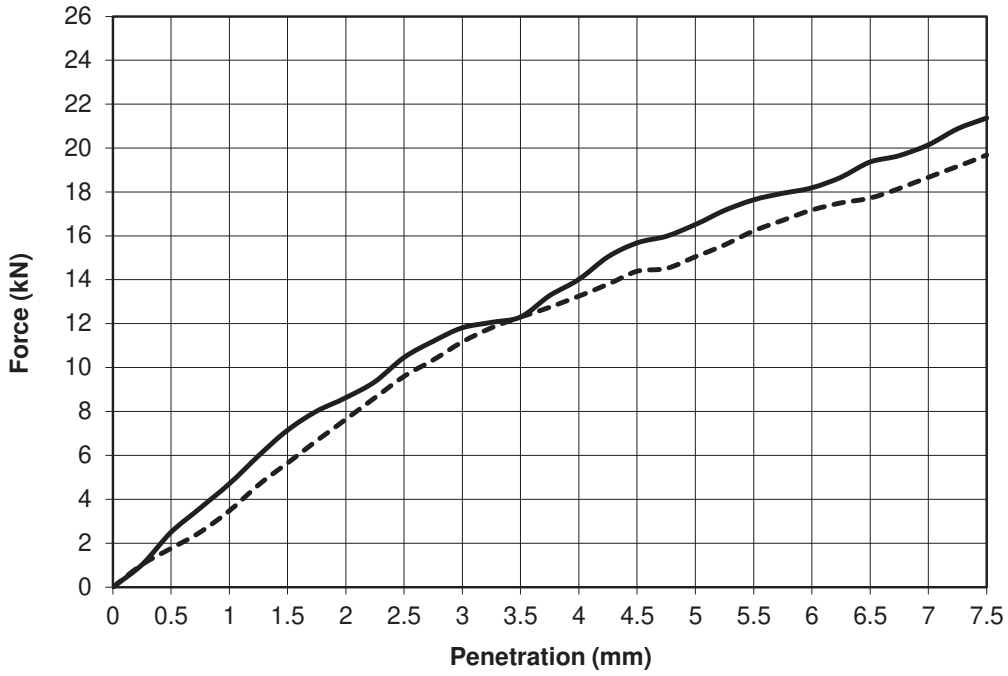
TEST REPORT
Determination of California Bearing Ratio (CBR)

Tested in accordance with BS1377:Part 4:1990, clause 7

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RECEIVED: 13/08/2024

Report No.	R142680	Contract	Halverstown , Naas - Proposed Data Centres
Contract No.	24330	Customer	DOBA
Date received	24/01/23	Date Tested	01/02/23
BH/TP No.*	TP26	Sample No.*	AA181975 Type: B
Depth* (m)	0.50	Lab sample No.	A22/7575



Key: ———— Top ---------- Base

Description:	Mottled brown slightly sandy slightly gravelly CLAY		
Initial Condition:	1% Lime/2% Cement/ 5 Days Soaked		
Moisture Content (%):	13	Bulk Density (Mg/m^3):	2.16
Surcharge (kg):	4	Dry Density (Mg/m^3):	1.90
% Material >20mm:	7.6		
Method of compaction:	Static Compaction Method 2		

Test Result	Top	Base
CBR %	**83**	**75**
Moisture Content %	13	14

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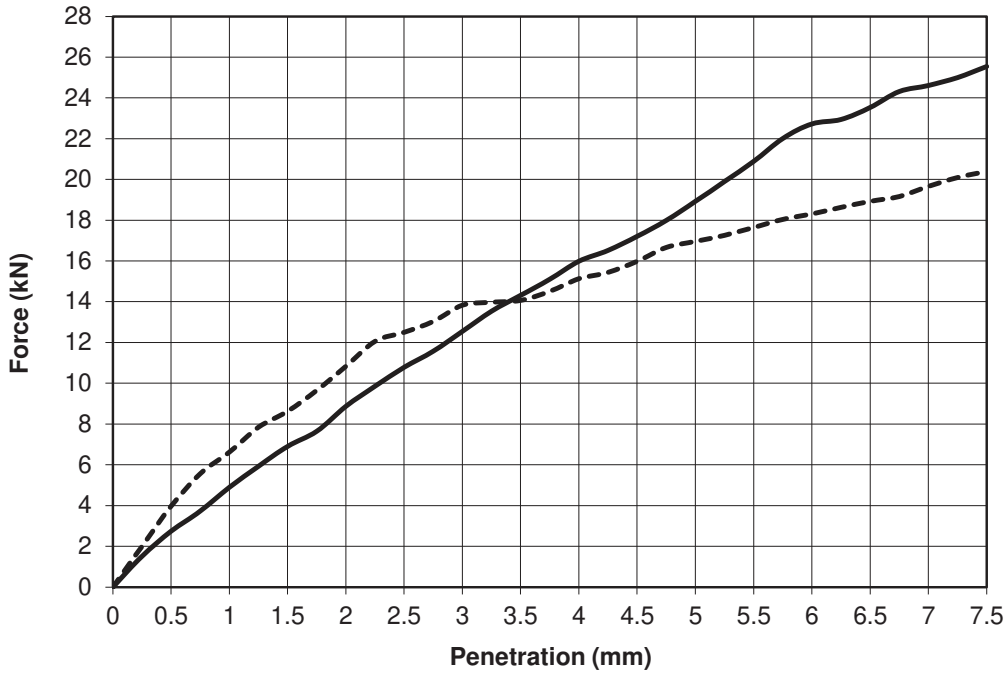
TEST REPORT
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ISO 17025 INAB ACCREDITED TESTING DETAILED IN SCOPE REG NO. 133T

RECEIVED: 13/08/2024

Report No.	R143190	Contract	Halverstown , Naas - Proposed Data Centres
Contract No.	24330	Customer	DOBA
Date received	24/01/23	Date Tested	17/02/23
BH/TP No.*	TP26	Sample No.*	AA181975 Type: B
Depth* (m)	0.50	Lab sample No.	A22/7575



Key: ———— Top ---------- Base

Description:	Mottled brown slightly sandy slightly gravelly SILT/CLAY		
Initial Condition:	1% Lime/2% Cement 7 Days Soaked		
Moisture Content (%):	12	Bulk Density (Mg/m^3):	2.18
Surcharge (kg):	4	Dry Density (Mg/m^3):	1.94
% Material >20mm:	7.6		
Method of compaction:	Static Compaction Method 2		

Test Result	Top	Base
CBR %	**95**	**94**
Moisture Content %	12	12

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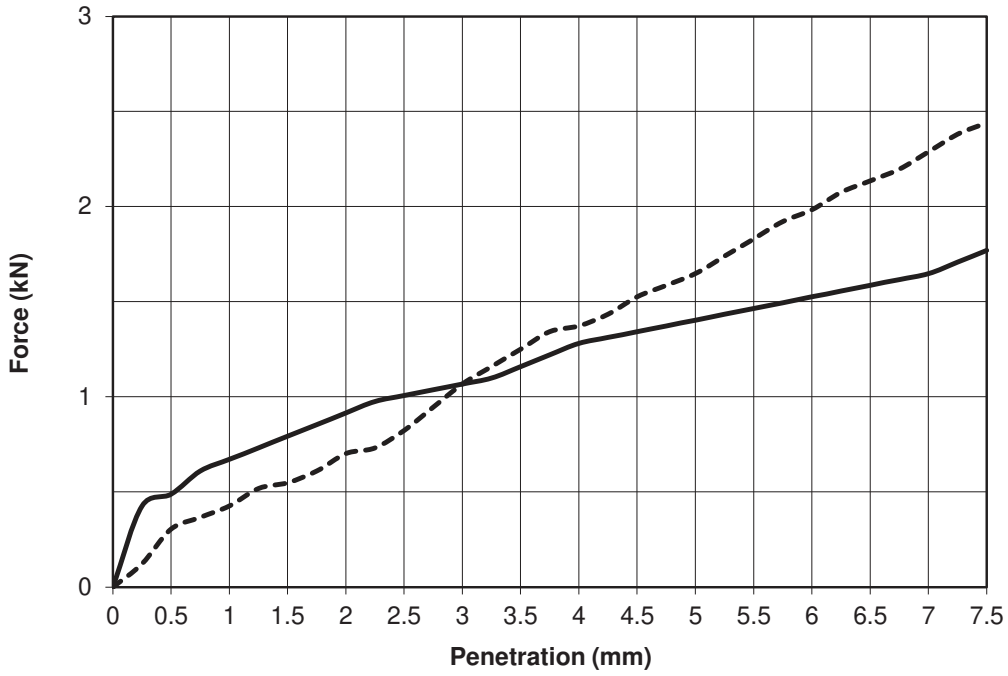
TEST REPORT
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Report No.	R145766	Contract	Halverstown , Naas - Proposed Data Centres
Contract No.	24330	Customer	DOBA
Date received	24/01/23	Date Tested	18/02/23
BH/TP No.*	TP31	Sample No.*	AA181992 Type: B
Depth* (m)	0.50	Lab sample No.	A22/7578



Key: ———— Top ---------- Base

Description:	Brown slightly sandy slightly gravelly CLAY		
Initial Condition:	1% Lime /3 Days soaked		
Moisture Content (%):	13	Bulk Density (Mg/m^3):	2.25
Surcharge (kg):	4	Dry Density (Mg/m^3):	1.99
% Material >20mm:	6.9		
Method of compaction:	Static Compaction Method 2		

Test Result	Top	Base
CBR %	**7.6**	**8.3**
Moisture Content %	13	13

Results relate only to the specimen tested, in as received condition unless otherwise noted

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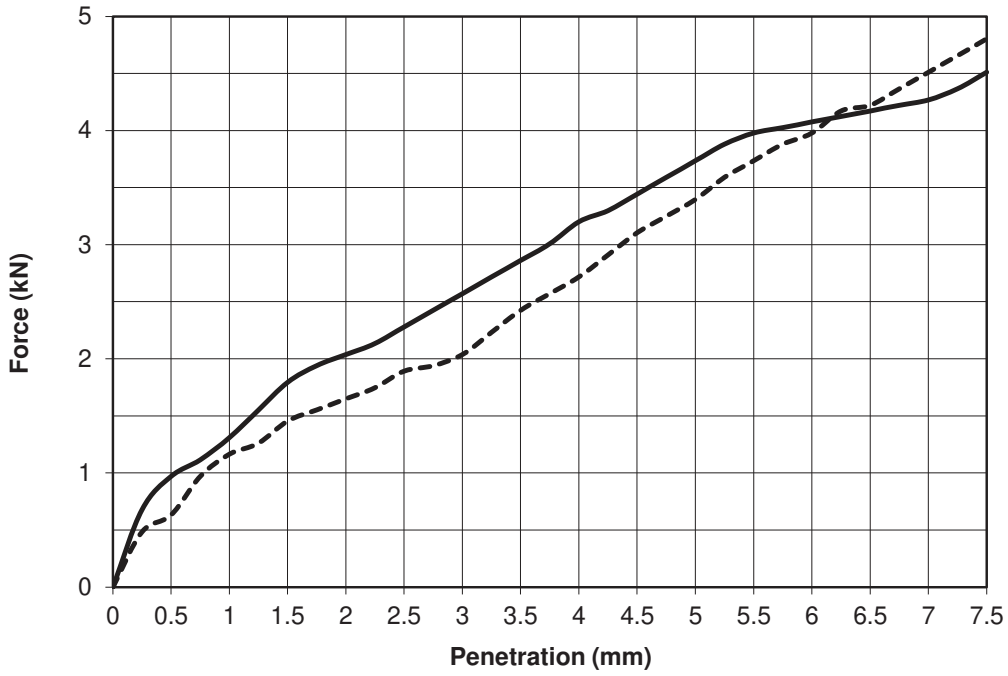
TEST REPORT
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Report No.	R145767	Contract	Halverstown , Naas - Proposed Data Centres
Contract No.	24330	Customer	DOBA
Date received	24/01/23	Date Tested	18/02/23
BH/TP No.*	TP31	Sample No.*	AA181992 Type: B
Depth* (m)	0.50	Lab sample No.	A22/7578



Key: ———— Top ---------- Base

Description:	Brown slightly sandy slightly gravelly CLAY		
Initial Condition:	1% Lime /5 Days soaked		
Moisture Content (%):	13	Bulk Density (Mg/m^3):	2.18
Surcharge (kg):	4	Dry Density (Mg/m^3):	1.93
% Material >20mm:	6.9		
Method of compaction:	Static Compaction Method 2		

Test Result	Top	Base
CBR %	**19**	**17**
Moisture Content %	13	13

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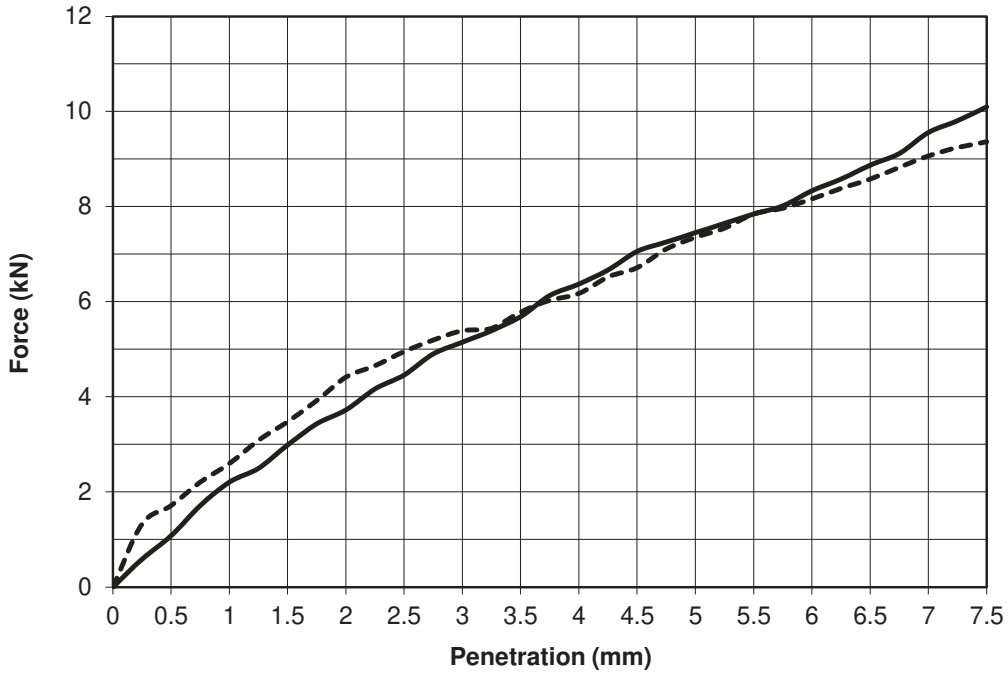
TEST REPORT
Determination of California Bearing Ratio (CBR)

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Report No.	R14319	Contract	Halverstown , Naas - Proposed Data Centres
Contract No.	24330	Customer	DOBA
Date received	24/01/23	Date Tested	18/02/23
BH/TP No.*	TP31	Sample No.*	AA181992 Type: B
Depth* (m)	0.50	Lab sample No.	A22/7578



Key: ———— Top ---------- Base

Description:	Brown slightly sandy slightly gravelly CLAY		
Initial Condition:	1% Lime /7 Days soaked		
Moisture Content (%):	14	Bulk Density (Mg/m^3):	2.17
Surcharge (kg):	4	Dry Density (Mg/m^3):	1.90
% Material >20mm:	6.9		
Method of compaction:	Static Compaction Method 2		

Test Result	Top	Base
CBR %	**37**	**37**
Moisture Content %	14	14

Results relate only to the specimen tested, in as received condition unless otherwise noted

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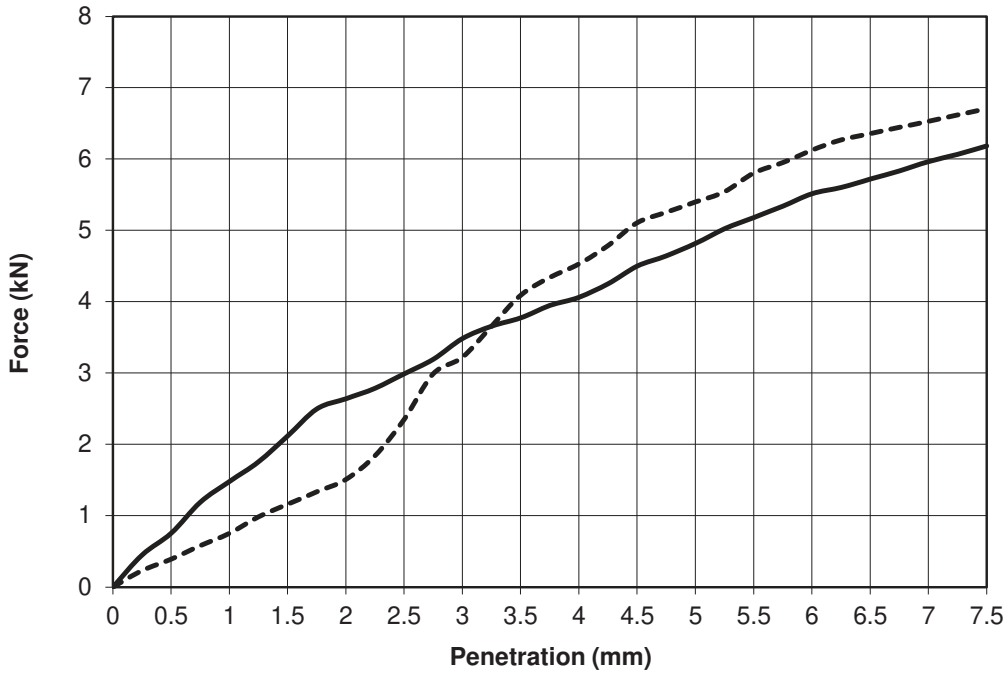
TEST REPORT
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RECEIVED: 13/08/2024

Report No.	R142682	Contract	Halverstown , Naas - Proposed Data Centres
Contract No.	24330	Customer	DOBA
Date received	24/01/23	Date Tested	01/02/23
BH/TP No.*	TP31	Sample No.*	AA181992 Type: B
Depth* (m)	0.50	Lab sample No.	A22/7578



Key: ———— Top ---------- Base

Description:	Brown slightly sandy slightly gravelly CLAY		
Initial Condition:	2% Lime /3 Days Soaked		
Moisture Content (%):	13	Bulk Density (Mg/m^3):	2.16
Surcharge (kg):	4	Dry Density (Mg/m^3):	1.92
% Material >20mm:	6.9		
Method of compaction:	Static Compaction Method 2		

Test Result	Top	Base
CBR %	**41**	**46**
Moisture Content %	13	12

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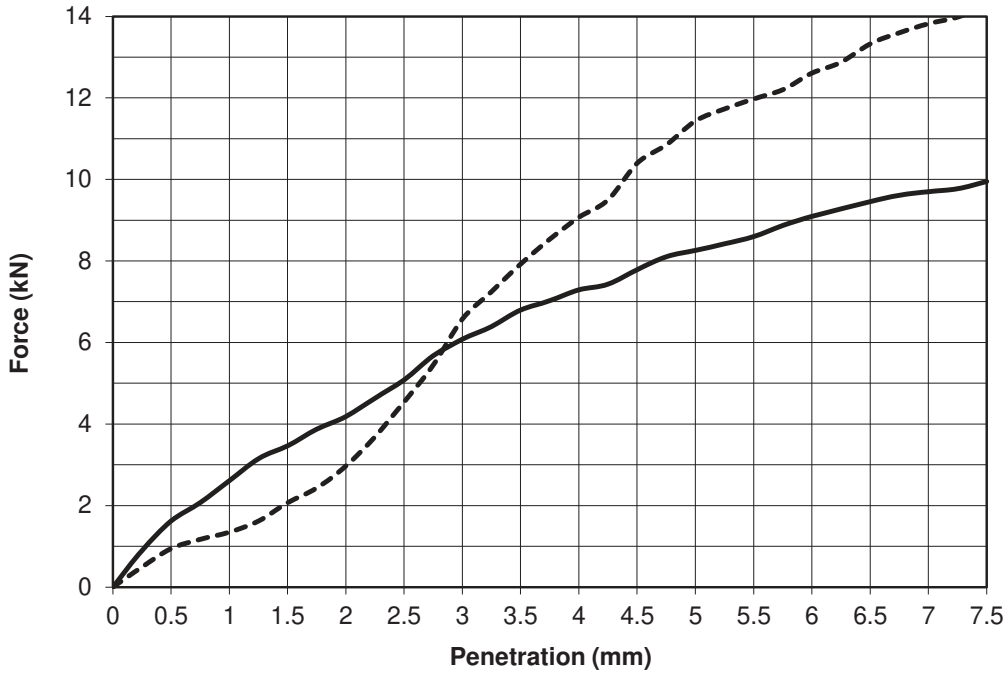
TEST REPORT
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Report No.	R142681	Contract	Halverstown , Naas - Proposed Data Centres
Contract No.	24330	Customer	DOBA
Date received	24/01/23	Date Tested	13/02/23
BH/TP No.*	TP31	Sample No.*	AA181992 Type: B
Depth* (m)	0.50	Lab sample No.	A22/7578



Key: ———— Top ---------- Base

Description:	Brown slightly sandy slightly gravelly CLAY		
Initial Condition:	2% Lime /5 Days Soaked		
Moisture Content (%):	12	Bulk Density (Mg/m^3):	2.22
Surcharge (kg):	4	Dry Density (Mg/m^3):	1.97
% Material >20mm:	6.9		
Method of compaction:	Static Compaction Method 2		

Test Result	Top	Base
CBR %	**41**	**57**
Moisture Content %	12	13

Results relate only to the specimen tested, in as received condition unless otherwise noted

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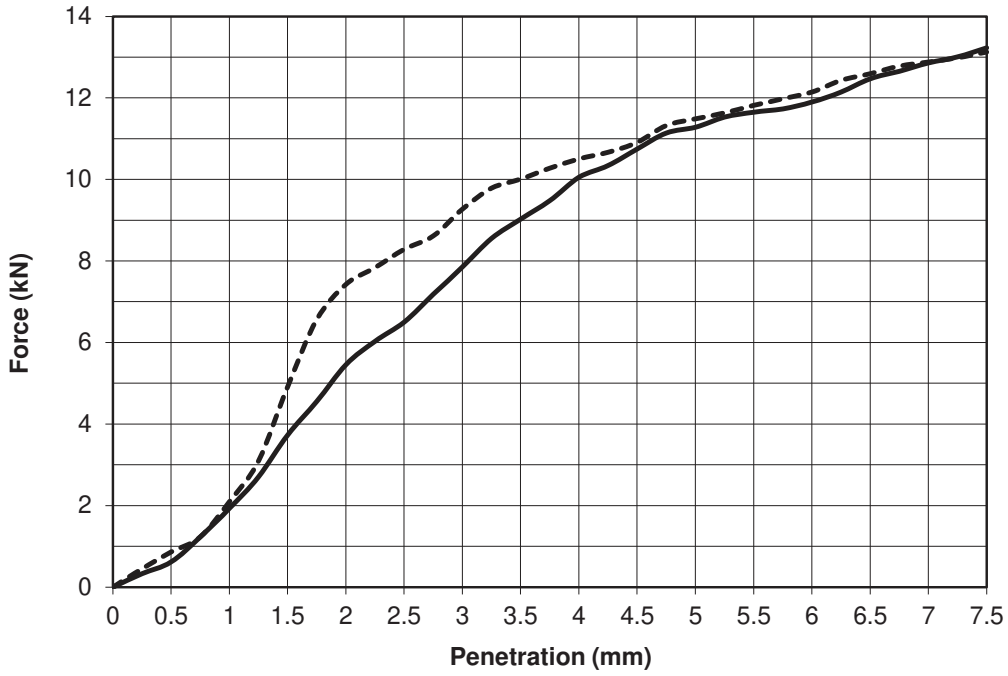
TEST REPORT
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Tested in accordance with BS1377:Part 4:1990, clause 7

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RECEIVED: 13/08/2024

Report No.	R142683	Contract	Halverstown , Naas - Proposed Data Centres
Contract No.	24330	Customer	DOBA
Date received	24/01/23	Date Tested	01/02/23
BH/TP No.*	TP31	Sample No.*	AA181992 Type: B
Depth* (m)	0.50	Lab sample No.	A22/7578



Key: ———— Top ---------- Base

Description:	Brown slightly sandy slightly gravelly CLAY		
Initial Condition:	2% Lime /7 Days Soaked		
Moisture Content (%):	13	Bulk Density (Mg/m^3):	2.18
Surcharge (kg):	4	Dry Density (Mg/m^3):	1.93
% Material >20mm:	6.9		
Method of compaction:	Static Compaction Method 2		

Test Result	Top	Base
CBR %	**63**	**57**
Moisture Content %	13	13

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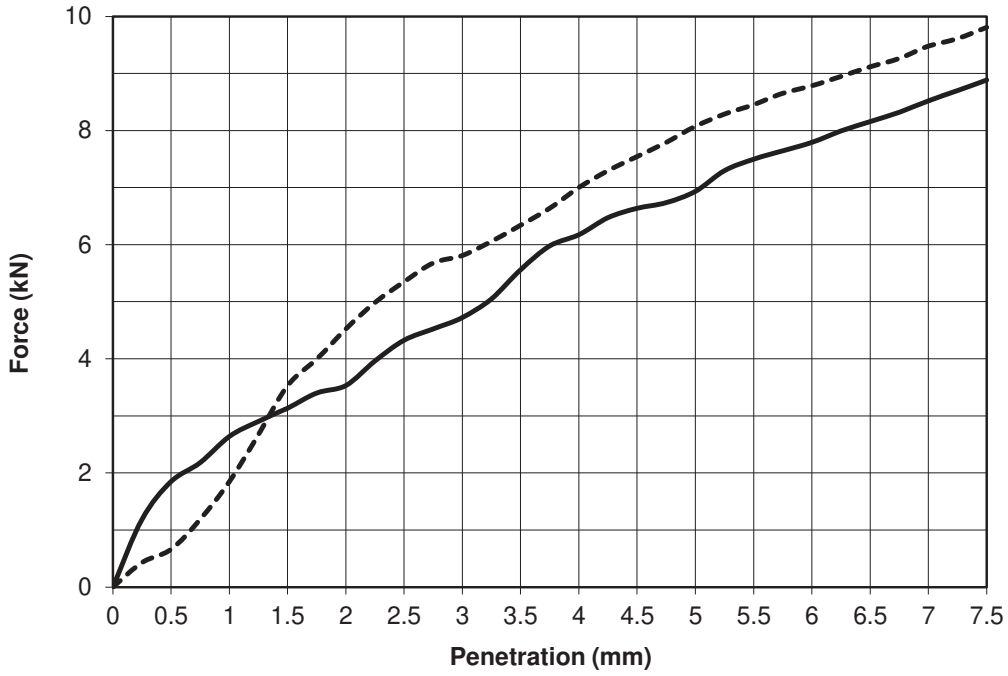
TEST REPORT
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RECEIVED: 13/08/2024

Report No.	R143196	Contract	Halverstown , Naas - Proposed Data Centres
Contract No.	24330	Customer	DOBA
Date received	24/01/23	Date Tested	13/02/23
BH/TP No.*	TP31	Sample No.*	AA181992 Type: B
Depth* (m)	0.50	Lab sample No.	A22/7578



Key: ———— Top ---------- Base

Description:	Brown slightly sandy slightly gravelly CLAY		
Initial Condition:	3% Lime/ 3 Days Soaked		
Moisture Content (%):	12	Bulk Density (Mg/m^3):	2.16
Surcharge (kg):	4	Dry Density (Mg/m^3):	1.93
% Material >20mm:	6.9		
Method of compaction:	Static Compaction Method 2		

Test Result	Top	Base
CBR %	**35**	**40**
Moisture Content %	12	12

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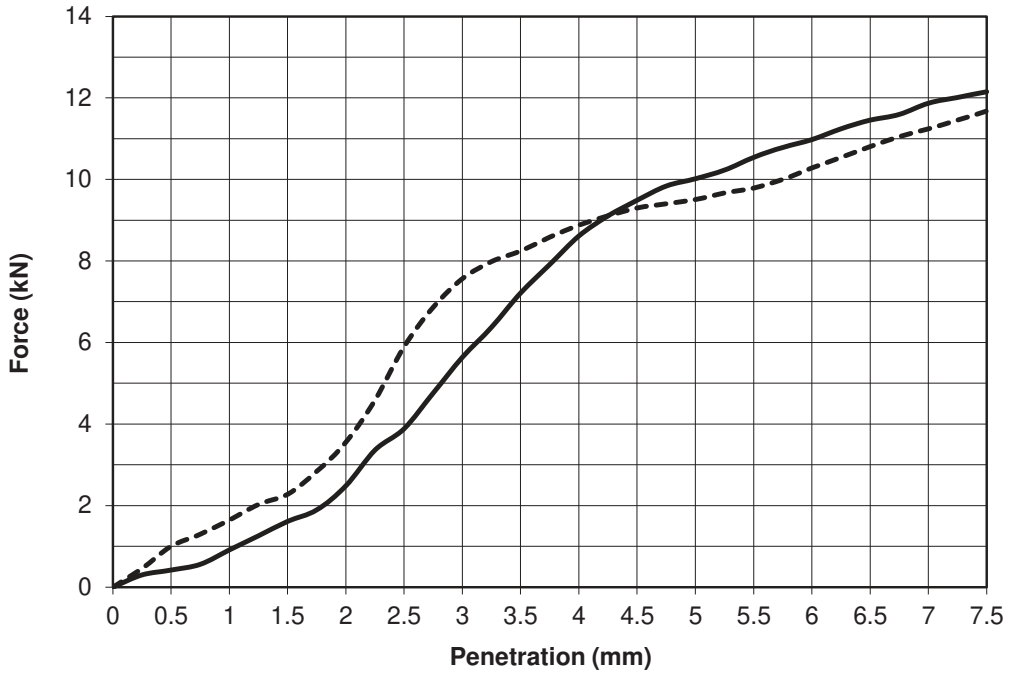
TEST REPORT
Determination of California Bearing Ratio (CBR)

Tested in accordance with BS1377:Part 4:1990, clause 7

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

RECEIVED: 13/08/2024

Report No.	R142684	Contract	Halverstown , Naas - Proposed Data Centres
Contract No.	24330	Customer	DOBA
Date received	24/01/23	Date Tested	01/02/23
BH/TP No.*	TP31	Sample No.*	AA181992 Type: B
Depth* (m)	0.50	Lab sample No.	A22/7578



Key: ———— Top ---------- Base

Description:	Brown slightly sandy slightly gravelly CLAY		
Initial Condition:	3% Lime/ 5 Day Soaked		
Moisture Content (%):	13	Bulk Density (Mg/m^3):	2.11
Surcharge (kg):	4	Dry Density (Mg/m^3):	1.86
% Material >20mm:	6.9		
Method of compaction:	Static Compaction Method 2		

Test Result	Top	Base
CBR %	**50**	**48**
Moisture Content %	13	13

Results relate only to the specimen tested, in as received condition unless otherwise noted

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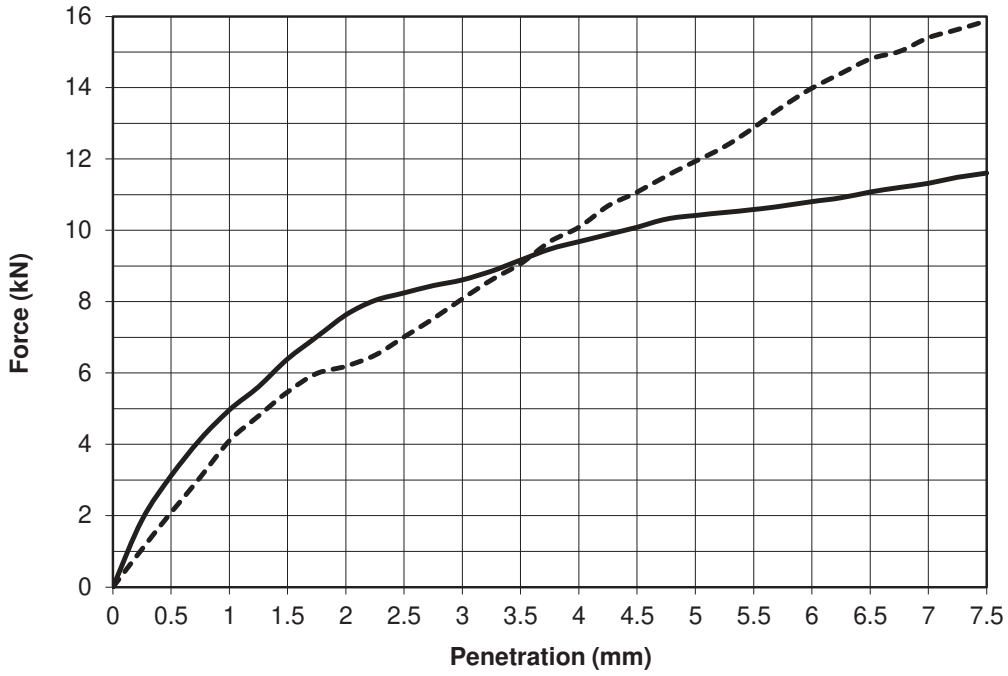
TEST REPORT
Determination of California Bearing Ratio (CBR)

Tested in accordance with BS1377:Part 4:1990, clause 7

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

RECEIVED: 13/08/2024

Report No.	R143195	Contract	Halverstown , Naas - Proposed Data Centres
Contract No.	24330	Customer	DOBA
Date received	24/01/23	Date Tested	16/02/23
BH/TP No.*	TP31	Sample No.*	AA181992 Type: B
Depth* (m)	0.50	Lab sample No.	A22/7578



Key: ———— Top ---------- Base

Description:	Brown slightly sandy slightly gravelly CLAY		
Initial Condition:	3% Lime/ 7 Days Soaked		
Moisture Content (%):	12	Bulk Density (Mg/m^3):	2.24
Surcharge (kg):	4	Dry Density (Mg/m^3):	2.00
% Material >20mm:	6.9		
Method of compaction:	Static Compaction Method 2		

Test Result	Top	Base
CBR %	**62**	**60**
Moisture Content %	11	13

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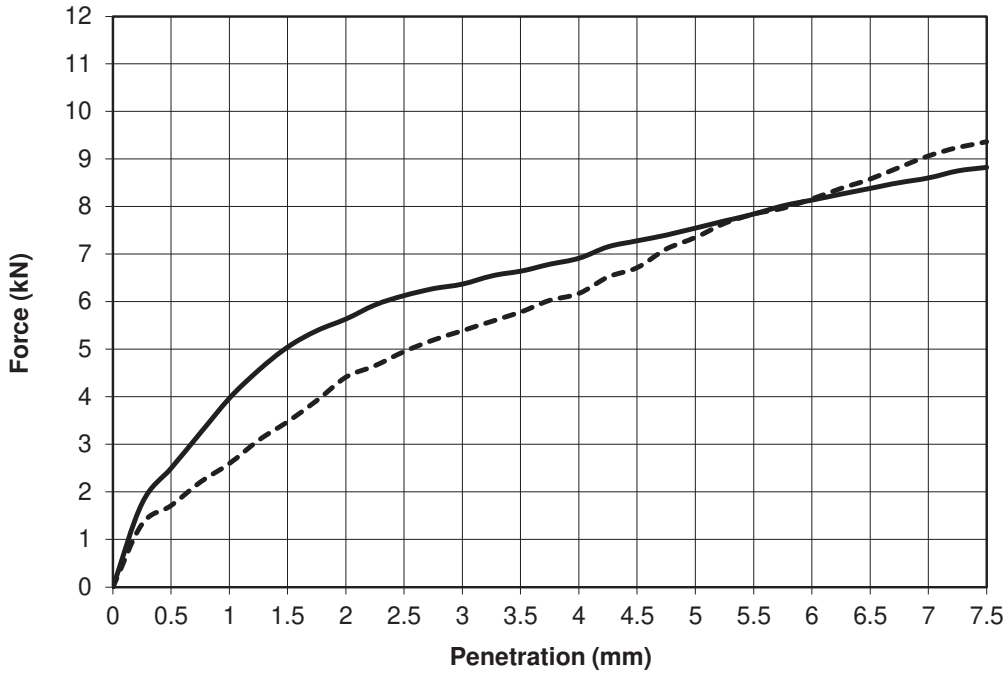
TEST REPORT
Determination of California Bearing Ratio (CBR)

Tested in accordance with BS1377:Part 4:1990, clause 7

ISO 17025 IVNAB ACCREDITED TESTING DETAILED IN SCOPE REG NO. 1331

RECEIVED: 13/08/2024

Report No.	R142193	Contract	Halverstown , Naas - Proposed Data Centres
Contract No.	24330	Customer	DOBA
Date received	24/01/23	Date Tested	17/02/23
BH/TP No.*	TP31	Sample No.*	AA181992 Type: B
Depth* (m)	0.50	Lab sample No.	A22/7578



Key: ———— Top ---------- Base

Description:	Brown slightly sandy slightly gravelly CLAY		
Initial Condition:	1% Lime 2 % Cement/ 3 Days Soaked		
Moisture Content (%):	12	Bulk Density (Mg/m^3):	2.22
Surcharge (kg):	4	Dry Density (Mg/m^3):	1.97
% Material >20mm:	6.9		
Method of compaction:	Static Compaction Method 2		

Test Result	Top	Base
CBR %	**46**	**37**
Moisture Content %	12	12

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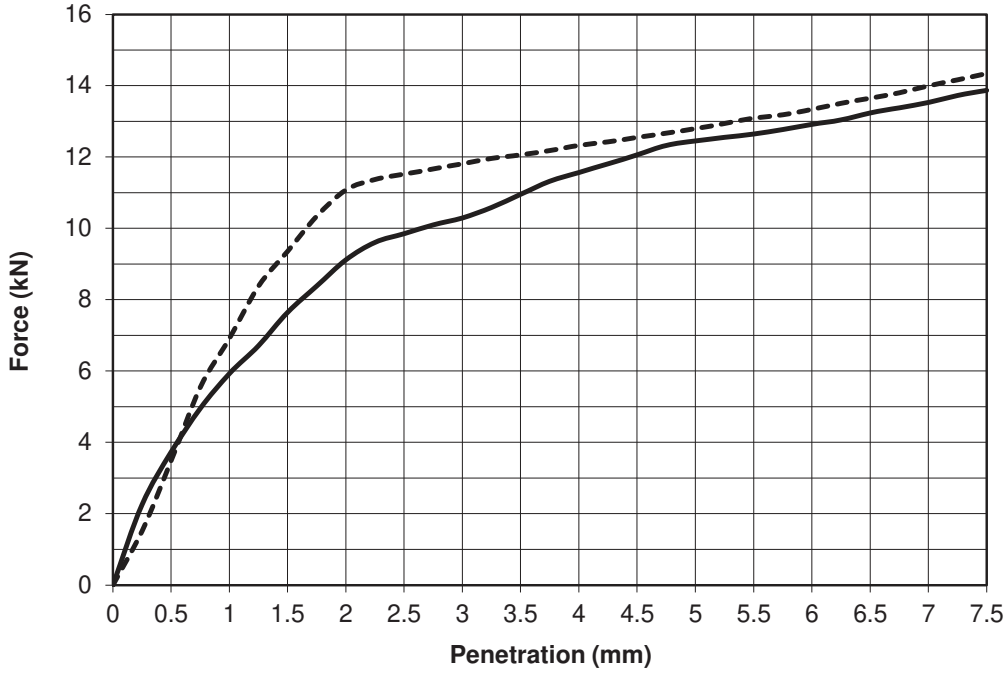
TEST REPORT
Determination of California Bearing Ratio (CBR)

Tested in accordance with BS1377:Part 4:1990, clause 7

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

RECEIVED: 13/08/2024

Report No.	R143194	Contract	Halverstown , Naas - Proposed Data Centres
Contract No.	24330	Customer	DOBA
Date received	24/01/23	Date Tested	17/02/23
BH/TP No.*	TP31	Sample No.*	AA181992 Type: B
Depth* (m)	0.50	Lab sample No.	A22/7578



Key: ———— Top ---------- Base

Description:	Brown slightly sandy slightly gravelly CLAY		
Initial Condition:	1% Lime 2% Cement/ 5 Day Soaked		
Moisture Content (%):	12	Bulk Density (Mg/m^3):	2.24
Surcharge (kg):	4	Dry Density (Mg/m^3):	2.00
% Material >20mm:	6.9		
Method of compaction:	Static Compaction Method 2		

Test Result	Top	Base
CBR %	**74**	**87**
Moisture Content %	12	12

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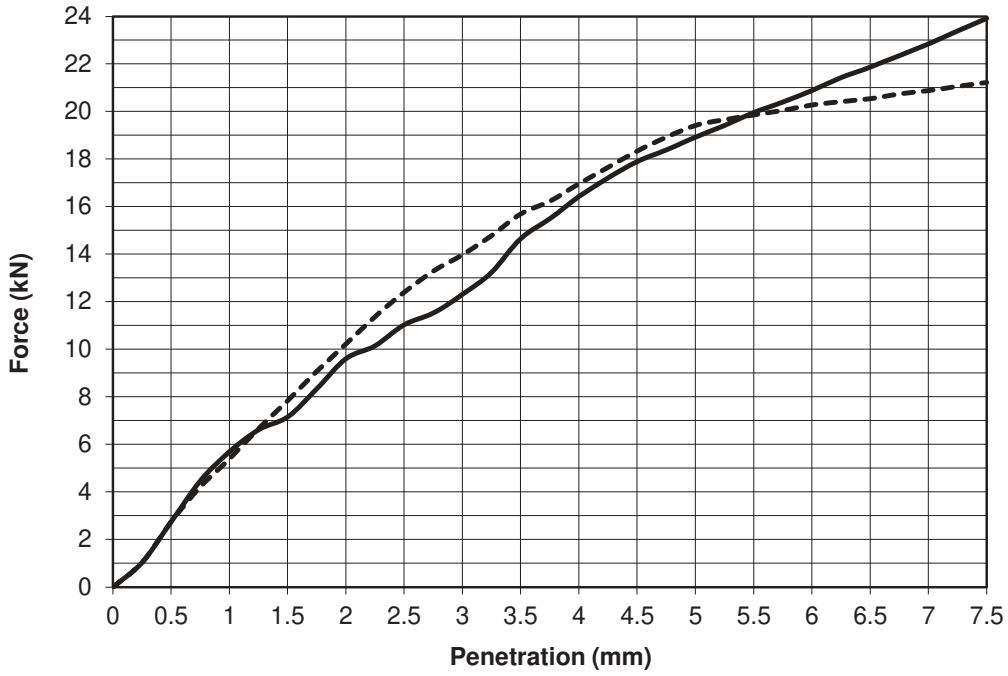
TEST REPORT
Determination of California Bearing Ratio (CBR)

Tested in accordance with BS1377:Part 4:1990, clause 7

ISO 17025 IVNAB ACCREDITED TESTING DETAILED IN SCOPE REG NO. 1331

RECEIVED: 13/08/2024

Report No.	R143197	Contract	Halverstown , Naas - Proposed Data Centres
Contract No.	24330	Customer	DOBA
Date received	24/01/23	Date Tested	13/02/23
BH/TP No.*	TP31	Sample No.*	AA181992 Type: B
Depth* (m)	0.50	Lab sample No.	A22/7578



Key: ———— Top ---------- Base

Description:	Brown slightly sandy slightly gravelly CLAY		
Initial Condition:	1% Lime 2% Cement /7 Day Soaked		
Moisture Content (%):	12	Bulk Density (Mg/m^3):	2.20
Surcharge (kg):	4	Dry Density (Mg/m^3):	1.97
% Material >20mm:	6.9		
Method of compaction:	Static Compaction Method 2		

Test Result	Top	Base
CBR %	**95**	**97**
Moisture Content %	12	12

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Test Report

Dry Density/Moisture Content Relationship

Tested in accordance with BS1377:Part 4:1990

ISO 17025 IVNAB ACCREDITED TESTING DETAILED IN SCOPE REG NO. 1331

RECEIVED: 13/08/2024

Report No. R142691 Contract No. 24330

Contract Name: Halverstown , Naas . - Proposed Data Centres

Location*: TP04

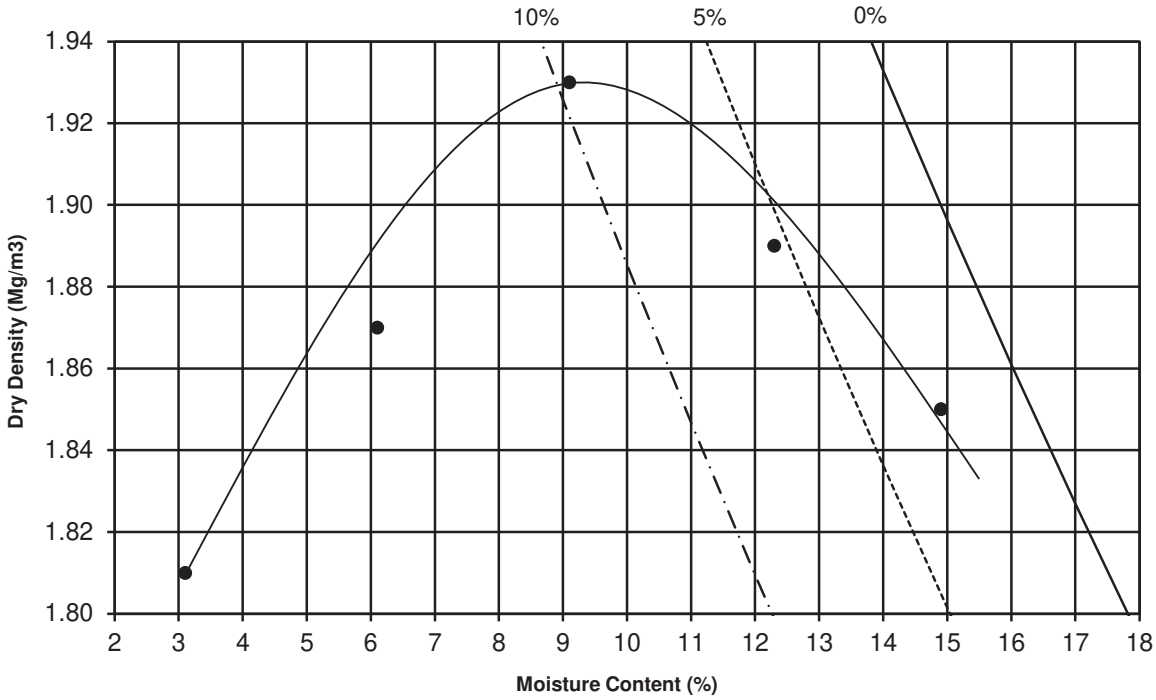
Sample No*. AA186982 Depth* (m) 0.6 Material Type B

Lab sample no. A22/7562 Customer: DOBA

Date Received: 24/01/2023 Test Method: 2.5 Kg Rammer

Date Tested: 26/01/2023 BS1377:Part 4:1990 3.3

Dry Density (Mg/m^3)	1.85	1.87	1.93	1.89	1.81		
Moisture Content (%)	15	6.1	9.1	12	3.1	0	



Maximum Dry Density (Mg/m^3): 1.93 Optimum Moisture Content (%): 9

Description: Mottled brown sandy gravelly SILT/CLAY

Sample Preparation: Material passing 20mm ~~Single~~ / Separate samples used

Particle Density (Mg/m^3): 2.65 Particle Density: Assumed

% retained on 20/37.5mm sieve: 1.5

Results relate only to the specimen tested, in as received condition unless otherwise noted.
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Test Report

Dry Density/Moisture Content Relationship

Tested in accordance with BS1377:Part 4:1990

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Report No. R145759 Contract No. 24330

Contract Name: Halverstown , Naas . - Proposed Data Centres

Location*: TP12

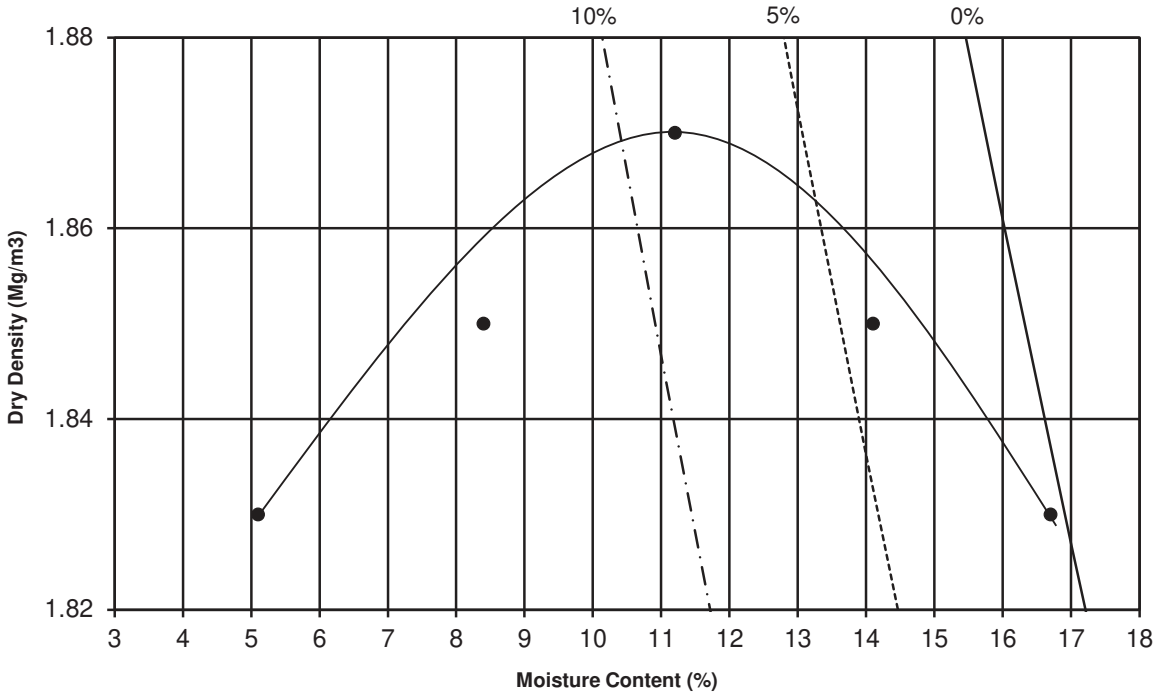
Sample No*. AA185481 Depth* (m) 0.5 Material Type B

Lab sample no. A22/7563 Customer: DOBA

Date Received: 24/01/2023 Test Method: 2.5 Kg Rammer

Date Tested: 26/01/2023 BS1377:Part 4:1990 3.3

Dry Density (Mg/m^3)	1.83	1.85	1.87	1.85	1.83		
Moisture Content (%)	17	8.4	11	14	5.1	0.0	



Maximum Dry Density (Mg/m^3): 1.87 Optimum Moisture Content (%): 11

Description: Brown slightly sandy, slightly gravelly, CLAY

Sample Preparation: Material passing 20mm ~~Single~~ / Separate samples used

Particle Density (Mg/m^3): 2.65 Particle Density: Assumed

% retained on 20/37.5mm sieve: 3.9

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Test Report

Dry Density/Moisture Content Relationship

Tested in accordance with BS1377:Part 4:1990

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Report No. R142692 Contract No. 24330

Contract Name: Halverstown , Naas . - Proposed Data Centres

Location*: TP15

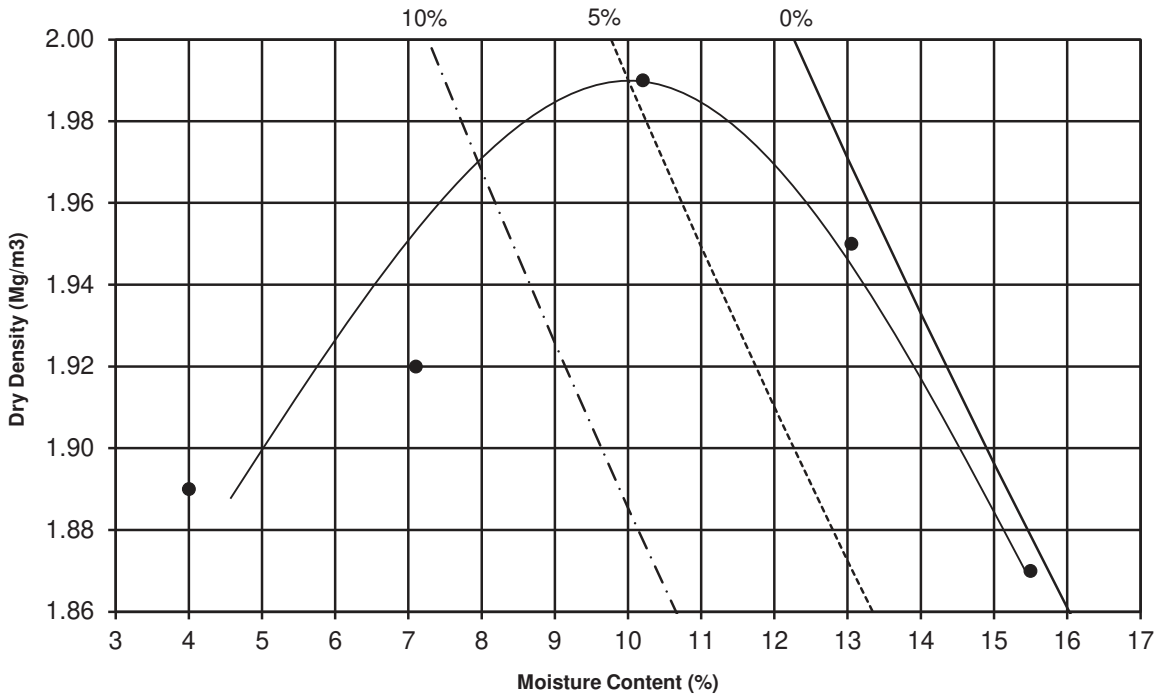
Sample No*. AA185479 Depth* (m) 1.5 Material Type B

Lab sample no. A22/7565 Customer: DOBA

Date Received: 24/01/2023 Test Method: 2.5 Kg Rammer

Date Tested: 26/01/2023 BS1377:Part 4:1990 3.3

Dry Density (Mg/m^3)	1.95	1.89	1.92	1.99	1.87		
Moisture Content (%)	13	4.0	7.1	10	16	0	



Maximum Dry Density (Mg/m^3): 1.99 Optimum Moisture Content (%): 10

Description: Brown slightly sandy, slightly gravelly, CLAY

Sample Preparation: Material passing 20mm ~~Single~~ / Separate samples used

Particle Density (Mg/m^3): 2.65 Particle Density: Assumed

% retained on 20/37.5mm sieve: 2.9

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Test Report

Dry Density/Moisture Content Relationship

Tested in accordance with BS1377:Part 4:1990

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Report No. R142693 Contract No. 24330

Contract Name: Halverstown , Naas . - Proposed Data Centres

Location*: TP16

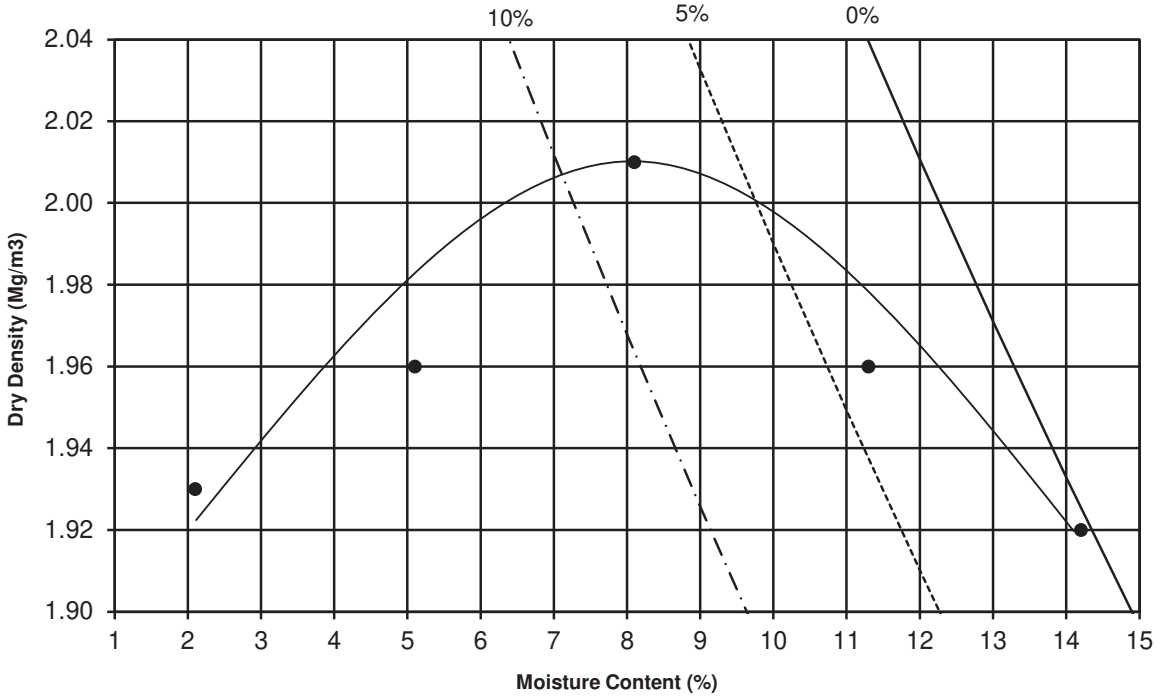
Sample No*. AA185481 Depth* (m) 1 Material Type B

Lab sample no. A22/7566 Customer: DOBA

Date Received: 24/01/2023 Test Method: 2.5 Kg Rammer

Date Tested: 24/01/2023 BS1377:Part 4:1990 3.3

Dry Density (Mg/m^3)	1.92	1.96	2.01	1.96	1.93		
Moisture Content (%)	14	5.1	8.1	11	2.1	0	



Maximum Dry Density (Mg/m^3): 2.01 Optimum Moisture Content (%): 8

Description: Mottled brown slightly sandy, slightly gravelly, CLAY

Sample Preparation: Material passing 20mm ~~Single~~ / Separate samples used

Particle Density (Mg/m^3): 2.65 Particle Density: Assumed

% retained on 20/37.5mm sieve: 11

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Dry Density/Moisture Content Relationship

Tested in accordance with BS1377:Part 4:1990

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Report No. R145756 Contract No. 24330

Contract Name: Halverstown , Naas . - Proposed Data Centres

Location*: TP19

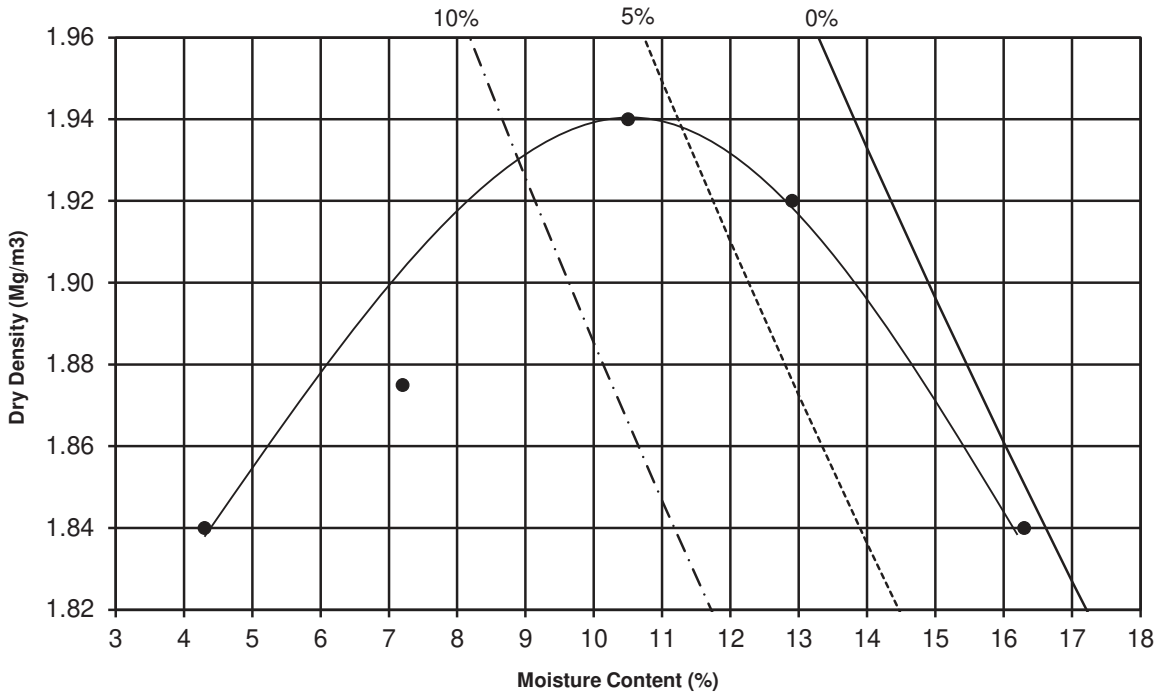
Sample No*. AA185468 Depth* (m) 0.5 Material Type B

Lab sample no. A22/7568 Customer: DOBA

Date Received: 24/01/2023 Test Method: 2.5 Kg Rammer

Date Tested: 26/01/2023 BS1377:Part 4:1990 3.3

Dry Density (Mg/m^3)	1.92	1.88	1.94	1.84	1.84		
Moisture Content (%)	13	7.2	11	16	4.3	0.0	



Maximum Dry Density (Mg/m^3): 1.94 Optimum Moisture Content (%): 11

Description: Mottled brown slightly sandy, slightly gravelly, CLAY

Sample Preparation: Material passing 20mm ~~Single~~ / Separate samples used

Particle Density (Mg/m^3): 2.65 Particle Density: Assumed

% retained on 20/37.5mm sieve: 5.1

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Dry Density/Moisture Content Relationship

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Report No. R142694 Contract No. 24330

Contract Name: Halverstown , Naas . - Proposed Data Centres

Location*: TP22

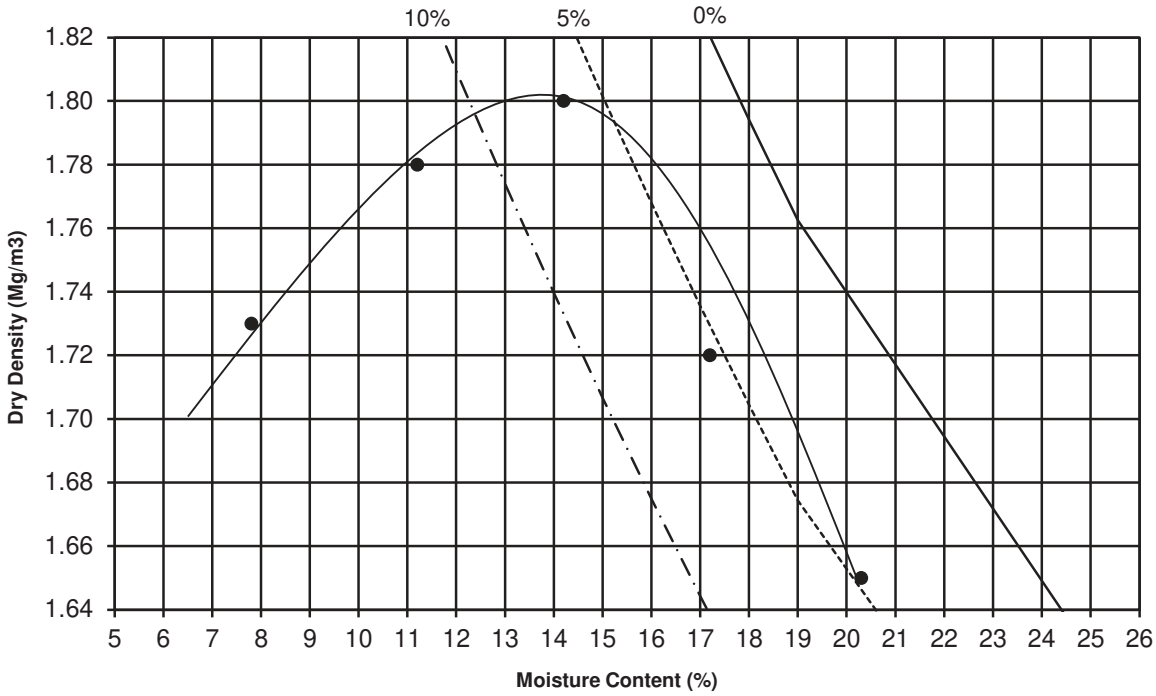
Sample No*. AA185497 Depth* (m) 0.6 Material Type B

Lab sample no. A22/7571 Customer: DOBA

Date Received: 24/01/2023 Test Method: 2.5 Kg Rammer

Date Tested: 26/01/2023 BS1377:Part 4:1990 3.3

Dry Density (Mg/m^3)	1.65	1.73	1.78	1.80	1.72		
Moisture Content (%)	20	7.8	11	14	17	0.0	



Maximum Dry Density (Mg/m^3): 1.80 Optimum Moisture Content (%): 14

Description: Mottled brown slightly sandy, slightly gravelly, CLAY

Sample Preparation: Material passing 20mm ~~Single~~ / Separate samples used

Particle Density (Mg/m^3): 2.65 Particle Density: Assumed

% retained on 20/37.5mm sieve: 5.9

Results relate only to the specimen tested, in as received condition unless otherwise noted.
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Test Report

Dry Density/Moisture Content Relationship

Tested in accordance with BS1377:Part 4:1990

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Report No. R145758 Contract No. 24330

Contract Name: Halverstown , Naas . - Proposed Data Centres

Location*: TP26

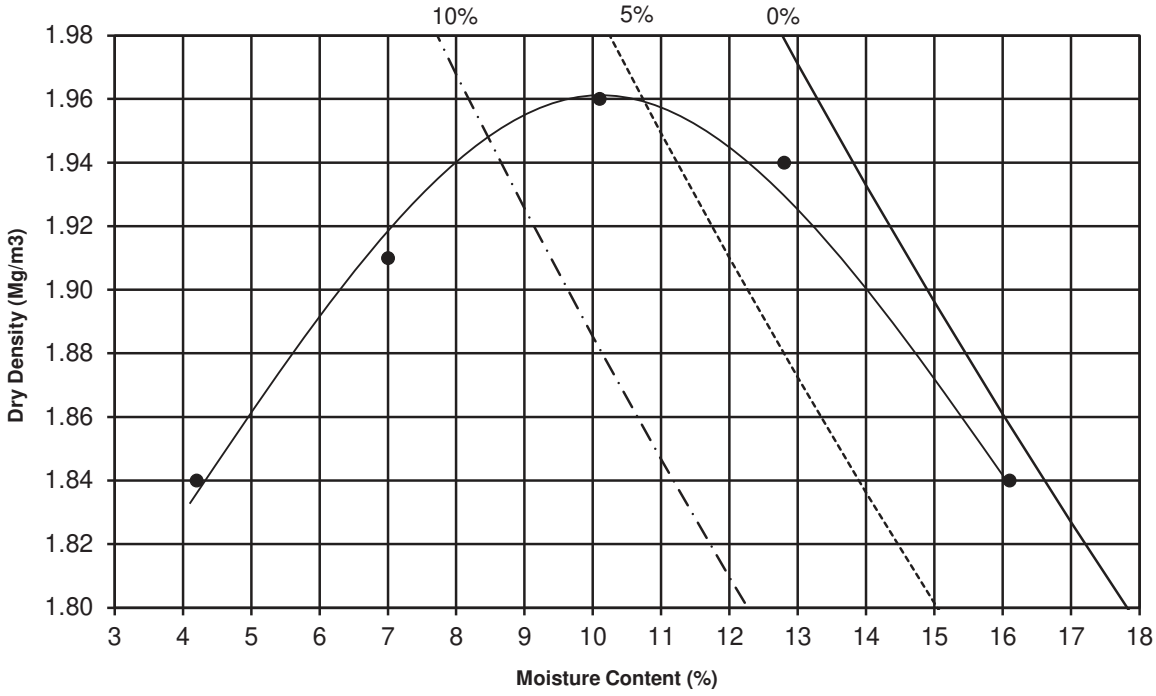
Sample No*. AA181975 Depth* (m) 0.5 Material Type B

Lab sample no. A22/7575 Customer: DOBA

Date Received: 24/01/2023 Test Method: 2.5 Kg Rammer

Date Tested: 26/01/2023 BS1377:Part 4:1990 3.3

Dry Density (Mg/m^3)	1.94	1.84	1.91	1.96	1.84		
Moisture Content (%)	13	4.2	7.0	10	16	0.0	



Maximum Dry Density (Mg/m^3): 1.96 Optimum Moisture Content (%): 10

Description: Brown slightly sandy, slightly gravelly, CLAY

Sample Preparation: Material passing 20mm ~~Single~~ / Separate samples used

Particle Density (Mg/m^3): 2.65 Particle Density: Assumed

% retained on 20/37.5mm sieve: 7.6

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Test Report

Dry Density/Moisture Content Relationship

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Report No. R145755 Contract No. 24330

Contract Name: Halverstown , Naas . - Proposed Data Centres

Location*: TP28

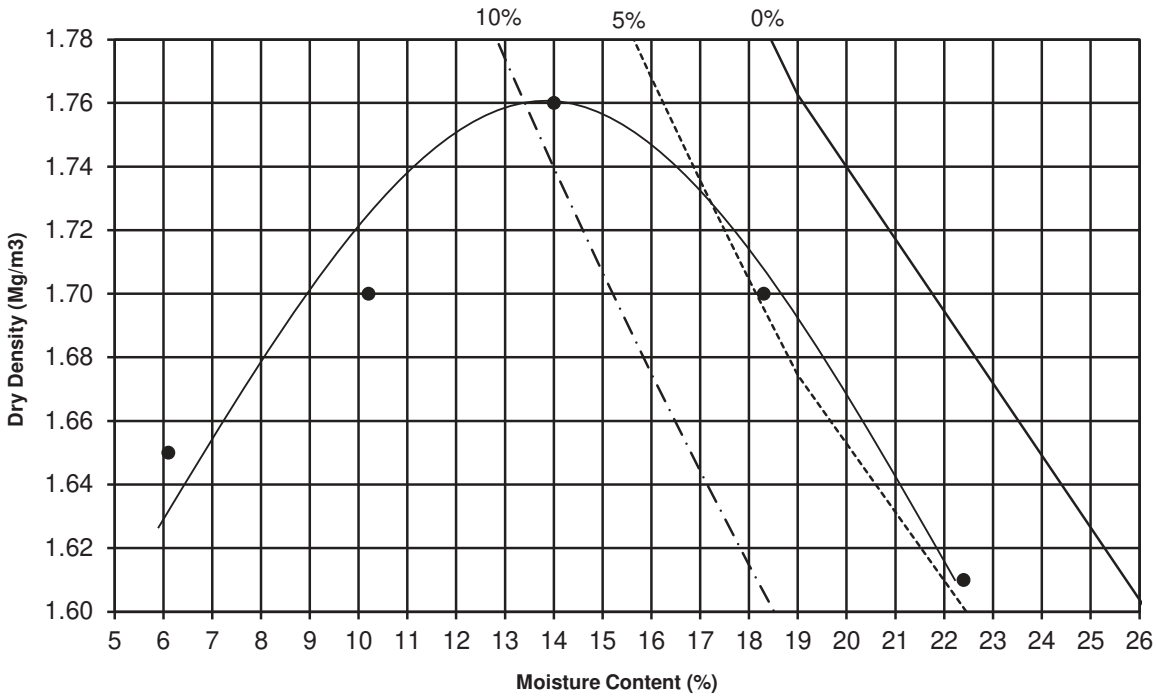
Sample No*. AA181969 Depth* (m) 0.6 Material Type B

Lab sample no. A22/7576 Customer: DOBA

Date Received: 24/01/2023 Test Method: 2.5 Kg Rammer

Date Tested: 26/01/2023 BS1377:Part 4:1990 3.3

Dry Density (Mg/m^3)	1.55	1.61	1.70	1.76	1.70	1.65	
Moisture Content (%)	26	22	18	14	10	6.1	



Maximum Dry Density (Mg/m^3): 1.76 Optimum Moisture Content (%): 14

Description: Mottled brown slightly sandy, slightly gravelly, CLAY

Sample Preparation: Material passing 20mm ~~Single~~ / Separate samples used

Particle Density (Mg/m^3): 2.65 Particle Density: Assumed

% retained on 20/37.5mm sieve: 2.8

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Test Report

Dry Density/Moisture Content Relationship

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Report No. R145757 Contract No. 24330

Contract Name: Halverstown , Naas . - Proposed Data Centres

Location*: TP31

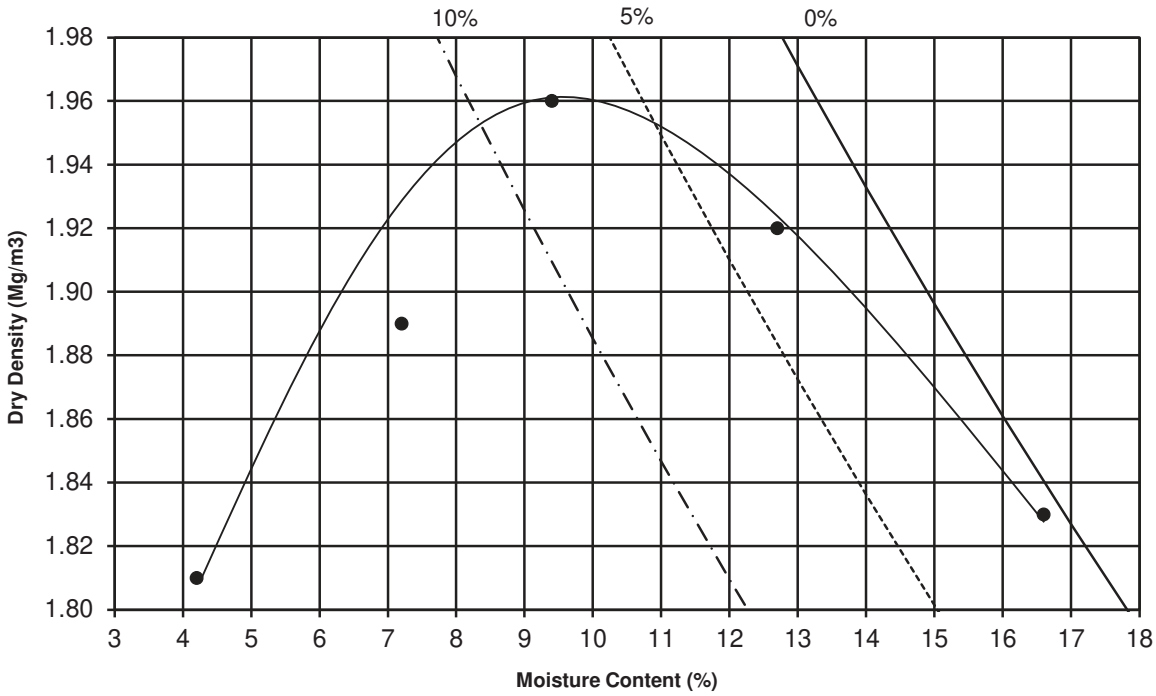
Sample No*. AA181992 Depth* (m) 0.5 Material Type B

Lab sample no. A22/7578 Customer: DOBA

Date Received: 24/01/2023 Test Method: 2.5 Kg Rammer

Date Tested: 26/01/2023 BS1377:Part 4:1990 3.3

Dry Density (Mg/m^3)	1.92	1.81	1.89	1.96	1.83		
Moisture Content (%)	13	4.2	7.2	9.4	17	0.0	



Maximum Dry Density (Mg/m^3): 1.96 Optimum Moisture Content (%): 9

Description: Brown slightly sandy, slightly gravelly, CLAY

Sample Preparation: Material passing 20mm ~~Single~~ / Separate samples used

Particle Density (Mg/m^3): 2.65 Particle Density: Assumed

% retained on 20/37.5mm sieve: 6.9

Results relate only to the specimen tested, in as received condition unless otherwise noted.
Opinions and interpretations are outside the scope of accreditation.
* denotes Customer supplied information
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Persons authorised to approve reports
J Barrett (Quality Manager)
H Byrne (Laboratory Manager)

IGSL Materials Laboratory	Approved by	Date	Page
	H Byrne	1/3/23	1 of 1

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Appendix 12

Chemical / Environmental Laboratory Results (Soil)

Report_22-48580
Report_22-48622

Report_ L23-00718-IGS - 23-32082

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

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Final Report

Report No.:	22-48580-1
Initial Date of Issue:	18-Jan-2023
Client	IGSL
Client Address:	M7 Business Park Naas County Kildare Ireland
Contact(s):	Darren Keogh
Project	24330 Halversown Naas Proposed Data Centre Sites (DOBA)

Quotation No.:	Q22-28896	**Date Received:**	20-Dec-2022
Order No.:		**Date Instructed:**	20-Dec-2022
No. of Samples:	36		
Turnaround (Wkdays):	7	**Results Due:**	04-Jan-2023
Date Approved:	18-Jan-2023		

Approved By:



Details: Stuart Henderson, Technical Manager

Results - Soil

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Project: 24330 Halversown Naas Proposed Data Centre Sites (DOBA)

Client: IGSL					**Chemtest Job No.:**	22-48580	22-48580	22-48580	22-48580	22-48580	22-48580	22-48580	22-48580
Quotation No.: Q22-28896					**Chemtest Sample ID.:**	1567070	1567071	1567072	1567073	1567074	1567075	1567076	1567077	1567079
Order No.:					Client Sample Ref.:	AA184690	AA184693	AA184669	AA184668	AA174678	AA184675	AA186957	AA181997	AA186960
					Sample Location:	BH03	BH04	BH06	BH08	BH10	BH12	TP01	TP02	TP05
					Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
					Top Depth (m):	1.00	1.00	1.00	1.00	1.00	1.00	0.50	0.50	0.50
					Asbestos Lab:		DURHAM	DURHAM		DURHAM		DURHAM		
Determinand	**Accred.**	**SOP**	**Units**	**LOD**										
ACM Type	U	2192		N/A			-	-		-		-		
Asbestos Identification	U	2192		N/A			No Asbestos Detected	No Asbestos Detected		No Asbestos Detected		No Asbestos Detected		
Moisture	N	2030	%	0.020	14	16	11	12	13	14	9.8	13	18	
pH	M	2010		4.0		[A] 8.2	[A] 8.4		[A] 8.4		[A] 8.4			
Boron (Hot Water Soluble)	M	2120	mg/kg	0.40		[A] < 0.40	[A] < 0.40		[A] < 0.40		[A] < 0.40			
Sulphate (2:1 Water Soluble) as SO4	M	2120	g/l	0.010		[A] < 0.010	[A] < 0.010		[A] < 0.010		[A] < 0.010			
Total Sulphur	M	2175	%	0.010		[A] < 0.010	[A] 0.025		[A] < 0.010		[A] < 0.010			
Sulphur (Elemental)	M	2180	mg/kg	1.0		[A] < 1.0	[A] < 1.0		[A] < 1.0		[A] < 1.0			
Cyanide (Free)	M	2300	mg/kg	0.50		[A] < 0.50	[A] < 0.50		[A] < 0.50		[A] < 0.50			
Cyanide (Total)	M	2300	mg/kg	0.50		[A] 0.50	[A] < 0.50		[A] < 0.50		[A] < 0.50			
Thiocyanate	M	2300	mg/kg	5.0		[A] < 5.0	[A] < 5.0		[A] < 5.0		[A] < 5.0			
Aluminium (Total)	N	2430	mg/kg	100		[A] 5200	[A] 1200		[A] 5000		[A] 3100			
Iron (Total)	N	2430	mg/kg	100		[A] 11000	[A] 5800		[A] 10000		[A] 8100			
Arsenic	M	2455	mg/kg	0.5		7.0	6.6		8.9		4.7			
Barium	M	2455	mg/kg	0		52	33		42		27			
Beryllium	U	2455	mg/kg	0.5		0.6	< 0.5		0.5		< 0.5			
Cadmium	M	2455	mg/kg	0.10		1.3	0.96		1.5		0.81			
Chromium	M	2455	mg/kg	0.5		18	6.2		15		14			
Manganese	M	2455	mg/kg	1.0		680	550		750		490			
Copper	M	2455	mg/kg	0.50		13	10		17		6.9			
Mercury	M	2455	mg/kg	0.05		0.06	< 0.05		0.06		< 0.05			
Nickel	M	2455	mg/kg	0.50		33	17		34		21			
Lead	M	2455	mg/kg	0.50		22	12		26		13			
Selenium	M	2455	mg/kg	0.25		0.79	0.54		0.72		0.46			
Vanadium	U	2455	mg/kg	0.5		17	7.0		15		11			
Zinc	M	2455	mg/kg	0.50		88	57		100		53			
Chromium (Hexavalent)	N	2490	mg/kg	0.50		< 0.50	< 0.50		< 0.50		< 0.50			
Organic Matter	M	2625	%	0.40		[A] 1.3	[A] 1.2		[A] 0.55		[A] < 0.40			
Total Organic Carbon	M	2625	%	0.20		[A] 0.77	[A] 0.67		[A] 0.32		[A] < 0.20			
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0		[A] < 1.0	[A] < 1.0		[A] < 1.0		[A] < 1.0			
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0		[A] < 1.0	[A] < 1.0		[A] < 1.0		[A] < 1.0			
Aliphatic TPH >C8-C10	N	2680	mg/kg	1.0		[A] < 1.0	[A] < 1.0		[A] < 1.0		[A] < 1.0			
Aliphatic TPH >C10-C12	N	2680	mg/kg	1.0		[A] < 1.0	[A] < 1.0		[A] < 1.0		[A] < 1.0			
Aliphatic TPH >C12-C16	N	2680	mg/kg	1.0		[A] < 1.0	[A] < 1.0		[A] < 1.0		[A] < 1.0			
Aliphatic TPH >C16-C21	N	2680	mg/kg	1.0		[A] < 1.0	[A] < 1.0		[A] < 1.0		[A] < 1.0			
Aliphatic TPH >C21-C35	N	2680	mg/kg	1.0		[A] < 1.0	[A] < 1.0		[A] < 1.0		[A] < 1.0			
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0		[A] < 1.0	[A] < 1.0		[A] < 1.0		[A] < 1.0			

Results - Soil

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Project: 24330 Halversown Naas Proposed Data Centre Sites (DOBA)

Client: IGSL					Chemtest Job No.:	22-48580	22-48580	22-48580	22-48580	22-48580	22-48580	22-48580	22-48580	22-48580
Quotation No.: Q22-28896					Chemtest Sample ID.:	1567070	1567071	1567072	1567073	1567074	1567075	1567076	1567077	1567079
Order No.:					Client Sample Ref.:	AA184690	AA184693	AA184669	AA184668	AA174678	AA184675	AA186957	AA181997	AA186960
					Sample Location:	BH03	BH04	BH06	BH08	BH10	BH12	TP01	TP02	TP05
					Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
					Top Depth (m):	1.00	1.00	1.00	1.00	1.00	1.00	0.50	0.50	0.50
					Asbestos Lab:		DURHAM	DURHAM		DURHAM		DURHAM		
Determinand	**Accred.**	**SOP**	**Units**	**LOD**										
Total Aliphatic Hydrocarbons	N	2680	mg/kg	5.0		[A] < 5.0	[A] < 5.0		[A] < 5.0		[A] < 5.0			
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0		[A] < 1.0	[A] < 1.0		[A] < 1.0		[A] < 1.0			
Aromatic TPH >C7-C8	N	2680	mg/kg	1.0		[A] < 1.0	[A] < 1.0		[A] < 1.0		[A] < 1.0			
Aromatic TPH >C8-C10	N	2680	mg/kg	1.0		[A] < 1.0	[A] < 1.0		[A] < 1.0		[A] < 1.0			
Aromatic TPH >C10-C12	N	2680	mg/kg	1.0		[A] < 1.0	[A] < 1.0		[A] < 1.0		[A] < 1.0			
Aromatic TPH >C12-C16	N	2680	mg/kg	1.0		[A] < 1.0	[A] < 1.0		[A] < 1.0		[A] < 1.0			
Aromatic TPH >C16-C21	N	2680	mg/kg	1.0		[A] < 1.0	[A] < 1.0		[A] < 1.0		[A] < 1.0			
Aromatic TPH >C21-C35	N	2680	mg/kg	1.0		[A] < 1.0	[A] < 1.0		[A] < 1.0		[A] < 1.0			
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0		[A] < 1.0	[A] < 1.0		[A] < 1.0		[A] < 1.0			
Total Aromatic Hydrocarbons	N	2680	mg/kg	5.0		[A] < 5.0	[A] < 5.0		[A] < 5.0		[A] < 5.0			
Total Petroleum Hydrocarbons	N	2680	mg/kg	10.0		[A] < 10	[A] < 10		[A] < 10		[A] < 10			
Dichlorodifluoromethane	U	2760	mg/kg	0.0010	[A] < 0.0010			[A] < 0.0010		[A] < 0.0010		[A] < 0.0010		
Chloromethane	M	2760	mg/kg	0.0010	[A] < 0.0010			[A] < 0.0010		[A] < 0.0010		[A] < 0.0010		
Vinyl Chloride	M	2760	mg/kg	0.0010	[A] < 0.0010			[A] < 0.0010		[A] < 0.0010		[A] < 0.0010		
Bromomethane	M	2760	mg/kg	0.020	[A] < 0.020			[A] < 0.020		[A] < 0.020		[A] < 0.020		
Chloroethane	U	2760	mg/kg	0.0020	[A] < 0.0020			[A] < 0.0020		[A] < 0.0020		[A] < 0.0020		
Trichlorofluoromethane	M	2760	mg/kg	0.0010	[A] < 0.0010			[A] < 0.0010		[A] < 0.0010		[A] < 0.0010		
1,1-Dichloroethene	M	2760	mg/kg	0.0010	[A] < 0.0010			[A] < 0.0010		[A] < 0.0010		[A] < 0.0010		
Trans 1,2-Dichloroethene	M	2760	mg/kg	0.0010	[A] < 0.0010			[A] < 0.0010		[A] < 0.0010		[A] < 0.0010		
1,1-Dichloroethane	M	2760	mg/kg	0.0010	[A] < 0.0010			[A] < 0.0010		[A] < 0.0010		[A] < 0.0010		
cis 1,2-Dichloroethene	M	2760	mg/kg	0.0010	[A] < 0.0010			[A] < 0.0010		[A] < 0.0010		[A] < 0.0010		
Bromochloromethane	U	2760	mg/kg	0.0050	[A] < 0.0050			[A] < 0.0050		[A] < 0.0050		[A] < 0.0050		
Trichloromethane	M	2760	mg/kg	0.0010	[A] < 0.0010			[A] < 0.0010		[A] < 0.0010		[A] < 0.0010		
1,1,1-Trichloroethane	M	2760	mg/kg	0.0010	[A] < 0.0010			[A] < 0.0010		[A] < 0.0010		[A] < 0.0010		
Tetrachloromethane	M	2760	mg/kg	0.0010	[A] < 0.0010			[A] < 0.0010		[A] < 0.0010		[A] < 0.0010		
1,1-Dichloropropene	U	2760	mg/kg	0.0010	[A] < 0.0010			[A] < 0.0010		[A] < 0.0010		[A] < 0.0010		
Benzene	M	2760	mg/kg	0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010		
1,2-Dichloroethane	M	2760	mg/kg	0.0020	[A] < 0.0020			[A] < 0.0020		[A] < 0.0020		[A] < 0.0020		
Trichloroethene	N	2760	mg/kg	0.0010	[A] < 0.0010			[A] < 0.0010		[A] < 0.0010		[A] < 0.0010		
1,2-Dichloropropane	M	2760	mg/kg	0.0010	[A] < 0.0010			[A] < 0.0010		[A] < 0.0010		[A] < 0.0010		
Dibromomethane	M	2760	mg/kg	0.0010	[A] < 0.0010			[A] < 0.0010		[A] < 0.0010		[A] < 0.0010		
Bromodichloromethane	M	2760	mg/kg	0.0050	[A] < 0.0050			[A] < 0.0050		[A] < 0.0050		[A] < 0.0050		
cis-1,3-Dichloropropene	N	2760	mg/kg	0.010	[A] < 0.010			[A] < 0.010		[A] < 0.010		[A] < 0.010		
Toluene	M	2760	mg/kg	0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010		
Trans-1,3-Dichloropropene	N	2760	mg/kg	0.010	[A] < 0.010			[A] < 0.010		[A] < 0.010		[A] < 0.010		
1,1,2-Trichloroethane	M	2760	mg/kg	0.010	[A] < 0.010			[A] < 0.010		[A] < 0.010		[A] < 0.010		
Tetrachloroethene	M	2760	mg/kg	0.0010	[A] < 0.0010			[A] < 0.0010		[A] < 0.0010		[A] < 0.0010		
1,3-Dichloropropane	U	2760	mg/kg	0.0020	[A] < 0.0020			[A] < 0.0020		[A] < 0.0020		[A] < 0.0020		

Results - Soil

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Project: 24330 Halversown Naas Proposed Data Centre Sites (DOBA)

Client: IGSL					Chemtest Job No.:	22-48580	22-48580	22-48580	22-48580	22-48580	22-48580	22-48580	22-48580	22-48580
Quotation No.: Q22-28896					Chemtest Sample ID.:	1567070	1567071	1567072	1567073	1567074	1567075	1567076	1567077	1567079
Order No.:					Client Sample Ref.:	AA184690	AA184693	AA184669	AA184668	AA174678	AA184675	AA186957	AA181997	AA186960
					Sample Location:	BH03	BH04	BH06	BH08	BH10	BH12	TP01	TP02	TP05
					Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
					Top Depth (m):	1.00	1.00	1.00	1.00	1.00	1.00	0.50	0.50	0.50
					Asbestos Lab:		DURHAM	DURHAM		DURHAM		DURHAM		
Determinand	**Accred.**	**SOP**	**Units**	**LOD**										
Dibromochloromethane	U	2760	mg/kg	0.010	[A] < 0.010			[A] < 0.010		[A] < 0.010		[A] < 0.010	
1,2-Dibromoethane	M	2760	mg/kg	0.0050	[A] < 0.0050			[A] < 0.0050		[A] < 0.0050		[A] < 0.0050	
Chlorobenzene	M	2760	mg/kg	0.0010	[A] < 0.0010			[A] < 0.0010		[A] < 0.0010		[A] < 0.0010	
1,1,1,2-Tetrachloroethane	M	2760	mg/kg	0.0020	[A] < 0.0020			[A] < 0.0020		[A] < 0.0020		[A] < 0.0020	
Ethylbenzene	M	2760	mg/kg	0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	
m & p-Xylene	M	2760	mg/kg	0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	
o-Xylene	M	2760	mg/kg	0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	
Styrene	M	2760	mg/kg	0.0010	[A] < 0.0010			[A] < 0.0010		[A] < 0.0010		[A] < 0.0010	
Tribromomethane	U	2760	mg/kg	0.0010	[A] < 0.0010			[A] < 0.0010		[A] < 0.0010		[A] < 0.0010	
Isopropylbenzene	M	2760	mg/kg	0.0010	[A] < 0.0010			[A] < 0.0010		[A] < 0.0010		[A] < 0.0010	
Bromobenzene	M	2760	mg/kg	0.0010	[A] < 0.0010			[A] < 0.0010		[A] < 0.0010		[A] < 0.0010	
1,2,3-Trichloropropane	N	2760	mg/kg	0.050	[A] < 0.050			[A] < 0.050		[A] < 0.050		[A] < 0.050	
N-Propylbenzene	U	2760	mg/kg	0.0010	[A] < 0.0010			[A] < 0.0010		[A] < 0.0010		[A] < 0.0010	
2-Chlorotoluene	M	2760	mg/kg	0.0010	[A] < 0.0010			[A] < 0.0010		[A] < 0.0010		[A] < 0.0010	
1,3,5-Trimethylbenzene	M	2760	mg/kg	0.0010	[A] < 0.0010			[A] < 0.0010		[A] < 0.0010		[A] < 0.0010	
4-Chlorotoluene	U	2760	mg/kg	0.0010	[A] < 0.0010			[A] < 0.0010		[A] < 0.0010		[A] < 0.0010	
Tert-Butylbenzene	U	2760	mg/kg	0.0010	[A] < 0.0010			[A] < 0.0010		[A] < 0.0010		[A] < 0.0010	
1,2,4-Trimethylbenzene	M	2760	mg/kg	0.0010	[A] < 0.0010			[A] < 0.0010		[A] < 0.0010		[A] < 0.0010	
Sec-Butylbenzene	U	2760	mg/kg	0.0010	[A] < 0.0010			[A] < 0.0010		[A] < 0.0010		[A] < 0.0010	
1,3-Dichlorobenzene	M	2760	mg/kg	0.0010	[A] < 0.0010			[A] < 0.0010		[A] < 0.0010		[A] < 0.0010	
4-Isopropyltoluene	N	2760	mg/kg	0.0010	[A] < 0.0010			[A] < 0.0010		[A] < 0.0010		[A] < 0.0010	
1,4-Dichlorobenzene	M	2760	mg/kg	0.0010	[A] < 0.0010			[A] < 0.0010		[A] < 0.0010		[A] < 0.0010	
N-Butylbenzene	U	2760	mg/kg	0.0010	[A] < 0.0010			[A] < 0.0010		[A] < 0.0010		[A] < 0.0010	
1,2-Dichlorobenzene	M	2760	mg/kg	0.0010	[A] < 0.0010			[A] < 0.0010		[A] < 0.0010		[A] < 0.0010	
1,2-Dibromo-3-Chloropropane	U	2760	mg/kg	0.050	[A] < 0.050			[A] < 0.050		[A] < 0.050		[A] < 0.050	
1,2,4-Trichlorobenzene	M	2760	mg/kg	0.0010	[A] < 0.0010			[A] < 0.0010		[A] < 0.0010		[A] < 0.0010	
Hexachlorobutadiene	U	2760	mg/kg	0.0010	[A] < 0.0010			[A] < 0.0010		[A] < 0.0010		[A] < 0.0010	
1,2,3-Trichlorobenzene	U	2760	mg/kg	0.0020	[A] < 0.0020			[A] < 0.0020		[A] < 0.0020		[A] < 0.0020	
Methyl Tert-Butyl Ether	M	2760	mg/kg	0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	
N-Nitrosodimethylamine	M	2790	mg/kg	0.50	[A] < 0.50			[A] < 0.50		[A] < 0.50		[A] < 0.50	
Phenol	M	2790	mg/kg	0.50	[A] < 0.50			[A] < 0.50		[A] < 0.50		[A] < 0.50	
2-Chlorophenol	M	2790	mg/kg	0.50	[A] < 0.50			[A] < 0.50		[A] < 0.50		[A] < 0.50	
Bis-(2-Chloroethyl)Ether	M	2790	mg/kg	0.50	[A] < 0.50			[A] < 0.50		[A] < 0.50		[A] < 0.50	
1,3-Dichlorobenzene	M	2790	mg/kg	0.50	[A] < 0.50			[A] < 0.50		[A] < 0.50		[A] < 0.50	
1,4-Dichlorobenzene	N	2790	mg/kg	0.50	[A] < 0.50			[A] < 0.50		[A] < 0.50		[A] < 0.50	
1,2-Dichlorobenzene	M	2790	mg/kg	0.50	[A] < 0.50			[A] < 0.50		[A] < 0.50		[A] < 0.50	
2-Methylphenol	M	2790	mg/kg	0.50	[A] < 0.50			[A] < 0.50		[A] < 0.50		[A] < 0.50	
Bis(2-Chloroisopropyl)Ether	M	2790	mg/kg	0.50	[A] < 0.50			[A] < 0.50		[A] < 0.50		[A] < 0.50	

Results - Soil

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Project: 24330 Halversown Naas Proposed Data Centre Sites (DOBA)

Client: IGSL					Chemtest Job No.:	22-48580	22-48580	22-48580	22-48580	22-48580	22-48580	22-48580	22-48580	22-48580
Quotation No.: Q22-28896					Chemtest Sample ID.:	1567070	1567071	1567072	1567073	1567074	1567075	1567076	1567077	1567079
Order No.:					Client Sample Ref.:	AA184690	AA184693	AA184669	AA184668	AA174678	AA184675	AA186957	AA181997	AA186960
					Sample Location:	BH03	BH04	BH06	BH08	BH10	BH12	TP01	TP02	TP05
					Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
					Top Depth (m):	1.00	1.00	1.00	1.00	1.00	1.00	0.50	0.50	0.50
					Asbestos Lab:		DURHAM	DURHAM		DURHAM		DURHAM		
Determinand	**Accred.**	**SOP**	**Units**	**LOD**										
Hexachloroethane	N	2790	mg/kg	0.50	[A] < 0.50			[A] < 0.50		[A] < 0.50		[A] < 0.50		
N-Nitrosodi-n-propylamine	M	2790	mg/kg	0.50	[A] < 0.50			[A] < 0.50		[A] < 0.50		[A] < 0.50		
4-Methylphenol	M	2790	mg/kg	0.50	[A] < 0.50			[A] < 0.50		[A] < 0.50		[A] < 0.50		
Nitrobenzene	M	2790	mg/kg	0.50	[A] < 0.50			[A] < 0.50		[A] < 0.50		[A] < 0.50		
Isophorone	M	2790	mg/kg	0.50	[A] < 0.50			[A] < 0.50		[A] < 0.50		[A] < 0.50		
2-Nitrophenol	N	2790	mg/kg	0.50	[A] < 0.50			[A] < 0.50		[A] < 0.50		[A] < 0.50		
2,4-Dimethylphenol	N	2790	mg/kg	0.50	[A] < 0.50			[A] < 0.50		[A] < 0.50		[A] < 0.50		
Bis(2-Chloroethoxy)Methane	M	2790	mg/kg	0.50	[A] < 0.50			[A] < 0.50		[A] < 0.50		[A] < 0.50		
2,4-Dichlorophenol	M	2790	mg/kg	0.50	[A] < 0.50			[A] < 0.50		[A] < 0.50		[A] < 0.50		
1,2,4-Trichlorobenzene	M	2790	mg/kg	0.50	[A] < 0.50			[A] < 0.50		[A] < 0.50		[A] < 0.50		
4-Chloroaniline	N	2790	mg/kg	0.50	[A] < 0.50			[A] < 0.50		[A] < 0.50		[A] < 0.50		
Hexachlorobutadiene	M	2790	mg/kg	0.50	[A] < 0.50			[A] < 0.50		[A] < 0.50		[A] < 0.50		
4-Chloro-3-Methylphenol	M	2790	mg/kg	0.50	[A] < 0.50			[A] < 0.50		[A] < 0.50		[A] < 0.50		
2-Methylnaphthalene	M	2790	mg/kg	0.50	[A] < 0.50			[A] < 0.50		[A] < 0.50		[A] < 0.50		
4-Nitrophenol	N	2790	mg/kg	0.50	[A] < 0.50			[A] < 0.50		[A] < 0.50		[A] < 0.50		
Hexachlorocyclopentadiene	N	2790	mg/kg	0.50	[A] < 0.50			[A] < 0.50		[A] < 0.50		[A] < 0.50		
2,4,6-Trichlorophenol	M	2790	mg/kg	0.50	[A] < 0.50			[A] < 0.50		[A] < 0.50		[A] < 0.50		
2,4,5-Trichlorophenol	M	2790	mg/kg	0.50	[A] < 0.50			[A] < 0.50		[A] < 0.50		[A] < 0.50		
2-Chloronaphthalene	M	2790	mg/kg	0.50	[A] < 0.50			[A] < 0.50		[A] < 0.50		[A] < 0.50		
2-Nitroaniline	M	2790	mg/kg	0.50	[A] < 0.50			[A] < 0.50		[A] < 0.50		[A] < 0.50		
Dimethylphthalate	M	2790	mg/kg	0.50	[A] < 0.50			[A] < 0.50		[A] < 0.50		[A] < 0.50		
2,6-Dinitrotoluene	M	2790	mg/kg	0.50	[A] < 0.50			[A] < 0.50		[A] < 0.50		[A] < 0.50		
3-Nitroaniline	N	2790	mg/kg	0.50	[A] < 0.50			[A] < 0.50		[A] < 0.50		[A] < 0.50		
Dibenzofuran	M	2790	mg/kg	0.50	[A] < 0.50			[A] < 0.50		[A] < 0.50		[A] < 0.50		
4-Chlorophenylphenylether	M	2790	mg/kg	0.50	[A] < 0.50			[A] < 0.50		[A] < 0.50		[A] < 0.50		
2,4-Dinitrotoluene	M	2790	mg/kg	0.50	[A] < 0.50			[A] < 0.50		[A] < 0.50		[A] < 0.50		
Diethyl Phthalate	M	2790	mg/kg	0.50	[A] < 0.50			[A] < 0.50		[A] < 0.50		[A] < 0.50		
4-Nitroaniline	M	2790	mg/kg	0.50	[A] < 0.50			[A] < 0.50		[A] < 0.50		[A] < 0.50		
2-Methyl-4,6-Dinitrophenol	N	2790	mg/kg	0.50	[A] < 0.50			[A] < 0.50		[A] < 0.50		[A] < 0.50		
Azobenzene	M	2790	mg/kg	0.50	[A] < 0.50			[A] < 0.50		[A] < 0.50		[A] < 0.50		
4-Bromophenylphenyl Ether	M	2790	mg/kg	0.50	[A] < 0.50			[A] < 0.50		[A] < 0.50		[A] < 0.50		
Hexachlorobenzene	M	2790	mg/kg	0.50	[A] < 0.50			[A] < 0.50		[A] < 0.50		[A] < 0.50		
Pentachlorophenol	N	2790	mg/kg	0.50	[A] < 0.50			[A] < 0.50		[A] < 0.50		[A] < 0.50		
Carbazole	M	2790	mg/kg	0.50	[A] < 0.50			[A] < 0.50		[A] < 0.50		[A] < 0.50		
Di-N-Butyl Phthalate	M	2790	mg/kg	0.50	[A] < 0.50			[A] < 0.50		[A] < 0.50		[A] < 0.50		
Butylbenzyl Phthalate	M	2790	mg/kg	0.50	[A] < 0.50			[A] < 0.50		[A] < 0.50		[A] < 0.50		
Bis(2-Ethylhexyl)Phthalate	N	2790	mg/kg	0.50	[A] < 0.50			[A] < 0.50		[A] < 0.50		[A] < 0.50		
Di-N-Octyl Phthalate	M	2790	mg/kg	0.50	[A] < 0.50			[A] < 0.50		[A] < 0.50		[A] < 0.50		

Results - Soil

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Project: 24330 Halversown Naas Proposed Data Centre Sites (DOBA)

Client: IGSL					Chemtest Job No.:	22-48580	22-48580	22-48580	22-48580	22-48580	22-48580	22-48580	22-48580	22-48580
Quotation No.: Q22-28896					Chemtest Sample ID.:	1567070	1567071	1567072	1567073	1567074	1567075	1567076	1567077	1567079
Order No.:					Client Sample Ref.:	AA184690	AA184693	AA184669	AA184668	AA174678	AA184675	AA186957	AA181997	AA186960
					Sample Location:	BH03	BH04	BH06	BH08	BH10	BH12	TP01	TP02	TP05
					Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
					Top Depth (m):	1.00	1.00	1.00	1.00	1.00	1.00	0.50	0.50	0.50
					Asbestos Lab:		DURHAM	DURHAM		DURHAM		DURHAM		
Determinand	**Accred.**	**SOP**	**Units**	**LOD**										
Naphthalene	M	2800	mg/kg	0.10		< 0.10	0.26		< 0.10		< 0.10			
Acenaphthylene	N	2800	mg/kg	0.10		< 0.10	< 0.10		< 0.10		< 0.10			
Acenaphthene	M	2800	mg/kg	0.10		< 0.10	< 0.10		< 0.10		< 0.10			
Fluorene	M	2800	mg/kg	0.10		< 0.10	< 0.10		< 0.10		< 0.10			
Phenanthrene	M	2800	mg/kg	0.10		< 0.10	< 0.10		< 0.10		< 0.10			
Anthracene	M	2800	mg/kg	0.10		< 0.10	< 0.10		< 0.10		< 0.10			
Fluoranthene	M	2800	mg/kg	0.10		< 0.10	< 0.10		< 0.10		< 0.10			
Pyrene	M	2800	mg/kg	0.10		< 0.10	< 0.10		< 0.10		< 0.10			
Benzo[a]anthracene	M	2800	mg/kg	0.10		< 0.10	< 0.10		< 0.10		< 0.10			
Chrysene	M	2800	mg/kg	0.10		< 0.10	< 0.10		< 0.10		< 0.10			
Benzo[b]fluoranthene	M	2800	mg/kg	0.10		< 0.10	< 0.10		< 0.10		< 0.10			
Benzo[k]fluoranthene	M	2800	mg/kg	0.10		< 0.10	< 0.10		< 0.10		< 0.10			
Benzo[a]pyrene	M	2800	mg/kg	0.10		< 0.10	< 0.10		< 0.10		< 0.10			
Indeno(1,2,3-c,d)Pyrene	M	2800	mg/kg	0.10		< 0.10	< 0.10		< 0.10		< 0.10			
Dibenz(a,h)Anthracene	N	2800	mg/kg	0.10		< 0.10	< 0.10		< 0.10		< 0.10			
Benzo[g,h,i]perylene	M	2800	mg/kg	0.10		< 0.10	< 0.10		< 0.10		< 0.10			
Total Of 16 PAH's	N	2800	mg/kg	2.0		< 2.0	< 2.0		< 2.0		< 2.0			
PCB 81	N	2815	mg/kg	0.010										< 0.010
PCB 77	U	2815	mg/kg	0.010										< 0.010
PCB 105	N	2815	mg/kg	0.010										< 0.010
PCB 114	N	2815	mg/kg	0.010										< 0.010
PCB 118	N	2815	mg/kg	0.010										< 0.010
PCB 123	N	2815	mg/kg	0.010										< 0.010
PCB 126	N	2815	mg/kg	0.010										< 0.010
PCB 156	N	2815	mg/kg	0.010										< 0.010
PCB 157	N	2815	mg/kg	0.010										< 0.010
PCB 167	N	2815	mg/kg	0.010										< 0.010
PCB 169	N	2815	mg/kg	0.010										< 0.010
PCB 189	N	2815	mg/kg	0.010										< 0.010
Total PCBs (12 Congeners)	N	2815	mg/kg	0.12										< 0.12
Resorcinol	M	2920	mg/kg	0.020		< 0.020	< 0.020		< 0.020		< 0.020			
Phenol	M	2920	mg/kg	0.020		< 0.020	< 0.020		< 0.020		< 0.020			
Cresols	M	2920	mg/kg	0.020		< 0.020	< 0.020		< 0.020		< 0.020			
Xylenols	M	2920	mg/kg	0.020		< 0.020	< 0.020		< 0.020		< 0.020			
1-Naphthol	N	2920	mg/kg	0.020		< 0.020	< 0.020		< 0.020		< 0.020			
Trimethylphenols	M	2920	mg/kg	0.020		< 0.020	< 0.020		< 0.020		< 0.020			
Total Phenols	M	2920	mg/kg	0.10		< 0.10	< 0.10		< 0.10		< 0.10			

Results - Soil

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Project: 24330 Halversown Naas Proposed Data Centre Sites (DOBA)

Client: IGSL					Chemtest Job No.:	22-48580	22-48580	22-48580	22-48580	22-48580	22-48580	22-48580	22-48580	22-48580
Quotation No.: Q22-28896					Chemtest Sample ID.:	1567080	1567081	1567082	1567084	1567085	1567086	1567087	1567089	1567090
Order No.:					Client Sample Ref.:	AA186979	AA186963	AA186966	AA186969	AA185474	AA185457	AA185458	AA185485	AA185464
					Sample Location:	TP06	TP07	TP08	TP10	TP13	TP14	TP14	TP17	TP18
					Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
					Top Depth (m):	0.50	0.50	0.50	0.50	0.50	0.50	0.80	0.60	0.50
					Asbestos Lab:	DURHAM			DURHAM		DURHAM			DURHAM
Determinand	**Accred.**	**SOP**	**Units**	**LOD**										
ACM Type	U	2192		N/A		-			-		-			-
Asbestos Identification	U	2192		N/A		No Asbestos Detected			No Asbestos Detected		No Asbestos Detected			No Asbestos Detected
Moisture	N	2030	%	0.020		13	13	12	13	14	10	6.6	9.5	6.9
pH	M	2010		4.0		[A] 8.5			[A] 8.6		[A] 8.4			[A] 8.5
Boron (Hot Water Soluble)	M	2120	mg/kg	0.40		[A] < 0.40			[A] < 0.40		[A] < 0.40			[A] < 0.40
Sulphate (2:1 Water Soluble) as SO4	M	2120	g/l	0.010		[A] < 0.010			[A] < 0.010		[A] < 0.010			[A] < 0.010
Total Sulphur	M	2175	%	0.010		[A] < 0.010			[A] < 0.010		[A] < 0.010			[A] < 0.010
Sulphur (Elemental)	M	2180	mg/kg	1.0		[A] < 1.0			[A] < 1.0		[A] < 1.0			[A] < 1.0
Cyanide (Free)	M	2300	mg/kg	0.50		[A] < 0.50			[A] < 0.50		[A] < 0.50			[A] < 0.50
Cyanide (Total)	M	2300	mg/kg	0.50		[A] < 0.50			[A] < 0.50		[A] < 0.50			[A] < 0.50
Thiocyanate	M	2300	mg/kg	5.0		[A] < 5.0			[A] < 5.0		[A] < 5.0			[A] < 5.0
Aluminium (Total)	N	2430	mg/kg	100		[A] 3700			[A] 5500		[A] 6200			[A] 4700
Iron (Total)	N	2430	mg/kg	100		[A] 7500			[A] 10000		[A] 9600			[A] 13000
Arsenic	M	2455	mg/kg	0.5		4.5			6.5		4.6			6.8
Barium	M	2455	mg/kg	0		27			40		45			54
Beryllium	U	2455	mg/kg	0.5		< 0.5			0.6		0.5			0.6
Cadmium	M	2455	mg/kg	0.10		0.85			1.1		0.76			1.4
Chromium	M	2455	mg/kg	0.5		12			18		13			18
Manganese	M	2455	mg/kg	1.0		330			410		190			440
Copper	M	2455	mg/kg	0.50		10			17		6.4			13
Mercury	M	2455	mg/kg	0.05		< 0.05			0.08		< 0.05			0.05
Nickel	M	2455	mg/kg	0.50		19			29		17			28
Lead	M	2455	mg/kg	0.50		29			22		19			26
Selenium	M	2455	mg/kg	0.25		0.55			0.74		0.67			0.95
Vanadium	U	2455	mg/kg	0.5		12			16		13			17
Zinc	M	2455	mg/kg	0.50		62			96		54			97
Chromium (Hexavalent)	N	2490	mg/kg	0.50		< 0.50			< 0.50		< 0.50			< 0.50
Organic Matter	M	2625	%	0.40		[A] 1.3			[A] 0.54		[A] 0.88			[A] 1.3
Total Organic Carbon	M	2625	%	0.20		[A] 0.76			[A] 0.32		[A] 0.51			[A] 0.78
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0		[A] < 1.0			[A] < 1.0		[A] < 1.0			[A] < 1.0
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0		[A] < 1.0			[A] < 1.0		[A] < 1.0			[A] < 1.0
Aliphatic TPH >C8-C10	N	2680	mg/kg	1.0		[A] < 1.0			[A] < 1.0		[A] < 1.0			[A] < 1.0
Aliphatic TPH >C10-C12	N	2680	mg/kg	1.0		[A] < 1.0			[A] < 1.0		[A] < 1.0			[A] < 1.0
Aliphatic TPH >C12-C16	N	2680	mg/kg	1.0		[A] < 1.0			[A] < 1.0		[A] < 1.0			[A] < 1.0
Aliphatic TPH >C16-C21	N	2680	mg/kg	1.0		[A] < 1.0			[A] < 1.0		[A] < 1.0			[A] < 1.0
Aliphatic TPH >C21-C35	N	2680	mg/kg	1.0		[A] < 1.0			[A] < 1.0		[A] < 1.0			[A] < 1.0
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0		[A] < 1.0			[A] < 1.0		[A] < 1.0			[A] < 1.0

Results - Soil

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Project: 24330 Halversown Naas Proposed Data Centre Sites (DOBA)

Client: IGSL					Chemtest Job No.:	22-48580	22-48580	22-48580	22-48580	22-48580	22-48580	22-48580	22-48580	22-48580
Quotation No.: Q22-28896					Chemtest Sample ID.:	1567080	1567081	1567082	1567084	1567085	1567086	1567087	1567089	1567090
Order No.:					Client Sample Ref.:	AA186979	AA186963	AA186966	AA186969	AA185474	AA185457	AA185458	AA185485	AA185464
					Sample Location:	TP06	TP07	TP08	TP10	TP13	TP14	TP14	TP17	TP18
					Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
					Top Depth (m):	0.50	0.50	0.50	0.50	0.50	0.50	0.80	0.60	0.50
					Asbestos Lab:	DURHAM			DURHAM		DURHAM			DURHAM
Determinand	**Accred.**	**SOP**	**Units**	**LOD**										
Total Aliphatic Hydrocarbons	N	2680	mg/kg	5.0		[A] < 5.0			[A] < 5.0		[A] < 5.0			[A] < 5.0
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0		[A] < 1.0			[A] < 1.0		[A] < 1.0			[A] < 1.0
Aromatic TPH >C7-C8	N	2680	mg/kg	1.0		[A] < 1.0			[A] < 1.0		[A] < 1.0			[A] < 1.0
Aromatic TPH >C8-C10	N	2680	mg/kg	1.0		[A] < 1.0			[A] < 1.0		[A] < 1.0			[A] < 1.0
Aromatic TPH >C10-C12	N	2680	mg/kg	1.0		[A] < 1.0			[A] < 1.0		[A] < 1.0			[A] < 1.0
Aromatic TPH >C12-C16	N	2680	mg/kg	1.0		[A] < 1.0			[A] < 1.0		[A] < 1.0			[A] < 1.0
Aromatic TPH >C16-C21	N	2680	mg/kg	1.0		[A] < 1.0			[A] < 1.0		[A] < 1.0			[A] < 1.0
Aromatic TPH >C21-C35	N	2680	mg/kg	1.0		[A] < 1.0			[A] < 1.0		[A] < 1.0			[A] < 1.0
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0		[A] < 1.0			[A] < 1.0		[A] < 1.0			[A] < 1.0
Total Aromatic Hydrocarbons	N	2680	mg/kg	5.0		[A] < 5.0			[A] < 5.0		[A] < 5.0			[A] < 5.0
Total Petroleum Hydrocarbons	N	2680	mg/kg	10.0		[A] < 10			[A] < 10		[A] < 10			[A] < 10
Dichlorodifluoromethane	U	2760	mg/kg	0.0010			[A] < 0.0010			[A] < 0.0010		[A] < 0.0010		
Chloromethane	M	2760	mg/kg	0.0010			[A] < 0.0010			[A] < 0.0010		[A] < 0.0010		
Vinyl Chloride	M	2760	mg/kg	0.0010			[A] < 0.0010			[A] < 0.0010		[A] < 0.0010		
Bromomethane	M	2760	mg/kg	0.020			[A] < 0.020			[A] < 0.020		[A] < 0.020		
Chloroethane	U	2760	mg/kg	0.0020			[A] < 0.0020			[A] < 0.0020		[A] < 0.0020		
Trichlorofluoromethane	M	2760	mg/kg	0.0010			[A] < 0.0010			[A] < 0.0010		[A] < 0.0010		
1,1-Dichloroethene	M	2760	mg/kg	0.0010			[A] < 0.0010			[A] < 0.0010		[A] < 0.0010		
Trans 1,2-Dichloroethene	M	2760	mg/kg	0.0010			[A] < 0.0010			[A] < 0.0010		[A] < 0.0010		
1,1-Dichloroethane	M	2760	mg/kg	0.0010			[A] < 0.0010			[A] < 0.0010		[A] < 0.0010		
cis 1,2-Dichloroethene	M	2760	mg/kg	0.0010			[A] < 0.0010			[A] < 0.0010		[A] < 0.0010		
Bromochloromethane	U	2760	mg/kg	0.0050			[A] < 0.0050			[A] < 0.0050		[A] < 0.0050		
Trichloromethane	M	2760	mg/kg	0.0010			[A] < 0.0010			[A] < 0.0010		[A] < 0.0010		
1,1,1-Trichloroethane	M	2760	mg/kg	0.0010			[A] < 0.0010			[A] < 0.0010		[A] < 0.0010		
Tetrachloromethane	M	2760	mg/kg	0.0010			[A] < 0.0010			[A] < 0.0010		[A] < 0.0010		
1,1-Dichloropropene	U	2760	mg/kg	0.0010			[A] < 0.0010			[A] < 0.0010		[A] < 0.0010		
Benzene	M	2760	mg/kg	0.0010	[A] < 0.0010		[A] < 0.0010		[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010		[A] < 0.0010
1,2-Dichloroethane	M	2760	mg/kg	0.0020			[A] < 0.0020			[A] < 0.0020		[A] < 0.0020		
Trichloroethene	N	2760	mg/kg	0.0010			[A] < 0.0010			[A] < 0.0010		[A] < 0.0010		
1,2-Dichloropropane	M	2760	mg/kg	0.0010			[A] < 0.0010			[A] < 0.0010		[A] < 0.0010		
Dibromomethane	M	2760	mg/kg	0.0010			[A] < 0.0010			[A] < 0.0010		[A] < 0.0010		
Bromodichloromethane	M	2760	mg/kg	0.0050			[A] < 0.0050			[A] < 0.0050		[A] < 0.0050		
cis-1,3-Dichloropropene	N	2760	mg/kg	0.010			[A] < 0.010			[A] < 0.010		[A] < 0.010		
Toluene	M	2760	mg/kg	0.0010	[A] < 0.0010		[A] < 0.0010		[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010		[A] < 0.0010
Trans-1,3-Dichloropropene	N	2760	mg/kg	0.010			[A] < 0.010			[A] < 0.010		[A] < 0.010		
1,1,2-Trichloroethane	M	2760	mg/kg	0.010			[A] < 0.010			[A] < 0.010		[A] < 0.010		
Tetrachloroethene	M	2760	mg/kg	0.0010			[A] < 0.0010			[A] < 0.0010		[A] < 0.0010		
1,3-Dichloropropane	U	2760	mg/kg	0.0020			[A] < 0.0020			[A] < 0.0020		[A] < 0.0020		

Results - Soil

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Project: 24330 Halversown Naas Proposed Data Centre Sites (DOBA)

Client: IGSL					Chemtest Job No.:	22-48580	22-48580	22-48580	22-48580	22-48580	22-48580	22-48580	22-48580	22-48580
Quotation No.: Q22-28896					Chemtest Sample ID.:	1567080	1567081	1567082	1567084	1567085	1567086	1567087	1567089	1567090
Order No.:					Client Sample Ref.:	AA186979	AA186963	AA186966	AA186969	AA185474	AA185457	AA185458	AA185485	AA185464
					Sample Location:	TP06	TP07	TP08	TP10	TP13	TP14	TP14	TP17	TP18
					Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
					Top Depth (m):	0.50	0.50	0.50	0.50	0.50	0.50	0.80	0.60	0.50
					Asbestos Lab:	DURHAM			DURHAM		DURHAM			DURHAM
Determinand	**Accred.**	**SOP**	**Units**	**LOD**										
Dibromochloromethane	U	2760	mg/kg	0.010		[A] < 0.010			[A] < 0.010		[A] < 0.010			
1,2-Dibromoethane	M	2760	mg/kg	0.0050		[A] < 0.0050			[A] < 0.0050		[A] < 0.0050			
Chlorobenzene	M	2760	mg/kg	0.0010		[A] < 0.0010			[A] < 0.0010		[A] < 0.0010			
1,1,1,2-Tetrachloroethane	M	2760	mg/kg	0.0020		[A] < 0.0020			[A] < 0.0020		[A] < 0.0020			
Ethylbenzene	M	2760	mg/kg	0.0010	[A] < 0.0010	[A] < 0.0010		[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010			[A] < 0.0010
m & p-Xylene	M	2760	mg/kg	0.0010	[A] < 0.0010	[A] < 0.0010		[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010			[A] < 0.0010
o-Xylene	M	2760	mg/kg	0.0010	[A] < 0.0010	[A] < 0.0010		[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010			[A] < 0.0010
Styrene	M	2760	mg/kg	0.0010		[A] < 0.0010			[A] < 0.0010		[A] < 0.0010			
Tribromomethane	U	2760	mg/kg	0.0010		[A] < 0.0010			[A] < 0.0010		[A] < 0.0010			
Isopropylbenzene	M	2760	mg/kg	0.0010		[A] < 0.0010			[A] < 0.0010		[A] < 0.0010			
Bromobenzene	M	2760	mg/kg	0.0010		[A] < 0.0010			[A] < 0.0010		[A] < 0.0010			
1,2,3-Trichloropropane	N	2760	mg/kg	0.050		[A] < 0.050			[A] < 0.050		[A] < 0.050			
N-Propylbenzene	U	2760	mg/kg	0.0010		[A] < 0.0010			[A] < 0.0010		[A] < 0.0010			
2-Chlorotoluene	M	2760	mg/kg	0.0010		[A] < 0.0010			[A] < 0.0010		[A] < 0.0010			
1,3,5-Trimethylbenzene	M	2760	mg/kg	0.0010		[A] < 0.0010			[A] < 0.0010		[A] < 0.0010			
4-Chlorotoluene	U	2760	mg/kg	0.0010		[A] < 0.0010			[A] < 0.0010		[A] < 0.0010			
Tert-Butylbenzene	U	2760	mg/kg	0.0010		[A] < 0.0010			[A] < 0.0010		[A] < 0.0010			
1,2,4-Trimethylbenzene	M	2760	mg/kg	0.0010		[A] < 0.0010			[A] < 0.0010		[A] < 0.0010			
Sec-Butylbenzene	U	2760	mg/kg	0.0010		[A] < 0.0010			[A] < 0.0010		[A] < 0.0010			
1,3-Dichlorobenzene	M	2760	mg/kg	0.0010		[A] < 0.0010			[A] < 0.0010		[A] < 0.0010			
4-Isopropyltoluene	N	2760	mg/kg	0.0010		[A] < 0.0010			[A] < 0.0010		[A] < 0.0010			
1,4-Dichlorobenzene	M	2760	mg/kg	0.0010		[A] < 0.0010			[A] < 0.0010		[A] < 0.0010			
N-Butylbenzene	U	2760	mg/kg	0.0010		[A] < 0.0010			[A] < 0.0010		[A] < 0.0010			
1,2-Dichlorobenzene	M	2760	mg/kg	0.0010		[A] < 0.0010			[A] < 0.0010		[A] < 0.0010			
1,2-Dibromo-3-Chloropropane	U	2760	mg/kg	0.050		[A] < 0.050			[A] < 0.050		[A] < 0.050			
1,2,4-Trichlorobenzene	M	2760	mg/kg	0.0010		[A] < 0.0010			[A] < 0.0010		[A] < 0.0010			
Hexachlorobutadiene	U	2760	mg/kg	0.0010		[A] < 0.0010			[A] < 0.0010		[A] < 0.0010			
1,2,3-Trichlorobenzene	U	2760	mg/kg	0.0020		[A] < 0.0020			[A] < 0.0020		[A] < 0.0020			
Methyl Tert-Butyl Ether	M	2760	mg/kg	0.0010	[A] < 0.0010	[A] < 0.0010		[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010			[A] < 0.0010
N-Nitrosodimethylamine	M	2790	mg/kg	0.50		[A] < 0.50			[A] < 0.50		[A] < 0.50			
Phenol	M	2790	mg/kg	0.50		[A] < 0.50			[A] < 0.50		[A] < 0.50			
2-Chlorophenol	M	2790	mg/kg	0.50		[A] < 0.50			[A] < 0.50		[A] < 0.50			
Bis-(2-Chloroethyl)Ether	M	2790	mg/kg	0.50		[A] < 0.50			[A] < 0.50		[A] < 0.50			
1,3-Dichlorobenzene	M	2790	mg/kg	0.50		[A] < 0.50			[A] < 0.50		[A] < 0.50			
1,4-Dichlorobenzene	N	2790	mg/kg	0.50		[A] < 0.50			[A] < 0.50		[A] < 0.50			
1,2-Dichlorobenzene	M	2790	mg/kg	0.50		[A] < 0.50			[A] < 0.50		[A] < 0.50			
2-Methylphenol	M	2790	mg/kg	0.50		[A] < 0.50			[A] < 0.50		[A] < 0.50			
Bis(2-Chloroisopropyl)Ether	M	2790	mg/kg	0.50		[A] < 0.50			[A] < 0.50		[A] < 0.50			

Results - Soil

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Project: 24330 Halversown Naas Proposed Data Centre Sites (DOBA)

Client: IGSL					Chemtest Job No.:	22-48580	22-48580	22-48580	22-48580	22-48580	22-48580	22-48580	22-48580	22-48580
Quotation No.: Q22-28896					Chemtest Sample ID.:	1567080	1567081	1567082	1567084	1567085	1567086	1567087	1567089	1567090
Order No.:					Client Sample Ref.:	AA186979	AA186963	AA186966	AA186969	AA185474	AA185457	AA185458	AA185485	AA185464
					Sample Location:	TP06	TP07	TP08	TP10	TP13	TP14	TP14	TP17	TP18
					Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
					Top Depth (m):	0.50	0.50	0.50	0.50	0.50	0.50	0.80	0.60	0.50
					Asbestos Lab:	DURHAM			DURHAM		DURHAM			DURHAM
Determinand	**Accred.**	**SOP**	**Units**	**LOD**										
Hexachloroethane	N	2790	mg/kg	0.50		[A] < 0.50			[A] < 0.50		[A] < 0.50			
N-Nitrosodi-n-propylamine	M	2790	mg/kg	0.50		[A] < 0.50			[A] < 0.50		[A] < 0.50			
4-Methylphenol	M	2790	mg/kg	0.50		[A] < 0.50			[A] < 0.50		[A] < 0.50			
Nitrobenzene	M	2790	mg/kg	0.50		[A] < 0.50			[A] < 0.50		[A] < 0.50			
Isophorone	M	2790	mg/kg	0.50		[A] < 0.50			[A] < 0.50		[A] < 0.50			
2-Nitrophenol	N	2790	mg/kg	0.50		[A] < 0.50			[A] < 0.50		[A] < 0.50			
2,4-Dimethylphenol	N	2790	mg/kg	0.50		[A] < 0.50			[A] < 0.50		[A] < 0.50			
Bis(2-Chloroethoxy)Methane	M	2790	mg/kg	0.50		[A] < 0.50			[A] < 0.50		[A] < 0.50			
2,4-Dichlorophenol	M	2790	mg/kg	0.50		[A] < 0.50			[A] < 0.50		[A] < 0.50			
1,2,4-Trichlorobenzene	M	2790	mg/kg	0.50		[A] < 0.50			[A] < 0.50		[A] < 0.50			
4-Chloroaniline	N	2790	mg/kg	0.50		[A] < 0.50			[A] < 0.50		[A] < 0.50			
Hexachlorobutadiene	M	2790	mg/kg	0.50		[A] < 0.50			[A] < 0.50		[A] < 0.50			
4-Chloro-3-Methylphenol	M	2790	mg/kg	0.50		[A] < 0.50			[A] < 0.50		[A] < 0.50			
2-Methylnaphthalene	M	2790	mg/kg	0.50		[A] < 0.50			[A] < 0.50		[A] < 0.50			
4-Nitrophenol	N	2790	mg/kg	0.50		[A] < 0.50			[A] < 0.50		[A] < 0.50			
Hexachlorocyclopentadiene	N	2790	mg/kg	0.50		[A] < 0.50			[A] < 0.50		[A] < 0.50			
2,4,6-Trichlorophenol	M	2790	mg/kg	0.50		[A] < 0.50			[A] < 0.50		[A] < 0.50			
2,4,5-Trichlorophenol	M	2790	mg/kg	0.50		[A] < 0.50			[A] < 0.50		[A] < 0.50			
2-Chloronaphthalene	M	2790	mg/kg	0.50		[A] < 0.50			[A] < 0.50		[A] < 0.50			
2-Nitroaniline	M	2790	mg/kg	0.50		[A] < 0.50			[A] < 0.50		[A] < 0.50			
Dimethylphthalate	M	2790	mg/kg	0.50		[A] < 0.50			[A] < 0.50		[A] < 0.50			
2,6-Dinitrotoluene	M	2790	mg/kg	0.50		[A] < 0.50			[A] < 0.50		[A] < 0.50			
3-Nitroaniline	N	2790	mg/kg	0.50		[A] < 0.50			[A] < 0.50		[A] < 0.50			
Dibenzofuran	M	2790	mg/kg	0.50		[A] < 0.50			[A] < 0.50		[A] < 0.50			
4-Chlorophenylphenylether	M	2790	mg/kg	0.50		[A] < 0.50			[A] < 0.50		[A] < 0.50			
2,4-Dinitrotoluene	M	2790	mg/kg	0.50		[A] < 0.50			[A] < 0.50		[A] < 0.50			
Diethyl Phthalate	M	2790	mg/kg	0.50		[A] < 0.50			[A] < 0.50		[A] < 0.50			
4-Nitroaniline	M	2790	mg/kg	0.50		[A] < 0.50			[A] < 0.50		[A] < 0.50			
2-Methyl-4,6-Dinitrophenol	N	2790	mg/kg	0.50		[A] < 0.50			[A] < 0.50		[A] < 0.50			
Azobenzene	M	2790	mg/kg	0.50		[A] < 0.50			[A] < 0.50		[A] < 0.50			
4-Bromophenylphenyl Ether	M	2790	mg/kg	0.50		[A] < 0.50			[A] < 0.50		[A] < 0.50			
Hexachlorobenzene	M	2790	mg/kg	0.50		[A] < 0.50			[A] < 0.50		[A] < 0.50			
Pentachlorophenol	N	2790	mg/kg	0.50		[A] < 0.50			[A] < 0.50		[A] < 0.50			
Carbazole	M	2790	mg/kg	0.50		[A] < 0.50			[A] < 0.50		[A] < 0.50			
Di-N-Butyl Phthalate	M	2790	mg/kg	0.50		[A] < 0.50			[A] < 0.50		[A] < 0.50			
Butylbenzyl Phthalate	M	2790	mg/kg	0.50		[A] < 0.50			[A] < 0.50		[A] < 0.50			
Bis(2-Ethylhexyl)Phthalate	N	2790	mg/kg	0.50		[A] < 0.50			[A] < 0.50		[A] < 0.50			
Di-N-Octyl Phthalate	M	2790	mg/kg	0.50		[A] < 0.50			[A] < 0.50		[A] < 0.50			

Results - Soil

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Project: 24330 Halversown Naas Proposed Data Centre Sites (DOBA)

Client: IGSL					Chemtest Job No.:	22-48580	22-48580	22-48580	22-48580	22-48580	22-48580	22-48580	22-48580	22-48580
Quotation No.: Q22-28896					Chemtest Sample ID.:	1567080	1567081	1567082	1567084	1567085	1567086	1567087	1567089	1567090
Order No.:					Client Sample Ref.:	AA186979	AA186963	AA186966	AA186969	AA185474	AA185457	AA185458	AA185485	AA185464
					Sample Location:	TP06	TP07	TP08	TP10	TP13	TP14	TP14	TP17	TP18
					Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
					Top Depth (m):	0.50	0.50	0.50	0.50	0.50	0.50	0.80	0.60	0.50
					Asbestos Lab:	DURHAM			DURHAM		DURHAM			DURHAM
Determinand	**Accred.**	**SOP**	**Units**	**LOD**										
Naphthalene	M	2800	mg/kg	0.10		< 0.10			< 0.10		< 0.10			< 0.10
Acenaphthylene	N	2800	mg/kg	0.10		< 0.10			< 0.10		< 0.10			< 0.10
Acenaphthene	M	2800	mg/kg	0.10		< 0.10			< 0.10		< 0.10			< 0.10
Fluorene	M	2800	mg/kg	0.10		< 0.10			< 0.10		< 0.10			< 0.10
Phenanthrene	M	2800	mg/kg	0.10		< 0.10			< 0.10		< 0.10			< 0.10
Anthracene	M	2800	mg/kg	0.10		< 0.10			< 0.10		< 0.10			< 0.10
Fluoranthene	M	2800	mg/kg	0.10		< 0.10			< 0.10		< 0.10			< 0.10
Pyrene	M	2800	mg/kg	0.10		< 0.10			< 0.10		< 0.10			< 0.10
Benzo[a]anthracene	M	2800	mg/kg	0.10		< 0.10			< 0.10		< 0.10			< 0.10
Chrysene	M	2800	mg/kg	0.10		< 0.10			< 0.10		< 0.10			< 0.10
Benzo[b]fluoranthene	M	2800	mg/kg	0.10		< 0.10			< 0.10		< 0.10			< 0.10
Benzo[k]fluoranthene	M	2800	mg/kg	0.10		< 0.10			< 0.10		< 0.10			< 0.10
Benzo[a]pyrene	M	2800	mg/kg	0.10		< 0.10			< 0.10		< 0.10			< 0.10
Indeno(1,2,3-c,d)Pyrene	M	2800	mg/kg	0.10		< 0.10			< 0.10		< 0.10			< 0.10
Dibenz(a,h)Anthracene	N	2800	mg/kg	0.10		< 0.10			< 0.10		< 0.10			< 0.10
Benzo[g,h,i]perylene	M	2800	mg/kg	0.10		< 0.10			< 0.10		< 0.10			< 0.10
Total Of 16 PAH's	N	2800	mg/kg	2.0		< 2.0			< 2.0		< 2.0			< 2.0
PCB 81	N	2815	mg/kg	0.010				< 0.010					< 0.010	
PCB 77	U	2815	mg/kg	0.010				< 0.010					< 0.010	
PCB 105	N	2815	mg/kg	0.010				< 0.010					< 0.010	
PCB 114	N	2815	mg/kg	0.010				< 0.010					< 0.010	
PCB 118	N	2815	mg/kg	0.010				< 0.010					< 0.010	
PCB 123	N	2815	mg/kg	0.010				< 0.010					< 0.010	
PCB 126	N	2815	mg/kg	0.010				< 0.010					< 0.010	
PCB 156	N	2815	mg/kg	0.010				< 0.010					< 0.010	
PCB 157	N	2815	mg/kg	0.010				< 0.010					< 0.010	
PCB 167	N	2815	mg/kg	0.010				< 0.010					< 0.010	
PCB 169	N	2815	mg/kg	0.010				< 0.010					< 0.010	
PCB 189	N	2815	mg/kg	0.010				< 0.010					< 0.010	
Total PCBs (12 Congeners)	N	2815	mg/kg	0.12				< 0.12					< 0.12	
Resorcinol	M	2920	mg/kg	0.020		< 0.020			< 0.020		< 0.020			< 0.020
Phenol	M	2920	mg/kg	0.020		< 0.020			< 0.020		< 0.020			< 0.020
Cresols	M	2920	mg/kg	0.020		< 0.020			< 0.020		< 0.020			< 0.020
Xylenols	M	2920	mg/kg	0.020		< 0.020			< 0.020		< 0.020			< 0.020
1-Naphthol	N	2920	mg/kg	0.020		< 0.020			< 0.020		< 0.020			< 0.020
Trimethylphenols	M	2920	mg/kg	0.020		< 0.020			< 0.020		< 0.020			< 0.020
Total Phenols	M	2920	mg/kg	0.10		< 0.10			< 0.10		< 0.10			< 0.10

Results - Soil

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Project: 24330 Halversown Naas Proposed Data Centre Sites (DOBA)

Client: IGSL					**Chemtest Job No.:**	22-48580	22-48580	22-48580	22-48580	22-48580	22-48580	22-48580	22-48580
Quotation No.: Q22-28896					**Chemtest Sample ID.:**	1567091	1567092	1567093	1567094	1567096	1567097	1567098	1567099	1567100
Order No.:					Client Sample Ref.:	AA185488	AA185498	AA181957	AA181963	AA181976	AA181972	AA181969	AA181966	AA181978
					Sample Location:	TP20	TP22	TP23	TP25	TP26	TP27	TP28	TP29	TP30
					Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
					Top Depth (m):	0.60	1.40	0.50	0.50	1.30	0.50	0.60	0.50	0.50
					Asbestos Lab:	DURHAM		DURHAM			DURHAM		DURHAM	
Determinand	**Accred.**	**SOP**	**Units**	**LOD**										
ACM Type	U	2192		N/A		-		-			-		-	
Asbestos Identification	U	2192		N/A		No Asbestos Detected		No Asbestos Detected			No Asbestos Detected		No Asbestos Detected	
Moisture	N	2030	%	0.020		13	11	14	13	10	11	21	8.4	14
pH	M	2010		4.0		[A] 8.6		[A] 8.5			[A] 8.5		[A] 8.4	
Boron (Hot Water Soluble)	M	2120	mg/kg	0.40		[A] < 0.40		[A] < 0.40			[A] < 0.40		[A] < 0.40	
Sulphate (2:1 Water Soluble) as SO4	M	2120	g/l	0.010		[A] < 0.010		[A] < 0.010			[A] < 0.010		[A] < 0.010	
Total Sulphur	M	2175	%	0.010		[A] < 0.010		[A] < 0.010			[A] < 0.010		[A] < 0.010	
Sulphur (Elemental)	M	2180	mg/kg	1.0		[A] < 1.0		[A] < 1.0			[A] < 1.0		[A] < 1.0	
Cyanide (Free)	M	2300	mg/kg	0.50		[A] < 0.50		[A] < 0.50			[A] < 0.50		[A] < 0.50	
Cyanide (Total)	M	2300	mg/kg	0.50		[A] < 0.50		[A] < 0.50			[A] < 0.50		[A] < 0.50	
Thiocyanate	M	2300	mg/kg	5.0		[A] < 5.0		[A] < 5.0			[A] < 5.0		[A] < 5.0	
Aluminium (Total)	N	2430	mg/kg	100		[A] 3700		[A] 7500			[A] 4100		[A] 4800	
Iron (Total)	N	2430	mg/kg	100		[A] 9200		[A] 15000			[A] 9800		[A] 4900	
Arsenic	M	2455	mg/kg	0.5		5.8		9.1			7.5		7.7	
Barium	M	2455	mg/kg	0		79		51			71		46	
Beryllium	U	2455	mg/kg	0.5		< 0.5		0.8			0.5		0.8	
Cadmium	M	2455	mg/kg	0.10		1.2		2.4			1.9		1.7	
Chromium	M	2455	mg/kg	0.5		14		20			14		19	
Manganese	M	2455	mg/kg	1.0		< 1.0		1000			1000		680	
Copper	M	2455	mg/kg	0.50		11		21			13		17	
Mercury	M	2455	mg/kg	0.05		< 0.05		0.07			< 0.05		0.06	
Nickel	M	2455	mg/kg	0.50		24		52			35		37	
Lead	M	2455	mg/kg	0.50		19		29			23		25	
Selenium	M	2455	mg/kg	0.25		0.60		1.1			0.54		0.84	
Vanadium	U	2455	mg/kg	0.5		14		21			14		18	
Zinc	M	2455	mg/kg	0.50		73		130			88		110	
Chromium (Hexavalent)	N	2490	mg/kg	0.50		< 0.50		< 0.50			< 0.50		< 0.50	
Organic Matter	M	2625	%	0.40		[A] 0.75		[A] 0.66			[A] < 0.40		[A] < 0.40	
Total Organic Carbon	M	2625	%	0.20		[A] 0.43		[A] 0.38			[A] < 0.20		[A] < 0.20	
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0		[A] < 1.0		[A] < 1.0			[A] < 1.0		[A] < 1.0	
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0		[A] < 1.0		[A] < 1.0			[A] < 1.0		[A] < 1.0	
Aliphatic TPH >C8-C10	N	2680	mg/kg	1.0		[A] < 1.0		[A] < 1.0			[A] < 1.0		[A] < 1.0	
Aliphatic TPH >C10-C12	N	2680	mg/kg	1.0		[A] < 1.0		[A] < 1.0			[A] < 1.0		[A] < 1.0	
Aliphatic TPH >C12-C16	N	2680	mg/kg	1.0		[A] < 1.0		[A] < 1.0			[A] < 1.0		[A] < 1.0	
Aliphatic TPH >C16-C21	N	2680	mg/kg	1.0		[A] < 1.0		[A] < 1.0			[A] < 1.0		[A] < 1.0	
Aliphatic TPH >C21-C35	N	2680	mg/kg	1.0		[A] < 1.0		[A] < 1.0			[A] < 1.0		[A] < 1.0	
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0		[A] < 1.0		[A] < 1.0			[A] < 1.0		[A] < 1.0	

Results - Soil

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Project: 24330 Halversown Naas Proposed Data Centre Sites (DOBA)

Client: IGSL					Chemtest Job No.:	22-48580	22-48580	22-48580	22-48580	22-48580	22-48580	22-48580	22-48580	22-48580
Quotation No.: Q22-28896					Chemtest Sample ID.:	1567091	1567092	1567093	1567094	1567096	1567097	1567098	1567099	1567100
Order No.:					Client Sample Ref.:	AA185488	AA185498	AA181957	AA181963	AA181976	AA181972	AA181969	AA181966	AA181978
					Sample Location:	TP20	TP22	TP23	TP25	TP26	TP27	TP28	TP29	TP30
					Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
					Top Depth (m):	0.60	1.40	0.50	0.50	1.30	0.50	0.60	0.50	0.50
					Asbestos Lab:	DURHAM		DURHAM			DURHAM		DURHAM	
Determinand	**Accred.**	**SOP**	**Units**	**LOD**										
Total Aliphatic Hydrocarbons	N	2680	mg/kg	5.0		[A] < 5.0		[A] < 5.0			[A] < 5.0		[A] < 5.0	
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0		[A] < 1.0		[A] < 1.0			[A] < 1.0		[A] < 1.0	
Aromatic TPH >C7-C8	N	2680	mg/kg	1.0		[A] < 1.0		[A] < 1.0			[A] < 1.0		[A] < 1.0	
Aromatic TPH >C8-C10	N	2680	mg/kg	1.0		[A] < 1.0		[A] < 1.0			[A] < 1.0		[A] < 1.0	
Aromatic TPH >C10-C12	N	2680	mg/kg	1.0		[A] < 1.0		[A] < 1.0			[A] < 1.0		[A] < 1.0	
Aromatic TPH >C12-C16	N	2680	mg/kg	1.0		[A] < 1.0		[A] < 1.0			[A] < 1.0		[A] < 1.0	
Aromatic TPH >C16-C21	N	2680	mg/kg	1.0		[A] < 1.0		[A] < 1.0			[A] < 1.0		[A] < 1.0	
Aromatic TPH >C21-C35	N	2680	mg/kg	1.0		[A] < 1.0		[A] < 1.0			[A] < 1.0		[A] < 1.0	
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0		[A] < 1.0		[A] < 1.0			[A] < 1.0		[A] < 1.0	
Total Aromatic Hydrocarbons	N	2680	mg/kg	5.0		[A] < 5.0		[A] < 5.0			[A] < 5.0		[A] < 5.0	
Total Petroleum Hydrocarbons	N	2680	mg/kg	10.0		[A] < 10		[A] < 10			[A] < 10		[A] < 10	
Dichlorodifluoromethane	U	2760	mg/kg	0.0010			[A] < 0.0010			[A] < 0.0010		[A] < 0.0010		
Chloromethane	M	2760	mg/kg	0.0010			[A] < 0.0010			[A] < 0.0010		[A] < 0.0010		
Vinyl Chloride	M	2760	mg/kg	0.0010			[A] < 0.0010			[A] < 0.0010		[A] < 0.0010		
Bromomethane	M	2760	mg/kg	0.020			[A] < 0.020			[A] < 0.020		[A] < 0.020		
Chloroethane	U	2760	mg/kg	0.0020			[A] < 0.0020			[A] < 0.0020		[A] < 0.0020		
Trichlorofluoromethane	M	2760	mg/kg	0.0010			[A] < 0.0010			[A] < 0.0010		[A] < 0.0010		
1,1-Dichloroethene	M	2760	mg/kg	0.0010			[A] < 0.0010			[A] < 0.0010		[A] < 0.0010		
Trans 1,2-Dichloroethene	M	2760	mg/kg	0.0010			[A] < 0.0010			[A] < 0.0010		[A] < 0.0010		
1,1-Dichloroethane	M	2760	mg/kg	0.0010			[A] < 0.0010			[A] < 0.0010		[A] < 0.0010		
cis 1,2-Dichloroethene	M	2760	mg/kg	0.0010			[A] < 0.0010			[A] < 0.0010		[A] < 0.0010		
Bromochloromethane	U	2760	mg/kg	0.0050			[A] < 0.0050			[A] < 0.0050		[A] < 0.0050		
Trichloromethane	M	2760	mg/kg	0.0010			[A] < 0.0010			[A] < 0.0010		[A] < 0.0010		
1,1,1-Trichloroethane	M	2760	mg/kg	0.0010			[A] < 0.0010			[A] < 0.0010		[A] < 0.0010		
Tetrachloromethane	M	2760	mg/kg	0.0010			[A] < 0.0010			[A] < 0.0010		[A] < 0.0010		
1,1-Dichloropropene	U	2760	mg/kg	0.0010			[A] < 0.0010			[A] < 0.0010		[A] < 0.0010		
Benzene	M	2760	mg/kg	0.0010	[A] < 0.0010	[A] < 0.0010		[A] < 0.0010		[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	
1,2-Dichloroethane	M	2760	mg/kg	0.0020			[A] < 0.0020			[A] < 0.0020		[A] < 0.0020		
Trichloroethene	N	2760	mg/kg	0.0010			[A] < 0.0010			[A] < 0.0010		[A] < 0.0010		
1,2-Dichloropropane	M	2760	mg/kg	0.0010			[A] < 0.0010			[A] < 0.0010		[A] < 0.0010		
Dibromomethane	M	2760	mg/kg	0.0010			[A] < 0.0010			[A] < 0.0010		[A] < 0.0010		
Bromodichloromethane	M	2760	mg/kg	0.0050			[A] < 0.0050			[A] < 0.0050		[A] < 0.0050		
cis-1,3-Dichloropropene	N	2760	mg/kg	0.010			[A] < 0.010			[A] < 0.010		[A] < 0.010		
Toluene	M	2760	mg/kg	0.0010	[A] < 0.0010	[A] < 0.0010		[A] < 0.0010		[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	
Trans-1,3-Dichloropropene	N	2760	mg/kg	0.010			[A] < 0.010			[A] < 0.010		[A] < 0.010		
1,1,2-Trichloroethane	M	2760	mg/kg	0.010			[A] < 0.010			[A] < 0.010		[A] < 0.010		
Tetrachloroethene	M	2760	mg/kg	0.0010			[A] < 0.0010			[A] < 0.0010		[A] < 0.0010		
1,3-Dichloropropane	U	2760	mg/kg	0.0020			[A] < 0.0020			[A] < 0.0020		[A] < 0.0020		

Results - Soil

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Project: 24330 Halversown Naas Proposed Data Centre Sites (DOBA)

Client: IGSL					Chemtest Job No.:	22-48580	22-48580	22-48580	22-48580	22-48580	22-48580	22-48580	22-48580	22-48580
Quotation No.: Q22-28896					Chemtest Sample ID.:	1567091	1567092	1567093	1567094	1567096	1567097	1567098	1567099	1567100
Order No.:					Client Sample Ref.:	AA185488	AA185498	AA181957	AA181963	AA181976	AA181972	AA181969	AA181966	AA181978
					Sample Location:	TP20	TP22	TP23	TP25	TP26	TP27	TP28	TP29	TP30
					Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
					Top Depth (m):	0.60	1.40	0.50	0.50	1.30	0.50	0.60	0.50	0.50
					Asbestos Lab:	DURHAM		DURHAM			DURHAM		DURHAM	
Determinand	**Accred.**	**SOP**	**Units**	**LOD**										
Dibromochloromethane	U	2760	mg/kg	0.010		[A] < 0.010			[A] < 0.010		[A] < 0.010			
1,2-Dibromoethane	M	2760	mg/kg	0.0050		[A] < 0.0050			[A] < 0.0050		[A] < 0.0050			
Chlorobenzene	M	2760	mg/kg	0.0010		[A] < 0.0010			[A] < 0.0010		[A] < 0.0010			
1,1,1,2-Tetrachloroethane	M	2760	mg/kg	0.0020		[A] < 0.0020			[A] < 0.0020		[A] < 0.0020			
Ethylbenzene	M	2760	mg/kg	0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010		[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	
m & p-Xylene	M	2760	mg/kg	0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010		[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	
o-Xylene	M	2760	mg/kg	0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010		[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	
Styrene	M	2760	mg/kg	0.0010		[A] < 0.0010			[A] < 0.0010		[A] < 0.0010			
Tribromomethane	U	2760	mg/kg	0.0010		[A] < 0.0010			[A] < 0.0010		[A] < 0.0010			
Isopropylbenzene	M	2760	mg/kg	0.0010		[A] < 0.0010			[A] < 0.0010		[A] < 0.0010			
Bromobenzene	M	2760	mg/kg	0.0010		[A] < 0.0010			[A] < 0.0010		[A] < 0.0010			
1,2,3-Trichloropropane	N	2760	mg/kg	0.050		[A] < 0.050			[A] < 0.050		[A] < 0.050			
N-Propylbenzene	U	2760	mg/kg	0.0010		[A] < 0.0010			[A] < 0.0010		[A] < 0.0010			
2-Chlorotoluene	M	2760	mg/kg	0.0010		[A] < 0.0010			[A] < 0.0010		[A] < 0.0010			
1,3,5-Trimethylbenzene	M	2760	mg/kg	0.0010		[A] < 0.0010			[A] < 0.0010		[A] < 0.0010			
4-Chlorotoluene	U	2760	mg/kg	0.0010		[A] < 0.0010			[A] < 0.0010		[A] < 0.0010			
Tert-Butylbenzene	U	2760	mg/kg	0.0010		[A] < 0.0010			[A] < 0.0010		[A] < 0.0010			
1,2,4-Trimethylbenzene	M	2760	mg/kg	0.0010		[A] < 0.0010			[A] < 0.0010		[A] < 0.0010			
Sec-Butylbenzene	U	2760	mg/kg	0.0010		[A] < 0.0010			[A] < 0.0010		[A] < 0.0010			
1,3-Dichlorobenzene	M	2760	mg/kg	0.0010		[A] < 0.0010			[A] < 0.0010		[A] < 0.0010			
4-Isopropyltoluene	N	2760	mg/kg	0.0010		[A] < 0.0010			[A] < 0.0010		[A] < 0.0010			
1,4-Dichlorobenzene	M	2760	mg/kg	0.0010		[A] < 0.0010			[A] < 0.0010		[A] < 0.0010			
N-Butylbenzene	U	2760	mg/kg	0.0010		[A] < 0.0010			[A] < 0.0010		[A] < 0.0010			
1,2-Dichlorobenzene	M	2760	mg/kg	0.0010		[A] < 0.0010			[A] < 0.0010		[A] < 0.0010			
1,2-Dibromo-3-Chloropropane	U	2760	mg/kg	0.050		[A] < 0.050			[A] < 0.050		[A] < 0.050			
1,2,4-Trichlorobenzene	M	2760	mg/kg	0.0010		[A] < 0.0010			[A] < 0.0010		[A] < 0.0010			
Hexachlorobutadiene	U	2760	mg/kg	0.0010		[A] < 0.0010			[A] < 0.0010		[A] < 0.0010			
1,2,3-Trichlorobenzene	U	2760	mg/kg	0.0020		[A] < 0.0020			[A] < 0.0020		[A] < 0.0020			
Methyl Tert-Butyl Ether	M	2760	mg/kg	0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010		[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010		
N-Nitrosodimethylamine	M	2790	mg/kg	0.50		[A] < 0.50			[A] < 0.50		[A] < 0.50			
Phenol	M	2790	mg/kg	0.50		[A] < 0.50			[A] < 0.50		[A] < 0.50			
2-Chlorophenol	M	2790	mg/kg	0.50		[A] < 0.50			[A] < 0.50		[A] < 0.50			
Bis-(2-Chloroethyl)Ether	M	2790	mg/kg	0.50		[A] < 0.50			[A] < 0.50		[A] < 0.50			
1,3-Dichlorobenzene	M	2790	mg/kg	0.50		[A] < 0.50			[A] < 0.50		[A] < 0.50			
1,4-Dichlorobenzene	N	2790	mg/kg	0.50		[A] < 0.50			[A] < 0.50		[A] < 0.50			
1,2-Dichlorobenzene	M	2790	mg/kg	0.50		[A] < 0.50			[A] < 0.50		[A] < 0.50			
2-Methylphenol	M	2790	mg/kg	0.50		[A] < 0.50			[A] < 0.50		[A] < 0.50			
Bis(2-Chloroisopropyl)Ether	M	2790	mg/kg	0.50		[A] < 0.50			[A] < 0.50		[A] < 0.50			

Results - Soil

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Project: 24330 Halversown Naas Proposed Data Centre Sites (DOBA)

Client: IGSL					**Chemtest Job No.:**	22-48580	22-48580	22-48580	22-48580	22-48580	22-48580	22-48580	22-48580	22-48580
Quotation No.: Q22-28896					**Chemtest Sample ID.:**	1567091	1567092	1567093	1567094	1567096	1567097	1567098	1567099	1567100
Order No.:					Client Sample Ref.:	AA185488	AA185498	AA181957	AA181963	AA181976	AA181972	AA181969	AA181966	AA181978
					Sample Location:	TP20	TP22	TP23	TP25	TP26	TP27	TP28	TP29	TP30
					Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
					Top Depth (m):	0.60	1.40	0.50	0.50	1.30	0.50	0.60	0.50	0.50
					Asbestos Lab:	DURHAM		DURHAM			DURHAM		DURHAM	
Determinand	**Accred.**	**SOP**	**Units**	**LOD**										
Hexachloroethane	N	2790	mg/kg	0.50		[A] < 0.50			[A] < 0.50		[A] < 0.50			
N-Nitrosodi-n-propylamine	M	2790	mg/kg	0.50		[A] < 0.50			[A] < 0.50		[A] < 0.50			
4-Methylphenol	M	2790	mg/kg	0.50		[A] < 0.50			[A] < 0.50		[A] < 0.50			
Nitrobenzene	M	2790	mg/kg	0.50		[A] < 0.50			[A] < 0.50		[A] < 0.50			
Isophorone	M	2790	mg/kg	0.50		[A] < 0.50			[A] < 0.50		[A] < 0.50			
2-Nitrophenol	N	2790	mg/kg	0.50		[A] < 0.50			[A] < 0.50		[A] < 0.50			
2,4-Dimethylphenol	N	2790	mg/kg	0.50		[A] < 0.50			[A] < 0.50		[A] < 0.50			
Bis(2-Chloroethoxy)Methane	M	2790	mg/kg	0.50		[A] < 0.50			[A] < 0.50		[A] < 0.50			
2,4-Dichlorophenol	M	2790	mg/kg	0.50		[A] < 0.50			[A] < 0.50		[A] < 0.50			
1,2,4-Trichlorobenzene	M	2790	mg/kg	0.50		[A] < 0.50			[A] < 0.50		[A] < 0.50			
4-Chloroaniline	N	2790	mg/kg	0.50		[A] < 0.50			[A] < 0.50		[A] < 0.50			
Hexachlorobutadiene	M	2790	mg/kg	0.50		[A] < 0.50			[A] < 0.50		[A] < 0.50			
4-Chloro-3-Methylphenol	M	2790	mg/kg	0.50		[A] < 0.50			[A] < 0.50		[A] < 0.50			
2-Methylnaphthalene	M	2790	mg/kg	0.50		[A] < 0.50			[A] < 0.50		[A] < 0.50			
4-Nitrophenol	N	2790	mg/kg	0.50		[A] < 0.50			[A] < 0.50		[A] < 0.50			
Hexachlorocyclopentadiene	N	2790	mg/kg	0.50		[A] < 0.50			[A] < 0.50		[A] < 0.50			
2,4,6-Trichlorophenol	M	2790	mg/kg	0.50		[A] < 0.50			[A] < 0.50		[A] < 0.50			
2,4,5-Trichlorophenol	M	2790	mg/kg	0.50		[A] < 0.50			[A] < 0.50		[A] < 0.50			
2-Chloronaphthalene	M	2790	mg/kg	0.50		[A] < 0.50			[A] < 0.50		[A] < 0.50			
2-Nitroaniline	M	2790	mg/kg	0.50		[A] < 0.50			[A] < 0.50		[A] < 0.50			
Dimethylphthalate	M	2790	mg/kg	0.50		[A] < 0.50			[A] < 0.50		[A] < 0.50			
2,6-Dinitrotoluene	M	2790	mg/kg	0.50		[A] < 0.50			[A] < 0.50		[A] < 0.50			
3-Nitroaniline	N	2790	mg/kg	0.50		[A] < 0.50			[A] < 0.50		[A] < 0.50			
Dibenzofuran	M	2790	mg/kg	0.50		[A] < 0.50			[A] < 0.50		[A] < 0.50			
4-Chlorophenylphenylether	M	2790	mg/kg	0.50		[A] < 0.50			[A] < 0.50		[A] < 0.50			
2,4-Dinitrotoluene	M	2790	mg/kg	0.50		[A] < 0.50			[A] < 0.50		[A] < 0.50			
Diethyl Phthalate	M	2790	mg/kg	0.50		[A] < 0.50			[A] < 0.50		[A] < 0.50			
4-Nitroaniline	M	2790	mg/kg	0.50		[A] < 0.50			[A] < 0.50		[A] < 0.50			
2-Methyl-4,6-Dinitrophenol	N	2790	mg/kg	0.50		[A] < 0.50			[A] < 0.50		[A] < 0.50			
Azobenzene	M	2790	mg/kg	0.50		[A] < 0.50			[A] < 0.50		[A] < 0.50			
4-Bromophenylphenyl Ether	M	2790	mg/kg	0.50		[A] < 0.50			[A] < 0.50		[A] < 0.50			
Hexachlorobenzene	M	2790	mg/kg	0.50		[A] < 0.50			[A] < 0.50		[A] < 0.50			
Pentachlorophenol	N	2790	mg/kg	0.50		[A] < 0.50			[A] < 0.50		[A] < 0.50			
Carbazole	M	2790	mg/kg	0.50		[A] < 0.50			[A] < 0.50		[A] < 0.50			
Di-N-Butyl Phthalate	M	2790	mg/kg	0.50		[A] < 0.50			[A] < 0.50		[A] < 0.50			
Butylbenzyl Phthalate	M	2790	mg/kg	0.50		[A] < 0.50			[A] < 0.50		[A] < 0.50			
Bis(2-Ethylhexyl)Phthalate	N	2790	mg/kg	0.50		[A] < 0.50			[A] < 0.50		[A] < 0.50			
Di-N-Octyl Phthalate	M	2790	mg/kg	0.50		[A] < 0.50			[A] < 0.50		[A] < 0.50			

Results - Soil

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Project: 24330 Halversown Naas Proposed Data Centre Sites (DOBA)

Client: IGSL					**Chemtest Job No.:**	22-48580	22-48580	22-48580	22-48580	22-48580	22-48580	22-48580	22-48580	22-48580
Quotation No.: Q22-28896					**Chemtest Sample ID.:**	1567091	1567092	1567093	1567094	1567096	1567097	1567098	1567099	1567100
Order No.:					Client Sample Ref.:	AA185488	AA185498	AA181957	AA181963	AA181976	AA181972	AA181969	AA181966	AA181978
					Sample Location:	TP20	TP22	TP23	TP25	TP26	TP27	TP28	TP29	TP30
					Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
					Top Depth (m):	0.60	1.40	0.50	0.50	1.30	0.50	0.60	0.50	0.50
					Asbestos Lab:	DURHAM		DURHAM			DURHAM		DURHAM	
Determinand	**Accred.**	**SOP**	**Units**	**LOD**										
Naphthalene	M	2800	mg/kg	0.10		< 0.10		< 0.10			< 0.10		< 0.10	
Acenaphthylene	N	2800	mg/kg	0.10		< 0.10		< 0.10			< 0.10		< 0.10	
Acenaphthene	M	2800	mg/kg	0.10		< 0.10		< 0.10			< 0.10		< 0.10	
Fluorene	M	2800	mg/kg	0.10		< 0.10		< 0.10			< 0.10		< 0.10	
Phenanthrene	M	2800	mg/kg	0.10		< 0.10		< 0.10			< 0.10		< 0.10	
Anthracene	M	2800	mg/kg	0.10		< 0.10		< 0.10			< 0.10		< 0.10	
Fluoranthene	M	2800	mg/kg	0.10		< 0.10		< 0.10			< 0.10		< 0.10	
Pyrene	M	2800	mg/kg	0.10		< 0.10		< 0.10			< 0.10		< 0.10	
Benzo[a]anthracene	M	2800	mg/kg	0.10		< 0.10		< 0.10			< 0.10		< 0.10	
Chrysene	M	2800	mg/kg	0.10		< 0.10		< 0.10			< 0.10		< 0.10	
Benzo[b]fluoranthene	M	2800	mg/kg	0.10		< 0.10		< 0.10			< 0.10		< 0.10	
Benzo[k]fluoranthene	M	2800	mg/kg	0.10		< 0.10		< 0.10			< 0.10		< 0.10	
Benzo[a]pyrene	M	2800	mg/kg	0.10		< 0.10		< 0.10			< 0.10		< 0.10	
Indeno(1,2,3-c,d)Pyrene	M	2800	mg/kg	0.10		< 0.10		< 0.10			< 0.10		< 0.10	
Dibenz(a,h)Anthracene	N	2800	mg/kg	0.10		< 0.10		< 0.10			< 0.10		< 0.10	
Benzo[g,h,i]perylene	M	2800	mg/kg	0.10		< 0.10		< 0.10			< 0.10		< 0.10	
Total Of 16 PAH's	N	2800	mg/kg	2.0		< 2.0		< 2.0			< 2.0		< 2.0	
PCB 81	N	2815	mg/kg	0.010					< 0.010					< 0.010
PCB 77	U	2815	mg/kg	0.010					< 0.010					< 0.010
PCB 105	N	2815	mg/kg	0.010					< 0.010					< 0.010
PCB 114	N	2815	mg/kg	0.010					< 0.010					< 0.010
PCB 118	N	2815	mg/kg	0.010					< 0.010					< 0.010
PCB 123	N	2815	mg/kg	0.010					< 0.010					< 0.010
PCB 126	N	2815	mg/kg	0.010					< 0.010					< 0.010
PCB 156	N	2815	mg/kg	0.010					< 0.010					< 0.010
PCB 157	N	2815	mg/kg	0.010					< 0.010					< 0.010
PCB 167	N	2815	mg/kg	0.010					< 0.010					< 0.010
PCB 169	N	2815	mg/kg	0.010					< 0.010					< 0.010
PCB 189	N	2815	mg/kg	0.010					< 0.010					< 0.010
Total PCBs (12 Congeners)	N	2815	mg/kg	0.12					< 0.12					< 0.12
Resorcinol	M	2920	mg/kg	0.020		< 0.020		< 0.020			< 0.020		< 0.020	
Phenol	M	2920	mg/kg	0.020		< 0.020		< 0.020			< 0.020		< 0.020	
Cresols	M	2920	mg/kg	0.020		< 0.020		< 0.020			< 0.020		< 0.020	
Xylenols	M	2920	mg/kg	0.020		< 0.020		< 0.020			< 0.020		< 0.020	
1-Naphthol	N	2920	mg/kg	0.020		< 0.020		< 0.020			< 0.020		< 0.020	
Trimethylphenols	M	2920	mg/kg	0.020		< 0.020		< 0.020			< 0.020		< 0.020	
Total Phenols	M	2920	mg/kg	0.10		< 0.10		< 0.10			< 0.10		< 0.10	

Results - Soil

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Project: 24330 Halversown Naas Proposed Data Centre Sites (DOBA)

Client: IGSL					Chemtest Job No.:	22-48580	22-48580	22-48580	22-48580
Quotation No.: Q22-28896					Chemtest Sample ID.:	1567101	1567103	1567104	1567105
Order No.:					Client Sample Ref.:	AA181992	AA181995	AA181989	AA181987
					Sample Location:	TP31	TP32	TP33	TP34
					Sample Type:	SOIL	SOIL	SOIL	SOIL
					Top Depth (m):	0.50	1.40	0.50	1.40
					Asbestos Lab:	DURHAM	DURHAM	DURHAM	
Determinand	**Accred.**	**SOP**	**Units**	**LOD**					
ACM Type	U	2192		N/A	-	-	-	
Asbestos Identification	U	2192		N/A	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	
Moisture	N	2030	%	0.020	11	9.0	15	9.1
pH	M	2010		4.0	[A] 7.3	[A] 8.3	[A] 7.7	
Boron (Hot Water Soluble)	M	2120	mg/kg	0.40	[A] < 0.40	[A] < 0.40	[A] < 0.40	
Sulphate (2:1 Water Soluble) as SO4	M	2120	g/l	0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	
Total Sulphur	M	2175	%	0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	
Sulphur (Elemental)	M	2180	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	
Cyanide (Free)	M	2300	mg/kg	0.50	[A] 0.50	[A] 1.1	[A] 0.60	
Cyanide (Total)	M	2300	mg/kg	0.50	[A] 0.60	[A] 1.1	[A] 0.60	
Thiocyanate	M	2300	mg/kg	5.0	[A] < 5.0	[A] < 5.0	[A] < 5.0	
Aluminium (Total)	N	2430	mg/kg	100	[A] 8700	[A] 2200	[A] 5100	
Iron (Total)	N	2430	mg/kg	100	[A] 17000	[A] 7700	[A] 14000	
Arsenic	M	2455	mg/kg	0.5	9.4	6.9	7.6	
Barium	M	2455	mg/kg	0	42	35	42	
Beryllium	U	2455	mg/kg	0.5	0.8	< 0.5	0.6	
Cadmium	M	2455	mg/kg	0.10	1.1	0.99	1.6	
Chromium	M	2455	mg/kg	0.5	19	6.8	15	
Manganese	M	2455	mg/kg	1.0	990	580	740	
Copper	M	2455	mg/kg	0.50	18	10	16	
Mercury	M	2455	mg/kg	0.05	0.08	< 0.05	0.05	
Nickel	M	2455	mg/kg	0.50	41	17	34	
Lead	M	2455	mg/kg	0.50	32	12	25	
Selenium	M	2455	mg/kg	0.25	0.95	0.62	0.72	
Vanadium	U	2455	mg/kg	0.5	21	7.2	16	
Zinc	M	2455	mg/kg	0.50	130	58	100	
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50	< 0.50	< 0.50	
Organic Matter	M	2625	%	0.40	[A] 0.59	[A] < 0.40	[A] 0.67	
Total Organic Carbon	M	2625	%	0.20	[A] 0.34	[A] 0.22	[A] 0.39	
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	
Aliphatic TPH >C8-C10	N	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	
Aliphatic TPH >C10-C12	N	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	
Aliphatic TPH >C12-C16	N	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	
Aliphatic TPH >C16-C21	N	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	
Aliphatic TPH >C21-C35	N	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	

Results - Soil

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Project: 24330 Halversown Naas Proposed Data Centre Sites (DOBA)

Client: IGSL					Chemtest Job No.:	22-48580	22-48580	22-48580	22-48580
Quotation No.: Q22-28896					Chemtest Sample ID.:	1567101	1567103	1567104	1567105
Order No.:					Client Sample Ref.:	AA181992	AA181995	AA181989	AA181987
					Sample Location:	TP31	TP32	TP33	TP34
					Sample Type:	SOIL	SOIL	SOIL	SOIL
					Top Depth (m):	0.50	1.40	0.50	1.40
					Asbestos Lab:	DURHAM	DURHAM	DURHAM	
Determinand	**Accred.**	**SOP**	**Units**	**LOD**					
Total Aliphatic Hydrocarbons	N	2680	mg/kg	5.0	[A] < 5.0	[A] < 5.0	[A] < 5.0	
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	
Aromatic TPH >C7-C8	N	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	
Aromatic TPH >C8-C10	N	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	
Aromatic TPH >C10-C12	N	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	
Aromatic TPH >C12-C16	N	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	
Aromatic TPH >C16-C21	N	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	
Aromatic TPH >C21-C35	N	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	
Total Aromatic Hydrocarbons	N	2680	mg/kg	5.0	[A] < 5.0	[A] < 5.0	[A] < 5.0	
Total Petroleum Hydrocarbons	N	2680	mg/kg	10.0	[A] < 10	[A] < 10	[A] < 10	
Dichlorodifluoromethane	U	2760	mg/kg	0.0010				[A] < 0.0010
Chloromethane	M	2760	mg/kg	0.0010				[A] < 0.0010
Vinyl Chloride	M	2760	mg/kg	0.0010				[A] < 0.0010
Bromomethane	M	2760	mg/kg	0.020				[A] < 0.020
Chloroethane	U	2760	mg/kg	0.0020				[A] < 0.0020
Trichlorofluoromethane	M	2760	mg/kg	0.0010				[A] < 0.0010
1,1-Dichloroethene	M	2760	mg/kg	0.0010				[A] < 0.0010
Trans 1,2-Dichloroethene	M	2760	mg/kg	0.0010				[A] < 0.0010
1,1-Dichloroethane	M	2760	mg/kg	0.0010				[A] < 0.0010
cis 1,2-Dichloroethene	M	2760	mg/kg	0.0010				[A] < 0.0010
Bromochloromethane	U	2760	mg/kg	0.0050				[A] < 0.0050
Trichloromethane	M	2760	mg/kg	0.0010				[A] < 0.0010
1,1,1-Trichloroethane	M	2760	mg/kg	0.0010				[A] < 0.0010
Tetrachloromethane	M	2760	mg/kg	0.0010				[A] < 0.0010
1,1-Dichloropropene	U	2760	mg/kg	0.0010				[A] < 0.0010
Benzene	M	2760	mg/kg	0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010
1,2-Dichloroethane	M	2760	mg/kg	0.0020				[A] < 0.0020
Trichloroethene	N	2760	mg/kg	0.0010				[A] < 0.0010
1,2-Dichloropropane	M	2760	mg/kg	0.0010				[A] < 0.0010
Dibromomethane	M	2760	mg/kg	0.0010				[A] < 0.0010
Bromodichloromethane	M	2760	mg/kg	0.0050				[A] < 0.0050
cis-1,3-Dichloropropene	N	2760	mg/kg	0.010				[A] < 0.010
Toluene	M	2760	mg/kg	0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010
Trans-1,3-Dichloropropene	N	2760	mg/kg	0.010				[A] < 0.010
1,1,2-Trichloroethane	M	2760	mg/kg	0.010				[A] < 0.010
Tetrachloroethene	M	2760	mg/kg	0.0010				[A] < 0.0010
1,3-Dichloropropane	U	2760	mg/kg	0.0020				[A] < 0.0020

Results - Soil

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Project: 24330 Halversown Naas Proposed Data Centre Sites (DOBA)

Client: IGSL					Chemtest Job No.:	22-48580	22-48580	22-48580	22-48580
Quotation No.: Q22-28896					Chemtest Sample ID.:	1567101	1567103	1567104	1567105
Order No.:					Client Sample Ref.:	AA181992	AA181995	AA181989	AA181987
					Sample Location:	TP31	TP32	TP33	TP34
					Sample Type:	SOIL	SOIL	SOIL	SOIL
					Top Depth (m):	0.50	1.40	0.50	1.40
					Asbestos Lab:	DURHAM	DURHAM	DURHAM	
Determinand	**Accred.**	**SOP**	**Units**	**LOD**					
Dibromochloromethane	U	2760	mg/kg	0.010					[A] < 0.010
1,2-Dibromoethane	M	2760	mg/kg	0.0050					[A] < 0.0050
Chlorobenzene	M	2760	mg/kg	0.0010					[A] < 0.0010
1,1,1,2-Tetrachloroethane	M	2760	mg/kg	0.0020					[A] < 0.0020
Ethylbenzene	M	2760	mg/kg	0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	
m & p-Xylene	M	2760	mg/kg	0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	
o-Xylene	M	2760	mg/kg	0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	
Styrene	M	2760	mg/kg	0.0010					[A] < 0.0010
Tribromomethane	U	2760	mg/kg	0.0010					[A] < 0.0010
Isopropylbenzene	M	2760	mg/kg	0.0010					[A] < 0.0010
Bromobenzene	M	2760	mg/kg	0.0010					[A] < 0.0010
1,2,3-Trichloropropane	N	2760	mg/kg	0.050					[A] < 0.050
N-Propylbenzene	U	2760	mg/kg	0.0010					[A] < 0.0010
2-Chlorotoluene	M	2760	mg/kg	0.0010					[A] < 0.0010
1,3,5-Trimethylbenzene	M	2760	mg/kg	0.0010					[A] < 0.0010
4-Chlorotoluene	U	2760	mg/kg	0.0010					[A] < 0.0010
Tert-Butylbenzene	U	2760	mg/kg	0.0010					[A] < 0.0010
1,2,4-Trimethylbenzene	M	2760	mg/kg	0.0010					[A] < 0.0010
Sec-Butylbenzene	U	2760	mg/kg	0.0010					[A] < 0.0010
1,3-Dichlorobenzene	M	2760	mg/kg	0.0010					[A] < 0.0010
4-Isopropyltoluene	N	2760	mg/kg	0.0010					[A] < 0.0010
1,4-Dichlorobenzene	M	2760	mg/kg	0.0010					[A] < 0.0010
N-Butylbenzene	U	2760	mg/kg	0.0010					[A] < 0.0010
1,2-Dichlorobenzene	M	2760	mg/kg	0.0010					[A] < 0.0010
1,2-Dibromo-3-Chloropropane	U	2760	mg/kg	0.050					[A] < 0.050
1,2,4-Trichlorobenzene	M	2760	mg/kg	0.0010					[A] < 0.0010
Hexachlorobutadiene	U	2760	mg/kg	0.0010					[A] < 0.0010
1,2,3-Trichlorobenzene	U	2760	mg/kg	0.0020					[A] < 0.0020
Methyl Tert-Butyl Ether	M	2760	mg/kg	0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	
N-Nitrosodimethylamine	M	2790	mg/kg	0.50					[A] < 0.50
Phenol	M	2790	mg/kg	0.50					[A] < 0.50
2-Chlorophenol	M	2790	mg/kg	0.50					[A] < 0.50
Bis-(2-Chloroethyl)Ether	M	2790	mg/kg	0.50					[A] < 0.50
1,3-Dichlorobenzene	M	2790	mg/kg	0.50					[A] < 0.50
1,4-Dichlorobenzene	N	2790	mg/kg	0.50					[A] < 0.50
1,2-Dichlorobenzene	M	2790	mg/kg	0.50					[A] < 0.50
2-Methylphenol	M	2790	mg/kg	0.50					[A] < 0.50
Bis(2-Chloroisopropyl)Ether	M	2790	mg/kg	0.50					[A] < 0.50

Results - Soil

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Project: 24330 Halversown Naas Proposed Data Centre Sites (DOBA)

Client: IGSL					Chemtest Job No.:	22-48580	22-48580	22-48580	22-48580
Quotation No.: Q22-28896					Chemtest Sample ID.:	1567101	1567103	1567104	1567105
Order No.:					Client Sample Ref.:	AA181992	AA181995	AA181989	AA181987
					Sample Location:	TP31	TP32	TP33	TP34
					Sample Type:	SOIL	SOIL	SOIL	SOIL
					Top Depth (m):	0.50	1.40	0.50	1.40
					Asbestos Lab:	DURHAM	DURHAM	DURHAM	
Determinand	**Accred.**	**SOP**	**Units**	**LOD**					
Hexachloroethane	N	2790	mg/kg	0.50					[A] < 0.50
N-Nitrosodi-n-propylamine	M	2790	mg/kg	0.50					[A] < 0.50
4-Methylphenol	M	2790	mg/kg	0.50					[A] < 0.50
Nitrobenzene	M	2790	mg/kg	0.50					[A] < 0.50
Isophorone	M	2790	mg/kg	0.50					[A] < 0.50
2-Nitrophenol	N	2790	mg/kg	0.50					[A] < 0.50
2,4-Dimethylphenol	N	2790	mg/kg	0.50					[A] < 0.50
Bis(2-Chloroethoxy)Methane	M	2790	mg/kg	0.50					[A] < 0.50
2,4-Dichlorophenol	M	2790	mg/kg	0.50					[A] < 0.50
1,2,4-Trichlorobenzene	M	2790	mg/kg	0.50					[A] < 0.50
4-Chloroaniline	N	2790	mg/kg	0.50					[A] < 0.50
Hexachlorobutadiene	M	2790	mg/kg	0.50					[A] < 0.50
4-Chloro-3-Methylphenol	M	2790	mg/kg	0.50					[A] < 0.50
2-Methylnaphthalene	M	2790	mg/kg	0.50					[A] < 0.50
4-Nitrophenol	N	2790	mg/kg	0.50					[A] < 0.50
Hexachlorocyclopentadiene	N	2790	mg/kg	0.50					[A] < 0.50
2,4,6-Trichlorophenol	M	2790	mg/kg	0.50					[A] < 0.50
2,4,5-Trichlorophenol	M	2790	mg/kg	0.50					[A] < 0.50
2-Chloronaphthalene	M	2790	mg/kg	0.50					[A] < 0.50
2-Nitroaniline	M	2790	mg/kg	0.50					[A] < 0.50
Dimethylphthalate	M	2790	mg/kg	0.50					[A] < 0.50
2,6-Dinitrotoluene	M	2790	mg/kg	0.50					[A] < 0.50
3-Nitroaniline	N	2790	mg/kg	0.50					[A] < 0.50
Dibenzofuran	M	2790	mg/kg	0.50					[A] < 0.50
4-Chlorophenylphenylether	M	2790	mg/kg	0.50					[A] < 0.50
2,4-Dinitrotoluene	M	2790	mg/kg	0.50					[A] < 0.50
Diethyl Phthalate	M	2790	mg/kg	0.50					[A] < 0.50
4-Nitroaniline	M	2790	mg/kg	0.50					[A] < 0.50
2-Methyl-4,6-Dinitrophenol	N	2790	mg/kg	0.50					[A] < 0.50
Azobenzene	M	2790	mg/kg	0.50					[A] < 0.50
4-Bromophenylphenyl Ether	M	2790	mg/kg	0.50					[A] < 0.50
Hexachlorobenzene	M	2790	mg/kg	0.50					[A] < 0.50
Pentachlorophenol	N	2790	mg/kg	0.50					[A] < 0.50
Carbazole	M	2790	mg/kg	0.50					[A] < 0.50
Di-N-Butyl Phthalate	M	2790	mg/kg	0.50					[A] < 0.50
Butylbenzyl Phthalate	M	2790	mg/kg	0.50					[A] < 0.50
Bis(2-Ethylhexyl)Phthalate	N	2790	mg/kg	0.50					[A] < 0.50
Di-N-Octyl Phthalate	M	2790	mg/kg	0.50					[A] < 0.50

Results - Soil

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Project: 24330 Halversown Naas Proposed Data Centre Sites (DOBA)

Client: IGSL					Chemtest Job No.:	22-48580	22-48580	22-48580	22-48580
Quotation No.: Q22-28896					Chemtest Sample ID.:	1567101	1567103	1567104	1567105
Order No.:					Client Sample Ref.:	AA181992	AA181995	AA181989	AA181987
					Sample Location:	TP31	TP32	TP33	TP34
					Sample Type:	SOIL	SOIL	SOIL	SOIL
					Top Depth (m):	0.50	1.40	0.50	1.40
					Asbestos Lab:	DURHAM	DURHAM	DURHAM	
Determinand	**Accred.**	**SOP**	**Units**	**LOD**					
Naphthalene	M	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10		
Acenaphthylene	N	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10		
Acenaphthene	M	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10		
Fluorene	M	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10		
Phenanthrene	M	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10		
Anthracene	M	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10		
Fluoranthene	M	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10		
Pyrene	M	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10		
Benzo[a]anthracene	M	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10		
Chrysene	M	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10		
Benzo[b]fluoranthene	M	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10		
Benzo[k]fluoranthene	M	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10		
Benzo[a]pyrene	M	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10		
Indeno(1,2,3-c,d)Pyrene	M	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10		
Dibenz(a,h)Anthracene	N	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10		
Benzo[g,h,i]perylene	M	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10		
Total Of 16 PAH's	N	2800	mg/kg	2.0	< 2.0	< 2.0	< 2.0		
PCB 81	N	2815	mg/kg	0.010					
PCB 77	U	2815	mg/kg	0.010					
PCB 105	N	2815	mg/kg	0.010					
PCB 114	N	2815	mg/kg	0.010					
PCB 118	N	2815	mg/kg	0.010					
PCB 123	N	2815	mg/kg	0.010					
PCB 126	N	2815	mg/kg	0.010					
PCB 156	N	2815	mg/kg	0.010					
PCB 157	N	2815	mg/kg	0.010					
PCB 167	N	2815	mg/kg	0.010					
PCB 169	N	2815	mg/kg	0.010					
PCB 189	N	2815	mg/kg	0.010					
Total PCBs (12 Congeners)	N	2815	mg/kg	0.12					
Resorcinol	M	2920	mg/kg	0.020	< 0.020	< 0.020	< 0.020		
Phenol	M	2920	mg/kg	0.020	< 0.020	< 0.020	< 0.020		
Cresols	M	2920	mg/kg	0.020	< 0.020	< 0.020	< 0.020		
Xylenols	M	2920	mg/kg	0.020	< 0.020	< 0.020	< 0.020		
1-Naphthol	N	2920	mg/kg	0.020	< 0.020	< 0.020	< 0.020		
Trimethylphenols	M	2920	mg/kg	0.020	< 0.020	< 0.020	< 0.020		
Total Phenols	M	2920	mg/kg	0.10	< 0.10	< 0.10	< 0.10		

Results - Single Stage WAC

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Project: 24330 Halversown Naas Proposed Data Centre Sites (DOBA)

					Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	22-48580						
Chemtest Sample ID:	1567078						
Sample Ref:	AA186953						
Sample ID:							
Sample Location:	TP03						
Top Depth(m):	0.50						
Bottom Depth(m):							
Sampling Date:					**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Determinand	**SOP**	**Accred.**	**Units**				
Total Organic Carbon	2625	M	%	[A] 0.20	3	5	6
Loss On Ignition	2610	M	%	1.7	--	--	10
Total BTEX	2760	M	mg/kg	[A] < 0.010	6	--	--
Total PCBs (7 Congeners)	2815	M	mg/kg	< 0.10	1	--	--
TPH Total WAC	2670	M	mg/kg	[A] < 10	500	--	--
Total (Of 17) PAH's	2700	N	mg/kg	< 2.0	100	--	--
pH	2010	M		8.4	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.035	--	To evaluate	To evaluate
Eluate Analysis			**10:1 Eluate mg/l**	**10:1 Eluate mg/kg**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1455	U	0.0009	0.0093	0.5	2	25
Barium	1455	U	< 0.005	< 0.050	20	100	300
Cadmium	1455	U	< 0.00011	< 0.0011	0.04	1	5
Chromium	1455	U	0.0010	0.010	0.5	10	70
Copper	1455	U	0.0020	0.020	2	50	100
Mercury	1455	U	< 0.00005	< 0.00050	0.01	0.2	2
Molybdenum	1455	U	0.0009	0.0092	0.5	10	30
Nickel	1455	U	0.0016	0.016	0.4	10	40
Lead	1455	U	0.0010	0.0097	0.5	10	50
Antimony	1455	U	< 0.0005	< 0.0050	0.06	0.7	5
Selenium	1455	U	< 0.0005	< 0.0050	0.1	0.5	7
Zinc	1455	U	0.032	0.32	4	50	200
Chloride	1220	U	< 1.0	< 10	800	15000	25000
Fluoride	1220	U	0.39	3.9	10	150	500
Sulphate	1220	U	< 1.0	< 10	1000	20000	50000
Total Dissolved Solids	1020	N	46	460	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	9.0	90	500	800	1000

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

Waste Acceptance Criteria

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

Results - Single Stage WAC

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Project: 24330 Halversown Naas Proposed Data Centre Sites (DOBA)

					Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	22-48580						
Chemtest Sample ID:	1567083						
Sample Ref:	AA186975						
Sample ID:							
Sample Location:	TP09						
Top Depth(m):	0.50						
Bottom Depth(m):							
Sampling Date:					**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Determinand	**SOP**	**Accred.**	**Units**				
Total Organic Carbon	2625	M	%	[A] 0.26	3	5	6
Loss On Ignition	2610	M	%	1.7	--	--	10
Total BTEX	2760	M	mg/kg	[A] < 0.010	6	--	--
Total PCBs (7 Congeners)	2815	M	mg/kg	< 0.10	1	--	--
TPH Total WAC	2670	M	mg/kg	[A] < 10	500	--	--
Total (Of 17) PAH's	2700	N	mg/kg	< 2.0	100	--	--
pH	2010	M		8.5	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.044	--	To evaluate	To evaluate
Eluate Analysis			**10:1 Eluate mg/l**	**10:1 Eluate mg/kg**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1455	U	0.0002	0.0023	0.5	2	25
Barium	1455	U	< 0.005	< 0.050	20	100	300
Cadmium	1455	U	< 0.00011	< 0.0011	0.04	1	5
Chromium	1455	U	< 0.0005	< 0.0050	0.5	10	70
Copper	1455	U	0.0011	0.011	2	50	100
Mercury	1455	U	< 0.00005	< 0.00050	0.01	0.2	2
Molybdenum	1455	U	0.0009	0.0094	0.5	10	30
Nickel	1455	U	0.0007	0.0072	0.4	10	40
Lead	1455	U	< 0.0005	< 0.0050	0.5	10	50
Antimony	1455	U	< 0.0005	< 0.0050	0.06	0.7	5
Selenium	1455	U	0.0007	0.0069	0.1	0.5	7
Zinc	1455	U	0.011	0.11	4	50	200
Chloride	1220	U	< 1.0	< 10	800	15000	25000
Fluoride	1220	U	0.69	6.9	10	150	500
Sulphate	1220	U	< 1.0	< 10	1000	20000	50000
Total Dissolved Solids	1020	N	62	620	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	4.8	< 50	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	14

Waste Acceptance Criteria

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

Results - Single Stage WAC

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Project: 24330 Halversown Naas Proposed Data Centre Sites (DOBA)

					Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	22-48580						
Chemtest Sample ID:	1567088						
Sample Ref:	AA185478						
Sample ID:							
Sample Location:	TP15						
Top Depth(m):	0.50						
Bottom Depth(m):							
Sampling Date:					**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Determinand	**SOP**	**Accred.**	**Units**				
Total Organic Carbon	2625	M	%	[A] 0.55	3	5	6
Loss On Ignition	2610	M	%	1.8	--	--	10
Total BTEX	2760	M	mg/kg	[A] < 0.010	6	--	--
Total PCBs (7 Congeners)	2815	M	mg/kg	< 0.10	1	--	--
TPH Total WAC	2670	M	mg/kg	[A] < 10	500	--	--
Total (Of 17) PAH's	2700	N	mg/kg	< 2.0	100	--	--
pH	2010	M		8.7	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.20	--	To evaluate	To evaluate
Eluate Analysis			**10:1 Eluate mg/l**	**10:1 Eluate mg/kg**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1455	U	< 0.0002	< 0.0020	0.5	2	25
Barium	1455	U	< 0.005	< 0.050	20	100	300
Cadmium	1455	U	< 0.00011	< 0.0011	0.04	1	5
Chromium	1455	U	< 0.0005	< 0.0050	0.5	10	70
Copper	1455	U	0.0012	0.012	2	50	100
Mercury	1455	U	< 0.00005	< 0.00050	0.01	0.2	2
Molybdenum	1455	U	0.0014	0.014	0.5	10	30
Nickel	1455	U	0.0007	0.0073	0.4	10	40
Lead	1455	U	< 0.0005	< 0.0050	0.5	10	50
Antimony	1455	U	< 0.0005	< 0.0050	0.06	0.7	5
Selenium	1455	U	< 0.0005	< 0.0050	0.1	0.5	7
Zinc	1455	U	0.019	0.19	4	50	200
Chloride	1220	U	< 1.0	< 10	800	15000	25000
Fluoride	1220	U	0.40	4.0	10	150	500
Sulphate	1220	U	< 1.0	< 10	1000	20000	50000
Total Dissolved Solids	1020	N	46	460	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	4.5	< 50	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	9.8

Waste Acceptance Criteria

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

Results - Single Stage WAC

RECEIVED: 13/08/2024

Project: 24330 Halversown Naas Proposed Data Centre Sites (DOBA)

					Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	22-48580						
Chemtest Sample ID:	1567095						
Sample Ref:	AA181975						
Sample ID:							
Sample Location:	TP26						
Top Depth(m):	0.50						
Bottom Depth(m):							
Sampling Date:					**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Determinand	**SOP**	**Accred.**	**Units**				
Total Organic Carbon	2625	M	%	[A] 0.63	3	5	6
Loss On Ignition	2610	M	%	2.9	--	--	10
Total BTEX	2760	M	mg/kg	[A] < 0.010	6	--	--
Total PCBs (7 Congeners)	2815	M	mg/kg	< 0.10	1	--	--
TPH Total WAC	2670	M	mg/kg	[A] < 10	500	--	--
Total (Of 17) PAH's	2700	N	mg/kg	< 2.0	100	--	--
pH	2010	M		8.4	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.043	--	To evaluate	To evaluate
Eluate Analysis			**10:1 Eluate mg/l**	**10:1 Eluate mg/kg**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1455	U	0.0004	0.0039	0.5	2	25
Barium	1455	U	< 0.005	< 0.050	20	100	300
Cadmium	1455	U	< 0.00011	< 0.0011	0.04	1	5
Chromium	1455	U	< 0.0005	< 0.0050	0.5	10	70
Copper	1455	U	0.0019	0.019	2	50	100
Mercury	1455	U	< 0.00005	< 0.00050	0.01	0.2	2
Molybdenum	1455	U	0.0009	0.0090	0.5	10	30
Nickel	1455	U	0.0013	0.013	0.4	10	40
Lead	1455	U	0.0005	0.0051	0.5	10	50
Antimony	1455	U	< 0.0005	< 0.0050	0.06	0.7	5
Selenium	1455	U	< 0.0005	< 0.0050	0.1	0.5	7
Zinc	1455	U	0.028	0.28	4	50	200
Chloride	1220	U	< 1.0	< 10	800	15000	25000
Fluoride	1220	U	0.28	2.8	10	150	500
Sulphate	1220	U	< 1.0	< 10	1000	20000	50000
Total Dissolved Solids	1020	N	72	710	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	9.1	91	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	14

Waste Acceptance Criteria

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

Results - Single Stage WAC

RECEIVED: 13/08/2024

Project: 24330 Halversown Naas Proposed Data Centre Sites (DOBA)

					Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	22-48580						
Chemtest Sample ID:	1567102						
Sample Ref:	AA181994						
Sample ID:							
Sample Location:	TP32						
Top Depth(m):	0.50						
Bottom Depth(m):							
Sampling Date:							
Determinand	**SOP**	**Accred.**	**Units**		**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Total Organic Carbon	2625	M	%	[A] 0.30	3	5	6
Loss On Ignition	2610	M	%	3.3	--	--	10
Total BTEX	2760	M	mg/kg	[A] < 0.010	6	--	--
Total PCBs (7 Congeners)	2815	M	mg/kg	< 0.10	1	--	--
TPH Total WAC	2670	M	mg/kg	[A] < 10	500	--	--
Total (Of 17) PAH's	2700	N	mg/kg	< 2.0	100	--	--
pH	2010	M		7.1	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.038	--	To evaluate	To evaluate
Eluate Analysis			**10:1 Eluate mg/l**	**10:1 Eluate mg/kg**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1455	U	0.0006	0.0056	0.5	2	25
Barium	1455	U	< 0.005	< 0.050	20	100	300
Cadmium	1455	U	< 0.00011	< 0.0011	0.04	1	5
Chromium	1455	U	0.0010	0.0097	0.5	10	70
Copper	1455	U	0.0021	0.021	2	50	100
Mercury	1455	U	< 0.00005	< 0.00050	0.01	0.2	2
Molybdenum	1455	U	< 0.0002	< 0.0020	0.5	10	30
Nickel	1455	U	0.0027	0.027	0.4	10	40
Lead	1455	U	0.0010	0.010	0.5	10	50
Antimony	1455	U	< 0.0005	< 0.0050	0.06	0.7	5
Selenium	1455	U	< 0.0005	< 0.0050	0.1	0.5	7
Zinc	1455	U	0.041	0.41	4	50	200
Chloride	1220	U	1.2	12	800	15000	25000
Fluoride	1220	U	0.13	1.3	10	150	500
Sulphate	1220	U	< 1.0	< 10	1000	20000	50000
Total Dissolved Solids	1020	N	13	130	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	11	110	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	14

Waste Acceptance Criteria

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

Deviations

RECEIVED: 13/08/2024

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

Sample:	Sample Ref:	Sample ID:	Sample Location:	Sampled Date:	Deviation Code(s):	Containers Received:
1567070	AA184690		BH03		A	Amber Glass 250ml
1567070	AA184690		BH03		A	Plastic Tub 500g
1567071	AA184693		BH04		A	Amber Glass 250ml
1567071	AA184693		BH04		A	Plastic Tub 500g
1567072	AA184669		BH06		A	Amber Glass 250ml
1567072	AA184669		BH06		A	Plastic Tub 500g
1567073	AA184668		BH08		A	Amber Glass 250ml
1567073	AA184668		BH08		A	Plastic Tub 500g
1567074	AA174678		BH10		A	Amber Glass 250ml
1567074	AA174678		BH10		A	Plastic Tub 500g
1567075	AA184675		BH12		A	Amber Glass 250ml
1567075	AA184675		BH12		A	Plastic Tub 500g
1567076	AA186957		TP01		A	Amber Glass 250ml
1567076	AA186957		TP01		A	Plastic Tub 500g
1567077	AA181997		TP02		A	Amber Glass 250ml
1567077	AA181997		TP02		A	Plastic Tub 500g
1567078	AA186953		TP03		A	Amber Glass 250ml
1567078	AA186953		TP03		A	Plastic Tub 500g
1567080	AA186979		TP06		A	Amber Glass 250ml
1567080	AA186979		TP06		A	Plastic Tub 500g
1567081	AA186963		TP07		A	Amber Glass 250ml
1567081	AA186963		TP07		A	Plastic Tub 500g

Deviations

RECEIVED: 13/08/2024

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

Sample:	Sample Ref:	Sample ID:	Sample Location:	Sampled Date:	Deviation Code(s):	Containers Received:
1567083	AA186975		TP09		A	Amber Glass 250ml
1567083	AA186975		TP09		A	Plastic Tub 500g
1567084	AA186969		TP10		A	Amber Glass 250ml
1567084	AA186969		TP10		A	Plastic Tub 500g
1567085	AA185474		TP13		A	Amber Glass 250ml
1567085	AA185474		TP13		A	Plastic Tub 500g
1567086	AA185457		TP14		A	Amber Glass 250ml
1567086	AA185457		TP14		A	Plastic Tub 500g
1567087	AA185458		TP14		A	Amber Glass 250ml
1567087	AA185458		TP14		A	Plastic Tub 500g
1567088	AA185478		TP15		A	Amber Glass 250ml
1567088	AA185478		TP15		A	Plastic Tub 500g
1567090	AA185464		TP18		A	Amber Glass 250ml
1567090	AA185464		TP18		A	Plastic Tub 500g
1567091	AA185488		TP20		A	Amber Glass 250ml
1567091	AA185488		TP20		A	Plastic Tub 500g
1567092	AA185498		TP22		A	Amber Glass 250ml
1567092	AA185498		TP22		A	Plastic Tub 500g
1567093	AA181957		TP23		A	Amber Glass 250ml
1567093	AA181957		TP23		A	Plastic Tub 500g
1567095	AA181975		TP26		A	Amber Glass 250ml
1567095	AA181975		TP26		A	Plastic Tub 500g

Deviations

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

Sample:	Sample Ref:	Sample ID:	Sample Location:	Sampled Date:	Deviation Code(s):	Containers Received:
1567096	AA181976		TP26		A	Amber Glass 250ml
1567096	AA181976		TP26		A	Plastic Tub 500g
1567097	AA181972		TP27		A	Amber Glass 250ml
1567097	AA181972		TP27		A	Plastic Tub 500g
1567098	AA181969		TP28		A	Amber Glass 250ml
1567098	AA181969		TP28		A	Plastic Tub 500g
1567099	AA181966		TP29		A	Amber Glass 250ml
1567099	AA181966		TP29		A	Plastic Tub 500g
1567101	AA181992		TP31		A	Amber Glass 250ml
1567101	AA181992		TP31		A	Plastic Tub 500g
1567102	AA181994		TP32		A	Amber Glass 250ml
1567102	AA181994		TP32		A	Plastic Tub 500g
1567103	AA181995		TP32		A	Amber Glass 250ml
1567103	AA181995		TP32		A	Plastic Tub 500g
1567104	AA181989		TP33		A	Amber Glass 250ml
1567104	AA181989		TP33		A	Plastic Tub 500g
1567105	AA181987		TP34		A	Amber Glass 250ml
1567105	AA181987		TP34		A	Plastic Tub 500g

Test Methods

SOP	Title	Parameters included	Method summary
1020	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Conductivity Meter
1220	Anions, Alkalinity & Ammonium in Waters	Fluoride; Chloride; Nitrite; Nitrate; Total; Oxidisable Nitrogen (TON); Sulfate; Phosphate; Alkalinity; Ammonium	Automated colorimetric analysis using 'Aquakem 600' Discrete Analyser.
1455	Metals in Waters by ICP-MS	Metals, including: Antimony; Arsenic; Barium; Beryllium; Boron; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Tin; Vanadium; Zinc	Filtration of samples followed by direct determination by inductively coupled plasma mass spectrometry (ICP-MS).
1610	Total/Dissolved Organic Carbon in Waters	Organic Carbon	TOC Analyser using Catalytic Oxidation
1920	Phenols in Waters by HPLC	Phenolic compounds including: Phenol, Cresols, Xylenols, Trimethylphenols Note: Chlorophenols are excluded.	Determination by High Performance Liquid Chromatography (HPLC) using electrochemical detection.
2010	pH Value of Soils	pH	pH Meter
2015	Acid Neutralisation Capacity	Acid Reserve	Titration
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.
2040	Soil Description(Requirement of MCERTS)	Soil description	As received soil is described based upon BS5930
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES
2175	Total Sulphur in Soils	Total Sulphur	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2180	Sulphur (Elemental) in Soils by HPLC	Sulphur	Dichloromethane extraction / HPLC with UV detection
2192	Asbestos	Asbestos	Polarised light microscopy / Gravimetry
2300	Cyanides & Thiocyanate in Soils	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Allkaline extraction followed by colorimetric determination using Automated Flow Injection Analyser.
2430	Total Sulphate in soils	Total Sulphate	Acid digestion followed by determination of sulphate in extract by ICP-OES.
2455	Acid Soluble Metals in Soils	Metals, including: Arsenic; Barium; Beryllium; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Vanadium; Zinc	Acid digestion followed by determination of metals in extract by ICP-MS.
2490	Hexavalent Chromium in Soils	Chromium [VI]	Soil extracts are prepared by extracting dried and ground soil samples into boiling water. Chromium [VI] is determined by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazide.
2610	Loss on Ignition	loss on ignition (LOI)	Determination of the proportion by mass that is lost from a soil by ignition at 550°C.
2625	Total Organic Carbon in Soils	Total organic Carbon (TOC)	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2670	Total Petroleum Hydrocarbons (TPH) in Soils by GC-FID	TPH (C6–C40); optional carbon banding, e.g. 3-band – GRO, DRO & LRO*TPH C8–C40	Dichloromethane extraction / GC-FID
2680	TPH A/A Split	Aliphatics: >C5–C6, >C6–C8,>C8–C10, >C10–C12, >C12–C16, >C16–C21, >C21–C35, >C35– C44Aromatics: >C5–C7, >C7–C8, >C8– C10, >C10–C12, >C12–C16, >C16– C21, >C21– C35, >C35– C44	Dichloromethane extraction / GCxGC FID detection

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Test Methods

SOP	Title	Parameters included	Method summary
2700	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-FID	Acenaphthene; Acenaphthylene; Anthracene; Benzo[a]Anthracene; Benzo[a]Pyrene; Benzo[b]Fluoranthene; Benzo[ghi]Perylene; Benzo[k]Fluoranthene; Chrysene; Dibenz[ah]Anthracene; Fluoranthene; Fluorene; Indeno[123cd]Pyrene; Naphthalene; Phenanthrene; Pyrene	Dichloromethane extraction / GC-FID (GC-FID detection is non-selective and can be subject to interference from co-eluting compounds)
2760	Volatile Organic Compounds (VOCs) in Soils by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics.(cf. USEPA Method 8260)*please refer to UKAS schedule	Automated headspace gas chromatographic (GC) analysis of a soil sample, as received, with mass spectrometric (MS) detection of volatile organic compounds.
2790	Semi-Volatile Organic Compounds (SVOCs) in Soils by GC-MS	Semi-volatile organic compounds(cf. USEPA Method 8270)	Acetone/Hexane extraction / GC-MS
2800	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-MS	Acenaphthene*; Acenaphthylene; Anthracene*; Benzo[a]Anthracene*; Benzo[a]Pyrene*; Benzo[b]Fluoranthene*; Benzo[ghi]Perylene*; Benzo[k]Fluoranthene; Chrysene*; Dibenz[ah]Anthracene; Fluoranthene*; Fluorene*; Indeno[123cd]Pyrene*; Naphthalene*; Phenanthrene*; Pyrene*	Dichloromethane extraction / GC-MS
2810	Polychlorinated Biphenyls (PCB) as Aroclors in Soils by GC-ECD	Polychlorinated Biphenyls expressed as an Aroclor (normally reported as *Aroclor 1242)	Extraction of a soil sample, as received, into hexane/acetone (50:50) followed by gas chromatography (GC) using mass spectrometric (MS) detection for identification of polychlorinated biphenyls and electron capture detection (ECD) for quanitation if present.
2815	Polychlorinated Biphenyls (PCB) ICES7Congeners in Soils by GC-MS	ICES7 PCB congeners	Acetone/Hexane extraction / GC-MS
2920	Phenols in Soils by HPLC	Phenolic compounds including Resorcinol, Phenol, Methylphenols, Dimethylphenols, 1-Naphthol and TrimethylphenolsNote: chlorophenols are excluded.	60:40 methanol/water mixture extraction, followed by HPLC determination using electrochemical detection.
640	Characterisation of Waste (Leaching C10)	Waste material including soil, sludges and granular waste	ComplianceTest for Leaching of Granular Waste Material and Sludge

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Report Information

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Key

U	UKAS accredited
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S	This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
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T	This analysis has been subcontracted to an unaccredited laboratory
I/S	Insufficient Sample
U/S	Unsuitable Sample
N/E	not evaluated
<	"less than"
>	"greater than"
SOP	Standard operating procedure
LOD	Limit of detection

Comments or interpretations are beyond the scope of UKAS accreditation
The results relate only to the items tested
Uncertainty of measurement for the determinands tested are available upon request
None of the results in this report have been recovery corrected
All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis
All Asbestos testing is performed at the indicated laboratory
Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

A - Date of sampling not supplied
B - Sample age exceeds stability time (sampling to extraction)
C - Sample not received in appropriate containers
D - Broken Container
E - Insufficient Sample (Applies to LOI in Trommel Fines Only)

Sample Retention and Disposal

All soil samples will be retained for a period of 30 days from the date of receipt
All water samples will be retained for 14 days from the date of receipt
Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:
customerservices@chemtest.com

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

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Final Report

Report No.:	22-48622-1
Initial Date of Issue:	05-Jan-2023
Client	IGSL
Client Address:	M7 Business Park Naas County Kildare Ireland
Contact(s):	Darren Keogh
Project	24330 Halversown Naas Proposed Data Centre Sites (DOBA)
Quotation No.:	Q20-21693
Date Received:	20-Dec-2022
Order No.:	
Date Instructed:	20-Dec-2022
No. of Samples:	10
Turnaround (Wkdays):	7
Results Due:	04-Jan-2023
Date Approved:	05-Jan-2023
Approved By:	
Details:	Stuart Henderson, Technical Manager

Results - Soil

RECEIVED: 19/08/2024

Project: 24330 Halversown Naas Proposed Data Centre Sites (DOBA)

Client: IGSL					**Chemtest Job No.:**	22-48622	22-48622	22-48622	22-48622	22-48622	22-48622	22-48622	22-48622	22-48622	22-48622
Quotation No.: Q20-21693					**Chemtest Sample ID.:**	1567189	1567190	1567191	1567192	1567193	1567194	1567196	1567197	1567198	1567199
Order No.:					Client Sample Ref.:	AA184687	AA184690	AA184670	AA184673	AA184679	AA184677	AA186982	AA185481	AA185468	AA181975
					Sample Location:	BH01	BH03	BH05	BH07	BH09	BH11	TP04	TP12	TP19	TP26
					Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
					Top Depth (m):	1.00	1.00	1.00	1.00	1.00	1.00	0.60	0.50	0.50	0.50
Determinand	**Accred.**	**SOP**	**Units**	**LOD**											
Moisture	N	2030	%	0.020		14	13	10	28	14	21	16	11	9.3	17
pH (2.5:1)	N	2010		4.0		[A] 8.5	[A] 8.7	[A] 8.5	[A] 8.3	[A] 8.6	[A] 8.2	[A] 8.5	[A] 8.4	[A] 8.6	[A] 8.4
Magnesium (Water Soluble)	N	2120	g/l	0.010		[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010		[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010
Total Sulphur	U	2175	%	0.010		[A] 0.032	[A] 0.051	[A] < 0.010	[A] 0.026	[A] < 0.010	[A] < 0.010	[A] 0.013	[A] 0.015	[A] 0.25	[A] 0.099
Chloride (Water Soluble)	U	2220	g/l	0.010		[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010
Nitrate (Water Soluble)	N	2220	g/l	0.010		0.011	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Ammonium (Water Soluble)	U	2220	g/l	0.01		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Sulphate (Acid Soluble)	U	2430	%	0.010		[A] 0.11	[A] 0.024	[A] 0.037	[A] 0.074	[A] 0.024	[A] 0.036	[A] 0.026	[A] 0.015	[A] 0.019	[A] 0.030

Deviations

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

Sample:	Sample Ref:	Sample ID:	Sample Location:	Sampled Date:	Deviation Code(s):	Containers Received:
1567189	AA184687		BH01		A	Amber Glass 250ml
1567189	AA184687		BH01		A	Plastic Tub 500g
1567190	AA184690		BH03		A	Amber Glass 250ml
1567190	AA184690		BH03		A	Plastic Tub 500g
1567191	AA184670		BH05		A	Amber Glass 250ml
1567191	AA184670		BH05		A	Plastic Tub 500g
1567192	AA184673		BH07		A	Amber Glass 250ml
1567192	AA184673		BH07		A	Plastic Tub 500g
1567193	AA184679		BH09		A	Amber Glass 250ml
1567193	AA184679		BH09		A	Plastic Tub 500g
1567194	AA184677		BH11		A	Amber Glass 250ml
1567194	AA184677		BH11		A	Plastic Tub 500g
1567196	AA186982		TP04		A	Amber Glass 250ml
1567196	AA186982		TP04		A	Plastic Tub 500g
1567197	AA185481		TP12		A	Amber Glass 250ml
1567197	AA185481		TP12		A	Plastic Tub 500g
1567198	AA185468		TP19		A	Amber Glass 250ml
1567198	AA185468		TP19		A	Plastic Tub 500g
1567199	AA181975		TP26		A	Amber Glass 250ml
1567199	AA181975		TP26		A	Plastic Tub 500g

Test Methods

SOP	Title	Parameters included	Method summary
2010	pH Value of Soils	pH	pH Meter
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.
2040	Soil Description(Requirement of MCERTS)	Soil description	As received soil is described based upon BS5930
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES
2175	Total Sulphur in Soils	Total Sulphur	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2220	Water soluble Chloride in Soils	Chloride	Aqueous extraction and measuremernt by 'Aquakem 600' Discrete Analyser using ferric nitrate / mercuric thiocyanate.
2430	Total Sulphate in soils	Total Sulphate	Acid digestion followed by determination of sulphate in extract by ICP-OES.

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Report Information

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Key

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>	"greater than"
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LOD	Limit of detection

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The results relate only to the items tested
Uncertainty of measurement for the determinands tested are available upon request
None of the results in this report have been recovery corrected
All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis
All Asbestos testing is performed at the indicated laboratory
Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

A - Date of sampling not supplied
B - Sample age exceeds stability time (sampling to extraction)
C - Sample not received in appropriate containers
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E - Insufficient Sample (Applies to LOI in Trommel Fines Only)

Sample Retention and Disposal

All soil samples will be retained for a period of 30 days from the date of receipt
All water samples will be retained for 14 days from the date of receipt
Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:
customerservices@chemtest.com

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Leicester
LE1 4DH

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IGSL
Unit F
M7 Business Park
Naas

Analytical Test Report: L23/00718/IGS - 23-32082

Your Project Reference:	**24330 Halverstown Naas**		
Your Order Number:	21187	Samples Received / Instructed:	15/02/2023 / 15/02/2023
Report Issue Number:	1	Sample Tested:	15/02 to 22/02/2023
Samples Analysed:	5 aggregate samples	Report issued:	23/02/2023

Signed

James Gane
Analytical Services Manager
CTS Group

Notes:

General

Please refer to Methodologies page for details pertaining to the analytical methods undertaken.

Samples will be retained for 14 days after issue of this report unless otherwise requested.

Moisture Content was determined in accordance with CTS method statement MS - CL - Sample Prep, oven dried at <30˚C.

Moisture Content is reported as a percentage of the dry mass of soil, this calculation is in accordance with BS1377, Part 2, 1990, Clause 3.2

Where specification limits are included these are for guidance only. Where a measured value has been highlighted this is not implying acceptance or failure and certainty of measurement values have not been taken into account.

Uncertainty of measurement values are available on request.

Samples were supplied by customer, results apply to the samples as received.

Deviating Samples

On receipt samples are compared against our sample holding and handling protocols, where any deviations have been noted these are reported on our deviating sample page (if present)

Accreditation Key

UKAS = UKAS Accreditation, MCERTS = MCERTS Accreditation, u = Unaccredited

MCERTS Accreditation only covers the SAND, CLAY and LOAM matrices

Date of Issue: 23.09.2022

Issued by: J. Gane

Issue No: 1

Rev No: 1

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L23/00718/IGS - 23-32082

Project Reference - 24330 Halverstown Naas

Analytical Test Results - Chemical Analysis

Lab Reference			279664	279665	279666	279667	279668
Client Sample ID			A22/7562	A22/7575	A22/7568	A22/7563	A22/7578
Material			Soil	Soil	Soil	Soil	Soil
Source/Client Reference			TP04@ 0.6m	TP026@ 0.5m	TP19 @ 0.5m	TP12@ 0.5m	TP31@ 0.5m
Sample Matrix			Sand	Sand	Sand	Sand	Sand
Determinant	**Units**	**Accreditation**					
Water soluble sulphate	(mg/l)	u	< 10	< 10	< 10	< 10	< 10
Acid Soluble Sulphate	(%)	u	0.07	0.06	0.05	0.05	0.20
Total Sulphur	(%)	UKAS	0.03	0.03	0.03	0.03	0.08
pH Value	pH Units	MCERTS	12.7	12.6	12.8	12.5	12.6

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Project Reference - 24330 Halverstown Naas

Sample Descriptions

Lab Reference	Client Sample ID	Material	Source/Client Reference	Description	Moisture Content (%)	Stone Content (%)	Passing 2mm test sieve (%)
279664	A22/7562	Soil	TP04@0.6m	Mottled brown very gravelly silty sand	-	-	40
279665	A22/7575	Soil	TP026@0.5m	Mottled brown very gravelly silty sand	-	-	57
279666	A22/7568	Soil	TP19@0.5m	Mottled brown very gravelly silty sand	-	-	52
279667	A22/7563	Soil	TP12@0.5m	Mottled brown very gravelly silty sand	-	-	61
279668	A22/7578	Soil	TP31@0.5m	Mottled brown very gravelly silty sand	-	-	55

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Project Reference - 24330 Halverstown Naas

Sample Comments

Lab Reference	Client Sample ID	Material	Source/Client Reference	Comments
279664	A22/7562	Soil	TP04@0.6m	
279665	A22/7575	Soil	TP026@0.5m	
279666	A22/7568	Soil	TP19@0.5m	
279667	A22/7563	Soil	TP12@0.5m	
279668	A22/7578	Soil	TP31@0.5m	

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Project Reference - 24330 Halverstown Naas

Analysis Methodologies

Test Code	Test Name / Reference	Sample condition for analysis	Sample Preperation	Test Details
ANIONSS	MS - CL - Anions by Aquakem (2:1Extract)	Oven dried	Passing 2mm test sieve	Determination of Anions (inc Sulphate, chloride etc.) in soils by Aquakem. Analysis is based on a 2:1 water to soil extraction ratio
PHS	MS - CL - pH in Soils	As received	Passing 10mm test sieve	Determination of pH in soils using a pH probe (using a 1:3 soil to water extraction)
ASSO4S	MS - CL - Acid Soluble Sulphate	Oven Dried	Passing 2mm test sieve	Determination of total sulphate in soils by acid extraction followed by ICP analysis
SAMPLEPREP	MS - CL - Sample Preparation	-	-	Preparation of samples (including determination of moisture content) to allow for subsequent analysis
1377TS-ELT	BS1377 Total Sulphur Content by HTC	Oven dried	BS1377 : Part 1 : 2016	Total Sulphur Content testing of Soil in accordance with BS 1377 : Part 3 : 2018 + A1 : 2021 Clause 7.10 (using Eltra CS-800 Analyser)

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L23/00718/IGS - 23-32082

Project Reference - 24330 Halverstown Naas

Sample Deviations

Deviations are listed below against each sample and associated test method, where deviation(s) are noted it means data may not be representative of the sample at the time of sampling and it is possible that results provided may be compromised.

Observations on receipt

A - No date of sampling provided
C - Received in inappropriate container
H - Contains headspace
T - Temperature on receipt exceeds storage temperature
R - Date of sampling to receipt insufficient to allow analysis to be completed without deviation, Please note this is only a deviation if 'X' is also recorded against the sample

Observations whist in laboratory

X - Exceeds sampling to extraction or analysis timescales

Lab Reference	Client Sample ID	Material	Source/Client Reference	Test	Deviations
279664	A22/7562	Soil	TP04@0.6m		A
279665	A22/7575	Soil	TP026@0.5m		A
279666	A22/7568	Soil	TP19@0.5m		A
279667	A22/7563	Soil	TP12@0.5m		A
279668	A22/7578	Soil	TP31@0.5m		A

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Appendix 13

Waste Characterisation Report (OCM)

Unit 15
Melbourne Business Park
Model Farm Road
Cork T12 WR89

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Waste Characterisation Assessment

Lands at Halverstown

Naas

Co. Kildare

Prepared For: -

IGSL Limited
Unit F
M7 Business Park
Naas
County Kildare

Prepared By: -

O'Callaghan Moran & Associates
Unit 15 Melbourne Business Park
Model Farm Road
Cork

February 2023

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Project	Waste Characterisation: Halverstown, Naas, Co. Kildare			
Client	IGSL Limited			
Report No	Date	Status	Prepared By	Reviewed By
230010101	15/02/2023	Final	Austin Hynes PGeo MSc	Sean Moran B.Sc. MSc

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1 INTRODUCTION

IGSL Limited requested O'Callaghan Moran & Associates (OCM) to undertake a waste characterisation assessment of five (5 No.) samples of natural ground collected from five (5 No.) trial pits from lands at Halverstown, Naas, Co. Kildare.

1.1 Methodology

IGSL provided a description of the ground conditions and collected samples of the soils from the trial pit locations. The samples were analysed at an accredited laboratory and the results formed the basis for a waste classification assessment, which was undertaken by OCM in accordance with the Environmental Protection Agency (EPA) Guidelines on the Classification of Waste (2015).

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2 WASTE CLASSIFICATION ASSESSMENT

2.1 Soil Sampling and Laboratory Analysis

2.1.1 *Site Investigation*

The site investigation was completed by IGSL Limited in October 2022 and included the collection of five (5 No.) composite samples from five (5 No.) trial pits. The location of the samples is shown on Figure 2.1. The logs for the trial pits are in Appendix 1.

Each trial pit was installed in a separate field across the site area. There is topsoil at the surface of all trial pits to 0.30 mbgl. The subsurface of all trial pits comprises Natural Ground.

The subsurface of TP03 is composed of silty slight gravelly SAND to 0.80 mbgl. This is underlain by stiff, sandy gravelly SILT to 1.80 mbgl. Firm to stiff sandy gravelly CLAY was encountered between 1.80-2.20 mbgl.

At TP09, firm sandy gravelly SILT was encountered between 0.30-0.80 mbgl. This is underlain by firm, sandy gravelly SILT with cobble content to 1.60 mbgl. Silty sandy GRAVEL with cobble content was encountered to a depth of 2.40 mbgl.

TP15 is composed of firm, sandy gravelly SILT with cobble content to 1.00 mbgl. This is underlain by firm, sandy gravelly SILT to 1.70 mbgl. Soft to firm, sandy gravelly CLAY with cobble content was encountered between 1.70-2.80 mbgl.

The subsurface of TP26 comprises firm, sandy gravelly CLAY to 0.90 mbgl. Stiff, sandy gravelly CLAY with cobble content was encountered between 0.90-2.10 mbgl. This is underlain by firm to stiff, sandy gravelly CLAY with cobble content.

At TP32, firm, sandy gravelly CLAY was encountered to 0.80 mbgl. This is underlain by stiff, sandy gravelly CLAY with cobble content to 2.30 mbgl.

2.1.2 *Sample Collection*

IGSL collected the samples and placed them in laboratory prepared containers that were stored in coolers prior to shipment to Chemtest Ltd.

2.1.3 *Laboratory Analysis*

The samples were tested for metals (arsenic, barium, cadmium, chromium, copper, mercury, molybdenum, nickel, lead, antimony, selenium and zinc, total organic carbon (TOC), BTEX (benzene, toluene, ethylbenzene and xylene) aliphatic and aromatic hydrocarbons, polychlorinated biphenyls (PCB), mineral oil, polyaromatic hydrocarbons (PAH) and asbestos. Leachate generated from the samples was tested for arsenic, barium, cadmium, chromium, copper,

mercury, molybdenum, nickel, lead, antimony, selenium and zinc, chloride, fluoride, soluble sulphate, phenols, dissolved organic carbon (DOC), total dissolved solids (TDS).

This parameter range facilitates an assessment of the hazardous properties of the waste, and also allows a determination of appropriate off-site management options based on the Waste Acceptance Criteria (WAC) applied by landfill operators.

The analytical methods were all ISO/CEN approved and the method detection limits were below the relevant guidance/threshold values. The full laboratory report is in Appendix 2.

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O'Callaghan Moran & Associates,
Unit 15 Melbourne Business Park,
Model Farm Road, Cork.
Tel. (021) 4345366
Email: info@ocallaghanmoran.com

Title:

Figure 2.1 Sample Location Plan

Legend

This drawing is the property of O'Callaghan Moran & Associates and shall not be used, reproduced or disclosed to anyone without the prior written permission of O'Callaghan Moran & Associates and shall be returned upon request.

Client:

IGSL Limited

2.7 Waste Classification

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The Haz Waste Online Classification Engine, developed in the UK by One Touch Data Ltd, was used to determine the waste classification. This tool was developed specifically to establish whether waste is non-hazardous or hazardous and has been approved for use in Ireland by the Environmental Protection Agency. The full Waste Classification Report is in Appendix 3 and the results are summarised in Table 2.1.

Table 2.1 Waste Classification

Sample No.	Depth	Classification	LoW Code
TP3	0.5	Non-Hazardous	17 05 04
TP9	0.5	Non-Hazardous	17 05 04
TP15	0.5	Non-Hazardous	17 05 04
TP26	0.5	Non-Hazardous	17 05 04
TP32	0.5	Non-Hazardous	17 05 04

Asbestos was not detected in any of the samples tested.

All samples are classified as non-hazardous and the appropriate List of Waste Code is 17 05 04 (Soil and Stone other than those mentioned in 17 05 03*).

2.3 Waste Acceptance Criteria

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The results of the WAC testing are presented in Table 2.2, which includes for comparative purposes the WAC for Inert, Non Hazardous and Hazardous Waste Landfills pursuant to Article 16 of the EU Landfill Directive 1999/31/EC Annex II which establishes criteria and procedures for the acceptance of waste at landfills.

The sample from TP26 marginally exceeds the inert WAC for Total Organic Carbon (TOC).

All other samples meet the inert WAC.

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Table 2.2 WAC Results

Parameter	Unit	TP3	TP9	TP15	TP26	TP32	Inert Landfill	Inert Landfill Increased Limits	Non-Hazardous Landfill	Hazardous Landfill
Depth	m	0.5	0.5	0.5	0.5	0.5				
Antimony	mg/kg	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050	0.06	0.18	0.7	5
Arsenic	mg/kg	0.013	0.020	0.022	0.017	0.015	0.5	1.5	2	25
Barium	mg/kg	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	20	20	100	300
Cadmium	mg/kg	< 0.0011	< 0.0011	< 0.0011	< 0.0011	< 0.0011	0.04	0.04	1	5
Chromium	mg/kg	< 0.0050	0.015	0.010	< 0.0050	0.0074	0.5	0.5	10	70
Copper	mg/kg	0.024	0.022	0.020	0.016	0.010	2	2	50	100
Lead	mg/kg	< 0.0050	0.011	0.014	< 0.0050	< 0.0050	0.5	0.5	10	50
Molybdenum	mg/kg	0.0090	0.0041	0.0083	0.013	0.0062	0.5	1.5	10	30
Nickel	mg/kg	0.0050	0.016	0.012	0.0063	0.0058	0.4	0.4	10	40
Selenium	mg/kg	0.048	0.043	0.047	0.043	0.041	0.1	0.3	0.5	7
Zinc	mg/kg	0.12	0.10	0.081	0.076	0.041	4	4	50	200
Mercury	mg/kg	< 0.00050	< 0.00050	< 0.00050	< 0.00050	< 0.00050	0.01	0.01	0.2	2
Phenol	mg/kg	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	1	1	NE	NE
Fluoride	mg/kg	1.1	2.5	1.6	1.2	1.2	10	10	150	500
Chloride	mg/kg	13	< 10	< 10	< 10	< 10	800	2,400	15,000	25,000
Sulphate	mg/kg	28	13	< 10	< 10	< 10	1000*	3,000	20000*	50,000
DOC **	mg/kg	55	65	68	63	< 50	500	500	800	1,000
pH	pH units	8.7	8.6	8.7	8.4	8.9	NE	NE	NE	NE
TDS ***	mg/kg	640	300	390	540	420	4,000	12,000	60,000	100,000
TOC	%	0.23	0.29	< 0.20	3.2	0.9	3	6	NE	6
Benzene	mg/kg	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	6	6	NE	NE
Toluene	mg/kg	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	6	6	NE	NE
Ethylbenzene	mg/kg	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	6	6	NE	NE
m/p-Xylene	mg/kg	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	6	6	NE	NE
o-Xylene	mg/kg	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	6	6	NE	NE
PCB Total of 7	mg/kg	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	1	1	NE	NE
Total 17 PAH's	mg/kg	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	NE	100	NE	NE
Mineral Oil	mg/kg	< 10	< 10	< 10	< 10	< 10	500	500	NE	NE
Asbestos	% mass	NAD	NAD	NAD	NAD	NAD	NE	NE	NE	NE

NAD denotes No Asbestos Detected

* denotes sulphate level exceeding inert waste limit may be considered as complying if the TDS value does not exceed 6,000mg/kg at L/S = 10l/kg.

** denotes a higher limit may be accepted provided the DOC alternative values of 500mg/kg is achieved

*** denotes TDS. The values for TDS can be used to sulphate and chloride.

PAH over 1mg/kg and Mineral Oil over 50 mg/kg exceeds limit at soil recovery site in Ireland

2.4 Waste Management Options

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All of the soils are suitable for retention on site for landscaping or similar purposes. However if the soils are removed from the site options for recovery or disposal are outlined in this section.

The EPA has issued guidance on acceptance criteria for a range of parameters for soil recovery sites. This includes;

- Metals (solid conc. not leachability) in soil and stone (including As, Cd, Cr, Cu, Hg, Ni, Pb, Zn);
- Total organic carbon in soil and stone;
- Total BTEX (benzene, toluene, ethylbenzene, xylenes) in soil and stone;
- Mineral oil in soil and stone;
- Polycyclic aromatic hydrocarbons (PAHs) in soil and stone;
- Polychlorinated Biphenyls (PCBs) in soil and stone;
- Asbestos fibres in soil and stone.

The guidance requires that soils from brownfield sites should not exceed the limits for the parameters specified in Table 2.3 and 2.4. For metals limits have been specified for a range of soil types nationally separated into six domain areas.

Table 2.3 Soil Recovery Site Criteria

Parameter	Limit for Soil Recovery Sites
Total BTEX	0.05 mg/kg
Mineral Oil	50 mg/kg
Total PAHs	1 mg/kg
Total PCBs	0.05 mg/kg

All samples which meet the Inert WAC meet the soil recovery criteria for BTEX, Mineral Oil, PAH's and PCB's.

The soil and stone cannot be sent to soil recovery sites if the trigger levels for a particular domain are exceeded. There is however some flexibility in applying the limits. A derogation applies where up to three parameters can exceed the limit for a sample provided the concentration in the samples is no more than 1.5 times the trigger level. The site which is subject to this investigation is located in Domain 2 and the trigger levels are listed in Table 2.4.

Table 2.4 Soil Recovery Trigger Levels

		Domain 2 Trigger Level	1.5 times Trigger Level
Arsenic	**mg/kg**	24.90	37.35
Cadmium	**mg/kg**	3.28	4.92
Chromium	**mg/kg**	50.30	75.45
Copper	**mg/kg**	63.50	95.25
Mercury	**mg/kg**	0.36	0.54
Nickel	**mg/kg**	61.90	92.85
Lead	**mg/kg**	86.10	129.15
Zinc	**mg/kg**	197.00	295.5

All samples meet the soil recovery criteria for metal concentrations.

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Waste management options are summarised on Table 2.5. All are subject to approval of the waste management facility operators. The sample from TP-26 marginally exceeded the TOC limit but the level exceedance is not considered to be significant and the sample is therefore considered to meet Class A for recovery purposes subject to approval of the facility operator. If it is not accepted then it must be sent to a facility that can accept Class B-1 material (inert waste increased limits). Class A material is suitable for soil recovery at permitted soil recovery sites.

Table 2.5 Waste Management Options

Sample No.	Depth	Classification	LoW Code	Category
TP3	0.5	Non-Hazardous	17 05 04	A
TP9	0.5	Non-Hazardous	17 05 04	A
TP15	0.5	Non-Hazardous	17 05 04	A
TP26	0.5	Non-Hazardous	17 05 04	A
TP32	0.5	Non-Hazardous	17 05 04	A

A	Meets Soil Recovery Criteria

3 CONCLUSIONS AND RECOMMENDATIONS

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3.1 Conclusions

3.1.1 *Waste Classification*

Asbestos was not detected in any of the samples tested.

All samples are classified as non-hazardous and the appropriate List of Waste Code is 17 05 04 (Soil and Stone other than those mentioned in 17 05 03*).

If the soils have to be removed from the site the recovery/disposal options are discussed in Section 2.4.

3.2 Recommendations

OCM recommend that a copy of this report be provided in full to the relevant waste management facilities to which the made ground and subsoils will be consigned to confirm its suitability for acceptance.

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Appendix 1

Trial Pit Logs

TRIAL PIT RECORD

REPORT NUMBER 24330

CONTRACT Halverstown

TRIAL PIT NO. TP03
SHEET Sheet 1 of 1

LOGGED BY MB

CO-ORDINATES 686,128.56 E
719,683.63 N

DATE STARTED 18/10/2022
DATE COMPLETED 18/10/2022

GROUND LEVEL (m) 80.45

CLIENT

ENGINEER DOBA

EXCAVATION METHOD 7t Hitachi

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Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0 TOPSOIL: Soft brown slightly gravelly sandy CLAY. Sand is fine to coarse. Gravel is fine to medium subrounded.									
		0.30	80.15						
Brownish grey slightly gravelly silty SAND. Sand is fine to medium. Gravel is fine to coarse subangular to subrounded.					AA186953	B	0.50-0.60	39 31 34	
		0.80	79.65						
Stiff grey mottled orange sandy gravelly SILT. Sand is fine to medium. Gravel is fine to coarse subangular to subrounded. 1.0					AA186954	B	1.20-1.20		
		1.80	78.65		AA186955	B	1.80-1.80		
Firm to stiff brown sandy gravelly clayey SILT with a medium cobble content. Sand is fine to coarse. Gravel is fine to coarse subrounded.Cobbles are subrounded to rounded of limestone. 2.0									
		2.20	78.25						
Brownish grey very gravelly silty SAND with medium cobbles and ocassional boulders. Sand is fine to medium. Gravel is fine to coarse subangular to subrounded.Cobbles and boulders are subrounded to rounded of limestone.					AA186956	B	2.50-2.60		
		2.90	77.55						
End of Trial Pit at 2.90m 3.0									

Groundwater Conditions
Dry

Stability
Slightly unstable from 2.20m

General Remarks
Pit footprint scanned using cable avoidance tool [CAT]. Pit backfilled with arisings.

TRIAL PIT RECORD

REPORT NUMBER 24330

CONTRACT	Halverstown	**TRIAL PIT NO.**	**TP09**
		SHEET	Sheet 1 of 1
LOGGED BY	MB	**CO-ORDINATES**	686,274.81 E 719,546.61 N
		DATE STARTED	19/10/2022
		DATE COMPLETED	19/10/2022
CLIENT		**GROUND LEVEL (m)**	79.66
		EXCAVATION METHOD	7t Hitachi
ENGINEER	DOBA		

RECEIVED: 13/08/2024

	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0	TOPSOIL: Soft brown slightly gravelly sandy CLAY. Sand is fine to coarse. Gravel is fine to medium subrounded.		0.30	79.36						
	Firm grey mottled orange sandy gravelly SILT with silty sand lenses. Sand is fine to coarse. Gravel is fine to coarse subrounded.					AA186975	B	0.50-0.60	40 38 46 60 63 67	
1.0	Firm greyish brown sandy gravelly clayey SILT with a low cobble content. Sand is fine to coarse. Gravel is fine to coarse subrounded.Cobbles are subrounded to rounded of limestone.		0.80	78.86		AA186976	B	1.20-1.30		
	Brown silty sandy GRAVEL with a medium cobble content. Sand is fine to coarse. Gravel is fine to coarse subrounded.Cobbles are subrounded to rounded of limestone.		1.60	78.06						
2.0	Side wall collapse at 1.60m					AA186977	B	1.90-2.00		
	Firm dark grey very sandy gravelly clayey SILT with a medium cobble content. Sand is fine to coarse. Gravel is fine to coarse subrounded.Cobbles are subrounded to rounded of limestone. (Recovered wet)		2.40	77.26	1 (Seepage)	AA186978	B	2.50-2.60		
3.0	End of Trial Pit at 3.00m		3.00	76.66						

Groundwater Conditions
Seepage at 2.50m

Stability
Unstable, side wall collapse from 1.60m

General Remarks
Pit footprint scanned using cable avoidance tool [CAT]. Pit backfilled with arisings.

TRIAL PIT RECORD

REPORT NUMBER 24330

CONTRACT Halverstown

TRIAL PIT NO. TP15
SHEET Sheet 1 of 1

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CO-ORDINATES 686,444.04 E
719,538.61 N

DATE STARTED 04/10/2022
DATE COMPLETED 04/10/2022

GROUND LEVEL (m) 80.39

CLIENT
ENGINEER DOBA

EXCAVATION METHOD 7t Hitachi

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Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0 TOPSOIL: Soft brown gravelly sandy CLAY with rootlets. Sand is fine to coarse. Gravel is fine to medium subrounded.									
		0.30	80.09						
Firm greyish brown sandy gravelly slightly clayey SILT with a low coblle content. Sand is fine to coarse. Gravel is fine to coarse subrounded. Cobbles are subrounded to rounded of limestone					AA185478	B	0.50-0.50		
1.0 Firm greyish brown sandy gravelly SILT. Sand is fine to coarse. Gravel is fine to coarse subrounded. Cobbles are subrounded to rounded of limestone		1.00	79.39						
					AA185479	B	1.50-1.50		
Firm rarely soft to firm brown slightly sandy gravelly silty CLAY with a low cobble content with pockets of coarse yellow sand from 2.50m. Gravel is fine to coarse subrounded. Cobbles are subrounded to rounded of limestone 2.0 Side wall collapse from 2.0m to 2.50m		1.70	78.69						
					AA185480	B	2.30-2.30		
End of Trial Pit at 2.80m		2.80	77.59						
3.0									

Groundwater Conditions
Dry

Stability
Slightly unstable, side wall collapse at 2.0m

General Remarks
Pit footprint scanned using cable avoidance tool [CAT]. Pit backfilled with arisings.

TRIAL PIT RECORD

REPORT NUMBER 24330

CONTRACT	Halverstown	**TRIAL PIT NO.**	**TP26**
		SHEET	Sheet 1 of 1
LOGGED BY	MB	**CO-ORDINATES**	686,611.58 E 719,726.52 N
		DATE STARTED	13/10/2022
		DATE COMPLETED	13/10/2022
CLIENT		**GROUND LEVEL (m)**	83.00
ENGINEER	DOBA	**EXCAVATION METHOD**	7t Hitachi

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Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0 TOPSOIL: Soft brown gravelly sandy silty CLAY. Sand is fine to coarse. Gravel is fine to medium subrounded.									
		0.30	82.70					38	
Firm brown sandy gravelly silty CLAY with root hairs. Sand is fine to coarse. Gravel is fine to coarse subangular to subrounded.								46	
								42	
					AA181975	B	0.50-0.60	66	
								73	
								68	
		0.90	82.10						
1.0 Stiff brown very sandy very gravelly silty CLAY with a medium cobble content and ocassional boulders. Sand is fine to coarse. Gravel is fine to coarse subrounded.Cobbles and boulders are subrounded to rounded of limestone.									
					AA181976	B	1.30-1.40		
Boulder at 1.80m (up to 400mm)									
2.0		2.10	80.90						
Firm to stiff brown sandy very gravelly silty CLAY with a low cobble content. Sand is fine to coarse. Gravel is fine to coarse subrounded.Cobbles are subrounded to rounded of limestone.									
					AA181978	B	2.40-2.50		
		2.70	80.30						
End of Trial Pit at 2.70m									
3.0									

Groundwater Conditions
Dry

Stability
Good

General Remarks
Pit footprint scanned using cable avoidance tool [CAT]. Pit backfilled with arisings.

TRIAL PIT RECORD

REPORT NUMBER 24330

CONTRACT Halverstown

TRIAL PIT NO. TP32
SHEET Sheet 1 of 1

LOGGED BY MB

CO-ORDINATES 686,084.15 E
719,879.36 N

DATE STARTED 17/10/2022
DATE COMPLETED 17/10/2022

GROUND LEVEL (m) 83.16

CLIENT
ENGINEER DOBA

EXCAVATION METHOD 7t Hitachi

RECEIVED: 13/08/2024

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0 TOPSOIL: Soft brown gravelly sandy CLAY with roolets. Sand is fine to coarse. Gravel is fine to medium subrounded.									
		0.30	82.86					25	
Firm brown very sandy slightly gravelly silty CLAY. Sand is fine to coarse. Gravel is fine to coarse subrounded.Cobbles are subrounded to rounded of limestone.								34	
								29	
					AA181994	B	0.50-0.60	50	
								56	
								58	
		0.80	82.36						
Stiff brown very sandy slightly silty gravelly CLAY with a medium cobble content.Sand is fine to coarse. Gravel is fine to coarse subrounded. Cobbles are subrounded to rounded of limestone.									
1.0									
					AA181995	B	1.40-1.50		
2.0									
		2.30	80.86						
Stiff greyish brown sandy gravelly clayey SILT with a medium cobble content and occassional boulders. Sand is fine to coarse. Gravel is fine to coarse subrounded. Cobbles and boulders are subrounded to rounded of limestone.									
					AA181996	B	2.50-2.60		
		2.80	80.36						
End of Trial Pit at 2.30m									
3.0									

Groundwater Conditions
Dry

Stability
Good

General Remarks
Pit footprint scanned using cable avoidance tool [CAT]. Pit backfilled with arisings.

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Appendix 2

Laboratory Report

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

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Final Report

Report No.:	23-02702-1
Initial Date of Issue:	13-Feb-2023
Client	IGSL
Client Address:	M7 Business Park Naas County Kildare Ireland
Contact(s):	Darren Keogh
Project	Halverstown
Quotation No.:	Q20-19951
Order No.:	
No. of Samples:	5
Turnaround (Wkdays):	7
Date Approved:	13-Feb-2023
Approved By:	
Details:	Stuart Henderson, Technical Manager

Date Received:	30-Jan-2023
Date Instructed:	30-Jan-2023
Results Due:	07-Feb-2023

Results - Leachate

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Project: Halverstown

Client: IGSL					**Chemtest Job No.:**	23-02702	23-02702	23-02702	23-02702	23-02702
Quotation No.: Q20-19951					**Chemtest Sample ID.:**	1580840	1580841	1580842	1580843	1580844
					Client Sample ID.:	TP3	TP9	TP15	TP26	TP32
					Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL
					Top Depth (m):	0.5	0.5	0.5	0.5	0.5
Determinand	**Accred.**	**SOP**	**Type**	**Units**	**LOD**					
pH	U	1010	10:1		N/A	7.2	7.5	7.8	7.9	8.2
Ammonium	U	1220	10:1	mg/l	0.050	0.077	< 0.050	0.073	0.095	0.11
Ammonium	N	1220	10:1	mg/kg	0.10	0.78	1.1	0.76	1.0	1.2
Boron (Dissolved)	U	1455	10:1	mg/kg	0.01	< 0.01	< 0.01	< 0.01	0.11	< 0.01
Benzo[j]fluoranthene	N	1800	10:1	µg/l	0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010

Results - Soil

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Project: Halverstown

Client: IGSL			**Chemtest Job No.:**		23-02702	23-02702	23-02702	23-02702	23-02702
Quotation No.: Q20-19951			**Chemtest Sample ID.:**		1580840	1580841	1580842	1580843	1580844
			Client Sample ID.:		TP3	TP9	TP15	TP26	TP32
			Sample Type:		SOIL	SOIL	SOIL	SOIL	SOIL
			Top Depth (m):		0.5	0.5	0.5	0.5	0.5
			Asbestos Lab:		NEW-ASB	NEW-ASB	NEW-ASB	NEW-ASB	NEW-ASB
Determinand	**Accred.**	**SOP**	**Units**	**LOD**					
ACM Type	U	2192		N/A	-	-	-	-	-
Asbestos Identification	U	2192		N/A	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected
Moisture	N	2030	%	0.020	13	16	9.8	27	13
Boron (Hot Water Soluble)	U	2120	mg/kg	0.40	[A] < 0.40	[A] < 0.40	[A] < 0.40	[A] < 0.40	[A] < 0.40
Sulphur (Elemental)	U	2180	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Cyanide (Total)	U	2300	mg/kg	0.50	[A] < 0.50	[A] < 0.50	[A] < 0.50	[A] < 0.50	[A] < 0.50
Sulphide (Easily Liberatable)	N	2325	mg/kg	0.50	[A] 3.9	[A] 2.4	[A] 7.5	[A] 6.4	[A] 5.5
Sulphate (Acid Soluble)	U	2430	%	0.010	[A] 0.024	[A] 0.015	[A] 0.027	[A] 0.030	[A] 0.031
Arsenic	U	2455	mg/kg	0.5	7.1	7.3	9.7	7.4	9.7
Barium	U	2455	mg/kg	0	42	66	69	42	49
Cadmium	U	2455	mg/kg	0.10	1.9	1.7	1.9	1.3	2.2
Chromium	U	2455	mg/kg	0.5	14	19	19	16	20
Molybdenum	U	2455	mg/kg	0.5	0.7	< 0.5	1.0	0.6	1.6
Antimony	N	2455	mg/kg	2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Copper	U	2455	mg/kg	0.50	13	16	17	14	17
Mercury	U	2455	mg/kg	0.05	0.08	0.07	0.07	0.07	0.10
Nickel	U	2455	mg/kg	0.50	32	34	37	28	37
Lead	U	2455	mg/kg	0.50	36	28	29	30	47
Selenium	U	2455	mg/kg	0.25	0.57	0.65	0.77	0.59	0.90
Zinc	U	2455	mg/kg	0.50	120	93	120	81	130
Chromium (Trivalent)	N	2490	mg/kg	1.0	14	19	19	16	20
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Mineral Oil (TPH Calculation)	N	2670	mg/kg	10	< 10	< 10	< 10	< 10	< 10
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Aliphatic TPH >C8-C10	N	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Aliphatic TPH >C10-C12	N	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Aliphatic TPH >C12-C16	N	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Aliphatic TPH >C16-C21	N	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Aliphatic TPH >C21-C35	N	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Total Aliphatic Hydrocarbons	N	2680	mg/kg	5.0	[A] < 5.0	[A] < 5.0	[A] < 5.0	[A] < 5.0	[A] < 5.0
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Aromatic TPH >C7-C8	N	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Aromatic TPH >C8-C10	N	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Aromatic TPH >C10-C12	N	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Aromatic TPH >C12-C16	N	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Aromatic TPH >C16-C21	N	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Aromatic TPH >C21-C35	N	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0

Results - Soil

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Project: Halverstown

Client: IGSL			**Chemtest Job No.:**		23-02702	23-02702	23-02702	23-02702	23-02702
Quotation No.: Q20-19951			**Chemtest Sample ID.:**		1580840	1580841	1580842	1580843	1580844
			Client Sample ID.:		TP3	TP9	TP15	TP26	TP32
			Sample Type:		SOIL	SOIL	SOIL	SOIL	SOIL
			Top Depth (m):		0.5	0.5	0.5	0.5	0.5
			Asbestos Lab:		NEW-ASB	NEW-ASB	NEW-ASB	NEW-ASB	NEW-ASB
Determinand	**Accred.**	**SOP**	**Units**	**LOD**					
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Total Aromatic Hydrocarbons	N	2680	mg/kg	5.0	[A] < 5.0	[A] < 5.0	[A] < 5.0	[A] < 5.0	[A] < 5.0
Total Petroleum Hydrocarbons	N	2680	mg/kg	10.0	[A] < 10	[A] < 10	[A] < 10	[A] < 10	[A] < 10
Benzene	U	2760	µg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Toluene	U	2760	µg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Ethylbenzene	U	2760	µg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
m & p-Xylene	U	2760	µg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
o-Xylene	U	2760	µg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Methyl Tert-Butyl Ether	U	2760	µg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Naphthalene	N	2800	mg/kg	0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010
Acenaphthylene	N	2800	mg/kg	0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010
Acenaphthene	N	2800	mg/kg	0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010
Fluorene	N	2800	mg/kg	0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010
Phenanthrene	N	2800	mg/kg	0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010
Anthracene	N	2800	mg/kg	0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010
Fluoranthene	N	2800	mg/kg	0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010
Pyrene	N	2800	mg/kg	0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010
Benzo[a]anthracene	N	2800	mg/kg	0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010
Chrysene	N	2800	mg/kg	0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010
Benzo[b]fluoranthene	N	2800	mg/kg	0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010
Benzo[k]fluoranthene	N	2800	mg/kg	0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010
Benzo[a]pyrene	N	2800	mg/kg	0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010
Indeno(1,2,3-c,d)Pyrene	N	2800	mg/kg	0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010
Dibenz(a,h)Anthracene	N	2800	mg/kg	0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010
Benzo[g,h,i]perylene	N	2800	mg/kg	0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010
Coronene	N	2800	mg/kg	0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010
Total Of 17 PAH's	N	2800	mg/kg	0.20	[A] < 0.20	[A] < 0.20	[A] < 0.20	[A] < 0.20	[A] < 0.20
PCB 28	N	2815	mg/kg	0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010
PCB 52	N	2815	mg/kg	0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010
PCB 90+101	N	2815	mg/kg	0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010
PCB 118	N	2815	mg/kg	0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010
PCB 153	N	2815	mg/kg	0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010
PCB 138	N	2815	mg/kg	0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010
PCB 180	N	2815	mg/kg	0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010
Total PCBs (7 congeners)	N	2815	mg/kg	0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	[A] < 0.0010
Total Phenols	U	2920	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10

Results - Single Stage WAC

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Project: Halverstown

					Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	23-02702						
Chemtest Sample ID:	1580840						
Sample Ref:							
Sample ID:	TP3						
Sample Location:							
Top Depth(m):	0.5						
Bottom Depth(m):							
Sampling Date:							
Determinand	**SOP**	**Accred.**	**Units**		**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Total Organic Carbon	2625	U	%	[A] 0.23	3	5	6
Loss On Ignition	2610	U	%	1.3	--	--	10
Total BTEX	2760	U	mg/kg	[A] < 0.010	6	--	--
Total PCBs (7 congeners)	2815	N	mg/kg	[A] < 0.0010	1	--	--
TPH Total WAC	2670	U	mg/kg	[A] < 10	500	--	--
Total Of 17 PAH's	2800	N	mg/kg	[A] < 0.20	100	--	--
pH	2010	U		8.7	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.10	--	To evaluate	To evaluate
Eluate Analysis			**10:1 Eluate mg/l**	**10:1 Eluate mg/kg**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1455	U	0.0013	0.013	0.5	2	25
Barium	1455	U	< 0.005	< 0.050	20	100	300
Cadmium	1455	U	< 0.00011	< 0.0011	0.04	1	5
Chromium	1455	U	< 0.0005	< 0.0050	0.5	10	70
Copper	1455	U	0.0024	0.024	2	50	100
Mercury	1455	U	< 0.00005	< 0.00050	0.01	0.2	2
Molybdenum	1455	U	0.0009	0.0090	0.5	10	30
Nickel	1455	U	0.0005	0.0050	0.4	10	40
Lead	1455	U	< 0.0005	< 0.0050	0.5	10	50
Antimony	1455	U	< 0.0005	< 0.0050	0.06	0.7	5
Selenium	1455	U	0.0048	0.048	0.1	0.5	7
Zinc	1455	U	0.012	0.12	4	50	200
Chloride	1220	U	1.3	13	800	15000	25000
Fluoride	1220	U	0.11	1.1	10	150	500
Sulphate	1220	U	2.8	28	1000	20000	50000
Total Dissolved Solids	1020	N	64	640	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	5.5	55	500	800	1000

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

Waste Acceptance Criteria

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

Results - Single Stage WAC

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Project: Halverstown

					Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	23-02702						
Chemtest Sample ID:	1580841						
Sample Ref:							
Sample ID:	TP9						
Sample Location:							
Top Depth(m):	0.5						
Bottom Depth(m):							
Sampling Date:							
Determinand	**SOP**	**Accred.**	**Units**		**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Total Organic Carbon	2625	U	%	[A] 0.29	3	5	6
Loss On Ignition	2610	U	%	1.7	--	--	10
Total BTEX	2760	U	mg/kg	[A] < 0.010	6	--	--
Total PCBs (7 congeners)	2815	N	mg/kg	[A] < 0.0010	1	--	--
TPH Total WAC	2670	U	mg/kg	[A] < 10	500	--	--
Total Of 17 PAH's	2800	N	mg/kg	[A] < 0.20	100	--	--
pH	2010	U		8.6	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.026	--	To evaluate	To evaluate
Eluate Analysis			**10:1 Eluate mg/l**	**10:1 Eluate mg/kg**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1455	U	0.0020	0.020	0.5	2	25
Barium	1455	U	< 0.005	< 0.050	20	100	300
Cadmium	1455	U	< 0.00011	< 0.0011	0.04	1	5
Chromium	1455	U	0.0015	0.015	0.5	10	70
Copper	1455	U	0.0022	0.022	2	50	100
Mercury	1455	U	< 0.00005	< 0.00050	0.01	0.2	2
Molybdenum	1455	U	0.0004	0.0041	0.5	10	30
Nickel	1455	U	0.0016	0.016	0.4	10	40
Lead	1455	U	0.0011	0.011	0.5	10	50
Antimony	1455	U	< 0.0005	< 0.0050	0.06	0.7	5
Selenium	1455	U	0.0044	0.043	0.1	0.5	7
Zinc	1455	U	0.010	0.10	4	50	200
Chloride	1220	U	< 1.0	< 10	800	15000	25000
Fluoride	1220	U	0.25	2.5	10	150	500
Sulphate	1220	U	1.3	13	1000	20000	50000
Total Dissolved Solids	1020	N	30	300	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	6.5	65	500	800	1000

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

Waste Acceptance Criteria

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

Results - Single Stage WAC

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Project: Halverstown

					Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	23-02702						
Chemtest Sample ID:	1580842						
Sample Ref:							
Sample ID:	TP15						
Sample Location:							
Top Depth(m):	0.5						
Bottom Depth(m):							
Sampling Date:							
Determinand	**SOP**	**Accred.**	**Units**		**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Total Organic Carbon	2625	U	%	[A] < 0.20	3	5	6
Loss On Ignition	2610	U	%	2.0	--	--	10
Total BTEX	2760	U	mg/kg	[A] < 0.010	6	--	--
Total PCBs (7 congeners)	2815	N	mg/kg	[A] < 0.0010	1	--	--
TPH Total WAC	2670	U	mg/kg	[A] < 10	500	--	--
Total Of 17 PAH's	2800	N	mg/kg	[A] < 0.20	100	--	--
pH	2010	U		8.7	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.12	--	To evaluate	To evaluate
Eluate Analysis			**10:1 Eluate mg/l**	**10:1 Eluate mg/kg**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1455	U	0.0022	0.022	0.5	2	25
Barium	1455	U	< 0.005	< 0.050	20	100	300
Cadmium	1455	U	< 0.00011	< 0.0011	0.04	1	5
Chromium	1455	U	0.0010	0.010	0.5	10	70
Copper	1455	U	0.0020	0.020	2	50	100
Mercury	1455	U	< 0.00005	< 0.00050	0.01	0.2	2
Molybdenum	1455	U	0.0008	0.0083	0.5	10	30
Nickel	1455	U	0.0012	0.012	0.4	10	40
Lead	1455	U	0.0014	0.014	0.5	10	50
Antimony	1455	U	< 0.0005	< 0.0050	0.06	0.7	5
Selenium	1455	U	0.0047	0.047	0.1	0.5	7
Zinc	1455	U	0.008	0.081	4	50	200
Chloride	1220	U	< 1.0	< 10	800	15000	25000
Fluoride	1220	U	0.16	1.6	10	150	500
Sulphate	1220	U	< 1.0	< 10	1000	20000	50000
Total Dissolved Solids	1020	N	39	390	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	6.8	68	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	9.8

Waste Acceptance Criteria

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

Results - Single Stage WAC

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Project: Halverstown

					Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	23-02702						
Chemtest Sample ID:	1580843						
Sample Ref:							
Sample ID:	TP26						
Sample Location:							
Top Depth(m):	0.5						
Bottom Depth(m):							
Sampling Date:							
Determinand	**SOP**	**Accred.**	**Units**		**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Total Organic Carbon	2625	U	%	[A] 3.2	3	5	6
Loss On Ignition	2610	U	%	3.0	--	--	10
Total BTEX	2760	U	mg/kg	[A] < 0.010	6	--	--
Total PCBs (7 congeners)	2815	N	mg/kg	[A] < 0.0010	1	--	--
TPH Total WAC	2670	U	mg/kg	[A] < 10	500	--	--
Total Of 17 PAH's	2800	N	mg/kg	[A] < 0.20	100	--	--
pH	2010	U		8.4	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.028	--	To evaluate	To evaluate
Eluate Analysis			**10:1 Eluate mg/l**	**10:1 Eluate mg/kg**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1455	U	0.0017	0.017	0.5	2	25
Barium	1455	U	< 0.005	< 0.050	20	100	300
Cadmium	1455	U	< 0.00011	< 0.0011	0.04	1	5
Chromium	1455	U	< 0.0005	< 0.0050	0.5	10	70
Copper	1455	U	0.0016	0.016	2	50	100
Mercury	1455	U	< 0.00005	< 0.00050	0.01	0.2	2
Molybdenum	1455	U	0.0013	0.013	0.5	10	30
Nickel	1455	U	0.0006	0.0063	0.4	10	40
Lead	1455	U	< 0.0005	< 0.0050	0.5	10	50
Antimony	1455	U	< 0.0005	< 0.0050	0.06	0.7	5
Selenium	1455	U	0.0044	0.043	0.1	0.5	7
Zinc	1455	U	0.008	0.076	4	50	200
Chloride	1220	U	< 1.0	< 10	800	15000	25000
Fluoride	1220	U	0.12	1.2	10	150	500
Sulphate	1220	U	< 1.0	< 10	1000	20000	50000
Total Dissolved Solids	1020	N	55	540	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	6.3	63	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	27

Waste Acceptance Criteria

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

Results - Single Stage WAC

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Project: Halverstown

					Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	23-02702						
Chemtest Sample ID:	1580844						
Sample Ref:							
Sample ID:	TP32						
Sample Location:							
Top Depth(m):	0.5						
Bottom Depth(m):							
Sampling Date:							
Determinand	**SOP**	**Accred.**	**Units**		**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Total Organic Carbon	2625	U	%	[A] 0.90	3	5	6
Loss On Ignition	2610	U	%	1.8	--	--	10
Total BTEX	2760	U	mg/kg	[A] < 0.010	6	--	--
Total PCBs (7 congeners)	2815	N	mg/kg	[A] < 0.0010	1	--	--
TPH Total WAC	2670	U	mg/kg	[A] < 10	500	--	--
Total Of 17 PAH's	2800	N	mg/kg	[A] < 0.20	100	--	--
pH	2010	U		8.9	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.079	--	To evaluate	To evaluate
Eluate Analysis			**10:1 Eluate mg/l**	**10:1 Eluate mg/kg**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1455	U	0.0015	0.015	0.5	2	25
Barium	1455	U	< 0.005	< 0.050	20	100	300
Cadmium	1455	U	< 0.00011	< 0.0011	0.04	1	5
Chromium	1455	U	0.0007	0.0074	0.5	10	70
Copper	1455	U	0.0010	0.010	2	50	100
Mercury	1455	U	< 0.00005	< 0.00050	0.01	0.2	2
Molybdenum	1455	U	0.0006	0.0062	0.5	10	30
Nickel	1455	U	0.0006	0.0058	0.4	10	40
Lead	1455	U	< 0.0005	< 0.0050	0.5	10	50
Antimony	1455	U	< 0.0005	< 0.0050	0.06	0.7	5
Selenium	1455	U	0.0041	0.041	0.1	0.5	7
Zinc	1455	U	0.004	0.041	4	50	200
Chloride	1220	U	< 1.0	< 10	800	15000	25000
Fluoride	1220	U	0.12	1.2	10	150	500
Sulphate	1220	U	< 1.0	< 10	1000	20000	50000
Total Dissolved Solids	1020	N	42	420	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	4.9	< 50	500	800	1000

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

Waste Acceptance Criteria

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

Deviations

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

Sample:	Sample Ref:	Sample ID:	Sample Location:	Sampled Date:	Deviation Code(s):	Containers Received:
1580840		TP3			A	Amber Glass 250ml
1580840		TP3			A	Plastic Tub 500g
1580841		TP9			A	Amber Glass 250ml
1580841		TP9			A	Plastic Tub 500g
1580842		TP15			A	Amber Glass 250ml
1580842		TP15			A	Plastic Tub 500g
1580843		TP26			A	Amber Glass 250ml
1580843		TP26			A	Plastic Tub 500g
1580844		TP32			A	Amber Glass 250ml
1580844		TP32			A	Plastic Tub 500g

Test Methods

SOP	Title	Parameters included	Method summary
1010	pH Value of Waters	pH	pH Meter
1020	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Conductivity Meter
1220	Anions, Alkalinity & Ammonium in Waters	Fluoride; Chloride; Nitrite; Nitrate; Total; Oxidisable Nitrogen (TON); Sulfate; Phosphate; Alkalinity; Ammonium	Automated colorimetric analysis using 'Aquakem 600' Discrete Analyser.
1455	Metals in Waters by ICP-MS	Metals, including: Antimony; Arsenic; Barium; Beryllium; Boron; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Tin; Vanadium; Zinc	Filtration of samples followed by direct determination by inductively coupled plasma mass spectrometry (ICP-MS).
1610	Total/Dissolved Organic Carbon in Waters	Organic Carbon	TOC Analyser using Catalytic Oxidation
1800	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Waters by GC-MS	Acenaphthene; Acenaphthylene; Anthracene; Benzo[a]Anthracene; Benzo[a]Pyrene; Benzo[b]Fluoranthene; Benzo[ghi]Perylene; Benzo[k]Fluoranthene; Chrysene; Dibenz[ah]Anthracene; Fluoranthene; Fluorene; Indeno[123cd]Pyrene; Naphthalene; Phenanthrene; Pyrene	Pentane extraction / GCMS detection
1920	Phenols in Waters by HPLC	Phenolic compounds including: Phenol, Cresols, Xylenols, Trimethylphenols Note: Chlorophenols are excluded.	Determination by High Performance Liquid Chromatography (HPLC) using electrochemical detection.
2010	pH Value of Soils	pH	pH Meter
2015	Acid Neutralisation Capacity	Acid Reserve	Titration
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.
2040	Soil Description(Requirement of MCERTS)	Soil description	As received soil is described based upon BS5930
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES
2180	Sulphur (Elemental) in Soils by HPLC	Sulphur	Dichloromethane extraction / HPLC with UV detection
2192	Asbestos	Asbestos	Polarised light microscopy / Gravimetry
2300	Cyanides & Thiocyanate in Soils	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Allkaline extraction followed by colorimetric determination using Automated Flow Injection Analyser.
2325	Sulphide in Soils	Sulphide	Steam distillation with sulphuric acid / analysis by 'Aquakem 600' Discrete Analyser, using N,N–dimethyl-p-phenylenediamine.
2430	Total Sulphate in soils	Total Sulphate	Acid digestion followed by determination of sulphate in extract by ICP-OES.
2455	Acid Soluble Metals in Soils	Metals, including: Arsenic; Barium; Beryllium; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Vanadium; Zinc	Acid digestion followed by determination of metals in extract by ICP-MS.
2490	Hexavalent Chromium in Soils	Chromium [VI]	Soil extracts are prepared by extracting dried and ground soil samples into boiling water. Chromium [VI] is determined by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazide.
2610	Loss on Ignition	loss on ignition (LOI)	Determination of the proportion by mass that is lost from a soil by ignition at 550°C.
2625	Total Organic Carbon in Soils	Total organic Carbon (TOC)	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.

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Test Methods

SOP	Title	Parameters included	Method summary
2670	Total Petroleum Hydrocarbons (TPH) in Soils by GC-FID	TPH (C6–C40); optional carbon banding, e.g. 3-band – GRO, DRO & LRO*TPH C8–C40	Dichloromethane extraction / GC-FID
2680	TPH A/A Split	Aliphatics: >C5–C6, >C6–C8,>C8–C10, >C10–C12, >C12–C16, >C16–C21, >C21–C35, >C35– C44Aromatics: >C5–C7, >C7–C8, >C8– C10, >C10–C12, >C12–C16, >C16– C21, >C21– C35, >C35– C44	Dichloromethane extraction / GCxGC-FID detection
2760	Volatile Organic Compounds (VOCs) in Soils by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics.(cf. USEPA Method 8260)*please refer to UKAS schedule	Automated headspace gas chromatographic (GC) analysis of a soil sample, as received, with mass spectrometric (MS) detection of volatile organic compounds.
2800	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-MS	Acenaphthene*; Acenaphthylene; Anthracene*; Benzo[a]Anthracene*; Benzo[a]Pyrene*; Benzo[b]Fluoranthene*; Benzo[ghi]Perylene*; Benzo[k]Fluoranthene; Chrysene*; Dibenz[ah]Anthracene; Fluoranthene*; Fluorene*; Indeno[123cd]Pyrene*; Naphthalene*; Phenanthrene*; Pyrene*	Dichloromethane extraction / GC-MS
2815	Polychlorinated Biphenyls (PCB) ICES7Congeners in Soils by GC-MS	ICES7 PCB congeners	Acetone/Hexane extraction / GC-MS
2920	Phenols in Soils by HPLC	Phenolic compounds including Resorcinol, Phenol, Methylphenols, Dimethylphenols, 1-Naphthol and TrimethylphenolsNote: chlorophenols are excluded.	60:40 methanol/water mixture extraction, followed by HPLC determination using electrochemical detection.
640	Characterisation of Waste (Leaching C10)	Waste material including soil, sludges and granular waste	ComplianceTest for Leaching of Granular Waste Material and Sludge

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Report Information

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Key

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

Comments or interpretations are beyond the scope of UKAS accreditation
The results relate only to the items tested
Uncertainty of measurement for the determinands tested are available upon request
None of the results in this report have been recovery corrected
All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis
All Asbestos testing is performed at the indicated laboratory
Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

A - Date of sampling not supplied
B - Sample age exceeds stability time (sampling to extraction)
C - Sample not received in appropriate containers
D - Broken Container
E - Insufficient Sample (Applies to LOI in Trommel Fines Only)

Sample Retention and Disposal

All soil samples will be retained for a period of 30 days from the date of receipt
All water samples will be retained for 14 days from the date of receipt
Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:
customerservices@chemtest.com

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Appendix 3

Waste Classification Report

HazWasteOnline™

Waste Classification Report

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HMMVA-RUOAH-IZTKI

HazWasteOnline™ classifies waste as either **hazardous** or **non-hazardous** based on its chemical composition, related legislation and the rules and data defined in the current UK or EU technical guidance (Appendix C) (note that HP 9 Infectious is not assessed). It is the responsibility of the classifier named below to:

a) understand the origin of the waste
b) select the correct List of Waste code(s)
c) confirm that the list of determinands, results and sampling plan are fit for purpose
d) select and justify the chosen metal species (Appendix B)
e) correctly apply moisture correction and other available corrections
f) add the meta data for their user-defined substances (Appendix A)
g) check that the classification engine is suitable with respect to the national destination of the waste (Appendix C)

To aid the reviewer, the laboratory results, assumptions and justifications managed by the classifier are highlighted in pale yellow.

Job name

23-001-01 Halverstown

Description/Comments

5 No. composite samples from 5 No. Trial Pits in a greenfield site.

Project

23-001-01

Site

Halverstown

Classified by

Name:
Austin Hynes
Date:
14 Feb 2023 11:05 GMT
Telephone:
+353 (0)21 4345366

Company:
O'Callaghan Moran & Associates
Unit 15 Melbourne Business Park,
Model Farm Road
Cork

HazWasteOnline™ provides a two day, hazardous waste classification course that covers the use of the software and both basic and advanced waste classification techniques. Certification has to be renewed every 3 years.

HazWasteOnline™ Certification: CERTIFIED

Course	Date
Hazardous Waste Classification	06 Oct 2022

Next 3 year Refresher due by Oct 2025

Purpose of classification

7 - Disposal of Waste

Address of the waste

Lands at Halverstown, Naas, Co. Kilare **Post Code** NA

SIC for the process giving rise to the waste

41202 Construction of domestic buildings

Description of industry/producer giving rise to the waste

Site Investigation

Description of the specific process, sub-process and/or activity that created the waste

Excavation

Description of the waste

Soil and Stone

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Job summary

#	Sample name	Depth [m]	Classification Result	Hazard properties	Page
1	TP3	0.5	Non Hazardous		3
2	TP9	0.5	Non Hazardous		6
3	TP15	0.5	Non Hazardous		9
4	TP26	0.5	Non Hazardous		12
5	TP32	0.5	Non Hazardous		15

Related documents

#	Name	Description
1	OCM Waste Stream Updated 2021	waste stream template used to create this Job

Report

Created by: Austin Hynes

Created date: 14 Feb 2023 11:05 GMT

Appendices	Page
Appendix A: Classifier defined and non EU CLP determinands	18
Appendix B: Rationale for selection of metal species	19
Appendix C: Version	20

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Classification of sample: TP3

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:
TP3
Sample Depth:
0.5 m
Moisture content:
13%
(dry weight correction)

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 13% Dry Weight Moisture Correction applied (MC)

#	Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
1	antimony { antimony trioxide }	051-005-00-X	215-175-0	1309-64-4		<2	mg/kg	1.197	<2.394	mg/kg	<0.000239 %		<**LOD**
2	arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		7.1	mg/kg	1.32	8.296	mg/kg	0.00083 %	✓	
3	boron { diboron trioxide }	005-008-00-8	215-125-8	1303-86-2		<0.4	mg/kg	3.22	<1.288	mg/kg	<0.000129 %		<**LOD**
4	cadmium { cadmium oxide }	048-002-00-0	215-146-2	1306-19-0		1.9	mg/kg	1.142	1.921	mg/kg	0.000192 %	✓	
5	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		14	mg/kg	1.462	18.108	mg/kg	0.00181 %	✓	
6	chromium in chromium(VI) compounds { chromium (VI) compounds, with the exception of barium chromate and of compounds specified elsewhere in this Annex }	024-017-00-8				<0.5	mg/kg	2.27	<1.135	mg/kg	<0.000113 %		<**LOD**
7	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		13	mg/kg	1.126	12.953	mg/kg	0.0013 %	✓	
8	lead { lead chromate }	082-004-00-2	231-846-0	7758-97-6	1	36	mg/kg	1.56	49.693	mg/kg	0.00319 %	✓	
9	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		0.08	mg/kg	1.353	0.0958	mg/kg	0.00000958 %	✓	
10	molybdenum { molybdenum(VI) oxide }	042-001-00-9	215-204-7	1313-27-5		0.7	mg/kg	1.5	0.929	mg/kg	0.0000929 %	✓	
11	nickel { nickel chromate }	028-035-00-7	238-766-5	14721-18-7		32	mg/kg	2.976	84.284	mg/kg	0.00843 %	✓	
12	selenium { nickel selenate }	028-031-00-5	239-125-2	15060-62-5		0.57	mg/kg	2.554	1.288	mg/kg	0.000129 %	✓	
13	zinc { zinc chromate }	024-007-00-3	236-878-9	13530-65-9		120	mg/kg	2.774	294.6	mg/kg	0.0295 %	✓	
14	TPH (C6 to C40) petroleum group			TPH		<10	mg/kg		<10	mg/kg	<0.001 %		<**LOD**
15	tert-butyl methyl ether; MTBE; 2-methoxy-2-methylpropane	603-181-00-X	216-653-1	1634-04-4		<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<**LOD**

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#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		EU CLP index number	EC Number	CAS Number									
16		benzene				<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<LOD
		601-020-00-8	200-753-7	71-43-2									
17		toluene				<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<LOD
		601-021-00-3	203-625-9	108-88-3									
18		ethylbenzene				<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<LOD
		601-023-00-4	202-849-4	100-41-4									
19		xylene				<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<LOD
		601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]									
20		cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }				<0.5	mg/kg	1.884	<0.942	mg/kg	<0.0000942 %		<LOD
		006-007-00-5											
21		naphthalene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
		601-052-00-2	202-049-5	91-20-3									
22		acenaphthylene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
			205-917-1	208-96-8									
23		acenaphthene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
			201-469-6	83-32-9									
24		fluorene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
			201-695-5	86-73-7									
25		phenanthrene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
			201-581-5	85-01-8									
26		anthracene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
			204-371-1	120-12-7									
27		fluoranthene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
			205-912-4	206-44-0									
28		pyrene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
			204-927-3	129-00-0									
29		benzo[a]anthracene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
		601-033-00-9	200-280-6	56-55-3									
30		chrysene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
		601-048-00-0	205-923-4	218-01-9									
31		benzo[b]fluoranthene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
		601-034-00-4	205-911-9	205-99-2									
32		benzo[k]fluoranthene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
		601-036-00-5	205-916-6	207-08-9									
33		benzo[a]pyrene; benzo[def]chrysene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
		601-032-00-3	200-028-5	50-32-8									
34		indeno[123-cd]pyrene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
			205-893-2	193-39-5									
35		dibenz[a,h]anthracene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
		601-041-00-2	200-181-8	53-70-3									
36		benzo[ghi]perylene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
			205-883-8	191-24-2									
37		phenol				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
		604-001-00-2	203-632-7	108-95-2									
38		polychlorobiphenyls; PCB				<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<LOD
		602-039-00-4	215-648-1	1336-36-3									
										Total:	0.047 %		

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Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

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Classification of sample: TP9

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:
TP9
Sample Depth:
0.5 m
Moisture content:
16%
(dry weight correction)

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 16% Dry Weight Moisture Correction applied (MC)

#	Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
1	antimony { antimony trioxide }	051-005-00-X	215-175-0	1309-64-4		<2 mg/kg	1.197	<2.394 mg/kg	<0.000239 %		<**LOD**
2	arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		7.3 mg/kg	1.32	8.309 mg/kg	0.000831 %	✓	
3	boron { diboron trioxide }	005-008-00-8	215-125-8	1303-86-2		<0.4 mg/kg	3.22	<1.288 mg/kg	<0.000129 %		<**LOD**
4	cadmium { cadmium oxide }	048-002-00-0	215-146-2	1306-19-0		1.7 mg/kg	1.142	1.674 mg/kg	0.000167 %	✓	
5	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		19 mg/kg	1.462	23.939 mg/kg	0.00239 %	✓	
6	chromium in chromium(VI) compounds { chromium (VI) compounds, with the exception of barium chromate and of compounds specified elsewhere in this Annex }	024-017-00-8				<0.5 mg/kg	2.27	<1.135 mg/kg	<0.000113 %		<**LOD**
7	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		16 mg/kg	1.126	15.529 mg/kg	0.00155 %	✓	
8	lead { lead chromate }	082-004-00-2	231-846-0	7758-97-6	1	28 mg/kg	1.56	37.651 mg/kg	0.00241 %	✓	
9	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		0.07 mg/kg	1.353	0.0817 mg/kg	0.00000817 %	✓	
10	molybdenum { molybdenum(VI) oxide }	042-001-00-9	215-204-7	1313-27-5		<0.5 mg/kg	1.5	<0.75 mg/kg	<0.000075 %		<**LOD**
11	nickel { nickel chromate }	028-035-00-7	238-766-5	14721-18-7		34 mg/kg	2.976	87.235 mg/kg	0.00872 %	✓	
12	selenium { nickel selenate }	028-031-00-5	239-125-2	15060-62-5		0.65 mg/kg	2.554	1.431 mg/kg	0.000143 %	✓	
13	zinc { zinc chromate }	024-007-00-3	236-878-9	13530-65-9		93 mg/kg	2.774	222.41 mg/kg	0.0222 %	✓	
14	TPH (C6 to C40) petroleum group			TPH		<10 mg/kg		<10 mg/kg	<0.001 %		<**LOD**
15	tert-butyl methyl ether; MTBE; 2-methoxy-2-methylpropane	603-181-00-X	216-653-1	1634-04-4		<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		<**LOD**

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#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		EU CLP index number	EC Number	CAS Number									
16		benzene				<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<**LOD**
		601-020-00-8	200-753-7	71-43-2									
17		toluene				<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<**LOD**
		601-021-00-3	203-625-9	108-88-3									
18		ethylbenzene				<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<**LOD**
		601-023-00-4	202-849-4	100-41-4									
19		xylene				<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<**LOD**
		601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]									
20		cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }				<0.5	mg/kg	1.884	<0.942	mg/kg	<0.0000942 %		<**LOD**
		006-007-00-5											
21		naphthalene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<**LOD**
		601-052-00-2	202-049-5	91-20-3									
22		acenaphthylene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<**LOD**
			205-917-1	208-96-8									
23		acenaphthene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<**LOD**
			201-469-6	83-32-9									
24		fluorene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<**LOD**
			201-695-5	86-73-7									
25		phenanthrene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<**LOD**
			201-581-5	85-01-8									
26		anthracene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<**LOD**
			204-371-1	120-12-7									
27		fluoranthene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<**LOD**
			205-912-4	206-44-0									
28		pyrene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<**LOD**
			204-927-3	129-00-0									
29		benzo[a]anthracene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<**LOD**
		601-033-00-9	200-280-6	56-55-3									
30		chrysene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<**LOD**
		601-048-00-0	205-923-4	218-01-9									
31		benzo[b]fluoranthene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<**LOD**
		601-034-00-4	205-911-9	205-99-2									
32		benzo[k]fluoranthene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<**LOD**
		601-036-00-5	205-916-6	207-08-9									
33		benzo[a]pyrene; benzo[def]chrysene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<**LOD**
		601-032-00-3	200-028-5	50-32-8									
34		indeno[123-cd]pyrene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<**LOD**
			205-893-2	193-39-5									
35		dibenz[a,h]anthracene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<**LOD**
		601-041-00-2	200-181-8	53-70-3									
36		benzo[ghi]perylene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<**LOD**
			205-883-8	191-24-2									
37		phenol				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
		604-001-00-2	203-632-7	108-95-2									
38		polychlorobiphenyls; PCB				<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<**LOD**
		602-039-00-4	215-648-1	1336-36-3									
										Total:	0.0402 %		

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Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

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Classification of sample: TP15

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:
TP15
Sample Depth:
0.5 m
Moisture content:
9.8%
(dry weight correction)

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 9.8% Dry Weight Moisture Correction applied (MC)

#	Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
1	antimony { antimony trioxide }	051-005-00-X	215-175-0	1309-64-4		<2 mg/kg	1.197	<2.394 mg/kg	<0.000239 %		<**LOD**
2	arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		9.7 mg/kg	1.32	11.664 mg/kg	0.00117 %	✓	
3	boron { diboron trioxide }	005-008-00-8	215-125-8	1303-86-2		<0.4 mg/kg	3.22	<1.288 mg/kg	<0.000129 %		<**LOD**
4	cadmium { cadmium oxide }	048-002-00-0	215-146-2	1306-19-0		1.9 mg/kg	1.142	1.977 mg/kg	0.000198 %	✓	
5	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		19 mg/kg	1.462	25.291 mg/kg	0.00253 %	✓	
6	chromium in chromium(VI) compounds { chromium (VI) compounds, with the exception of barium chromate and of compounds specified elsewhere in this Annex }	024-017-00-8				<0.5 mg/kg	2.27	<1.135 mg/kg	<0.000113 %		<**LOD**
7	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		17 mg/kg	1.126	17.432 mg/kg	0.00174 %	✓	
8	lead { lead chromate }	082-004-00-2	231-846-0	7758-97-6	1	29 mg/kg	1.56	41.197 mg/kg	0.00264 %	✓	
9	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		0.07 mg/kg	1.353	0.0863 mg/kg	0.00000863 %	✓	
10	molybdenum { molybdenum(VI) oxide }	042-001-00-9	215-204-7	1313-27-5		1 mg/kg	1.5	1.366 mg/kg	0.000137 %	✓	
11	nickel { nickel chromate }	028-035-00-7	238-766-5	14721-18-7		37 mg/kg	2.976	100.293 mg/kg	0.01 %	✓	
12	selenium { nickel selenate }	028-031-00-5	239-125-2	15060-62-5		0.77 mg/kg	2.554	1.791 mg/kg	0.000179 %	✓	
13	zinc { zinc chromate }	024-007-00-3	236-878-9	13530-65-9		120 mg/kg	2.774	303.185 mg/kg	0.0303 %	✓	
14	TPH (C6 to C40) petroleum group			TPH		<10 mg/kg		<10 mg/kg	<0.001 %		<**LOD**
15	tert-butyl methyl ether; MTBE; 2-methoxy-2-methylpropane	603-181-00-X	216-653-1	1634-04-4		<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		<**LOD**

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#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		EU CLP index number	EC Number	CAS Number									
16		benzene				<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<LOD
		601-020-00-8	200-753-7	71-43-2									
17		toluene				<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<LOD
		601-021-00-3	203-625-9	108-88-3									
18		ethylbenzene				<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<LOD
		601-023-00-4	202-849-4	100-41-4									
19		xylene				<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<LOD
		601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]									
20		cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }				<0.5	mg/kg	1.884	<0.942	mg/kg	<0.0000942 %		<LOD
		006-007-00-5											
21		naphthalene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
		601-052-00-2	202-049-5	91-20-3									
22		acenaphthylene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
			205-917-1	208-96-8									
23		acenaphthene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
			201-469-6	83-32-9									
24		fluorene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
			201-695-5	86-73-7									
25		phenanthrene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
			201-581-5	85-01-8									
26		anthracene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
			204-371-1	120-12-7									
27		fluoranthene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
			205-912-4	206-44-0									
28		pyrene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
			204-927-3	129-00-0									
29		benzo[a]anthracene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
		601-033-00-9	200-280-6	56-55-3									
30		chrysene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
		601-048-00-0	205-923-4	218-01-9									
31		benzo[b]fluoranthene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
		601-034-00-4	205-911-9	205-99-2									
32		benzo[k]fluoranthene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
		601-036-00-5	205-916-6	207-08-9									
33		benzo[a]pyrene; benzo[def]chrysene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
		601-032-00-3	200-028-5	50-32-8									
34		indeno[123-cd]pyrene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
			205-893-2	193-39-5									
35		dibenz[a,h]anthracene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
		601-041-00-2	200-181-8	53-70-3									
36		benzo[ghi]perylene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
			205-883-8	191-24-2									
37		phenol				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
		604-001-00-2	203-632-7	108-95-2									
38		polychlorobiphenyls; PCB				<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<LOD
		602-039-00-4	215-648-1	1336-36-3									
										Total:	0.0506 %		

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Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

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Classification of sample: TP26

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:
TP26
Sample Depth:
0.5 m
Moisture content:
27%
(dry weight correction)

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 27% Dry Weight Moisture Correction applied (MC)

#	Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
1	antimony { antimony trioxide }	051-005-00-X	215-175-0	1309-64-4		<2 mg/kg	1.197	<2.394 mg/kg	<0.000239 %		<**LOD**
2	arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		7.4 mg/kg	1.32	7.693 mg/kg	0.000769 %	✓	
3	boron { diboron trioxide }	005-008-00-8	215-125-8	1303-86-2		<0.4 mg/kg	3.22	<1.288 mg/kg	<0.000129 %		<**LOD**
4	cadmium { cadmium oxide }	048-002-00-0	215-146-2	1306-19-0		1.3 mg/kg	1.142	1.169 mg/kg	0.000117 %	✓	
5	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		16 mg/kg	1.462	18.413 mg/kg	0.00184 %	✓	
6	chromium in chromium(VI) compounds { chromium (VI) compounds, with the exception of barium chromate and of compounds specified elsewhere in this Annex }	024-017-00-8				<0.5 mg/kg	2.27	<1.135 mg/kg	<0.000113 %		<**LOD**
7	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		14 mg/kg	1.126	12.411 mg/kg	0.00124 %	✓	
8	lead { lead chromate }	082-004-00-2	231-846-0	7758-97-6	1	30 mg/kg	1.56	36.846 mg/kg	0.00236 %	✓	
9	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		0.07 mg/kg	1.353	0.0746 mg/kg	0.00000746 %	✓	
10	molybdenum { molybdenum(VI) oxide }	042-001-00-9	215-204-7	1313-27-5		0.6 mg/kg	1.5	0.709 mg/kg	0.0000709 %	✓	
11	nickel { nickel chromate }	028-035-00-7	238-766-5	14721-18-7		28 mg/kg	2.976	65.618 mg/kg	0.00656 %	✓	
12	selenium { nickel selenate }	028-031-00-5	239-125-2	15060-62-5		0.59 mg/kg	2.554	1.186 mg/kg	0.000119 %	✓	
13	zinc { zinc chromate }	024-007-00-3	236-878-9	13530-65-9		81 mg/kg	2.774	176.934 mg/kg	0.0177 %	✓	
14	TPH (C6 to C40) petroleum group			TPH		<10 mg/kg		<10 mg/kg	<0.001 %		<**LOD**
15	tert-butyl methyl ether; MTBE; 2-methoxy-2-methylpropane	603-181-00-X	216-653-1	1634-04-4		<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		<**LOD**

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#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		EU CLP index number	EC Number	CAS Number									
16		benzene				<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<LOD
		601-020-00-8	200-753-7	71-43-2									
17		toluene				<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<LOD
		601-021-00-3	203-625-9	108-88-3									
18		ethylbenzene				<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<LOD
		601-023-00-4	202-849-4	100-41-4									
19		xylene				<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<LOD
		601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]									
20		cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }				<0.5	mg/kg	1.884	<0.942	mg/kg	<0.0000942 %		<LOD
		006-007-00-5											
21		naphthalene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
		601-052-00-2	202-049-5	91-20-3									
22		acenaphthylene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
			205-917-1	208-96-8									
23		acenaphthene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
			201-469-6	83-32-9									
24		fluorene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
			201-695-5	86-73-7									
25		phenanthrene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
			201-581-5	85-01-8									
26		anthracene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
			204-371-1	120-12-7									
27		fluoranthene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
			205-912-4	206-44-0									
28		pyrene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
			204-927-3	129-00-0									
29		benzo[a]anthracene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
		601-033-00-9	200-280-6	56-55-3									
30		chrysene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
		601-048-00-0	205-923-4	218-01-9									
31		benzo[b]fluoranthene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
		601-034-00-4	205-911-9	205-99-2									
32		benzo[k]fluoranthene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
		601-036-00-5	205-916-6	207-08-9									
33		benzo[a]pyrene; benzo[def]chrysene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
		601-032-00-3	200-028-5	50-32-8									
34		indeno[123-cd]pyrene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
			205-893-2	193-39-5									
35		dibenz[a,h]anthracene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
		601-041-00-2	200-181-8	53-70-3									
36		benzo[ghi]perylene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
			205-883-8	191-24-2									
37		phenol				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
		604-001-00-2	203-632-7	108-95-2									
38		polychlorobiphenyls; PCB				<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<LOD
		602-039-00-4	215-648-1	1336-36-3									
										Total:	0.0324 %		

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Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

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Classification of sample: TP32

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:
TP32
Sample Depth:
0.5 m
Moisture content:
13%
(dry weight correction)

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 13% Dry Weight Moisture Correction applied (MC)

#	Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
1	antimony { antimony trioxide }	051-005-00-X	215-175-0	1309-64-4		<2 mg/kg	1.197	<2.394 mg/kg	<0.000239 %		<**LOD**
2	arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		9.7 mg/kg	1.32	11.334 mg/kg	0.00113 %	✓	
3	boron { diboron trioxide }	005-008-00-8	215-125-8	1303-86-2		<0.4 mg/kg	3.22	<1.288 mg/kg	<0.000129 %		<**LOD**
4	cadmium { cadmium oxide }	048-002-00-0	215-146-2	1306-19-0		2.2 mg/kg	1.142	2.224 mg/kg	0.000222 %	✓	
5	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		20 mg/kg	1.462	25.868 mg/kg	0.00259 %	✓	
6	chromium in chromium(VI) compounds { chromium (VI) compounds, with the exception of barium chromate and of compounds specified elsewhere in this Annex }	024-017-00-8				<0.5 mg/kg	2.27	<1.135 mg/kg	<0.000113 %		<**LOD**
7	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		17 mg/kg	1.126	16.938 mg/kg	0.00169 %	✓	
8	lead { lead chromate }	082-004-00-2	231-846-0	7758-97-6	1	47 mg/kg	1.56	64.877 mg/kg	0.00416 %	✓	
9	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		0.1 mg/kg	1.353	0.12 mg/kg	0.000012 %	✓	
10	molybdenum { molybdenum(VI) oxide }	042-001-00-9	215-204-7	1313-27-5		1.6 mg/kg	1.5	2.124 mg/kg	0.000212 %	✓	
11	nickel { nickel chromate }	028-035-00-7	238-766-5	14721-18-7		37 mg/kg	2.976	97.453 mg/kg	0.00975 %	✓	
12	selenium { nickel selenate }	028-031-00-5	239-125-2	15060-62-5		0.9 mg/kg	2.554	2.034 mg/kg	0.000203 %	✓	
13	zinc { zinc chromate }	024-007-00-3	236-878-9	13530-65-9		130 mg/kg	2.774	319.15 mg/kg	0.0319 %	✓	
14	TPH (C6 to C40) petroleum group			TPH		<10 mg/kg		<10 mg/kg	<0.001 %		<**LOD**
15	tert-butyl methyl ether; MTBE; 2-methoxy-2-methylpropane	603-181-00-X	216-653-1	1634-04-4		<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		<**LOD**

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#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		EU CLP index number	EC Number	CAS Number									
16		benzene				<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<LOD
		601-020-00-8	200-753-7	71-43-2									
17		toluene				<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<LOD
		601-021-00-3	203-625-9	108-88-3									
18		ethylbenzene				<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<LOD
		601-023-00-4	202-849-4	100-41-4									
19		xylene				<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<LOD
		601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]									
20		cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }				<0.5	mg/kg	1.884	<0.942	mg/kg	<0.0000942 %		<LOD
		006-007-00-5											
21		naphthalene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
		601-052-00-2	202-049-5	91-20-3									
22		acenaphthylene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
			205-917-1	208-96-8									
23		acenaphthene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
			201-469-6	83-32-9									
24		fluorene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
			201-695-5	86-73-7									
25		phenanthrene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
			201-581-5	85-01-8									
26		anthracene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
			204-371-1	120-12-7									
27		fluoranthene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
			205-912-4	206-44-0									
28		pyrene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
			204-927-3	129-00-0									
29		benzo[a]anthracene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
		601-033-00-9	200-280-6	56-55-3									
30		chrysene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
		601-048-00-0	205-923-4	218-01-9									
31		benzo[b]fluoranthene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
		601-034-00-4	205-911-9	205-99-2									
32		benzo[k]fluoranthene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
		601-036-00-5	205-916-6	207-08-9									
33		benzo[a]pyrene; benzo[def]chrysene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
		601-032-00-3	200-028-5	50-32-8									
34		indeno[123-cd]pyrene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
			205-893-2	193-39-5									
35		dibenz[a,h]anthracene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
		601-041-00-2	200-181-8	53-70-3									
36		benzo[ghi]perylene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
			205-883-8	191-24-2									
37		phenol				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
		604-001-00-2	203-632-7	108-95-2									
38		polychlorobiphenyls; PCB				<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<LOD
		602-039-00-4	215-648-1	1336-36-3									
										Total:	0.0535 %		

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Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

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Appendix A: Classifier defined and non EU CLP determinands

- **chromium(III) oxide (worst case)** (EC Number: 215-160-9, CAS Number: 1308-38-9)

Description/Comments: Data from C&L Inventory Database
Data source: https://echa.europa.eu/information-on-chemicals/cl-inventory-database/-/discli/details/33806
Data source date: 17 Jul 2015
Hazard Statements: Acute Tox. 4; H332 , Acute Tox. 4; H302 , Eye Irrit. 2; H319 , STOT SE 3; H335 , Skin Irrit. 2; H315 , Resp. Sens. 1; H334 , Skin Sens. 1; H317 , Repr. 1B; H360FD , Aquatic Acute 1; H400 , Aquatic Chronic 1; H410

- **TPH (C6 to C40) petroleum group** (CAS Number: TPH)

Description/Comments: Hazard statements taken from WM3 1st Edition 2015; Risk phrases: WM2 3rd Edition 2013
Data source: WM3 1st Edition 2015
Data source date: 25 May 2015
Hazard Statements: Flam. Liq. 3; H226 , Asp. Tox. 1; H304 , STOT RE 2; H373 , Muta. 1B; H340 , Carc. 1B; H350 , Repr. 2; H361d , Aquatic Chronic 2; H411

- **ethylbenzene** (EC Number: 202-849-4, CAS Number: 100-41-4)

EU CLP index number: 601-023-00-4
Description/Comments:
Additional Hazard Statement(s): Carc. 2; H351
Reason for additional Hazards Statement(s):
03 Jun 2015 - Carc. 2; H351 hazard statement sourced from: IARC Group 2B (77) 2000

- **salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex**

EU CLP index number: 006-007-00-5
Description/Comments: Conversion factor based on a worst case compound: sodium cyanide
Additional Hazard Statement(s): EUH032 >= 0.2 %
Reason for additional Hazards Statement(s):
14 Dec 2015 - EUH032 >= 0.2 % hazard statement sourced from: WM3, Table C12.2

- **acenaphthylene** (EC Number: 205-917-1, CAS Number: 208-96-8)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 17 Jul 2015
Hazard Statements: Acute Tox. 4; H302 , Acute Tox. 1; H330 , Acute Tox. 1; H310 , Eye Irrit. 2; H319 , STOT SE 3; H335 , Skin Irrit. 2; H315

- **acenaphthene** (EC Number: 201-469-6, CAS Number: 83-32-9)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 17 Jul 2015
Hazard Statements: Eye Irrit. 2; H319 , STOT SE 3; H335 , Skin Irrit. 2; H315 , Aquatic Acute 1; H400 , Aquatic Chronic 1; H410 , Aquatic Chronic 2; H411

- **fluorene** (EC Number: 201-695-5, CAS Number: 86-73-7)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 06 Aug 2015
Hazard Statements: Aquatic Acute 1; H400 , Aquatic Chronic 1; H410

- **phenanthrene** (EC Number: 201-581-5, CAS Number: 85-01-8)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 06 Aug 2015
Hazard Statements: Acute Tox. 4; H302 , Eye Irrit. 2; H319 , STOT SE 3; H335 , Carc. 2; H351 , Skin Sens. 1; H317 , Aquatic Acute 1; H400 , Aquatic Chronic 1; H410 , Skin Irrit. 2; H315

- **anthracene** (EC Number: 204-371-1, CAS Number: 120-12-7)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 17 Jul 2015
Hazard Statements: Eye Irrit. 2; H319 , STOT SE 3; H335 , Skin Irrit. 2; H315 , Skin Sens. 1; H317 , Aquatic Acute 1; H400 , Aquatic Chronic 1; H410

- **fluoranthene** (EC Number: 205-912-4, CAS Number: 206-44-0)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 21 Aug 2015
Hazard Statements: Acute Tox. 4; H302 , Aquatic Acute 1; H400 , Aquatic Chronic 1; H410

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pyrene (EC Number: 204-927-3, CAS Number: 129-00-0)

Description/Comments: Data from C&L Inventory Database; SDS Sigma Aldrich 2014
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 21 Aug 2015
Hazard Statements: Skin Irrit. 2; H315 , Eye Irrit. 2; H319 , STOT SE 3; H335 , Aquatic Acute 1; H400 , Aquatic Chronic 1; H410

indeno[123-cd]pyrene (EC Number: 205-893-2, CAS Number: 193-39-5)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 06 Aug 2015
Hazard Statements: Carc. 2; H351

benzo[ghi]perylene (EC Number: 205-883-8, CAS Number: 191-24-2)

Description/Comments: Data from C&L Inventory Database; SDS Sigma Aldrich 28/02/2015
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 23 Jul 2015
Hazard Statements: Aquatic Acute 1; H400 , Aquatic Chronic 1; H410

polychlorobiphenyls; PCB (EC Number: 215-648-1, CAS Number: 1336-36-3)

EU CLP index number: 602-039-00-4
Description/Comments: Worst Case: IARC considers PCB Group 1; Carcinogenic to humans; POP specific threshold from ATP1 (Regulation 756/2010/EU) to POPs Regulation (Regulation 850/2004/EC). Where applicable, the calculation method laid down in European standards EN 12766-1 and EN 12766-2 shall be applied.
Additional Hazard Statement(s): Carc. 1A; H350
Reason for additional Hazards Statement(s):
29 Sep 2015 - Carc. 1A; H350 hazard statement sourced from: IARC Group 1 (23, Sup 7, 100C) 2012

Appendix B: Rationale for selection of metal species

antimony {antimony trioxide}

Worst case CLP species based on hazard statements/molecular weight and low solubility. Industrial sources include: flame retardants in electrical apparatus, textiles and coatings (edit as required)

arsenic {arsenic trioxide}

Reasonable case CLP species based on hazard statements/molecular weight and most common (stable) oxide of arsenic. Industrial sources include: smelting; main precursor to other arsenic compounds (edit as required)

boron {diboron trioxide}

Reasonable case CLP species based on hazard statements/ molecular weight, physical form and low solubility. Industrial sources include: fluxing agent for glass/enamels; additive for fibre optics, borosilicate glass (edit as required)

cadmium {cadmium oxide}

Reasonable case CLP species based on hazard statements/molecular weight, very low solubility in water. Industrial sources include: electroplating baths, electrodes for storage batteries, catalysts, ceramic glazes, phosphors, pigments and nematocides. (edit as required) Worst case compounds in CLP: cadmium sulphate, chloride, fluoride & iodide not expected as either very soluble and/or compound's industrial usage not related to site history (edit as required)

chromium in chromium(III) compounds {chromium(III) oxide (worst case)}

Reasonable case species based on hazard statements/molecular weight. Industrial sources include: tanning, pigment in paint, inks and glass (edit as required)

chromium in chromium(VI) compounds {chromium (VI) compounds, with the exception of barium chromate and of compounds specified elsewhere in this Annex}

Worst case species based on hazard statements/molecular weight (edit as required)

copper {dicopper oxide; copper (I) oxide}

Reasonable case CLP species based on hazard statements/molecular weight and insolubility in water. Industrial sources include: oxidised copper metal, brake pads, pigments, antifouling paints, fungicide. (edit as required) Worse case copper sulphate is very soluble and likely to have been leached away if ever present and/or not enough soluble sulphate detected. (edit as required)

lead {lead chromate}

Worst case CLP species based on hazard statements/molecular weight (edit as required)

mercury {mercury dichloride}

Worst case CLP species based on hazard statements/molecular weight (edit as required)

molybdenum {molybdenum(VI) oxide}

Worst case CLP species based on hazard statements/molecular weight (edit as required)

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nickel {nickel chromate}

Worst case CLP species based on hazard statements/molecular weight (edit as required)

selenium {nickel selenate}

Worst case CLP species based on hazard statements/molecular weight (edit as required)

zinc {zinc chromate}

Worst case CLP species based on hazard statements/molecular weight (edit as required)

cyanides {salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex}

Harmonised group entry used as most reasonable case as complex cyanides and those specified elsewhere in the annex are not likely to be present in this soil: [Note conversion factor based on a worst case compound: sodium cyanide] (edit as required)

Appendix C: Version

HazWasteOnline Classification Engine: WM3 1st Edition v1.1.NI - Jan 2021
HazWasteOnline Classification Engine Version: 2023.25.5511.10206 (25 Jan 2023)
HazWasteOnline Database: 2023.25.5511.10206 (25 Jan 2023)

This classification utilises the following guidance and legislation:
WM3 v1.1.NI - Waste Classification - 1st Edition v1.1.NI - Jan 2021
CLP Regulation - Regulation 1272/2008/EC of 16 December 2008
1st ATP - Regulation 790/2009/EC of 10 August 2009
2nd ATP - Regulation 286/2011/EC of 10 March 2011
3rd ATP - Regulation 618/2012/EU of 10 July 2012
4th ATP - Regulation 487/2013/EU of 8 May 2013
Correction to 1st ATP - Regulation 758/2013/EU of 7 August 2013
5th ATP - Regulation 944/2013/EU of 2 October 2013
6th ATP - Regulation 605/2014/EU of 5 June 2014
WFD Annex III replacement - Regulation 1357/2014/EU of 18 December 2014
Revised List of Waste 2014 - Decision 2014/955/EU of 18 December 2014
7th ATP - Regulation 2015/1221/EU of 24 July 2015
8th ATP - Regulation (EU) 2016/918 of 19 May 2016
9th ATP - Regulation (EU) 2016/1179 of 19 July 2016
10th ATP - Regulation (EU) 2017/776 of 4 May 2017
HP14 amendment - Regulation (EU) 2017/997 of 8 June 2017
13th ATP - Regulation (EU) 2018/1480 of 4 October 2018
14th ATP - Regulation (EU) 2020/217 of 4 October 2019
15th ATP - Regulation (EU) 2020/1182 of 19 May 2020
The Chemicals (Health and Safety) and Genetically Modified Organisms (Contained Use)(Amendment etc.) (EU Exit) Regulations 2020 - UK: 2020 No. 1567 of 16th December 2020
The Waste and Environmental Permitting etc. (Legislative Functions and Amendment etc.) (EU Exit) Regulations 2020 - UK: 2020 No. 1540 of 16th December 2020
17th ATP - Regulation (EU) 2021/849 of 11 March 2021
18th ATP - Regulation (EU) 2022/692 of 16 February 2022

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Appendix 14

Environmental Laboratory Results (Water)

Report_22-47891

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

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Final Report

Report No.:	22-47891-1
Initial Date of Issue:	10-Jan-2023
Client	IGSL
Client Address:	M7 Business Park Naas County Kildare Ireland
Contact(s):	Darren Keogh
Project	Halverstown

Quotation No.:		**Date Received:**	14-Dec-2022
Order No.:		**Date Instructed:**	19-Dec-2022
No. of Samples:	5		
Turnaround (Wkdays):	8	**Results Due:**	04-Jan-2023
Date Approved:	10-Jan-2023		

Approved By:



Details: Stuart Henderson, Technical Manager

Results - Water

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Project: Halverstown

Client: IGSL			**Chemtest Job No.:**		22-47891	22-47891	22-47891	22-47891	22-47891
Quotation No.:			**Chemtest Sample ID.:**		1564373	1564375	1564377	1564378	1564379
Order No.:			Client Sample Ref.:		Stream Start	Stream End	BH03	BH12	BH103
			Client Sample ID.:		WS1(1)	WS2(1)	WSBH03	WSBH12	WSBH103
			Sample Type:		WATER	WATER	WATER	WATER	WATER
			Top Depth (m):		0.5	0.7	1.3	0.98	2.2
			Date Sampled:		02-Dec-2022	02-Dec-2022	02-Dec-2022	02-Dec-2022	02-Dec-2022
Determinand	**Accred.**	**SOP**	**Units**	**LOD**					
pH	U	1010		N/A	[B] 8.3	[B] 7.9	[B] 7.6	[B] 7.4	[B] 7.5
Dissolved Oxygen	N	1150	mg O2/l	0.50	9.5	9.2	8.5	8.2	8.5
Dissolved CO2	N	1160	mg/l	0.60	[B] 3.8	[B] 10	[B] 19	[B] 29	[B] 22
Alkalinity (Total)	U	1220	mg/l	10	[B] 400	[B] 390	[B] 340	[B] 370	[B] 340
Orthophosphate as PO4	U	1220	mg/l	0.050	[B] 0.097	[B] 0.081	[B] 0.065	[B] 0.064	[B] 0.064
Sulphur	N	1220	mg/l	1.0	[B] 15	[B] 15	[B] 7.3	[B] 22	[B] 4.3
Cyanide (Total)	U	1300	mg/l	0.050	[B] < 0.050	[B] < 0.050	[B] < 0.050	[B] < 0.050	[B] < 0.050
Cyanide (Free)	U	1300	mg/l	0.050	[B] < 0.050	[B] < 0.050	[B] < 0.050	[B] < 0.050	[B] < 0.050
Sulphide	U	1325	mg/l	0.050	[B] < 0.050	[B] < 0.050	[B] < 0.050	[B] < 0.050	[B] < 0.050
Calcium (Dissolved)	U	1455	mg/l	2.00	[B] 120	[B] 120	[B] 77	[B] 110	[B] 87
Total Hardness as CaCO3	U	1270	mg/l	15	[B] 360	[B] 360	[B] 230	[B] 360	[B] 270
Aluminium (Dissolved)	N	1455	µg/l	5.0	[B] < 5.0	[B] < 5.0	[B] < 5.0	[B] < 5.0	[B] < 5.0
Arsenic (Dissolved)	U	1455	µg/l	0.20	[B] 0.78	[B] 0.76	[B] 0.38	[B] 0.44	[B] 0.35
Boron (Dissolved)	U	1455	µg/l	10.0	[B] 26	[B] 27	[B] 29	[B] 22	[B] 32
Barium (Dissolved)	U	1455	µg/l	5.00	[B] 48	[B] 46	[B] 38	[B] 91	[B] 72
Beryllium (Dissolved)	U	1455	µg/l	1.00	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0
Cadmium (Dissolved)	U	1455	µg/l	0.11	[B] < 0.11	[B] < 0.11	[B] < 0.11	[B] < 0.11	[B] < 0.11
Chromium (Dissolved)	U	1455	µg/l	0.50	[B] 7.1	[B] 7.9	[B] 0.89	[B] 0.54	[B] 8.8
Copper (Dissolved)	U	1455	µg/l	0.50	[B] 2.1	[B] 1.9	[B] 2.4	[B] 3.5	[B] 1.2
Iron (Dissolved)	N	1455	µg/l	5.0	[B] 9.3	[B] 8.3	[B] 5.9	[B] 8.7	[B] 5.0
Mercury (Dissolved)	U	1455	µg/l	0.05	[B] < 0.05	[B] < 0.05	[B] < 0.05	[B] < 0.05	[B] < 0.05
Manganese (Dissolved)	U	1455	µg/l	0.50	[B] 0.57	[B] 0.58	[B] 450	[B] 170	[B] 1.3
Nickel (Dissolved)	U	1455	µg/l	0.50	[B] 1.9	[B] 2.0	[B] 9.6	[B] 7.0	[B] 1.2
Lead (Dissolved)	U	1455	µg/l	0.50	[B] < 0.50	[B] < 0.50	[B] < 0.50	[B] < 0.50	[B] < 0.50
Selenium (Dissolved)	U	1455	µg/l	0.50	[B] 5.6	[B] 5.7	[B] 7.6	[B] 8.8	[B] 1.8
Vanadium (Dissolved)	U	1455	µg/l	0.50	[B] < 0.50	[B] < 0.50	[B] < 0.50	[B] < 0.50	[B] < 0.50
Zinc (Dissolved)	U	1455	µg/l	2.5	[B] < 2.5	[B] 2.7	[B] 3.4	[B] 9.4	[B] < 2.5
Chromium (Total)	N	1455	µg/l	0.50	[B] 9.9	[B] 11	[B] 15	[B] 33	[B] 24
Low-Level Chromium (Hexavalent)	U	1495	µg/l	0.10	[B] 4.6	[B] 5.2	[B] 0.41	[B] 0.27	[B] 6.1
Dissolved Organic Carbon	U	1610	mg/l	2.0	3.7	3.4	3.6	5.5	< 2.0
Dissolved Methane	N	1630	mg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	0.057
Aliphatic TPH >C5-C6	N	1675	µg/l	0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10
Aliphatic TPH >C6-C8	N	1675	µg/l	0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10
Aliphatic TPH >C8-C10	N	1675	µg/l	0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10
Aliphatic TPH >C10-C12	N	1675	µg/l	0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10
Aliphatic TPH >C12-C16	N	1675	µg/l	0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10
Aliphatic TPH >C16-C21	N	1675	µg/l	0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10
Aliphatic TPH >C21-C35	N	1675	µg/l	0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10
Aliphatic TPH >C35-C44	N	1675	µg/l	0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10

Results - Water

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Project: Halverstown

Client: IGSL			**Chemtest Job No.:**		22-47891	22-47891	22-47891	22-47891	22-47891
Quotation No.:			**Chemtest Sample ID.:**		1564373	1564375	1564377	1564378	1564379
Order No.:			Client Sample Ref.:		Stream Start	Stream End	BH03	BH12	BH103
			Client Sample ID.:		WS1(1)	WS2(1)	WSBH03	WSBH12	WSBH103
			Sample Type:		WATER	WATER	WATER	WATER	WATER
			Top Depth (m):		0.5	0.7	1.3	0.98	2.2
			Date Sampled:		02-Dec-2022	02-Dec-2022	02-Dec-2022	02-Dec-2022	02-Dec-2022
Determinand	**Accred.**	**SOP**	**Units**	**LOD**					
Total Aliphatic Hydrocarbons	N	1675	µg/l	5.0	[B] < 5.0	[B] < 5.0	[B] < 5.0	[B] < 5.0	[B] < 5.0
Aromatic TPH >C5-C7	N	1675	µg/l	0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10
Aromatic TPH >C7-C8	N	1675	µg/l	0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10
Aromatic TPH >C8-C10	N	1675	µg/l	0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10
Aromatic TPH >C10-C12	N	1675	µg/l	0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10
Aromatic TPH >C12-C16	N	1675	µg/l	0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10
Aromatic TPH >C16-C21	N	1675	µg/l	0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10
Aromatic TPH >C21-C35	N	1675	µg/l	0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10
Aromatic TPH >C35-C44	N	1675	µg/l	0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10
Total Aromatic Hydrocarbons	N	1675	µg/l	5.0	[B] < 5.0	[B] < 5.0	[B] < 5.0	[B] < 5.0	[B] < 5.0
Total Petroleum Hydrocarbons	N	1675	µg/l	10	[B] < 10	[B] < 10	[B] < 10	[B] < 10	[B] < 10
Dichlorodifluoromethane	U	1760	µg/l	1.0	[BC] < 1.0	[BC] < 1.0	[BC] < 1.0	[BC] < 1.0	[BC] < 1.0
Chloromethane	U	1760	µg/l	1.0	[BC] < 1.0	[BC] < 1.0	[BC] < 1.0	[BC] < 1.0	[BC] < 1.0
Vinyl Chloride	N	1760	µg/l	1.0	[BC] < 1.0	[BC] < 1.0	[BC] < 1.0	[BC] < 1.0	[BC] < 1.0
Bromomethane	U	1760	µg/l	5	[BC] < 5	[BC] < 5	[BC] < 5	[BC] < 5	[BC] < 5
Chloroethane	U	1760	µg/l	2.0	[BC] < 2.0	[BC] < 2.0	[BC] < 2.0	[BC] < 2.0	[BC] < 2.0
Trichlorofluoromethane	U	1760	µg/l	1.0	[BC] < 1.0	[BC] < 1.0	[BC] < 1.0	[BC] < 1.0	[BC] < 1.0
1,1-Dichloroethene	U	1760	µg/l	1.0	[BC] < 1.0	[BC] < 1.0	[BC] < 1.0	[BC] < 1.0	[BC] < 1.0
Trans 1,2-Dichloroethene	U	1760	µg/l	1.0	[BC] < 1.0	[BC] < 1.0	[BC] < 1.0	[BC] < 1.0	[BC] < 1.0
1,1-Dichloroethane	U	1760	µg/l	1.0	[BC] < 1.0	[BC] < 1.0	[BC] < 1.0	[BC] < 1.0	[BC] < 1.0
cis 1,2-Dichloroethene	U	1760	µg/l	1.0	[BC] < 1.0	[BC] < 1.0	[BC] < 1.0	[BC] < 1.0	[BC] < 1.0
Bromochloromethane	U	1760	µg/l	5	[BC] < 5	[BC] < 5	[BC] < 5	[BC] < 5	[BC] < 5
Trichloromethane	U	1760	µg/l	1.0	[BC] < 1.0	[BC] < 1.0	[BC] < 1.0	[BC] < 1.0	[BC] < 1.0
1,1,1-Trichloroethane	U	1760	µg/l	1.0	[BC] < 1.0	[BC] < 1.0	[BC] < 1.0	[BC] < 1.0	[BC] < 1.0
Tetrachloromethane	U	1760	µg/l	1.0	[BC] < 1.0	[BC] < 1.0	[BC] < 1.0	[BC] < 1.0	[BC] < 1.0
1,1-Dichloropropene	U	1760	µg/l	1.0	[BC] < 1.0	[BC] < 1.0	[BC] < 1.0	[BC] < 1.0	[BC] < 1.0
Benzene	U	1760	µg/l	1.0	[BC] < 1.0	[BC] < 1.0	[BC] < 1.0	[BC] < 1.0	[BC] < 1.0
1,2-Dichloroethane	U	1760	µg/l	2.0	[BC] < 2.0	[BC] < 2.0	[BC] < 2.0	[BC] < 2.0	[BC] < 2.0
Trichloroethene	N	1760	µg/l	1.0	[BC] < 1.0	[BC] < 1.0	[BC] < 1.0	[BC] < 1.0	[BC] < 1.0
1,2-Dichloropropane	U	1760	µg/l	1.0	[BC] < 1.0	[BC] < 1.0	[BC] < 1.0	[BC] < 1.0	[BC] < 1.0
Dibromomethane	U	1760	µg/l	10	[BC] < 10	[BC] < 10	[BC] < 10	[BC] < 10	[BC] < 10
Bromodichloromethane	U	1760	µg/l	5	[BC] < 5	[BC] < 5	[BC] < 5	[BC] < 5	[BC] < 5
cis-1,3-Dichloropropene	N	1760	µg/l	10	[BC] < 10	[BC] < 10	[BC] < 10	[BC] < 10	[BC] < 10
Toluene	U	1760	µg/l	1.0	[BC] < 1.0	[BC] < 1.0	[BC] < 1.0	[BC] < 1.0	[BC] < 1.0
Trans-1,3-Dichloropropene	N	1760	µg/l	10	[BC] < 10	[BC] < 10	[BC] < 10	[BC] < 10	[BC] < 10
1,1,2-Trichloroethane	U	1760	µg/l	10	[BC] < 10	[BC] < 10	[BC] < 10	[BC] < 10	[BC] < 10
Tetrachloroethene	U	1760	µg/l	1.0	[BC] < 1.0	[BC] < 1.0	[BC] < 1.0	[BC] < 1.0	[BC] < 1.0
1,3-Dichloropropane	U	1760	µg/l	2.0	[BC] < 2.0	[BC] < 2.0	[BC] < 2.0	[BC] < 2.0	[BC] < 2.0
Dibromochloromethane	U	1760	µg/l	10	[BC] < 10	[BC] < 10	[BC] < 10	[BC] < 10	[BC] < 10

Results - Water

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Project: Halverstown

Client: IGSL			**Chemtest Job No.:**		22-47891	22-47891	22-47891	22-47891	22-47891
Quotation No.:			**Chemtest Sample ID.:**		1564373	1564375	1564377	1564378	1564379
Order No.:			Client Sample Ref.:		Stream Start	Stream End	BH03	BH12	BH103
			Client Sample ID.:		WS1(1)	WS2(1)	WSBH03	WSBH12	WSBH103
			Sample Type:		WATER	WATER	WATER	WATER	WATER
			Top Depth (m):		0.5	0.7	1.3	0.98	2.2
			Date Sampled:		02-Dec-2022	02-Dec-2022	02-Dec-2022	02-Dec-2022	02-Dec-2022
Determinand	**Accred.**	**SOP**	**Units**	**LOD**					
1,2-Dibromoethane	U	1760	µg/l	5	[BC] < 5	[BC] < 5	[BC] < 5	[BC] < 5	[BC] < 5
Chlorobenzene	N	1760	µg/l	1.0	[BC] < 1.0	[BC] < 1.0	[BC] < 1.0	[BC] < 1.0	[BC] < 1.0
1,1,1,2-Tetrachloroethane	U	1760	µg/l	2.0	[BC] < 2.0	[BC] < 2.0	[BC] < 2.0	[BC] < 2.0	[BC] < 2.0
Ethylbenzene	U	1760	µg/l	1.0	[BC] < 1.0	[BC] < 1.0	[BC] < 1.0	[BC] < 1.0	[BC] < 1.0
m & p-Xylene	U	1760	µg/l	1.0	[BC] < 1.0	[BC] < 1.0	[BC] < 1.0	[BC] < 1.0	[BC] < 1.0
o-Xylene	U	1760	µg/l	1.0	[BC] < 1.0	[BC] < 1.0	[BC] < 1.0	[BC] < 1.0	[BC] < 1.0
Styrene	U	1760	µg/l	1.0	[BC] < 1.0	[BC] < 1.0	[BC] < 1.0	[BC] < 1.0	[BC] < 1.0
Tribromomethane	U	1760	µg/l	1.0	[BC] < 1.0	[BC] < 1.0	[BC] < 1.0	[BC] < 1.0	[BC] < 1.0
Isopropylbenzene	U	1760	µg/l	1.0	[BC] < 1.0	[BC] < 1.0	[BC] < 1.0	[BC] < 1.0	[BC] < 1.0
Bromobenzene	U	1760	µg/l	1.0	[BC] < 1.0	[BC] < 1.0	[BC] < 1.0	[BC] < 1.0	[BC] < 1.0
1,2,3-Trichloropropane	N	1760	µg/l	50	[BC] < 50	[BC] < 50	[BC] < 50	[BC] < 50	[BC] < 50
N-Propylbenzene	U	1760	µg/l	1.0	[BC] < 1.0	[BC] < 1.0	[BC] < 1.0	[BC] < 1.0	[BC] < 1.0
2-Chlorotoluene	U	1760	µg/l	1.0	[BC] < 1.0	[BC] < 1.0	[BC] < 1.0	[BC] < 1.0	[BC] < 1.0
1,3,5-Trimethylbenzene	U	1760	µg/l	1.0	[BC] < 1.0	[BC] < 1.0	[BC] < 1.0	[BC] < 1.0	[BC] < 1.0
4-Chlorotoluene	U	1760	µg/l	1.0	[BC] < 1.0	[BC] < 1.0	[BC] < 1.0	[BC] < 1.0	[BC] < 1.0
Tert-Butylbenzene	U	1760	µg/l	1.0	[BC] < 1.0	[BC] < 1.0	[BC] < 1.0	[BC] < 1.0	[BC] < 1.0
1,2,4-Trimethylbenzene	U	1760	µg/l	1.0	[BC] < 1.0	[BC] < 1.0	[BC] < 1.0	[BC] < 1.0	[BC] < 1.0
Sec-Butylbenzene	U	1760	µg/l	1.0	[BC] < 1.0	[BC] < 1.0	[BC] < 1.0	[BC] < 1.0	[BC] < 1.0
1,3-Dichlorobenzene	N	1760	µg/l	1.0	[BC] < 1.0	[BC] < 1.0	[BC] < 1.0	[BC] < 1.0	[BC] < 1.0
4-Isopropyltoluene	U	1760	µg/l	1.0	[BC] < 1.0	[BC] < 1.0	[BC] < 1.0	[BC] < 1.0	[BC] < 1.0
1,4-Dichlorobenzene	U	1760	µg/l	1.0	[BC] < 1.0	[BC] < 1.0	[BC] < 1.0	[BC] < 1.0	[BC] < 1.0
N-Butylbenzene	U	1760	µg/l	1.0	[BC] < 1.0	[BC] < 1.0	[BC] < 1.0	[BC] < 1.0	[BC] < 1.0
1,2-Dichlorobenzene	U	1760	µg/l	1.0	[BC] < 1.0	[BC] < 1.0	[BC] < 1.0	[BC] < 1.0	[BC] < 1.0
1,2-Dibromo-3-Chloropropane	U	1760	µg/l	50	[BC] < 50	[BC] < 50	[BC] < 50	[BC] < 50	[BC] < 50
1,2,4-Trichlorobenzene	U	1760	µg/l	1.0	[BC] < 1.0	[BC] < 1.0	[BC] < 1.0	[BC] < 1.0	[BC] < 1.0
Hexachlorobutadiene	U	1760	µg/l	1.0	[BC] < 1.0	[BC] < 1.0	[BC] < 1.0	[BC] < 1.0	[BC] < 1.0
1,2,3-Trichlorobenzene	U	1760	µg/l	2.0	[BC] < 2.0	[BC] < 2.0	[BC] < 2.0	[BC] < 2.0	[BC] < 2.0
Methyl Tert-Butyl Ether	N	1760	µg/l	1.0	[BC] < 1.0	[BC] < 1.0	[BC] < 1.0	[BC] < 1.0	[BC] < 1.0
N-Nitrosodimethylamine	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Phenol	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2-Chlorophenol	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Bis-(2-Chloroethyl)Ether	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,3-Dichlorobenzene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,4-Dichlorobenzene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,2-Dichlorobenzene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2-Methylphenol (o-Cresol)	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Bis(2-Chloroisopropyl)Ether	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Hexachloroethane	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
N-Nitrosodi-n-propylamine	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50

Results - Water

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Project: Halverstown

Client: IGSL			**Chemtest Job No.:**		22-47891	22-47891	22-47891	22-47891	22-47891
Quotation No.:			**Chemtest Sample ID.:**		1564373	1564375	1564377	1564378	1564379
Order No.:			Client Sample Ref.:		Stream Start	Stream End	BH03	BH12	BH103
			Client Sample ID.:		WS1(1)	WS2(1)	WSBH03	WSBH12	WSBH103
			Sample Type:		WATER	WATER	WATER	WATER	WATER
			Top Depth (m):		0.5	0.7	1.3	0.98	2.2
			Date Sampled:		02-Dec-2022	02-Dec-2022	02-Dec-2022	02-Dec-2022	02-Dec-2022
Determinand	**Accred.**	**SOP**	**Units**	**LOD**					
4-Methylphenol	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Nitrobenzene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Isophorone	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2-Nitrophenol	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2,4-Dimethylphenol	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Bis(2-Chloroethoxy)Methane	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2,4-Dichlorophenol	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,2,4-Trichlorobenzene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
4-Chloroaniline	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Hexachlorobutadiene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
4-Chloro-3-Methylphenol	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2-Methylnaphthalene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Hexachlorocyclopentadiene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2,4,6-Trichlorophenol	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2,4,5-Trichlorophenol	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2-Chloronaphthalene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2-Nitroaniline	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Dimethylphthalate	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2,6-Dinitrotoluene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
3-Nitroaniline	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Dibenzofuran	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
4-Chlorophenylphenylether	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2,4-Dinitrotoluene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Diethyl Phthalate	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
4-Nitroaniline	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2-Methyl-4,6-Dinitrophenol	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Azobenzene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
4-Bromophenylphenyl Ether	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Hexachlorobenzene	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Pentachlorophenol	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Carbazole	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Di-N-Butyl Phthalate	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Butylbenzyl Phthalate	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Bis(2-Ethylhexyl)Phthalate	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Di-N-Octyl Phthalate	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
4-Nitrophenol	N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Naphthalene	U	1800	µg/l	0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10
Acenaphthylene	U	1800	µg/l	0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10
Acenaphthene	U	1800	µg/l	0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10

Results - Water

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Project: Halverstown

Client: IGSL			**Chemtest Job No.:**		22-47891	22-47891	22-47891	22-47891	22-47891
Quotation No.:			**Chemtest Sample ID.:**		1564373	1564375	1564377	1564378	1564379
Order No.:			Client Sample Ref.:		Stream Start	Stream End	BH03	BH12	BH103
			Client Sample ID.:		WS1(1)	WS2(1)	WSBH03	WSBH12	WSBH103
			Sample Type:		WATER	WATER	WATER	WATER	WATER
			Top Depth (m):		0.5	0.7	1.3	0.98	2.2
			Date Sampled:		02-Dec-2022	02-Dec-2022	02-Dec-2022	02-Dec-2022	02-Dec-2022
Determinand	**Accred.**	**SOP**	**Units**	**LOD**					
Fluorene	U	1800	µg/l	0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10
Phenanthrene	U	1800	µg/l	0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10
Anthracene	U	1800	µg/l	0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10
Fluoranthene	U	1800	µg/l	0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10
Pyrene	U	1800	µg/l	0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10
Benzo[a]anthracene	U	1800	µg/l	0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10
Chrysene	U	1800	µg/l	0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10
Benzo[b]fluoranthene	U	1800	µg/l	0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10
Benzo[k]fluoranthene	U	1800	µg/l	0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10
Benzo[a]pyrene	U	1800	µg/l	0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10
Indeno(1,2,3-c,d)Pyrene	U	1800	µg/l	0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10
Dibenz(a,h)Anthracene	U	1800	µg/l	0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10
Benzo[g,h,i]perylene	U	1800	µg/l	0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10
Total Of 16 PAH's	U	1800	µg/l	2.0	[B] < 2.0	[B] < 2.0	[B] < 2.0	[B] < 2.0	[B] < 2.0
PCB 81	N	1815	µg/l	0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
PCB 77	N	1815	µg/l	0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
PCB 105	N	1815	µg/l	0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
PCB 114	N	1815	µg/l	0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
PCB 118	N	1815	µg/l	0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
PCB 123	N	1815	µg/l	0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
PCB 126	N	1815	µg/l	0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
PCB 156	N	1815	µg/l	0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
PCB 157	N	1815	µg/l	0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
PCB 167	N	1815	µg/l	0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
PCB 169	N	1815	µg/l	0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
PCB 189	N	1815	µg/l	0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Total PCBs (12 Congeners)	N	1815	µg/l	0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Resorcinol	U	1920	mg/l	0.0050	[B] < 0.0050	[B] < 0.0050	[B] < 0.0050	[B] < 0.0050	[B] < 0.0050
Phenol	U	1920	mg/l	0.0050	[B] < 0.0050	[B] < 0.0050	[B] < 0.0050	[B] < 0.0050	[B] < 0.0050
Cresols	U	1920	mg/l	0.0050	[B] < 0.0050	[B] < 0.0050	[B] < 0.0050	[B] < 0.0050	[B] < 0.0050
Xylenols	U	1920	mg/l	0.0050	[B] < 0.0050	[B] < 0.0050	[B] < 0.0050	[B] < 0.0050	[B] < 0.0050
1-Naphthol	N	1920	mg/l	0.0050	[B] < 0.0050	[B] < 0.0050	[B] < 0.0050	[B] < 0.0050	[B] < 0.0050
Trimethylphenols	U	1920	mg/l	0.0050	[B] < 0.0050	[B] < 0.0050	[B] < 0.0050	[B] < 0.0050	[B] < 0.0050
Total Phenols	U	1920	mg/l	0.030	[B] < 0.030	[B] < 0.030	[B] < 0.030	[B] < 0.030	[B] < 0.030

Deviations

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

Sample:	Sample Ref:	Sample ID:	Sample Location:	Sampled Date:	Deviation Code(s):	Containers Received:
1564373	Stream Start	WS1(1)		02-Dec-2022	BC	Coloured Winchester 1000ml
1564375	Stream End	WS2(1)		02-Dec-2022	BC	Coloured Winchester 1000ml
1564377	BH03	WSBH03		02-Dec-2022	BC	Coloured Winchester 1000ml
1564378	BH12	WSBH12		02-Dec-2022	BC	Coloured Winchester 1000ml
1564379	BH103	WSBH103		02-Dec-2022	BC	Coloured Winchester 1000ml

Test Methods

SOP	Title	Parameters included	Method summary
1010	pH Value of Waters	pH	pH Meter
1150	Dissolved Oxygen	Dissolved Oxygen (DO)	Electrometric determination (on site preferred), using oxygen sensitive membrane electrode.
1160	Aggressive Dissolved CO2	Aggressive Dissolved CO2	Titration
1220	Anions, Alkalinity & Ammonium in Waters	Fluoride; Chloride; Nitrite; Nitrate; Total; Oxidisable Nitrogen (TON); Sulfate; Phosphate; Alkalinity; Ammonium	Automated colorimetric analysis using 'Aquakem 600' Discrete Analyser.
1270	Total Hardness of Waters	Total hardness	Calculation applied to calcium and magnesium results, expressed as mg l-1 CaCO3 equivalent.
1300	Cyanides & Thiocyanate in Waters	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Continuous Flow Analysis.
1325	Sulphide in Waters	Sulphides	Automated colorimetric analysis by 'Aquakem 600' Discrete Analyser using N,N–dimethyl-pphenylenediamine.
1455	Metals in Waters by ICP-MS	Metals, including: Antimony; Arsenic; Barium; Beryllium; Boron; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Tin; Vanadium; Zinc	Filtration of samples followed by direct determination by inductively coupled plasma mass spectrometry (ICP-MS).
1495	Low Level Hexavalent Chromium in Waters	Chromium [VI]	Colorimetric determination of hexavalent chromium expressed as Cr (VI) µg/l in water, using Ion Chromatography and UV-visible spectrophotometry.
1610	Total/Dissolved Organic Carbon in Waters	Organic Carbon	TOC Analyser using Catalytic Oxidation
1675	TPH Aliphatic/Aromatic split in Waters by GC-FID(cf. Texas Method 1006 / TPH CWG)	Aliphatics: >C5–C6, >C6–C8, >C8– C10, >C10–C12, >C12–C16, >C16–C21, >C21–C35, >C35– C44Aromatics: >C5–C7, >C7–C8, >C8– C10, >C10–C12, >C12–C16, >C16– C21, >C21– C35, >C35– C44	Pentane extraction / GCxGC FID detection
1760	Volatile Organic Compounds (VOCs) in Waters by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics. (cf. USEPA Method 8260)	Automated headspace gas chromatographic (GC) analysis of water samples with mass spectrometric (MS) detection of volatile organic compounds.
1790	Semi-Volatile Organic Compounds (SVOCs) in Waters by GC-MS	Semi-volatile organic compounds	Solvent extraction / GCMS detection
1800	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Waters by GC-MS	Acenaphthene; Acenaphthylene; Anthracene; Benzo[a]Anthracene; Benzo[a]Pyrene; Benzo[b]Fluoranthene; Benzo[ghi]Perylene; Benzo[k]Fluoranthene; Chrysene; Dibenz[ah]Anthracene; Fluoranthene; Fluorene; Indeno[123cd]Pyrene; Naphthalene; Phenanthrene; Pyrene	Pentane extraction / GCMS detection
1815	Polychlorinated Biphenyls (PCB) ICES7 Congeners in Waters by GC-MS	ICES7 PCB congeners	Solvent extraction / GCMS detection
1920	Phenols in Waters by HPLC	Phenolic compounds including: Phenol, Cresols, Xylenols, Trimethylphenols Note: Chlorophenols are excluded.	Determination by High Performance Liquid Chromatography (HPLC) using electrochemical detection.

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Report Information

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Key

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

Comments or interpretations are beyond the scope of UKAS accreditation
The results relate only to the items tested
Uncertainty of measurement for the determinands tested are available upon request
None of the results in this report have been recovery corrected
All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis
All Asbestos testing is performed at the indicated laboratory
Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

A - Date of sampling not supplied
B - Sample age exceeds stability time (sampling to extraction)
C - Sample not received in appropriate containers
D - Broken Container
E - Insufficient Sample (Applies to LOI in Trommel Fines Only)

Sample Retention and Disposal

All soil samples will be retained for a period of 30 days from the date of receipt
All water samples will be retained for 14 days from the date of receipt
Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:
customerservices@chemtest.com

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Appendix 15

Geotechnical Laboratory Results (Rock)

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(Diametrial) POINT LOAD STRENGTH INDEX TEST DATA

Contract: Halverstown

Contract no. 24330

Sample Type: Core

Date of test: 31/05/2023

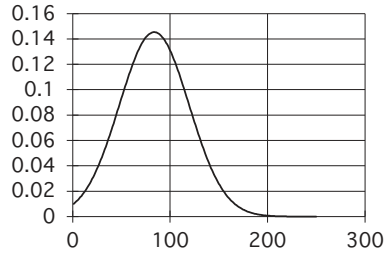
RC No.	Depth m	D (Diameter) mm	P (failure load) kN	F	Is (index strength) Mpa	Is(50) (index strength) Mpa	*UCS MPa	Type	Orienation
RC02	15.4	78	29.0	1.222	4.77	5.83	117	d	//
	17.0	78	26.2	1.222	4.31	5.26	105	d	//
	18.5	78	24.0	1.222	3.95	4.82	96	d	//
	19.5	78	19.4	1.222	3.19	3.90	78	d	//
RC03	9.9	78	18.5	1.222	3.04	3.71	74	d	//
	11.0	78	2.8	1.222	0.47	0.57	11	d	//
	11.6	78	21.6	1.222	3.54	4.33	87	d	//
	12.7	78	23.0	1.222	3.78	4.62	92	d	//
	14.0	78	22.0	1.222	3.62	4.42	88	d	//
RC04	13.0	78	30.9	1.222	5.08	6.20	124	d	//
	13.3	78	3.0	1.222	0.49	0.60	12	d	//
	15.1	78	30.0	1.222	4.93	6.02	120	d	//
	16.0	78	20.6	1.222	3.39	4.14	83	d	//

Statistical Summary Data	Is(50)	UCS*
Number of Samples Tested	13	13
Minimum	0.57	11
Average	4.19	84
Maximum	6.20	124
Standard Dev.	1.78	36
Upper 95% Confidence Limit	7.68	153.65
Lower 95% Confidence Limit	0.69	13.77

Comments:

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

*UCS Normal Distribution Curve



Abbreviations	
i	irregular
a	axial
b	block
d	diametral

approx. orientation to planes of weakness/bedding

U	unknown
P	perpendicular
//	parallel

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Appendix 16

Exploratory Hole Location Plans

2022 Investigation

DWG01 – DWG05

2023 Investigation

Additional Works

24330 - Halverstown

Exploratory Hole Location Plan - DWG 01

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Legend

- Cable Percussion Borehole
- Dynamic Probe
- Soakaway Test (to BRE365)
- Plate Bearing Test
- Trial Pit



24330 - Halverstown

Exploratory Hole Location Plan - DWG 02

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24330 - Halverstown
Exploratory Hole Location Plan - DWG 03
Legend
Cable Percussion Borehole
Dynamic Probe
Soakaway Test (to BRE365)
Plate Bearing Test
Trial Pit
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BH02
PB12
TP21
DP08
SATP13
TP02
DP06
DP07
DP04
DP15
SATP01
PB06
TP05
DP40
TP01
TP03
PB13
TP07
DP03
DP05
BH01
BH04
DP01
PB07
DP16
PB01
DP12
DP14
TP04
DP23
TP10
TP08
SATP02
TP06
BH06
DP02
TP12
DP13
DP11
PB08
PB02
DP09
DP22
DP20
TP09
BH03
DP10
SATP03
DP21
PB09
DP17
DP19
PB03
TP14
BH05
TP16
Google Earth
Image © 2022 Maxar Technologies
N
100 m

24330 - Halverstown

Exploratory Hole Location Plan - DWG 04



24330 - Halverstown

Exploratory Hole Location Plan - DWG 05




24330 - Halverstown
Additional Works - Exploratory Hole Location Plan
Legend
Rotary Open Hole
Rotary Drillhole
Soakaway Pit
Trial Pit
Trial Pit / Rotary Open Hole
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BRE SA01
BRE SA02
BRE SA03
BRE SA04
BRE SA05
BRE SA06
RC01
RC02
RC03
RC04
RC07
TP01
TP02
TP03
TP04
TP05
TP06
TP08
TP10
RO01
RO02
RO03
RO04
RO05
RO06
RO08
RO10
Google Earth
300 m
N

Appendix 4.2 C
KCC Water Services Department Meeting Notes

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Notes from Pre-planning Technical Meeting between DOB&A and KCC WSD

Project:	Herbata Data Centre, Halverstown , Naas		
Project No.:	DOBA 2232		
Date:	11.04.2023 11.15 am		
Venue:	Microsoft Teams		
Attendees:			
	Kehinde Oluwatosin	KCC Planning	KO
	David Hall	KCC WSD	DH
	Donnachadh O'Brien	Donnachadh O'Brien & Associates	DOB
	Richard Kiernan	Donnachadh O'Brien & Associates	RK
	Martin Forte	Donnachadh O'Brien & Associates	MF
	David Bosonnet	Brady Shipman Martin (Landscaping)	DB

Item	**Minutes/ Notes form technical meeting**	
1	DOB outlined that this technical meeting followed on from previous formal pre-planning meetings to specifical deal with SW drainage design and nature based SUDS strategy	
2	DOB gave Power point presentation on overall drainage strategy under the following headings • Introduction & Proposed Development • Existing Site conditions and assessment of natural catchments and Qbar run off rates based on soil type and Site investigation • Ground Conditions and site investigations- moderate infiltration solutions are feasible in areas • Proposed SuDS Hierarchy- adaption of nature based and infiltration solutions in Surface Water/SuDS Design. 30% climate change factor applied to design. • Typical SuDS Design Integration- swales, bio-ponds etc – likelihood of bio-ponds at southern end of site • Flooding- SSFRA prepared and site in Flood Zone C with >2.4m freeboard from site flood design level to lowest road level • Bluebell Steam Culvert- Section 50 – proposal to culvert stream • Proposed draining works required on R409 arising form road improvements required by KCC Roads department • Potential use of SuDS ponds as supplemental fire and cooling water source	
3	DB presented on the co-ordinated of the SW design strategy for the site with their landscaping design including: • Proposal for diverse bio-retention solutions incorporating bio-retention basins and bio-retention ponds	

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	• Use of bio-swales parallel to buildings • Use of green retaining walls in areas where there are proposed steps in the site and utilising the natural road run off to irrigate these walls. • Bio-diverse planning in SUDS features utilising native planting • Use of green geo-engineered headwalls at outfalls to Bluebell stream. • Use of biofiltration around car parks • Incorporation of both wet and dry meadows as part of overall landscaping	
4	Kehinde Oluwatosin (KO) noted : • the cross section through the M7 motorway and the potential visual impact • referred to the previous pre-planning meeting and discussions on this matter where the use of a green wall was suggested. • mounds and planting may not provide sufficient screening • concerns from a massing and scale point of view DB presented the proposed site cross sections and noted that: • 4-6m mounding and planting would provide a high degree of screening from M7 • existing ESB OH cables traversing the site, there are existing constraints and limitations the provision of mounds and landscaping • would be developing this further prior to submission to maximise screening to development from M7	
5	David Hall (DH) noted the following in relation to SW drainage strategy /proposals for the site: • Generally welcomed the nature-based SUDS proposals being adapted across the site and noted that incorporation or wetland areas and wetland planting is welcomed • Agreed that final planning design would be subject to further development and fine tuning and the WSD are open to further consultation as necessary • scheme appeared to be hitting targets in respect to prioritising infiltration and nature-based solutions. No 'red-flags' in relation to proposals. • importance of including 6 months groundwater monitoring and adapting infiltration techniques where feasible on the site • depths of infiltration ~~tests~~ SuDS need to be consistent with design depths of infiltration tests • any planning application should clearly demonstrate that the proposed use of ponds-wetlands as fire fighting water storage and-or process water cooling purposes shall not adversely affect drainage requirements eg attenuation storage.	

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- importance of water quality form Bluebell due to its proximity to Liffey and potential downstream impact at Leixlip (source of potable water for treatment).
- It should be clearly demonstrated in any planning application that there will be no increase in runoff volume discharging to the Bluebell-Yeomanstown watercourse as a result of the proposed development.
- Discharge of water direct to swales from internal road network by
  use of dropped kerbs. DOB showed a typical section noting this is being adapted. Roadside bioswales should also convey runoff where possible.
- Internal overland flow routers post development should be identified for exceedance/ blockage scenario.
- Agreed with adaption of 30% climate change but given nature of development, design for 10% urban creep is not required or appropriate
- Address maintenance of SUDS features (particularly permeable paving) in planning submission. **Post Meeting Note** : it is not proposed to have any internal roads or infrastructure taken in charge. NB where Permeable paving will act as attenuation storage, proper ~~NB where Permeable paving will act as attenuation storage, proper~~maintenance will be key and this should be addressed in any planning application. ~~maintenance~~
- Mounds and berms to have adequate drainage provision
- Maximise the use of green/blue roofs on ancillary buildings
- Address safety issues associate with open bodies of water in relation to authorised/unauthorised access
- Noted Section 50 culverting of Bluebell , and noted that this can be included in planning conditions.
- R409 drainage works – DH to discuss internally with David Reel in the context of implementing infiltration techniques under the path/cycle path. DOB noted that he had preliminary discussions with David Reel and that preference appears to be for a closed Surface Water piped network brough internally into the site, as infiltration techniques were not generally taken in charge by KCC Roads.
- WSP will also discuss requirement for separate drainage system for R409 road upgrade.

Advised DB to liaise with Carmel O'Grady on the Parks Department on the landscaping / planting proposals which should generally be in accordance with CIRIA SuDS Manual for nature based solutions.

Advised DOBA to liaise with Irish Water in respected to Pre connection Enquiry and Confirmation of Feasibility. DOB noted that this is in hand and we expect this imminently form IW.

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& ASSOCIATES CONSULTING ENGINEERS

UNIT 5C ELM HOUSE
MILLENNIUM PARK
NAAS
CO. KILDARE

P +353 45 948 042

INFO@DOBRIEN-ENGINEERS.IE
WWW.DOBRIEN-ENGINEERS.IE

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Communication between DOBA and Inland Fisheries Ireland confirming that the minimum 10m Riparian buffer provided to the Bluebell stream is adequate.

RE: Data Centre Project at Halverstown, Naas Co Kildare

MC Matthew Carroll <Matthew.Carroll@fisheriesireland.ie>
To Donnachadh O'Brien

Reply | Reply All | Forward

Thu 27/07/2023 15:58

You forwarded this message on 27/07/2023 16:49.

Hi Donnachadh,

As discussed earlier, the proposed minimum 10m buffer zone at certain points adjacent to the Bluebell stream is adequate when you consider the project in its entirety.
Prior to the construction phase of the project, it is important that the contractor is made aware of their obligations and requirement in accordance with planning to protect the aquatic environment.

Matt
Matthew Carroll
Fisheries Environmental Officer

Matthew.Carroll@fisheriesireland.ie • +353 (0)1 8842 600 • www.fisheriesireland.ie • D24 CK66



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Appendix 4.2 D
Surface Water Attenuation Calculations

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Herbata Data Centre:	Date:		
Halverstown, Naas Co. Kildare Surface Water Analysis- Catchment 1	07/02/2023		
	Designed by:	Checked by:	Approved By:
	MC	RK	DOB
Report Details: Type: Junctions Storm Phase: Catchment 1 Final	Donnachadh O'Brien & Associates: Unit 5C Elm House Millennium Park, Naas Co. Kildare		

DONNACHADH O'BRIEN
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Name	Junction Type	Easting (m)	Northing (m)	Cover Level (m)	Depth (m)	Invert Level (m)	Chamber Shape	Diameter (m)
SMH 1.00	Manhole	686394.755	719899.910	83.340	1.406	81.934	Circular	1.200
SMH 4.01	Manhole	686216.267	719839.644	82.859	1.330	81.529	Circular	1.200
SMH 1.07	Manhole	686222.412	719827.857	82.923	2.746	80.177	Circular	1.350
SMH 1.08	Manhole	686191.045	719807.890	82.745	2.661	80.084	Circular	1.350
SMH 1.09	Manhole	686170.409	719805.591	82.500	2.468	80.032	Circular	1.350
SMH 1.10	Manhole	686123.431	719787.879	82.000	3.264	78.736	Circular	1.200
SMH 1.11	Manhole	686131.223	719769.713	81.009	3.134	77.874	Circular	1.350
SMH 1.12	Manhole	686084.691	719740.017	80.346	2.610	77.736	Circular	1.350
SMH 1.13	Manhole	686073.415	719709.115	79.656	2.003	77.654	Circular	1.350
SMH 1.14	Manhole	686048.171	719692.216	79.000	1.422	77.578	Circular	1.350
SMH 1.06	Manhole	686248.151	719853.582	82.900	2.632	80.268	Circular	1.350
SMH 3.00	Manhole	686279.176	719837.284	81.860	1.417	80.443	Circular	1.350
SMH 1.01	Manhole	686364.162	719914.612	84.813	3.015	81.798	Circular	1.200
SMH 1.02	Manhole	686353.778	719908.306	84.693	2.944	81.749	Circular	1.200
SMH 2.00	Manhole	686299.048	719875.064	83.758	0.844	82.914	Circular	1.200
SIC 2.02	Manhole	686306.496	719864.628	83.750	0.751	82.999	Circular	1.200
SIC 2.01	Manhole	686312.006	719855.258	83.720	0.648	83.072	Circular	1.200
SIC 2.00	Manhole	686318.505	719845.513	83.600	0.450	83.150	Circular	1.200
SMH 1.03	Manhole	686340.177	719912.436	84.000	2.308	81.692	Circular	1.200
SMH 1.04	Manhole	686304.681	719891.006	84.000	2.332	81.668	Circular	1.200
SMH 4.00	Manhole	686224.745	719872.388	83.364	1.619	81.745	Circular	1.200
SMH 5.00	Manhole	686201.515	719817.419	82.900	1.350	81.550	Circular	1.200
SIC 6.02	Manhole	686204.569	719802.031	82.700	1.651	81.049	Circular	1.200
SMH 1.05	Manhole	686253.023	719858.452	82.900	1.273	81.627	Circular	1.200
SIC 6.01	Manhole	686210.444	719792.056	82.500	1.374	81.126	Circular	1.200
SIC 6.00	Manhole	686216.542	719782.784	82.200	1.000	81.200	Circular	1.200
SMH 7.00	Manhole	686168.818	719766.792	80.400	2.323	78.077	Circular	1.200
SMH 7.01	Manhole	686154.745	719784.724	81.332	3.346	77.986	Circular	1.350
SIC 8.00	Manhole	686152.769	719745.216	79.900	0.450	79.450	Circular	1.200
SIC 8.01	Manhole	686147.596	719753.340	80.500	1.114	79.386	Circular	1.200
SIC 8.02	Manhole	686141.661	719763.244	81.015	1.706	79.309	Circular	1.200
SMH 9.00	Manhole	686106.867	719616.890	79.300	1.859	77.441	Circular	1.200
SMH 9.01	Manhole	686098.659	719611.703	79.000	1.608	77.392	Circular	1.200
SMH 1.15	Manhole	686027.870	719637.070	78.100	1.562	76.538	Circular	1.200
Catchment 1 Outfall	Manhole	686002.417	719621.929	77.000	0.536	76.464	Circular	1.200
SMH 23.00	Manhole	686178.150	719858.711	84.000	0.975	83.025	Circular	1.200
SMH 23.01	Manhole	686126.393	719871.994	84.000	1.509	82.491	Circular	1.200
SMH 23.02	Manhole	686121.997	719855.678	83.640	3.278	80.362	Circular	1.200
SMH 23.03	Manhole	686132.284	719853.017	83.650	3.341	80.309	Circular	1.200
SMH 23.04	Manhole	686126.208	719829.528	82.000	1.812	80.188	Circular	1.200
SMH 24.00	Manhole	686173.893	719842.253	83.650	1.225	82.425	Circular	1.200

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Name	Lock
SMH 1.00	None
SMH 4.01	None
SMH 1.07	None
SMH 1.08	None
SMH 1.09	None
SMH 1.10	None
SMH 1.11	None
SMH 1.12	None
SMH 1.13	None
SMH 1.14	None
SMH 1.06	None
SMH 3.00	None
SMH 1.01	None
SMH 1.02	None
SMH 2.00	None
SIC 2.02	None
SIC 2.01	None
SIC 2.00	None
SMH 1.03	None
SMH 1.04	None
SMH 4.00	None
SMH 5.00	None
SIC 6.02	None
SMH 1.05	None
SIC 6.01	None
SIC 6.00	None
SMH 7.00	None
SMH 7.01	None
SIC 8.00	None
SIC 8.01	None
SIC 8.02	None
SMH 9.00	None
SMH 9.01	None
SMH 1.15	None
Catchment 1 Outfall	None
SMH 23.00	None
SMH 23.01	None
SMH 23.02	None
SMH 23.03	None
SMH 23.04	None
SMH 24.00	None

Inlets

Junction	Inlet Name	Incoming Item(s)	Bypass Destination	Capacity Type
SMH 1.00	Inlet (1)	Weir C1-2	(None)	No Restriction
SMH 4.01	Inlet (1)	4.000	(None)	No Restriction
SMH 1.07	Inlet	4.001	(None)	No Restriction
	Inlet (1)	1.008	(None)	No Restriction
SMH 1.08	Inlet	1.009	(None)	No Restriction
	Inlet (2)	6.002	(None)	No Restriction
	Inlet (4)	5.000	(None)	No Restriction
SMH 1.09	Inlet	1.010	(None)	No Restriction
SMH 1.10	Inlet (1)	1.012	(None)	No Restriction

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Junction	Inlet Name	Incoming Item(s)	Bypass Destination	Capacity Type
SMH 1.11	Inlet	1.013	(None)	No Restriction
	Inlet (1)	8.002	(None)	No Restriction
	Inlet (2)	7.001	(None)	No Restriction
SMH 1.12	Inlet	1.014	(None)	No Restriction
	Inlet (1)	Catchment Area (49)	(None)	No Restriction
	Inlet (2)	Catchment Area (17) (1)	(None)	No Restriction
SMH 1.13	Inlet	1.015	(None)	No Restriction
	Inlet (1)	Catchment Area (16) (1)	(None)	No Restriction
SMH 1.14	Inlet	1.016	(None)	No Restriction
SMH 1.06	Inlet	1.007	(None)	No Restriction
	Inlet (2)	3.000	(None)	No Restriction
SMH 3.00	Inlet	Weir C1-4	(None)	No Restriction
SMH 1.01	Inlet	1.000	(None)	No Restriction
SMH 1.02	Inlet	1.001	(None)	No Restriction
SMH 2.00	Inlet (1)	2.002	(None)	No Restriction
SIC 2.02	Inlet	2.001	(None)	No Restriction
	Inlet (1)	No Delay (2)	(None)	No Restriction
SIC 2.01	Inlet	2.000	(None)	No Restriction
	Inlet (1)	No Delay (1)	(None)	No Restriction
SIC 2.00	Inlet	No Delay	(None)	No Restriction
SMH 1.03	Inlet	1.002	(None)	No Restriction
SMH 1.04	Inlet	1.004	(None)	No Restriction
SMH 4.00	Inlet	No Delay (6)	(None)	No Restriction
SMH 5.00	Inlet	No Delay (7)	(None)	No Restriction
SIC 6.02	Inlet	6.001	(None)	No Restriction
	Inlet (1)	No Delay (5)	(None)	No Restriction
SMH 1.05	Inlet	1.006	(None)	No Restriction
SIC 6.01	Inlet (1)	6.000	(None)	No Restriction
	Inlet (2)	No Delay (4)	(None)	No Restriction
SIC 6.00	Inlet	Catchment Area (26) No Delay (3)	(None)	No Restriction
SMH 7.00	Inlet	Weir C1-6	(None)	No Restriction
SMH 7.01	Inlet	7.000	(None)	No Restriction
SIC 8.00	Inlet	No Delay (8)	(None)	No Restriction
SIC 8.01	Inlet	8.000	(None)	No Restriction
	Inlet (1)	No Delay (9)	(None)	No Restriction
SIC 8.02	Inlet	8.001	(None)	No Restriction
	Inlet (1)	No Delay (10)	(None)	No Restriction
SMH 9.00	Inlet (1)	Weir C1-8	(None)	No Restriction
	Inlet (2)	Weir C1-10	(None)	No Restriction
SMH 9.01	Inlet	9.000	(None)	No Restriction
SMH 1.15	Inlet	1.018	(None)	No Restriction
Catchment 1 Outfall	Inlet	1.019	(None)	No Restriction
SMH 23.00	Inlet	Catchment Area (35)	(None)	No Restriction
	Inlet (1)	Catchment Area (55)	(None)	No Restriction
	Inlet (2)	Catchment Area (37)	(None)	No Restriction
SMH 23.01	Inlet	23.000	(None)	No Restriction
	Inlet (1)	Catchment Area (44)	(None)	No Restriction
	Inlet (2)	Catchment Area (53)	(None)	No Restriction
SMH 23.02	Inlet	23.001	(None)	No Restriction
	Inlet (1)	Catchment Area (45)	(None)	No Restriction
	Inlet (2)	Catchment Area (59)	(None)	No Restriction

Herbata Data Centre: Halverstown, Naas Co. Kildare Surface Water Analysis- Catchment 1	Date: 07/02/2023			DONNACHADH O'BRIEN & ASSOCIATES CONSULTING ENGINEERS
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Report Details: Type: Junctions Storm Phase: Catchment 1 Final	Donnachadh O'Brien & Associates: Unit 5C Elm House Millennium Park, Naas Co. Kildare			

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Junction	Inlet Name	Incoming Item(s)	Bypass Destination	Capacity Type
SMH 23.03	Inlet	23.002	(None)	No Restriction
	Inlet (1)	24.000	(None)	No Restriction
	Inlet (3)	Catchment Area (43)	(None)	No Restriction
	Inlet (4)	No Delay (11)	(None)	No Restriction
	Inlet (5)	No Delay (12)	(None)	No Restriction
SMH 23.04	Inlet	23.003	(None)	No Restriction
	Inlet (1)	Catchment Area (57)	(None)	No Restriction
SMH 24.00	Inlet	Catchment Area (56)	(None)	No Restriction
	Inlet (1)	Catchment Area (38)	(None)	No Restriction

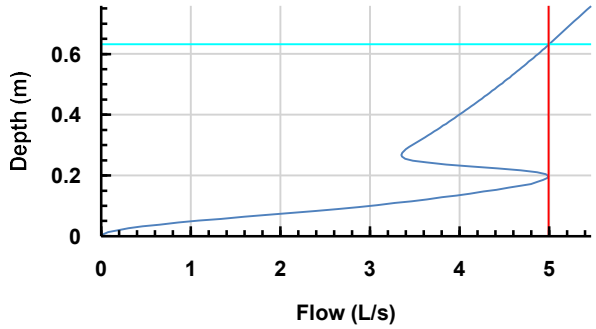
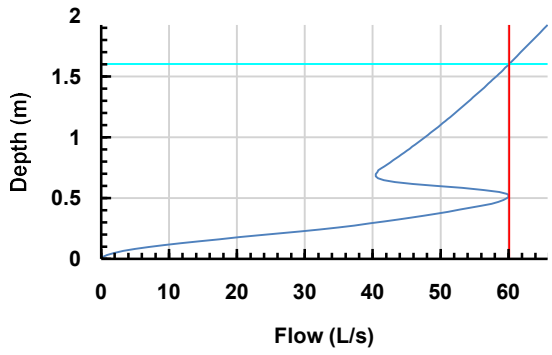
Outlets

Junction	Outlet Name	Outgoing Connection	Outlet Type
SMH 1.00	Outlet	1.000	Free Discharge
SMH 4.01	Outlet	4.001	Free Discharge
SMH 1.07	Outlet	1.009	Free Discharge
SMH 1.08	Outlet	1.010	Free Discharge
SMH 1.09	Outlet	1.011	Free Discharge
SMH 1.10	Outlet	1.013	Free Discharge
SMH 1.11	Outlet	1.014	Free Discharge
SMH 1.12	Outlet	1.015	Free Discharge
SMH 1.13	Outlet	1.016	Free Discharge
SMH 1.14	Outlet	1.017	Free Discharge
SMH 1.06	Outlet	1.008	Free Discharge
SMH 3.00	Outlet	3.000	Free Discharge
SMH 1.01	Outlet	1.001	Free Discharge
SMH 1.02	Outlet	1.002	Free Discharge
SMH 2.00	Outlet	2.003	Free Discharge
SIC 2.02	Outlet	2.002	Free Discharge
SIC 2.01	Outlet	2.001	Free Discharge
SIC 2.00	Outlet	2.000	Free Discharge
SMH 1.03	Outlet	1.003	Free Discharge
SMH 1.04	Outlet	1.005	Free Discharge
SMH 4.00	Outlet	4.000	Free Discharge
SMH 5.00	Outlet	5.000	Free Discharge
SIC 6.02	Outlet	6.002	Free Discharge
	Outlet	1.007	Hydro-Brake®

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Junction	Outlet Name	Outgoing Connection	Outlet Type
SMH 1.05	Invert Level (m)	81.627	
	Design Depth (m)	0.632	
	Design Flow (L/s)	5.0	
	Objective	Minimise Upstream Storage Requirements	
	Application	Surface Water Only	
	Sump Available	☐	
	Unit Reference	CHE-0107-5000-0632-5000	
			
SIC 6.01	Outlet	6.001	Free Discharge
SIC 6.00	Outlet	6.000	Free Discharge
SMH 7.00	Outlet	7.000	Free Discharge
SMH 7.01	Outlet	7.001	Free Discharge
SIC 8.00	Outlet	8.000	Free Discharge
SIC 8.01	Outlet	8.001	Free Discharge
SIC 8.02	Outlet	8.002	Free Discharge
SMH 9.00	Outlet	9.000	Free Discharge
SMH 9.01	Outlet	9.001	Free Discharge
SMH 1.15	Outlet	1.019	Hydro-Brake®
	Invert Level (m)	76.538	
	Design Depth (m)	1.602	
	Design Flow (L/s)	60.12	
	Objective	Minimise Upstream Storage Requirements	
	Application	Surface Water Only	
	Sump Available	☐	
	Unit Reference	CHE-0292-6012-1602-6012	
			

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& ASSOCIATES CONSULTING ENGINEERS

RECEIVED: 13/08/2024

Junction	Outlet Name	Outgoing Connection	Outlet Type
SMH 23.00	Outlet	23.000	Free Discharge
SMH 23.01	Outlet	23.001	Free Discharge
SMH 23.02	Outlet	23.002	Free Discharge
SMH 23.03	Outlet	23.003	Free Discharge
SMH 23.04	Outlet	23.004	Free Discharge
SMH 24.00	Outlet	24.000	Free Discharge

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Pond 3B Type : Pond

Dimensions

Exceedance Level (m)	84.000
Depth (m)	2.332
Base Level (m)	81.668
Freeboard (mm)	1700
Initial Depth (m)	0.000
Porosity (%)	100
Average Slope (1:X)	4.067
Total Volume (m³)	667.384

Depth (m)	Area (m²)	Volume (m³)
0.000	934.8466	0.000
0.632	1181.9514	667.384
0.633	1396.8152	668.672
2.332	2245.3712	3734.328

Inlets

Inlet (4)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (28)
Bypass Destination	(None)
Capacity Type	No Restriction

Inlet (5)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (27) Catchment Area (33) (1)
Bypass Destination	(None)
Capacity Type	No Restriction

Inlet (6)

Inlet Type	Point Inflow
Incoming Item(s)	1.003
Bypass Destination	(None)
Capacity Type	No Restriction

Outlets

Outlet (1)

Outgoing Connection	1.004
Outlet Type	Free Discharge

Advanced

Perimeter	Circular
Length (m)	67.680
Friction Scheme	Manning's n
n	0.01

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Pond 2

Type : Pond

Dimensions

Exceedance Level (m)	81.000
Depth (m)	2.750
Base Level (m)	78.250
Freeboard (mm)	1250
Initial Depth (m)	0.500
Porosity (%)	100
Average Slope (1:X)	5.641
Total Volume (m³)	2985.812

Depth (m)	Area (m²)	Volume (m³)
0.000	1298.3417	0.000
0.500	1598.3656	722.879
0.501	1920.2187	724.635
1.500	2624.9864	2985.812
1.501	3006.2295	2988.626
2.750	4036.0046	7370.743

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Inlets

Inlet

Inlet Type	Point Inflow
Incoming Item(s)	1.011
Bypass Destination	(None)
Capacity Type	No Restriction

Inlet (1)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (29)
Bypass Destination	(None)
Capacity Type	No Restriction

Inlet (2)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (30) Catchment Area (52) Catchment Area (54)
Bypass Destination	(None)
Capacity Type	No Restriction

Inlet (7)

Inlet Type	Point Inflow
Incoming Item(s)	23.004
Bypass Destination	(None)
Capacity Type	No Restriction

Inlet (8)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (58)
Bypass Destination	(None)
Capacity Type	No Restriction

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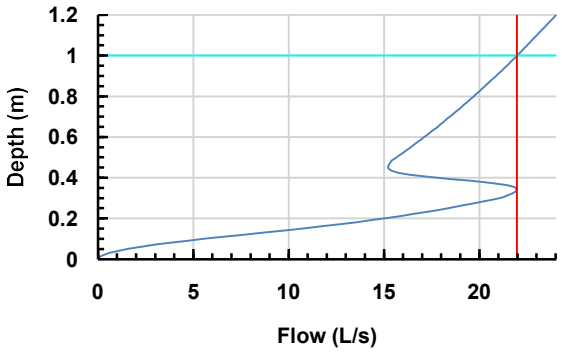
Outlets

Outlet

Outgoing Connection	1.012
Outlet Type	Hydro-Brake®

Invert Level (m)	78.750
Design Depth (m)	1.000
Design Flow (L/s)	22.0
Objective	Minimise Upstream Storage Requirements
Application	Surface Water Only
Sump Available	☐

Unit Reference	CHE-0196-2200-1000-2200



Advanced

Perimeter	Circular
Length (m)	104.067
Friction Scheme	Manning's n
n	0.01

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BL ROOF 1

Type : Tank

Dimensions

Exceedance Level (m)	83.750
Depth (m)	0.200
Base Level (m)	83.550
Freeboard (mm)	0
Initial Depth (m)	0.000
Porosity (%)	100
Average Slope (1:X)	0.00
Total Volume (m³)	263.240

Depth (m)	Area (m²)	Volume (m³)
0.000	1316.20	0.000
0.200	1316.20	263.240

Inlets

Inlet (1)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (3)
Bypass Destination	(None)
Capacity Type	No Restriction

Inlet (2)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (1)
Bypass Destination	(None)
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	BL Roof 1- Outfall
Outlet Type	Orifice

Diameter (m)	0.047
Coefficient of Discharge	0.600
Invert Level (m)	83.550

Advanced

Perimeter	Circular
Length (m)	94.014

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BL ROOF 2

Type : Tank

Dimensions

Exceedance Level (m)	82.200
Depth (m)	0.200
Base Level (m)	82.000
Freeboard (mm)	0
Initial Depth (m)	0.000
Porosity (%)	100
Average Slope (1:X)	0.00
Total Volume (m³)	263.228

Depth (m)	Area (m²)	Volume (m³)
0.000	1316.14	0.000
0.200	1316.14	263.228

Inlets

Inlet

Inlet Type	Point Inflow
Incoming Item(s)	Catchment Area (5)
Bypass Destination	(None)
Capacity Type	No Restriction

Inlet (1)

Inlet Type	Point Inflow
Incoming Item(s)	Catchment Area (6)
Bypass Destination	(None)
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	BL RF 2 - Outfall
Outlet Type	Orifice

Diameter (m)	0.047
Coefficient of Discharge	0.600
Invert Level (m)	82.000

Advanced

Perimeter	Circular
Length (m)	94.010

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Pond 3A

Type : Pond

Dimensions

Exceedance Level (m)	82.900
Depth (m)	1.232
Base Level (m)	81.668
Freeboard (mm)	600
Initial Depth (m)	0.000
Porosity (%)	100
Average Slope (1:X)	5.31
Total Volume (m³)	484.390

Depth (m)	Area (m²)	Volume (m³)
0.000	650.609300	0.000
0.632	888.432300	484.390
0.633	1099.451600	485.382
1.232	1376.523422	1225.384

Inlets

Inlet

Inlet Type	Point Inflow
Incoming Item(s)	1.005
Bypass Destination	(None)
Capacity Type	No Restriction

Inlet (1)

Inlet Type	Point Inflow
Incoming Item(s)	2.003
Bypass Destination	(None)
Capacity Type	No Restriction

Inlet (2)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (28) (1) Catchment Area (32) Catchment Area (33) (1) (1)
Bypass Destination	(None)
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	1.006
Outlet Type	Free Discharge

Advanced

Perimeter	Circular
Length (m)	62.944
Friction Scheme	Manning's n
n	0.01

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BL ROOF 3 Type : Tank

Dimensions

Exceedance Level (m)	82.200
Depth (m)	0.200
Base Level (m)	82.000
Freeboard (mm)	0
Initial Depth (m)	0.000
Porosity (%)	100
Average Slope (1:X)	0.00
Total Volume (m³)	263.228

Depth (m)	Area (m²)	Volume (m³)
0.000	1316.14	0.000
0.200	1316.14	263.228

Inlets

Inlet (2)

Inlet Type	Point Inflow
Incoming Item(s)	Catchment Area (1) (1)
Bypass Destination	(None)
Capacity Type	No Restriction

Inlet (3)

Inlet Type	Point Inflow
Incoming Item(s)	Catchment Area (48)
Bypass Destination	(None)
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	BL RF 3 - Outfall
Outlet Type	Orifice
Diameter (m)	0.047
Coefficient of Discharge	0.600
Invert Level (m)	82.000

Advanced

Perimeter	Circular
Length (m)	94.010

Pond 1 Type : Pond

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Dimensions

Exceedance Level (m)	79.000
Depth (m)	1.626
Base Level (m)	77.374
Freeboard (mm)	860
Initial Depth (m)	0.000
Porosity (%)	100
Average Slope (1:X)	5.245
Total Volume (m³)	1510.247

Depth (m)	Area (m²)	Volume (m³)
0.000	1724.8750	0.000
0.766	2229.0886	1510.247
0.767	2577.2051	1512.648
1.626	3208.8815	3992.821

Inlets

Inlet (1)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (28) (2)
Bypass Destination	(None)
Capacity Type	No Restriction

Inlet (3)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (29) (1)
Bypass Destination	(None)
Capacity Type	No Restriction

Inlet (4)

Inlet Type	Point Inflow
Incoming Item(s)	9.001
Bypass Destination	(None)
Capacity Type	No Restriction

Inlet (5)

Inlet Type	Point Inflow
Incoming Item(s)	1.017
Bypass Destination	(None)
Capacity Type	No Restriction

Outlets

Outlet (1)

Outgoing Connection	1.018
Outlet Type	Free Discharge

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Advanced

Perimeter	Circular
Length (m)	110.520
Friction Scheme	Manning's n
n	0.01

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PP1.3

Type : Porous Paving

Dimensions

Exceedance Level (m)	83.750
Depth (m)	0.400
Base Level (m)	83.350
Paving Layer Depth (mm)	110
Membrane Percolation (m/hr)	500.0
Porosity (%)	40
Length (m)	57.942
Long. Slope (1:X)	500.00
Width (m)	4.927
Total Volume (m³)	33.724

Under Drain

Height Above Base (m)	0.050
Diameter (mm)	150
No. of Barrels	1
Release Height (m)	0.000
Friction Scheme	Manning's n
n	0.015

Inlets

Inlet

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (23)
Bypass Destination	(None)
Capacity Type	No Restriction

Inlet (1)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (24)
Bypass Destination	(None)
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	No Delay (2)
Outlet Type	Under Drain

Advanced

Conductivity (m/hr)	500.0

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PP GA1

Type : Porous Paving

Dimensions

Exceedance Level (m)	84.000
Depth (m)	0.500
Base Level (m)	83.500
Paving Layer Depth (mm)	110
Membrane Percolation (m/hr)	1000.0
Porosity (%)	40
Length (m)	39.675
Long. Slope (1:X)	500.00
Width (m)	5.037
Total Volume (m³)	31.599

Under Drain

Height Above Base (m)	0.050
Diameter (mm)	150
No. of Barrels	1
Release Height (m)	0.000
Friction Scheme	Manning's n
n	0.015

Inlets

Inlet (2)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (46)
Bypass Destination	(None)
Capacity Type	No Restriction

Outlets

Outlet (1)

Outgoing Connection	No Delay (11)
Outlet Type	Under Drain

Advanced

Conductivity (m/hr)	500.0

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PP1.2

Type : Porous Paving

Dimensions

Exceedance Level (m)	83.720
Depth (m)	0.400
Base Level (m)	83.320
Paving Layer Depth (mm)	110
Membrane Percolation (m/hr)	500.0
Porosity (%)	40
Length (m)	47.541
Long. Slope (1:X)	500.00
Width (m)	5.038
Total Volume (m³)	28.285

Under Drain

Height Above Base (m)	0.050
Diameter (mm)	150
No. of Barrels	1
Release Height (m)	0.000
Friction Scheme	Manning's n
n	0.015

Inlets

Inlet (2)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (23) (1)
Bypass Destination	(None)
Capacity Type	No Restriction

Outlets

Outlet (1)

Outgoing Connection	No Delay (1)
Outlet Type	Under Drain

Advanced

Conductivity (m/hr)	500.0

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PP1.1

Type : Porous Paving

Dimensions

Exceedance Level (m)	83.600
Depth (m)	0.400
Base Level (m)	83.200
Paving Layer Depth (mm)	110
Membrane Percolation (m/hr)	500.0
Porosity (%)	40
Length (m)	58.434
Long. Slope (1:X)	500.00
Width (m)	5.916
Total Volume (m³)	40.712

Under Drain

Height Above Base (m)	0.050
Diameter (mm)	150
No. of Barrels	1
Release Height (m)	0.000
Friction Scheme	Manning's n
n	0.015

Inlets

Inlet

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (23) (1) (1)
Bypass Destination	(None)
Capacity Type	No Restriction

Outlets

Outlet (1)

Outgoing Connection	No Delay
Outlet Type	Under Drain

Advanced

Conductivity (m/hr)	500.0

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PP2.1

Type : Porous Paving

Dimensions

Exceedance Level (m)	82.200
Depth (m)	0.400
Base Level (m)	81.800
Paving Layer Depth (mm)	110
Membrane Percolation (m/hr)	500.0
Porosity (%)	40
Length (m)	50.660
Long. Slope (1:X)	500.00
Width (m)	5.117
Total Volume (m³)	30.605

Under Drain

Height Above Base (m)	0.050
Diameter (mm)	150
No. of Barrels	1
Release Height (m)	0.000
Friction Scheme	Manning's n
n	0.015

Inlets

Inlet

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (25) (1) (1)
Bypass Destination	(None)
Capacity Type	No Restriction

Outlets

Outlet (1)

Outgoing Connection	No Delay (3)
Outlet Type	Under Drain

Advanced

Conductivity (m/hr)	500.0

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PP2.2

Type : Porous Paving

Dimensions

Exceedance Level (m)	82.500
Depth (m)	0.400
Base Level (m)	82.100
Paving Layer Depth (mm)	110
Membrane Percolation (m/hr)	500.0
Porosity (%)	40
Length (m)	47.437
Long. Slope (1:X)	500.00
Width (m)	5.037
Total Volume (m³)	28.223

Under Drain

Height Above Base (m)	0.050
Diameter (mm)	150
No. of Barrels	1
Release Height (m)	0.000
Friction Scheme	Manning's n
n	0.015

Inlets

Inlet (1)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (25) (1)
Bypass Destination	(None)
Capacity Type	No Restriction

Outlets

Outlet (1)

Outgoing Connection	No Delay (4)
Outlet Type	Under Drain

Advanced

Conductivity (m/hr)	500.0

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PP2.3

Type : Porous Paving

Dimensions

Exceedance Level (m)	82.700
Depth (m)	0.400
Base Level (m)	82.300
Paving Layer Depth (mm)	110
Membrane Percolation (m/hr)	500.0
Porosity (%)	40
Length (m)	58.075
Long. Slope (1:X)	500.00
Width (m)	5.063
Total Volume (m³)	34.718

Under Drain

Height Above Base (m)	0.050
Diameter (mm)	150
No. of Barrels	1
Release Height (m)	0.000
Friction Scheme	Manning's n
n	0.015

Inlets

Inlet (2)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (25)
Bypass Destination	(None)
Capacity Type	No Restriction

Outlets

Outlet (1)

Outgoing Connection	No Delay (5)
Outlet Type	Under Drain

Advanced

Conductivity (m/hr)	500.0

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PP GA2

Type : Porous Paving

Dimensions

Exceedance Level (m)	84.000
Depth (m)	0.500
Base Level (m)	83.500
Paving Layer Depth (mm)	110
Membrane Percolation (m/hr)	1000.0
Porosity (%)	40
Length (m)	40.128
Long. Slope (1:X)	200.00
Width (m)	5.037
Total Volume (m³)	31.959

Under Drain

Height Above Base (m)	0.050
Diameter (mm)	150
No. of Barrels	1
Release Height (m)	0.000
Friction Scheme	Manning's n
n	0.015

Inlets

Inlet (2)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (47)
Bypass Destination	(None)
Capacity Type	No Restriction

Outlets

Outlet (1)

Outgoing Connection	No Delay (12)
Outlet Type	Under Drain

Advanced

Conductivity (m/hr)	500.0

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PP3.1

Type : Porous Paving

Dimensions

Exceedance Level (m)	79.900
Depth (m)	0.400
Base Level (m)	79.500
Paving Layer Depth (mm)	110
Membrane Percolation (m/hr)	500.0
Porosity (%)	40
Length (m)	50.455
Long. Slope (1:X)	500.00
Width (m)	5.043
Total Volume (m³)	30.053

Under Drain

Height Above Base (m)	0.050
Diameter (mm)	150
No. of Barrels	1
Release Height (m)	0.000
Friction Scheme	Manning's n
n	0.015

Inlets

Inlet

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (50)
Bypass Destination	(None)
Capacity Type	No Restriction

Outlets

Outlet (1)

Outgoing Connection	No Delay (8)
Outlet Type	Under Drain

Advanced

Conductivity (m/hr)	500.0

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PP3.2

Type : Porous Paving

Dimensions

Exceedance Level (m)	80.500
Depth (m)	0.400
Base Level (m)	80.100
Paving Layer Depth (mm)	110
Membrane Percolation (m/hr)	500.0
Porosity (%)	40
Length (m)	47.511
Long. Slope (1:X)	500.00
Width (m)	5.037
Total Volume (m³)	28.266

Under Drain

Height Above Base (m)	0.050
Diameter (mm)	150
No. of Barrels	1
Release Height (m)	0.000
Friction Scheme	Manning's n
n	0.015

Inlets

Inlet (1)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (49) (1)
Bypass Destination	(None)
Capacity Type	No Restriction

Outlets

Outlet (1)

Outgoing Connection	No Delay (9)
Outlet Type	Under Drain

Advanced

Conductivity (m/hr)	500.0

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PP3.3

Type : Porous Paving

Dimensions

Exceedance Level (m)	81.015
Depth (m)	0.400
Base Level (m)	80.615
Paving Layer Depth (mm)	110
Membrane Percolation (m/hr)	500.0
Porosity (%)	40
Length (m)	57.381
Long. Slope (1:X)	500.00
Width (m)	5.034
Total Volume (m³)	34.113

Under Drain

Height Above Base (m)	0.050
Diameter (mm)	150
No. of Barrels	1
Release Height (m)	0.000
Friction Scheme	Manning's n
n	0.015

Inlets

Inlet

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (18) (1)
Bypass Destination	(None)
Capacity Type	No Restriction

Outlets

Outlet (1)

Outgoing Connection	No Delay (10)
Outlet Type	Under Drain

Advanced

Conductivity (m/hr)	500.0

Herbata Data Centre:	Date:		
Halverstown, Naas Co. Kildare Surface Water Analysis- Catchment 1	07/02/2023		
	Designed by: MC	Checked by: RK	Approved By: DOB
Report Details: Type: Stormwater Controls Storm Phase: Catchment 1 Final	Donnachadh O'Brien & Associates: Unit 5C Elm House Millennium Park, Naas Co. Kildare		

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SWC1-2

Type : Swale

Swale

Exceedance Level (m)	82.600
Depth (m)	0.650
Base Level (m)	81.950
Top Width (m)	6.000
Side Slope (1:X)	2.31
Base Width (m)	3.000
Freeboard (mm)	0
Length (m)	52.000
Long. Slope (1:X)	200.00
Filtration Rate (m/hr)	0.0
Friction Scheme	Manning's n
n	0.01
Total Volume (m^3)	152.100

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Inlets

Inlet

Inlet Type	Point Inflow
Incoming Item(s)	Weir C1-1
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (2)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (10)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (3)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (11)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (4)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (12)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (1)

Inlet Type	Point Inflow
Incoming Item(s)	BL Roof 1- Outfall
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	Weir C1-2
Outlet Type	Weir

Width (m)	0.050
Coefficient of Discharge	0.544
Crest Level (m)	81.950

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Advanced

Swale

Porosity (%)	100



SWC1-1

Type : Swale

Swale

Exceedance Level (m)	82.900
Depth (m)	0.650
Base Level (m)	82.250
Top Width (m)	6.000
Side Slope (1:X)	2.31
Base Width (m)	3.000
Freeboard (mm)	0
Length (m)	50.000
Long. Slope (1:X)	200.00
Filtration Rate (m/hr)	0.0
Friction Scheme	Manning's n
n	0.01
Total Volume (m³)	146.250

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Inlets

Inlet

Inlet Type	Point Inflow
Incoming Item(s)	Catchment Area
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (1)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (7)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (2)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (8)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (3)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (9)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	Weir C1-1
Outlet Type	Weir

Width (m)	0.050
Coefficient of Discharge	0.544
Crest Level (m)	82.250

Advanced

Swale

Porosity (%)	100



SWC1-4

Type : Swale

Herbata Data Centre:	Date:		
Halverstown, Naas Co. Kildare Surface Water Analysis- Catchment 1	07/02/2023		
	Designed by: MC	Checked by: RK	Approved By: DOB
Report Details: Type: Stormwater Controls Storm Phase: Catchment 1 Final	Donnachadh O'Brien & Associates: Unit 5C Elm House Millennium Park, Naas Co. Kildare		

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Swale

Exceedance Level (m)	81.100
Depth (m)	0.650
Base Level (m)	80.450
Top Width (m)	6.000
Side Slope (1:X)	2.31
Base Width (m)	3.000
Freeboard (mm)	0
Length (m)	57.000
Long. Slope (1:X)	200.00
Filtration Rate (m/hr)	0.0
Friction Scheme	Manning's n
n	0.01
Total Volume (m³)	166.725

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Inlets

Inlet

Inlet Type	Point Inflow
Incoming Item(s)	Weir C1-3
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (1)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (21)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (2)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (16)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (3)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (22)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (4)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (15)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (5)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (14)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (6)

Inlet Type	Point Inflow
Incoming Item(s)	BL RF 2 - Outfall
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

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Outlets

Outlet

Outgoing Connection	Weir C1-4
Outlet Type	Weir

Width (m)	0.200
Coefficient of Discharge	0.544
Crest Level (m)	80.450

Advanced

Swale

Porosity (%)	100



SWC1-3

Type : Swale

Swale

Exceedance Level (m)	81.404
Depth (m)	0.650
Base Level (m)	80.754
Top Width (m)	6.000
Side Slope (1:X)	2.31
Base Width (m)	3.000
Freeboard (mm)	0
Length (m)	50.000
Long. Slope (1:X)	200.00
Filtration Rate (m/hr)	0.0
Friction Scheme	Manning's n
n	0.01
Total Volume (m³)	146.250

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Inlets

Inlet (1)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (18)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (2)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (13)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (3)

Inlet Type	Point Inflow
Incoming Item(s)	Catchment Area (2)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (4)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (19)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (5)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (20)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (6)

Inlet Type	Point Inflow
Incoming Item(s)	Catchment Area (4)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (7)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (17)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Herbata Data Centre:	Date:		
Halverstown, Naas Co. Kildare Surface Water Analysis- Catchment 1	07/02/2023		
	Designed by: MC	Checked by: RK	Approved By: DOB
Report Details: Type: Stormwater Controls Storm Phase: Catchment 1 Final	Donnachadh O'Brien & Associates: Unit 5C Elm House Millennium Park, Naas Co. Kildare		

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Outlets

Outlet

Outgoing Connection	Weir C1-3
Outlet Type	Weir

Width (m)	0.200
Coefficient of Discharge	0.544
Crest Level (m)	80.754

Advanced

Swale

Porosity (%)	100

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SWC1-GA1

Type : Swale

Swale

Exceedance Level (m)	83.095
Depth (m)	0.500
Base Level (m)	82.595
Top Width (m)	3.282
Side Slope (1:X)	3.00
Base Width (m)	0.282
Freeboard (mm)	0
Length (m)	96.994
Long. Slope (1:X)	200.00
Filtration Rate (m/hr)	0.0
Friction Scheme	Manning's n
n	0.01
Total Volume (m³)	86.423

Inlets

Inlet

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (33) Catchment Area (34)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	No Delay (6)
Outlet Type	Orifice

Diameter (m)	0.150
Coefficient of Discharge	0.600
Invert Level (m)	82.595

Advanced

Swale

Porosity (%)	100

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SWC1-GA2 Type : Swale

Swale

Exceedance Level (m)	82.900
Depth (m)	0.500
Base Level (m)	82.400
Top Width (m)	1.629
Side Slope (1:X)	1.00
Base Width (m)	0.629
Freeboard (mm)	0
Length (m)	54.262
Long. Slope (1:X)	500.00
Filtration Rate (m/hr)	0.0
Friction Scheme	Manning's n
n	0.01
Total Volume (m³)	30.618

Inlets

Inlet

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (31) Catchment Area (36)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	No Delay (7)
Outlet Type	Orifice

Diameter (m)	0.150
Coefficient of Discharge	0.600
Invert Level (m)	82.400

Advanced

Swale

Porosity (%)	100

SWC1-6 Type : Swale

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Swale

Exceedance Level (m)	78.730
Depth (m)	0.650
Base Level (m)	78.080
Top Width (m)	6.000
Side Slope (1:X)	2.31
Base Width (m)	3.000
Freeboard (mm)	0
Length (m)	57.000
Long. Slope (1:X)	200.00
Filtration Rate (m/hr)	0.0
Friction Scheme	Manning's n
n	0.01
Total Volume (m³)	166.725

Inlets

Inlet

Inlet Type	Point Inflow
Incoming Item(s)	Weir C1-5
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (7)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (8) (1)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (8)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (6) (1)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (9)

Inlet Type	Lateral Inflow
Incoming Item(s)	BL RF 3 - Outfall
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (1)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (7) (1) Catchment Area (12) (1)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

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Outlets

Outlet

Outgoing Connection	Weir C1-6
Outlet Type	Weir

Width (m)	0.600
Coefficient of Discharge	0.544
Crest Level (m)	78.080

Advanced

Swale

Porosity (%)	100



SWC1-5

Type : Swale

Swale

Exceedance Level (m)	79.030
Depth (m)	0.650
Base Level (m)	78.380
Top Width (m)	6.000
Side Slope (1:X)	2.31
Base Width (m)	3.000
Freeboard (mm)	0
Length (m)	50.000
Long. Slope (1:X)	200.00
Filtration Rate (m/hr)	0.0
Friction Scheme	Manning's n
n	0.01
Total Volume (m³)	146.250

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Inlets

Inlet

Inlet Type	Point Inflow
Incoming Item(s)	Catchment Area (38) (1)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (8)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (4) (2)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (9)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (5) (1)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (10)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (9) (1)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (11)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (10) (1)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (1)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (11) (1)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (2)

Inlet Type	Point Inflow
Incoming Item(s)	Catchment Area (51)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

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Outlets

Outlet

Outgoing Connection	Weir C1-5
Outlet Type	Weir

Width (m)	0.200
Coefficient of Discharge	0.544
Crest Level (m)	78.380

Advanced

Swale

Porosity (%)	100



SWC1-9

Type : Swale

Swale

Exceedance Level (m)	78.400
Depth (m)	0.650
Base Level (m)	77.750
Top Width (m)	6.000
Side Slope (1:X)	2.31
Base Width (m)	3.000
Freeboard (mm)	0
Length (m)	40.000
Long. Slope (1:X)	200.00
Filtration Rate (m/hr)	0.0
Friction Scheme	Manning's n
n	0.01
Total Volume (m³)	117.000

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Inlets

Inlet

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (27) (1)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (1)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (13) (1)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (6)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (19) (1)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (7)

Inlet Type	Point Inflow
Incoming Item(s)	Catchment Area (3) (1)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	Weir C1-9
Outlet Type	Weir

Width (m)	0.075
Coefficient of Discharge	0.544
Crest Level (m)	77.750

Advanced

Swale

Porosity (%)	100



SWC1-10 Type : Swale

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Swale

Exceedance Level (m)	78.100
Depth (m)	0.650
Base Level (m)	77.450
Top Width (m)	6.000
Side Slope (1:X)	2.31
Base Width (m)	3.000
Freeboard (mm)	0
Length (m)	50.000
Long. Slope (1:X)	200.00
Filtration Rate (m/hr)	0.0
Friction Scheme	Manning's n
n	0.01
Total Volume (m³)	146.250

Inlets

Inlet

Inlet Type	Point Inflow
Incoming Item(s)	Weir C1-9
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (5)

Inlet Type	Point Inflow
Incoming Item(s)	Catchment Area (2) (1)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (6)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (20) (1)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (7)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (14) (1)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (8)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (26) (1)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

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Outlets

Outlet

Outgoing Connection	Weir C1-10
Outlet Type	Weir

Width (m)	0.225
Coefficient of Discharge	0.544
Crest Level (m)	77.450

Advanced

Swale

Porosity (%)	100



SWC1-7

Type : Swale

Swale

Exceedance Level (m)	78.280
Depth (m)	0.650
Base Level (m)	77.630
Top Width (m)	6.000
Side Slope (1:X)	2.31
Base Width (m)	3.000
Freeboard (mm)	0
Length (m)	55.000
Long. Slope (1:X)	200.00
Filtration Rate (m/hr)	0.0
Friction Scheme	Manning's n
n	0.01
Total Volume (m³)	160.875

Inlets

Inlet

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (22) (1)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (4)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (24) (1)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

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Outlets

Outlet (1)

Outgoing Connection	Weir C1-7
Outlet Type	Weir

Width (m)	0.075
Coefficient of Discharge	0.544
Crest Level (m)	77.630

Advanced

Swale

Porosity (%)	100



SWC1-8

Type : Swale

Swale

Exceedance Level (m)	78.100
Depth (m)	0.650
Base Level (m)	77.450
Top Width (m)	6.000
Side Slope (1:X)	2.31
Base Width (m)	3.000
Freeboard (mm)	0
Length (m)	35.000
Long. Slope (1:X)	200.00
Filtration Rate (m/hr)	0.0
Friction Scheme	Manning's n
n	0.01
Total Volume (m^3)	102.375

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Inlets

Inlet (5)

Inlet Type	Point Inflow
Incoming Item(s)	Weir C1-7
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (6)

Inlet Type	Point Inflow
Incoming Item(s)	Catchment Area (39) (1)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (7)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (21) (1)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (8)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (15) (1)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (9)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (25) (2)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	Weir C1-8
Outlet Type	Weir

Width (m)	0.225
Coefficient of Discharge	0.544
Crest Level (m)	77.450

Herbata Data Centre:	Date:		
Halverstown, Naas Co. Kildare Surface Water Analysis- Catchment 1	07/02/2023		
	Designed by: MC	Checked by: RK	Approved By: DOB
Report Details: Type: Stormwater Controls Storm Phase: Catchment 1 Final	Donnachadh O'Brien & Associates: Unit 5C Elm House Millennium Park, Naas Co. Kildare		

DONNACHADH O'BRIEN
& ASSOCIATES CONSULTING ENGINEERS

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Advanced

Swale

Porosity (%)	100

Herbata Data Centre:	Date:		
Halverstown, Naas Co. Kildare Surface Water Analysis- Catchment 1	07/02/2023		
	Designed by:	Checked by:	Approved By:
	MC	RK	DOB
Report Details: Type: Inflow Summary Storm Phase: Catchment 1 Final	Donnachadh O'Brien & Associates: Unit 5C Elm House Millennium Park, Naas Co. Kildare		

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Inflow Label	Connected To	Flow (L/s)	Runoff Method	Area (ha)	Percentage Impervious (%)	Urban Creep (%)	Adjusted Percentage Impervious (%)	Area Analysed (ha)
Catchment Area	SWC1-1		Time of Concentration	0.257	95	0	95	0.244
Catchment Area (1)	BL ROOF 1		Time of Concentration	0.164	95	0	95	0.156
Catchment Area (1) (1)	BL ROOF 3		Time of Concentration	0.132	95	0	95	0.125
Catchment Area (2)	SWC1-3		Time of Concentration	0.286	95	0	95	0.271
Catchment Area (2) (1)	SWC1-10		Time of Concentration	0.279	95	0	95	0.265
Catchment Area (3)	BL ROOF 1		Time of Concentration	0.132	95	0	95	0.125
Catchment Area (3) (1)	SWC1-9		Time of Concentration	0.189	95	0	95	0.179
Catchment Area (4)	SWC1-3		Time of Concentration	0.248	95	0	95	0.236
Catchment Area (4) (2)	SWC1-5		Time of Concentration	0.032	80	0	80	0.026
Catchment Area (5)	BL ROOF 2		Time of Concentration	0.166	95	0	95	0.158
Catchment Area (5) (1)	SWC1-5		Time of Concentration	0.039	100	0	100	0.039
Catchment Area (6)	BL ROOF 2		Time of Concentration	0.132	95	0	95	0.125
Catchment Area (6) (1)	SWC1-6		Time of Concentration	0.023	80	0	80	0.019
Catchment Area (7)	SWC1-1		Time of Concentration	0.033	80	0	80	0.027
Catchment Area (7) (1)	SWC1-6		Time of Concentration	0.196	80	0	80	0.157
Catchment Area (8)	SWC1-1		Time of Concentration	0.039	80	0	80	0.031
Catchment Area (8) (1)	SWC1-6		Time of Concentration	0.009	100	0	100	0.009
Catchment Area (9)	SWC1-1		Time of Concentration	0.079	30	0	30	0.024
Catchment Area (9) (1)	SWC1-5		Time of Concentration	0.038	80	0	80	0.030
Catchment Area (10)	SWC1-2		Time of Concentration	0.025	80	0	80	0.020
Catchment Area (10) (1)	SWC1-5		Time of Concentration	0.023	80	0	80	0.019
Catchment Area (11)	SWC1-2		Time of Concentration	0.050	80	0	80	0.040
Catchment Area (11) (1)	SWC1-5		Time of Concentration	0.056	30	0	30	0.017
Catchment Area (12)	SWC1-2		Time of Concentration	0.089	30	0	30	0.027
Catchment Area (12) (1)	SWC1-6		Time of Concentration	0.064	30	0	30	0.019
Catchment Area (13)	SWC1-3		Time of Concentration	0.024	30	0	30	0.007
Catchment Area (13) (1)	SWC1-9		Time of Concentration	0.041	80	0	80	0.033
Catchment Area (14)	SWC1-4		Time of Concentration	0.008	80	0	80	0.006
Catchment Area (14) (1)	SWC1-10		Time of Concentration	0.039	80	0	80	0.031
Catchment Area (15)	SWC1-4		Time of Concentration	0.134	80	0	80	0.107

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Catchment Area (15) (1)	SWC1-8		Time of Concentration	0.038	80	0	80	0.030
Catchment Area (16)	SWC1-4		Time of Concentration	0.064	30	0	30	0.019
Catchment Area (16) (1)	SMH 1.13		Time of Concentration	0.137	80	0	80	0.110
Catchment Area (17)	SWC1-3		Time of Concentration	0.055	30	0	30	0.017
Catchment Area (17) (1)	SMH 1.12		Time of Concentration	0.047	30	0	30	0.014
Catchment Area (18)	SWC1-3		Time of Concentration	0.038	80	0	80	0.030
Catchment Area (18) (1)	PP3.3		Time of Concentration	0.059	80	0	80	0.047
Catchment Area (19)	SWC1-3		Time of Concentration	0.038	80	0	80	0.030
Catchment Area (19) (1)	SWC1-9		Time of Concentration	0.018	80	0	80	0.014
Catchment Area (20)	SWC1-3		Time of Concentration	0.031	80	0	80	0.025
Catchment Area (20) (1)	SWC1-10		Time of Concentration	0.025	80	0	80	0.020
Catchment Area (21)	SWC1-4		Time of Concentration	0.024	80	0	80	0.019
Catchment Area (21) (1)	SWC1-8		Time of Concentration	0.024	80	0	80	0.019
Catchment Area (22)	SWC1-4		Time of Concentration	0.062	80	0	80	0.050
Catchment Area (22) (1)	SWC1-7		Time of Concentration	0.010	80	0	80	0.008
Catchment Area (23)	PP1.3		Time of Concentration	0.061	80	0	80	0.049
Catchment Area (23) (1)	PP1.2		Time of Concentration	0.081	80	0	80	0.065
Catchment Area (23) (1) (1)	PP1.1		Time of Concentration	0.089	80	0	80	0.071
Catchment Area (24)	PP1.3		Time of Concentration	0.047	30	0	30	0.014
Catchment Area (24) (1)	SWC1-7		Time of Concentration	0.093	30	0	30	0.028
Catchment Area (25)	PP2.3		Time of Concentration	0.058	80	0	80	0.047
Catchment Area (25) (1)	PP2.2		Time of Concentration	0.081	80	0	80	0.065
Catchment Area (25) (1) (1)	PP2.1		Time of Concentration	0.096	80	0	80	0.077
Catchment Area (25) (2)	SWC1-8		Time of Concentration	0.089	30	0	30	0.027
Catchment Area (26)	SIC 6.00		Time of Concentration	0.047	30	0	30	0.014
Catchment Area (26) (1)	SWC1-10		Time of Concentration	0.088	30	0	30	0.026
Catchment Area (27)	Pond 3B		Time of Concentration	0.076	80	0	80	0.060
Catchment Area (27) (1)	SWC1-9		Time of Concentration	0.074	30	0	30	0.022
Catchment Area (28)	Pond 3B		Time of Concentration	0.552	30	0	30	0.166
Catchment Area (28) (1)	Pond 3A		Time of Concentration	0.205	30	0	30	0.061
Catchment Area (28) (2)	Pond 1		Time of Concentration	0.044	30	0	30	0.013

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Catchment Area (29)	Pond 2		Time of Concentration	0.083	80	0	80	0.067
Catchment Area (29) (1)	Pond 1		Time of Concentration	0.321	95	0	95	0.305
Catchment Area (30)	Pond 2		Time of Concentration	0.562	30	0	30	0.169
Catchment Area (31)	SWC1-GA2		Time of Concentration	0.134	30	0	30	0.040
Catchment Area (32)	Pond 3A		Time of Concentration	0.080	80	0	80	0.064
Catchment Area (33)	SWC1-GA1		Time of Concentration	0.090	80	0	80	0.072
Catchment Area (33) (1)	Pond 3B		Time of Concentration	0.106	80	0	80	0.084
Catchment Area (33) (1) (1)	Pond 3A		Time of Concentration	0.070	80	0	80	0.056
Catchment Area (34)	SWC1-GA1		Time of Concentration	0.303	30	0	30	0.091
Catchment Area (35)	SMH 23.00		Time of Concentration	0.104	80	0	80	0.083
Catchment Area (36)	SWC1-GA2		Time of Concentration	0.146	80	0	80	0.117
Catchment Area (37)	SMH 23.00		Time of Concentration	0.005	80	0	80	0.004
Catchment Area (38)	SMH 24.00		Time of Concentration	0.005	80	0	80	0.004
Catchment Area (38) (1)	SWC1-5		Time of Concentration	0.274	95	0	95	0.261
Catchment Area (39) (1)	SWC1-8		Time of Concentration	0.312	95	0	95	0.296
Catchment Area (43)	SMH 23.03		Time of Concentration	0.020	95	0	95	0.019
Catchment Area (44)	SMH 23.01		Time of Concentration	0.046	80	0	80	0.037
Catchment Area (45)	SMH 23.02		Time of Concentration	0.016	80	0	80	0.013
Catchment Area (46)	PP GA1		Time of Concentration	0.053	80	0	80	0.043
Catchment Area (47)	PP GA2		Time of Concentration	0.051	80	0	80	0.041
Catchment Area (48)	BL ROOF 3		Time of Concentration	0.137	95	0	95	0.130
Catchment Area (49)	SMH 1.12		Time of Concentration	0.041	80	0	80	0.033
Catchment Area (49) (1)	PP3.2		Time of Concentration	0.082	80	0	80	0.066
Catchment Area (50)	PP3.1		Time of Concentration	0.094	100	0	100	0.094
Catchment Area (51)	SWC1-5		Time of Concentration	0.288	95	0	95	0.274
Catchment Area (52)	Pond 2		Time of Concentration	0.160	30	0	30	0.048
Catchment Area (53)	SMH 23.01		Time of Concentration	0.019	95	0	95	0.018
Catchment Area (54)	Pond 2		Time of Concentration	0.039	80	0	80	0.031
Catchment Area (55)	SMH 23.00		Time of Concentration	0.019	95	0	95	0.018
Catchment Area (56)	SMH 24.00		Time of Concentration	0.019	95	0	95	0.018
Catchment Area (57)	SMH 23.04		Time of Concentration	0.031	30	0	30	0.009

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Catchment Area (58)	Pond 2		Time of Concentration	0.030	30	0	30	0.009
Catchment Area (59)	SMH 23.02		Time of Concentration	0.026	95	0	95	0.024
TOTAL		**0.0**		**9.243**				**6.466**

Herbata Data Centre:	Date:		
Halverstown, Naas Co. Kildare Surface Water Analysis- Catchment 1	07/02/2023		
	Designed by:	Checked by:	Approved By:
	MC	RK	DOB
Report Title:	Donnachadh O'Brien & Associates:		
Rainfall Analysis Criteria	Unit 5C Elm House Millennium Park, Naas Co. Kildare		

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Runoff Type	Dynamic
Output Interval (mins)	5
Time Step	Reduced
Urban Creep	Apply Global Value
Urban Creep Global Value (%)	0
Junction Flood Risk Margin (mm)	0
Perform No Discharge Analysis	☐

Rainfall

100Yr

Type: FSR

Region	Scotland And Ireland
M5-60 (mm)	16.2
Ratio R	0.287
Summer	☑
Winter	☑

Return Period

Return Period (years)	Increase Rainfall (%)
100.0	30.000

Storm Durations

Duration (mins)	Run Time (mins)
15	30
30	60
60	120
120	240
180	360
240	480
360	720
480	960
600	1200
720	1440
960	1920
1440	2880
2160	4320
2880	5760
4320	8640
5760	11520
7200	14400
8640	17280
10080	20160

Herbata Data Centre:	Date:		
Halverstown, Naas Co. Kildare Surface Water Analysis- Catchment 1	07/02/2023		
	Designed by:	Checked by:	Approved By:
	MC	RK	DOB
Report Details: Type: Junctions Summary Storm Phase: Catchment 1 Final	Donnachadh O'Brien & Associates: Unit 5C Elm House Millennium Park, Naas Co. Kildare		

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& ASSOCIATES CONSULTING ENGINEERS

RECEIVED: 13/08/2024

Critical Storm Per Item: Rank By: Max. Depth

Junction	Storm Event	Cover Level (m)	Invert Level (m)	Max. Level (m)	Max. Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Status
SMH 1.00	100Yr: 100 years: +30 %: 4320 mins: Summer	83.340	81.934	82.238	0.304	9.5	0.344	0.000	9.4	989.377	Surcharged
SMH 4.01	100Yr: 100 years: +30 %: 30 mins: Summer	82.859	81.529	81.614	0.084	27.9	0.095	0.000	27.9	52.138	OK
SMH 1.07	100Yr: 100 years: +30 %: 60 mins: Summer	82.923	80.177	80.594	0.417	132.1	0.597	0.000	132.4	429.472	OK
SMH 1.08	100Yr: 100 years: +30 %: 60 mins: Summer	82.745	80.084	80.522	0.438	183.6	0.627	0.000	183.6	554.225	OK
SMH 1.09	100Yr: 100 years: +30 %: 60 mins: Summer	82.500	80.032	80.412	0.379	183.6	0.543	0.000	183.6	553.647	OK
SMH 1.10	100Yr: 100 years: +30 %: 5760 mins: Winter	82.000	78.736	78.850	0.114	22.0	0.129	0.000	22.0	5446.963	OK
SMH 1.11	100Yr: 100 years: +30 %: 120 mins: Summer	81.009	77.874	78.463	0.589	121.2	0.843	0.000	121.3	757.668	Surcharged
SMH 1.12	100Yr: 100 years: +30 %: 120 mins: Summer	80.346	77.736	78.241	0.505	123.7	0.722	0.000	123.8	780.216	Surcharged
SMH 1.13	100Yr: 100 years: +30 %: 60 mins: Summer	79.656	77.654	78.117	0.463	137.7	0.663	0.000	137.2	562.124	Surcharged
SMH 1.14	100Yr: 100 years: +30 %: 720 mins: Summer	79.000	77.578	77.979	0.401	107.0	0.573	0.000	107.0	2285.836	Surcharged
SMH 1.06	100Yr: 100 years: +30 %: 60 mins: Summer	82.900	80.268	80.714	0.446	106.5	0.639	0.000	106.8	362.669	Surcharged
SMH 3.00	100Yr: 100 years: +30 %: 60 mins: Summer	81.860	80.443	80.825	0.382	102.7	0.547	0.000	102.9	341.247	Surcharged
SMH 1.01	100Yr: 100 years: +30 %: 4320 mins: Summer	84.813	81.798	82.237	0.439	9.4	0.496	0.000	9.4	989.341	Surcharged
SMH 1.02	100Yr: 100 years: +30 %: 4320 mins: Summer	84.693	81.749	82.236	0.487	9.4	0.551	0.000	9.4	989.324	Surcharged
SMH 2.00	100Yr: 100 years: +30 %: 180 mins: Summer	83.758	82.914	83.172	0.258	19.7	0.291	0.000	19.7	91.564	Surcharged
SIC 2.02	100Yr: 100 years: +30 %: 180 mins: Summer	83.750	82.999	83.358	0.358	19.7	0.405	0.000	19.7	91.568	Surcharged
SIC 2.01	100Yr: 100 years: +30 %: 180 mins: Summer	83.720	83.072	83.417	0.345	12.6	0.391	0.000	12.7	62.799	Surcharged

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SIC 2.00	100Yr: 100 years: +30 %: 180 mins: Summer	83.600	83.150	83.425	0.275	7.9	0.311	0.000	8.1	31.364	Surcharged
SMH 1.03	100Yr: 100 years: +30 %: 4320 mins: Summer	84.000	81.692	82.236	0.544	9.4	0.615	0.000	9.3	989.153	Surcharged
SMH 1.04	100Yr: 100 years: +30 %: 4320 mins: Summer	84.000	81.668	82.234	0.566	4.5	0.640	0.000	4.5	1356.891	Surcharged
SMH 4.00	100Yr: 100 years: +30 %: 30 mins: Summer	83.364	81.745	81.887	0.142	27.8	0.161	0.000	27.9	52.165	OK
SMH 5.00	100Yr: 100 years: +30 %: 30 mins: Summer	82.900	81.550	81.698	0.148	28.8	0.167	0.000	28.9	50.175	OK
SIC 6.02	100Yr: 100 years: +30 %: 120 mins: Summer	82.700	81.049	81.132	0.083	26.7	0.094	0.000	26.7	83.195	OK
SMH 1.05	100Yr: 100 years: +30 %: 4320 mins: Summer	82.900	81.627	82.232	0.605	5.0	0.684	0.000	5.0	1848.596	Surcharged
SIC 6.01	100Yr: 100 years: +30 %: 120 mins: Summer	82.500	81.126	81.392	0.266	21.4	0.301	0.000	21.6	66.733	Surcharged
SIC 6.00	100Yr: 100 years: +30 %: 120 mins: Summer	82.200	81.200	81.456	0.256	13.1	0.289	0.000	12.2	39.729	Surcharged
SMH 7.00	100Yr: 100 years: +30 %: 60 mins: Summer	80.400	78.077	78.697	0.620	88.4	0.701	0.000	88.3	363.065	Surcharged
SMH 7.01	100Yr: 100 years: +30 %: 120 mins: Summer	81.332	77.986	78.526	0.540	84.6	0.772	0.000	84.6	463.406	Surcharged
SIC 8.00	100Yr: 100 years: +30 %: 120 mins: Summer	79.900	79.450	79.737	0.287	9.8	0.324	0.000	9.9	41.247	Surcharged
SIC 8.01	100Yr: 100 years: +30 %: 120 mins: Summer	80.500	79.386	79.713	0.327	16.9	0.370	0.000	16.8	68.472	Surcharged
SIC 8.02	100Yr: 100 years: +30 %: 120 mins: Summer	81.015	79.309	79.589	0.280	22.1	0.317	0.000	22.1	85.124	Surcharged
SMH 9.00	100Yr: 100 years: +30 %: 60 mins: Summer	79.300	77.441	78.021	0.580	74.8	0.655	0.000	74.0	308.384	Surcharged
SMH 9.01	100Yr: 100 years: +30 %: 720 mins: Summer	79.000	77.392	77.981	0.589	40.1	0.666	0.000	40.0	878.206	Surcharged
SMH 1.15	100Yr: 100 years: +30 %: 720 mins: Summer	78.100	76.538	77.921	1.383	58.7	1.564	0.000	59.6	3191.458	Surcharged
Catchment 1 Outfall	100Yr: 100 years: +30 %: 30 mins: Summer	77.000	76.464	76.764	0.300	59.4	0.000	0.000	59.4	95.373	OK
SMH 23.00	100Yr: 100 years: +30 %: 15 mins: Summer	84.000	83.025	83.473	0.448	56.2	0.507	0.000	48.0	24.298	Surcharged
SMH 23.01	100Yr: 100 years: +30 %: 15 mins: Summer	84.000	82.491	82.962	0.471	77.6	0.533	0.000	73.3	37.126	Surcharged
SMH 23.02	100Yr: 100 years: +30 %: 15 mins: Summer	83.640	80.362	82.073	1.711	93.1	1.935	0.000	82.5	45.692	Surcharged

Herbata Data Centre: Halverstown, Naas Co. Kildare Surface Water Analysis- Catchment 1	Date: 07/02/2023		
	Designed by: MC	Checked by: RK	Approved By: DOB
Report Details: Type: Junctions Summary Storm Phase: Catchment 1 Final	Donnachadh O'Brien & Associates: Unit 5C Elm House Millennium Park, Naas Co. Kildare		

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& ASSOCIATES CONSULTING ENGINEERS

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SMH 23.03	100Yr: 100 years: +30 %: 15 mins: Summer	83.650	80.309	81.742	1.433	103.4	1.621	0.000	94.7	60.123	Surcharged
SMH 23.04	100Yr: 100 years: +30 %: 15 mins: Summer	82.000	80.188	80.865	0.677	99.6	0.766	0.000	96.3	62.063	Surcharged
SMH 24.00	100Yr: 100 years: +30 %: 15 mins: Summer	83.650	82.425	82.510	0.085	11.7	0.096	0.000	10.2	5.040	OK

Herbata Data Centre:	Date:		
Halverstown, Naas Co. Kildare Surface Water Analysis- Catchment 1	07/02/2023		
	Designed by: MC	Checked by: RK	Approved By: DOB
Report Details: Type: Stormwater Controls Summary Storm Phase: Catchment 1 Final	Donnachadh O'Brien & Associates: Unit 5C Elm House Millennium Park, Naas Co. Kildare		

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RECEIVED: 13/08/2024

Critical Storm Per Item: Rank By: Max. DS Depth

Stormwater Control	Storm Event	Max. US Level (m)	Max. DS Level (m)	Max. US Depth (m)	Max. DS Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Total Lost Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Percentage Available (%)	Status
SWC1-2	100Yr: 100 years: +30 %: 240 mins: Summer	82.454	82.454	0.244	0.504	36.4	76.251	0.000	0.000	22.8	288.499	49.868	OK
SWC1-1	100Yr: 100 years: +30 %: 120 mins: Summer	82.818	82.818	0.318	0.568	80.3	89.911	0.000	0.000	27.6	164.284	38.523	OK
SWC1-4	100Yr: 100 years: +30 %: 60 mins: Summer	81.035	81.034	0.300	0.584	161.2	102.580	0.000	0.000	102.7	341.434	38.473	OK
SWC1-3	100Yr: 100 years: +30 %: 60 mins: Summer	81.353	81.353	0.349	0.599	204.3	97.893	0.000	0.000	123.3	254.969	33.065	OK
Pond 3B	100Yr: 100 years: +30 %: 4320 mins: Summer	82.235	82.235	0.567	0.567	16.2	591.655	0.000	0.000	4.5	1357.251	11.347	OK
Pond 2	100Yr: 100 years: +30 %: 2880 mins: Summer	79.454	79.454	1.204	1.204	63.7	2242.623	0.000	0.000	22.0	3812.972	24.891	OK
PP1.3	100Yr: 100 years: +30 %: 120 mins: Summer	83.594	83.511	0.128	0.161	15.5	17.762	0.000	0.000	8.2	25.237	47.330	OK
PP GA1	100Yr: 100 years: +30 %: 120 mins: Summer	83.699	83.643	0.120	0.143	10.6	11.068	0.000	0.000	6.3	17.271	64.973	OK
BL ROOF 1	100Yr: 100 years: +30 %: 2880 mins: Summer	83.728	83.728	0.178	0.178	8.3	234.523	0.000	0.000	1.7	324.316	10.909	OK
BL ROOF 2	100Yr: 100 years: +30 %: 2880 mins: Summer	82.179	82.179	0.179	0.179	8.4	235.817	0.000	0.000	1.7	326.271	10.413	OK
Pond 3A	100Yr: 100 years: +30 %: 4320 mins: Summer	82.233	82.233	0.565	0.565	12.4	425.561	0.000	0.000	5.0	1848.828	12.145	OK
PP1.2	100Yr: 100 years: +30 %: 120 mins: Summer	83.561	83.493	0.146	0.173	16.1	16.181	0.000	0.000	9.2	27.530	42.791	OK
PP1.1	100Yr: 100 years: +30 %: 180 mins: Summer	83.451	83.433	0.134	0.233	14.1	25.759	0.000	0.000	7.9	32.536	36.729	OK

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PP2.1	100Yr: 100 years: +30 %: 60 mins: Summer	82.065	81.982	0.164	0.181	25.5	19.247	0.000	0.000	10.5	24.107	37.113	OK
PP2.2	100Yr: 100 years: +30 %: 120 mins: Summer	82.341	82.271	0.146	0.171	16.1	16.175	0.000	0.000	9.3	27.601	42.690	OK
PP2.3	100Yr: 100 years: +30 %: 180 mins: Summer	82.519	82.434	0.103	0.134	9.2	15.017	0.000	0.000	5.4	20.082	56.745	OK
SWC1-GA1	100Yr: 100 years: +30 %: 30 mins: Summer	83.122	83.020	0.042	0.425	60.3	23.564	0.000	0.000	27.8	52.195	72.734	OK
SWC1-GA2	100Yr: 100 years: +30 %: 30 mins: Summer	82.849	82.850	0.341	0.450	58.1	22.080	0.000	0.000	28.8	50.216	27.884	OK
PP GA2	100Yr: 100 years: +30 %: 120 mins: Summer	83.794	83.649	0.094	0.149	10.1	9.875	0.000	0.000	6.9	16.565	69.103	OK
SWC1-6	100Yr: 100 years: +30 %: 60 mins: Summer	78.703	78.703	0.338	0.623	166.4	113.733	0.000	0.000	88.4	363.229	31.784	OK
SWC1-5	100Yr: 100 years: +30 %: 60 mins: Summer	79.013	79.014	0.383	0.634	220.5	106.886	0.000	0.000	135.8	275.079	26.916	OK
BL ROOF 3	100Yr: 100 years: +30 %: 2880 mins: Summer	82.156	82.156	0.156	0.156	7.6	204.662	0.000	0.000	1.7	303.042	22.249	OK
PP3.1	100Yr: 100 years: +30 %: 120 mins: Summer	79.817	79.766	0.216	0.266	23.2	25.408	0.000	0.000	9.8	41.967	15.456	OK
PP3.2	100Yr: 100 years: +30 %: 120 mins: Summer	80.342	80.271	0.147	0.171	16.2	16.266	0.000	0.000	9.3	27.829	42.455	OK
PP3.3	100Yr: 100 years: +30 %: 180 mins: Summer	80.833	80.750	0.103	0.135	9.3	14.860	0.000	0.000	5.5	20.294	56.439	OK
SWC1-9	100Yr: 100 years: +30 %: 60 mins: Summer	78.223	78.223	0.273	0.473	82.4	58.129	0.000	0.000	26.9	96.257	50.317	OK
SWC1-10	100Yr: 100 years: +30 %: 60 mins: Summer	78.047	78.048	0.347	0.598	136.9	97.487	0.000	0.000	56.9	193.701	33.342	OK
SWC1-7	100Yr: 100 years: +30 %: 180 mins: Summer	77.998	77.998	0.093	0.368	19.9	45.941	0.000	0.000	4.1	33.787	71.443	OK
SWC1-8	100Yr: 100 years: +30 %: 60 mins: Summer	78.022	78.022	0.397	0.572	123.4	70.158	0.000	0.000	40.9	143.851	31.470	OK

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Pond 1	100Yr: 100 years: +30 %: 720 mins: Summer	77.974	77.974	0.600	0.600	169.0	1150.563	0.000	0.000	58.7	3191.746	23.816	OK

Herbata Data Centre:	Date:		
Halverstown, Naas Co. Kildare Surface Water Analysis- Catchment 2	07/02/2023		
	Designed by:	Checked by:	Approved By:
	MC	RK	DOB
Report Details: Type: Junctions Storm Phase: Catchment 2 Final	Donnachadh O'Brien & Associates: Unit 5C Elm House Millennium Park, Naas Co. Kildare		

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& ASSOCIATES CONSULTING ENGINEERS

RECEIVED: 15/08/2024

Name	Junction Type	Easting (m)	Northing (m)	Cover Level (m)	Depth (m)	Invert Level (m)	Sump Depth (m)	Chamber Shape
SMH 10.15	Manhole	686262.346	719464.010	78.500	1.500	77.000	0.000	Circular
SMH 12.00	Manhole	686477.484	719674.754	81.900	1.650	80.250	0.000	Circular
SMH 12.02	Manhole	686394.386	719621.224	81.510	1.724	79.786	0.000	Circular
SMH 12.03	Manhole	686352.184	719594.181	81.200	1.649	79.551	0.000	Circular
SMH 10.12	Manhole	686297.390	719559.010	80.700	2.580	78.120	0.000	Circular
SMH 14.03	Manhole	686267.599	719547.213	79.000	1.609	77.391	0.000	Circular
SMH 10.16	Manhole	686249.393	719449.768	77.313	0.835	76.478	0.000	Circular
Catchment 2 Outfall	Manhole	686248.127	719448.404	77.197	0.727	76.470	0.000	Circular
SMH 10.11	Manhole	686301.008	719593.396	80.976	2.787	78.189	0.000	Circular
SMH 10.09	Manhole	686396.186	719654.191	81.150	2.735	78.415	0.000	Circular
SMH 10.06	Manhole	686497.308	719716.810	82.534	2.071	80.463	0.000	Circular
SMH 10.05	Manhole	686496.234	719740.623	82.725	2.143	80.582	0.000	Circular
SMH 10.10	Manhole	686343.124	719620.298	81.014	2.725	78.289	0.000	Circular
SMH 15.01	Manhole	686224.260	719546.337	78.796	1.175	77.621	0.000	Circular
SMH 15.00	Manhole	686189.754	719524.296	78.748	1.025	77.723	0.000	Circular
SMH 14.00	Manhole	686273.210	719574.329	78.760	1.282	77.478	0.000	Circular
SMH 15.02	Manhole	686269.146	719575.008	78.788	1.300	77.488	0.000	Circular
SMH 10.07	Manhole	686453.986	719689.138	82.520	2.314	80.206	0.000	Circular
SMH 13.01	Manhole	686344.027	719523.896	80.746	1.596	79.150	0.000	Circular
SMH 10.13	Manhole	686312.678	719534.742	80.700	2.637	78.063	0.000	Circular
SIC 12.02	Manhole	686483.191	719677.414	81.945	0.700	81.245	0.000	Circular
SIC 12.01	Manhole	686492.941	719683.107	81.952	0.632	81.320	0.000	Circular
SIC 12.00	Manhole	686501.806	719688.691	81.960	0.570	81.390	0.000	Circular
SMH 10.00	Manhole	686439.552	719863.984	84.250	1.233	83.017	0.000	Circular
SMH 10.01	Manhole	686439.000	719860.436	84.245	1.471	82.774	0.000	Circular
SMH 11.01	Manhole	686483.832	719795.647	83.095	1.180	81.915	0.000	Circular
SMH 11.00	Manhole	686504.765	719807.951	82.835	0.799	82.036	0.000	Circular
SMH 12.04	Manhole	686330.712	719580.392	81.065	1.634	79.431	0.000	Circular
SMH 10.02	Manhole	686481.053	719794.009	83.071	1.420	81.651	0.000	Circular
BIO 5 MAN	Manhole	686506.441	719689.602	82.000	1.000	81.000	0.500	Circular
SMH 10.03	Manhole	686497.909	719766.635	82.596	1.630	80.966	0.000	Circular
SMH 10.04	Manhole	686504.437	719745.839	82.289	1.589	80.700	0.000	Circular
SMH 10.08	Manhole	686412.852	719662.864	81.526	1.515	80.011	0.000	Circular
SMH 14.01	Manhole	686277.326	719567.935	78.760	1.301	77.459	0.000	Circular
SMH 14.02	Manhole	686279.208	719554.661	79.716	2.291	77.425	0.000	Circular
SMH 10.14	Manhole	686288.379	719519.163	79.000	1.400	77.600	0.000	Circular
SMH 12.01	Manhole	686441.818	719651.779	81.733	1.682	80.051	0.000	Circular
SMH 13.00	Manhole	686365.836	719490.572	80.773	1.425	79.348	0.000	Circular
SMH 10.02A	Manhole	686485.793	719786.312	82.937	1.690	81.247	0.000	Circular

Herbata Data Centre:	Date:		
Halverstown, Naas Co. Kildare Surface Water Analysis- Catchment 2	07/02/2023		
	Designed by:	Checked by:	Approved By:
	MC	RK	DOB
Report Details: Type: Junctions Storm Phase: Catchment 2 Final	Donnachadh O'Brien & Associates: Unit 5C Elm House Millennium Park, Naas Co. Kildare		

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RECEIVED: 13/08/2024

Name	Diameter (m)	Access Required	Intersection Easting (m)	Intersection Northing (m)	Lock
SMH 10.15	1.350	☐			All
SMH 12.00	1.350	☐			All
SMH 12.02	1.500	☐			All
SMH 12.03	1.500	☐			All
SMH 10.12	1.500	☐			All
SMH 14.03	1.500	☐			All
SMH 10.16	1.350	☑	686249.393	719449.768	All
Catchment 2 Outfall	0.000	☑	686248.127	719448.404	All
SMH 10.11	1.500	☐			None
SMH 10.09	1.500	☐			None
SMH 10.06	1.500	☐			None
SMH 10.05	1.200	☐			None
SMH 10.10	1.500	☐			None
SMH 15.01	1.350	☐			None
SMH 15.00	1.200	☐			None
SMH 14.00	1.500	☐			None
SMH 15.02	1.200	☐			None
SMH 10.07	1.200	☐			None
SMH 13.01	1.200	☐			None
SMH 10.13	1.200	☐			None
SIC 12.02	0.600	☐			None
SIC 12.01	0.600	☐			None
SIC 12.00	0.600	☐			None
SMH 10.00	1.200	☐			None
SMH 10.01	1.200	☐			None
SMH 11.01	1.200	☐			None
SMH 11.00	0.600	☐			None
SMH 12.04	1.500	☐			None
SMH 10.02	1.200	☐			None
BIO 5 MAN	0.600	☐			None
SMH 10.03	1.200	☐			None
SMH 10.04	1.200	☐			None
SMH 10.08	1.200	☐			None
SMH 14.01	1.200	☐			None
SMH 14.02	1.200	☐			None
SMH 10.14	1.200	☐			None
SMH 12.01	1.500	☐			None
SMH 13.00	1.200	☐			None
SMH 10.02A	1.200	☐			None

Inlets

Junction	Inlet Name	Incoming Item(s)	Bypass Destination	Capacity Type
SMH 10.15	Inlet (1)	10.015	(None)	No Restriction
SMH 12.00	Inlet	Catchment Area (10)	(None)	No Restriction
	Inlet (1)	Catchment Area (14)	(None)	No Restriction
	Inlet (2)	BL RF 5 - Outfall	(None)	No Restriction
	Inlet (3)	Catchment Area (1)	(None)	No Restriction
	Inlet (5)	12.002	(None)	No Restriction
SMH 12.02	Inlet (1)	12.004	(None)	No Restriction
	Inlet (2)	Catchment Area (16)	(None)	No Restriction
	Inlet (3)	Catchment Area (12)	(None)	No Restriction
	Inlet (4)	Catchment Area (3)	(None)	No Restriction

Herbata Data Centre:	Date:		
Halverstown, Naas Co. Kildare Surface Water Analysis- Catchment 2	07/02/2023		
	Designed by:	Checked by:	Approved By:
	MC	RK	DOB
Report Details: Type: Junctions Storm Phase: Catchment 2 Final	Donnachadh O'Brien & Associates: Unit 5C Elm House Millennium Park, Naas Co. Kildare		

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Junction	Inlet Name	Incoming Item(s)	Bypass Destination	Capacity Type
SMH 12.03	Inlet	12.005	(None)	No Restriction
	Inlet (2)	Catchment Area (17)	(None)	No Restriction
	Inlet (3)	Catchment Area (13)	(None)	No Restriction
	Inlet (4)	Catchment Area (4)	(None)	No Restriction
SMH 10.12	Inlet	Catchment Area (27)	(None)	No Restriction
	Inlet (2)	10.011	(None)	No Restriction
	Inlet (3)	12.007	(None)	No Restriction
SMH 14.03	Inlet	14.002	(None)	No Restriction
SMH 10.16	Inlet	10.016	(None)	No Restriction
Catchment 2 Outfall	Inlet	10.017	(None)	No Restriction
SMH 10.11	Inlet	10.010	(None)	No Restriction
	Inlet (1)	Catchment Area (41)	(None)	No Restriction
	Inlet (2)	Catchment Area (101)	(None)	No Restriction
SMH 10.09	Inlet	10.008	(None)	No Restriction
	Inlet (2)	Catchment Area (100)	(None)	No Restriction
	Inlet (3)	Weir 2-4	(None)	No Restriction
	Inlet (4)	Catchment Area (102)	(None)	No Restriction
SMH 10.06	Inlet	10.005	(None)	No Restriction
	Inlet (1)	Catchment Area (103)	(None)	No Restriction
	Inlet (2)	Catchment Area (104)	(None)	No Restriction
	Inlet (3)	Catchment Area	(None)	No Restriction
SMH 10.05	Inlet	Weir 2-2	(None)	No Restriction
	Inlet (1)	10.004	(None)	No Restriction
	Inlet (2)	Catchment Area (105)	(None)	No Restriction
SMH 10.10	Inlet	10.009	(None)	No Restriction
	Inlet (1)	Catchment Area (106)	(None)	No Restriction
	Inlet (2)	Catchment Area (40)	(None)	No Restriction
SMH 15.01	Inlet	15.000	(None)	No Restriction
SMH 15.00	Inlet	Catchment Area (115)	(None)	No Restriction
SMH 14.00	Inlet	weir 2-6	(None)	No Restriction
	Inlet (1)	15.002	(None)	No Restriction
SMH 15.02	Inlet	Catchment Area (116)	(None)	No Restriction
	Inlet (2)	15.001	(None)	No Restriction
SMH 10.07	Inlet	10.006	(None)	No Restriction
	Inlet (1)	Catchment Area (5)	(None)	No Restriction
	Inlet (2)	Catchment Area (6)	(None)	No Restriction
SMH 13.01	Inlet	Catchment Area (31)	(None)	No Restriction
	Inlet (1)	Catchment Area (32)	(None)	No Restriction
	Inlet (2)	13.000	(None)	No Restriction
SMH 10.13	Inlet	13.001	(None)	No Restriction
	Inlet (2)	Catchment Area (28)	(None)	No Restriction
	Inlet (3)	10.012	(None)	No Restriction
SIC 12.02	Inlet	12.001	(None)	No Restriction
	Inlet (1)	No Delay (5)	(None)	No Restriction
	Inlet (2)	Catchment Area (22)	(None)	No Restriction
SIC 12.01	Inlet	12.000	(None)	No Restriction
	Inlet (1)	No Delay (4)	(None)	No Restriction
	Inlet (2)	Catchment Area (33)	(None)	No Restriction
	Inlet (3)	Catchment Area (21)	(None)	No Restriction
SIC 12.00	Inlet	No Delay (3)	(None)	No Restriction
	Inlet (1)	No Delay (8)	(None)	No Restriction
	Inlet (2)	Catchment Area (34)	(None)	No Restriction

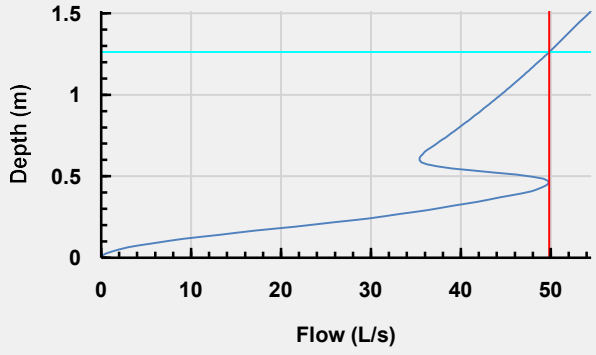
Herbata Data Centre: Halverstown, Naas Co. Kildare Surface Water Analysis- Catchment 2	Date: 07/02/2023			DONNACHADH O'BRIEN & ASSOCIATES CONSULTING ENGINEERS
	Designed by: MC	Checked by: RK	Approved By: DOB	
Report Details: Type: Junctions Storm Phase: Catchment 2 Final	Donnachadh O'Brien & Associates: Unit 5C Elm House Millennium Park, Naas Co. Kildare			

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Junction	Inlet Name	Incoming Item(s)	Bypass Destination	Capacity Type
SMH 10.00	Inlet	No Delay	(None)	No Restriction
	Inlet (1)	Catchment Area (38)	(None)	No Restriction
SMH 10.01	Inlet	10.000	(None)	No Restriction
SMH 11.01	Inlet	11.000	(None)	No Restriction
	Inlet (1)	No Delay (1)	(None)	No Restriction
SMH 11.00	Inlet	No Delay (2)	(None)	No Restriction
SMH 12.04	Inlet	12.006	(None)	No Restriction
SMH 10.02	Inlet	10.001	(None)	No Restriction
	Inlet (1)	11.001	(None)	No Restriction
BIO 5 MAN	Inlet	No Delay (9)	(None)	No Restriction
SMH 10.03	Inlet	10.002 (1)	(None)	No Restriction
SMH 10.04	Inlet	10.003	(None)	No Restriction
SMH 10.08	Inlet	10.007	(None)	No Restriction
	Inlet (1)	Catchment Area (39)	(None)	No Restriction
SMH 14.01	Inlet	14.000	(None)	No Restriction
SMH 14.02	Inlet	14.001	(None)	No Restriction
SMH 10.14	Inlet	10.013	(None)	No Restriction
SMH 12.01	Inlet	12.003	(None)	No Restriction
	Inlet (1)	Catchment Area (2)	(None)	No Restriction
	Inlet (2)	Catchment Area (15)	(None)	No Restriction
	Inlet (3)	Catchment Area (11)	(None)	No Restriction
SMH 10.02A	Inlet	10.002	(None)	No Restriction

Outlets

Junction	Outlet Name	Outgoing Connection	Outlet Type
SMH 10.15	Outlet	10.016	Hydro-Brake®
	Invert Level (m)	77.000	
	Design Depth (m)	1.262	
	Design Flow (L/s)	49.81	
	Objective	Minimise Upstream Storage Requirements	
	Application	Surface Water Only	
	Sump Available	☐	
	Unit Reference	CHE-0275-4981-1262-4981	



SMH 12.00	Outlet	12.003	Free Discharge
SMH 12.02	Outlet	12.005	Free Discharge
SMH 12.03	Outlet	12.006	Free Discharge
SMH 10.12	Outlet	10.012	Free Discharge
SMH 14.03	Outlet	14.003	Free Discharge

Herbata Data Centre:	Date:		
Halverstown, Naas Co. Kildare Surface Water Analysis- Catchment 2	07/02/2023 Designed by: MC	Checked by: RK	Approved By: DOB
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Junction	Outlet Name	Outgoing Connection	Outlet Type
SMH 10.16	Outlet	10.017	Free Discharge
SMH 10.11	Outlet	10.011	Free Discharge
SMH 10.09	Outlet	10.009	Free Discharge
SMH 10.06	Outlet	10.006	Free Discharge
SMH 10.05	Outlet	10.005	Free Discharge
SMH 10.10	Outlet	10.010	Free Discharge
SMH 15.01	Outlet	15.001	Free Discharge
SMH 15.00	Outlet	15.000	Free Discharge
SMH 14.00	Outlet	14.000	Free Discharge
SMH 15.02	Outlet	15.002	Free Discharge
SMH 10.07	Outlet	10.007	Free Discharge
SMH 13.01	Outlet	13.001	Free Discharge
SMH 10.13	Outlet	10.013	Free Discharge
SIC 12.02	Outlet	12.002	Free Discharge
SIC 12.01	Outlet	12.001	Free Discharge
SIC 12.00	Outlet	12.000	Free Discharge
SMH 10.00	Outlet	10.000	Free Discharge
SMH 10.01	Outlet	10.001	Free Discharge
SMH 11.01	Outlet	11.001	Free Discharge
SMH 11.00	Outlet	11.000	Free Discharge
SMH 12.04	Outlet	12.007	Free Discharge
SMH 10.02	Outlet	10.002	Free Discharge
BIO 5 MAN	Outlet	No Delay (8)	Orifice
	Diameter (m)	0.150	
	Coefficient of Discharge	0.600	
	Invert Level (m)	81.500	
SMH 10.03	Outlet	10.003	Free Discharge
SMH 10.04	Outlet	10.004	Free Discharge
SMH 10.08	Outlet	10.008	Free Discharge
SMH 14.01	Outlet	14.001	Free Discharge
SMH 14.02	Outlet	14.002	Free Discharge
SMH 10.14	Outlet	10.014	Free Discharge
SMH 12.01	Outlet	12.004	Free Discharge
SMH 13.00	Outlet	13.000	Free Discharge
SMH 10.02A	Outlet	10.002 (1)	Free Discharge

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BIO 5.1 Type : Bioretention

Ponding Area

Exceedance Level (m)	81.700
Depth (m)	0.050
Base Level (m)	81.650
Top Area (m²)	447.34
Side Slope (1:X)	1.00
Base Area (m²)	443.38
Freeboard (mm)	0
Porosity (%)	100
Length (m)	39.656
Long. Slope (1:X)	500.00
Filtration Rate (m/hr)	500.0
Friction Scheme	Manning's n
n	0.01
Total Volume (m³)	133.463

Filter Area

Base Level (m)	81.150

Under Drain

Height Above Base (m)	0.050
Diameter (mm)	150
No. of Barrels	1
Friction Scheme	Manning's n
n	0.015
Release Height (m)	0.000

Filtration Layers

Use	Name	Filtration Layer Depth (mm)	Porosity (%)	Conductivity (m/hr)	Soil Type
☐	Soil	0	0	0.0	Soil Type
	Storage	500	50	500.0	

Inlets

Inlet

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (9)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (1)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (23)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Herbata Data Centre:	Date:		
Halverstown, Naas Co. Kildare Surface Water Analysis- Catchment 2	07/02/2023		
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Report Details: Type: Stormwater Controls Storm Phase: Catchment 2 Final	Donnachadh O'Brien & Associates: Unit 5C Elm House Millennium Park, Naas Co. Kildare		

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Outlets

Outlet

Outgoing Connection	No Delay (10)
Outlet Type	Under Drain

Advanced

Ponding Area

Base Perimeter (m)	101.673
Top Perimeter (m)	101.873



BIO 5.2

Type : Bioretention

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Ponding Area

Exceedance Level (m)	82.000
Depth (m)	0.050
Base Level (m)	81.950
Top Area (m²)	87.93
Side Slope (1:X)	2.00
Base Area (m²)	76.13
Freeboard (mm)	0
Porosity (%)	100
Length (m)	58.966
Long. Slope (1:X)	500.00
Filtration Rate (m/hr)	500.0
Friction Scheme	Manning's n
n	0.01
Total Volume (m³)	19.953

Filter Area

Base Level (m)	81.450

Under Drain

Height Above Base (m)	0.050
Diameter (mm)	150
No. of Barrels	1
Friction Scheme	Manning's n
n	0.015
Release Height (m)	0.000

Filtration Layers

Use	Name	Filtration Layer Depth (mm)	Porosity (%)	Conductivity (m/hr)	Soil Type
☐	Soil	0	0	0.0	Soil Type
	Storage	500	40	500.0	

Inlets

Inlet

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (8)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (1)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (24)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Herbata Data Centre:	Date:		
Halverstown, Naas Co. Kildare Surface Water Analysis- Catchment 2	07/02/2023		
	Designed by: MC	Checked by: RK	Approved By: DOB
Report Details: Type: Stormwater Controls Storm Phase: Catchment 2 Final	Donnachadh O'Brien & Associates: Unit 5C Elm House Millennium Park, Naas Co. Kildare		

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Outlets

Outlet

Outgoing Connection	No Delay (9)
Outlet Type	Under Drain

Advanced

Ponding Area

Base Perimeter (m)	120.515
Top Perimeter (m)	120.915

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Pond 5

Type : Pond

Dimensions

Exceedance Level (m)	78.615
Depth (m)	1.853
Base Level (m)	76.762
Freeboard (mm)	353
Initial Depth (m)	0.500
Porosity (%)	100
Average Slope (1:X)	5.212
Total Volume (m³)	5335.369

Depth (m)	Area (m²)	Volume (m³)
0.000	2797.4748	0.000
0.500	3133.7943	1482.022
0.501	3485.9994	1485.330
1.500	4233.8907	5335.369
1.501	4629.1813	5339.799
1.853	4901.3121	7016.938

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Inlets

Inlet (1)

Inlet Type	Point Inflow
Incoming Item(s)	14.003
Bypass Destination	(None)
Capacity Type	No Restriction

Inlet (2)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (55)
Bypass Destination	(None)
Capacity Type	No Restriction

Inlet (3)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (53)
Bypass Destination	(None)
Capacity Type	No Restriction

Inlet (4)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (56)
Bypass Destination	(None)
Capacity Type	No Restriction

Inlet (6)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (119)
Bypass Destination	(None)
Capacity Type	No Restriction

Inlet

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (117)
Bypass Destination	(None)
Capacity Type	No Restriction

Inlet (5)

Inlet Type	Point Inflow
Incoming Item(s)	10.014
Bypass Destination	(None)
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	10.015
Outlet Type	Orifice

Diameter (m)	0.600
Coefficient of Discharge	0.600
Invert Level (m)	77.262

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Advanced

Perimeter	Circular
Length (m)	95.291
Friction Scheme	Manning's n
n	0.01



BL ROOF 5

Type : Tank

Dimensions

Exceedance Level (m)	81.716
Depth (m)	0.200
Base Level (m)	81.516
Freeboard (mm)	0
Initial Depth (m)	0.000
Porosity (%)	100
Average Slope (1:X)	0.00
Total Volume (m³)	255.594

Depth (m)	Area (m²)	Volume (m³)
0.000	1277.968076	0.000
0.200	1277.968076	255.594

Inlets

Inlet

Inlet Type	Point Inflow
Incoming Item(s)	Catchment Area (7)
Bypass Destination	(None)
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	BL RF 5 - Outfall
Outlet Type	Orifice

Diameter (m)	0.047
Coefficient of Discharge	0.600
Invert Level (m)	81.516

Advanced

Perimeter	Circular
Length (m)	91.312

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PP5.3

Type : Porous Paving

Dimensions

Exceedance Level (m)	81.850
Depth (m)	0.460
Base Level (m)	81.390
Paving Layer Depth (mm)	110
Membrane Percolation (m/hr)	500.0
Porosity (%)	40
Length (m)	57.425
Long. Slope (1:X)	500.00
Width (m)	4.887
Total Volume (m³)	39.902

Under Drain

Height Above Base (m)	0.050
Diameter (mm)	150
No. of Barrels	1
Release Height (m)	0.000
Friction Scheme	Manning's n
n	0.015

Inlets

Inlet

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (18)
Bypass Destination	(None)
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	No Delay (3)
Outlet Type	Under Drain

Advanced

Conductivity (m/hr)	500.0

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PP5.2

Type : Porous Paving

Dimensions

Exceedance Level (m)	81.850
Depth (m)	0.460
Base Level (m)	81.390
Paving Layer Depth (mm)	110
Membrane Percolation (m/hr)	500.0
Porosity (%)	40
Length (m)	47.424
Long. Slope (1:X)	500.00
Width (m)	4.888
Total Volume (m³)	32.953

Under Drain

Height Above Base (m)	0.050
Diameter (mm)	150
No. of Barrels	1
Release Height (m)	0.000
Friction Scheme	Manning's n
n	0.015

Inlets

Inlet

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (19)
Bypass Destination	(None)
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	No Delay (4)
Outlet Type	Under Drain

Advanced

Conductivity (m/hr)	500.0

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PP5.1

Type : Porous Paving

Dimensions

Exceedance Level (m)	81.850
Depth (m)	0.460
Base Level (m)	81.390
Paving Layer Depth (mm)	110
Membrane Percolation (m/hr)	500.0
Porosity (%)	40
Length (m)	50.551
Long. Slope (1:X)	500.00
Width (m)	4.887
Total Volume (m³)	35.126

Under Drain

Height Above Base (m)	0.050
Diameter (mm)	150
No. of Barrels	1
Release Height (m)	0.000
Friction Scheme	Manning's n
n	0.015

Inlets

Inlet

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (20)
Bypass Destination	(None)
Capacity Type	No Restriction

Inlet (1)

Inlet Type	Point Inflow
Incoming Item(s)	No Delay (10)
Bypass Destination	(None)
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	No Delay (5)
Outlet Type	Under Drain

Advanced

Conductivity (m/hr)	500.0

Herbata Data Centre:	Date:		
Halverstown, Naas Co. Kildare Surface Water Analysis- Catchment 2	07/02/2023		
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SWC2-2

Type : Swale

Swale

Exceedance Level (m)	81.700
Depth (m)	0.650
Base Level (m)	81.050
Top Width (m)	6.000
Side Slope (1:X)	2.31
Base Width (m)	3.000
Freeboard (mm)	0
Length (m)	47.000
Long. Slope (1:X)	90.00
Filtration Rate (m/hr)	0.0
Friction Scheme	Manning's n
n	0.01
Total Volume (m^3)	137.475

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Inlets

Inlet

Inlet Type	Point Inflow
Incoming Item(s)	Weir 2-1
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (1)

Inlet Type	Point Inflow
Incoming Item(s)	Catchment Area (63)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (2)

Inlet Type	Point Inflow
Incoming Item(s)	Catchment Area (64)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (3)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (75)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (4)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (79)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (5)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (77)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

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Outlets

Outlet (1)

Outgoing Connection	Weir 2-2
Outlet Type	Weir

Width (m)	0.150
Coefficient of Discharge	0.544
Crest Level (m)	81.050

Advanced

Swale

Porosity (%)	100



SWC2-1

Type : Swale

Swale

Exceedance Level (m)	82.545
Depth (m)	0.650
Base Level (m)	81.895
Top Width (m)	6.000
Side Slope (1:X)	2.31
Base Width (m)	3.000
Freeboard (mm)	175
Length (m)	38.000
Long. Slope (1:X)	72.00
Filtration Rate (m/hr)	0.0
Friction Scheme	Manning's n
n	0.01
Total Volume (m³)	73.936

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Inlets

Inlet

Inlet Type	Point Inflow
Incoming Item(s)	Catchment Area (62)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (1)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (78)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (2)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (74)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (3)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (76)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	Weir 2-1
Outlet Type	Weir

Width (m)	0.100
Coefficient of Discharge	0.544
Crest Level (m)	81.895

Advanced

Swale

Porosity (%)	100



SWC2-4

Type : Swale

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Swale

Exceedance Level (m)	80.090
Depth (m)	0.650
Base Level (m)	79.440
Top Width (m)	6.000
Side Slope (1:X)	2.31
Base Width (m)	3.000
Freeboard (mm)	0
Length (m)	52.472
Long. Slope (1:X)	100.00
Filtration Rate (m/hr)	0.0
Friction Scheme	Manning's n
n	0.01
Total Volume (m³)	153.482

Inlets

Inlet

Inlet Type	Point Inflow
Incoming Item(s)	Weir 2-3
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (1)

Inlet Type	Point Inflow
Incoming Item(s)	Catchment Area (65)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (2)

Inlet Type	Point Inflow
Incoming Item(s)	Catchment Area (66)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (3)

Inlet Type	Point Inflow
Incoming Item(s)	Catchment Area (69)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (4)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (85)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

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Inlet (5)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (83)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (6)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (82)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (7)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (86)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (8)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (87)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	Weir 2-4
Outlet Type	Weir

Width (m)	0.450
Coefficient of Discharge	0.544
Crest Level (m)	79.440

Advanced

Swale

Porosity (%)	100



SWC2-3

Type : Swale

Herbata Data Centre:	Date:		
Halverstown, Naas Co. Kildare Surface Water Analysis- Catchment 2	07/02/2023		
	Designed by: MC	Checked by: RK	Approved By: DOB
Report Details: Type: Stormwater Controls Storm Phase: Catchment 2 Final	Donnachadh O'Brien & Associates: Unit 5C Elm House Millennium Park, Naas Co. Kildare		

DONNACHADH O'BRIEN
& ASSOCIATES CONSULTING ENGINEERS

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Swale

Exceedance Level (m)	81.080
Depth (m)	0.650
Base Level (m)	80.430
Top Width (m)	6.000
Side Slope (1:X)	2.31
Base Width (m)	3.000
Freeboard (mm)	0
Length (m)	50.000
Long. Slope (1:X)	100.00
Filtration Rate (m/hr)	0.0
Friction Scheme	Manning's n
n	0.01
Total Volume (m³)	146.250

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Inlets

Inlet

Inlet Type	Point Inflow
Incoming Item(s)	Catchment Area (67)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (1)

Inlet Type	Point Inflow
Incoming Item(s)	Catchment Area (68)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (3)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (80)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (4)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (81)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (5)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (89)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (6)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (84)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (7)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (88)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

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Outlets

Outlet

Outgoing Connection	Weir 2-3
Outlet Type	Weir

Width (m)	0.150
Coefficient of Discharge	0.544
Crest Level (m)	80.430

Advanced

Swale

Porosity (%)	100



SWC2-6

Type : Swale

Swale

Exceedance Level (m)	78.195
Depth (m)	0.650
Base Level (m)	77.545
Top Width (m)	7.145
Side Slope (1:X)	3.19
Base Width (m)	3.000
Freeboard (mm)	0
Length (m)	57.000
Long. Slope (1:X)	250.00
Filtration Rate (m/hr)	0.0
Friction Scheme	Manning's n
n	0.01
Total Volume (m³)	187.943

Inlets

Inlet

Inlet Type	Point Inflow
Incoming Item(s)	Weir 2-5
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (1)

Inlet Type	Point Inflow
Incoming Item(s)	Catchment Area (70)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

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Inlet (2)

Inlet Type	Point Inflow
Incoming Item(s)	Catchment Area (72)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (3)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (97)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (4)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (99)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (5)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (98)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (6)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (96)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (7)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (95)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (8)

Inlet Type	Point Inflow
Incoming Item(s)	Catchment Area (118)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

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Outlets

Outlet (1)

Outgoing Connection	weir 2-6
Outlet Type	Weir

Width (m)	0.400
Coefficient of Discharge	0.544
Crest Level (m)	77.545

Advanced

Swale

Porosity (%)	100



SWC2-5

Type : Swale

Swale

Exceedance Level (m)	78.885
Depth (m)	0.650
Base Level (m)	78.235
Top Width (m)	6.000
Side Slope (1:X)	2.31
Base Width (m)	3.000
Freeboard (mm)	0
Length (m)	50.000
Long. Slope (1:X)	200.00
Filtration Rate (m/hr)	0.0
Friction Scheme	Manning's n
n	0.01
Total Volume (m³)	146.250

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Inlets

Inlet

Inlet Type	Point Inflow
Incoming Item(s)	Catchment Area (71)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (1)

Inlet Type	Point Inflow
Incoming Item(s)	Catchment Area (73)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (3)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (94)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (4)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (93)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (5)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (92)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (6)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (91)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (7)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (90)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

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Outlets

Outlet

Outgoing Connection	Weir 2-5
Outlet Type	Weir

Width (m)	0.200
Coefficient of Discharge	0.544
Crest Level (m)	78.235

Advanced

Swale

Porosity (%)	100



SWC2-GA1

Type : Swale

Swale

Exceedance Level (m)	84.150
Depth (m)	0.500
Base Level (m)	83.650
Top Width (m)	1.471
Side Slope (1:X)	1.00
Base Width (m)	0.471
Freeboard (mm)	200
Length (m)	35.611
Long. Slope (1:X)	68.00
Filtration Rate (m/hr)	0.0
Friction Scheme	Manning's n
n	0.01
Total Volume (m³)	8.239

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Inlets

Inlet

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (30)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (1)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (25)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (2)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (29)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	No Delay
Outlet Type	Orifice

Diameter (m)	0.225
Coefficient of Discharge	0.600
Invert Level (m)	83.650

Advanced

Swale

Porosity (%)	100



SWC2-GA2

Type : Swale

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Swale

Exceedance Level (m)	83.095
Depth (m)	0.500
Base Level (m)	82.595
Top Width (m)	1.442
Side Slope (1:X)	1.00
Base Width (m)	0.442
Freeboard (mm)	100
Length (m)	61.983
Long. Slope (1:X)	67.00
Filtration Rate (m/hr)	0.0
Friction Scheme	Manning's n
n	0.01
Total Volume (m³)	20.878

Inlets

Inlet

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (37)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (1)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (26)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	No Delay (1)
Outlet Type	Orifice

Diameter (m)	0.150
Coefficient of Discharge	0.600
Invert Level (m)	82.595

Advanced

Swale

Porosity (%)	100



SWC2-GA3

Type : Swale

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Swale

Exceedance Level (m)	82.850
Depth (m)	0.650
Base Level (m)	82.200
Top Width (m)	3.000
Side Slope (1:X)	1.00
Base Width (m)	1.700
Freeboard (mm)	0
Length (m)	60.336
Long. Slope (1:X)	150.00
Filtration Rate (m/hr)	0.0
Friction Scheme	Manning's n
n	0.01
Total Volume (m³)	92.163

Inlets

Inlet

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (36)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (1)

Inlet Type	Point Inflow
Incoming Item(s)	Catchment Area (35)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	No Delay (2)
Outlet Type	Orifice

Diameter (m)	0.225
Coefficient of Discharge	0.600
Invert Level (m)	82.200

Advanced

Swale

Porosity (%)	100

Herbata Data Centre:	Date:		
Halverstown, Naas Co. Kildare Surface Water Analysis- Catchment 2	07/02/2023		
	Designed by: MC	Checked by: RK	Approved By: DOB
Report Details: Type: Inflow Summary Storm Phase: Catchment 2 Final	Donnachadh O'Brien & Associates: Unit 5C Elm House Millennium Park, Naas Co. Kildare		

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Inflow Label	Connected To	Flow (L/s)	Runoff Method	Area (ha)	Percentage Impervious (%)	Urban Creep (%)	Adjusted Percentage Impervious (%)	Area Analysed (ha)
Catchment Area	SMH 10.06		Time of Concentration	0.075	80	0	80	0.060
Catchment Area (1)	SMH 12.00		Time of Concentration	0.081	95	0	95	0.077
Catchment Area (2)	SMH 12.01		Time of Concentration	0.213	95	0	95	0.202
Catchment Area (3)	SMH 12.02		Time of Concentration	0.249	95	0	95	0.236
Catchment Area (4)	SMH 12.03		Time of Concentration	0.171	95	0	95	0.162
Catchment Area (5)	SMH 10.07		Time of Concentration	0.105	80	0	80	0.084
Catchment Area (6)	SMH 10.07		Time of Concentration	0.065	80	0	80	0.052
Catchment Area (7)	BL ROOF 5		Time of Concentration	0.264	95	0	95	0.251
Catchment Area (8)	BIO 5.2		Time of Concentration	0.026	80	0	80	0.021
Catchment Area (9)	BIO 5.1		Time of Concentration	0.030	80	0	80	0.024
Catchment Area (10)	SMH 12.00		Time of Concentration	0.059	80	0	80	0.047
Catchment Area (11)	SMH 12.01		Time of Concentration	0.027	80	0	80	0.021
Catchment Area (12)	SMH 12.02		Time of Concentration	0.025	80	0	80	0.020
Catchment Area (13)	SMH 12.03		Time of Concentration	0.043	80	0	80	0.034
Catchment Area (14)	SMH 12.00		Time of Concentration	0.040	80	0	80	0.032
Catchment Area (15)	SMH 12.01		Time of Concentration	0.044	80	0	80	0.035
Catchment Area (16)	SMH 12.02		Time of Concentration	0.044	80	0	80	0.035
Catchment Area (17)	SMH 12.03		Time of Concentration	0.045	80	0	80	0.036
Catchment Area (18)	PP5.3		Time of Concentration	0.029	80	0	80	0.023
Catchment Area (19)	PP5.2		Time of Concentration	0.061	80	0	80	0.049
Catchment Area (20)	PP5.1		Time of Concentration	0.075	80	0	80	0.060
Catchment Area (21)	SIC 12.01		Time of Concentration	0.008	80	0	80	0.006
Catchment Area (22)	SIC 12.02		Time of Concentration	0.009	30	0	30	0.003
Catchment Area (23)	BIO 5.1		Time of Concentration	0.045	95	0	95	0.043
Catchment Area (24)	BIO 5.2		Time of Concentration	0.018	95	0	95	0.017
Catchment Area (25)	SWC2-GA1		Time of Concentration	0.067	80	0	80	0.054
Catchment Area (26)	SWC2-GA2		Time of Concentration	0.063	80	0	80	0.051
Catchment Area (27)	SMH 10.12		Time of Concentration	0.020	80	0	80	0.016
Catchment Area (28)	SMH 10.13		Time of Concentration	0.048	80	0	80	0.038
Catchment Area (29)	SWC2-GA1		Time of Concentration	0.006	80	0	80	0.005

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Catchment Area (30)	SWC2-GA1		Time of Concentration	0.007	30	0	30	0.002
Catchment Area (31)	SMH 13.01		Time of Concentration	0.033	80	0	80	0.027
Catchment Area (32)	SMH 13.01		Time of Concentration	0.037	80	0	80	0.030
Catchment Area (33)	SIC 12.01		Time of Concentration	0.006	30	0	30	0.002
Catchment Area (34)	SIC 12.00		Time of Concentration	0.007	30	0	30	0.002
Catchment Area (35)	SWC2-GA3		Time of Concentration	0.188	95	0	95	0.179
Catchment Area (36)	SWC2-GA3		Time of Concentration	0.153	30	0	30	0.046
Catchment Area (37)	SWC2-GA2		Time of Concentration	0.052	30	0	30	0.016
Catchment Area (38)	SMH 10.00		Time of Concentration	0.269	30	0	30	0.081
Catchment Area (39)	SMH 10.08		Time of Concentration	0.013	80	0	80	0.010
Catchment Area (40)	SMH 10.10		Time of Concentration	0.052	80	0	80	0.042
Catchment Area (41)	SMH 10.11		Time of Concentration	0.024	80	0	80	0.019
Catchment Area (53)	Pond 5		Time of Concentration	0.617	30	0	30	0.185
Catchment Area (55)	Pond 5		Time of Concentration	0.085	30	0	30	0.026
Catchment Area (56)	Pond 5		Time of Concentration	0.518	95	0	95	0.492
Catchment Area (62)	SWC2-1		Time of Concentration	0.176	95	0	95	0.167
Catchment Area (63)	SWC2-2		Time of Concentration	0.071	95	0	95	0.068
Catchment Area (64)	SWC2-2		Time of Concentration	0.158	95	0	95	0.150
Catchment Area (65)	SWC2-4		Time of Concentration	0.177	95	0	95	0.168
Catchment Area (66)	SWC2-4		Time of Concentration	0.078	95	0	95	0.074
Catchment Area (67)	SWC2-3		Time of Concentration	0.204	95	0	95	0.194
Catchment Area (68)	SWC2-3		Time of Concentration	0.248	95	0	95	0.235
Catchment Area (69)	SWC2-4		Time of Concentration	0.157	95	0	95	0.149
Catchment Area (70)	SWC2-6		Time of Concentration	0.184	95	0	95	0.174
Catchment Area (71)	SWC2-5		Time of Concentration	0.289	95	0	95	0.275
Catchment Area (72)	SWC2-6		Time of Concentration	0.177	95	0	95	0.168
Catchment Area (73)	SWC2-5		Time of Concentration	0.271	95	0	95	0.257
Catchment Area (74)	SWC2-1		Time of Concentration	0.039	80	0	80	0.031
Catchment Area (75)	SWC2-2		Time of Concentration	0.048	80	0	80	0.039
Catchment Area (76)	SWC2-1		Time of Concentration	0.022	80	0	80	0.018
Catchment Area (77)	SWC2-2		Time of Concentration	0.039	80	0	80	0.032
Catchment Area (78)	SWC2-1		Time of Concentration	0.059	30	0	30	0.018

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Catchment Area (79)	SWC2-2		Time of Concentration	0.076	30	0	30	0.023
Catchment Area (80)	SWC2-3		Time of Concentration	0.041	80	0	80	0.032
Catchment Area (81)	SWC2-3		Time of Concentration	0.028	80	0	80	0.022
Catchment Area (82)	SWC2-4		Time of Concentration	0.034	80	0	80	0.027
Catchment Area (83)	SWC2-4		Time of Concentration	0.037	80	0	80	0.030
Catchment Area (84)	SWC2-3		Time of Concentration	0.055	30	0	30	0.017
Catchment Area (85)	SWC2-4		Time of Concentration	0.073	30	0	30	0.022
Catchment Area (86)	SWC2-4		Time of Concentration	0.033	80	0	80	0.026
Catchment Area (87)	SWC2-4		Time of Concentration	0.038	80	0	80	0.030
Catchment Area (88)	SWC2-3		Time of Concentration	0.047	80	0	80	0.038
Catchment Area (89)	SWC2-3		Time of Concentration	0.028	80	0	80	0.023
Catchment Area (90)	SWC2-5		Time of Concentration	0.039	80	0	80	0.031
Catchment Area (91)	SWC2-5		Time of Concentration	0.026	80	0	80	0.021
Catchment Area (92)	SWC2-5		Time of Concentration	0.054	30	0	30	0.016
Catchment Area (93)	SWC2-5		Time of Concentration	0.027	80	0	80	0.022
Catchment Area (94)	SWC2-5		Time of Concentration	0.044	80	0	80	0.035
Catchment Area (95)	SWC2-6		Time of Concentration	0.039	80	0	80	0.032
Catchment Area (96)	SWC2-6		Time of Concentration	0.037	80	0	80	0.030
Catchment Area (97)	SWC2-6		Time of Concentration	0.078	30	0	30	0.023
Catchment Area (98)	SWC2-6		Time of Concentration	0.038	80	0	80	0.031
Catchment Area (99)	SWC2-6		Time of Concentration	0.036	80	0	80	0.029
Catchment Area (100)	SMH 10.09		Time of Concentration	0.059	80	0	80	0.047
Catchment Area (101)	SMH 10.11		Time of Concentration	0.063	30	0	30	0.019
Catchment Area (102)	SMH 10.09		Time of Concentration	0.135	30	0	30	0.041
Catchment Area (103)	SMH 10.06		Time of Concentration	0.034	30	0	30	0.010
Catchment Area (104)	SMH 10.06		Time of Concentration	0.056	80	0	80	0.045
Catchment Area (105)	SMH 10.05		Time of Concentration	0.008	30	0	30	0.002
Catchment Area (106)	SMH 10.10		Time of Concentration	0.093	30	0	30	0.028
Catchment Area (115)	SMH 15.00		Time of Concentration	0.067	80	0	80	0.054
Catchment Area (116)	SMH 15.02		Time of Concentration	0.067	80	0	80	0.053
Catchment Area (117)	Pond 5		Time of Concentration	0.065	30	0	30	0.020
Catchment Area (118)	SWC2-6		Time of Concentration	0.051	30	0	30	0.015

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Catchment Area (119)	Pond 5		Time of Concentration	0.122	30	0	30	0.037
TOTAL		**0.0**		**8.242**				**6.098**

Herbata Data Centre:	Date:		
Halverstown, Naas Co. Kildare Surface Water Analysis- Catchment 2	07/02/2023		
	Designed by:	Checked by:	Approved By:
	MC	RK	DOB
Report Title:	Donnachadh O'Brien & Associates:		
Rainfall Analysis Criteria	Unit 5C Elm House Millennium Park, Naas Co. Kildare		

DONNACHADH O'BRIEN & ASSOCIATES CONSULTING ENGINEERS

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Runoff Type	Dynamic
Output Interval (mins)	5
Time Step	Reduced
Urban Creep	Apply Global Value
Urban Creep Global Value (%)	0
Junction Flood Risk Margin (mm)	0
Prefill Manhole Sumps	☐
Perform No Discharge Analysis	☐

Rainfall

100Yr

Type: FSR

Region	Scotland And Ireland
M5-60 (mm)	16.2
Ratio R	0.287
Summer	☑
Winter	☑

Return Period

Return Period (years)	Increase Rainfall (%)
100.0	30.000

Storm Durations

Duration (mins)	Run Time (mins)
15	30
30	60
60	120
120	240
180	360
240	480
360	720
480	960
600	1200
720	1440
960	1920
1440	2880
2160	4320
2880	5760
4320	8640
5760	11520
7200	14400
8640	17280
10080	20160

Herbata Data Centre:	Date:		
Halverstown, Naas Co. Kildare Surface Water Analysis- Catchment 2	07/02/2023		
	Designed by:	Checked by:	Approved By:
	MC	RK	DOB
Report Details: Type: Junctions Summary Storm Phase: Catchment 2 Final	Donnachadh O'Brien & Associates: Unit 5C Elm House Millennium Park, Naas Co. Kildare		

DONNACHADH O'BRIEN
& ASSOCIATES CONSULTING ENGINEERS

RECEIVED: 13/08/2024

Critical Storm Per Item: Rank By: Max. Depth

Junction	Storm Event	Cover Level (m)	Invert Level (m)	Max. Level (m)	Max. Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Status
SMH 10.15	100Yr: 100 years: +30 %: 720 mins: Winter	78.500	77.000	78.211	1.211	168.0	1.733	0.000	49.6	3095.986	Surcharged
SMH 12.00	100Yr: 100 years: +30 %: 15 mins: Summer	81.900	80.250	81.425	1.175	85.5	1.681	0.000	64.5	53.728	Surcharged
SMH 12.02	100Yr: 100 years: +30 %: 15 mins: Summer	81.510	79.786	81.240	1.454	326.6	2.570	0.000	299.1	179.056	Surcharged
SMH 12.03	100Yr: 100 years: +30 %: 15 mins: Summer	81.200	79.551	80.694	1.143	424.0	2.020	0.000	389.2	232.414	Surcharged
SMH 10.12	100Yr: 100 years: +30 %: 30 mins: Summer	80.700	78.120	79.424	1.304	854.0	2.304	0.000	853.0	1124.646	Surcharged
SMH 14.03	100Yr: 100 years: +30 %: 960 mins: Summer	79.000	77.391	78.190	0.799	65.4	1.413	0.000	64.8	1196.019	Surcharged
SMH 10.16	100Yr: 100 years: +30 %: 240 mins: Summer	77.313	76.478	76.749	0.272	49.8	0.389	0.000	49.8	994.956	Surcharged
Catchment 2 Outfall	100Yr: 100 years: +30 %: 15 mins: Summer	77.197	76.470	76.695	0.225	41.2	0.000	0.000	41.2	39.516	OK
SMH 10.11	100Yr: 100 years: +30 %: 30 mins: Summer	80.976	78.189	79.564	1.375	504.7	2.430	0.000	507.5	786.827	Surcharged
SMH 10.09	100Yr: 100 years: +30 %: 30 mins: Summer	81.150	78.415	79.923	1.508	487.4	2.664	0.000	491.2	757.537	Surcharged
SMH 10.06	100Yr: 100 years: +30 %: 30 mins: Summer	82.534	80.463	80.988	0.525	192.3	0.928	0.000	189.5	341.384	Surcharged
SMH 10.05	100Yr: 100 years: +30 %: 30 mins: Summer	82.725	80.582	81.164	0.582	166.3	0.658	0.000	166.8	305.322	Surcharged
SMH 10.10	100Yr: 100 years: +30 %: 30 mins: Summer	81.014	78.289	79.737	1.448	498.1	2.558	0.000	500.9	777.042	Surcharged
SMH 15.01	100Yr: 100 years: +30 %: 960 mins: Summer	78.796	77.621	78.192	0.571	3.2	0.817	0.000	2.4	62.493	Surcharged
SMH 15.00	100Yr: 100 years: +30 %: 960 mins: Summer	78.748	77.723	78.193	0.470	3.5	0.531	0.000	3.2	56.113	Surcharged
SMH 14.00	100Yr: 100 years: +30 %: 960 mins: Summer	78.760	77.478	78.189	0.711	66.7	1.256	0.000	66.4	1232.552	Surcharged
SMH 15.02	100Yr: 100 years: +30 %: 720 mins: Winter	78.788	77.488	78.193	0.705	5.7	0.797	0.000	7.1	116.695	Surcharged

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SMH 10.07	100Yr: 100 years: +30 %: 30 mins: Summer	82.520	80.206	80.780	0.574	239.7	0.649	0.000	237.6	383.620	Surcharged
SMH 13.01	100Yr: 100 years: +30 %: 15 mins: Summer	80.746	79.150	79.302	0.152	30.4	0.172	0.000	26.4	13.149	OK
SMH 10.13	100Yr: 100 years: +30 %: 30 mins: Summer	80.700	78.063	79.049	0.986	888.1	1.115	0.000	887.3	1152.449	Surcharged
SIC 12.02	100Yr: 100 years: +30 %: 120 mins: Summer	81.945	81.245	81.485	0.240	22.7	0.068	0.000	22.7	69.562	Surcharged
SIC 12.01	100Yr: 100 years: +30 %: 60 mins: Summer	81.952	81.320	81.569	0.249	14.0	0.070	0.000	14.0	32.492	Surcharged
SIC 12.00	100Yr: 100 years: +30 %: 60 mins: Summer	81.960	81.390	81.597	0.207	9.2	0.059	0.000	8.9	16.221	Surcharged
SMH 10.00	100Yr: 100 years: +30 %: 15 mins: Summer	84.250	83.017	83.559	0.542	71.7	0.613	0.000	63.4	32.919	Surcharged
SMH 10.01	100Yr: 100 years: +30 %: 15 mins: Summer	84.245	82.774	83.443	0.669	63.4	0.756	0.000	55.4	32.560	Surcharged
SMH 11.01	100Yr: 100 years: +30 %: 30 mins: Summer	83.095	81.915	82.678	0.763	53.2	0.862	0.000	53.9	92.788	Surcharged
SMH 11.00	100Yr: 100 years: +30 %: 30 mins: Summer	82.835	82.036	82.711	0.675	48.5	0.191	0.000	48.7	71.625	Surcharged
SMH 12.04	100Yr: 100 years: +30 %: 15 mins: Summer	81.065	79.431	80.130	0.699	389.2	1.234	0.000	349.3	231.770	Surcharged
SMH 10.02	100Yr: 100 years: +30 %: 30 mins: Summer	83.071	81.651	82.662	1.011	80.6	1.143	0.000	77.0	137.965	Surcharged
BIO 5 MAN	100Yr: 100 years: +30 %: 60 mins: Summer	82.000	81.000	81.638	0.638	8.7	0.181	0.000	8.5	13.391	OK
SMH 10.03	100Yr: 100 years: +30 %: 30 mins: Summer	82.596	80.966	81.900	0.934	74.1	1.056	0.000	74.7	137.868	Surcharged
SMH 10.04	100Yr: 100 years: +30 %: 30 mins: Summer	82.289	80.700	81.419	0.719	74.7	0.813	0.000	75.9	137.834	Surcharged
SMH 10.08	100Yr: 100 years: +30 %: 30 mins: Summer	81.526	80.011	80.470	0.459	241.4	0.519	0.000	239.3	385.786	Surcharged
SMH 14.01	100Yr: 100 years: +30 %: 960 mins: Summer	78.760	77.459	78.191	0.732	66.4	0.827	0.000	66.0	1201.354	Surcharged
SMH 14.02	100Yr: 100 years: +30 %: 960 mins: Summer	79.716	77.425	78.192	0.767	66.0	0.867	0.000	65.4	1196.932	Surcharged
SMH 10.14	100Yr: 100 years: +30 %: 30 mins: Summer	79.000	77.600	78.424	0.824	887.3	0.933	0.000	887.0	1152.109	Surcharged
SMH 12.01	100Yr: 100 years: +30 %: 15 mins: Summer	81.733	80.051	81.365	1.315	203.5	2.323	0.000	169.8	112.247	Surcharged
SMH 13.00	100Yr: 100 years: +30 %: 15 mins: Summer	80.773	79.348	79.348	0.000	0.0	0.000	0.000	0.0	0.000	OK

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SMH 10.02A	100Yr: 100 years: +30 %: 30 mins: Summer	82.937	81.247	82.407	1.160	77.0	1.312	0.000	74.1	137.916	Surcharged

Herbata Data Centre:	Date:		
Halverstown, Naas Co. Kildare Surface Water Analysis- Catchment 2	07/02/2023		
	Designed by: MC	Checked by: RK	Approved By: DOB
Report Details: Type: Stormwater Controls Summary Storm Phase: Catchment 2 Final	Donnachadh O'Brien & Associates: Unit 5C Elm House Millennium Park, Naas Co. Kildare		

DONNACHADH O'BRIEN & ASSOCIATES CONSULTING ENGINEERS

RECEIVED: 13/08/2024

Critical Storm Per Item: Rank By: Max. DS Depth

Stormwater Control	Storm Event	Max. US Level (m)	Max. DS Level (m)	Max. US Depth (m)	Max. DS Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Total Lost Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Percentage Available (%)	Status
PP5.3	100Yr: 100 years: +30 %: 180 mins: Summer	81.582	81.521	0.077	0.131	4.6	11.024	0.000	0.000	2.9	6.780	72.373	OK
Pond 5	100Yr: 100 years: +30 %: 960 mins: Summer	78.188	78.188	1.426	1.426	354.1	5023.666	0.000	0.000	195.0	4463.159	5.842	OK
SWC2-2	100Yr: 100 years: +30 %: 60 mins: Summer	81.677	81.679	0.105	0.629	151.7	70.013	0.000	0.000	92.3	225.172	49.072	OK
SWC2-1	100Yr: 100 years: +30 %: 30 mins: Summer	82.446	82.362	0.023	0.467	86.7	31.319	0.000	0.000	51.1	74.227	57.640	OK
SWC2-4	100Yr: 100 years: +30 %: 30 mins: Summer	80.048	80.046	0.083	0.606	307.8	72.696	0.000	0.000	264.7	344.934	52.636	OK
SWC2-3	100Yr: 100 years: +30 %: 30 mins: Summer	81.061	81.061	0.131	0.631	207.5	77.525	0.000	0.000	117.3	178.184	46.991	OK
SWC2-6	100Yr: 100 years: +30 %: 960 mins: Summer	78.189	78.189	0.416	0.644	94.6	142.950	0.000	0.000	61.6	1380.869	23.940	OK
SWC2-5	100Yr: 100 years: +30 %: 60 mins: Summer	78.817	78.817	0.332	0.582	217.6	93.550	0.000	0.000	136.4	271.767	36.034	OK
PP5.2	100Yr: 100 years: +30 %: 120 mins: Summer	81.609	81.583	0.124	0.193	12.1	15.012	0.000	0.000	6.9	18.802	54.445	OK
PP5.1	100Yr: 100 years: +30 %: 120 mins: Summer	81.628	81.562	0.137	0.172	14.8	16.167	0.000	0.000	8.6	24.007	53.973	OK
BL ROOF 5	100Yr: 100 years: +30 %: 2880 mins: Summer	81.676	81.676	0.160	0.160	7.4	204.475	0.000	0.000	1.6	293.430	20.000	OK
BIO 5.1	100Yr: 100 years: +30 %: 10080 mins: Summer	81.570	81.569	0.340	0.419	0.8	84.153	0.000	0.000	0.4	53.798	36.946	OK
BIO 5.2	100Yr: 100 years: +30 %: 60 mins: Summer	81.734	81.668	0.166	0.218	12.7	6.187	0.000	0.000	8.7	14.058	68.994	OK

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SWC2-GA1	100Yr: 100 years: +30 %: 15 mins: Summer	84.191	83.844	0.017	0.194	32.8	1.442	0.000	0.000	28.4	14.187	82.500	OK
SWC2-GA2	100Yr: 100 years: +30 %: 15 mins: Summer	83.539	82.891	0.019	0.296	35.7	3.349	0.000	0.000	22.0	15.414	83.960	OK
SWC2-GA3	100Yr: 100 years: +30 %: 30 mins: Summer	82.765	82.768	0.162	0.568	83.0	46.856	0.000	0.000	48.5	71.636	49.160	OK

Herbata Data Centre:	Date:		
Halverstown, Naas Co. Kildare Surface Water Analysis- Catchment 3	07/02/2023		
	Designed by:	Checked by:	Approved By:
	MC	RK	DOB
Report Details: Type: Junctions Storm Phase: Catchment 3 Final	Donnachadh O'Brien & Associates: Unit 5C Elm House Millennium Park, Naas Co. Kildare		

DONNACHADH O'BRIEN
& ASSOCIATES CONSULTING ENGINEERS

RECEIVED: 13/08/2024

Name	Junction Type	Easting (m)	Northing (m)	Cover Level (m)	Depth (m)	Invert Level (m)	Chamber Shape	Diameter (m)
SMH 18.00	Manhole	686560.669	719584.844	80.885	0.650	80.235	Circular	1.200
SMH 18.01	Manhole	686357.329	719453.697	80.750	1.650	79.100	Circular	1.500
SMH 18.04	Manhole	686406.589	719355.492	80.732	1.914	78.818	Circular	1.500
SMH 18.03	Manhole	686373.149	719406.780	80.793	1.822	78.971	Circular	1.500
SMH 18.02	Manhole	686356.885	719432.592	80.822	1.775	79.047	Circular	1.500
SMH 19.00	Manhole	686520.538	719398.294	80.360	1.395	78.965	Circular	1.350
SMH 19.01	Manhole	686563.254	719382.432	80.000	1.187	78.813	Circular	1.350
SMH 16.10	Manhole	686536.970	719309.434	79.000	1.291	77.709	Circular	1.350
SMH 16.11	Manhole	686506.338	719311.073	79.000	1.444	77.556	Circular	1.350
Catchment 3 Outfall	Manhole	686448.149	719322.941	79.000	1.800	77.200	Circular	1.350
SMH 16.12	Manhole	686452.805	719333.757	79.000	1.735	77.265	Circular	1.500
SMH 18.06	Manhole	686503.496	719314.428	80.000	1.445	78.555	Circular	1.500
SMH 16.03	Manhole	686621.323	719590.605	82.000	1.116	80.884	Circular	1.200
SMH 16.04	Manhole	686612.968	719579.001	82.000	1.152	80.848	Circular	1.200
SMH 16.05	Manhole	686614.849	719528.177	81.850	1.873	79.977	Circular	1.200
SMH 16.08	Manhole	686622.572	719419.796	80.640	1.907	78.733	Circular	1.200
SMH 17.00	Manhole	686552.656	719703.428	82.800	1.232	81.568	Circular	1.200
SMH 17.01	Manhole	686563.780	719700.960	82.750	1.233	81.517	Circular	1.200
SMH 17.02	Manhole	686580.002	719674.484	82.600	1.221	81.379	Circular	1.200
SMH 17.03	Manhole	686576.982	719663.491	82.500	1.172	81.328	Circular	1.200
SMH 16.06	Manhole	686603.760	719512.580	81.520	2.308	79.211	Circular	1.200
SMH 16.00	Manhole	686724.391	719671.031	82.810	1.385	81.425	Circular	1.200
SMH 16.01	Manhole	686717.072	719648.885	82.750	1.418	81.332	Circular	1.200
SMH 16.02	Manhole	686669.218	719619.757	82.800	1.692	81.108	Circular	1.200
SIC 17.02	Manhole	686531.308	719778.740	83.750	1.641	82.109	Circular	1.200
SIC 17.01	Manhole	686527.751	719789.696	83.500	1.327	82.173	Circular	1.200
SIC 17.00	Manhole	686529.831	719803.480	82.750	0.500	82.250	Circular	1.200
SMH 16.07	Manhole	686619.092	719469.258	81.286	2.305	78.981	Circular	1.200
SMH 18.07	Manhole	686534.128	719312.789	80.000	1.522	78.478	Circular	1.500
SMH 16.09	Manhole	686616.063	719417.465	80.615	1.917	78.698	Circular	1.200
SIC 18.00	Manhole	686530.744	719537.809	81.850	0.700	81.150	Circular	1.200
SIC 18.01	Manhole	686539.742	719543.264	81.700	0.620	81.080	Circular	1.200
SIC 18.02	Manhole	686548.745	719548.888	81.625	0.616	81.009	Circular	1.200
SMH 18.05	Manhole	686447.557	719338.132	80.423	1.716	78.707	Circular	1.500
SMH 22.00	Manhole	686424.784	719359.128	80.840	1.237	79.603	Circular	1.200
SMH 22.01	Manhole	686474.838	719391.475	81.120	1.815	79.305	Circular	1.200
SMH 22.02	Manhole	686482.457	719379.684	81.000	1.765	79.235	Circular	1.200

Herbata Data Centre:	Date:		
Halverstown, Naas Co. Kildare Surface Water Analysis- Catchment 3	07/02/2023		
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Report Details: Type: Junctions Storm Phase: Catchment 3 Final	Donnachadh O'Brien & Associates: Unit 5C Elm House Millennium Park, Naas Co. Kildare		

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Name	Lock
SMH 18.00	All
SMH 18.01	All
SMH 18.04	All
SMH 18.03	All
SMH 18.02	All
SMH 19.00	None
SMH 19.01	None
SMH 16.10	None
SMH 16.11	None
Catchment 3 Outfall	None
SMH 16.12	None
SMH 18.06	None
SMH 16.03	None
SMH 16.04	None
SMH 16.05	None
SMH 16.08	None
SMH 17.00	None
SMH 17.01	None
SMH 17.02	None
SMH 17.03	None
SMH 16.06	None
SMH 16.00	None
SMH 16.01	None
SMH 16.02	None
SIC 17.02	None
SIC 17.01	None
SIC 17.00	None
SMH 16.07	None
SMH 18.07	None
SMH 16.09	None
SIC 18.00	None
SIC 18.01	None
SIC 18.02	None
SMH 18.05	None
SMH 22.00	None
SMH 22.01	None
SMH 22.02	None

Inlets

Junction	Inlet Name	Incoming Item(s)	Bypass Destination	Capacity Type
SMH 18.01	Inlet (1)	Weir 3-12	(None)	No Restriction
SMH 18.04	Inlet (1)	Catchment Area (47) 18.005	(None)	No Restriction
	Inlet (2)	Catchment Area (52)	(None)	No Restriction
SMH 18.03	Inlet (1)	Catchment Area (51)	(None)	No Restriction
	Inlet (2)	Catchment Area (48)	(None)	No Restriction
	Inlet (3)	18.004	(None)	No Restriction
SMH 18.02	Inlet (1)	18.003	(None)	No Restriction
	Inlet (2)	Catchment Area (50)	(None)	No Restriction
	Inlet (3)	Catchment Area (49)	(None)	No Restriction
SMH 19.00	Inlet	Weir 3- 15	(None)	No Restriction
	Inlet (1)	Weir 3- 13	(None)	No Restriction
	Inlet	19.000	(None)	No Restriction

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Report Details: Type: Junctions Storm Phase: Catchment 3 Final	Donnachadh O'Brien & Associates: Unit 5C Elm House Millennium Park, Naas Co. Kildare		

DONNACHADH O'BRIEN
& ASSOCIATES CONSULTING ENGINEERS

RECEIVED: 13/08/2024

Junction	Inlet Name	Incoming Item(s)	Bypass Destination	Capacity Type
SMH 19.01	Inlet (1)	Catchment Area (10)	(None)	No Restriction
SMH 16.10	Inlet	16.012	(None)	No Restriction
SMH 16.11	Inlet	16.013	(None)	No Restriction
Catchment 3 Outfall	Inlet	16.015	(None)	No Restriction
SMH 16.12	Inlet (1)	16.014	(None)	No Restriction
SMH 18.06	Inlet	18.007	(None)	No Restriction
SMH 16.03	Inlet	16.002	(None)	No Restriction
	Inlet (2)	Weir 3-8	(None)	No Restriction
SMH 16.04	Inlet	16.003	(None)	No Restriction
SMH 16.05	Inlet (1)	16.005	(None)	No Restriction
SMH 16.08	Inlet (2)	16.008	(None)	No Restriction
SMH 17.00	Inlet	Weir 3-6	(None)	No Restriction
SMH 17.01	Inlet	17.003	(None)	No Restriction
	Inlet (2)	Catchment Area (148)	(None)	No Restriction
SMH 17.02	Inlet	17.004	(None)	No Restriction
	Inlet (1)	Catchment Area (160)	(None)	No Restriction
SMH 17.03	Inlet	17.005	(None)	No Restriction
SMH 16.06	Inlet	16.006	(None)	No Restriction
	Inlet (1)	Catchment Area (41) (2) (1) (1)	(None)	No Restriction
SMH 16.00	Inlet	Weir 3-4	(None)	No Restriction
SMH 16.01	Inlet	Catchment Area (151)	(None)	No Restriction
	Inlet (1)	16.000	(None)	No Restriction
SMH 16.02	Inlet	16.001	(None)	No Restriction
SIC 17.02	Inlet	No Delay (7)	(None)	No Restriction
	Inlet (1)	17.001	(None)	No Restriction
SIC 17.01	Inlet	No Delay (6)	(None)	No Restriction
	Inlet (1)	17.000	(None)	No Restriction
SIC 17.00	Inlet	No Delay (5)	(None)	No Restriction
SMH 16.07	Inlet	16.007	(None)	No Restriction
	Inlet (1)	Catchment Area (1)	(None)	No Restriction
SMH 18.07	Inlet (1)	18.008	(None)	No Restriction
SMH 16.09	Inlet	16.009	(None)	No Restriction
SIC 18.00	Inlet	No Delay (8)	(None)	No Restriction
SIC 18.01	Inlet	No Delay (9)	(None)	No Restriction
	Inlet (1)	18.000	(None)	No Restriction
SIC 18.02	Inlet	No Delay (10) 18.001	(None)	No Restriction
	Inlet (1)	Catchment Area (41) (2)	(None)	No Restriction
SMH 18.05	Inlet	18.006	(None)	No Restriction
SMH 22.00	Inlet	Catchment Area (130)	(None)	No Restriction
	Inlet (1)	Catchment Area (121)	(None)	No Restriction
	Inlet (2)	Catchment Area (131)	(None)	No Restriction
SMH 22.01	Inlet	22.000	(None)	No Restriction
	Inlet (1)	Catchment Area (124)	(None)	No Restriction
SMH 22.02	Inlet	22.001	(None)	No Restriction

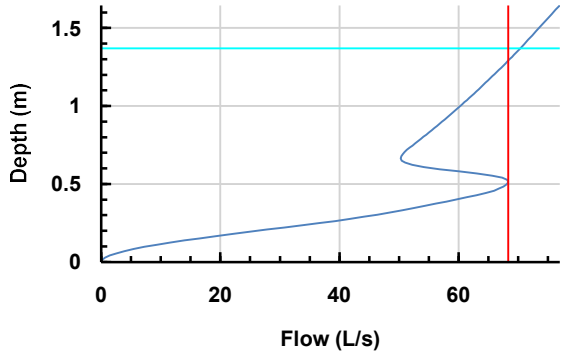
Outlets

Junction	Outlet Name	Outgoing Connection	Outlet Type
SMH 18.00	Outlet	No Delay (4)	Orifice
	Diameter (m)	0.225	
	Coefficient of Discharge	0.600	
	Invert Level (m)	80.235	

Herbata Data Centre: Halverstown, Naas Co. Kildare Surface Water Analysis- Catchment 3	Date: 07/02/2023		
	Designed by: MC	Checked by: RK	Approved By: DOB
Report Details: Type: Junctions Storm Phase: Catchment 3 Final	Donnachadh O'Brien & Associates: Unit 5C Elm House Millennium Park, Naas Co. Kildare		

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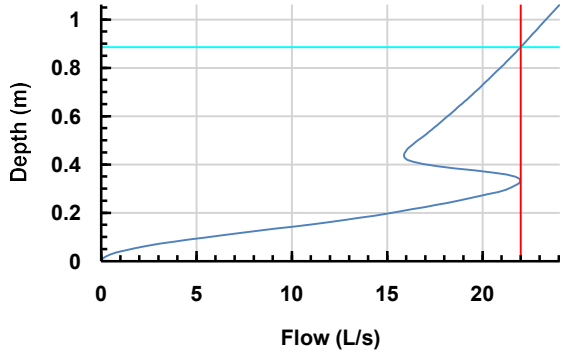
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Junction	Outlet Name	Outgoing Connection	Outlet Type
SMH 18.01	Outlet	18.003	Free Discharge
SMH 18.04	Outlet (1)	18.006	Free Discharge
SMH 18.03	Outlet	18.005	Free Discharge
SMH 18.02	Outlet	18.004	Free Discharge
SMH 19.00	Outlet	19.000	Free Discharge
SMH 19.01	Outlet	19.001	Free Discharge
SMH 16.10	Outlet	16.013	Free Discharge
SMH 16.11	Outlet	16.014	Free Discharge
SMH 16.12	Outlet	16.015	Hydro-Brake®
	Invert Level (m)	77.265	
	Design Depth (m)	1.370	
	Design Flow (L/s)	70.49	
	Objective	Minimise Upstream Storage Requirements	
	Application	Surface Water Only	
	Sump Available	☐	
	Unit Reference	CHE-0315-7049-1370-7049	
			
SMH 18.06	Outlet	18.008	Free Discharge
SMH 16.03	Outlet	16.003	Free Discharge
SMH 16.04	Outlet	16.004	Free Discharge
	Outlet	16.006	Hydro-Brake®

Herbata Data Centre:	Date:		
Halverstown, Naas Co. Kildare Surface Water Analysis- Catchment 3	07/02/2023		
	Designed by:	Checked by:	Approved By:
	MC	RK	DOB
Report Details: Type: Junctions Storm Phase: Catchment 3 Final	Donnachadh O'Brien & Associates: Unit 5C Elm House Millennium Park, Naas Co. Kildare		

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Junction	Outlet Name	Outgoing Connection	Outlet Type
SMH 16.05	Invert Level (m)	79.977	
	Design Depth (m)	0.885	
	Design Flow (L/s)	22.0	
	Objective	Minimise Upstream Storage Requirements	
	Application	Surface Water Only	
	Sump Available	☐	
	Unit Reference	CHE-0199-2200-0885-2200	
			
SMH 16.08	Outlet	16.009	Free Discharge
SMH 17.00	Outlet	17.003	Free Discharge
SMH 17.01	Outlet	17.004	Free Discharge
SMH 17.02	Outlet	17.005	Free Discharge
SMH 17.03	Outlet	17.006	Free Discharge
SMH 16.06	Outlet	16.007	Free Discharge
SMH 16.00	Outlet	16.000	Free Discharge
SMH 16.01	Outlet	16.001	Free Discharge
SMH 16.02	Outlet	16.002	Free Discharge
SIC 17.02	Outlet	17.002	Free Discharge
SIC 17.01	Outlet	17.001	Free Discharge
SIC 17.00	Outlet	17.000	Free Discharge
SMH 16.07	Outlet	16.008	Free Discharge
SMH 18.07	Outlet	18.009	Free Discharge
SMH 16.09	Outlet	16.010	Free Discharge
SIC 18.00	Outlet	18.000	Free Discharge
SIC 18.01	Outlet	18.001	Free Discharge
SIC 18.02	Outlet	18.002	Free Discharge
SMH 18.05	Outlet	18.007	Free Discharge
SMH 22.00	Outlet	22.000	Free Discharge
SMH 22.01	Outlet	22.001	Free Discharge
SMH 22.02	Outlet	22.002	Free Discharge

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BL ROOF 6 Type : Tank

Dimensions

Exceedance Level (m)	80.585
Depth (m)	0.200
Base Level (m)	80.385
Freeboard (mm)	0
Initial Depth (m)	0.000
Porosity (%)	100
Average Slope (1:X)	0.00
Total Volume (m³)	263.176

Depth (m)	Area (m²)	Volume (m³)
0.000	1315.880503	0.000
0.200	1315.880503	263.176

Inlets

Inlet

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (42)
Bypass Destination	(None)
Capacity Type	No Restriction

Inlet (1)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (120)
Bypass Destination	(None)
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	BL RF 6- Outfall
Outlet Type	Orifice

Diameter (m)	0.047
Coefficient of Discharge	0.600
Invert Level (m)	80.385

Advanced

Perimeter	Circular
Length (m)	93.950

Pond 6B Type : Pond

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Dimensions

Exceedance Level (m)	79.185
Depth (m)	1.435
Base Level (m)	77.750
Freeboard (mm)	550
Initial Depth (m)	0.000
Porosity (%)	100
Average Slope (1:X)	4.041
Total Volume (m³)	1292.296

Depth (m)	Area (m²)	Volume (m³)
0.000	1225.00	0.000
1.435	2050.00	2324.553

Inlets

Inlet

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (12) Catchment Area (13)
Bypass Destination	(None)
Capacity Type	No Restriction

Inlet (1)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (2)
Bypass Destination	(None)
Capacity Type	No Restriction

Inlet (5)

Inlet Type	Point Inflow
Incoming Item(s)	18.009
Bypass Destination	(None)
Capacity Type	No Restriction

Inlet (6)

Inlet Type	Point Inflow
Incoming Item(s)	16.011
Bypass Destination	(None)
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	16.012
Outlet Type	Free Discharge

Advanced

Perimeter	Circular
Length (m)	67.086
Friction Scheme	Manning's n
n	0.01

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Pond 4

Type: Pond

Dimensions

Exceedance Level (m)	81.850
Depth (m)	2.350
Base Level (m)	79.500
Freeboard (mm)	965
Initial Depth (m)	0.500
Porosity (%)	100
Average Slope (1:X)	3.169
Total Volume (m³)	3617.834

Depth (m)	Area (m²)	Volume (m³)
0.000	2225.00	0.000
2.350	3644.60	6828.528

Inlets

Inlet

Inlet Type	Point Inflow
Incoming Item(s)	16.004
Bypass Destination	(None)
Capacity Type	No Restriction

Inlet (1)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (167) Catchment Area (139)
Bypass Destination	(None)
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	16.005
Outlet Type	Free Discharge

Advanced

Perimeter	Circular
Length (m)	94.064
Friction Scheme	Manning's n
n	0.01

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BL ROOF 4 Type : Tank

Dimensions

Exceedance Level (m)	83.285
Depth (m)	0.200
Base Level (m)	83.085
Freeboard (mm)	0
Initial Depth (m)	0.000
Porosity (%)	100
Average Slope (1:X)	0.00
Total Volume (m³)	263.230

Depth (m)	Area (m²)	Volume (m³)
0.000	1316.15	0.000
0.200	1316.15	263.230

Inlets

Inlet

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (158)
Bypass Destination	(None)
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	BL RF 4 - Outfall
Outlet Type	Orifice
Diameter (m)	0.047
Coefficient of Discharge	0.600
Invert Level (m)	83.085

Advanced

Perimeter	Circular
Length (m)	94.011

Pond 6A Type : Pond

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Dimensions

Exceedance Level (m)	79.185
Depth (m)	1.435
Base Level (m)	77.750
Freeboard (mm)	525
Initial Depth (m)	0.000
Porosity (%)	100
Average Slope (1:X)	4.82
Total Volume (m³)	1059.862

Depth (m)	Area (m²)	Volume (m³)
0.000	910.00	0.000
1.435	1800.00	1908.475

Inlets

Inlet

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (4)
Bypass Destination	(None)
Capacity Type	No Restriction

Inlet (1)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (3)
Bypass Destination	(None)
Capacity Type	No Restriction

Inlet (2)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (11)
Bypass Destination	(None)
Capacity Type	No Restriction

Inlet (5)

Inlet Type	Point Inflow
Incoming Item(s)	19.001
Bypass Destination	(None)
Capacity Type	No Restriction

Inlet (6)

Inlet Type	Point Inflow
Incoming Item(s)	16.010
Bypass Destination	(None)
Capacity Type	No Restriction

Outlets

Outlet (1)

Outgoing Connection	16.011
Outlet Type	Free Discharge

Herbata Data Centre:	Date:		
Halverstown, Naas Co. Kildare Surface Water Analysis- Catchment 3	07/02/2023		
	Designed by: MC	Checked by: RK	Approved By: DOB
Report Details: Type: Stormwater Controls Storm Phase: Catchment 3 Final	Donnachadh O'Brien & Associates: Unit 5C Elm House Millennium Park, Naas Co. Kildare		

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Advanced

Perimeter	Circular
Length (m)	70.389
Friction Scheme	Manning's n
n	0.01

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PP6.3

Type : Porous Paving

Dimensions

Exceedance Level (m)	81.625
Depth (m)	0.460
Base Level (m)	81.165
Paving Layer Depth (mm)	110
Membrane Percolation (m/hr)	500.0
Porosity (%)	40
Length (m)	57.549
Long. Slope (1:X)	500.00
Width (m)	5.096
Total Volume (m³)	41.667

Under Drain

Height Above Base (m)	0.050
Diameter (mm)	150
No. of Barrels	1
Release Height (m)	0.000
Friction Scheme	Manning's n
n	0.015

Inlets

Inlet

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (41)
Bypass Destination	(None)
Capacity Type	No Restriction

Inlet (2)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (61) Catchment Area (41) (2) (1)
Bypass Destination	(None)
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	No Delay (10)
Outlet Type	Under Drain

Advanced

Conductivity (m/hr)	500.0

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PP4.3

Type : Porous Paving

Dimensions

Exceedance Level (m)	82.750
Depth (m)	0.460
Base Level (m)	82.290
Paving Layer Depth (mm)	110
Membrane Percolation (m/hr)	500.0
Porosity (%)	40
Length (m)	55.074
Long. Slope (1:X)	500.00
Width (m)	4.955
Total Volume (m³)	38.517

Under Drain

Height Above Base (m)	0.050
Diameter (mm)	110
No. of Barrels	1
Release Height (m)	0.000
Friction Scheme	Manning's n
n	0.015

Inlets

Inlet (2)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (156) (2)
Bypass Destination	(None)
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	No Delay (5)
Outlet Type	Under Drain

Advanced

Conductivity (m/hr)	500.0

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PP4.2

Type : Porous Paving

Dimensions

Exceedance Level (m)	83.500
Depth (m)	0.460
Base Level (m)	83.040
Paving Layer Depth (mm)	110
Membrane Percolation (m/hr)	500.0
Porosity (%)	40
Length (m)	47.579
Long. Slope (1:X)	500.00
Width (m)	5.053
Total Volume (m³)	33.931

Under Drain

Height Above Base (m)	0.050
Diameter (mm)	110
No. of Barrels	1
Release Height (m)	0.000
Friction Scheme	Manning's n
n	0.015

Inlets

Inlet

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (156) (1)
Bypass Destination	(None)
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	No Delay (6)
Outlet Type	Under Drain

Advanced

Conductivity (m/hr)	500.0

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PP4.1

Type : Porous Paving

Dimensions

Exceedance Level (m)	83.750
Depth (m)	0.460
Base Level (m)	83.290
Paving Layer Depth (mm)	110
Membrane Percolation (m/hr)	500.0
Porosity (%)	40
Length (m)	51.817
Long. Slope (1:X)	500.00
Width (m)	5.180
Total Volume (m³)	37.873

Under Drain

Height Above Base (m)	0.050
Diameter (mm)	110
No. of Barrels	1
Release Height (m)	0.000
Friction Scheme	Manning's n
n	0.015

Inlets

Inlet (2)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (156)
Bypass Destination	(None)
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	No Delay (7)
Outlet Type	Under Drain

Advanced

Conductivity (m/hr)	500.0

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PP6.2

Type : Porous Paving

Dimensions

Exceedance Level (m)	81.700
Depth (m)	0.460
Base Level (m)	81.240
Paving Layer Depth (mm)	110
Membrane Percolation (m/hr)	500.0
Porosity (%)	40
Length (m)	47.868
Long. Slope (1:X)	500.00
Width (m)	5.037
Total Volume (m³)	34.266

Under Drain

Height Above Base (m)	0.050
Diameter (mm)	150
No. of Barrels	1
Release Height (m)	0.000
Friction Scheme	Manning's n
n	0.015

Inlets

Inlet (2)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (41) (1)
Bypass Destination	(None)
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	No Delay (9)
Outlet Type	Under Drain

Advanced

Conductivity (m/hr)	500.0

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PP6.1

Type : Porous Paving

Dimensions

Exceedance Level (m)	81.850
Depth (m)	0.460
Base Level (m)	81.390
Paving Layer Depth (mm)	110
Membrane Percolation (m/hr)	500.0
Porosity (%)	40
Length (m)	50.710
Long. Slope (1:X)	500.00
Width (m)	5.037
Total Volume (m³)	36.301

Under Drain

Height Above Base (m)	0.050
Diameter (mm)	150
No. of Barrels	1
Release Height (m)	0.000
Friction Scheme	Manning's n
n	0.015

Inlets

Inlet

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (41) (1) (1)
Bypass Destination	(None)
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	No Delay (8)
Outlet Type	Under Drain

Advanced

Conductivity (m/hr)	500.0

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SWC3-9

Type : Swale

Swale

Exceedance Level (m)	80.798
Depth (m)	0.650
Base Level (m)	80.148
Top Width (m)	6.900
Side Slope (1:X)	3.00
Base Width (m)	3.000
Freeboard (mm)	0
Length (m)	57.000
Long. Slope (1:X)	200.00
Filtration Rate (m/hr)	0.0
Friction Scheme	Manning's n
n	0.01
Total Volume (m³)	183.398

Inlets

Inlet

Inlet Type	Point Inflow
Incoming Item(s)	No Delay (4)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (2)

Inlet Type	Point Inflow
Incoming Item(s)	Catchment Area (6)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (4)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (29)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (5)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (60)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

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Inlet (6)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (19)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (7)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (23)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (8)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (33)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (9)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (40)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (3)

Inlet Type	Point Inflow
Incoming Item(s)	18.002
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	Weir 3-9
Outlet Type	Weir

Width (m)	0.100
Coefficient of Discharge	0.544
Crest Level (m)	80.148

Advanced

Swale

Porosity (%)	100

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SWC3-10

Type : Swale

Swale

Exceedance Level (m)	80.499
Depth (m)	0.650
Base Level (m)	79.849
Top Width (m)	6.900
Side Slope (1:X)	3.00
Base Width (m)	3.000
Freeboard (mm)	0
Length (m)	57.000
Long. Slope (1:X)	200.00
Filtration Rate (m/hr)	0.0
Friction Scheme	Manning's n
n	0.01
Total Volume (m^3)	183.397

Inlets

Inlet

Inlet Type	Point Inflow
Incoming Item(s)	Weir 3-9
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (2)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (30)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (3)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (20)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (4)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (24)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

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Inlet (5)

Inlet Type	Point Inflow
Incoming Item(s)	Catchment Area (7)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (6)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (34)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (7)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (39)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (8)

Inlet Type	Point Inflow
Incoming Item(s)	Catchment Area (43)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (9)

Inlet Type	Point Inflow
Incoming Item(s)	BL RF 6- Outfall
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	Weir 3-10
Outlet Type	Weir

Width (m)	0.200
Coefficient of Discharge	0.544
Crest Level (m)	79.849

Advanced

Swale

Porosity (%)	100

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SWC3-11

Type : Swale

Swale

Exceedance Level (m)	80.199
Depth (m)	0.650
Base Level (m)	79.549
Top Width (m)	6.900
Side Slope (1:X)	3.00
Base Width (m)	3.000
Freeboard (mm)	0
Length (m)	57.000
Long. Slope (1:X)	200.00
Filtration Rate (m/hr)	0.0
Friction Scheme	Manning's n
n	0.01
Total Volume (m³)	183.397

Inlets

Inlet

Inlet Type	Point Inflow
Incoming Item(s)	Weir 3-10
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (1)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (31)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (2)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (21)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (3)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (25)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

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Inlet (4)

Inlet Type	Point Inflow
Incoming Item(s)	Catchment Area (8)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (5)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (35)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (6)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (38)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (7)

Inlet Type	Point Inflow
Incoming Item(s)	Catchment Area (44)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	Weir 3-11
Outlet Type	Weir

Width (m)	0.350
Coefficient of Discharge	0.544
Crest Level (m)	79.549

Advanced

Swale

Porosity (%)	100



SWC3-12

Type : Swale

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Swale

Exceedance Level (m)	79.900
Depth (m)	0.650
Base Level (m)	79.250
Top Width (m)	6.900
Side Slope (1:X)	3.00
Base Width (m)	3.000
Freeboard (mm)	0
Length (m)	57.000
Long. Slope (1:X)	200.00
Filtration Rate (m/hr)	0.0
Friction Scheme	Manning's n
n	0.01
Total Volume (m³)	183.398

Inlets

Inlet

Inlet Type	Point Inflow
Incoming Item(s)	Weir 3-11
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (2)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (32)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (3)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (22)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (4)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (26)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (5)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (36)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

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Inlet (6)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (37)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (7)

Inlet Type	Point Inflow
Incoming Item(s)	Catchment Area (46)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (8)

Inlet Type	Point Inflow
Incoming Item(s)	Catchment Area (45)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (1)

Inlet Type	Point Inflow
Incoming Item(s)	Catchment Area (9)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	Weir 3-12
Outlet Type	Weir

Width (m)	0.600
Coefficient of Discharge	0.544
Crest Level (m)	79.250

Advanced

Swale

Porosity (%)	100



SWC3-14 Type : Swale

RECEIVED: 13/08/2024

Swale

Exceedance Level (m)	79.935
Depth (m)	0.650
Base Level (m)	79.285
Top Width (m)	6.900
Side Slope (1:X)	3.00
Base Width (m)	3.000
Freeboard (mm)	0
Length (m)	47.000
Long. Slope (1:X)	200.00
Filtration Rate (m/hr)	0.0
Friction Scheme	Manning's n
n	0.01
Total Volume (m³)	151.223

Inlets

Inlet

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (134)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (1)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (127)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Outlets

Outlet (1)

Outgoing Connection	Weir 3- 14
Outlet Type	Weir

Width (m)	0.050
Coefficient of Discharge	0.544
Crest Level (m)	79.285

Advanced

Swale

Porosity (%)	100



SWC3-15

Type : Swale

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Swale

Exceedance Level (m)	79.650
Depth (m)	0.650
Base Level (m)	79.000
Top Width (m)	6.900
Side Slope (1:X)	3.00
Base Width (m)	3.000
Freeboard (mm)	0
Length (m)	55.000
Long. Slope (1:X)	200.00
Filtration Rate (m/hr)	0.0
Friction Scheme	Manning's n
n	0.01
Total Volume (m³)	176.963

Inlets

Inlet

Inlet Type	Point Inflow
Incoming Item(s)	Weir 3- 14
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (2)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (133)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (3)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (128)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (4)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (126)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (5)

Inlet Type	Point Inflow
Incoming Item(s)	Catchment Area (123)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

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Outlets

Outlet (1)

Outgoing Connection	Weir 3- 15
Outlet Type	Weir

Width (m)	0.050
Coefficient of Discharge	0.544
Crest Level (m)	79.000

Advanced

Swale

Porosity (%)	100



SWC3-13

Type : Swale

Swale

Exceedance Level (m)	79.650
Depth (m)	0.650
Base Level (m)	79.000
Top Width (m)	7.200
Side Slope (1:X)	3.00
Base Width (m)	3.300
Freeboard (mm)	0
Length (m)	45.000
Long. Slope (1:X)	200.00
Filtration Rate (m/hr)	0.0
Friction Scheme	Manning's n
n	0.01
Total Volume (m³)	153.563

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Inlets

Inlet (1)

Inlet Type	Point Inflow
Incoming Item(s)	Catchment Area (122)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (2)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (125)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (3)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (129)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (4)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (132)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (5)

Inlet Type	Point Inflow
Incoming Item(s)	22.002
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Outlets

Outlet (1)

Outgoing Connection	Weir 3- 13
Outlet Type	Weir

Width (m)	0.100
Coefficient of Discharge	0.544
Crest Level (m)	79.000

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Advanced

Swale

Porosity (%)	100



SWC3-1

Type : Swale

Swale

Exceedance Level (m)	82.832
Depth (m)	0.650
Base Level (m)	82.182
Top Width (m)	6.000
Side Slope (1:X)	2.31
Base Width (m)	3.000
Freeboard (mm)	0
Length (m)	55.000
Long. Slope (1:X)	200.00
Filtration Rate (m/hr)	0.0
Friction Scheme	Manning's n
n	0.01
Total Volume (m³)	160.875

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Inlets

Inlet (1)

Inlet Type	Point Inflow
Incoming Item(s)	BL RF 4 - Outfall
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (2)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (143)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (3)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (155)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (4)

Inlet Type	Point Inflow
Incoming Item(s)	Catchment Area (166)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Outlets

Outlet (1)

Outgoing Connection	Weir 3-1
Outlet Type	Weir

Width (m)	0.050
Coefficient of Discharge	0.544
Crest Level (m)	82.182

Herbata Data Centre:	Date:		
Halverstown, Naas Co. Kildare Surface Water Analysis- Catchment 3	07/02/2023		
	Designed by: MC	Checked by: RK	Approved By: DOB
Report Details: Type: Stormwater Controls Storm Phase: Catchment 3 Final	Donnachadh O'Brien & Associates: Unit 5C Elm House Millennium Park, Naas Co. Kildare		

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& ASSOCIATES CONSULTING ENGINEERS

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Advanced

Swale

Porosity (%)	100



SWC3-2

Type : Swale

Swale

Exceedance Level (m)	82.544
Depth (m)	0.650
Base Level (m)	81.894
Top Width (m)	6.000
Side Slope (1:X)	2.31
Base Width (m)	3.000
Freeboard (mm)	0
Length (m)	55.000
Long. Slope (1:X)	200.00
Filtration Rate (m/hr)	0.0
Friction Scheme	Manning's n
n	0.01
Total Volume (m³)	160.875

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Inlets

Inlet

Inlet Type	Point Inflow
Incoming Item(s)	Weir 3-1
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (1)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (142)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (2)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (154)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (3)

Inlet Type	Point Inflow
Incoming Item(s)	Catchment Area (165)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (4)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (5)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Outlets

Outlet (1)

Outgoing Connection	Weir 3-2
Outlet Type	Weir

Width (m)	0.100
Coefficient of Discharge	0.544
Crest Level (m)	81.894

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Advanced

Swale

Porosity (%)	100



SWC3-3

Type : Swale

Swale

Exceedance Level (m)	82.260
Depth (m)	0.650
Base Level (m)	81.610
Top Width (m)	6.000
Side Slope (1:X)	2.31
Base Width (m)	3.000
Freeboard (mm)	0
Length (m)	55.000
Long. Slope (1:X)	200.00
Filtration Rate (m/hr)	0.0
Friction Scheme	Manning's n
n	0.01
Total Volume (m³)	160.875

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Inlets

Inlet (1)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (141)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (2)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (153)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (3)

Inlet Type	Point Inflow
Incoming Item(s)	Catchment Area (164)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (4)

Inlet Type	Point Inflow
Incoming Item(s)	Weir 3-2
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (14)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	Weir 3-3
Outlet Type	Weir

Width (m)	0.200
Coefficient of Discharge	0.544
Crest Level (m)	81.610

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Advanced

Swale

Porosity (%)	100



SWC3-4

Type : Swale

Swale

Exceedance Level (m)	82.150
Depth (m)	0.650
Base Level (m)	81.500
Top Width (m)	6.000
Side Slope (1:X)	2.31
Base Width (m)	3.000
Freeboard (mm)	0
Length (m)	20.000
Long. Slope (1:X)	200.00
Filtration Rate (m/hr)	0.0
Friction Scheme	Manning's n
n	0.01
Total Volume (m³)	58.500

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Inlets

Inlet

Inlet Type	Point Inflow
Incoming Item(s)	Weir 3-3
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (1)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (140)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (2)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (152)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (3)

Inlet Type	Point Inflow
Incoming Item(s)	Catchment Area (163)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	Weir 3-4
Outlet Type	Weir

Width (m)	0.200
Coefficient of Discharge	0.544
Crest Level (m)	81.500

Advanced

Swale

Porosity (%)	100



SWC3-5

Type : Swale

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Swale

Exceedance Level (m)	82.436
Depth (m)	0.650
Base Level (m)	81.786
Top Width (m)	6.000
Side Slope (1:X)	2.31
Base Width (m)	3.000
Freeboard (mm)	0
Length (m)	38.000
Long. Slope (1:X)	200.00
Filtration Rate (m/hr)	0.0
Friction Scheme	Manning's n
n	0.01
Total Volume (m³)	111.150

Inlets

Inlet (9)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (112) Catchment Area (111)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (1)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (109)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (2)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (146) Catchment Area (108)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (3)

Inlet Type	Point Inflow
Incoming Item(s)	17.002
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

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Outlets

Outlet

Outgoing Connection	Weir 3-5
Outlet Type	Weir

Width (m)	0.050
Coefficient of Discharge	0.544
Crest Level (m)	81.786

Advanced

Swale

Porosity (%)	100



SWC3-6

Type : Swale

Swale

Exceedance Level (m)	82.235
Depth (m)	0.650
Base Level (m)	81.585
Top Width (m)	6.000
Side Slope (1:X)	2.31
Base Width (m)	3.000
Freeboard (mm)	0
Length (m)	38.000
Long. Slope (1:X)	200.00
Filtration Rate (m/hr)	0.0
Friction Scheme	Manning's n
n	0.01
Total Volume (m³)	111.150

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Inlets

Inlet

Inlet Type	Point Inflow
Incoming Item(s)	Weir 3-5
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (1)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (113)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (2)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (147)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (3)

Inlet Type	Point Inflow
Incoming Item(s)	Catchment Area (159)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	Weir 3-6
Outlet Type	Weir

Width (m)	0.100
Coefficient of Discharge	0.544
Crest Level (m)	81.585

Advanced

Swale

Porosity (%)	100



SWC3-7 Type : Swale

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Swale

Exceedance Level (m)	81.754
Depth (m)	0.650
Base Level (m)	81.104
Top Width (m)	6.000
Side Slope (1:X)	2.31
Base Width (m)	3.000
Freeboard (mm)	0
Length (m)	43.000
Long. Slope (1:X)	200.00
Filtration Rate (m/hr)	0.0
Friction Scheme	Manning's n
n	0.01
Total Volume (m³)	125.775

Inlets

Inlet

Inlet Type	Point Inflow
Incoming Item(s)	17.006
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (1)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (114)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (2)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (149)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (3)

Inlet Type	Point Inflow
Incoming Item(s)	Catchment Area (161)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

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Outlets

Outlet

Outgoing Connection	Weir 3-7
Outlet Type	Weir

Width (m)	0.200
Coefficient of Discharge	0.544
Crest Level (m)	81.104

Advanced

Swale

Porosity (%)	100



SWC3-8

Type : Swale

Swale

Exceedance Level (m)	81.540
Depth (m)	0.650
Base Level (m)	80.890
Top Width (m)	6.000
Side Slope (1:X)	2.31
Base Width (m)	3.000
Freeboard (mm)	0
Length (m)	40.000
Long. Slope (1:X)	200.00
Filtration Rate (m/hr)	0.0
Friction Scheme	Manning's n
n	0.01
Total Volume (m³)	117.000

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Inlets

Inlet (9)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (138)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet

Inlet Type	Point Inflow
Incoming Item(s)	Weir 3-7
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (1)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (150)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Inlet (2)

Inlet Type	Point Inflow
Incoming Item(s)	Catchment Area (162)
Bypass Destination	(None)
Inlet Destination	Ponding Area
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	Weir 3-8
Outlet Type	Weir

Width (m)	1.000
Coefficient of Discharge	0.544
Crest Level (m)	80.890

Advanced

Swale

Porosity (%)	100

Herbata Data Centre:	Date:		
Halverstown, Naas Co. Kildare Surface Water Analysis- Catchment 3	07/02/2023		
	Designed by:	Checked by:	Approved By:
	MC	RK	DOB
Report Details: Type: Inflow Summary Storm Phase: Catchment 3 Final	Donnachadh O'Brien & Associates: Unit 5C Elm House Millennium Park, Naas Co. Kildare		

DONNACHADH O'BRIEN
& ASSOCIATES CONSULTING ENGINEERS

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Inflow Label	Connected To	Flow (L/s)	Runoff Method	Area (ha)	Percentage Impervious (%)	Urban Creep (%)	Adjusted Percentage Impervious (%)	Area Analysed (ha)
Catchment Area	SWC3-1		Time of Concentration	0.141	30	0	30	0.042
Catchment Area (1)	SMH 16.07		Time of Concentration	0.052	80	0	80	0.041
Catchment Area (2)	Pond 6B		Time of Concentration	0.045	80	0	80	0.036
Catchment Area (3)	Pond 6A		Time of Concentration	0.038	80	0	80	0.030
Catchment Area (4)	Pond 6A		Time of Concentration	0.218	30	0	30	0.065
Catchment Area (5)	SWC3-2		Time of Concentration	0.335	30	0	30	0.100
Catchment Area (6)	SWC3-9		Time of Concentration	0.086	95	0	95	0.081
Catchment Area (7)	SWC3-10		Time of Concentration	0.218	95	0	95	0.207
Catchment Area (8)	SWC3-11		Time of Concentration	0.250	95	0	95	0.238
Catchment Area (9)	SWC3-12		Time of Concentration	0.179	95	0	95	0.170
Catchment Area (10)	SMH 19.01		Time of Concentration	0.175	90	0	90	0.158
Catchment Area (11)	Pond 6A		Time of Concentration	0.038	30	0	30	0.011
Catchment Area (12)	Pond 6B		Time of Concentration	0.202	90	0	90	0.182
Catchment Area (13)	Pond 6B		Time of Concentration	0.374	30	0	30	0.112
Catchment Area (14)	SWC3-3		Time of Concentration	0.412	30	0	30	0.124
Catchment Area (19)	SWC3-9		Time of Concentration	0.118	80	0	80	0.095
Catchment Area (20)	SWC3-10		Time of Concentration	0.046	80	0	80	0.036
Catchment Area (21)	SWC3-11		Time of Concentration	0.045	80	0	80	0.036
Catchment Area (22)	SWC3-12		Time of Concentration	0.060	80	0	80	0.048
Catchment Area (23)	SWC3-9		Time of Concentration	0.014	80	0	80	0.011
Catchment Area (24)	SWC3-10		Time of Concentration	0.028	80	0	80	0.022
Catchment Area (25)	SWC3-11		Time of Concentration	0.028	80	0	80	0.022
Catchment Area (26)	SWC3-12		Time of Concentration	0.023	80	0	80	0.018
Catchment Area (29)	SWC3-9		Time of Concentration	0.091	30	0	30	0.027
Catchment Area (30)	SWC3-10		Time of Concentration	0.088	30	0	30	0.026
Catchment Area (31)	SWC3-11		Time of Concentration	0.089	30	0	30	0.027
Catchment Area (32)	SWC3-12		Time of Concentration	0.129	30	0	30	0.039
Catchment Area (33)	SWC3-9		Time of Concentration	0.052	80	0	80	0.042
Catchment Area (34)	SWC3-10		Time of Concentration	0.044	80	0	80	0.035
Catchment Area (35)	SWC3-11		Time of Concentration	0.045	80	0	80	0.036

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Catchment Area (36)	SWC3-12		Time of Concentration	0.046	80	0	80	0.037
Catchment Area (37)	SWC3-12		Time of Concentration	0.034	80	0	80	0.027
Catchment Area (38)	SWC3-11		Time of Concentration	0.038	80	0	80	0.030
Catchment Area (39)	SWC3-10		Time of Concentration	0.036	80	0	80	0.029
Catchment Area (40)	SWC3-9		Time of Concentration	0.028	80	0	80	0.023
Catchment Area (41)	PP6.3		Time of Concentration	0.072	80	0	80	0.058
Catchment Area (41) (1)	PP6.2		Time of Concentration	0.079	80	0	80	0.063
Catchment Area (41) (1) (1)	PP6.1		Time of Concentration	0.059	80	0	80	0.047
Catchment Area (41) (2)	SIC 18.02		Time of Concentration	0.027	80	0	80	0.021
Catchment Area (41) (2) (1)	PP6.3		Time of Concentration	0.134	30	0	30	0.040
Catchment Area (41) (2) (1) (1)	SMH 16.06		Time of Concentration	0.104	80	0	80	0.083
Catchment Area (42)	BL ROOF 6		Time of Concentration	0.132	95	0	95	0.125
Catchment Area (43)	SWC3-10		Time of Concentration	0.161	95	0	95	0.153
Catchment Area (44)	SWC3-11		Time of Concentration	0.291	95	0	95	0.277
Catchment Area (45)	SWC3-12		Time of Concentration	0.095	95	0	95	0.090
Catchment Area (46)	SWC3-12		Time of Concentration	0.190	95	0	95	0.181
Catchment Area (47)	SMH 18.04		Time of Concentration	0.019	80	0	80	0.015
Catchment Area (48)	SMH 18.03		Time of Concentration	0.019	80	0	80	0.015
Catchment Area (49)	SMH 18.02		Time of Concentration	0.002	80	0	80	0.002
Catchment Area (50)	SMH 18.02		Time of Concentration	0.021	80	0	80	0.017
Catchment Area (51)	SMH 18.03		Time of Concentration	0.031	80	0	80	0.025
Catchment Area (52)	SMH 18.04		Time of Concentration	0.033	80	0	80	0.026
Catchment Area (60)	SWC3-9		Time of Concentration	0.079	80	0	80	0.063
Catchment Area (61)	PP6.3		Time of Concentration	0.047	30	0	30	0.014
Catchment Area (108)	SWC3-5		Time of Concentration	0.015	80	0	80	0.012
Catchment Area (109)	SWC3-5		Time of Concentration	0.025	80	0	80	0.020
Catchment Area (111)	SWC3-5		Time of Concentration	0.082	30	0	30	0.024
Catchment Area (112)	SWC3-5		Time of Concentration	0.092	30	0	30	0.028
Catchment Area (113)	SWC3-6		Time of Concentration	0.148	30	0	30	0.044
Catchment Area (114)	SWC3-7		Time of Concentration	0.376	30	0	30	0.113

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Catchment Area (120)	BL ROOF 6		Time of Concentration	0.168	95	0	95	0.160
Catchment Area (121)	SMH 22.00		Time of Concentration	0.272	100	0	100	0.272
Catchment Area (122)	SWC3-13		Time of Concentration	0.177	95	0	95	0.158
Catchment Area (123)	SWC3-15		Time of Concentration	0.256	95	0	95	0.243
Catchment Area (124)	SMH 22.01		Time of Concentration	0.027	80	0	80	0.021
Catchment Area (125)	SWC3-13		Time of Concentration	0.017	80	0	80	0.014
Catchment Area (126)	SWC3-15		Time of Concentration	0.031	80	0	80	0.025
Catchment Area (127)	SWC3-14		Time of Concentration	0.113	80	0	80	0.090
Catchment Area (128)	SWC3-15		Time of Concentration	0.047	80	0	80	0.037
Catchment Area (129)	SWC3-13		Time of Concentration	0.027	80	0	80	0.022
Catchment Area (130)	SMH 22.00		Time of Concentration	0.063	80	0	80	0.051
Catchment Area (131)	SMH 22.00		Time of Concentration	0.071	30	0	30	0.021
Catchment Area (132)	SWC3-13		Time of Concentration	0.041	30	0	30	0.012
Catchment Area (133)	SWC3-15		Time of Concentration	0.070	30	0	30	0.021
Catchment Area (134)	SWC3-14		Time of Concentration	0.069	30	0	30	0.021
Catchment Area (138)	SWC3-8		Time of Concentration	0.168	30	0	30	0.050
Catchment Area (139)	Pond 4		Time of Concentration	0.207	30	0	30	0.062
Catchment Area (140)	SWC3-4		Time of Concentration	0.015	30	0	30	0.004
Catchment Area (141)	SWC3-3		Time of Concentration	0.043	30	0	30	0.013
Catchment Area (142)	SWC3-2		Time of Concentration	0.043	30	0	30	0.013
Catchment Area (143)	SWC3-1		Time of Concentration	0.074	30	0	30	0.022
Catchment Area (146)	SWC3-5		Time of Concentration	0.041	80	0	80	0.033
Catchment Area (147)	SWC3-6		Time of Concentration	0.056	80	0	80	0.045
Catchment Area (148)	SMH 17.01		Time of Concentration	0.048	80	0	80	0.039
Catchment Area (149)	SWC3-7		Time of Concentration	0.061	80	0	80	0.049
Catchment Area (150)	SWC3-8		Time of Concentration	0.056	80	0	80	0.045
Catchment Area (151)	SMH 16.01		Time of Concentration	0.149	80	0	80	0.119
Catchment Area (152)	SWC3-4		Time of Concentration	0.032	80	0	80	0.026
Catchment Area (153)	SWC3-3		Time of Concentration	0.073	80	0	80	0.059
Catchment Area (154)	SWC3-2		Time of Concentration	0.072	80	0	80	0.058
Catchment Area (155)	SWC3-1		Time of Concentration	0.189	80	0	80	0.151
Catchment Area (156)	PP4.1		Time of Concentration	0.075	80	0	80	0.060

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Catchment Area (156) (1)	PP4.2		Time of Concentration	0.102	80	0	80	0.082
Catchment Area (156) (2)	PP4.3		Time of Concentration	0.104	80	0	80	0.083
Catchment Area (158)	BL ROOF 4		Time of Concentration	0.236	95	0	95	0.225
Catchment Area (159)	SWC3-6		Time of Concentration	0.204	95	0	95	0.194
Catchment Area (160)	SMH 17.02		Time of Concentration	0.220	95	0	95	0.209
Catchment Area (161)	SWC3-7		Time of Concentration	0.175	95	0	95	0.166
Catchment Area (162)	SWC3-8		Time of Concentration	0.186	95	0	95	0.177
Catchment Area (163)	SWC3-4		Time of Concentration	0.170	95	0	95	0.162
Catchment Area (164)	SWC3-3		Time of Concentration	0.167	95	0	95	0.158
Catchment Area (165)	SWC3-2		Time of Concentration	0.198	95	0	95	0.188
Catchment Area (166)	SWC3-1		Time of Concentration	0.182	95	0	95	0.173
Catchment Area (167)	Pond 4		Time of Concentration	0.697	30	0	30	0.209
TOTAL		**0.0**		**11.664**				**7.869**

Herbata Data Centre:	Date:		
Halverstown, Naas Co. Kildare Surface Water Analysis- Catchment 3	07/02/2023		
	Designed by:	Checked by:	Approved By:
	MC	RK	DOB
Report Title:	Donnachadh O'Brien & Associates:		
Rainfall Analysis Criteria	Unit 5C Elm House Millennium Park, Naas Co. Kildare		

DONNACHADH O'BRIEN
& ASSOCIATES CONSULTING ENGINEERS

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Runoff Type	Dynamic
Output Interval (mins)	5
Time Step	Reduced
Urban Creep	Apply Global Value
Urban Creep Global Value (%)	0
Junction Flood Risk Margin (mm)	0
Perform No Discharge Analysis	☐

Rainfall

100Yr

Type: FSR

Region	Scotland And Ireland
M5-60 (mm)	16.2
Ratio R	0.287
Summer	☑
Winter	☑

Return Period

Return Period (years)	Increase Rainfall (%)
100.0	30.000

Storm Durations

Duration (mins)	Run Time (mins)
15	30
30	60
60	120
120	240
180	360
240	480
360	720
480	960
600	1200
720	1440
960	1920
1440	2880
2160	4320
2880	5760
4320	8640
5760	11520
7200	14400
8640	17280
10080	20160

Herbata Data Centre:	Date:		
Halverstown, Naas Co. Kildare Surface Water Analysis- Catchment 3	07/02/2023		
	Designed by:	Checked by:	Approved By:
	MC	RK	DOB
Report Details: Type: Junctions Summary Storm Phase: Catchment 3 Final	Donnachadh O'Brien & Associates: Unit 5C Elm House Millennium Park, Naas Co. Kildare		

DONNACHADH O'BRIEN
& ASSOCIATES CONSULTING ENGINEERS

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Critical Storm Per Item: Rank By: Max. Depth

Junction	Storm Event	Cover Level (m)	Invert Level (m)	Max. Level (m)	Max. Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Status
SMH 18.00	100Yr: 100 years: +30 %: 15 mins: Summer	80.885	80.235	80.235	0.000	0.0	0.000	0.000	0.0	0.000	OK
SMH 18.01	100Yr: 100 years: +30 %: 60 mins: Summer	80.750	79.100	79.681	0.581	312.0	1.027	0.000	311.5	907.447	OK
SMH 18.04	100Yr: 100 years: +30 %: 60 mins: Summer	80.732	78.818	79.362	0.544	324.9	0.962	0.000	324.2	942.727	OK
SMH 18.03	100Yr: 100 years: +30 %: 60 mins: Summer	80.793	78.971	79.516	0.545	319.7	0.963	0.000	318.9	928.275	OK
SMH 18.02	100Yr: 100 years: +30 %: 60 mins: Summer	80.822	79.047	79.609	0.562	314.3	0.993	0.000	313.8	913.877	OK
SMH 19.00	100Yr: 100 years: +30 %: 120 mins: Summer	80.360	78.965	79.283	0.318	67.7	0.455	0.000	67.8	500.469	Surcharged
SMH 19.01	100Yr: 100 years: +30 %: 30 mins: Summer	80.000	78.813	79.152	0.339	99.2	0.485	0.000	98.4	189.533	Surcharged
SMH 16.10	100Yr: 100 years: +30 %: 720 mins: Summer	79.000	77.709	78.617	0.908	69.3	1.299	0.000	69.1	4281.352	Surcharged
SMH 16.11	100Yr: 100 years: +30 %: 720 mins: Summer	79.000	77.556	78.579	1.024	69.1	1.465	0.000	68.7	4275.970	Surcharged
Catchment 3 Outfall	100Yr: 100 years: +30 %: 5760 mins: Summer	79.000	77.200	77.381	0.181	70.7	0.000	0.000	70.7	12301.229	OK
SMH 16.12	100Yr: 100 years: +30 %: 720 mins: Summer	79.000	77.265	78.517	1.252	68.7	2.212	0.000	68.3	4270.740	Surcharged
SMH 18.06	100Yr: 100 years: +30 %: 60 mins: Summer	80.000	78.555	79.057	0.502	323.0	0.887	0.000	321.8	937.967	OK
SMH 16.03	100Yr: 100 years: +30 %: 60 mins: Summer	82.000	80.884	81.466	0.583	252.9	0.659	0.000	252.7	945.651	Surcharged
SMH 16.04	100Yr: 100 years: +30 %: 60 mins: Summer	82.000	80.848	81.322	0.474	252.7	0.537	0.000	252.6	944.333	Surcharged
SMH 16.05	100Yr: 100 years: +30 %: 2160 mins: Summer	81.850	79.977	80.857	0.880	22.0	0.995	0.000	22.0	3655.621	Surcharged
SMH 16.08	100Yr: 100 years: +30 %: 15 mins: Summer	80.640	78.733	79.049	0.316	51.6	0.358	0.000	48.8	30.720	Surcharged
SMH 17.00	100Yr: 100 years: +30 %: 60 mins: Summer	82.800	81.568	82.171	0.603	40.5	0.682	0.000	40.9	169.769	Surcharged

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SMH 17.01	100Yr: 100 years: +30 %: 15 mins: Summer	82.750	81.517	82.153	0.636	39.9	0.719	0.000	36.5	42.698	Surcharged
SMH 17.02	100Yr: 100 years: +30 %: 15 mins: Summer	82.600	81.379	82.204	0.825	112.4	0.933	0.000	90.2	82.719	Surcharged
SMH 17.03	100Yr: 100 years: +30 %: 60 mins: Summer	82.500	81.328	81.807	0.479	75.2	0.542	0.000	74.8	265.420	Surcharged
SMH 16.06	100Yr: 100 years: +30 %: 15 mins: Summer	81.520	79.211	79.846	0.634	44.7	0.718	0.000	36.2	21.713	Surcharged
SMH 16.00	100Yr: 100 years: +30 %: 60 mins: Summer	82.810	81.425	81.928	0.503	100.3	0.569	0.000	100.5	421.893	Surcharged
SMH 16.01	100Yr: 100 years: +30 %: 60 mins: Summer	82.750	81.332	81.858	0.527	117.6	0.596	0.000	116.0	469.545	Surcharged
SMH 16.02	100Yr: 100 years: +30 %: 60 mins: Summer	82.800	81.108	81.664	0.556	116.0	0.629	0.000	114.5	467.301	Surcharged
SIC 17.02	100Yr: 100 years: +30 %: 240 mins: Summer	83.750	82.109	82.450	0.341	16.8	0.385	0.000	16.6	125.238	Surcharged
SIC 17.01	100Yr: 100 years: +30 %: 240 mins: Summer	83.500	82.173	82.496	0.324	11.9	0.366	0.000	11.7	93.504	Surcharged
SIC 17.00	100Yr: 100 years: +30 %: 240 mins: Summer	82.750	82.250	82.506	0.256	5.8	0.290	0.000	5.4	47.006	Surcharged
SMH 16.07	100Yr: 100 years: +30 %: 15 mins: Summer	81.286	78.981	79.595	0.614	58.4	0.695	0.000	51.6	30.934	Surcharged
SMH 18.07	100Yr: 100 years: +30 %: 60 mins: Summer	80.000	78.478	78.924	0.446	321.8	0.789	0.000	321.2	936.588	OK
SMH 16.09	100Yr: 100 years: +30 %: 15 mins: Summer	80.615	78.698	78.952	0.254	48.8	0.288	0.000	46.4	30.587	Surcharged
SIC 18.00	100Yr: 100 years: +30 %: 120 mins: Summer	81.850	81.150	81.465	0.315	6.0	0.356	0.000	5.7	17.366	Surcharged
SIC 18.01	100Yr: 100 years: +30 %: 120 mins: Summer	81.700	81.080	81.451	0.371	11.4	0.419	0.000	11.2	42.963	Surcharged
SIC 18.02	100Yr: 100 years: +30 %: 120 mins: Summer	81.625	81.009	81.403	0.394	23.0	0.445	0.000	22.6	102.905	Surcharged
SMH 18.05	100Yr: 100 years: +30 %: 60 mins: Summer	80.423	78.707	79.230	0.523	324.2	0.925	0.000	323.0	940.295	OK
SMH 22.00	100Yr: 100 years: +30 %: 15 mins: Summer	80.840	79.603	80.201	0.598	48.1	0.676	0.000	37.3	31.160	Surcharged
SMH 22.01	100Yr: 100 years: +30 %: 15 mins: Summer	81.120	79.305	79.849	0.544	48.7	0.616	0.000	40.9	35.506	Surcharged
SMH 22.02	100Yr: 100 years: +30 %: 15 mins: Summer	81.000	79.235	79.731	0.496	40.9	0.561	0.000	35.6	35.118	Surcharged

Herbata Data Centre:	Date:		
Halverstown, Naas Co. Kildare Surface Water Analysis- Catchment 3	07/02/2023		
	Designed by:	Checked by:	Approved By:
	MC	RK	DOB
Report Details: Type: Stormwater Controls Summary Storm Phase: Catchment 3 Final	Donnachadh O'Brien & Associates: Unit 5C Elm House Millennium Park, Naas Co. Kildare		

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& ASSOCIATES CONSULTING ENGINEERS

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Critical Storm Per Item: Rank By: Max. DS Depth

Stormwater Control	Storm Event	Max. US Level (m)	Max. DS Level (m)	Max. US Depth (m)	Max. DS Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Total Lost Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Percentage Available (%)	Status
SWC3-9	100Yr: 100 years: +30 %: 120 mins: Summer	80.683	80.683	0.250	0.535	105.9	95.129	0.000	0.000	52.2	279.055	48.130	OK
SWC3-10	100Yr: 100 years: +30 %: 60 mins: Summer	80.427	80.427	0.293	0.578	209.4	108.666	0.000	0.000	116.4	397.479	40.748	OK
SWC3-11	100Yr: 100 years: +30 %: 60 mins: Summer	80.170	80.170	0.336	0.621	322.2	122.850	0.000	0.000	226.1	662.930	33.014	OK
SWC3-12	100Yr: 100 years: +30 %: 60 mins: Summer	79.838	79.838	0.303	0.588	407.0	111.729	0.000	0.000	312.0	908.234	39.078	OK
PP6.3	100Yr: 100 years: +30 %: 120 mins: Summer	81.524	81.444	0.243	0.279	27.7	32.025	0.000	0.000	10.4	49.703	23.139	OK
BL ROOF 6	100Yr: 100 years: +30 %: 2880 mins: Summer	80.564	80.564	0.179	0.179	8.4	235.496	0.000	0.000	1.7	331.552	10.518	OK
SWC3-14	100Yr: 100 years: +30 %: 180 mins: Summer	79.607	79.607	0.087	0.322	21.9	35.719	0.000	0.000	6.2	65.067	76.380	OK
SWC3-15	100Yr: 100 years: +30 %: 180 mins: Summer	79.593	79.593	0.318	0.593	69.7	110.901	0.000	0.000	23.8	252.529	37.331	OK
SWC3-13	100Yr: 100 years: +30 %: 120 mins: Summer	79.529	79.529	0.304	0.529	90.4	86.150	0.000	0.000	43.9	300.274	43.899	OK
Pond 6B	100Yr: 100 years: +30 %: 720 mins: Summer	78.633	78.633	0.883	0.883	185.7	1288.182	0.000	0.000	69.3	4297.961	0.318	OK
SWC3-1	100Yr: 100 years: +30 %: 120 mins: Summer	82.816	82.816	0.359	0.634	96.5	114.472	0.000	0.000	28.6	203.780	28.844	OK
SWC3-2	100Yr: 100 years: +30 %: 120 mins: Summer	82.490	82.490	0.321	0.596	111.7	103.539	0.000	0.000	56.6	381.579	35.640	OK
SWC3-3	100Yr: 100 years: +30 %: 120 mins: Summer	82.203	82.203	0.318	0.593	135.8	102.751	0.000	0.000	84.9	559.152	36.130	OK

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SWC3-4	100Yr: 100 years: +30 %: 120 mins: Summer	82.096	82.096	0.496	0.596	113.1	46.635	0.000	0.000	101.9	654.530	20.283	OK
SWC3-5	100Yr: 100 years: +30 %: 240 mins: Summer	82.297	82.297	0.321	0.511	35.9	62.930	0.000	0.000	19.3	199.461	43.382	OK
SWC3-6	100Yr: 100 years: +30 %: 120 mins: Summer	82.208	82.208	0.433	0.623	75.9	85.012	0.000	0.000	39.1	284.610	23.516	OK
SWC3-7	100Yr: 100 years: +30 %: 60 mins: Summer	81.718	81.718	0.399	0.614	183.3	91.294	0.000	0.000	112.6	386.058	27.415	OK
SWC3-8	100Yr: 100 years: +30 %: 60 mins: Summer	81.473	81.473	0.383	0.583	194.1	80.018	0.000	0.000	141.5	481.766	31.608	OK
Pond 4	100Yr: 100 years: +30 %: 2160 mins: Summer	80.870	80.870	1.370	1.370	105.0	3571.992	0.000	0.000	22.0	3655.873	1.267	OK
PP4.3	100Yr: 100 years: +30 %: 240 mins: Summer	82.626	82.534	0.226	0.244	13.9	27.019	0.000	0.000	5.8	47.290	29.850	OK
BL ROOF 4	100Yr: 100 years: +30 %: 2880 mins: Summer	83.223	83.223	0.138	0.138	6.7	182.050	0.000	0.000	1.5	262.740	30.840	OK
PP4.2	100Yr: 100 years: +30 %: 60 mins: Summer	83.370	83.234	0.235	0.194	27.1	22.407	0.000	0.000	7.5	24.571	33.963	OK
PP4.1	100Yr: 100 years: +30 %: 120 mins: Summer	83.550	83.445	0.157	0.155	14.8	18.590	0.000	0.000	5.5	23.850	50.916	OK
Pond 6A	100Yr: 100 years: +30 %: 720 mins: Summer	78.658	78.658	0.908	0.908	102.2	1056.977	0.000	0.000	38.2	2176.144	0.272	OK
PP6.2	100Yr: 100 years: +30 %: 120 mins: Summer	81.487	81.464	0.151	0.224	15.5	18.458	0.000	0.000	6.8	26.145	46.133	OK
PP6.1	100Yr: 100 years: +30 %: 120 mins: Summer	81.604	81.533	0.113	0.143	11.6	13.859	0.000	0.000	6.0	17.788	61.823	OK

Appendix 4.2 E
Uisce Eireann Confirmation of Feasibility Letter

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CONFIRMATION OF FEASIBILITY

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

Irish Water
PO Box 448,
South City
Delivery Office,
Cork City.

www.water.ie

Donnachadh O'Brien

Unit 5C, Elm House
Millennium Park
Naas
Co. Kildare
W91P9P8

11 May 2023

Our Ref: CDS23000739 Pre-Connection Enquiry
Halverstown, Halverstown, Kildare, Co.Kildare

Dear Applicant/Agent,

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

Irish Water has reviewed the pre-connection enquiry in relation to a Water & Wastewater connection for a Business Connection of 6 unit(s) at Halverstown, Halverstown, Kildare, Co.Kildare, (the **Development)**.

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

- **Water Connection**
  - Feasible without infrastructure upgrade by Irish Water
  - This PCE is only validate for 1.3l/s demand. If applicant needs to have more flow, applicant should apply again for a new PCE for further assessment.

- **Wastewater Connection**
  - Feasible without infrastructure upgrade by Irish Water.
  - Applicant should install private rising mains from the site to the existing 300mm wastewater gravity network along Newbridge Road.
  - This PCE is only validate to a maximum discharging load of 5l/s during the cooling event. If applicant needs to discharge more flow, applicant should apply again for a new PCE for further assessment.

Stiúrthóirí / Directors: Tony Keohane (Chairman), Niall Gleeson (CEO), Christopher Banks, Fred Barry, Gerard Britchfield, Liz Joyce, Patricia King, Eileen Maher, Cathy Mannion, Michael Walsh
Oifig Chláraithe / Registered Office: Teach Colvill, 24–26 Sráid Thalbóid, Baile Átha Cliath 1, D01 NP86 / Colvill House, 24–26 Talbot Street, Dublin 1 D01 NP86
Is cuideachta ghníomhaíochta ainmnithe atá faoi theorainn scaireanna é Uisce Éireann / Irish Water is a designated activity company, limited by shares.
Uimhir Chláraithe in Éirinn / Registered in Ireland No.: 530363
IW-H-P-MD
REV013

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

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

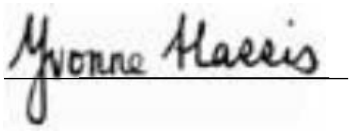
Where can you find more information?

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

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

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

Yours sincerely,



Yvonne Harris
Head of Customer Operations

Section A - What is important to know?

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

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

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Section B – Details of Irish Water's Network(s)

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



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

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

excavations or any other works being carried out. Service connection pipes are not generally shown but their presence should be anticipated.

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Appendix 4.2 F
Fire Hydrant Flow Simulation Testing

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Hydrant Testing Report

Naas, Co. Kildare



Client:	Donnacadh O'Brien Associates
Site Contact:	Richard Kiernan
Project:	Hydrant Testing & 7 Day Logging Naas, Co. Kildare
Technician:	Aaron Hogan
Start/Finish of Survey	17/01/2023

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2 Hydrant Specifications & Flow Requirements 3

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2.2 Key Aspects of Fire Hydrant Specification 4

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1 Scope of Works

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SES Water Management were requested by Donnocadh O'Brien Associates to carry out flow and pressure testing on hydrants at Naas, Co. Kildare.

Pressure logging of the hydrants was carried out over a 7-day period. Flow testing was then carried out using a digital flow meter with static and residual pressures also being recorded.

2 Hydrant Specifications & Flow Requirements

2.1 Guidelines for Fire Flow Requirements

Housing Developments
Housing Developments with units of detached or semi-detached houses of not more than two floors should have a supply capable of delivering a minimum of 8 l/s (480 l/min) OR multi occupied developments with units of more than 2 floors should have a water supply capable of delivering a minimum of 20 to 35 l/s (1,200 to 2,100 Litres/minute).

Village Hall or the like
Should have a water supply capable of delivering 15 Litres per second (900 Litres/minute) through any single hydrant on the development.

Primary School and/or Single Storey Health Centre or the like
Should have a water supply capable of delivering 20 Litres per second (1,200 Litres/minute) through any single hydrant on the development.

Secondary Schools, Colleges, Large Health & Community Facilities or the like
Should have a water supply capable of delivering 35 Litres per second (2,100 Litres/minute) through any single hydrant on the development.

Industry
Up to one hectare, facility should have 20 Litres per second (1,200 Litres/minute)
Between one and two hectares, facility should have 35 Litres per second (2,100 Litres/minute)

2.2 Key Aspects of Fire Hydrant Specification

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SURFACE:
Hydrants should be located in the footpath or grass margin adjoining the roadway. Where it is located in the grass, the periphery of the box should be concreted. The surface box and concrete surround should be kept over the level of the adjoining surface to prevent polluted water from entering the hydrant pit.

FRAME:
Hydrant chambers should have a cast iron surface box. The surface box should be bedded in mortar on the chamber walls, and if the hydrants are located other than on a footway or roadway, they should be surrounded by 150mm concrete of 100mm in depth.

COVER:
The hydrant cover should provide a 375mm x 225mm clear opening and should be placed centrally over the hydrant to permit freedom of affixing stand-pipe and valve key.

PIT:
The hydrant pit / chamber should provide not less than 75mm clearance around the hydrant body. Hydrant pits should be constructed to be self-draining. The pit should be clean and free of all debris.

OUTLET DEPTH:
The depth of the hydrant outlet should not exceed 350mm below finished ground level, with the top of the spindle being 75mm minimum to 225mm maximum below finished surface to footpath.

MARKER:
A hydrant indicator plate should be fitted on a wall or marker post at 450mm over ground level. They should show the diameter of the water main and the distance in metres of the hydrant from the marker.

TESTING:
Fire hydrants should be tested on an annual basis. The Fire Hydrant condition should be assessed to ensure it meets the required criteria. The flow and pressure should be recorded and reported in writing. Calibration certificates must be available for all test Equipment used.

3 Fire Hydrant Condition Survey

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The hydrant to be flow and pressure tested was reviewed to assess that it meets the standards in accordance with the BS9990.

Appendix A provides full details of the condition survey which was completed on site. The items below are the main findings of the fire hydrant condition survey;

- All Hydrants are accessible and have spindles in place, except for FH2 where the Spindle is missing.
- All Hydrant Pits are in good condition, and the hydrants Frames/Covers are in poor condition.
- Hydrant outlet FH1 and FH2 connections are LUG, FH3 is an LRT connection.
- All Hydrants have marker plates to identify hydrant location/details.
- The covers to the Hydrant chambers are NOT painted canary yellow.


FH1


FH1


FH2



FH2


FH3


FH3

Figure 1: Fire Hydrant Condition Images

4 Fire Hydrant Flow, Pressure Testing & 7-Day Logging

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4.1 7-Day Pressure Logging

Pressure loggers were deployed on the Fire Hydrants on 17th January 2023 to record pressure over a 7-day logging period. The graph below shows the pressure logging results which show the day night variation in pressure. There is a pressure reducing valve in operation in the area reducing pressure from 1:00a.m to 6:00am.

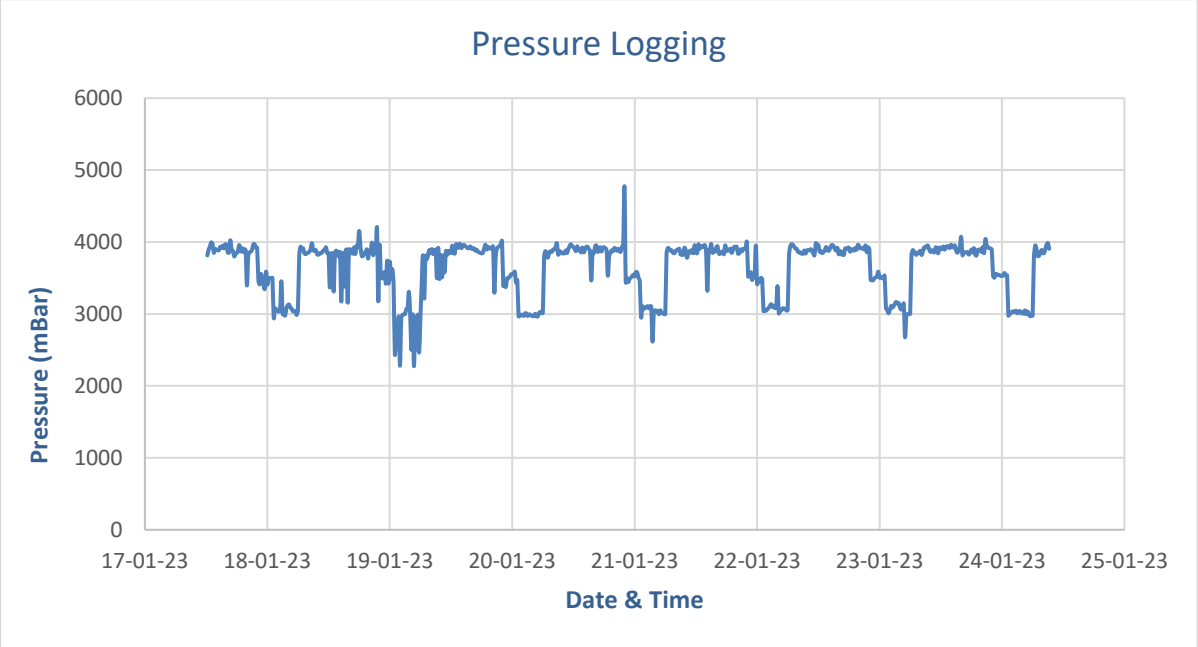


Figure 1: 7-Day Static Pressure Logging Results

Based on the downloaded pressure data, the static pressure varies from 3.0 bar at night to 4.0 bar during the day.

4.2 Hydrant Testing

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Flow testing was carried out on the hydrants and the results are documented in the table and graphs below.

The test includes measuring the static pressure at the test hydrant before the flow test begins. A digital hydrant flow meter is connected to the hydrant to record flow rates in Litres per minute over a 5-minute period. The flow rates detailed below, are the average maximum sustainable flow based on the 3-minute flow test.

Flow testing was carried out on 24th January 2023 at 09.30hrs and the results are details in the table below.

FH No.	Flow Rate L/Min	Static Pressure (bar)	Residual Pressure (bar)
FH1	1300	3.5	2.8
FH2	1580	3.5	2.3
FH3	1697	4.0	3.2

Table 1: Fire Hydrant Flow & Pressure Test Results

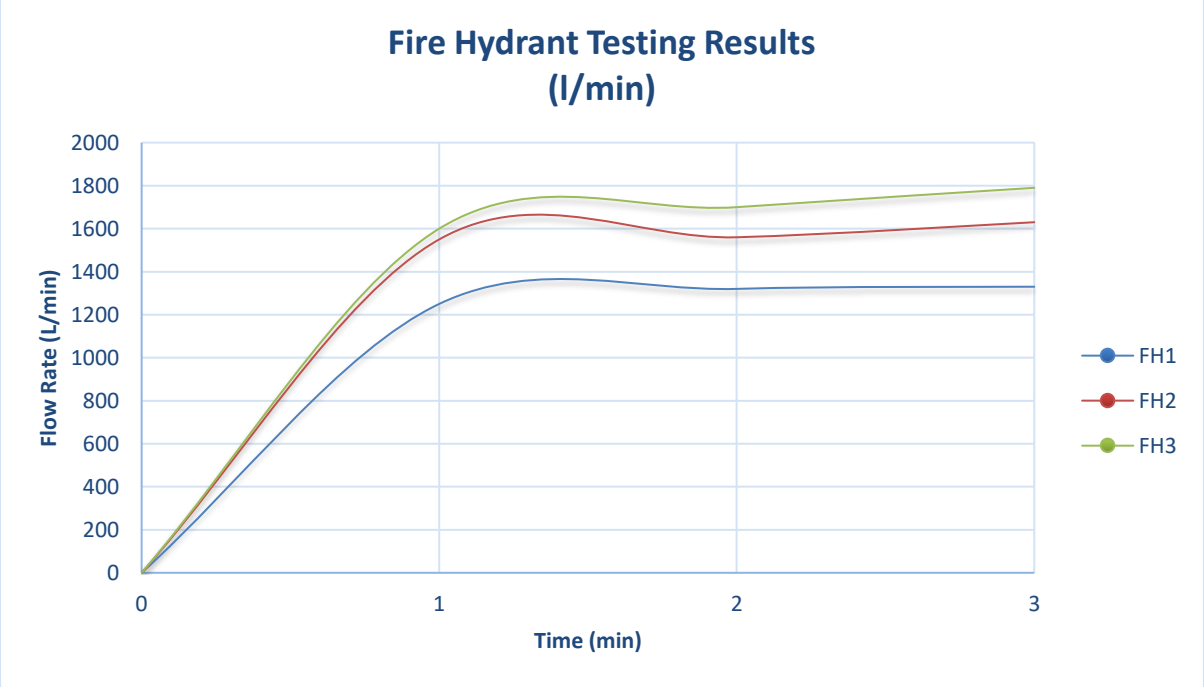


Figure 2: Fire Hydrant Flow Test Results

5 Fire Hydrant Location Plan

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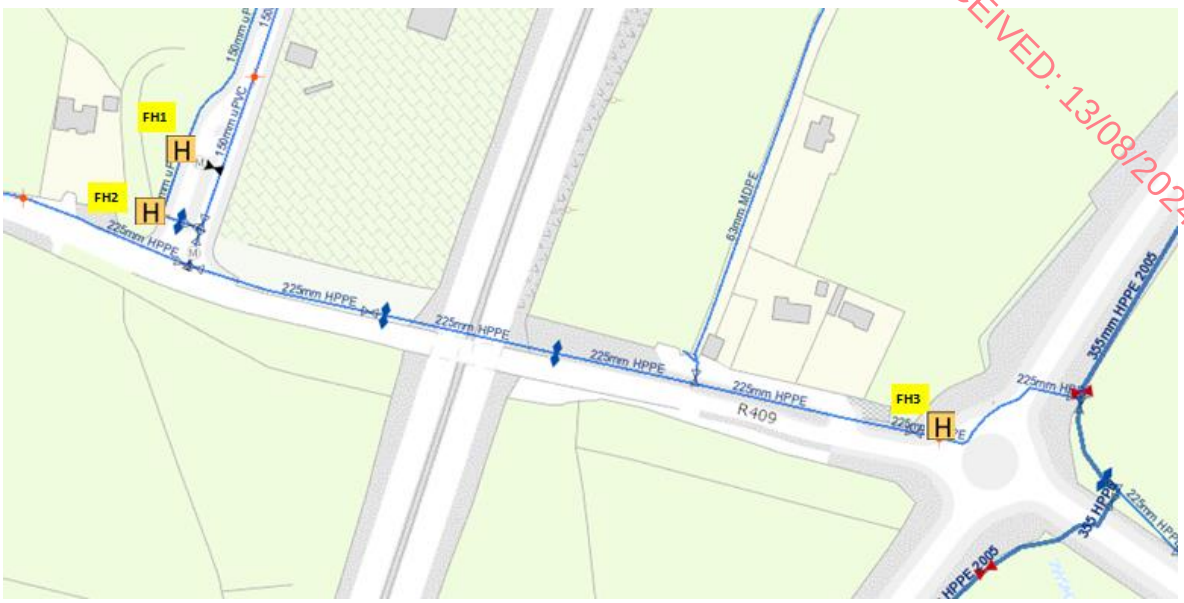


Figure 3: Fire Hydrant Location Plan

Appendix A – Fire Hydrant Condition Survey

FH No.	Surface	Cover / Frame	Pit	Type	Depth	Marker / Plate	Canary Yellow	Spindle	Operating	Comments
1	Grass	Poor	Good	LUG	290	Yes	No	Good		No Plinth
2	Grass	Poor	Good	LUG	370	Yes	No	Missing		No Plinth
3	Grass	Poor	Good	LRT	520	Yes	No	Good		No Plinth