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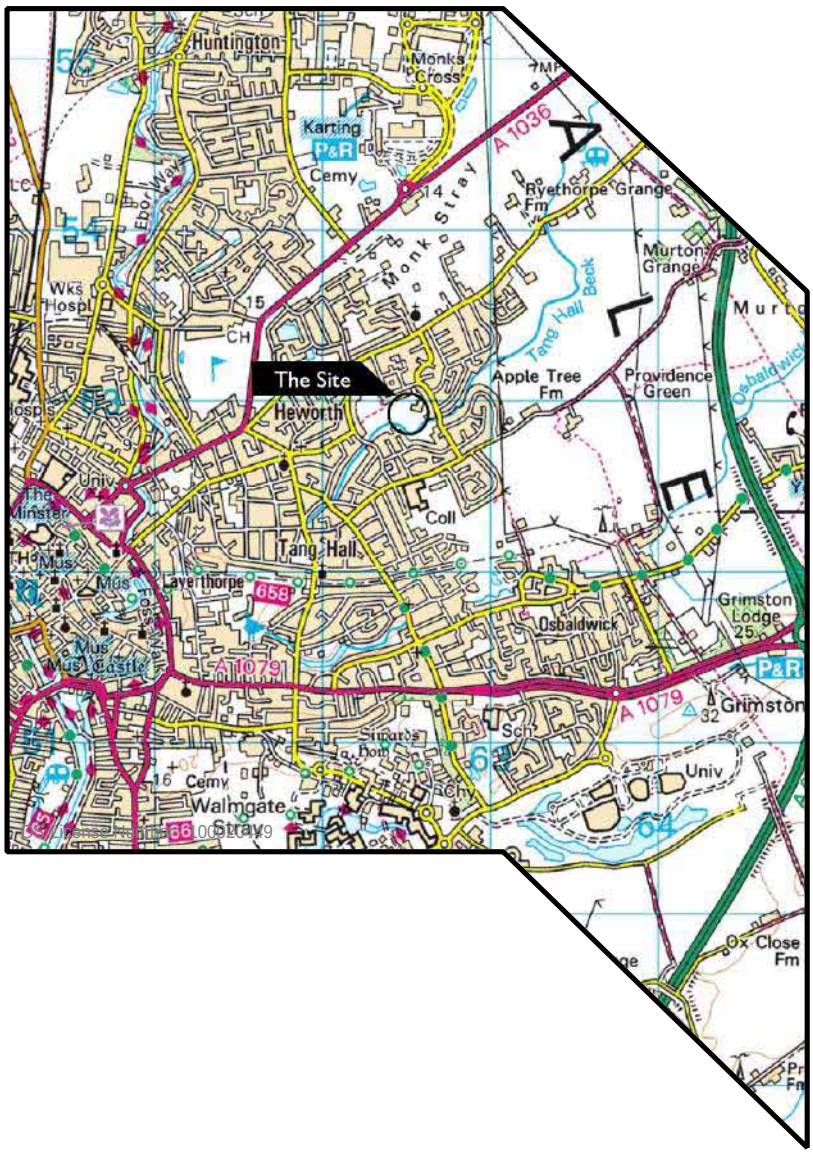

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HEMPLAND PRIMARY SCHOOL, YORK

for

Department for Education

Engineer : Mott MacDonald Ltd

Project Number PC218325

April 2022

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Preliminary Ground Investigation Report with
Interpretive Chapter
for

HEMPLAND PRIMARY SCHOOL, YORK

for
Department for Education

Engineer :
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1.0 INTRODUCTION

This Geo-environmental and Geotechnical Ground Investigation was carried out to the instruction of the Engineer, Mott McDonald Limited, on behalf of the Client, The Department for Education, with the purpose of providing design input with respect to Civil, Structural and Geo-Environmental engineering for the redevelopment of a primary school in York. The site is currently developed as a school. The proposals for the redevelopment of the site consist of refurbishment of existing buildings, or demolition and rebuild of existing school buildings. If the rebuild option is chosen, this would consist of the demolition of existing school buildings and construction of a new two-storey block either to the east, south or west of the main school building; with the footprint of the existing building reinstated as a play area.

A Desk Study has already been prepared by Geotechnics Limited to which reference should be made for full details of the site history and its environmental setting. It is advised that this report is read in conjunction with the Desk Study report (Ref: PC218325 Geoenvironmental and Geotechnical Desk Study Report at Hempland Primary School, York dated 26th October 2021).

This report summarises the findings of the desk study and presents the findings of an intrusive geo-environmental and geotechnical survey undertaken in accordance with Stage 1 of RIBA Plan of Work 2020 Overview. The report aims to reduce uncertainty in geo-environmental and geotechnical risks identified in the previous Desk Study. It is intended to be used by the Client to aid in later stages of the design and construction of the proposed rebuild should that option be chosen. In addition, this report has been devised to generally comply with the relevant principles and requirements of a range of guidance including:

- Part IIA of the Environment Protection Act, 1990.
- Contaminated Land (England) (Amendment) Regulations 2012 and Contaminated Land Statutory Guidance (DEFRA, April 2012).
- National Planning Policy Framework (HCA, July 2021).
- BS EN 1997-1:2004+A1:2013: "Eurocode 7. Geotechnical Design".
- BS5930:2015+A1:2020: "Code of Practice for Ground Investigations".
- BS10175: 2011 +A2:2017 "Investigation of Potentially Contaminated Sites - Code of Practice".
- The Building Regulations 2010. Part C (HM Government 2013).
- Environment Agency (2020) "Land Contamination Risk Management".
- Environment Agency (2011) Report GPLC1 "Guiding Principles for Land Contamination".
- Environment Agency (2017) "The Environment Agency's Approach to Groundwater Protection" November 2017 Version 1.1.
- Sustainable Remediation Forum UK (SuRF) Framework.

The purpose of this report is to gain a preliminary understanding of the ground conditions at the site and within the limitations of the scope of the Ground Investigation authorised by the Department for Education. The ground investigation was commissioned to help Contractors assess the ground related risks and make suitable cost allowances for the most likely design solution and undertake a preliminary assessment of the risks relating to identified source-pathway-receptor linkages.

Contractors for the scheme shall only use the factual data from this preliminary Ground Investigation Report. Contractors should obtain any additional investigation work that may be required to prepare their own detailed Ground Investigation Report and Geotechnical Design Report to Eurocode 7 and to prepare their own contaminated land risk assessment in line with Land Contamination Risk Management (LCRM, 2020) guidance including further

ground investigation and risk assessment, remediation options appraisal and remediation strategy and verification (if required), which are to be used as the basis of the contractors detailed design.

2.0 PRESENTATION

A description of the site and a summary of the procedures followed during the investigation process are presented in Sections 3 to 6. The factual data so obtained are presented in Appendices 2 to 12 of this report.

A Desk Study to seek information which may already exist about the site, its history, geology and ground conditions was carried out by Geotechnics Limited in October 2021.

An interpretation of the data obtained is presented in Section 7 and a geotechnical evaluation of its significance in relation to proposals available at the time of preparation of this report is presented in Section 8. A geo-environmental assessment is presented in Sections 9 and 10 with conclusions and recommendations in Section 11.

Attention is drawn to the General Notes and Investigation Procedures presented in Appendix 13 to aid an understanding of the procedures followed and the context in which the report should be read.

In addition, data in electronic format in accordance with "The Electronic Transfer of Geotechnical Data from Ground Investigations" published by the AGS (the AGS Format) are presented separately.

3.0 THE SITE

For full details of the site's history, environmental setting and sensitive land use, reference should be made to the Desk Study mentioned in Section 1.0 above. A Site Location Plan can be found in Appendix 1 and the site location is summarised in the table below.

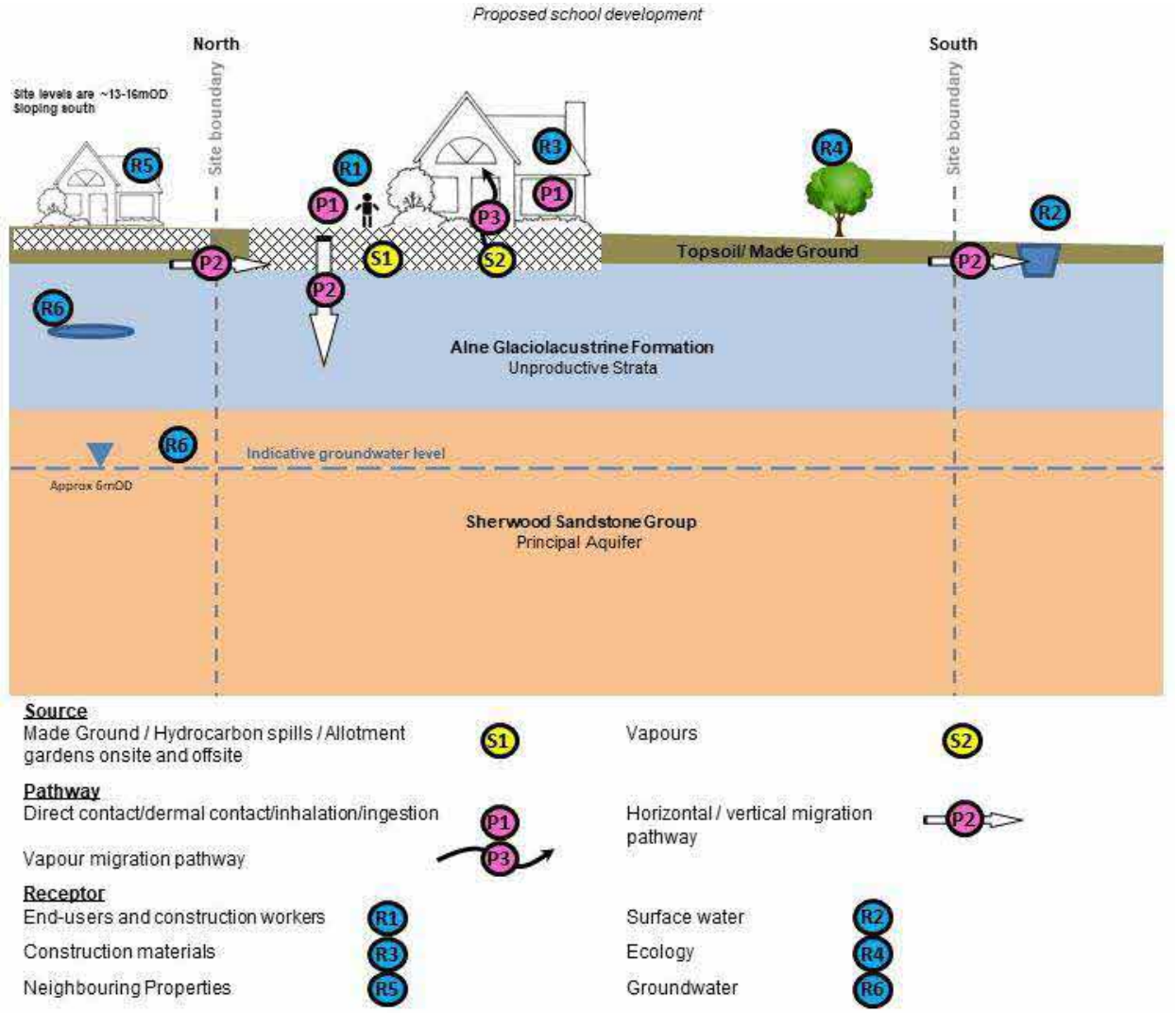
Location	Hempland Primary School, Whitby Ave, Heworth, York
Grid Reference	462581, 452930
Post Code	YO31 1ET
Site Area	Approximately 2.28 Ha
Site Shape	The site is irregular in shape with maximum plan dimensions of 179m by 147m
Topography	The site is generally flat with elevations of approximately 15m OD to 16m OD around the school buildings in the northern half of the site. The southern half of the site slopes down to around 13m OD along the southern boundary of the site, towards the minor valley along which Tang Hall Beck flows. The topography of the surrounding land is fairly flat.
Trees	Mature / semi mature trees spread around the site with two rows of trees being observed along the southern boundary. A hedge runs along the western site boundary.

4.0 PRELIMINARY CONCEPTUAL SITE MODEL & CONTAMINANT LINKAGES

The Desk Study for the site (Ref: PC218325, October 2021) presented a preliminary conceptual site model based on publicly available information and on-site observations. The preliminary conceptual site model identified several potential contaminant linkages (source → pathway → receptor). Potential risks were assessed for these contaminant linkages, which identified where additional information was required. These are summarised below.

4.1 Preliminary Conceptual Site Model

In accordance with BS 10175 and LCRM, a schematic Initial Conceptual Site Model was developed, and this is shown below.



The ground model and proposed end use described above have been considered in relation to Nathaniel et al. 2015, The LQM/CIEH S4ULs for Human Health Risk Assessment. The proposed development generally does not conform to the conceptual models defined in Nathaniel et al. 2015 however for the purpose of this geoenvironmental assessment, the site is closest to public open space (parkland) and residential without home grown produce.

4.2 Potential Contaminant Linkages Assessment

For each potential contaminant linkage, an assessment was made of the potential impact upon identified sensitive receptors. Potential contaminant linkages requiring further investigation are summarised below:

- Contaminants in soil and groundwater → Dermal contact, ingestion, inhalation → Construction workers
- Contaminants in soil and groundwater → Dermal contact, ingestion, inhalation → Future site workers, visitors and pupils
- Contaminants in soil and groundwater → Downward / lateral migration → Principal Aquifer

Further details of the potential contaminant linkage assessment are presented in the Desk Study (reference: PC218325, October 2021). No credible source of ground gases were identified, although confirmatory monitoring has been undertaken as part of the scope of the works.

5.0 PROCEDURE

5.1 Commissioning

The intrusive ground investigation was awarded following submission of a proposal for ground investigation of the site in consultation with Mott MacDonald Limited.

5.2 General

The procedures followed in this site investigation are based on BS 5930:2015+A1:2020 – Code of Practice for Site Investigations and BS 10175:2011+A2:2017 - Investigation of Potentially Contaminated Sites. The soils and rocks encountered have been described in accordance with BS5930:2015+A1:2020 and BS EN ISO 14688-1:2018 and BS EN ISO 14689:2018. The positions of the exploratory holes are shown on the Exploratory Hole Location Plan in Appendix 12.

The exploratory hole locations were selected by Geotechnics Limited, and approved by Mott MacDonald Limited, to give a general coverage of the site as well as focus on any targets identified in the Desk Study within the constraints posed by buried and overhead services on the site. The number and type of exploratory holes was kept within the Client's financial limits, with the investigation being considered as a preliminary phase of the investigation works.

The co-ordinates and levels shown on the Exploratory Hole Records were measured using a Leica SmartRover GPS survey device. The depths quoted on the exploratory hole records are in metres below ground level.

Prior to commencement of the intrusive investigative works, the available service drawings were consulted to check for the presence of buried services at the proposed exploratory hole locations.

Prior to breaking ground at each exploratory hole location, the location was scanned using a cable avoidance tool (CAT) by a suitably trained engineer. At each exploratory hole location an inspection pit was excavated using hand tools to a depth of 1.20m below ground level to also check for the presence of underground services. On completion of the excavation, the location was scanned again using a CAT.

5.3 Cable Percussion Boreholes

Four (4 No.) 150mm diameter boreholes (numbered CP01 to CP04) were each sunk by Cable Percussion Tool techniques to a depth of 8.45m below ground level. This boring work was carried out between 22nd and 25th November 2021.

Representative disturbed (D and B) and driven open-tube thin-walled (UT) samples of the soils encountered were obtained at regular intervals. Standard Penetration Tests (SPTs) were undertaken at the depths indicated on the borehole records in accordance with BS EN ISO 22476-3:2005+A1:2011 to obtain a measure of the engineering properties of the proved strata. In addition, environmental soil samples (ES) were recovered at the depths indicated on the Borehole Records, presented in Appendix 2.

No groundwater was encountered during the boring operations. It should be noted that the addition of water to the borehole as part of the boring process may have masked the presence of groundwater in the borehole. Where water was added it has been noted on the Borehole Records.

On completion, standpipes were installed in the cable percussion boreholes (see Section 5.6).

5.4 Dynamic Sample Boreholes

Three (3 No.) Dynamic Sample Boreholes (numbered WS01 to WS03) were undertaken at the site to a depth of 4.45m below ground level. This dynamic sampling work was carried out on 26th November 2021 and was supervised on site by a geotechnical/geo-environmental engineer.

The Dynamic Samples were taken using Super-Heavy Dynamic Probe apparatus which drives lined steel tubes into the ground in 1m lengths. Samples are retrieved in the plastic liners and placed in jars. The retrieved liners were split and the recovered soils described before being sub-sampled into ES, D and B samples as shown on the Borehole Records, presented in Appendix 3. The hole is cased and progress depends on the nature of the strata penetrated.

Standard Penetration Tests (SPTs) were undertaken at the depths indicated on the borehole records in accordance with BS EN ISO 22476-3:2005+A1:2011 to obtain a measure of the engineering properties of the proved strata.

Groundwater was not observed during the Dynamic Sampling. On completion, Dynamic Sample Boreholes WS01 and WS03 were backfilled with bentonite pellets to 0.30m below ground level and finished with arising's (WS01) or asphalt (WS03). A standpipe was installed in WS02 (see Section 5.6).

5.5 Dynamic Cone Penetration Tests

Five (5 No.) Dynamic Cone Penetration (DCP) Tests were carried out at the locations marked on the Exploratory Hole Location Plan (see Appendix 12) and numbered DCP01 to DCP05. The tests were either commenced from Ground Level (DCP02, DCP03 and DCP05) or following removal of the asphalt (DCP01 and DCP04) and were performed to give an indication of CBR values at shallow depths to aid pavement design. All DCP test locations were adjacent to another exploratory hole and the relevant inspection pit was used to check for buried services. The relevant adjacent locations are as follows:

DCP Location	Adjacent Exploratory Hole Location
DCP01	CP01
DCP02	WS02
DCP03	WS03
DCP04	CP04
DCP05	CP03

The test comprises the measurement of increments of penetration of a 60° cone driven into the ground using an 8kg hammer falling a distance of 575mm. The CBR is obtained from the relationship between the CBR and the DCP readings;

$$Log_{10}(CBR) = 2.48 - 1.057 \times Log_{10}(mm/blow)$$

as defined in 'Operating Instructions for the TRL Dynamic Cone Penetrometer' by Jones & Rolt (1991) published by the Transport Research Laboratory. The test results are presented in Appendix 4.

5.6 Instrumentation and Monitoring

Long-term monitoring of the gas and groundwater levels was made possible by the installation of standpipes as follows:

Exploratory Hole	Standpipe Slotted Pipe & Filter Zone (m)	Strata Monitored
CP01	1.00 to 8.00	Glaciolacustrine Clay and Glacial Till
CP02	1.00 to 8.00	Glaciolacustrine Clay and Glacial Till
CP03	1.00 to 8.00	Glaciolacustrine Clay and Glacial Till
CP04	1.50 to 8.00	Glaciolacustrine Clay and Glacial Till
WS02	2.00 to 4.00	Glaciolacustrine Clay and Glacial Till

The response zones above cross over natural strata boundaries. The site was classified as having a low gas risk as no plausible sources of gas were identified during the desk study or during the on-site investigation.

Monitoring of the gas and groundwater levels at the site commenced on 2nd December 2021 with further visits on 9th, 16th and 23rd December 2021.

On each of the monitoring visits a record of the groundwater level in the standpipes was obtained where possible. All monitoring wells were dry for each monitoring visit. The following parameters were measured and recorded in each standpipe using a Gas Data Limited GFM435 Gas Analyser:-

- Concentrations (% Vol) of CH_4, O_2, CO_2, along with (ppm) H_2S, CO.
- Flow Rate.
- Differential Pressure.
- Barometric Pressure.

The results of the monitoring are presented in Appendix 5.

6.0 LABORATORY TESTING

6.1 Geotechnical

The laboratory testing schedule was formulated by Geotechnics Limited, and approved by Mott MacDonald Limited, in order to relate to the proposed development plans available at the time of scheduling. The number and type of testing undertaken was constrained by the Client's financial limits, with the investigation being considered as a preliminary phase of the investigation works. Unless otherwise stated, the tests were carried out in Geotechnics Limited's UKAS accredited Laboratory (Testing No. 1365) and were undertaken in accordance with the appropriate Standards as indicated below and on the Laboratory Test Certificate in Appendix 7. Any descriptions, opinions and interpretations are outside the scope of UKAS accreditation.

The tests undertaken can be summarised as follows:-

Standard	Test Description	Quantity
BS EN ISO 17892-1:2014	Water Content Determination	22
BS EN ISO 17892-4:2016	Particle Size Distribution Determination – Sieving Method	3
	Particle Size Distribution Determination – Pipette Method	3
BS EN ISO 17892-5:2017	Incremental Loading Oedometer Test	2
BS EN ISO 17892-8:2018	Unconsolidated Undrained Triaxial Test – Single Stage	5
BS EN ISO 17892-12:2018	Determination of Liquid and Plastic Limits	17
BS 1377:1990 Part 4 - 3.3	Dry Density/Moisture Content relationship determination. Compaction Test – British Standard (2.5 kg Hammer)	2

The following testing was carried out at the laboratories of Derwentside Environmental Testing Services (DETS) (UKAS Accredited Laboratory, Number 2139).

BRE Special Digest 1 Suite

8 No. Suites comprising Soluble Sulphate and pH.

Asbestos

4 No. Asbestos screens

The results of these tests are also presented in Appendix 7.

6.2 Contamination

Twelve (12No.) selected samples of soil and three (3No.) samples of groundwater were tested at the laboratories of Derwentside Environmental Testing Services Limited for a number of determinands in order to allow assessment of potential site contamination. The determinands were specified by the Engineer and are detailed below and on the results sheets in Appendix 8 together with the test result as well as the test method, accreditation and detection limit. The laboratory testing schedule was formulated by Geotechnics Limited, and approved by Mott MacDonald Limited, in order to relate to the proposed development plans available at the time of scheduling. The number and type of testing undertaken was constrained by the Client's financial limits, with the investigation being considered as a preliminary phase of the investigation works. The soil samples were tested for the following determinands:-

Metals

- Antimony
- Arsenic
- Barium
- Beryllium
- Boron (Water Soluble)
- Chromium
- Chromium (Hexavalent)
- Copper
- Iron
- Lead
- Molybdenum
- Nickel
- Selenium
- Vanadium
- Zinc

Inorganics

- pH
- Cyanide (Free)
- Total Organic Carbon
- Sulphate (Water Soluble)
- Total Sulphur

Other

- Petroleum Hydrocarbons (Aliphatic / Aromatic speciated)
- Polyaromatic Hydrocarbons (Speciated)
- Phenols
- Volatile Organic Compounds (VOC)
- MTBE
- Asbestos

The groundwater samples were analysed for the following determinands:

Metals

- Antimony
- Arsenic
- Barium
- Beryllium
- Boron
- Calcium
- Chromium
- Chromium III
- Chromium (Hexavalent)
- Copper
- Iron
- Lead
- Magnesium
- Manganese
- Molybdenum
- Nickel
- Selenium
- Vanadium
- Zinc

Inorganics

- pH
- Cyanide (Total & Free)
- Ammoniacal Nitrogen
- Sulphate
- Sulphide
- Chloride
- Fluoride
- Total Hardness

Other

- Petroleum Hydrocarbons (Aliphatic / Aromatic speciated)
- Polyaromatic Hydrocarbons (Speciated)

In addition, three (3No.) leachate samples were prepared from selected soil samples in accordance with the BS EN 12457 and analysed for the determinands detailed below and on the results sheets in Appendix 8.

Metals

- Antimony
- Arsenic
- Barium
- Beryllium
- Boron
- Calcium
- Chromium
- Chromium III
- Chromium (Hexavalent)
- Copper
- Iron
- Lead
- Magnesium
- Manganese
- Molybdenum
- Nickel
- Selenium
- Vanadium
- Zinc

Inorganics

- pH
- Cyanide (Total & Free)
- Ammonical Nitrogen
- Sulphate (Water Soluble)
- Sulphide
- Chloride
- Fluoride

Other

- Speciated Phenols

The results are presented in Appendix 8.

7.0 INTERPRETATION

7.1 Ground Conditions

On the basis of the expected geology discussed in the Desk Study and the findings of the exploratory holes it has been possible to classify the various strata proved in the investigation into the following divisions:-

- Made Ground
- Glaciolacustrine Clay
- Glacial Till

The ground profile exposed in the exploratory holes represents the conditions at discrete locations. The degree to which they represent conditions between or beyond the exploratory holes is a matter for conjecture and these can only be interpolated and hence, the uncertainties arising from this should be recognised.

The ground profile at the site is summarised as follows:-

Stratum	Typical Description	Depth to Top (m bgl)	Level of Top (m OD)	Thickness (m)
Made Ground	Asphalt (Found in CP01, CP04, WS03)	GL	12.08 to 13.65	0.15
Made Ground (Surface covering)	Dark brown slightly gravelly clayey/silty sand with occasional rootlets. The gravel variously composed of brick, sandstone and mudstone. (Found as a topsoil-like surface covering in CP02, CP03, WS01, WS02)	GL	13.01 to 13.58	0.10 to 0.55

Made Ground (Granular)	Reddish brown, light brown, light grey and light greyish brown sandy gravel (with a low cobble content – CP04). The gravel variously composed of brick fragments, concrete, asphalt, sandstone and mudstone. Cobble content is of brick and sandstone. (Found in CP01, CP04, WS03)	0.15	11.93 to 13.50	0.35 to 0.65
Made Ground (Cohesive)	Soft and firm brown, varying to brownish grey, greyish brown and mottled grey slightly sandy slightly gravelly clay (with a low cobble content – CP02). The gravel variously composed of sandstone, mudstone and brick fragments. Cobble content is of sandstone and brick. (All holes except CP03)	0.50 to 0.80	11.28 to 13.15	0.50 to 1.00
Glaciolacustrine Clay	Firm fissured brown mottled grey and light grey slightly sandy CLAY with occasional calcareous inclusions (up to 20mm in size) and occasional sandy pockets (up to 20mm in size). Fissures are extremely closely, varying to closely, spaced, randomly orientated, smooth and dull.	0.10 to 1.50	10.78 to 12.91	0.50 to 1.90
Glacial Till	Firm to stiff brown slightly sandy slightly gravelly calcareous CLAY. Gravel is composed of mudstone and sandstone.	2.00 to 3.00	10.08 to 11.47	2.00 to 6.45 proven*

* Base of stratum not found

This table provides a brief summary of the ground profiles found in the exploratory holes. Reference should be made to the Exploratory Hole Records for detailed descriptions of the soils encountered.

7.1.1 Made Ground

Made Ground was encountered in all the exploratory holes.

Boreholes CP01, CP04 and WS03 were surfaced with black asphalt. The thickness of the asphalt at all three locations was 0.15m.

The surface of Boreholes CP02, CP03, WS01 and WS02 were covered with Made Ground that appeared topsoil-like and included brick fragments. The thickness was between 0.10 to 0.55m.

Granular Made Ground was present in all of the exploratory holes (except CP03) either starting from ground level (WS01 and WS02), or below the topsoil or asphalt (at 0.10m or 0.15m depth, respectively). The thickness varies between 0.35 and 0.65m across the site. The granular Made Ground typically comprises sand or gravel containing varying proportions of clay, silt and cobbles. The gravel content includes sandstone, mudstone, asphalt, concrete and brick fragments. The cobbles, where present, are of sandstone and brick. Rootlets were noted in exploratory hole locations CP02, WS01 and WS02.

Cohesive Made Ground was present in all of the exploratory holes (except CP03). The cohesive Made Ground underlay the granular Made Ground at depths ranging between 0.50m and 0.80m below ground level. Its thickness varies between 0.50m and 1.00m. The cohesive Made Ground is typically firm, with the exceptions of CP01 and WS02 where it is described as soft. It typically comprises slightly sandy slightly gravelly clay with the addition of a low cobble content in CP02. The gravel content comprises sandstone, mudstone and brick fragments. The cobbles are of sandstone and mudstone.

Two (2No.) Standard Penetration Tests were carried out in the cohesive Made Ground at locations CP04 and WS03, both producing a result of N=12. The blows recorded for the part of the test within the cohesive Made Ground is indicative of a firm clay.

A single (1No.) Particle Size Distribution test on a sample of the cohesive Made Ground from Borehole WS03 at 0.50m showed the sample to comprise 73% fine material (<63µm) with 24% sand and 3% gravel fractions. A combined plot for this test is presented in Figure 2 of Appendix 9.

Four (4No.) water content tests were carried out on samples of the cohesive Made Ground. The results ranged from 20% to 29%. Atterberg Limit tests on three (3No.) of the same samples gave a modified plasticity index of 32.64%, 38.61% and 18.7%. A combined plot of moisture content against depth is presented in Figure 3 of Appendix 9. The plasticity index results have been plotted in Figure 4 of Appendix 9.

A single (1No.) compaction test on a sample of the cohesive Made Ground from borehole WS03 showed the optimum moisture content (20.0%) to be slightly drier than the natural moisture content (21.4%), the sample achieving a maximum dry density of 1.70Mg/m^3.

A table summarising these test results for the Made Ground is presented in Table 1 of Appendix 9.

7.1.2 Glaciolacustrine Clay

Glaciolacustrine Clay was encountered below the Made Ground, typically at depths of between 1.00m and 1.50m below ground level. The exception was CP03 where there the Glaciolacustrine Clay was present from 0.10m depth below topsoil. The Glaciolacustrine Clay was between 0.70m and 2.20m thick. It typically comprises firm sandy clay with closely to extremely closely spaced fissures, sandy pockets and calcareous nodules. A 0.35m thick layer of slightly gravelly slightly clayey sand was encountered in WS01 contained within the clay.

Standard Penetration Tests carried out within the Glaciolacustrine Clay showed a range of N values of between N=8 and N=20. Such results are indicative of a low varying to high strength clay with an undrained shear strength of the order of 35 to 90kN/m², based on the tentative relationship $c_u = f_1 x$ (kN/m²) proposed by Stroud & Butler, where f_1 = 4.5 for clay based on the Plasticity Index (PI). From the mean PI of 37% an undrained strength of 65kN/m^2 (medium strength) is estimated. Triaxial compression tests carried out on a single (1No.) undisturbed sample of the Glaciolacustrine Clay from Boreholes CP01 yielded a result for the undrained shear strength of 124kN/m². This result indicates a high strength clay. A plot of the estimated Undrained Shear Strength from SPT N -values against depth for the Glaciolacustrine Clay is presented in Figure 1 in Appendix 9.

Measurements on the triaxial test specimen yielded a bulk density value of 2.01Mg/m^3.

Two (2No.) Particle Size Distribution tests were undertaken on samples of the Glaciolacustrine Clay. These showed the samples to comprise between 81% and 90% fines (<63µm) material, with sand fractions between 8% and 14% and gravel fractions between 2% and 5%. A combined plot for these two tests is presented in Figure 2 of Appendix 9.

Water content tests carried out on five (5No.) samples of the Glaciolacustrine Clay yielded values ranging from 25% to 31%. A plot of water content against depth for these deposits, presented in Figure 3 of Appendix 9, suggests a trend for the water content to decrease with depth.

Three (3No.) Atterberg Limit tests were completed on samples of the Glaciolacustrine Clay and showed the soils to have a medium to high plasticity with modified plasticity index results of 31%, 35% and 42%. The results of the tests have been plotted in Figure 4 of Appendix 9.

A single (1No.) compaction test on a sample of the Glaciolacustrine Clay from Cable Percussion Borehole CP01 showed the optimum moisture content (23.0%) to be drier than the natural moisture content (29.4%), the sample achieving a maximum dry density of 1.55Mg/m^3. The plot in Figure 3 shows the results of all the natural moisture content tests to be greater than the optimum moisture content of this sample. Therefore it is anticipated that the soils may need treating before reusing on site, by either drying or the addition of a suitable material such as lime, in order to achieve the optimum moisture content.

A single (1No.) oedometer consolidation test carried out on an undisturbed sample from Borehole CP02 yielded a value for the coefficient of volume compressibility, m_v of 0.09m²/MN for the applied pressure range of 100 - 200kN/m². This is indicative of low compressibility clay. Typically, a *fluvio-glacial clay* would be of medium

compressibility with an m_v value of 0.10-0.30m²/MN. As the test result is below this range, which is considered conservative, the result should be treated as anomalous.

From the results of insitu and laboratory testing, it can be summarised that the Glaciolacustrine Clay is typically of medium strength, high plasticity and has a natural moisture content of 25% to 31%. A table summarising the test results for the clay deposits, with range, mean and median values (where applicable) is presented in Table 2 of Appendix 9.

7.1.3 Glacial Till

Glacial Till was encountered below the Glaciolacustrine Clay in all exploratory hole locations at depths ranging between 2.00m and 3.00m below ground level (10.08m OD to 11.47m OD). The depth to the base of the Glacial Till is unknown. The deposits were proven to a depth of 8.45m below ground level (3.63m OD to 5.20m OD), with a proven thickness of between 5.45 and 6.45m, in the Cable Percussion boreholes. The Glacial Till typically comprises firm to stiff slightly sandy slightly gravelly calcareous clay. The gravel is of sandstone and mudstone.

Standard Penetration Tests carried out within the Glacial Till deposits showed a range of N values between N=12 and N=41. Such results are indicative of a medium to very high strength clay with an undrained shear strength of the order of 65kN/m² to 225kN/m², averaging at 130kN/m², based on the tentative relationship $c_u = f_1.xN$ (kN/m²) proposed by Stroud & Butler, where $f_1 = 5.5$ for clay with a mean PI of 17% Triaxial compression tests carried out on undisturbed samples of the Glacial Till from Boreholes CP01 (4.00 - 4.45m), CP02 (5.00 – 5.45m) and CP03 (2.00 – 2.45m and 6.00 – 6.45m) yielded undrained shear strengths of 68kN/m² to 167kN/m². These results again indicate medium to very high strength clay. A plot of the estimated Undrained Shear Strength from SPT N-values against depth for the Glacial Till deposits is presented in Figure 1 in Appendix 9. The plot shows a weak correlation of increase in Undrained Shear Strength with increase in depth.

Measurements on the triaxial test specimens yielded bulk density values of 2.19Mg/m³ to 2.25Mg/m³.

A single (1No.) oedometer consolidation test carried out on an undisturbed sample from Borehole CP03 yielded values for the coefficient of volume compressibility, m_v of 0.13MN/m² and 0.14MN/m² for the applied pressure ranges of 50 – 100kN/m² and 100 - 200kN/m², respectively. Such m_v values are indicative of medium compressibility clay and are typical of a *weathered boulder clay*.

Water content tests carried out on sixteen (16No.) samples of the Glacial Till deposits yielded values ranging from 11% to 17% with a mean of 13.7%. A plot of moisture content against depth for these deposits, presented in Figure 3 of Appendix 9, suggests a slight decrease in water content with an increasing depth.

Eleven (11No.) Atterberg Limit tests were completed on samples of the Glacial Till deposits and showed the soils to have a low plasticity with a modified plasticity index range of 11.7% to 16.2% and a mean of 14.3%. The results of the test have been plotted in Figure 4 of Appendix 9.

From the results of insitu and laboratory testing, it can be summarised that the Glacial Till is typically of medium to very high strength, low plasticity and has a natural moisture content of 11% to 17%. A table summarising the test results for the clay deposits, with range, mean and median values (where applicable) is presented in Table 3 of Appendix 9.

7.1.6 Ground Model

A cross section from approximately west to east is presented in Appendix 6.

7.2 Groundwater

Groundwater was not encountered during the sinking of the exploratory holes.

Standpipes were installed in Boreholes CP01 to CP04, and WS02, and with the exception of WS02, which was installed at 4.00m, all recorded water during the monitoring visits. The results can be summarised as follows.

Borehole	Stratum covered by Filter Zone	Groundwater Level		Remarks
		Depth (m bgl)	Level (m OD)	
CP01	Glaciolacustrine Clay and Glacial Till	1.76 – 1.92	11.73 – 11.89	Slight rise over monitoring visits
CP02	Glaciolacustrine Clay and Glacial Till	4.42 – 7.78	5.69 – 9.05	Rising over monitoring visits
CP03	Glaciolacustrine Clay and Glacial Till	0.30 – 5.00	8.01 - 12.71	Varying over monitoring visits
CP04	Glaciolacustrine Clay and Glacial Till	1.10 – 1.38	10.70 – 10.98	Slight fall over monitoring visits. Stopcock cover noted as flooded during visit 3 and 4.
WS02	Glaciolacustrine Clay and Glacial Till	3.58 (Visit 1) DRY (Visits 2 to 4)	10.00 (Visit 1)	Dry during visits 2 to 4

It should be noted that groundwater levels can vary both seasonally and after prolonged periods of wet or dry weather.

The groundwater levels recorded at the site are variable with high groundwater levels recorded in CP03. The filter zones of all the standpipes include both the Glaciolacustrine Clay and the Glacial Till and as no water-bearing granular layers were noted within these soils, it is unlikely that the high water levels represent perched water. However, perched water may be present in the Made Ground which was detected during the investigation.

The results of the groundwater monitoring are presented in Appendix 5.

8.0 GEOTECHNICAL EVALUATION

8.1 Proposals

It is understood that proposals for the site include the construction of a new secondary school comprising a two-storey school building along with associated infrastructure, car parking and soft landscaping. A plan showing the proposed rebuild location options at the time of preparation of this report is presented in Appendix 11. The following structural loadings have been provided by the engineer, for a two storey steel framed building.

	SLS (kN)	ULS (kN)
Internal	1500.0	2075.0
Edge	825.0	1150.0
Corner	450.0	625.0

Details of proposed finished levels had not been made available at the time of preparation of this report. It has been assumed that finished levels will be close to the existing ground levels.

8.2 Foundation Solutions

The approach to design and selection of suitable foundation options for this site is based on a hierarchy of complexity and expense. If the simplest and cheapest solution case can be shown to be appropriate, then further discussion is considered superfluous. Where such simple and proven techniques are not expected to be suitable, then other options are examined in more detail. It should be noted that the following comments on foundation solutions are

based on the proposals discussed in Section 8.1 above; if proposals for the site are changed, it may be necessary to reconsider the foundation solutions. The following options have been considered:

- Traditional strip/pad foundations at shallow depth.
- Traditional strip/pad foundations, but using trench fill to transfer loads to soils at greater depths.

8.2.1 Strip/Pad Foundations

It is anticipated that foundations, floor slabs and other substructures will have been removed as part of the demolition of the existing school buildings. Should the proposed new school building overlie part of the footprint of the existing school building, remnant demolition fill is likely to be encountered within new foundation excavations. Other Made Ground has been noted elsewhere across the site.

Made Ground is typically heterogeneous, of variable composition, thickness, relative density or consistency, compressibility, with a potential for further degradation and could potentially be chemically aggressive in nature. Hence, in its present condition, the Made Ground is deemed too variable to support the proposed school buildings on traditional strip/pad foundations without the risk of excessive and unacceptable settlements occurring.

Following a topsoil strip (where required) and relatively minor re-grading of the site in order to achieve the proposed finished floor levels, it is evident that the Glaciolacustrine Clay should provide a suitable bearing stratum for structural foundations.

The Glaciolacustrine Clay can generally be taken as being of medium compressibility (being firm in consistency) and traditional strip/pad foundations can be used to support the proposed buildings. Foundations should be installed at a minimum depth of 1.25m below ground level. The founding depths should also take account any existing trees and shrubs, and any that are proposed or removed, see Section 8.2.3 below. Any old foundations or buried structures should be removed to prevent hard spots below the new buildings. The resulting voids should be filled with suitably compacted clean crushed stone or similar suitable hardcore and the new foundations taken below this.

It is recommended that careful inspection of foundation trenches is carried out by a Geotechnical Engineer or other suitably qualified person prior to concreting, to ensure that natural undisturbed firm or stiff clay is present at the base. Should foundation depth be extended to below 1.50m, consideration should be given to the use of concrete trench fill foundations (see Section 8.2.2 below). Foundation settlement will be partly dependent on the applied loadings but for suitably designed strip / pad foundations settlements should be designed to be within normal tolerable limits for low sensitivity structures (i.e. 25mm).

8.2.2 Trench Fill Foundations

In some areas foundation depths will be required to increase to:

1) take account of the effect of nearby trees and hedgerows (both current and pre-existing) in line with NHBC Standards Chapter 4.2, 'Building near Trees' (2022),
2) extend through any greater thicknesses of Made Ground, or,
3) extend through any softer Glaciolacustrine Clay to stiffer soils.

Placing foundations at a greater depth in clay soil would generally mean that they could benefit from a higher undrained shear strength for the soil. However, notwithstanding this, the allowable bearing capacity of the clay soil at greater depth would increase by virtue of the increase in depth factor. Where practicable the foundations should bear onto a uniform stratum to minimise the risk of differential settlements.

It is again recommended that the foundation excavations are carefully inspected by a geotechnical engineer or other suitably qualified person prior to concreting.

8.2.3 Building near Trees

Several mature / semi-mature trees are present around the site, mainly to the north, east and west of the existing school buildings, and along the western edge of the play area in the east of the site. The distribution of trees across

the site is likely to impact the foundation design of all of the development options.

Tree root systems in clay soils can cause shrinkage and swelling movements due to moisture extraction by the trees. NHBC Standards Chapter 4.2, 'Building near Trees' (2022) gives guidance on foundation depths and precautions against heave where foundations are to be constructed within influencing distance of trees. It should be noted that special precautions may be required relating to heave where trees have been or are to be removed.

The volume change potential of the soils found during the investigation are based on the Modified Plasticity Index, I'p, which is calculated as follows:

$$I'p = Ip \times \frac{\%\ \text{less than } 425\mu m}{100}$$

The Atterberg limit (plasticity index) tests have been carried out on samples of the Cohesive Made Ground, Glaciolacustrine Clay and Glacial Till. These test results can be used to determine the volume change potential in accordance with NHBC Chapter 4.2. The results are summarised in the following table:

Sample	PI (%)	% less than 425µm	Modified Plasticity Index I'p (%)	Volume Change Potential
Cohesive Made Ground				
CP01 0.80m	34	96	32.6	Medium
CP02 0.50m	39	99	38.6	Medium
CP04 0.80m	22	85	18.7	Low
Glaciolacustrine Clay				
CP01 1.50m	36	99	35.6	Medium
CP02 1.20-1.65m	42	100	42.0	High
CP03 0.50m	34	92	31.3	Medium
Glacial Till				
CP01 4.00-4.45m	17	83	14.1	Low
CP02 2.50m	18	86	15.5	Low
CP02 4.50m	17	85	14.5	Low
CP03 2.00-2.45m	15	86	12.9	Low
CP03 3.50m	17	85	14.5	Low
CP04 2.50m	17	84	14.3	Low
CP04 3.50m	17	88	15.0	Low
WS01 3.00-3.50m	18	90	16.2	Low
WS02 2.50m	17	93	15.8	Low
WS03 2.50m	15	78	11.7	Low
WS03 3.50-4.00m	15	87	13.0	Low

On the basis of these results it is recommended that a high volume change potential is adopted when determining foundation depths in relation to trees and the requirements for compressible materials/ voids adjacent to foundations or below floor slabs.

As a guide, based on the procedures outlined in NHBC Standards Chapter 4.2 for a High Volume Change Potential soil with a high, moderate and low water demand mature tree of 20m in height, the following minimum foundation depths are indicated;

Distance of foundation from Tree (m)	Broad Leaf Tree			Coniferous Tree	
	High Water Demand	Moderate Water Demand	Low Water Demand	High Water Demand	Moderate Water Demand
0	>2.50	2.35	1.75	>2.50	2.20
10	2.50	1.50	1.00	1.45	1.00
20	1.50	1.00	1.00	1.00	1.00

These foundation depths are for guidance only. As part of the design process, the foundation depths should be assessed in relation to the tree species, its water demand and its mature height for existing or planned trees and for its actual height for one which is to be removed.

For High Volume Change Potential soils the NHBC recommend a 35mm minimum void dimension against the sides of foundations or sides of ground beams constructed within the zone of influence of trees.

8.3 Ground Floor Slabs

In accordance with NHBC Chapter 4.2, 'Building near Trees', special precautions may also be required relating to heave on ground slabs, where trees have been, or are to be removed. As previously stated in Section 8.2.3 above, the Glaciolacustrine Clay can generally be taken as having a High Volume Change Potential based on NHBC Chapter 4.2.

For High Volume Change Potential soils, the NHBC recommend the following minimum void dimensions below ground beams or ground floor slabs constructed within the zone of influence of trees.

Type	Under Ground Beam and Suspended In Situ Concrete Ground Floor	Under Precast Concrete Ground Floor
Minimum Void	150mm	300mm

Should cast in situ suspended floor slabs be adopted then a void former will be required in order to create the minimum required void dimension beneath the slabs to protect against potential heave of the underlying clay soils.

8.4 Buried Concrete

The results of the chemical testing on samples from the site during this preliminary investigation show the following:

Made Ground (2 No. samples)
Water Soluble Sulphate 56 mg/l and 60 mg/l
pH 7.3 and 7.8

Glaciolacustrine Clay (2No. samples)
Water Soluble Sulphate 68 mg/l and 1100 mg/l
pH 9.1 and 11.6

Glacial Till (4No. samples)
Water Soluble Sulphate 250 to 930 mg/l
pH 8.6 to 11.7

The characteristic water soluble sulphate concentrations for the Glaciolacustrine Clay and the Glacial Till lie within Design Sulphate Class DS-2 of BRE Special Digest 1. The site is unlikely to contain chemical residues produced by or associated with industrial production and hence can be considered to be a "natural ground location". Given the occasional presence of sand bands within the low permeability clay soils, groundwater is conservatively considered to be "mobile". The soils are not expected to be pyritic and the ACEC Class for the site is therefore AC-2. It is recommended that all subsurface concrete is designed to meet the requirements of this classification.

8.5 Excavations

The soils below this site would all be classed as 'easy digging' for normal backhoe excavation plant. However, following demolition, any areas of hardstanding and concrete floor slabs from the existing school development, together with any remnant foundations or other substructure remains will require the use of hydraulic breakers to assist with their removal.

Support to the sides of excavations should be in accordance with the recommendations of CIRIA Report 97, 1983. Close-boarded support will be required for excavations in excess of 1.20m depth where any granular materials or soft cohesive deposits are encountered.

For excavations below 1.20m depth in firm clay, half- boarding will be required. Shallower excavations will need support or battering back to a safe slope angle (gradient no steeper than 1 vertical to 3 horizontal), if they are to remain open for extended periods or if personnel are expected to enter.

Maximum groundwater levels of between 0.30 to 4.42m bgl (9.05 to 12.71m OD) were recorded over the monitoring period and for groundwater levels greater than 1m bgl, some form of dewatering / groundwater control will be necessary during construction.

All plant and machinery will need to maintain an appropriate stand off from the crest of all open excavations.

All formations should be protected from mechanical disturbance and assumed to be frost-susceptible.

8.6 Pavement Design

The conditions prevailing at the time of construction will affect the CBR of the subgrade soil and its strength. Research has shown the importance of the equilibrium moisture content of the subgrade. The relationship between soil suction and the moisture content shows that a soil that becomes wet during construction will retain water and will therefore be weaker under the pavement in the equilibrium condition than a foundation that has remained dry, particularly for soils of low to medium plasticity.

The formation for new pavements is likely to be comprised of either Made Ground and/or Glaciolacustrine Clay. The Plasticity Indices (PI) obtained from tests on these materials ranged between 22% to 39% for the Cohesive Made Ground, and between 34% and 42% for the Glaciolacustrine Clay.

Equilibrium CBR values for various materials for poor and good construction conditions are given in a report by the TRRL (Report 1132). The following equilibrium CBR values are indicated for poor and good construction conditions assuming a high water table, and a thick pavement construction, in the TRRL Report.

PI	Equilibrium CBR (%)	
	Poor Conditions	Good Conditions
20	4	7
30	3.5	5
40	2.5	3

CBR values for the soils at a nominal 600mm depth, estimated from in situ dynamic cone penetration tests are presented in the following table:

CBR Test	CBR (%) At 600mm depth	Material
DCP01	10.2	Cohesive Made Ground
DCP02	12.5	Cohesive Made Ground
DCP03	18.8	Cohesive Made Ground
DCP04	17.6	Granular Made Ground
DCP05	6.0	Glaciolacustrine Clay

With the variations in CBR encountered, it would be prudent to adopt a conservative approach to pavement design, with the adoption of a preliminary design CBR value of 4% for the site. Where any weaker zones are encountered, the exposed surface should be proof-rolled and any soft spots that depress unduly should be removed and replaced with clean crushed stone or similar suitable granular fill. Further testing of the formation surface following the site strip and any re-grading would help to confirm the design CBR value.

In accordance with Road Note 29, "A Guide to the Structural Design of Pavements for New Roads", 1970, where poorly-drained cohesive soils have a PI of less than 20% they are considered to be frost susceptible. Based on this criteria, the Made Ground and Glaciolacustrine Clay can be considered as non-frost susceptible. Should the base of any foundations be taken into the Glacial Till, it would be prudent to consider these soils as being frost susceptible.

8.7 Retaining Walls

Due to the generally flat topography of the site, it is anticipated that retaining walls will be unlikely to be required as part of the school redevelopment.

8.8 Soakaway Drainage

This investigation did not include any trial pit soakaway tests. The natural soils below the site comprised mainly clay and silt and such materials will likely exhibit poor to negligible infiltration rates. If the possible use of soakaway drainage is to be investigated for the new school, it would be necessary to carry out soakaway tests in accordance with BRE Digest 365 'Soakaway Design', 2016.

8.9 Earthworks

Due to the generally flat-lying nature of the site, significant earthworks are not anticipated. However, surplus spoil will arise from excavations for foundations. These arisings could be used, if required, for any landscape mounds, subject to their geo-environmental suitability. Laboratory testing on a single (1No.) sample of Made Ground and a single (1No.) sample of the Glaciolacustrine Clay have shown both to have moisture contents wet of optimum. As a result should they be required for use as engineered fill, it may prove necessary to dry the soils by either spreading them out and allowing to dry naturally or by the addition and mixing of a suitable material, such as lime.

8.10 Updated Geotechnical Risk Register

A preliminary geotechnical risk register for the site was presented in the Desk Study (reference: PC218325, October 2021). The geotechnical risk register has been updated to reflect the findings of this investigation and above recommendations, as follows:

	Condition	Hazard	Potential Impact	Before Control			Comments / Proposed Mitigation	After Control		
				Probability	Impact	Risk		Probability	Impact	Risk
R1	Compressible ground	Insufficient bearing capacity leading to potential increased total and differential settlement problems. The underlying Glaciolacustrine Clay could include highly compressible soft clay and silt layers.	Failure / excessive movement of the foundations / ground bearing floor slabs leading to cracking of buildings. Potential for differential settlement.	3 (P)	4 (H)	12 (Md)	Use concrete strip/pad or trench fill foundations to transfer foundation loads onto the firm or stiffer Glaciolacustrine Clay and/or Glacial Till.	1 (VU)	4 (H)	4 (N)
R2	Made Ground	Variable behaviour and thickness leading to variable bearing capacities and unpredictable total and differential settlements. A	Failure / excessive movement of the foundations / ground bearing floor slabs	4 (L)	4 (H)	16 (Sb)	Use concrete strip/pad or trench fill foundations to transfer foundation loads onto the firm or stiffer Glaciolacustrine Clay and/or Glacial Tills.	1 (VU)	4 (H)	4 (N)

		thickness of Made Ground of up to about 1m could be present.	leading to cracking of buildings. Potential for differential settlement.							
R3	Swelling / Shrinking Soils	Shallow foundation movement due to seasonal shrinkage / swelling of clay soils associated with trees and shrubs. Trees and shrubs are present on the site, some of which may be removed during development and the underlying Glaciolacustrine Clay is of High Volume Change Potential.	Excessive movement of the foundations / ground bearing floor slabs leading to cracking of buildings.	**4 (L)**	**4 (H)**	**16 (Sb)**	If any foundations are within influencing distance of existing or removed trees, determine foundation depths and requirements for compressible materials/voids adjacent to foundations/below floor slabs using guidance in NHBC Chapter 4.2 'Building Near Trees'.	**1 (VU)**	**4 (H)**	**4 (N)**
R4	Obstruction / Hard Strata	Affecting excavations during construction works and potential hard spots below foundations / floor slabs. Obstructions possibly within Made Ground and boulders possibly within Glacial Till.	Differential movement of the foundations / ground bearing floor slabs leading to cracking of buildings. Delays to excavations during construction .	**3 (P)**	**4 (H)**	**12 (Md)**	Use backhoe excavation plant but have hydraulic breakers available to assist with the removal of any remnant hardstanding, concrete floor slabs, foundations or other substructure remains following the demolition of the previous school development.	**1 (VU)**	**4 (H)**	**4 (N)**
R5	High groundwater	Instability of foundation excavations and problems with foundation, floor slab and road / hardstanding formations.	Excessive movement of the foundations / ground bearing floor slabs leading to cracking of buildings and subsidence of roads / hardstanding areas.	**3 (P)**	**4 (H)**	**12 (Md)**	Maximum groundwater levels of between 0.30 and 4.42m bgl recorded during monitoring. Excavations will require control measures to control groundwater.	**1 (VU)**	**4 (H)**	**4 (N)**
R6	Chemically Aggressive Soil	Corrosive attack of buried concrete.	Degradation of concrete foundation and buried concrete structures leading to failure.	**3 (P)**	**3 (M)**	**9 (Md)**	Use concrete to AC-2 classification of BRE SD1 for all subsurface concrete.	**1 (VU)**	**3 (M)**	**3 (N)**
R7	Buried services	Damage during construction works posing risk to Health and Safety of site personnel and public.	Increased cost and delay for unplanned diversions, protection or repair.	**2 (U)**	**5 (VH)**	**10 (Md)**	All Statutory Service Plans to be provided to the Specialist Contractors prior to works taking place. Vigilance throughout any excavation work for any indications of unrecorded buried services.	**2 (U)**	**5 (VH)**	**10 (Md)**

R8	Slopes	Failure of existing slopes along southern edge of site along river bank and any slope created during development separating different areas.	Not expected.	**1 (VU)**	**4 (H)**	**4 (N)**				
R9	Retaining Walls	Failure or movement of any created retaining walls or structures during development separating different site areas.	Not expected.	**1 (VU)**	**4 (H)**	**4 (N)**				
R10	Solution Features	Potential collapse or settlement of ground affecting buildings, hardstanding and infrastructure.	Not expected.	**1 (VU)**	**4 (H)**	**4 (N)**				
R11	Mining Activities	Potential collapse or settlement of ground affecting buildings, hardstanding and infrastructure.	Not expected.	**1 (VU)**	**4 (H)**	**4 (N)**				
R12	Frost Susceptibility	Affecting the subgrade of roads and areas of hardstanding.	Subsidence and cracking of roads and areas for hardstanding and increased maintenance and management costs.	**3 (P)**	**3 (P)**	**9 (Mn)**	Atterberg limit testing indicates that the cohesive Made Ground and Glaciolacustrine Clay are non-frost susceptible. The Glacial Till is frost susceptible.	**1 (VU)**	**3 (P)**	**3 (N)**
R13	UXO	Affecting investigation and construction works and posing risk to Health and Safety of site personnel and the public.	Increased costs and delay to the project and potential serious injury or death.	**2 (U)**	**5 (VH)**	**10 (Md)**	Preliminary UXO Threat Assessment carried out and risk assessed as very low and no further action required. Vigilance throughout investigation and construction works required.	**1 (VU)**	**5 (VH)**	**5 (Mn)**

9.0 GENERIC QUANTITATIVE RISK ASSESSMENT

9.1 Introduction

The UK approach to the assessment of contaminated land is based upon the principles of risk assessment, which is founded on the use of 'source-pathway-receptor' principles in order to establish the potential presence of 'pollutant linkage' as detailed in the LCRM.

Geotechnics Limited adopts a tiered approach to risk assessment in accordance with current UK guidance and good practice. The initial step of this process, known as Tier 1 or Generic Quantitative Risk Assessment (GQRA), is the comparison of site-derived data with relevant guideline levels.

Should the adopted criteria be exceeded, then two courses of action are available. The first is to break the pollutant linkage by undertaking remedial works such as removing or treating the contaminated soil. Alternatively, a more detailed risk assessment (DQRA) can be carried out to determine whether a contamination risk exists.

The UK approach to the assessment of human health risk from contaminated land is set out in the CLEA (Contaminated Land Exposure Assessment) framework, which was first published in 2002 by the Department for Environment, Food and Rural Affairs (DEFRA) and the Environment Agency (EA). The original guidance was withdrawn, and revised guidance issued in 2009, which is set out in the following documents published by the EA:

'*Human Health Toxicological Assessment of Contaminants in Soil*', *Science Report SC050021/SR2; and*

'*Updated Technical Background to the CLEA Model*', *Science Report SC050021/SR3.*

The CLEA model uses generic assumptions about the fate and transport of chemicals in the environment and a generic conceptual model for site conditions together with human behaviour to estimate long term human exposure to soil contaminants. Soil Guideline Values (SGV) were previously derived using the CLEA Model by comparing estimated exposure with 'Health Criteria Values' (HCV) that represent a tolerable risk to health from chronic exposure.

The CLEA model has also been used to determine other generic assessment criteria (GACs), including those used within this assessment.

9.2 Risk Assessment Methodology

Based on site size, homogeneous ground conditions and site history, the site has been considered as one averaging zone. Relevant guidance issued by the Chartered Institute of Environmental Health (CIEH), in association with LQM, published November 2015 has been adopted.

Laboratory testing results were directly compared to the adopted GAC for residential without home grown produce / public open space (parkland), and results are shown in full in Appendix 10.

9.3 Risk Assessment for Human Health

Of the twelve samples tested, one sample exceeded the relevant SGV/GAC. This was a soil sample taken from location WS02 at 0.30m depth. The sample exceeded the SGV of 1mg/kg for Benzo(a)pyrene for residential without home grown produce with a reported concentration of 1.6mg/kg. However the concentration is below the relevant LQM Suitable for Use Level (S4UL) for residential without home grown produce of 3.2mg/kg. Therefore the sample is not considered to pose a significant risk to human health.

The twelve samples were laboratory screened for asbestos; and asbestos was not detected in any of the samples.

9.4 Risk Assessment for Phytotoxic Effects

Concentrations of the phytotoxic metals copper, nickel and zinc nickel do not exceed the guideline values for the protection of plants as presented in the Defra Sewage Sludge Code of Practice. Any risks to plants are assessed as being very low. Mercury and cadmium were not included in the analytical suite. The results of the phytotoxic screening are presented in the tables below.

Determinand	Number of samples	GAC (mg/kg)	Results Exceeding GAC (mg/kg)	Exceeds GAC (Y/N)
Arsenic	12	All pH - 50	-	N
Copper	12	pH>7 - 200	-	N
Cadmium	-	All pH – 3	Not analysed for	-
Chromium	12	All pH - 400	-	N
Nickel	12	pH>7 – 110	-	N
Mercury	-	All pH - 1	Not analysed for	-
Lead	12	All pH – 300	-	N
Zinc	12	pH>7 – 300	-	N
Selenium	12	All pH - 3	-	N

9.5 Assessment for the Protection of Controlled Waters

The risks to controlled waters (groundwater and surface waters) from contaminants on-site have been assessed in accordance with the Environment Agency (EA) documents (The Environment Agency's Approach to Groundwater Protection, 2017 and Remedial Targets Methodology, 2006). Pollutant inputs from contaminated land sites are considered as passive inputs under the European Water Framework Directive (2000/60/EC) (WFD) and its daughter Directives, and as such are regulated under the Agency's 'limit' pollution objective. Acceptable water quality targets (WQT) are defined for protection of human health (based on Drinking Water Standards (DWS)) and for protection of aquatic ecosystems (Environmental Quality Standards (EQS)).

Groundwater was not encountered during progression of exploratory holes. During the four rounds of monitoring all wells, with the exception of WS02, have recorded groundwater (although CP02 had insufficient water for sampling during the first visit). Groundwater gauging show that groundwater levels vary by up to approximately 3m across the site during the final monitoring visit.

It is considered that groundwater encountered in monitoring wells is likely to be due to a mixture of infiltration of rainfall being trapped within monitoring wells and potentially hydraulically isolated groundwater within the low permeability cohesive deposits. Relatively large fluctuations in elevation have been encountered between monitoring rounds for individual monitoring wells. Head differences of over 4m further show that there is very limited lateral hydraulic connectivity between any true groundwater encountered as wells as rainwater collecting within monitoring wells which are acting as sumps. Therefore, any lateral or downward pathways for the migration of groundwater or contaminants leached from soils will be tortuous and slow

Recovered water samples from the first monitoring visit, as well as soil samples selected for soil leaching analysis with the leaching aliquot, were analysed and screened against Environmental Quality Standards (EQS) rather than the Drinking Water Standards (DWS). EQS are considered the most appropriate screening criteria as there are no groundwater abstractions in the vicinity of the site and groundwater will form base flow to local rivers. There are no groundwater abstractions in the vicinity of the site, and base flow to surface water courses is the most appropriate receptor to consider.

Exceedances of the relevant guidance criteria are summarised in the table below.

Determinand	Unadjusted EQS GAC (µg/l)	DW S GAC (µg/l)	Results Exceeding EQS (µg/l)	Results Exceeding DW S (µg/l)
Copper	1	2000	CP01 – Soil Leachate – 4.6 CP01 – Groundwater – 1.8 CP03 – Groundwater – 4.4 CP04 – Groundwater – 1.5 WS02 – Soil Leachate – 1.4	
Iron	1000	200	CP01 – Soil Leachate – 1300	WS02 – Groundwater – 290
Lead	1.2	10	CP01 – Soil Leachate – 3.1 WS02 – Soil Leachate - 1.9	
Manganese	123	50	CP01 – Groundwater – 180 CP04 – Groundwater – 550	
Selenium	-	10		CP01 – Groundwater – 29 CP03 – Groundwater – 37
Zinc	10.9	3000	CP01 – Soil Leachate – 300 CP01 – Groundwater – 63 CP03 – Groundwater – 140 CP04 – Groundwater – 50 WS02 – Soil Leachate – 110	
Fluoranthene	0.0063	-	CP01 – Groundwater – 0.06 CP04 – Groundwater – 0.02	
Benzo(b) fluoranthene	0.00017 (BaP value)	0.10	CP01 – Groundwater – 0.01	

The results above show that there are some exceedances of EQS DWS values for some heavy metals and Benzo(b)fluoranthene. As discussed above these concentrations are likely to reflect concentrations from localised groundwater or from the relatively aggressive leaching of soils via leaching tests. The combination of the concentrations present, the presence of tortuous pathways and a lack of identified sources means that these

exceedances will not present a risk to sensitive receptors.

9.6 Ground Gas Risk Assessment

The four rounds of ground gas monitoring results obtained are presented in Appendix 5. Two rounds of the monitoring were undertaken when atmospheric pressure was less than 1000mbar (996 mbar on 9 December 2021 and 997 mbar on 16 December 2021).

The conceptual model has not shown any significant sources of ground gas to be present, such as active or recently closed landfills, thick Made Ground containing labile carbon or bedrock subject to mining and possibly mineshafts. The measured flow rates show that there is no significant source of ground gases at depth. Slightly elevated ground gases and depleted oxygen are typically widespread in soils and the soils ground gas regime and strata encountered are considered to be typical of Gas Regime A and no ground gas protection measure are required within any foundations (Card et al. 2019).

10.0 REVISED CONTAMINANT LINKAGE ASSESSMENT

An updated assessment of pollutant linkages has been made following the completion of a ground investigation and generic quantitative risk assessment to assess potential sources.

Hazard Identification				Hazard Assessment			
Link	Contaminant	Pathway	Receptor	Probability	Consequence	Risk	Contaminant Linkage Assessment
1	Contaminated soil/groundwater	Ingestion (via soil dust) and inhalation (via soil dust and vapours), ingestion through dirty hands, dermal contact with soil/water.	A- Humans using the site during construction	Negligible / Not credible	Medium	Low	NAR
2		Ingestion (via soil dust) and inhalation (via soil dust and vapours), ingestion through dirty hands, dermal contact with soil/water.	B- Humans using the site after development completion	Negligible / Not credible	Medium	Low	NAR
3		Downward / Lateral migration	D – Unproductive strata D – Principal Aquifer	Low / Unlikely	Medium	Medium / Low	NAR – the severity is borderline mild, which would give a low risk. There are also no credible sources on site.
4		Inhalation	B- Humans using the site after development completion	Negligible / Not credible	Medium	Low	NAR
5	Gas – methane & carbon dioxide	Inhalation, dermal/direct contact	E- Ecology (Flora/Fauna)	Negligible / Not credible	Negligible	Near Zero	NAR
6		Inhalation, dermal/direct contact	B - Humans using the site after development completion	N/A	Severe	Low	NAR

7	Contaminated soil/waste/ groundwater	Interface between Made Ground / Topsoil and Unproductive strata	E- Ecology (Flora/Fauna)	Negligible	Mild	Low	NAR
8	Contaminated groundwater	Direct contact.	F- Building structures	Negligible	Mild	Low	NAR

11.0 CONCLUSIONS

11.1 Geotechnical

This preliminary ground investigation has shown the site to be typically underlain by variable depths (typically less than 1.2m) of Made Ground above firm Glaciolacustrine Clay (Alne Glaciolacustrine Formation) extending to between 2m and 3m depth which in turn overlies firm becoming stiff Glacial Till.

It is anticipated that the proposed school buildings could be supported on traditional concrete strip/pad foundations or concrete trench fill foundations, these being constructed on the Glaciolacustrine Clay and/or the Glacial Till.

Several mature / semi mature trees are spread around the site. Hence, as a precaution against heave in the underlying clay soils there are requirements for compressible materials/voids adjacent to foundations/below floor slabs in accordance with NHBC guidelines.

Testing carried out during this preliminary investigation indicates that subsurface concrete should be designed to comply with the AC-2 classification of BRE Special Digest 1.

It would be prudent to adopt a conservative approach to pavement design, with the adoption of a preliminary design CBR value of 4% for the site. Where weaker zones are present at formation level, the exposed surface should be proof-rolled and any soft spots that depress unduly should be removed and replaced with clean crushed stone or similar suitable granular fill. Further CBR testing of the likely formation surface is advised prior to final design/construction.

The natural soils below the site comprised mainly clay and silt and such materials will likely exhibit poor to negligible infiltration rates. If the possible use of soakaway drainage is to be investigated for the new school, it would be necessary to carry out soakaway tests in accordance with BRE Digest 365 'Soakaway Design', 2016.

Significant earthworks are not anticipated on this generally flat-lying site. Surplus spoil will arise from excavations for foundations. These arising's could be used, if required, for any landscape mounds, subject to their geo-environmental suitability.

Due to the generally flat topography of the site, it is anticipated that retaining walls will be unlikely to be required as part of the school redevelopment.

Potential abnormal geotechnical costs may arise from the following:

- Deeper excavations for concrete trench fill foundations in order to extend through locally thicker Made Ground (e.g. CP04), through softer zones in the clay soils, and to install footings on clay soils outside of the zone of influence of trees on the site in accordance with NHBC guidelines.
- As a precaution against heave in the underlying clay soils there are requirements for compressible materials/voids adjacent to foundations/below floor slabs in accordance with NHBC guidelines.
- Potential weaker zones at pavement formation surface requiring removal and replacement.

11.2 Updated Environmental Risk Assessment

A preliminary risk assessment has been carried out based on the contaminant-pathway-receptor model as defined in Statutory Guidance to Part IIA of the Environment Protection Act, 1990, in accordance with BS 10175: 2011 +A2 2017 "Investigation of Potentially Contaminated Sites – Code of Practice" and LCRM. In order to make a more detailed assessment of the potential hazards, a preliminary Phase 2 intrusive investigation was carried out to reduce uncertainty and produce a more comprehensive conceptual site model of the site. This detailed the characteristic ground conditions and elements of the surrounding environment and has assisted with identifying contaminant linkages

There are no exceedances of human health GACs for future site users or construction staff. Concentrations of soil leaching and groundwater contaminants show that there are no significant risks to controlled water receptors. Ground gas monitoring has confirmed that there are no significant sources of ground gases present affecting the site and the ground gas regime is classified as Gas Regime A for methane and carbon dioxide and no ground gas protection measures are required for any proposed structures.

Based on the scope of the works undertaken during this preliminary investigation, there are no anticipated abnormal costs relating to geoenvironmental conditions. However, there may be special conditions appertaining to the site which were not revealed by this investigation and which have not been taken into account in this report.

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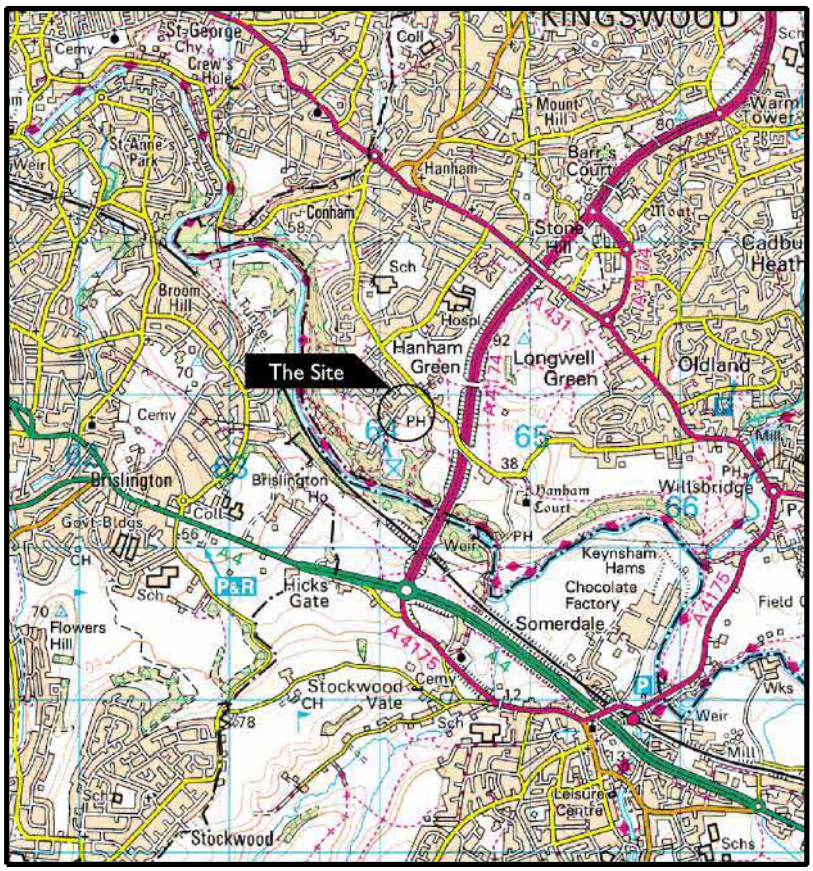
APPENDIX 1

Site Location Plan

SITE LOCATION PLAN



Geotechnical and Geoenvironmental Desk Study at
Trial Site Location
for
Department for Education

GEOTECHNICS
geotechnical and geoenvironmental specialists

NOTES:

School Site Boundary

School Playing Field Boundary

Separation of 2 adjoining blocks

18mm — Typical Block dimensions

EFA1	CDC Site Reference
EFAD	CDC Block Reference
ANC1	Ancillary Block Reference
Car Park, etc.	Annotation to specific areas

Blocks - NEW

Blocks - DEMOLISHED

Blocks - EXISTING

Rev	Date	Description	Drn	Ch

Education & Skills Funding Agency

Education Funding Agency

CDC 17 - 19

SCHOOL:

142844
Hempland Primary Academy

Site Address

Whitby Avenue, Stockton Lane
York, North Yorkshire
YO13 1ET

Survey Organisation	CAPITA		
Drawn	K.TIBBS	Date	16JAN18
Checked	C.STEWART	Date	23JAN18
Scale:	NTS	Original Size:	A3

Document Staus:

FINAL

Drawing Number: 142844-1 of 1

Revision: REV

100mm on Original

Print Date: 25/02/2019 15:09:13

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APPENDIX 2

Cable Percussion Borehole Records

DATA SHEET - Symbols and Abbreviations used on Records

Sample Types

B	Bulk disturbed sample
BLK	Block sample
C	Core sample
D	Small disturbed sample (tub/jar)
E	Environmental test sample
ES	Environmental soil sample
EW	Environmental water sample
G	Gas sample
L	Liner sample
LB	Large bulk disturbed sample
P	Piston sample (PF - failed P sample)
TW	Thin walled push in sample
U	Open Tube - 102mm diameter with blows to take sample. (UF - failed U sample)
UT	Thin wall open drive tube sampler - 102mm diameter with blows to take sample. (UTF - failed UT sample)
V	Vial sample
W	Water sample
#	Sample Not Recovered

Insitu Testing / Properties

CBRP	CBR using TRL probe
CHP	Constant Head Permeability Test
COND	Electrical conductivity
TC	Thermal Conductivity
TR	Thermal Resistivity
HV	Strength from Hand Vane
ICBR	CBR Test
IDEN	Density Test
IRES	Resistivity Test
MEX	CBR using Mexecone Probe Test
PKR	Packer Permeability Test
PLT	Plate Load Test
PP	Strength from Pocket Penetrometer
Temp	Temperature
VHP	Variable Head Permeability Test
VN	Strength from Insitu Vane
w%	Water content

(All other strengths from undrained triaxial testing)

S	Standard Penetration Test (SPT)
C	SPT with cone
N	SPT Result
-/-	Blows/penetration (mm) after seating drive
-*/- (mm)	Total blows/penetration
( )	Extrapolated value

Groundwater

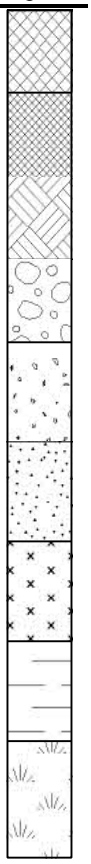
Water Strike

Depth Water Rose To

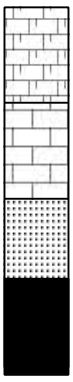
Instrumentation

Strata

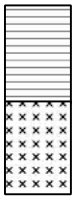
Legend



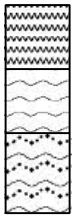
Note: Composite soil types shown by combined symbols



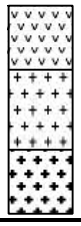
Strata, Continued



Metamorphic Rock



Igneous Rock



Backfill Materials

Rotary Core

RQD	Rock Quality Designation (% of intact core >100mm)
FRACTURE INDEX	Fractures/metre
FRACTURE SPACING (m)	Maximum Minimum
NI	Non-intact core
NR	No core recovery
AZCL	Assumed zone of core loss

(where core recovery is unknown it is assumed to be at the base of the run)

GEOTECHNICS

BOREHOLE RECORD - Cable Percussion

Project	HEMPLAND PRIMARY SCHOOL, YORK	Engineer	MOTT MACDONALD LIMITED	Borehole	CP01
				Project No	PC218325
Client	DEPARTMENT FOR EDUCATION	National Grid Coordinates	462516.2 E 452976.5 N	Ground Level	13.65 m OD

Scale 1:50

Depth	Sample Type	Depth Cased & (to Water)	Strength kPa	w %	SPT N	Description	Depth	Legend	Level m OD
							G.L.		13.65
0.10	ES					MADE GROUND: Asphalt.	0.15		13.50
0.30- 0.50	B					MADE GROUND: Reddish brown and light grey sandy gravel of angular to subangular fine to coarse of mudstone, sandstone, concrete, asphalt and brick fragments (Sub base).	0.50		13.15
0.30	D								
0.30	ES								
0.50- 1.00	B								
0.80	D			29					
0.80	ES					MADE GROUND: Soft brown occasionally mottled light grey slightly sandy slightly gravelly clay. Gravel is angular to subrounded fine to coarse of mudstone, sandstone and brick fragments.			
1.20- 1.65	D	1.20 (DRY)			S8		1.20		12.45
1.50- 2.00	B								
1.50	D			27		Firm fissured brown mottled grey and light grey slightly sandy CLAY with some calcareous inclusions (up to 20mm) and occasional sandy pockets (up to 15mm). Fissures are extremely closely spaced, randomly orientated, smooth and dull. At 2.00m, stiff.			
2.00- 2.45	UT34	1.70 (DRY)	124	25					
2.50- 3.00	B								
2.50	D								
2.70- 3.15	D								
3.00- 3.45	D	1.70 (DRY)			S13		3.00		10.65
3.50- 4.00	B					Firm brown slightly sandy slightly gravelly calcareous CLAY. Gravel is subangular to subrounded fine to coarse of mudstone and sandstone.			
3.50	D								
4.00- 4.45	UT39	1.70 (DRY)	68	13					
4.50- 5.00	B								
4.50	D								
5.00- 5.45	D	1.70 (DRY)			S20	Below 5.00m, stiff.			
5.50- 6.00	B								
5.50	D								
6.00- 6.45	UT53	1.70 (DRY)							
6.50- 7.00	B					Below 6.50m, very stiff.			
6.50	D								
7.00- 7.45	D	1.70 (DRY)			S41				
7.50- 8.00	B								
7.50	D								
8.00- 8.45	D	1.70 (DRY)			S41				
						End of Borehole	8.45		5.20

Boring

Depth	Hole Dia	Technique	Crew
1.20	0.40	Inspection Pit	KR/SR
8.45	0.15	Cable Percussion	KR/SR

Progress

Depth of Hole	Depth Cased	Depth to Water	Date	Time
G.L.			25/11/21	08:00
8.45	1.70	DRY	25/11/21	18:00

Groundwater

Depth Struck	Depth Cased	Rose to	in Mins	Depth Sealed	Remarks on Groundwater
					None encountered during boring.

Remarks AGS

Tarmacadam broken out using hydraulic breaker. Inspection pit hand excavated to 1.20m depth and no services were found.
ES sample = 1 x 1 litre plastic tub, 2 x 258ml amber glass jars and 2 x 60ml VOC vials.
A 50mm standpipe was installed to 8.00m with a geowrapped slotted section from 1.00m to 8.00m with upright lockable protective cover. Backfill details from base of hole: gravel filter up to 1.00m, bentonite up to 0.30m, concrete up to ground level.

Symbols and abbreviations are explained on the accompanying key sheet.

All dimensions are in metres.

Logged in accordance with BS5930:2015 + A1:2020

Logged by CP
Checked by JK
Figure 1 of 1
13/04/2022

geotechnics

BOREHOLE RECORD - Cable Percussion

Project	HEMPLAND PRIMARY SCHOOL, YORK	Engineer	MOTT MACDONALD LIMITED	Borehole	CP02
				Project No	PC218325
Client	DEPARTMENT FOR EDUCATION	National Grid Coordinates	462617.1 E 452998.7 N	Ground Level	13.47 m OD

Scale 1:50

Depth	Sample Type	Depth Cased & (to Water)	Strength kPa	w %	SPT N	Description	Depth	Legend	Level m OD
							G.L.		13.47
0.10- 0.50	B					MADE GROUND: Dark brown slightly gravelly clayey fine to medium sand with occasional roots (up to 3mm diameter). Gravel is angular to subrounded fine to coarse of mudstone, sandstone and brick fragments. Many rootlets to 0.10m depth. Between 0.20-0.50m, with a low cobble content of brick.			
0.20	D								
0.20	ES								
0.50- 1.00	B						0.50		12.97
0.50	D			29					
0.50	ES								
1.00	ES						1.00		12.47
1.20- 1.65	UT31	1.20 (DRY)		28		MADE GROUND: Firm greyish brown mottled grey slightly sandy slightly gravelly clay with a low angular to subangular cobble content of sandstone and brick. Gravel is angular to subangular fine to coarse of mudstone and sandstone.			
1.70- 2.00	B								
1.70	D								
2.00- 2.45	D	1.50 (DRY)			S12	Firm fissured brown mottled grey and light grey slightly sandy CLAY with some calcareous inclusions (up to 15mm) and occasional sandy pockets (up to 15mm). Fissures are extremely closely spaced, randomly orientated, smooth and dull.	2.00		11.47
2.50- 3.00	B								
2.50	D			16		Firm brown slightly sandy slightly gravelly calcareous CLAY. Gravel is subangular to subrounded fine to coarse of mudstone and sandstone.			
3.00- 3.45	UT43	1.50 (DRY)		12					
3.50- 4.00	B								
3.50	D								
4.00- 4.45	D	1.50 (DRY)			S18	Below 4.00m, stiff.			
4.50- 5.00	B								
4.50	D			15					
5.00	D					At 5.00m, very stiff.			
5.00- 5.45	UT50	1.50 (DRY)	167	11					
5.50- 6.00	B								
5.50	D								
6.00- 6.45	D	1.50 (DRY)			S25				
6.50- 7.00	B								
6.50	D								
7.00- 7.45	UT52	1.50 (DRY)							
7.50- 8.00	B								
7.50	D								
8.00- 8.45	D	1.50 (DRY)			S25				
						End of Borehole	8.45		5.02

Boring

Depth	Hole Dia	Technique	Crew
1.20	0.40	Inspection Pit	KR/SR
8.45	0.15	Cable Percussion	KR/SR

Progress

Depth of Hole	Depth Cased	Depth to Water	Date	Time
G.L.			24/11/21	08:00
8.45	1.50	DRY	24/11/21	18:00

Groundwater

Depth Struck	Depth Cased	Rose to	in Mins	Depth Sealed	Remarks on Groundwater
					None encountered during boring.

Remarks

Inspection pit hand excavated to 1.20m depth and no services were found.
ES sample = 1 x 1 litre plastic tub, 2 x 258ml amber glass jars and 2 x 60ml VOC vials.
A 50mm standpipe was installed to 8.00m with a geowrapped slotted section from 1.00m to 8.00m with upright lockable protective cover. Backfill details from base of hole: gravel filter up to 1.00m, bentonite up to 0.30m, concrete up to ground level.

Symbols and abbreviations are explained on the accompanying key sheet.

All dimensions are in metres.

Logged in accordance with BS5930:2015 + A1:2020

Logged by CP
Checked by JK
Figure 1 of 1
13/04/2022

geotechnics

BOREHOLE RECORD - Cable Percussion

Project	HEMPLAND PRIMARY SCHOOL, YORK	Engineer	MOTT MACDONALD LIMITED	Borehole	CP03
				Project No	PC218325
Client	DEPARTMENT FOR EDUCATION	National Grid Coordinates	462557.3 E 452917.1 N	Ground Level	13.01 m OD

Scale 1:50

Depth	Sample Type	Depth Cased & (to Water)	Strength kPa	w %	SPT N	Description	Depth	Legend	Level m OD
							G.L.		13.01
0.10- 0.50	B					MADE GROUND: Light brown slightly gravelly slightly silty sand with occasional rootlets. Gravel is subangular to subrounded fine to coarse of sandstone, mudstone and brick fragments. Many rootlets to 0.10m depth.	0.10		12.91
0.20	D								
0.20	ES								
0.50- 1.00	B								
0.50	D			31					
0.50	ES								
1.00	ES					Firm fissured brown mottled grey and light grey slightly sandy CLAY with some calcareous inclusions (up to 20mm) and occasional sandy pockets (up to 20mm). Fissures are very closely spaced, randomly orientated, smooth and dull.			
1.20- 1.65	D	1.50 (DRY)			S14				
1.50- 2.00	B						1.50		11.51
1.50	D					Firm brown occasionally mottled brownish grey slightly sandy CLAY with occasional calcareous inclusions (up to 15mm) and occasional reddish brown and yellowish brown sandy pockets (up to 20mm). Fissures are closely spaced, randomly orientated, smooth and dull.			
2.00- 2.45	UT41	1.50 (DRY)	129	14			2.00		11.01
2.50- 3.00	B					Stiff brown slightly sandy slightly gravelly calcareous CLAY. Gravel is subangular to subrounded fine to coarse of mudstone and sandstone.			
2.50	D								
3.00- 3.45	D	1.50 (DRY)			S19				
3.50- 4.00	B								
3.50	D			16					
4.00- 4.45	UT45	1.50 (DRY)		12					
4.50- 5.00	B								
4.50	D								
5.00- 5.45	D	1.50 (DRY)			S21				
5.50- 6.00	B								
5.50	D								
6.00- 6.45	UT51	1.50	115	12					
6.50- 7.00	B								
6.50	D								
7.00- 7.45	D	1.50 (DRY)			S21				
7.50	D								
7.50- 7.95	UT52	1.50 (DRY)							
8.00- 8.45	D	1.50 (DRY)			S24				
						End of Borehole	8.45		4.56

Boring

Depth	Hole Dia	Technique	Crew
1.20	0.40	Inspection Pit	KR/SR
8.45	0.15	Cable Percussion	KR/SR

Progress

Depth of Hole	Depth Cased	Depth to Water	Date	Time
G.L.			23/11/21	08:00
8.45	1.50	DRY	23/11/21	18:00

Groundwater

Depth Struck	Depth Cased	Rose to	in Mins	Depth Sealed	Remarks on Groundwater
					None encountered during boring.

Remarks AGS

Inspection pit hand excavated to 1.20m depth and no services were found.
ES sample = 1 x 1 litre plastic tub, 2 x 258ml amber glass jars and 2 x 60ml VOC vials.
A 50mm standpipe was installed to 8.00m with a geowrapped slotted section from 1.00m to 8.00m with upright lockable protective cover. Backfill details from base of hole: gravel filter up to 1.00m, bentonite up to 0.30m, concrete up to ground level.

Symbols and abbreviations are explained on the accompanying key sheet.

All dimensions are in metres.

Logged in accordance with BS5930:2015 + A1:2020

Logged by CP
Checked by JK
Figure 1 of 1
13/04/2022

geotechnics

BOREHOLE RECORD - Cable Percussion

Project	HEMPLAND PRIMARY SCHOOL, YORK	Engineer	MOTT MACDONALD LIMITED	Borehole	CP04
				Project No	PC218325
Client	DEPARTMENT FOR EDUCATION	National Grid Coordinates	462644.8 E 452904.8 N	Ground Level	12.08 m OD

Scale 1:50

Depth	Sample Type	Depth Cased & (to Water)	Strength kPa	w %	SPT N	Description	Depth	Level m OD
							G.L.	12.08
0.10	ES					MADE GROUND: Asphalt.	0.15	11.93
0.30 - 0.80	B					MADE GROUND: Light greyish brown slightly gravelly fine to medium sand. Gravel is angular to subangular fine to coarse of sandstone, asphalt, concrete and brick fragments (Sub base).	0.30	11.78
0.30	D							
0.30	ES							
0.80 - 1.20	B						0.80	11.28
0.80	D			20		MADE GROUND: Light reddish brown sandy gravel with a low angular to subangular cobble content of sandstone and brick. Gravel is angular to subangular fine to coarse of mudstone, sandstone, concrete, asphalt and brick fragments.		
0.80	ES							
1.20 - 1.65	D	1.20 (DRY)			S12		1.30	10.78
1.50 - 2.00	B							
1.50	D							
1.50	ES							
2.00 - 2.45	D	1.70 (DRY)			S19	MADE GROUND: Firm dark brownish grey mottled red slightly sandy slightly gravelly clay. Gravel is angular to subrounded fine to coarse of mudstone, sandstone and brick fragments (Some ash**).	2.00	10.08
2.50 - 3.00	B					Firm brown occasionally mottled brownish grey slightly sandy CLAY with occasional calcareous inclusions (up to 15mm) and occasional reddish brown and yellowish brown sandy pockets (up to 20mm). Fissures are closely spaced, randomly orientated, smooth and dull.		
2.50	D			15				
3.00 - 3.45	D	1.70 (DRY)			S21			
						Stiff brown slightly sandy slightly gravelly calcareous CLAY. Gravel is subangular to subrounded fine to coarse of mudstone and sandstone.		
3.50 - 4.00	B							
3.50	D			16				
4.00 - 4.45	D	1.70 (DRY)			S23			
4.50 - 5.00	B							
4.50	D							
5.00 - 5.45	D	1.70 (DRY)			S25			
5.50 - 6.00	B							
5.50	D							
6.00 - 6.45	UT41	1.70 (DRY)		12				
6.50 - 7.00	B							
6.50	D							
7.00 - 7.45	D	1.70 (DRY)			S26			
7.50	D							
7.50 - 7.95	UT49	1.70 (DRY)						
8.00 - 8.45	D	1.70 (DRY)			S24			
						End of Borehole	8.45	3.63

Boring

Depth	Hole Dia	Technique	Crew
1.20	0.40	Inspection Pit	KR/SR
8.45	0.15	Cable Percussion	KR/SR

Progress

Depth of Hole	Depth Cased	Depth to Water	Date	Time
G.L.			22/11/21	08:00
8.45	1.70	DRY	22/11/21	18:00

Groundwater

Depth Struck	Depth Cased	Rose to	in Mins	Depth Sealed	Remarks on Groundwater
					None encountered during boring.

Remarks

Tarmacadam broken out using hydraulic breaker. Inspection pit hand excavated to 1.20m depth and no services were found.
ES sample = 1 x 1 litre plastic tub, 2 x 258ml amber glass jars and 2 x 60ml VOC vials.
** Drillers description.
A 50mm standpipe was installed to 8.00m with a geowrapped slotted section from 1.50m to 8.00m with upright lockable protective cover. Backfill details from base of hole: gravel filter up to 1.50m, bentonite up to 0.30m, concrete up to ground level.

Symbols and abbreviations are explained on the accompanying key sheet.

All dimensions are in metres.

Logged in accordance with BS5930:2015 + A1:2020

Logged by CP
Checked by JK
Figure 1 of 1
13/04/2022

geotechnics

Fieldwork Results - *SPT Results Summary*

Project HEMPLAND PRIMARY SCHOOL, YORK **Project No** PC218325

Client Department for Education

Hole	Depth m bgl	Level m OD	Type	SWP (mm)	Seating Drive		Test Drive				SPT 'N' Value	Uncorrected SPT 'N'
					0-75 (mm)	75-150 (mm)	0-75 (mm)	75-150 (mm)	150-225 (mm)	225-300 (mm)		10 20 30 40 50
CP01	1.20	12.45	S	-	1	1	1	2	2	3	8	*
CP01	3.00	10.65	S	-	2	2	3	3	3	4	13	*
CP01	5.00	8.65	S	-	3	4	4	5	5	6	20	*
CP01	7.00	6.65	S	-	6	8	9	10	10	12	41	*
CP01	8.00	5.65	S	-	8	9	9	10	11	11	41	*

Driller	Kris Roebuck
Hammer No.	AR665
Energy Ratio, Er (%)	70.00
Calibration Date	12/03/2021

Remarks

-/- Blows/penetration (mm) after seating
-*/- Total blows/penetration (mm)
SWP Penetration under own weight (mm)

S - Standard Penetration Test (SPT)
C - SPT with cone
L - Split Spoon with liner used

GEOTECHNICS

Fieldwork Results - *SPT Results Summary*

Project HEMPLAND PRIMARY SCHOOL, YORK **Project No** PC218325

Client Department for Education

Hole	Depth m bgl	Level m OD	Type	SWP (mm)	Seating Drive 0-75 (mm)	Seating Drive 75-150 (mm)	Test Drive 0-75 (mm)	Test Drive 75-150 (mm)	Test Drive 150-225 (mm)	Test Drive 225-300 (mm)	SPT 'N' Value	Uncorrected SPT 'N' 10 20 30 40 50
CP02	2.00	11.47	S	-	1	2	2	3	3	4	12	*
CP02	4.00	9.47	S	-	3	3	4	4	5	5	18	*
CP02	6.00	7.47	S	-	3	4	5	6	6	8	25	*
CP02	8.00	5.47	S	-	4	4	5	6	7	7	25	*

Driller	Kris Roebuck
Hammer No.	AR665
Energy Ratio, Er (%)	70.00
Calibration Date	12/03/2021

Remarks

-/- Blows/penetration (mm) after seating
-*/- Total blows/penetration (mm)
SWP Penetration under own weight (mm)

S - Standard Penetration Test (SPT)
C - SPT with cone
L - Split Spoon with liner used

GEOTECHNICS

Fieldwork Results - *SPT Results Summary*

Project HEMPLAND PRIMARY SCHOOL, YORK **Project No** PC218325

Client Department for Education

Hole	Depth m bgl	Level m OD	Type	SWP (mm)	Seating Drive 0-75 (mm)	Seating Drive 75-150 (mm)	Test Drive 0-75 (mm)	Test Drive 75-150 (mm)	Test Drive 150-225 (mm)	Test Drive 225-300 (mm)	SPT 'N' Value	Uncorrected SPT 'N' 10 20 30 40 50
CP03	1.20	11.81	S	-	2	2	3	3	4	4	14	*
CP03	3.00	10.01	S	-	3	4	4	4	5	6	19	*
CP03	5.00	8.01	S	-	3	4	4	5	5	7	21	*
CP03	7.00	6.01	S	-	3	4	4	5	6	6	21	*
CP03	8.00	5.01	S	-	4	4	5	6	6	7	24	*

Driller	Kris Roebuck
Hammer No.	AR665
Energy Ratio, Er (%)	70.00
Calibration Date	12/03/2021

Remarks

-/- Blows/penetration (mm) after seating
-*/- Total blows/penetration (mm)
SWP Penetration under own weight (mm)

S - Standard Penetration Test (SPT)
C - SPT with cone
L - Split Spoon with liner used

GEOTECHNICS

Fieldwork Results - *SPT Results Summary*

Project HEMPLAND PRIMARY SCHOOL, YORK **Project No** PC218325

Client Department for Education

Hole	Depth m bgl	Level m OD	Type	SWP (mm)	Seating Drive		Test Drive				SPT 'N' Value	Uncorrected SPT 'N' 10 20 30 40 50
					0-75 (mm)	75-150 (mm)	0-75 (mm)	75-150 (mm)	150-225 (mm)	225-300 (mm)		
CP04	1.20	10.88	S	-	1	2	2	3	3	4	12	*
CP04	2.00	10.08	S	-	2	3	4	4	5	6	19	*
CP04	3.00	9.08	S	-	3	4	4	5	5	7	21	*
CP04	4.00	8.08	S	-	4	4	5	5	6	7	23	*
CP04	5.00	7.08	S	-	4	5	5	6	6	8	25	*
CP04	7.00	5.08	S	-	4	5	5	6	7	8	26	*
CP04	8.00	4.08	S	-	4	4	5	6	6	7	24	*

Driller	Kris Roebuck
Hammer No.	AR665
Energy Ratio, Er (%)	70.00
Calibration Date	12/03/2021

Remarks

-/- Blows/penetration (mm) after seating
-*/- Total blows/penetration (mm)
SWP Penetration under own weight (mm)

S - Standard Penetration Test (SPT)
C - SPT with cone
L - Split Spoon with liner used

GEOTECHNICS

SPT Hammer Energy Test Report

in accordance with BSEN ISO 22476-3:2005

ARCHWAY ENGINEERING (UK) LTD
AINLEYS INDUSTRIAL ESTATE
ELLAND
WEST YORKSHIRE
HX5 9JP

SPT Hammer Ref:	AR665
Test Date:	12/03/2021
Report Date:	12/03/2021
File Name:	AR665.spt
Test Operator:	JL

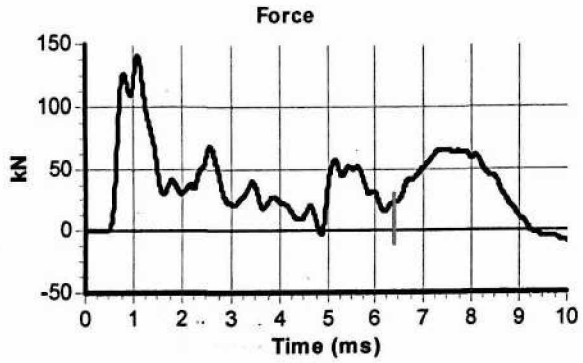
Instrumented Rod Data

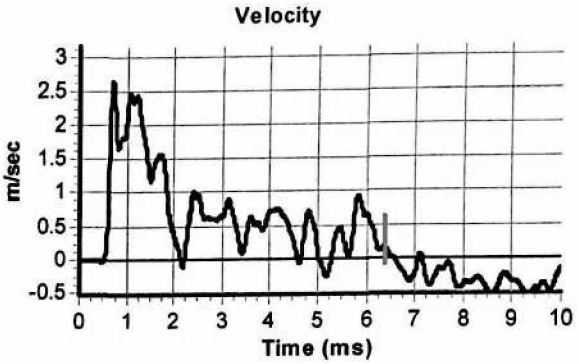
Diameter d_r (mm):	54
Wall Thickness t_r (mm):	6.3
Assumed Modulus E_a (GPa):	208
Accelerometer No.1:	7080
Accelerometer No.2:	11609

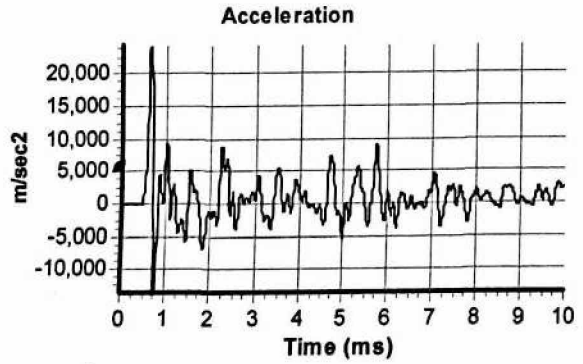
SPT Hammer Information

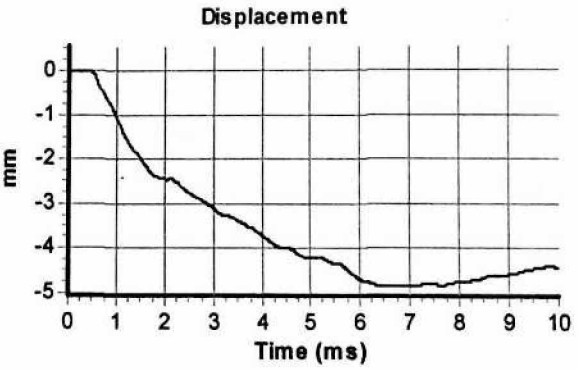
Hammer Mass m (kg):	63.5
Falling Height h (mm):	760
SPT String Length L (m):	10.0

Comments / Location









Calculations

Area of Rod A (mm2):	944
Theoretical Energy E_{theor} (J):	473
Measured Energy E_{meas} (J):	332

Energy Ratio E_r (%): **70**

[redacted]

Signed: C.McCLUSKEY

Title: FITTER

The recommended calibration interval is 12 months

APPENDIX 3

Dynamic Sample Borehole Records

DATA SHEET - Symbols and Abbreviations used on Records

Sample Types

B	Bulk disturbed sample
BLK	Block sample
C	Core sample
D	Small disturbed sample (tub/jar)
E	Environmental test sample
ES	Environmental soil sample
EW	Environmental water sample
G	Gas sample
L	Liner sample
LB	Large bulk disturbed sample
P	Piston sample (PF - failed P sample)
TW	Thin walled push in sample
U	Open Tube - 102mm diameter with blows to take sample. (UF - failed U sample)
UT	Thin wall open drive tube sampler - 102mm diameter with blows to take sample. (UTF - failed UT sample)
V	Vial sample
W	Water sample
#	Sample Not Recovered

Insitu Testing / Properties

CBRP	CBR using TRL probe
CHP	Constant Head Permeability Test
COND	Electrical conductivity
TC	Thermal Conductivity
TR	Thermal Resistivity
HV	Strength from Hand Vane
ICBR	CBR Test
IDEN	Density Test
IRES	Resistivity Test
MEX	CBR using Mexecone Probe Test
PKR	Packer Permeability Test
PLT	Plate Load Test
PP	Strength from Pocket Penetrometer
Temp	Temperature
VHP	Variable Head Permeability Test
VN	Strength from Insitu Vane
w%	Water content

(All other strengths from undrained triaxial testing)

S	Standard Penetration Test (SPT)
C	SPT with cone
N	SPT Result
-/-	Blows/penetration (mm) after seating drive
-*/- (mm)	Total blows/penetration
( )	Extrapolated value

Groundwater

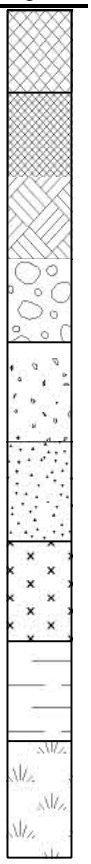
Water Strike

Depth Water Rose To

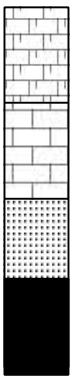
Instrumentation

Strata

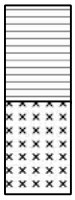
Legend



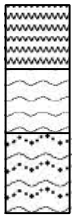
Note: Composite soil types shown by combined symbols



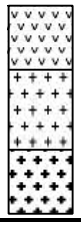
Strata, Continued



Metamorphic Rock



Igneous Rock



Backfill Materials

Rotary Core

RQD	Rock Quality Designation (% of intact core >100mm)
FRACTURE INDEX	Fractures/metre
FRACTURE SPACING (m)	Maximum Minimum
NI	Non-intact core
NR	No core recovery
AZCL	Assumed zone of core loss

(where core recovery is unknown it is assumed to be at the base of the run)

GEOTECHNICS

BOREHOLE RECORD - Dynamic Sampler

Project **HEMPLAND PRIMARY SCHOOL, YORK**
Engineer **MOTT MACDONALD LIMITED**
Borehole **WS01**
Project No **PC218325**

Client **DEPARTMENT FOR EDUCATION**
National Grid Coordinates **462528** E **452937** N
Ground Level **13.37** m OD

Scale 1:50

Depth	Sample Type	Depth Cased & (to Water)	Strength kPa	w %	SPT N	Description	Depth	Legend	Level m OD
							G.L.		13.37
0.00- 0.50	B					MADE GROUND: Dark brown slightly gravelly slightly clayey fine to medium sand with occasional rootlets. Gravel is angular to subrounded fine to coarse of sandstone and brick fragments. Many rootlets to 0.10m depth.			
0.10	D						0.55		12.82
0.10	ES								
0.55	D					MADE GROUND: Firm light orangish brown slightly sandy slightly gravelly clay. Gravel is angular to subangular fine to coarse of mudstone, sandstone and brick fragments.			
0.55	ES						1.20		12.17
1.00- 1.50	B					Firm fissured brown mottled grey and light grey slightly sandy CLAY with some calcareous inclusions (up to 20mm) and occasional sandy pockets (up to 15mm). Fissures are extremely closely spaced, randomly orientated, smooth and dull.			
1.20- 1.65	D	1.00 (DRY)			S13		1.65		11.72
1.50- 2.00	B					Brown slightly gravelly slightly clayey SAND. Gravel is angular to subangular fine to coarse of mudstone and sandstone.			
1.50	D						2.00		11.37
2.00- 2.50	B					Stiff fissured brown mottled grey slightly sandy CLAY with some calcareous inclusions (up to 10mm) and occasional sandy pockets (up to 10mm). Fissures are closely spaced, randomly orientated, smooth and dull.			
2.00- 2.45	D	1.00 (DRY)			S20		2.45		10.92
2.50- 3.00	B					Stiff brown slightly sandy slightly gravelly calcareous CLAY. Gravel is subangular to subrounded fine to coarse of mudstone and sandstone.			
2.50	D								
3.00- 3.50	B			13					
3.00- 3.45	D	1.00 (DRY)			S21				
3.50- 4.00	B								
3.50	D								
4.00- 4.45	D	1.00 (DRY)			S25				
						End of Borehole	4.45		8.92

Boring

Depth	Hole Dia	Technique	Crew
1.20	0.40	Inspection Pit	KR/SR
4.00	0.10	Dynamic Sampler	KR/SR

Progress

Depth of Hole	Depth Cased	Depth to Water	Date	Time
G.L.			26/11/21	08:00
4.45	1.00	DRY	26/11/21	18:00

Groundwater

Depth Struck	Depth Cased	Rose to	in Mins	Depth Sealed	Remarks on Groundwater
					None encountered during sampling.

Remarks

AGS

Inspection pit hand excavated to 1.20m depth and no services were found.
ES sample = 1 x 1 litre plastic tub, 2 x 258ml amber glass jars and 2 x 60ml VOC vials.
Backfill details from base of hole: bentonite up to 0.30m, arisings up to ground level.

Logged by **CP**
Checked by **JK**
Figure **1 of 1**
13/04/2022

Symbols and abbreviations are explained on the accompanying key sheet.

All dimensions are in metres.

Logged in accordance with BS5930:2015 + A1:2020

geotechnics

BOREHOLE RECORD - Dynamic Sampler

Project **HEMPLAND PRIMARY SCHOOL, YORK**
Engineer **MOTT MACDONALD LIMITED**
Borehole **WS02**
Project No **PC218325**

Client **DEPARTMENT FOR EDUCATION**
National Grid Coordinates **462582.3** E **453006.5** N
Ground Level **13.58** m OD

Sampling | Properties | Strata — Scale 1:50

Depth	Sample Type	Depth Cased & (to Water)	Strength kPa	w %	SPT N	Description	Depth	Legend	Level m OD
							G.L.		13.58
0.30	D					MADE GROUND: Dark brown slightly silty slightly gravelly fine to medium sand with occasional rootlets. Gravel is angular to subangular fine to coarse of mudstone, sandstone and brick fragments. Many rootlets to 0.10m depth.			
0.30	ES						0.50		13.08
0.50- 1.00	B								
1.00	D					MADE GROUND: Soft light greyish brown slightly sandy slightly gravelly clay. Gravel is angular to subrounded fine to coarse of mudstone, sandstone and brick fragments.			
1.00	ES						1.00		12.58
1.20- 1.65	D	1.00 (DRY)			S13				
1.50- 2.00	B					Firm fissured brown mottled grey and light grey slightly sandy CLAY with some calcareous inclusions (up to 20mm) and occasional sandy pockets (up to 15mm). Fissures are very closely to extremely closely spaced, randomly orientated, smooth and dull.			
1.50	D								
2.00- 2.45	D	1.00 (DRY)			S20				
							2.20		11.38
2.50- 3.00	B					Stiff brown slightly sandy slightly gravelly calcareous CLAY. Gravel is subangular to subrounded fine to coarse of mudstone and sandstone.			
2.50	D			17					
3.00- 3.45	D	1.00 (DRY)			S23				
3.50- 4.00	B								
3.50	D								
4.00- 4.45	D	1.00 (DRY)			S25				
						End of Borehole	4.45		9.13

Boring | Progress | Groundwater

Depth	Hole Dia	Technique	Crew	Depth of Hole	Depth Cased	Depth to Water	Date	Time	Depth Struck	Depth Cased	Rose to	in Mins	Depth Sealed	Remarks on Groundwater
1.20	0.40	Inspection Pit	KR/SR	G.L.			26/11/21	08:00						None encountered during sampling.
4.00	0.10	Dynamic Sampler	KR/SR	4.45	1.00	DRY	26/11/21	18:00						

Remarks

Inspection pit hand excavated to 1.20m depth and no services were found.
ES sample = 1 x 1 litre plastic tub, 2 x 258ml amber glass jars and 2 x 60ml VOC vials.
A 50mm standpipe was installed to 4.00m with a geowrapped slotted section from 2.00m to 4.00m with upright lockable protective cover. Backfill details from base of hole: gravel filter up to 2.00m, bentonite up to 0.30m, concrete up to ground level.

Symbols and abbreviations are explained on the accompanying key sheet.

All dimensions are in metres.

Logged in accordance with BS5930:2015 + A1:2020

Logged by **CP**
Checked by **JK**
Figure **1 of 1**
13/04/2022

geotechnics

BOREHOLE RECORD - Dynamic Sampler

Project **HEMPLAND PRIMARY SCHOOL, YORK**
Engineer **MOTT MACDONALD LIMITED**
Borehole **WS03**
Project No **PC218325**

Client **DEPARTMENT FOR EDUCATION**
National Grid Coordinates **462616.6** E **452943.1** N
Ground Level **13.00** m OD

Scale 1:50

Depth	Sample Type	Depth Cased & (to Water)	Strength kPa	w %	SPT N	Description	Depth	Legend	Level m OD
							G.L.		13.00
0.10	ES					MADE GROUND: Asphalt.	0.15		12.85
0.30- 0.50	B					MADE GROUND: Light brownish grey mottled red slightly sandy gravel of angular to subangular fine to coarse of mudstone, sandstone, concrete, asphalt and brick fragments.	0.50		12.50
0.30	ES								
0.50- 1.00	B								
0.50	D								
0.80	D								
0.80	ES					POSSIBLE MADE GROUND: Firm light greyish brown slightly sandy slightly gravelly clay. Gravel is angular to subrounded fine to coarse of mudstone, sandstone and brick fragments.			
1.20- 1.65	D	1.00 (DRY)			S12				
1.50- 2.00	B						1.50		11.50
1.50	D					Firm fissured brown mottled grey and light grey slightly sandy CLAY with some calcareous inclusions (up to 20mm) and occasional sandy pockets (up to 15mm). Fissures are extremely closely spaced, randomly orientated, smooth and dull.			
2.00- 2.45	D	1.00 (DRY)			S24		2.00		11.00
2.50- 3.00	B					Stiff brown slightly sandy slightly gravelly calcareous CLAY. Gravel is subangular to subrounded fine to coarse of mudstone and sandstone.			
2.50	D			13					
2.50- 3.00	D								
3.00- 3.45	D	1.00 (DRY)			S27				
3.50- 4.00	B			13					
3.50	D								
4.00- 4.45	D	1.00 (DRY)			S29				
						End of Borehole	4.45		8.55

Boring

Depth	Hole Dia	Technique	Crew
1.20	0.40	Inspection Pit	KR/SR
4.00	0.10	Dynamic Sampler	KR/SR

Progress

Depth of Hole	Depth Cased	Depth to Water	Date	Time
G.L.			26/11/21	08:00
4.45	1.00	DRY	26/11/21	18:00

Groundwater

Depth Struck	Depth Cased	Rose to	in Mins	Depth Sealed	Remarks on Groundwater
					None encountered during sampling.

Remarks

Tarmacadam broken out using hydraulic breaker. Inspection pit hand excavated to 1.20m depth and no services were found.
ES sample = 1 x 1 litre plastic tub, 2 x 258ml amber glass jars and 2 x 60ml VOC vials.
Backfill details from base of hole: bentonite up to 0.30m, concrete up to 0.15m, asphalt up to ground level.

Logged by CP
Checked by JK
Figure 1 of 1
13/04/2022

Symbols and abbreviations are explained on the accompanying key sheet.

All dimensions are in metres.

Logged in accordance with BS5930:2015 + A1:2020

geotechnics

Fieldwork Results - *SPT Results Summary*

Project HEMPLAND PRIMARY SCHOOL, YORK **Project No** PC218325

Client Department for Education

Hole	Depth m bgl	Level m OD	Type	SWP (mm)	Seating Drive		Test Drive				SPT 'N' Value	Uncorrected SPT 'N'
					0-75 (mm)	75-150 (mm)	0-75 (mm)	75-150 (mm)	150-225 (mm)	225-300 (mm)		10 20 30 40 50
WS01	1.20	12.17	S	-	2	3	3	3	3	4	13	*
WS01	2.00	11.37	S	-	3	3	4	5	5	6	20	*
WS01	3.00	10.37	S	-	3	4	5	5	5	6	21	*
WS01	4.00	9.37	S	-	4	4	5	6	6	8	25	*

Driller	Kris Roebuck
Hammer No.	AR2475
Energy Ratio, Er (%)	66.00
Calibration Date	08/11/2021

Remarks

-/- Blows/penetration (mm) after seating
-*/- Total blows/penetration (mm)
SWP Penetration under own weight (mm)

S - Standard Penetration Test (SPT)
C - SPT with cone
L - Split Spoon with liner used

GEOTECHNICS

Fieldwork Results - *SPT Results Summary*

Project HEMPLAND PRIMARY SCHOOL, YORK **Project No** PC218325

Client Department for Education

Hole	Depth m bgl	Level m OD	Type	SWP (mm)	Seating Drive		Test Drive				SPT 'N' Value	Uncorrected SPT 'N' 10 20 30 40 50
					0-75 (mm)	75-150 (mm)	0-75 (mm)	75-150 (mm)	150-225 (mm)	225-300 (mm)		
WS02	1.20	12.38	S	-	3	3	3	3	3	4	13	*
WS02	2.00	11.58	S	-	4	4	4	5	5	6	20	*
WS02	3.00	10.58	S	-	4	4	4	5	6	8	23	*
WS02	4.00	9.58	S	-	4	5	5	6	7	7	25	*

Driller	Kris Roebuck
Hammer No.	AR2475
Energy Ratio, Er (%)	66.00
Calibration Date	08/11/2021

Remarks

-/- Blows/penetration (mm) after seating
-*/- Total blows/penetration (mm)
SWP Penetration under own weight (mm)

S - Standard Penetration Test (SPT)
C - SPT with cone
L - Split Spoon with liner used

GEOTECHNICS

Fieldwork Results - *SPT Results Summary*

Project HEMPLAND PRIMARY SCHOOL, YORK **Project No** PC218325

Client Department for Education

Hole	Depth m bgl	Level m OD	Type	SWP (mm)	Seating Drive		Test Drive				SPT 'N' Value	Uncorrected SPT 'N'
					0-75 (mm)	75-150 (mm)	0-75 (mm)	75-150 (mm)	150-225 (mm)	225-300 (mm)		10 20 30 40 50
WS03	1.20	11.80	S	-	2	2	2	2	4	4	12	*
WS03	2.00	11.00	S	-	3	4	5	5	7	7	24	*
WS03	3.00	10.00	S	-	4	5	6	6	7	8	27	*
WS03	4.00	9.00	S	-	4	5	6	7	7	9	29	*

Driller	Kris Roebuck
Hammer No.	AR2475
Energy Ratio, Er (%)	66.00
Calibration Date	08/11/2021

Remarks

-/- Blows/penetration (mm) after seating
-*/- Total blows/penetration (mm)
SWP Penetration under own weight (mm)

S - Standard Penetration Test (SPT)
C - SPT with cone
L - Split Spoon with liner used

GEOTECHNICS

SPT Hammer Energy Test Report

in accordance with BSEN ISO 22476-3:2005

CRAIG'S Rig
SYD06

ARCHWAY ENGINEERING (UK) LTD
AINLEYS INDUSTRIAL ESTATE
ELLAND
WEST YORKSHIRE
HX5 9JP

SPT Hammer Ref:	AR2475
Test Date:	08/11/2021
Report Date:	08/11/2021
File Name:	AR2475.spt
Test Operator:	KM

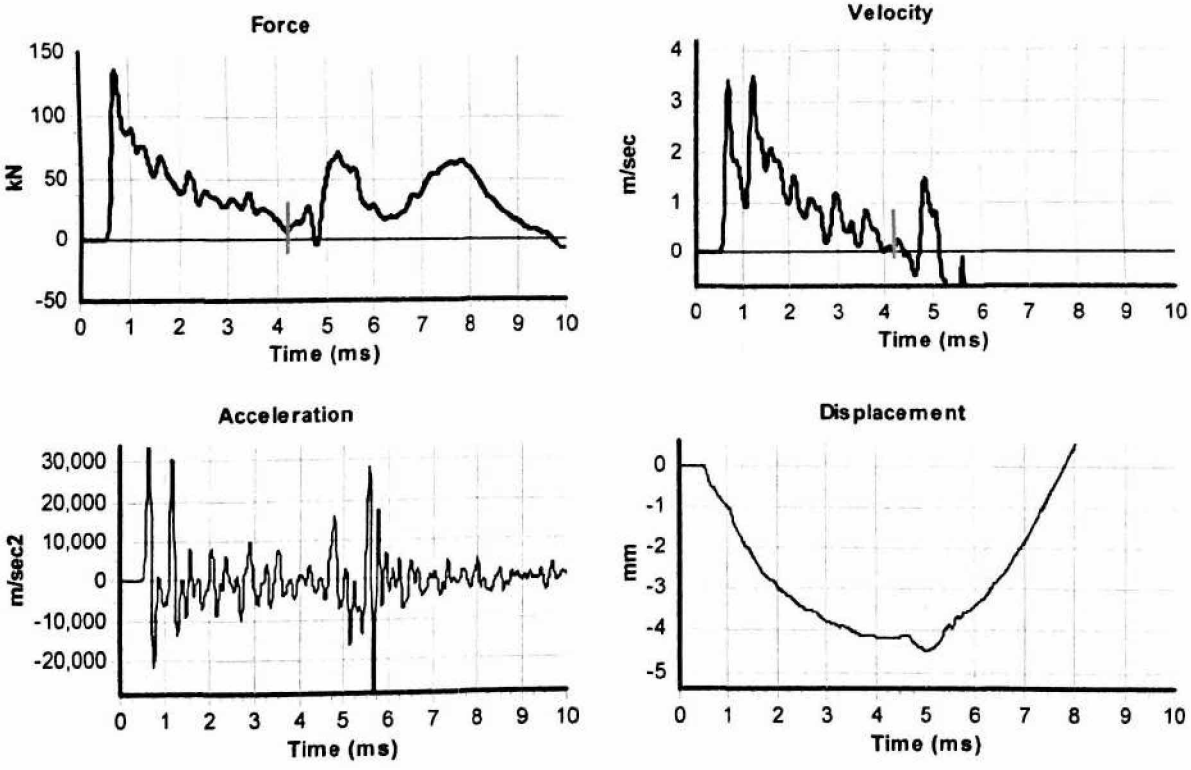
Instrumented Rod Data

Diameter d_r (mm):	54
Wall Thickness t_r (mm):	6.0
Assumed Modulus E_a (GPa):	200
Accelerometer No.1:	7080
Accelerometer No.2:	11609

SPT Hammer Information

Hammer Mass m (kg):	63.5
Falling Height h (mm):	760
SPT String Length L (m):	12.0

Comments / Location



Calculations

Area of Rod A (mm2):	905
Theoretical Energy E_{theor} (J):	473
Measured Energy E_{meas} (J):	310

Energy Ratio E_r (%): **66**

[redacted]

Title: SALES

The recommended calibration interval is 12 months

APPENDIX 4

Dynamic Cone Penetration Tests

In Situ Testing - *Dynamic Cone Penetration Test*

Project HEMPLAND PRIMARY SCHOOL, YORK

Client Department for Education

Location No. DCP01
Project No. PC218325
Test No. 1
Test Date 24/11/2021

Blows No.	Blows Total	Rod No.	Reading (mm)	Corrected Depth (mm)
0	0	1	115	80
1	1	1	123	88
1	2	1	123	88
1	3	1	130	95
1	4	1	141	106
1	5	1	150	115
1	6	1	159	124
1	7	1	163	128
1	8	1	167	132
2	10	1	174	139
2	12	1	180	145
5	17	1	194	159
5	22	1	220	185
2	24	1	230	195
2	26	1	242	207
2	28	1	254	219
2	30	1	265	230
2	32	1	281	246
2	34	1	293	258
2	36	1	304	269
2	38	1	320	285

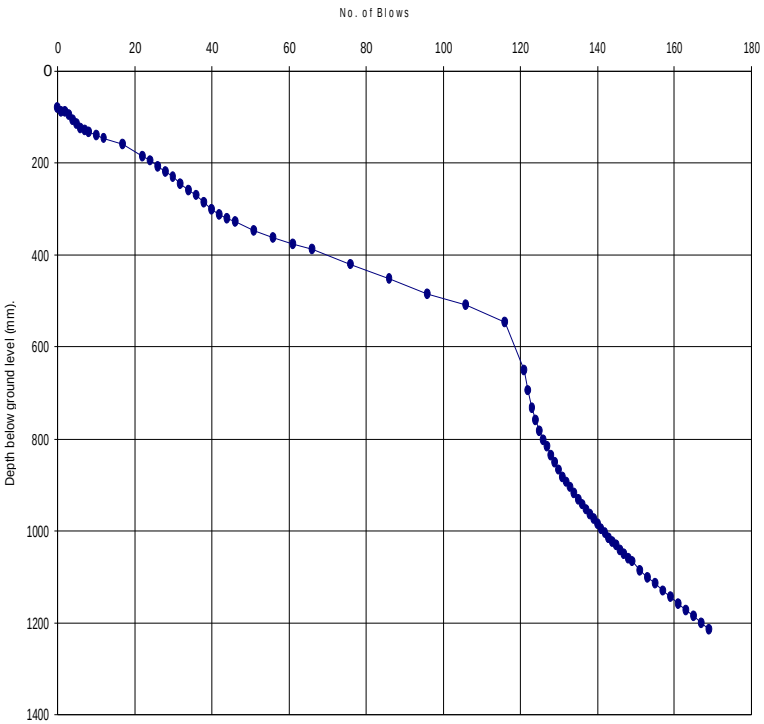
Blows No.	Blows Total	Rod No.	Reading (mm)	Corrected Depth (mm)
2	40	1	335	300
2	42	1	347	312
2	44	1	356	321
2	46	1	363	328
5	51	1	382	347
5	56	1	397	362
5	61	1	410	375
5	66	1	421	386
10	76	1	455	420
10	86	1	487	452
10	96	1	520	485
10	106	1	544	509
10	116	1	581	546
5	121	1	685	650
1	122	1	730	695
1	123	1	766	731
1	124	1	793	758
1	125	1	817	782
1	126	1	837	802
1	127	1	852	817
1	128	1	871	836

Blows No.	Blows Total	Rod No.	Reading (mm)	Corrected Depth (mm)
1	129	1	886	851
1	130	2	63	867
1	131	2	79	883
1	132	2	89	893
1	133	2	101	905
1	134	2	114	918
1	135	2	128	932
1	136	2	138	942
1	137	2	149	953
1	138	2	160	964
1	139	2	170	974
1	140	2	181	985
1	141	2	192	996
1	142	2	200	1004
1	143	2	211	1015
1	144	2	220	1024
1	145	2	227	1031
1	146	2	238	1042
1	147	2	246	1050
1	148	2	256	1060
1	149	2	263	1067

Test Started at	0.08 **m**
Operator	CP
Checked by	JK

Rod No.	Zero Reading (mm)
1	115
2	47

Depth bgl (mm) Top	Depth bgl (mm) Base	Blows No. Top	Blows No. Base	DCP mm/blow	CBR %
80	312	0	42	33	7.5
312	546	42	116	12	21.3
546	817	116	127	25	10.2
817	1215	127	169	9	28.0



Remarks
CBR estimated using the correlation in the HA Manual for Roads and Bridges, CS229, Rev. 0, 2020
Dynamic Cone Penetration Test DCP01 located adjacent to Cable Percussive Borehole CP01.

Printed: 18/02/2022

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In Situ Testing - *Dynamic Cone Penetration Test*

Project HEMPLAND PRIMARY SCHOOL, YORK

Client Department for Education

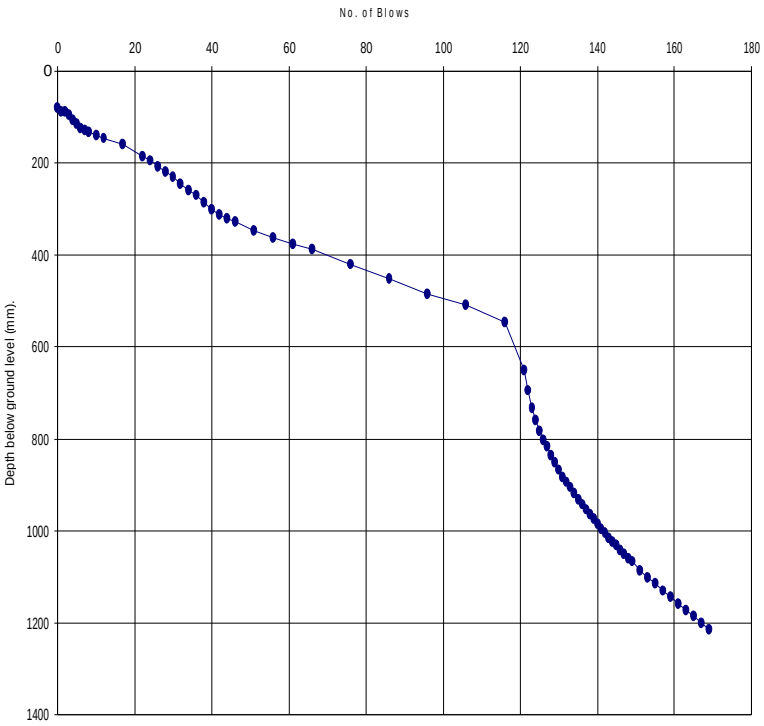
Location No. DCP01
Project No. PC218325
Test No. 1
Test Date 24/11/2021

Blows No.	Blows Total	Rod No.	Reading (mm)	Corrected Depth (mm)
2	151	2	283	1087
2	153	2	297	1101
2	155	2	311	1115
2	157	2	326	1130
2	159	2	340	1144
2	161	2	355	1159
2	163	2	369	1173
2	165	2	382	1186
2	167	2	397	1201
2	169	2	411	1215

Test Started at	0.08 **m**
Operator	CP
Checked by	JK

Rod No.	Zero Reading (mm)
1	115
2	47

Depth bgl (mm) Top	Depth bgl (mm) Base	Blows No. Top	Blows No. Base	DCP mm/blow	CBR %
80	312	0	42	33	7.5
312	546	42	116	12	21.3
546	817	116	127	25	10.2
817	1215	127	169	9	28.0



Remarks
CBR estimated using the correlation in the HA Manual for Roads and Bridges, CS229, Rev. 0, 2020
Dynamic Cone Penetration Test DCP01 located adjacent to Cable Percussive Borehole CP01.

Printed: 18/02/2022

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In Situ Testing - Dynamic Cone Penetration Test

Project HEMPLAND PRIMARY SCHOOL, YORK

Client Department for Education

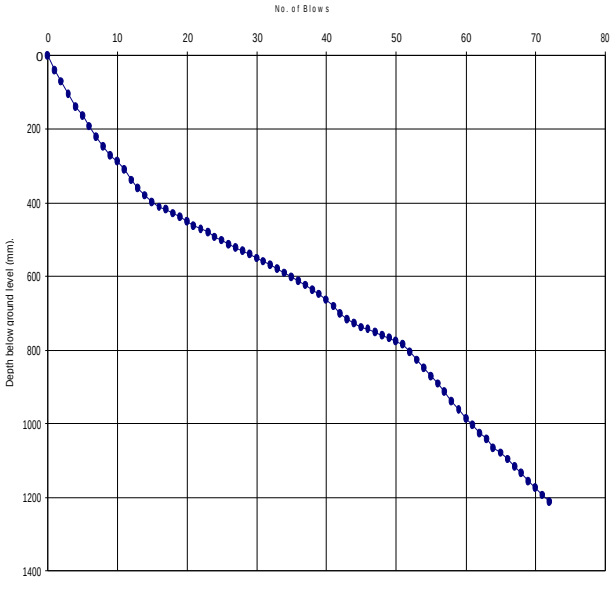
Location No. DCP02
Project No. PC218325
Test No. 1
Test Date 23/11/2021

Blows No.	Blows Total	Rod No.	Reading (mm)	Corrected Depth (mm)
0	0	1	92	0
1	1	1	131	39
1	2	1	162	70
1	3	1	195	103
1	4	1	231	139
1	5	1	255	163
1	6	1	284	192
1	7	1	314	222
1	8	1	340	248
1	9	1	363	271
1	10	1	380	288
1	11	1	402	310
1	12	1	431	339
1	13	1	453	361
1	14	1	472	380
1	15	1	489	397
1	16	1	503	411
1	17	1	510	418
1	18	1	521	429
1	19	1	531	439
1	20	1	544	452
1	21	1	555	463
1	22	1	562	470
1	23	1	573	481
1	24	1	585	493
1	25	1	594	502
1	26	1	605	513
1	27	1	614	522
1	28	1	623	531
1	29	1	632	540
1	30	1	642	550
1	31	1	652	560
1	32	1	660	568
1	33	1	671	579
1	34	1	683	591
1	35	1	693	601
1	36	1	704	612
1	37	1	715	623
1	38	1	728	636
1	39	1	739	647
1	40	1	755	663
1	41	1	774	682
1	42	1	793	701
1	43	1	809	717
1	44	1	820	728
1	45	1	830	738
1	46	1	836	744
1	47	1	843	751
1	48	1	852	760
1	49	2	11	767
1	50	2	20	776
1	51	2	30	786
1	52	2	49	805
1	53	2	71	827
1	54	2	93	849
1	55	2	116	872
1	56	2	135	891
1	57	2	157	913
1	58	2	183	939
1	59	2	207	963
1	60	2	230	986
1	61	2	249	1005
1	62	2	271	1027

Test Started at	0.00 **m**
Operator	CP
Checked by	JK

Rod No.	Zero Reading (mm)
1	92
2	4

Depth bgl (mm) Top	Depth bgl (mm) Base	Blows No. Top	Blows No. Base	DCP mm/blow	CBR %
0	380	0	15	48	5.1
380	786	15	52	11	24.0
786	1212	52	73	20	12.5



Remarks
CBR estimated using the correlation in the HA Manual for Roads and Bridges, CS229, Rev. 0, 2020
Dynamic Cone Penetration Test DCP02 located adjacent to Dynamic Sample Borehole WS02.

Printed: 18/02/2022

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In Situ Testing - *Dynamic Cone Penetration Test*

Project HEMPLAND PRIMARY SCHOOL, YORK

Client Department for Education

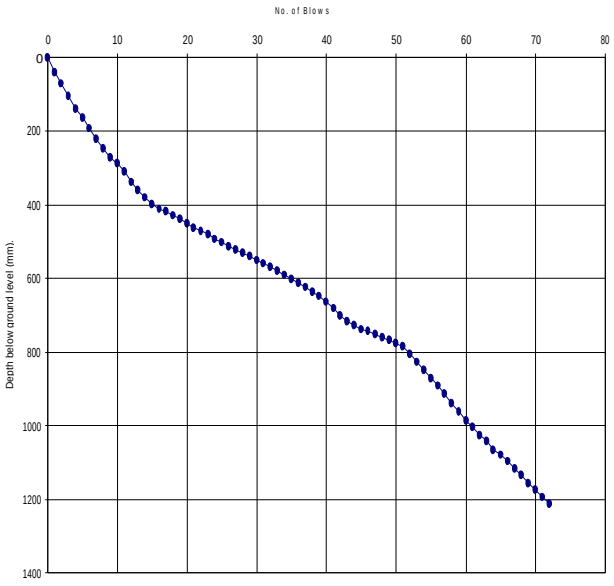
Location No. DCP02
Project No. PC218325
Test No. 1
Test Date 23/11/2021

Blows No.	Blows Total	Rod No.	Reading (mm)	Corrected Depth (mm)
1	63	2	286	1042
1	64	2	310	1066
1	65	2	323	1079
1	66	2	342	1098
1	67	2	361	1117
1	68	2	379	1135
1	69	2	400	1156
1	70	2	419	1175
1	71	2	438	1194
1	72	2	456	1212

Test Started at	0.00 **m**
Operator	CP
Checked by	JK

Rod No.	Zero Reading (mm)
1	92
2	4

Depth bgl (mm) Top	Depth bgl (mm) Base	Blows No. Top	Blows No. Base	DCP mm/blow	CBR %
0	380	0	15	48	5.1
380	786	15	52	11	24.0
786	1212	52	73	20	12.5



Remarks
CBR estimated using the correlation in the HA Manual for Roads and Bridges, CS229, Rev. 0, 2020
Dynamic Cone Penetration Test DCP02 located adjacent to Dynamic Sample Borehole WS02.

Printed: 18/02/2022

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In Situ Testing - *Dynamic Cone Penetration Test*

Project HEMPLAND PRIMARY SCHOOL, YORK

Client Department for Education

Location No. DCP03
Project No. PC218325
Test No. 1
Test Date 23/11/2021

Blows No.	Blows Total	Rod No.	Reading (mm)	Corrected Depth (mm)
0	0	1	111	0
1	1	1	132	21
1	2	1	141	30
1	3	1	147	36
1	4	1	157	46
1	5	1	160	49
1	6	1	167	56
1	7	1	170	59
1	8	1	181	70
1	9	1	185	74
1	10	1	189	78
2	12	1	201	90
2	14	1	209	98
2	16	1	220	109
2	18	1	222	111
5	23	1	234	123
5	28	1	249	138
5	33	1	260	149
5	38	1	285	174
5	43	1	304	193
5	48	1	317	206

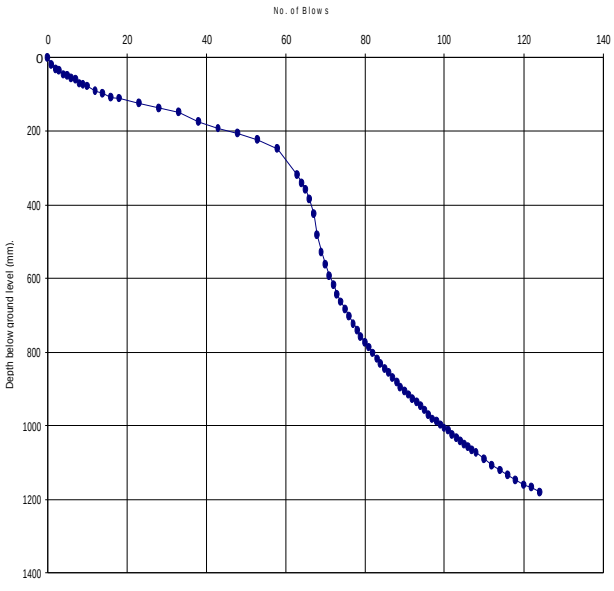
Blows No.	Blows Total	Rod No.	Reading (mm)	Corrected Depth (mm)
5	53	1	334	223
5	58	1	359	248
5	63	1	430	319
1	64	1	452	341
1	65	1	469	358
1	66	1	495	384
1	67	1	535	424
1	68	1	593	482
1	69	1	639	528
1	70	1	673	562
1	71	1	704	593
1	72	1	729	618
1	73	1	754	643
1	74	1	775	664
1	75	1	795	684
1	76	1	814	703
1	77	1	834	723
1	78	1	853	742
1	79	2	37	759
1	80	2	51	773
1	81	2	66	788

Blows No.	Blows Total	Rod No.	Reading (mm)	Corrected Depth (mm)
1	82	2	80	802
1	83	2	96	818
1	84	2	109	831
1	85	2	122	844
1	86	2	134	856
1	87	2	148	870
1	88	2	160	882
1	89	2	173	895
1	90	2	185	907
1	91	2	194	916
1	92	2	205	927
1	93	2	214	936
1	94	2	224	946
1	95	2	235	957
1	96	2	248	970
1	97	2	259	981
1	98	2	266	988
1	99	2	275	997
1	100	2	284	1006
1	101	2	292	1014
1	102	2	301	1023

Test Started at	0.00 **m**
Operator	CP
Checked by	JK

Rod No.	Zero Reading (mm)
1	111
2	20

Depth bgl (mm) Top	Depth bgl (mm) Base	Blows No. Top	Blows No. Base	DCP mm/blow	CBR %
0	111	0	18	111	2.1
111	248	18	58	9	29.1
248	358	58	65	16	16.4
358	618	65	72	37	6.6
618	1006	72	100	14	18.8
1006	1181	100	124	7	37.0



Remarks
CBR estimated using the correlation in the HA Manual for Roads and Bridges, CS229, Rev. 0, 2020
Dynamic Cone Penetration Test DCP03 located adjacent to Dynamic Sample Borehole WS03.

Printed: 18/02/2022

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In Situ Testing - *Dynamic Cone Penetration Test*

Project HEMPLAND PRIMARY SCHOOL, YORK

Client Department for Education

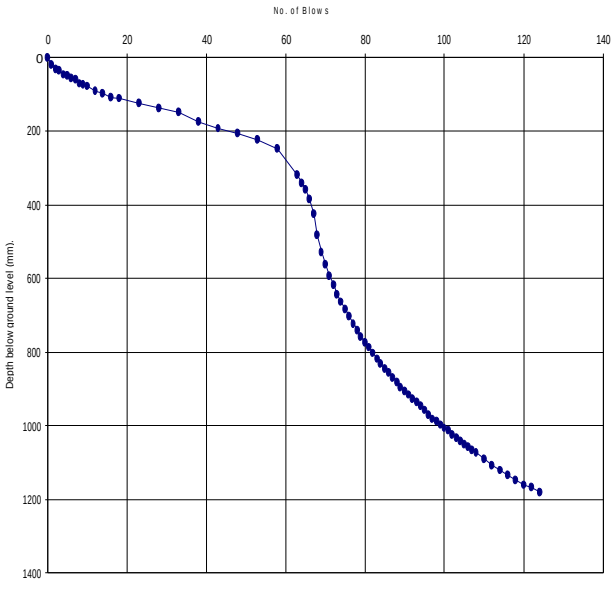
Location No. DCP03
Project No. PC218325
Test No. 1
Test Date 23/11/2021

Blows No.	Blows Total	Rod No.	Reading (mm)	Corrected Depth (mm)
1	103	2	311	1033
1	104	2	319	1041
1	105	2	328	1050
1	106	2	336	1058
1	107	2	343	1065
1	108	2	350	1072
2	110	2	368	1090
2	112	2	385	1107
2	114	2	400	1122
2	116	2	413	1135
2	118	2	426	1148
2	120	2	439	1161
2	122	2	445	1167
2	124	2	459	1181

Test Started at	0.00 **m**
Operator	CP
Checked by	JK

Rod No.	Zero Reading (mm)
1	111
2	20

Depth bgl (mm) Top	Depth bgl (mm) Base	Blows No. Top	Blows No. Base	DCP mm/blow	CBR %
0	111	0	18	111	2.1
111	248	18	58	9	29.1
248	358	58	65	16	16.4
358	618	65	72	37	6.6
618	1006	72	100	14	18.8
1006	1181	100	124	7	37.0



Remarks
CBR estimated using the correlation in the HA Manual for Roads and Bridges, CS229, Rev. 0, 2020
Dynamic Cone Penetration Test DCP03 located adjacent to Dynamic Sample Borehole WS03.

Printed: 18/02/2022

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In Situ Testing - *Dynamic Cone Penetration Test*

Project HEMPLAND PRIMARY SCHOOL, YORK

Client Department for Education

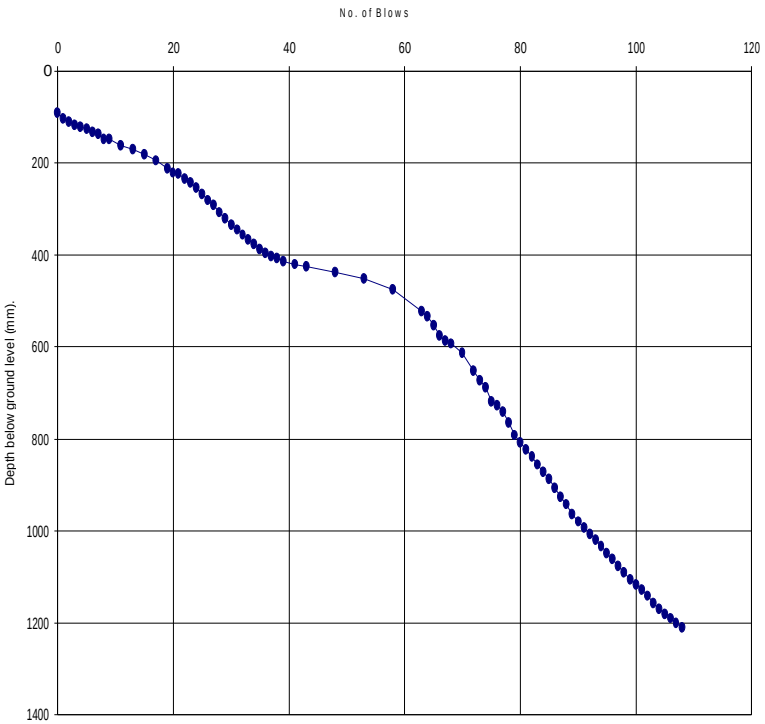
Location No. DCP04
Project No. PC218325
Test No. 1
Test Date 22/11/2021

Blows No.	Blows Total	Rod No.	Reading (mm)	Corrected Depth (mm)
0	0	1	122	90
1	1	1	137	105
1	2	1	142	110
1	3	1	149	117
1	4	1	154	122
1	5	1	159	127
1	6	1	165	133
1	7	1	170	138
1	8	1	180	148
1	9	1	181	149
2	11	1	193	161
2	13	1	203	171
2	15	1	214	182
2	17	1	226	194
2	19	1	245	213
1	20	1	253	221
1	21	1	256	224
1	22	1	267	235
1	23	1	275	243
1	24	1	286	254
1	25	1	300	268
1	26	1	313	281
1	27	1	324	292
1	28	1	340	308
1	29	1	353	321
1	30	1	366	334
1	31	1	378	346
1	32	1	389	357
1	33	1	400	368
1	34	1	408	376
1	35	1	419	387
1	36	1	427	395
1	37	1	435	403
1	38	1	440	408
1	39	1	445	413
2	41	1	453	421
2	43	1	456	424
5	48	1	470	438
5	53	1	483	451
5	58	1	507	475
5	63	1	554	522
1	64	1	564	532
1	65	1	585	553
1	66	1	606	574
1	67	1	619	587
1	68	1	625	593
2	70	1	644	612
2	72	1	685	653
1	73	1	704	672
1	74	1	720	688
1	75	1	751	719
1	76	1	760	728
1	77	1	774	742
1	78	1	797	765
1	79	1	823	791
1	80	1	839	807
1	81	1	854	822
1	82	1	871	839
1	83	1	888	856
1	84	2	66	872
1	85	2	81	887
1	86	2	101	907
1	87	2	121	927

Test Started at	0.09 **m**
Operator	CP
Checked by	JK

Rod No.	Zero Reading (mm)
1	122
2	50

Depth bgl (mm) Top	Depth bgl (mm) Base	Blows No. Top	Blows No. Base	DCP mm/blow	CBR %
90	254	0	24	18	14.0
254	413	24	39	18	14.5
413	475	39	58	3	86.5
475	1210	58	108	15	17.6



Remarks
CBR estimated using the correlation in the HA Manual for Roads and Bridges, CS229, Rev. 0, 2020
Dynamic Cone Penetration Test DCP04 located adjacent to Cable Percussive Borehole CP04.

Printed: 18/02/2022

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In Situ Testing - *Dynamic Cone Penetration Test*

Project HEMPLAND PRIMARY SCHOOL, YORK

Client Department for Education

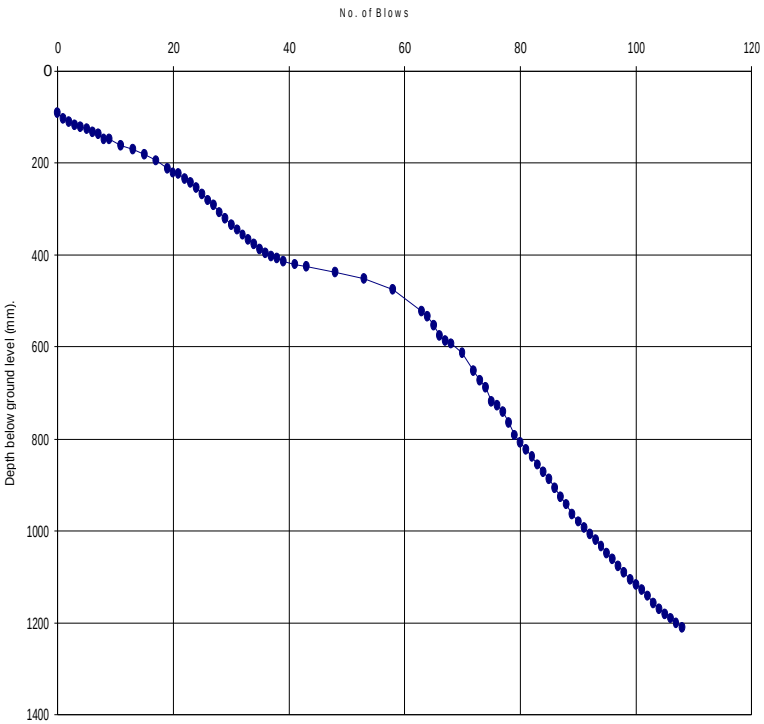
Location No. DCP04
Project No. PC218325
Test No. 1
Test Date 22/11/2021

Blows No.	Blows Total	Rod No.	Reading (mm)	Corrected Depth (mm)
1	88	2	137	943
1	89	2	158	964
1	90	2	174	980
1	91	2	187	993
1	92	2	200	1006
1	93	2	214	1020
1	94	2	226	1032
1	95	2	242	1048
1	96	2	256	1062
1	97	2	271	1077
1	98	2	285	1091
1	99	2	300	1106
1	100	2	310	1116
1	101	2	322	1128
1	102	2	336	1142
1	103	2	350	1156
1	104	2	363	1169
1	105	2	375	1181
1	106	2	384	1190
1	107	2	395	1201
1	108	2	404	1210

Test Started at	0.09 **m**
Operator	CP
Checked by	JK

Rod No.	Zero Reading (mm)
1	122
2	50

Depth bgl (mm) Top	Depth bgl (mm) Base	Blows No. Top	Blows No. Base	DCP mm/blow	CBR %
90	254	0	24	18	14.0
254	413	24	39	18	14.5
413	475	39	58	3	86.5
475	1210	58	108	15	17.6



Remarks
CBR estimated using the correlation in the HA Manual for Roads and Bridges, CS229, Rev. 0, 2020
Dynamic Cone Penetration Test DCP04 located adjacent to Cable Percussive Borehole CP04.

Printed: 18/02/2022

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In Situ Testing - *Dynamic Cone Penetration Test*

Project HEMPLAND PRIMARY SCHOOL, YORK

Client Department for Education

Location No. DCP05
Project No. PC218325
Test No. 1
Test Date 23/11/2021

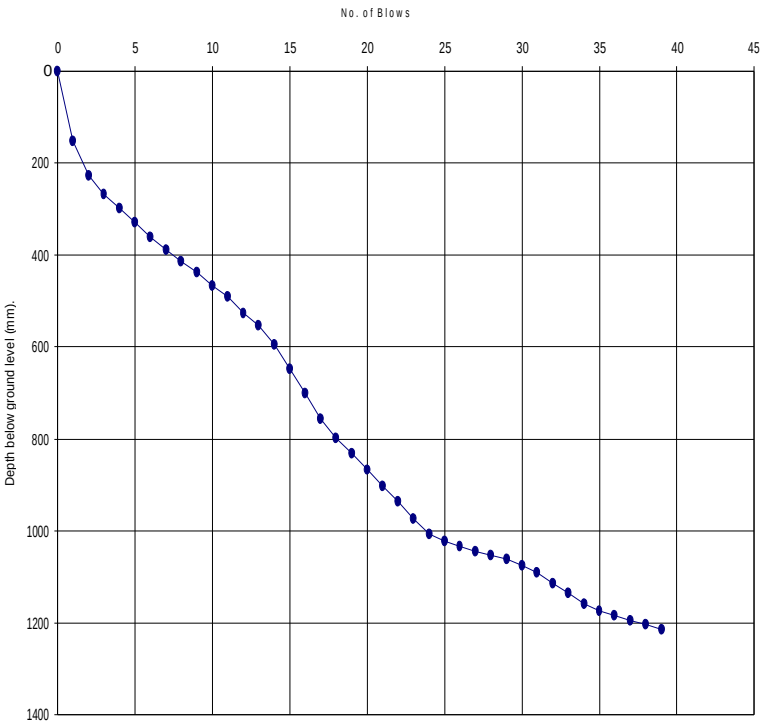
Blows No.	Blows Total	Rod No.	Reading (mm)	Corrected Depth (mm)
0	0	1	63	0
1	1	1	216	153
1	2	1	291	228
1	3	1	330	267
1	4	1	361	298
1	5	1	393	330
1	6	1	423	360
1	7	1	452	389
1	8	1	476	413
1	9	1	502	439
1	10	1	530	467
1	11	1	553	490
1	12	1	589	526
1	13	1	615	552
1	14	1	658	595
1	15	1	711	648
1	16	1	764	701
1	17	1	820	757
1	18	1	861	798
1	19	2	52	832
1	20	2	86	866

Blows No.	Blows Total	Rod No.	Reading (mm)	Corrected Depth (mm)
1	21	2	123	903
1	22	2	156	936
1	23	2	193	973
1	24	2	226	1006
1	25	2	241	1021
1	26	2	253	1033
1	27	2	264	1044
1	28	2	272	1052
1	29	2	281	1061
1	30	2	295	1075
1	31	2	311	1091
1	32	2	334	1114
1	33	2	355	1135
1	34	2	379	1159
1	35	2	394	1174
1	36	2	404	1184
1	37	2	414	1194
1	38	2	423	1203
1	39	2	435	1215

Test Started at	0.00 **m**
Operator	CP
Checked by	JK

Rod No.	Zero Reading (mm)
1	63
18	18

Depth bgl (mm) Top	Depth bgl (mm) Base	Blows No. Top	Blows No. Base	DCP mm/blow	CBR %
0	228	0	2	228	1.0
228	595	2	14	73	3.2
595	1003	14	24	41	6.0
1003	1075	24	30	12	21.8
1075	1215	30	39	16	16.6



Remarks
CBR estimated using the correlation in the HA Manual for Roads and Bridges, CS229, Rev. 0, 2020
Dynamic Cone Penetration Test DCP05 located adjacent to Cable Percussive Borehole CP03.

Printed: 18/02/2022

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APPENDIX 5

Monitoring Results

FIELDWORK - *Water Level Monitoring*

Project HEMPLAND PRIMARY SCHOOL, YORK

Project No PC218325

Client Department for Education

Sheet No 1

Borehole		CP01		CP02		CP03		CP04		WS02			
Instrument (dia. mm)		S (50mm)		S (50mm)		S (50mm)		S (50mm)		S (50mm)			
Depth to Base (m)		8.00		8.00		8.00		8.00 (Note 1)		4.00			
Filter Zone (m)		1.00-8.00		1.00-8.00		1.00-8.00		1.50-8.00		2.00-4.00			
Level		13.65 m OD		13.47 m OD		13.01 m OD		12.08 m OD		13.58 m OD			
Date	Time	Depth (m)	Level	Depth (m)	Level	Depth (m)	Level	Depth (m)	Level	Depth (m)	Level	Depth (m)	Level
2 Dec 2021		1.92	*11.73*	7.78	*5.69*	5.00	*8.01*	1.10	*10.98*	3.58	*10.00*		
9 Dec 2021		1.87	*11.78*	5.02	*8.45*	0.30	*12.71*	1.12	*10.96*	DRY			
16 Dec 2021		1.82	*11.83*	5.02	*8.45*	0.75	*12.26*	1.38	*10.70*	DRY			
23 Dec 2021		1.76	*11.89*	4.42	*9.05*	0.80	*12.21*	1.35	*10.73*	DRY			

Remarks Note 1 - Installation cover flooded prior to monitoring during rounds 3 and 4.

Symbols and abbreviations are explained on the accompanying key sheet.

All dimensions are in metres.

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FIELDWORK - *Insitu Gas Monitoring - Daily Record*

Project **HEMPLAND PRIMARY SCHOOL, YORK**

Project No **PC218325**

Date **02/12/2021**

Client **Department for Education**

Sheet No. **1 (1 of 4)**

Equipment Used

GI Infra Red Gas Analyser MK1 ☐ MK2 ☐ GA2000 ☐

Other **Gas Data GFM435;**

Weather / Site Conditions

Wind	Still ☐	Light ☒	Moderate ☐	Strong ☐
Cloud Cover	None ☐	Slight ☐	Cloudy ☐	Overcast ☒
Precipitation	Dry ☒	Slight ☐	Moderate ☐	Heavy ☐

Borehole	Depth to Base (m)	Depth to Water (m bgl)	Electrical Conductivity (uS/cm)	pH (pH Units)	Redox (mV)	Dissolved Oxygen (mg/l)	Methane (Peak) CH4 (% VOL)	Methane (Steady) CH4 (% VOL)	Remarks
CP01	**8.00**						**<0.1**	**<0.1**	
CP02	**8.00**						**<0.1**	**<0.1**	
CP03	**8.00**						**<0.1**	**<0.1**	
CP04	**8.00**						**<0.1**	**<0.1**	
WS02	**4.00**						**<0.1**	**<0.1**	

Remarks

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FIELDWORK - *Insitu Gas Monitoring - Daily Record*

Project **HEMPLAND PRIMARY SCHOOL, YORK**

Project No **PC218325**

Date **02/12/2021**

Client **Department for Education**

Sheet No. **1 (2 of 4)**

Equipment Used

GI Infra Red Gas Analyser MK1 ☐ MK2 ☐ GA2000 ☐

Other **Gas Data GFM435;**

Weather / Site Conditions

Wind	Still	☐	Light	x	Moderate	☐	Strong ☐
Cloud Cover	None	☐	Slight	☐	Cloudy	☐	Overcast x
Precipitation	Dry	x	Slight	☐	Moderate	☐	Heavy ☐

Borehole	Depth to Base (m)	Carbon Dioxide (Peak) (% VOL)	Carbon Dioxide (Steady) (% VOL)	Oxygen (Peak) (% VOL)	Oxygen (Steady) (% VOL)	Hydrogen Sulphide H2S (ppm)	Carbon Monoxide CO (ppm)	Diff. Pressure (mbar)	Remarks
CP01	**8.00**	**0.6**	**0.6**	**19.8**	**19.8**	**<1**	**<1**	**1015**	
CP02	**8.00**	**1.4**	**1.4**	**17.8**	**17.8**	**<1**	**<1**	**1015**	
CP03	**8.00**	**0.3**	**0.3**	**18.6**	**18.6**	**<1**	**<1**	**1015**	
CP04	**8.00**	**0.4**	**0.4**	**18.9**	**18.9**	**<1**	**<1**	**1016**	
WS02	**4.00**	**2.3**	**2.3**	**17.6**	**17.6**	**<1**	**<1**	**1015**	

Remarks

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FIELDWORK - *Insitu Gas Monitoring - Daily Record*

Project **HEMPLAND PRIMARY SCHOOL, YORK**

Project No **PC218325**

Date **02/12/2021**

Client **Department for Education**

Sheet No. **1 (3 of 4)**

Equipment Used

GI Infra Red Gas Analyser MK1 ☐ MK2 ☐ GA2000 ☐

Other **Gas Data GFM435;**

Weather / Site Conditions

Wind	Still	☐	Light	x	Moderate	☐	Strong ☐
Cloud Cover	None	☐	Slight	☐	Cloudy	☐	Overcast x
Precipitation	Dry	x	Slight	☐	Moderate	☐	Heavy ☐

Borehole	Depth to Base (m)	Diff. Pressure (Pa)	Flow Rate (Peak) (l/hr)	Flow Rate (Steady) (l/hr)	PID Reading (ppm)	Odour (-)	Turbidity (FTU)	Wind ()	Remarks
CP01	**8.00**	**<1**	**<0.1**	**<0.1**				**Light**	
CP02	**8.00**	**<1**	**<0.1**	**<0.1**				**Light**	
CP03	**8.00**	**<1**	**<0.1**	**<0.1**				**Light**	
CP04	**8.00**	**<1**	**<0.1**	**<0.1**				**Light**	
WS02	**4.00**	**<1**	**<0.1**	**<0.1**				**Light**	

Remarks

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FIELDWORK - *Insitu Gas Monitoring - Daily Record*

Project **HEMPLAND PRIMARY SCHOOL, YORK**

Project No **PC218325**

Date **02/12/2021**

Client **Department for Education**

Sheet No. **1 (4 of 4)**

Equipment Used

GI Infra Red Gas Analyser MK1 ☐ MK2 ☐ GA2000 ☐

Other **Gas Data GFM435;**

Weather / Site Conditions

Wind	Still ☐	Light ☒	Moderate ☐	Strong ☐
Cloud Cover	None ☐	Slight ☐	Cloudy ☐	Overcast ☒
Precipitation	Dry ☒	Slight ☐	Moderate ☐	Heavy ☐

Borehole	Depth to Base (m)	Cloud ()	Rain ()	Equipment Used ()	Monitored by ()	Remarks
CP01	**8.00**	**Overcast**	**Dry**	**Gas Data GFM435**	**AVM**	
CP02	**8.00**	**Overcast**	**Dry**	**Gas Data GFM435**	**AVM**	
CP03	**8.00**	**Overcast**	**Dry**	**Gas Data GFM435**	**AVM**	
CP04	**8.00**	**Overcast**	**Dry**	**Gas Data GFM435**	**AVM**	
WS02	**4.00**	**Overcast**	**Dry**	**Gas Data GFM435**	**AVM**	

Remarks

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FIELDWORK - *Insitu Gas Monitoring - Daily Record*

Project **HEMPLAND PRIMARY SCHOOL, YORK**

Project No **PC218325**

Date **09/12/2021**

Client **Department for Education**

Sheet No. **1 (1 of 4)**

Equipment Used

GI Infra Red Gas Analyser MK1 ☐ MK2 ☐ GA2000 ☐

Other **Gas Data GFM435;**

Weather / Site Conditions

Wind	Still [x]	Light ☐	Moderate ☐	Strong ☐
Cloud Cover	None ☐	Slight ☐	Cloudy ☐	Overcast [x]
Precipitation	Dry [x]	Slight ☐	Moderate ☐	Heavy ☐

Borehole	Depth to Base (m)	Depth to Water (m bgl)	Electrical Conductivity (uS/cm)	pH (pH Units)	Redox (mV)	Dissolved Oxygen (mg/l)	Methane (Peak) CH4 (% VOL)	Methane (Steady) CH4 (% VOL)	Remarks
CP01	**8.00**		**1242**	**743**	**75.7**	**26.2**	**<0.1**	**<0.1**	
CP02	**8.00**						**<0.1**	**<0.1**	
CP03	**8.00**		**627**	**7.98**	**99.3**	**35.5**	**<0.1**	**<0.1**	
CP04	**8.00**		**862**	**7.98**	**98.2**	**46.6**	**<0.1**	**<0.1**	
WS02	**4.00**						**<0.1**	**<0.1**	

Remarks

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FIELDWORK - *Insitu Gas Monitoring - Daily Record*

Project **HEMPLAND PRIMARY SCHOOL, YORK**

Project No **PC218325**

Date **09/12/2021**

Client **Department for Education**

Sheet No. **1 (2 of 4)**

Equipment Used

GI Infra Red Gas Analyser MK1 ☐ MK2 ☐ GA2000 ☐

Other **Gas Data GFM435;**

Weather / Site Conditions

Wind	Still	x	Light	☐	Moderate	☐	Strong ☐
Cloud Cover	None	☐	Slight	☐	Cloudy	☐	Overcast x
Precipitation	Dry	x	Slight	☐	Moderate	☐	Heavy ☐

Borehole	Depth to Base (m)	Carbon Dioxide (Peak) (% VOL)	Carbon Dioxide (Steady) (% VOL)	Oxygen (Peak) (% VOL)	Oxygen (Steady) (% VOL)	Hydrogen Sulphide H2S (ppm)	Carbon Monoxide CO (ppm)	Diff. Pressure (mbar)	Remarks
CP01	**8.00**	**3.0**	**3.0**	**16.9**	**16.9**	**<1**	**<1**	**996**	
CP02	**8.00**	**0.9**	**0.9**	**18.0**	**18.0**	**<1**	**<1**	**996**	
CP03	**8.00**	**0.6**	**0.6**	**15.7**	**15.7**	**<1**	**<1**	**996**	
CP04	**8.00**	**0.4**	**0.4**	**19.7**	**19.7**	**<1**	**<1**	**996**	
WS02	**4.00**	**3.0**	**3.0**	**16.9**	**16.9**	**<1**	**<1**	**996**	

Remarks

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FIELDWORK - *Insitu Gas Monitoring - Daily Record*

Project **HEMPLAND PRIMARY SCHOOL, YORK**

Project No **PC218325**

Date **09/12/2021**

Client **Department for Education**

Sheet No. **1 (3 of 4)**

Equipment Used

GI Infra Red Gas Analyser MK1 ☐ MK2 ☐ GA2000 ☐

Other **Gas Data GFM435;**

Weather / Site Conditions

Wind	Still	x	Light	☐	Moderate	☐	Strong ☐
Cloud Cover	None	☐	Slight	☐	Cloudy	☐	Overcast x
Precipitation	Dry	x	Slight	☐	Moderate	☐	Heavy ☐

Borehole	Depth to Base (m)	Diff. Pressure (Pa)	Flow Rate (Peak) (l/hr)	Flow Rate (Steady) (l/hr)	PID Reading (ppm)	Odour (-)	Turbidity (FTU)	Wind ()	Remarks
CP01	**8.00**	**<1**	**<0.1**	**<0.1**		**None**	**1000**	**Still**	
CP02	**8.00**	**<1**	**<0.1**	**<0.1**				**Still**	
CP03	**8.00**	**<1**	**<0.1**	**<0.1**		**None**	**1000**	**Still**	
CP04	**8.00**	**<1**	**<0.1**	**<0.1**		**None**	**1000**	**Still**	
WS02	**4.00**	**<1**	**<0.1**	**<0.1**				**Still**	

Remarks

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FIELDWORK - *Insitu Gas Monitoring - Daily Record*

Project **HEMPLAND PRIMARY SCHOOL, YORK**

Project No **PC218325**

Date **09/12/2021**

Client **Department for Education**

Sheet No. **1 (4 of 4)**

Equipment Used

GI Infra Red Gas Analyser MK1 ☐ MK2 ☐ GA2000 ☐

Other **Gas Data GFM435;**

Weather / Site Conditions

Wind	Still [x]	Light ☐	Moderate ☐	Strong ☐
Cloud Cover	None ☐	Slight ☐	Cloudy ☐	Overcast [x]
Precipitation	Dry [x]	Slight ☐	Moderate ☐	Heavy ☐

Borehole	Depth to Base (m)	Cloud ()	Rain ()	Equipment Used ()	Monitored by ()	Remarks
CP01	**8.00**	**Overcast**	**Dry**	**Gas Data GFM435**	**AVM**	
CP02	**8.00**	**Overcast**	**Dry**	**Gas Data GFM435**	**AVM**	
CP03	**8.00**	**Overcast**	**Dry**	**Gas Data GFM435**	**AVM**	
CP04	**8.00**	**Overcast**	**Dry**	**Gas Data GFM435**	**AVM**	
WS02	**4.00**	**Overcast**	**Dry**	**Gas Data GFM435**	**AVM**	

Remarks

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FIELDWORK - *Insitu Gas Monitoring - Daily Record*

Project **HEMPLAND PRIMARY SCHOOL, YORK**

Project No **PC218325**

Date **16/12/2021**

Client **Department for Education**

Sheet No. **1 (1 of 4)**

Equipment Used

GI Infra Red Gas Analyser MK1 ☐ MK2 ☐ GA2000 ☐

Other **Gas Data GFM435;**

Weather / Site Conditions

Wind	Still ☐	Light ☒	Moderate ☐	Strong ☐
Cloud Cover	None ☐	Slight ☐	Cloudy ☐	Overcast ☒
Precipitation	Dry ☒	Slight ☐	Moderate ☐	Heavy ☐

Borehole	Depth to Base (m)	Depth to Water (m bgl)	Electrical Conductivity (uS/cm)	pH (pH Units)	Redox (mV)	Dissolved Oxygen (mg/l)	Methane (Peak) CH4 (% VOL)	Methane (Steady) CH4 (% VOL)	Remarks
CP01	**8.00**						**<0.1**	**<0.1**	
CP02	**8.00**						**<0.1**	**<0.1**	
CP03	**8.00**						**<0.1**	**<0.1**	
CP04	**8.00**						**<0.1**	**<0.1**	
WS02	**4.00**						**<0.1**	**<0.1**	

Remarks

geotechnics

FIELDWORK - *Insitu Gas Monitoring - Daily Record*

Project **HEMPLAND PRIMARY SCHOOL, YORK**

Project No **PC218325**

Date **16/12/2021**

Client **Department for Education**

Sheet No. **1 (2 of 4)**

Equipment Used

GI Infra Red Gas Analyser MK1 ☐ MK2 ☐ GA2000 ☐

Other **Gas Data GFM435;**

Weather / Site Conditions

Wind	Still	☐	Light	x	Moderate	☐	Strong ☐
Cloud Cover	None	☐	Slight	☐	Cloudy	☐	Overcast x
Precipitation	Dry	x	Slight	☐	Moderate	☐	Heavy ☐

Borehole	Depth to Base (m)	Carbon Dioxide (Peak) (% VOL)	Carbon Dioxide (Steady) (% VOL)	Oxygen (Peak) (% VOL)	Oxygen (Steady) (% VOL)	Hydrogen Sulphide H2S (ppm)	Carbon Monoxide CO (ppm)	Diff. Pressure (mbar)	Remarks
CP01	8.00	2.7	2.7	15.8	15.8	<1	<1	997	
CP02	8.00	1.2	1.2	18.4	18.4	<1	<1	997	
CP03	8.00	0.5	0.5	19.5	19.5	<1	<1	997	
CP04	8.00	0.1	0.1	20.0	20.1	<1	<1	997	
WS02	4.00	1.0	1.0	19.1	19.1	<1	<1	997	

Remarks

geotechnics

FIELDWORK - *Insitu Gas Monitoring - Daily Record*

Project **HEMPLAND PRIMARY SCHOOL, YORK**

Project No **PC218325**

Date **16/12/2021**

Client **Department for Education**

Sheet No. **1 (3 of 4)**

Equipment Used

GI Infra Red Gas Analyser MK1 ☐ MK2 ☐ GA2000 ☐

Other **Gas Data GFM435;**

Weather / Site Conditions

Wind	Still	☐	Light	x	Moderate	☐	Strong ☐
Cloud Cover	None	☐	Slight	☐	Cloudy	☐	Overcast x
Precipitation	Dry	x	Slight	☐	Moderate	☐	Heavy ☐

Borehole	Depth to Base (m)	Diff. Pressure (Pa)	Flow Rate (Peak) (l/hr)	Flow Rate (Steady) (l/hr)	PID Reading (ppm)	Odour (-)	Turbidity (FTU)	Wind ()	Remarks
CP01	**8.00**	**<1**	**<0.1**	**<0.1**				**Light**	
CP02	**8.00**	**<1**	**<0.1**	**<0.1**				**Light**	
CP03	**8.00**	**<1**	**<0.1**	**<0.1**				**Light**	
CP04	**8.00**	**<1**	**<0.1**	**<0.1**				**Light**	
WS02	**4.00**	**<1**	**<0.1**	**<0.1**				**Light**	

Remarks

geotechnics

FIELDWORK - *Insitu Gas Monitoring - Daily Record*

Project **HEMPLAND PRIMARY SCHOOL, YORK**

Project No **PC218325**

Date **16/12/2021**

Client **Department for Education**

Sheet No. **1 (4 of 4)**

Equipment Used

GI Infra Red Gas Analyser MK1 ☐ MK2 ☐ GA2000 ☐

Other **Gas Data GFM435;**

Weather / Site Conditions

Wind	Still ☐	Light ☒	Moderate ☐	Strong ☐
Cloud Cover	None ☐	Slight ☐	Cloudy ☐	Overcast ☒
Precipitation	Dry ☒	Slight ☐	Moderate ☐	Heavy ☐

Borehole	Depth to Base (m)	Cloud ()	Rain ()	Equipment Used ()	Monitored by ()	Remarks
CP01	**8.00**	**Overcast**	**Dry**	**Gas Data GFM435**	**AVM**	
CP02	**8.00**	**Overcast**	**Dry**	**Gas Data GFM435**	**AVM**	
CP03	**8.00**	**Overcast**	**Dry**	**Gas Data GFM435**	**AVM**	
CP04	**8.00**	**Overcast**	**Dry**	**Gas Data GFM435**	**AVM**	
WS02	**4.00**	**Overcast**	**Dry**	**Gas Data GFM435**	**AVM**	

Remarks

geotechnics

FIELDWORK - *Insitu Gas Monitoring - Daily Record*

Project **HEMPLAND PRIMARY SCHOOL, YORK**

Project No **PC218325**

Date **23/12/2021**

Client **Department for Education**

Sheet No. **1 (1 of 4)**

Equipment Used

GI Infra Red Gas Analyser MK1 ☐ MK2 ☐ GA2000 ☐

Other **Gas Data GFM435;**

Weather / Site Conditions

Wind	Still	☐	Light	x	Moderate	☐	Strong ☐
Cloud Cover	None	☐	Slight	☐	Cloudy	x	Overcast ☐
Precipitation	Dry	x	Slight	☐	Moderate	☐	Heavy ☐

Borehole	Depth to Base (m)	Depth to Water (m bgl)	Electrical Conductivity (uS/cm)	pH (pH Units)	Redox (mV)	Dissolved Oxygen (mg/l)	Methane (Peak) CH4 (% VOL)	Methane (Steady) CH4 (% VOL)	Remarks
CP01	**8.00**						**<0.1**	**<0.1**	
CP02	**8.00**						**<0.1**	**<0.1**	
CP03	**8.00**						**<0.1**	**<0.1**	
CP04	**8.00**						**<0.1**	**<0.1**	
WS02	**4.00**						**<0.1**	**<0.1**	

Remarks

geotechnics

FIELDWORK - *Insitu Gas Monitoring - Daily Record*

Project **HEMPLAND PRIMARY SCHOOL, YORK**

Project No **PC218325**

Date **23/12/2021**

Client **Department for Education**

Sheet No. **1 (2 of 4)**

Equipment Used

GI Infra Red Gas Analyser MK1 ☐ MK2 ☐ GA2000 ☐

Other **Gas Data GFM435;**

Weather / Site Conditions

Wind	Still	☐	Light	x	Moderate	☐	Strong ☐
Cloud Cover	None	☐	Slight	☐	Cloudy	x	Overcast ☐
Precipitation	Dry	x	Slight	☐	Moderate	☐	Heavy ☐

Borehole	Depth to Base (m)	Carbon Dioxide (Peak) (% VOL)	Carbon Dioxide (Steady) (% VOL)	Oxygen (Peak) (% VOL)	Oxygen (Steady) (% VOL)	Hydrogen Sulphide H2S (ppm)	Carbon Monoxide CO (ppm)	Diff. Pressure (mbar)	Remarks
CP01	**8.00**	**4.2**	**4.2**	**14.4**	**14.4**	**<1**	**<1**	**1005**	
CP02	**8.00**	**1.4**	**1.4**	**18.8**	**18.8**	**<1**	**<1**	**1005**	
CP03	**8.00**	**0.6**	**0.6**	**18.6**	**18.6**	**<1**	**<1**	**1005**	
CP04	**8.00**	**0.2**	**0.2**	**20.0**	**20.0**	**<1**	**<1**	**1005**	
WS02	**4.00**	**2.2**	**2.2**	**15.8**	**15.8**	**<1**	**<1**	**1005**	

Remarks

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FIELDWORK - *Insitu Gas Monitoring - Daily Record*

Project **HEMPLAND PRIMARY SCHOOL, YORK**

Project No **PC218325**

Date **23/12/2021**

Client **Department for Education**

Sheet No. **1 (3 of 4)**

Equipment Used

GI Infra Red Gas Analyser MK1 ☐ MK2 ☐ GA2000 ☐

Other **Gas Data GFM435;**

Weather / Site Conditions

Wind	Still	☐	Light	x	Moderate	☐	Strong ☐
Cloud Cover	None	☐	Slight	☐	Cloudy	x	Overcast ☐
Precipitation	Dry	x	Slight	☐	Moderate	☐	Heavy ☐

Borehole	Depth to Base (m)	Diff. Pressure (Pa)	Flow Rate (Peak) (l/hr)	Flow Rate (Steady) (l/hr)	PID Reading (ppm)	Odour (-)	Turbidity (FTU)	Wind ()	Remarks
CP01	**8.00**	**<1**	**<0.1**	**<0.1**				**Light**	
CP02	**8.00**	**<1**	**<0.1**	**<0.1**				**Light**	
CP03	**8.00**	**<1**	**<0.1**	**<0.1**				**Light**	
CP04	**8.00**	**<1**	**<0.1**	**<0.1**				**Light**	
WS02	**4.00**	**<1**	**<0.1**	**<0.1**				**Light**	

Remarks

geotechnics

FIELDWORK - *Insitu Gas Monitoring - Daily Record*

Project **HEMPLAND PRIMARY SCHOOL, YORK**

Project No **PC218325**

Date **23/12/2021**

Client **Department for Education**

Sheet No. **1 (4 of 4)**

Equipment Used

GI Infra Red Gas Analyser MK1 ☐ MK2 ☐ GA2000 ☐

Other **Gas Data GFM435;**

Weather / Site Conditions

Wind	Still ☐	Light ☒	Moderate ☐	Strong ☐
Cloud Cover	None ☐	Slight ☐	Cloudy ☒	Overcast ☐
Precipitation	Dry ☒	Slight ☐	Moderate ☐	Heavy ☐

Borehole	Depth to Base (m)	Cloud ()	Rain ()	Equipment Used ()	Monitored by ()	Remarks
CP01	**8.00**	**Cloudy**	**Dry**	**Gas Data GFM435**	**AVM**	
CP02	**8.00**	**Cloudy**	**Dry**	**Gas Data GFM435**	**AVM**	
CP03	**8.00**	**Cloudy**	**Dry**	**Gas Data GFM435**	**AVM**	
CP04	**8.00**	**Cloudy**	**Dry**	**Gas Data GFM435**	**AVM**	
WS02	**4.00**	**Cloudy**	**Dry**	**Gas Data GFM435**	**AVM**	

Remarks

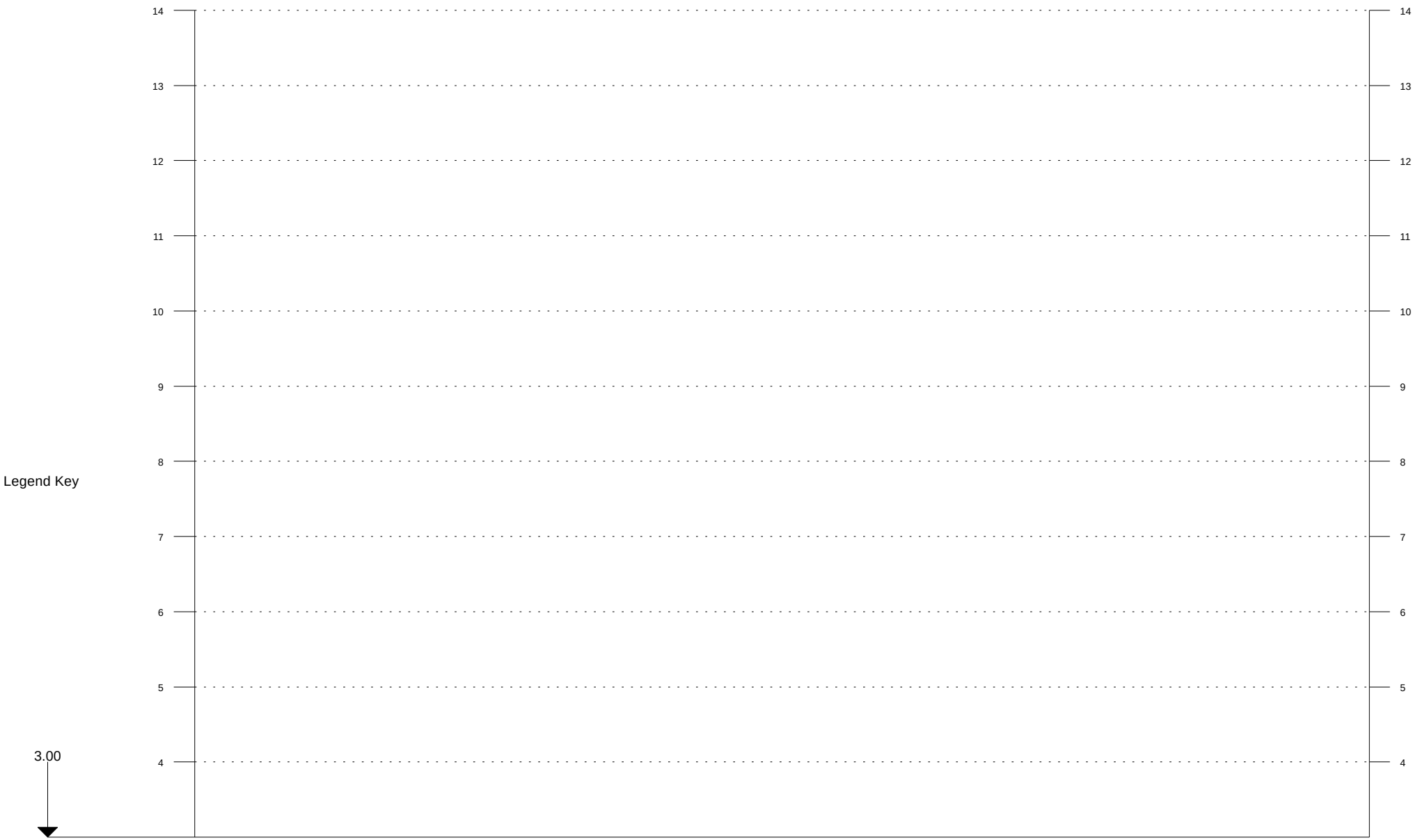
geotechnics

Form 002/3

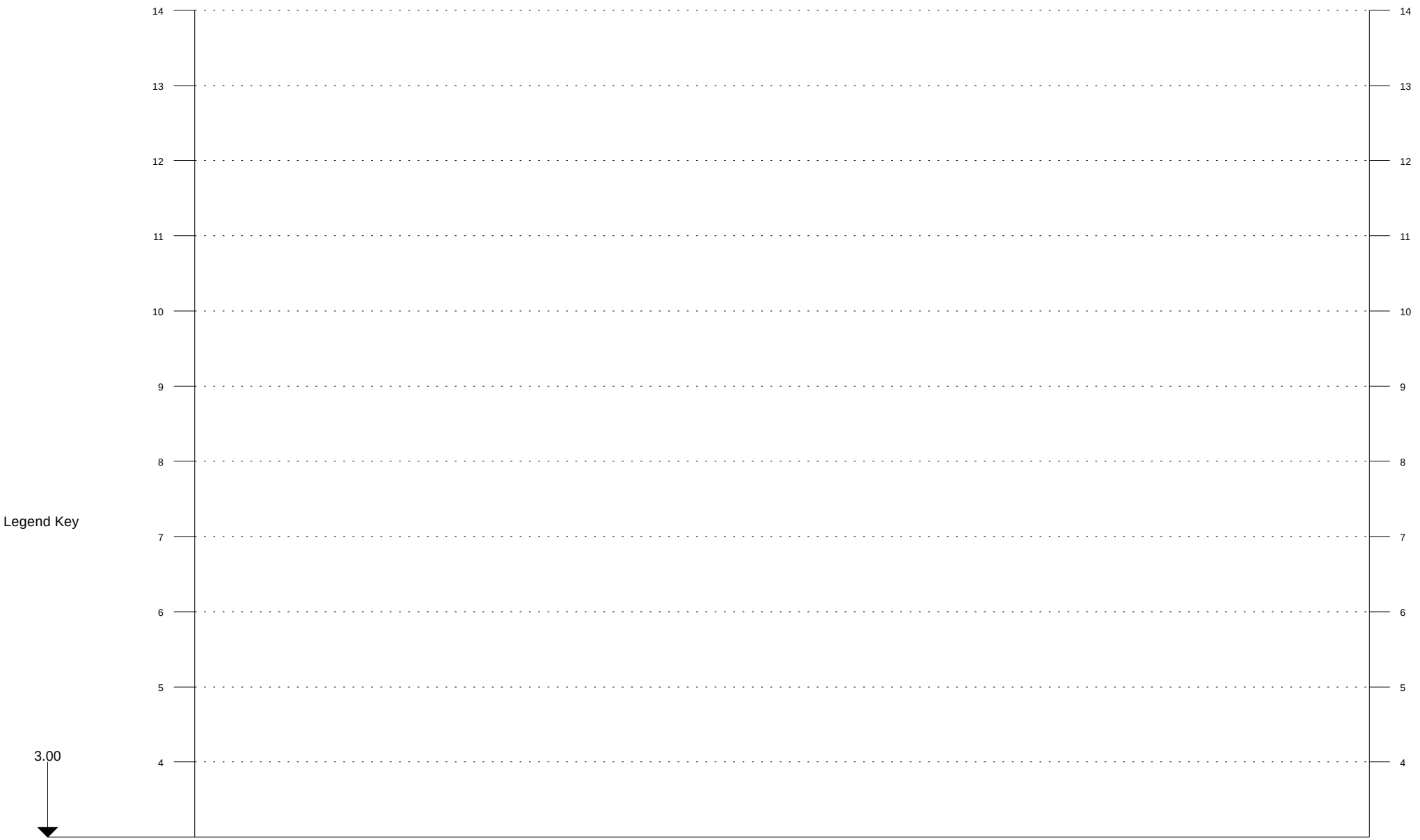
APPENDIX 6

Ground Model Cross Section

Project:	HEMPLAND PRIMARY	Title:	Section Line A - A'	203 Torrington Avenue Tile Hill Coventry CV4 9AP	Phone: 024 7669 4664 Email: mail@geotechnics.co.uk www.geotechnics.co.uk	GEOTECHNICS geotechnical and geoenvironmental specialists
		Vertical Scale:	1:70			
Project No.:	PC218325	Horizontal Scale:	1:926			
Client:	Department for Education	Engineer:	Mott MacDonald Limited			



Project:	HEMPLAND PRIMARY	Title:	Section Line B - B'	203 Torrington Avenue Tile Hill Coventry CV4 9AP	Phone: 024 7669 4664 Email: mail@geotechnics.co.uk www.geotechnics.co.uk	GEOTECHNICS geotechnical and geoenvironmental specialists
		Vertical Scale:	1:70			
Project No.:	PC218325	Horizontal Scale:	1:1286			
Client:	Department for Education	Engineer:	Mott MacDonald Limited			



APPENDIX 7

Laboratory Test Results - Geotechnical

Laboratory Test Certificate

Form REP008 Rev 3

Issued To	Geotechnics Ltd The Geotechnical Centre 203 Torrington Avenue Tile Hill Coventry, CV4 9AP	**Date of issue**	28.01.22
		Issue No.	1
		Client Ref. No.	N/A
		Samples / Material Source	
		Samples Recv'd	17.12.21
Testing Start Date	06.01.22	Sample State	As received
Testing Complete	28.01.22	Sampled by	Geotechnics Limited
Comments			
Project No	PC218325		
Project Name	Hempland Primary.		

Summary of Tests

Standard	Test Description	Test Quantity	UKAS
BS EN ISO 17892-1:2014	Water Content	22	Yes
BS EN ISO 17892-12:2018 Cl. 5.3 & 5.5	Liquid Limit and Plastic Limit (4 Points Method)	17	Yes
BS EN ISO 17892-4:2016 Cl. 5.2	Particle Size Distribution by Sieving Method	3	Yes
BS EN ISO 17892-4:2016 Cl. 5.4	Particle Size Distribution by Pipette Method	3	Yes
BS 1377-4:1990 Cl. 3.3	2.5 kg Rammer Dry Density/Moisture Content Relationship (Compaction)	2	Yes
BS EN ISO 17892-8:2018	Shear Strength by Unconsolidated Undrained Triaxial Test - Single Stage	5	Yes
BS EN ISO 17892-5:2017	Incremental Loading Oedometer	2	Yes

Note: Any descriptions, opinions or interpretations are outside the scope of UKAS accreditation.
The results within this report relate only to the samples tested and received from the client.

UKAS TESTING
1365

Test Results checked and approved for issue.
Signed for and on behalf of Geotechnics Limited

[redacted]

Paul Smart (Laboratory Testing Manager)

GEOTECHNICS
geotechnical and geoenvironmental specialists
203 Torrington Avenue, Tile Hill,
Coventry, CV4 9UT

LABORATORY RESULTS - Classification and Strength

Project HEMPLAND PRIMARY SCHOOL, YORK **Project No:** PC218325

Sample					Classification					Strength					
Hole	Depth (Specimen Depth) m	Type	Sample Ref	Description	Symbol	I_p (>425) %	w_L %	w_p %	w (p_d) %	Test	$_b$ ($_d$) Mg/m^3	3 kN/m^2	1 3 kN/m^2	c_u kN/m^2	c_{Avg} kN/m^2
CP01	0.80 (0.80)	D	C77879	MADE GROUND: Brown slightly gravelly clay.	CH	34 (4%)	57	23	29.2						
CP01	1.50 (1.50)	D	C77881	Brown slightly sandy CLAY.	CH	36 (1%)	61	25	26.7						
CP01	2.00-2.45 (2.25)	UT	C77751	Brown slightly sandy slightly gravelly CLAY.					25.3 <28.2>	SS	2.01	40	248	124	124
CP01	4.00-4.45 (4.00-4.15)	UT	C77757	Brown slightly sandy slightly gravelly CLAY. (See Test Remarks Sheet for further information)	CL	17 (17%)	30	13	13.3 <13.0>	SS	2.24	80	136	68	68
CP02	0.50 (0.50)	D	C77894	MADE GROUND: Greyish brown slightly sandy slightly gravelly clay.	CH	39 (1%)	66	27	28.9						
CP02	1.20-1.65 (1.20)	UT	C77756	Brown mottled grey slightly sandy CLAY.	CH	42 (0%)	68	26	27.8						
CP02	2.50 (2.50)	D	C77897	Brown mottled grey slightly sandy slightly gravelly CLAY.	CL	18 (14%)	31	13	16.1						
CP02	3.00-3.45 (3.00)	UT	C77758	Brown slightly sandy slightly gravelly CLAY.					12.1						
CP02	4.50 (4.50)	D	C77900	Brown slightly gravelly sandy CLAY.	CL	17 (15%)	30	13	14.8						
CP02	5.00-5.45 (5.05)	UT	C77760	Brown slightly sandy slightly gravelly CLAY.					11.3 <13.4>	SS	2.19	100	334	167	167
CP03	0.50 (0.50)	D	C77907	Brown mottled grey slightly sandy slightly gravelly CLAY.	CH	34 (8%)	56	22	31.3						
CP03	2.00-2.45 (2.00-2.20)	UT	C77755	Brown mottled light grey slightly sandy CLAY. (See Test Remarks Sheet for further information)	CL	15 (14%)	28	13	14.3 [13.6]	SS	2.25	40	259	129 ##	129
CP03	3.50 (3.50)	D	C77912	Brown mottled light grey slightly sandy CLAY.	CL	17 (15%)	30	13	15.5						
CP03	4.00-4.45 (4.00)	UT	C77752	Brown slightly sandy slightly gravelly CLAY.					12.2						
CP03	6.00-6.45 (6.23)	UT	C77754	Brown slightly sandy slightly gravelly CLAY. (See Test Remarks Sheet for further information)					12.0 [12.0]	SS	2.23	120	230	115 ##	115
CP04	0.80 (0.80)	D	C77921	MADE GROUND: Dark brownish grey slightly sandy slightly gravelly clay.	CI	22 (15%)	39	17	20.2						

Remarks NST - Not suitable for Test
For Standards followed see Laboratory Test Certficate
w% - ^ = Rock water content test; x = Aggregate moisture content test
QUT Water Contents: <Failure Zone>, [After test]

GEOTECHNICS
geotechnical and geoenvironmental specialists

LABORATORY RESULTS - *Classification and Strength*

Project HEMPLAND PRIMARY SCHOOL, YORK **Project No:** PC218325

Sample					Classification					Strength					
Hole	Depth (Specimen Depth) m	Type	Sample Ref	Description	Symbol	I_p (>425) %	w_L %	w_p %	w (p_d) %	Test	$_b$ ($_d$) Mg/m^3	$_3$ kN/m^2	$_1$ $_3$ kN/m^2	c_u kN/m^2	c_{Avg} kN/m^2
CP04	2.50 (2.50)	D	C77925	Brown mottled grey slightly sandy slightly gravelly CLAY.	CL	17 (16%)	30	13	14.8						
CP04	3.50 (3.50)	D	C77927	Brown mottled grey slightly sandy slightly gravelly CLAY.	CL	17 (12%)	31	14	15.7						
CP04	6.00-6.45 (6.00)	UT	C77761	Brown slightly sandy slightly gravelly CLAY.					11.8	SS		120			
WS01	3.00-3.50 (3.00)	B	C77781	Brown slightly sandy slightly gravelly CLAY.	CL	18 (10%)	30	12	13.1						
WS02	2.50 (2.50)	D	C77949	Brown slightly sandy slightly gravelly CLAY.	CL	17 (7%)	31	14	17.1						
WS03	2.50 (2.50)	D	C77957	Brown slightly sandy slightly gravelly CLAY.	CL	15 (22%)	29	14	12.6						
WS03	3.50-4.00 (3.50)	B	C77776	Brown slightly sandy slightly gravelly CLAY.	CL	15 (13%)	27	12	12.7						

Remarks NST - Not suitable for Test
For Standards followed see Laboratory Test Certficate
w% - ^ = Rock water content test; x = Aggregate moisture content test
QUT Water Contents: <Failure Zone>, [After test]

GEOTECHNICS
geotechnical and geoenvironmental specialists

LABORATORY RESULTS - Atterberg Limit

Project HEMPLAND PRIMARY SCHOOL, YORK **Project No:** PC218325

Sample					Results								
Hole	Depth (Specimen Depth) m	Type	Sample Ref	Description	Test Type	Point Data		Sym-bol	Ip %	>425 sieve µm	w_L %	w_p %
						Cone Pene.	Water % (Factor)					
CP01	0.80 (0.80)	D	C77879	MADE GROUND: Brown slightly gravelly clay.	Fall Cone 4pt with increasing water content, cone type: 80g/30, washed over 425um sieve			CH	34	4%	57	23
CP01	1.50 (1.50)	D	C77881	Brown slightly sandy CLAY.	Fall Cone 4pt with decreasing water content, cone type: 80g/30, washed over 425um sieve			CH	36	1%	61	25
CP01	4.00-4.45 (4.00)	UT	C77757	Brown slightly sandy slightly gravelly CLAY. (See Test Remarks Sheet for further information)	Fall Cone 4pt with increasing water content, cone type: 80g/30, washed over 425um sieve			CL	17	17%	30	13
CP02	0.50 (0.50)	D	C77894	MADE GROUND: Greyish brown slightly sandy slightly gravelly clay.	Fall Cone 4pt with increasing water content, cone type: 80g/30, washed over 425um sieve			CH	39	1%	66	27
CP02	1.20-1.65 (1.20)	UT	C77756	Brown mottled grey slightly sandy CLAY.	Fall Cone 4pt with increasing water content, cone type: 80g/30, washed over 425um sieve			CH	42	0%	68	26
CP02	2.50 (2.50)	D	C77897	Brown mottled grey slightly sandy slightly gravelly CLAY.	Fall Cone 4pt with increasing water content, cone type: 80g/30, washed over 425um sieve			CL	18	14%	31	13
CP02	4.50 (4.50)	D	C77900	Brown slightly gravelly sandy CLAY.	Fall Cone 4pt with increasing water content, cone type: 80g/30, washed over 425um sieve			CL	17	15%	30	13
CP03	0.50 (0.50)	D	C77907	Brown mottled grey slightly sandy slightly gravelly CLAY.	Fall Cone 4pt with decreasing water content, cone type: 80g/30, washed over 425um sieve			CH	34	8%	56	22
CP03	2.00-2.45 (2.00)	UT	C77755	Brown mottled light grey slightly sandy CLAY. (See Test Remarks Sheet for further information)	Fall Cone 4pt with increasing water content, cone type: 80g/30, washed over 425um sieve			CL	15	14%	28	13
CP03	3.50 (3.50)	D	C77912	Brown mottled light grey slightly sandy CLAY.	Fall Cone 4pt with decreasing water content, cone type: 80g/30, washed over 425um sieve			CL	17	15%	30	13
CP04	0.80 (0.80)	D	C77921	MADE GROUND: Dark brownish grey slightly sandy slightly gravelly clay.	Fall Cone 4pt with increasing water content, cone type: 80g/30, washed over 425um sieve			CI	22	15%	39	17

Remarks

GEOTECHNICS
geotechnical and geoenvironmental specialists

LABORATORY RESULTS - Atterberg Limit

Project HEMPLAND PRIMARY SCHOOL, YORK **Project No:** PC218325

Sample					Results								
Hole	Depth (Specimen Depth) m	Type	Sample Ref	Description	Test Type	Point Data		Symbol	Ip %	>425 sieve µm	w_L %	w_p %
						Cone Pene.	Water % (Factor)					
CP04	2.50 (2.50)	D	C77925	Brown mottled grey slightly sandy slightly gravelly CLAY.	Fall Cone 4pt with increasing water content, cone type: 80g/30, washed over 425um sieve			CL	17	16%	30	13
CP04	3.50 (3.50)	D	C77927	Brown mottled grey slightly sandy slightly gravelly CLAY.	Fall Cone 4pt with decreasing water content, cone type: 80g/30, washed over 425um sieve			CL	17	12%	31	14
WS01	3.00-3.50 (3.00)	B	C77781	Brown slightly sandy slightly gravelly CLAY.	Fall Cone 4pt with decreasing water content, cone type: 80g/30, washed over 425um sieve			CL	18	10%	30	12
WS02	2.50 (2.50)	D	C77949	Brown slightly sandy slightly gravelly CLAY.	Fall Cone 4pt with increasing water content, cone type: 80g/30, washed over 425um sieve			CL	17	7%	31	14
WS03	2.50 (2.50)	D	C77957	Brown slightly sandy slightly gravelly CLAY.	Fall Cone 4pt with decreasing water content, cone type: 80g/30, washed over 425um sieve			CL	15	22%	29	14
WS03	3.50-4.00 (3.50)	B	C77776	Brown slightly sandy slightly gravelly CLAY.	Fall Cone 4pt with increasing water content, cone type: 80g/30, washed over 425um sieve			CL	15	13%	27	12

Remarks

GEOTECHNICS
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LABORATORY RESULTS - Particle Size Distribution

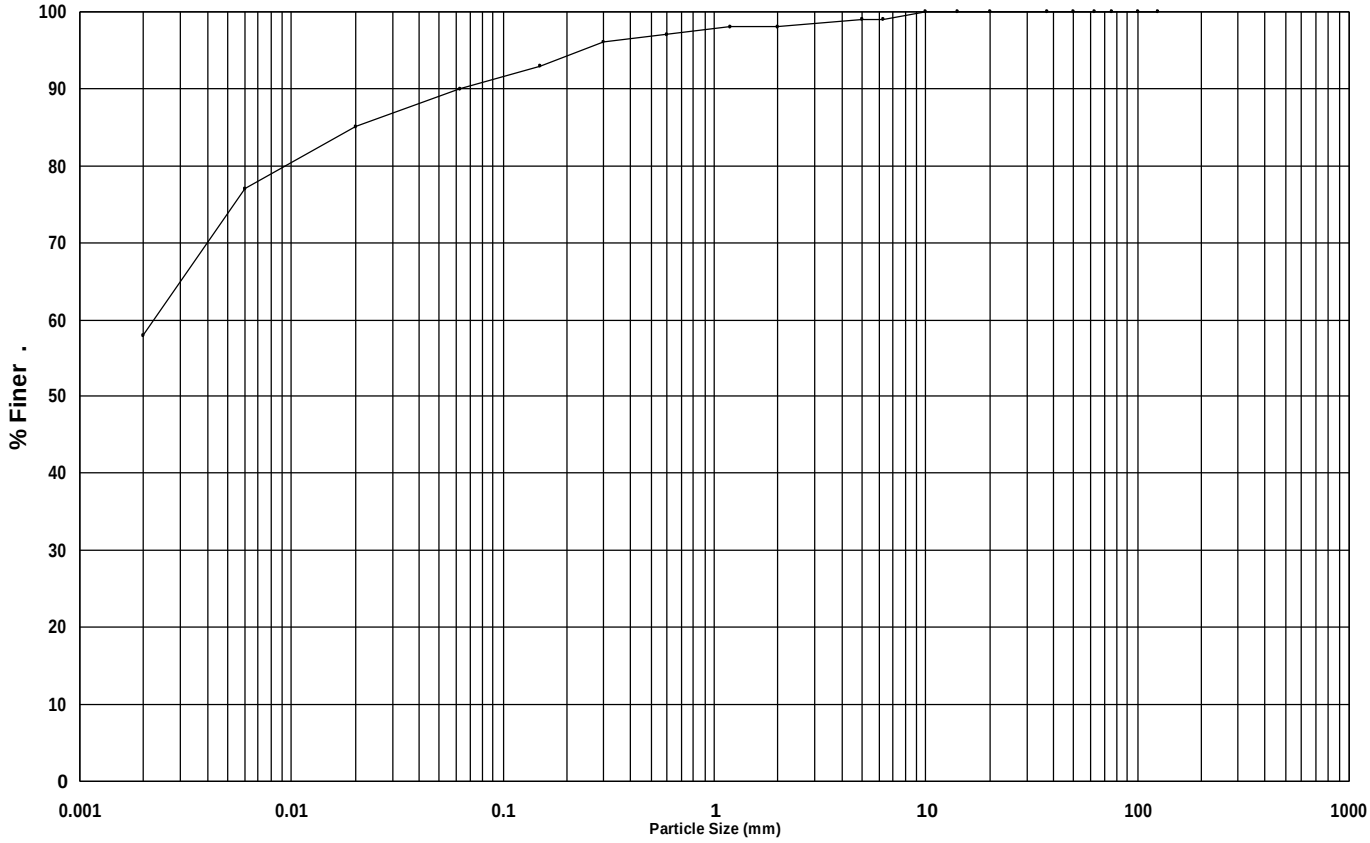
Project: HEMPLAND PRIMARY

Project No: PC218325

Hole	CP01
Sample Depth	1.50-2.00m
Sample Type	B
Sample Ref	C77737

Sample Description

Brown mottled grey slightly sandy slightly gravelly CLAY.



Classification		Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	Cobbles	Boulders
	CLAY	SILT			SAND			Gravel				

Classification	% of each
CLAY	58
SILT	32
SAND	8
GRAVEL	2
COBBLES	0
BOULDERS	0

Size	% Finer
125 mm	100
100 mm	100
75 mm	100
63 mm	100
50 mm	100
37.5 mm	100
20 mm	100
14 mm	100
10 mm	100
6.3 mm	99
5 mm	99
2 mm	98
1.18 mm	98
600 µm	97
300 µm	96
150 µm	93

Size	% Finer
63 µm	90
20 µm	85
6 µm	77
2 µm	58

Uniformity Coefficient
Not Available

Sieving Method
Wet sieve

Fine Particle Analysis	
Method	Pipette
Pre-treated with	Hydrogen Peroxide
% loss on Pre-treatment	0.00
Particle Density	2.65 (Assumed)

Remarks Sieve:-Test performed in accordance with BS EN ISO 17892-4:2016
Pipette:-Test performed in accordance with BS EN ISO 17892-4:2016

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LABORATORY RESULTS - Particle Size Distribution

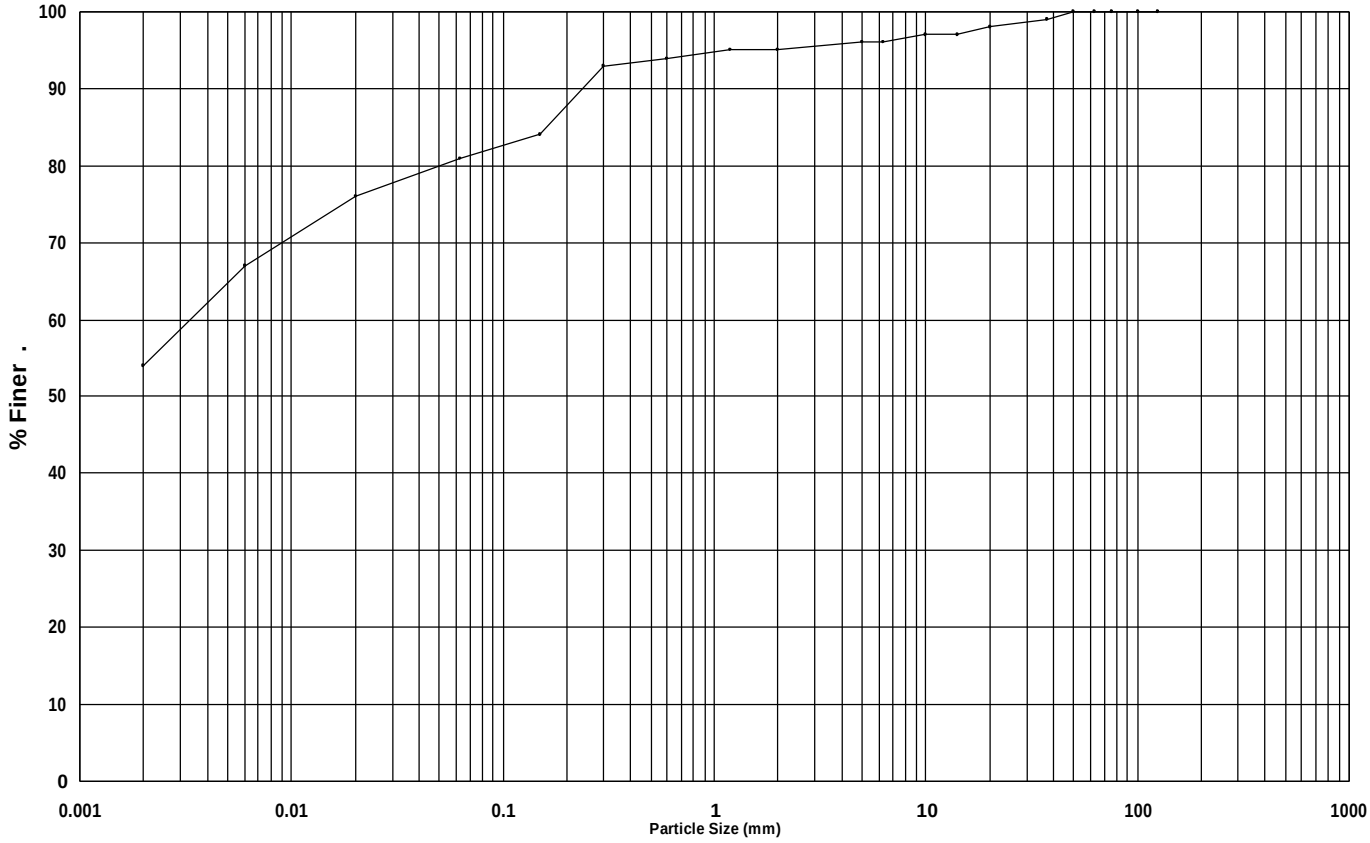
Project: HEMPLAND PRIMARY

Project No: PC218325

Hole	CP03
Sample Depth	1.50-2.00m
Sample Type	B
Sample Ref	C77739

Sample Description

Brown mottled grey slightly sandy slightly gravelly CLAY.



Classification		Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	Cobbles	Boulders
	CLAY	SILT			SAND			Gravel				

Classification	% of each
CLAY	54
SILT	27
SAND	14
GRAVEL	5
COBBLES	0
BOULDERS	0

Size	% Finer
125 mm	100
100 mm	100
75 mm	100
63 mm	100
50 mm	100
37.5 mm	99
20 mm	98
14 mm	97
10 mm	97
6.3 mm	96
5 mm	96
2 mm	95
1.18 mm	95
600 µm	94
300 µm	93
150 µm	84

Size	% Finer
63 µm	81
20 µm	76
6 µm	67
2 µm	54

Uniformity Coefficient
Not Available

Sieving Method
Wet sieve

Fine Particle Analysis	
Method	Pipette
Pre-treated with	Hydrogen Peroxide
% loss on Pre-treatment	0.00
Particle Density	2.65 (Assumed)

Remarks Sieve:-Test performed as "Non Standard" due to sample mass not being in accordance with BS EN ISO 17892-4:2016
Pipette:-Test performed in accordance with BS EN ISO 17892-4:2016

10/02/2022

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LABORATORY RESULTS - *Particle Size Distribution*

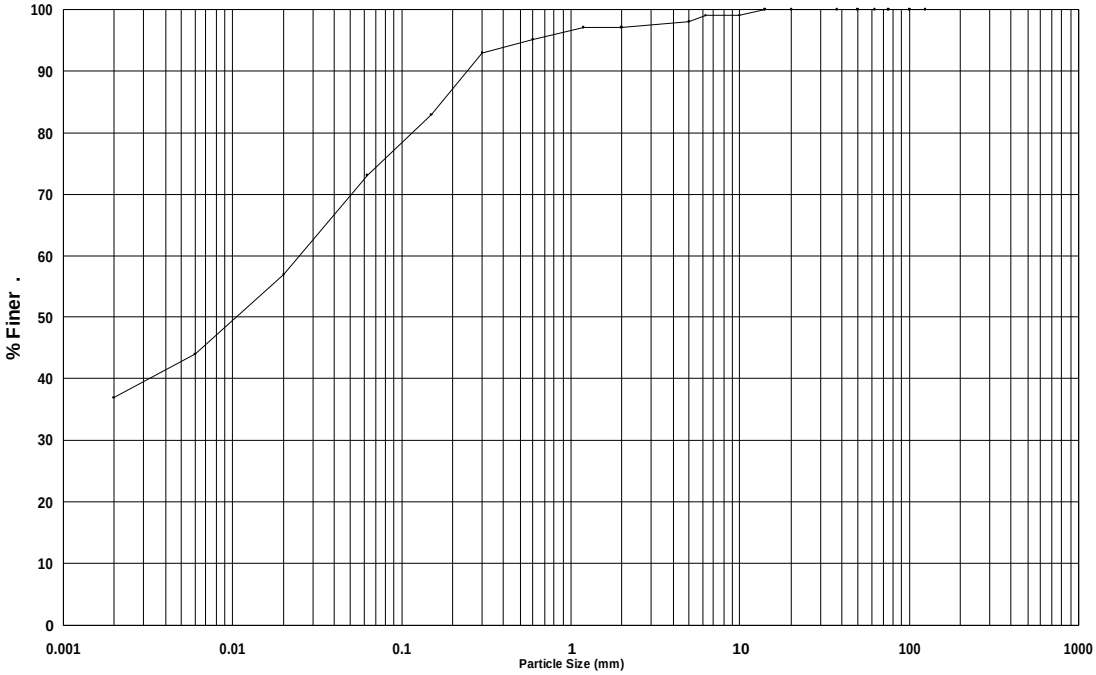
Project: HEMPLAND PRIMARY

Project No: PC218325

Hole WS03
Sample Depth 0.50-1.00m
Sample Type B
Sample Ref C77773

Sample Description

MADE GROUND: Light greyish brown slightly sandy slightly gravelly clay.



Classification	CLAY	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	Cobbles	Boulders
		SILT			SAND			Gravel				

Classification	% of each
CLAY	37
SILT	36
SAND	24
GRAVEL	3
COBBLES	0
BOULDERS	0

Size	% Finer
125 mm	100
100 mm	100
75 mm	100
63 mm	100
50 mm	100
37.5 mm	100
20 mm	100
14 mm	100
10 mm	99
6.3 mm	99
5 mm	98
2 mm	97
1.18 mm	97
600 µm	95
300 µm	93
150 µm	83

Size	% Finer
63 µm	73
20 µm	57
6 µm	44
2 µm	37

Uniformity Coefficient
Not Available

Sieving Method
Wet sieve

Fine Particle Analysis	
Method	Pipette
Pre-treated with	Hydrogen Peroxide
% loss on Pre-treatment	0.00
Particle Density	2.65 (Assumed)

Remarks Sieve:-Test performed in accordance with BS EN ISO 17892-4:2016
Pipette:-Test performed in accordance with BS EN ISO 17892-4:2016

10/02/2022

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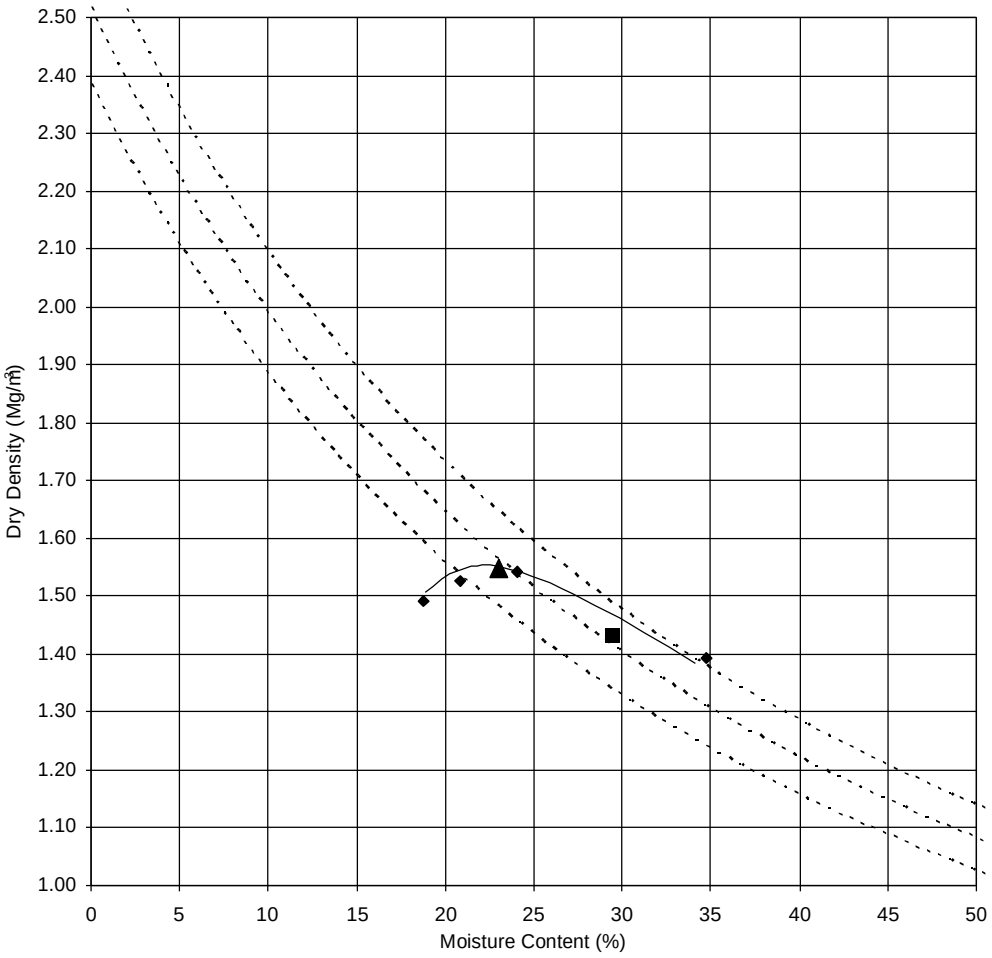
LABORATORY RESULTS - *Compaction*

Project: HEMPLAND PRIMARY

Project No: PC218325

Hole	CP01
Sample Depth	1.50-2.00m
Sample Type	B
Sample Ref	C77737



Optimum Moisture Content
2.5kg Rammer
2.5kg Rammer at natural moisture content

Optimum Moisture Content	23.0	
Maximum Dry Density	1.55	Mg/m^3
Particle Density	2.65 (Ass'm)	Mg/m^3
Preparation	Single Sample 2.5kg Rammer	

Particles retained on	37.5mm sieve	0 %
	20mm sieve	0 %
Description	Brown mottled grey slightly sandy slightly gravelly CLAY.	

Remarks BS1377 Part 4 1990 : Clause 3.3 and 3.4

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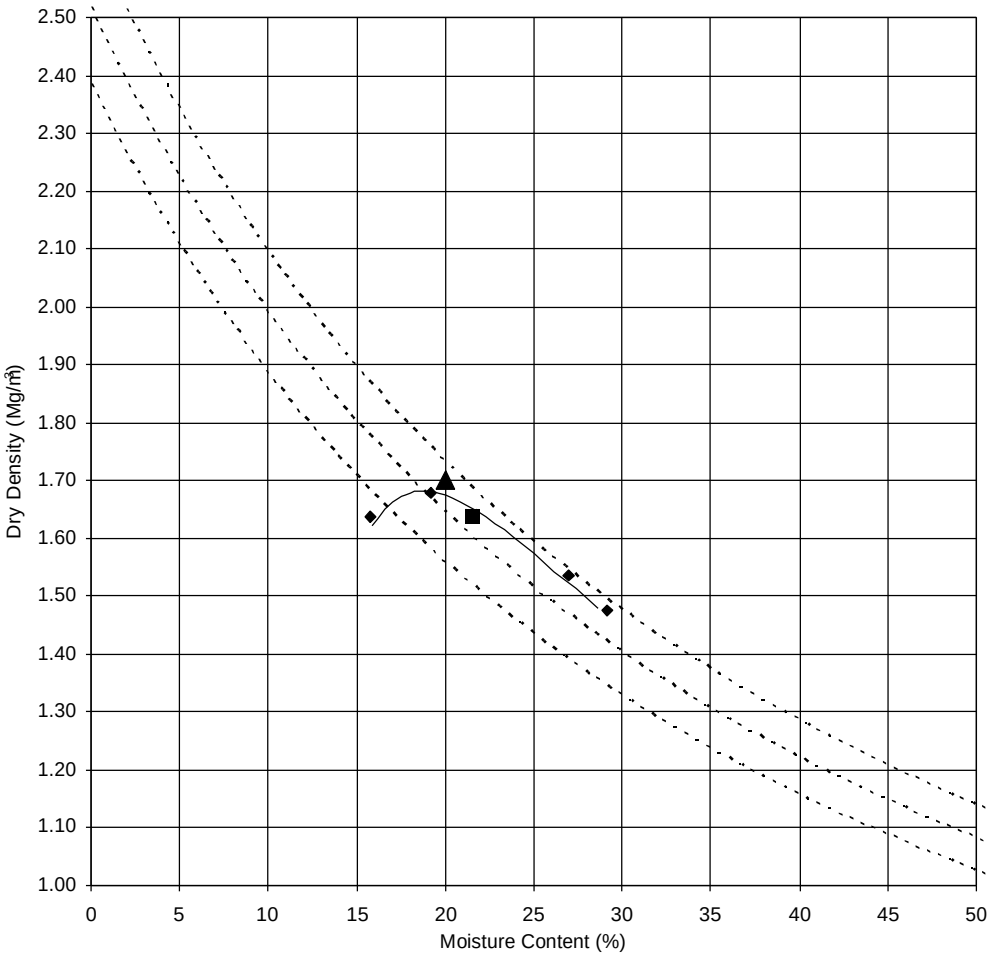
LABORATORY RESULTS - *Compaction*

Project: HEMPLAND PRIMARY

Project No: PC218325

Hole	WS03
Sample Depth	0.50-1.00m
Sample Type	B
Sample Ref	C77773



Optimum Moisture Content
2.5kg Rammer
2.5kg Rammer at natural moisture content

Optimum Moisture Content	20.0	
Maximum Dry Density	1.70	Mg/m^3
Particle Density	2.65 (Ass'm)	Mg/m^3
Preparation	Single Sample 2.5kg Rammer	

Particles retained on	37.5mm sieve	0 %
	20mm sieve	0 %
Description	MADE GROUND: Light greyish brown slightly sandy slightly gravelly clay.	

Remarks BS1377 Part 4 1990 : Clause 3.3 and 3.4

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LABORATORY RESULTS - *MCV, Compaction, CBR*

Project HEMPLAND PRIMARY **Project No:** PC218325

Sample					MCV		Compaction					CBR				
Hole	Depth (Specimen Depth) m	Type	Sample Ref	Description	MCV	w %	Type	w (Opt) %	d Mg/m³	b Mg/m³	d (Max) Mg/m³	Type	Top CBR %	Top w %	Bottom CBR %	Bottom w %
CP01	1.50-2.00 (1.50-2.00)	B	C77737	Brown mottled grey slightly sandy slightly gravelly CLAY.			2.5kg	(23.0)	2.65a		(1.55)					
								20.9		1.85	1.53					
								34.7		1.88	1.39					
								29.4*		*1.85	*1.43					
								24.1		1.92	1.54					
								18.8		1.77	1.49					
WS03	0.50-1.00 (0.50-1.00)	B	C77773	MADE GROUND: Light greyish brown slightly sandy slightly gravelly clay.			2.5kg	(20.0)	2.65a		(1.70)					
								21.4*		*1.99	*1.64					
								27.0		1.95	1.54					
								29.2		1.91	1.48					
								15.8		1.90	1.64					
								19.2		2.00	1.68					

Remarks

Particle Density - a=assumed, m=measured
w% - * = at natural moisture content; x = aggregate moisture content
# = stabilised, see relevant test plot for details
NST = Not suitable for Test
For Standards followed see Laboratory Test Certficate

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LABORATORY RESULTS - Unconsolidated Undrained Triaxial Test

Project: HEMPLAND PRIMARY

Project No: PC218325

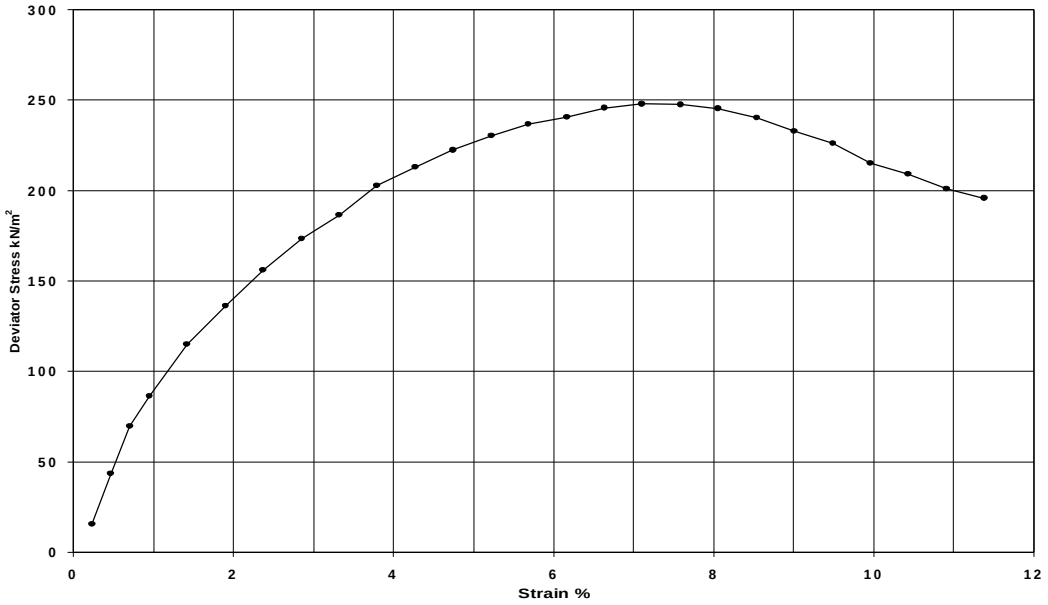
Hole	CP01
Sample Depth	2.00-2.45m
Sample Type	UT
Sample Ref	C77751

Sample Description

The following samples were combined to perform this test:

Brown slightly sandy slightly gravelly CLAY.

BS EN ISO 17892-8:2018



		Stage 1	Stage 2	Stage 3
Test Type		Single Stage		
Sample Condition		Undisturbed		
Orientation of sample		Vertical		
Initial Diameter	(mm)	97.97		
Initial Length	(mm)	210.84		
Initial Water Content	(%)	25.3		
Initial Bulk Density	(Mg/m³)	2.01		
Initial Dry Density	(Mg/m³)	1.60		
Particle Density	(Mg/m³)	2.65 Assumed		
Cell Pressure	(kPa)	40		
'Specimen Height' at start of Shearing Stage	(mm)	210.74		
Membrane Thickness/Correction	(mm/kPa)	100 / 0.0000		
Rate of Strain	(%/min)	2.0		
Corrected Deviator Stress	(kPa)	248		
Undrained Shear Strength	(kPa)	124		
Strain at Failure	(%)	7.1		
Failure Zone Water Content	(%)	28.2		
Water Content (after test)	(%)			
Mode of Failure				

Strain %	Corrected Deviator Stress kN/m²	Strain %	Corrected Deviator Stress kN/m²
0.2	15.7	10.0	215.4
0.5	43.7	10.4	209.3
0.7	69.8	10.9	201.0
0.9	86.6	11.4	196.1
1.4	115.3		
1.9	136.3		
2.4	156.0		
2.8	173.2		
3.3	186.6		
3.8	202.7		
4.3	213.3		
4.7	222.5		
5.2	230.4		
5.7	236.9		
6.2	240.9		
6.6	245.8		
7.1	247.9		
7.6	247.8		
8.1	245.4		
8.5	240.6		
9.0	232.9		
9.5	226.1		

Remarks

10/02/2022

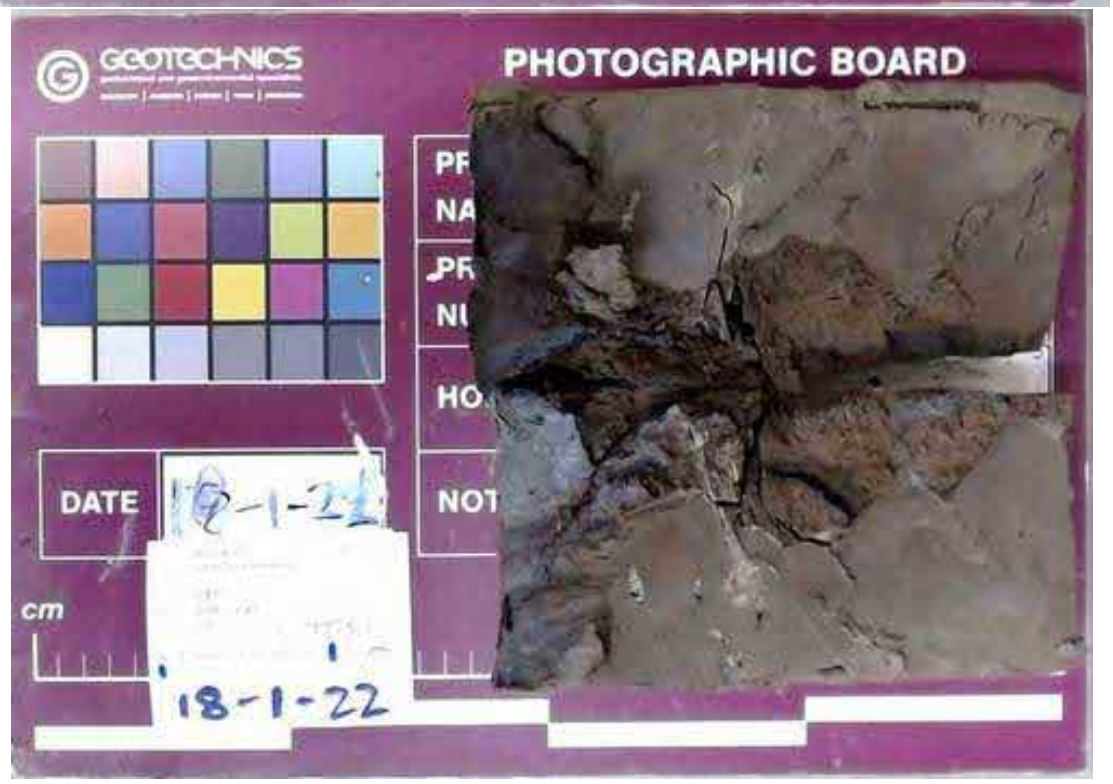
GEOTECHNICS

LABORATORY RESULTS - Unconsolidated Undrained Triaxial Test

Project: HEMPLAND PRIMARY

Project No: PC218325

Hole	CP01
Sample Depth	2.00-2.45m
Sample Type	UT
Sample Ref	C77751



Remarks

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LABORATORY RESULTS - Unconsolidated Undrained Triaxial Test

Project: HEMPLAND PRIMARY

Project No: PC218325

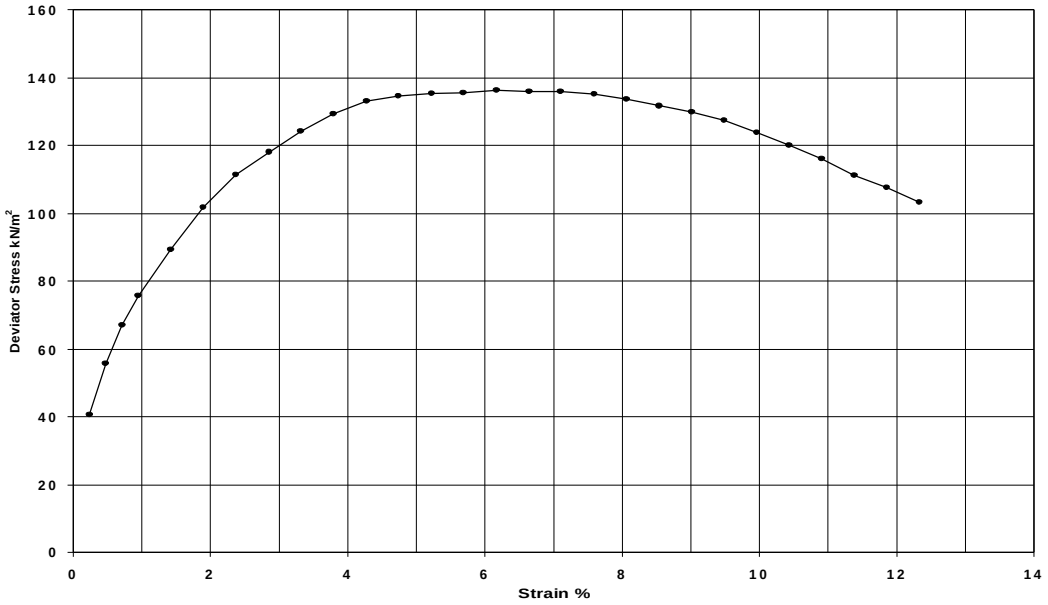
Hole	CP01
Sample Depth	4.00-4.45m
Sample Type	UT
Sample Ref	C77757

Sample Description

The following samples were combined to perform this test:

Brown slightly sandy slightly gravelly CLAY.

BS EN ISO 17892-8:2018



		Stage 1	Stage 2	Stage 3
Test Type		Single Stage		
Sample Condition		Undisturbed		
Orientation of sample		Vertical		
Initial Diameter	(mm)	103.75		
Initial Length	(mm)	210.84		
Initial Water Content	(%)	13.3		
Initial Bulk Density	(Mg/m³)	2.24		
Initial Dry Density	(Mg/m³)	1.98		
Particle Density	(Mg/m³)	2.65 Assumed		
Cell Pressure	(kPa)	80		
'Specimen Height' at start of Shearing Stage	(mm)	210.71		
Membrane Thickness/Correction	(mm/kPa)	100 / 0.0000		
Rate of Strain	(%/min)	1.9		
Corrected Deviator Stress	(kPa)	136		
Undrained Shear Strength	(kPa)	68		
Strain at Failure	(%)	6.2		
Failure Zone Water Content	(%)	13.0		
Water Content (after test)	(%)			
Mode of Failure		Intermediate		

Strain %	Corrected Deviator Stress kN/m²	Strain %	Corrected Deviator Stress kN/m²
0.2	40.5	10.0	123.9
0.5	55.6	10.4	120.1
0.7	67.1	10.9	116.1
0.9	75.8	11.4	111.3
1.4	89.4	11.9	107.5
1.9	101.8	12.3	103.4
2.4	111.5		
2.8	118.1		
3.3	124.2		
3.8	129.5		
4.3	133.0		
4.7	134.5		
5.2	135.4		
5.7	135.5		
6.2	136.3		
6.6	135.9		
7.1	135.8		
7.6	135.1		
8.1	133.7		
8.5	131.6		
9.0	130.0		
9.5	127.5		

Remarks AGS Gravel larger than one sixth of the diameter of the sample present, this may affect the test results.

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GEOTECHNICS

LABORATORY RESULTS - Unconsolidated Undrained Triaxial Test

Project: HEMPLAND PRIMARY

Project No: PC218325

Hole	CP01
Sample Depth	4.00-4.45m
Sample Type	UT
Sample Ref	C77757

Remarks

10/02/2022

GEOTECHNICS

LABORATORY RESULTS - Unconsolidated Undrained Triaxial Test

Project: HEMPLAND PRIMARY

Project No: PC218325

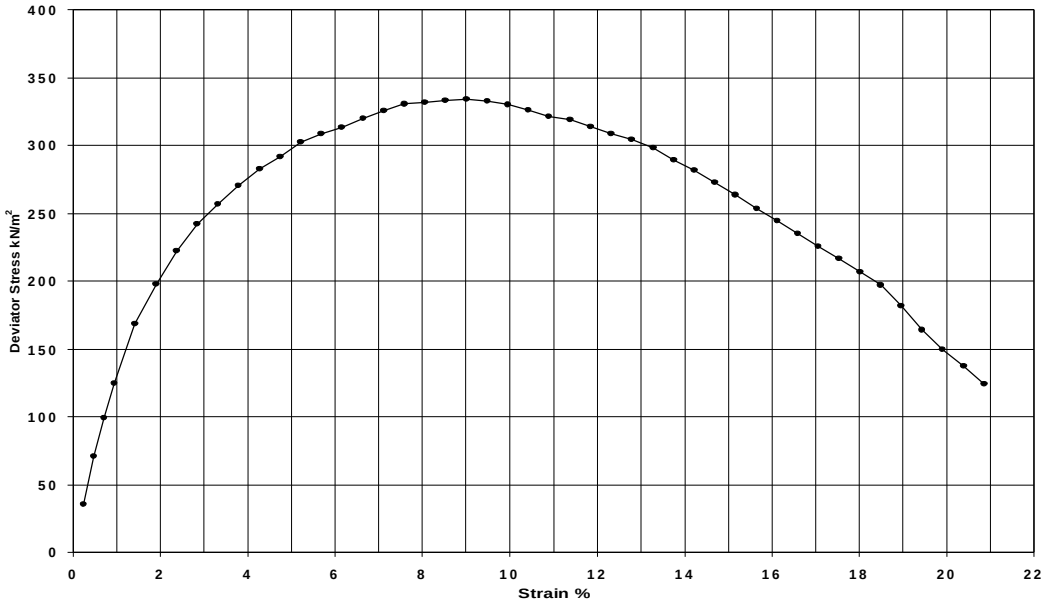
Hole	CP02
Sample Depth	5.00-5.45m
Sample Type	UT
Sample Ref	C77760

Sample Description

The following samples were combined to perform this test:

Brown slightly sandy slightly gravelly CLAY.

BS EN ISO 17892-8:2018



		Stage 1	Stage 2	Stage 3
Test Type		Single Stage		
Sample Condition		Undisturbed		
Orientation of sample		Vertical		
Initial Diameter	(mm)	104.71		
Initial Length	(mm)	210.92		
Initial Water Content	(%)	11.3		
Initial Bulk Density	(Mg/m³)	2.19		
Initial Dry Density	(Mg/m³)	1.97		
Particle Density	(Mg/m³)	2.65 Assumed		
Cell Pressure	(kPa)	100		
'Specimen Height' at start of Shearing Stage	(mm)	210.85		
Membrane Thickness/Correction	(mm/kPa)	1 / 0.0000		
Rate of Strain	(%/min)	1.9		
Corrected Deviator Stress	(kPa)	334		
Undrained Shear Strength	(kPa)	167		
Strain at Failure	(%)	9.0		
Failure Zone Water Content	(%)	13.4		
Water Content (after test)	(%)			
Mode of Failure		Intermediate		

Strain %	Corrected Deviator Stress kN/m²	Strain %	Corrected Deviator Stress kN/m²
0.2	35.5	10.0	330.2
0.5	71.0	10.4	326.5
0.7	99.0	10.9	321.7
0.9	125.1	11.4	319.1
1.4	168.5	11.9	314.0
1.9	197.7	12.3	308.7
2.4	222.3	12.8	304.1
2.8	242.0	13.3	298.1
3.3	257.1	13.7	289.7
3.8	270.4	14.2	281.8
4.3	282.6	14.7	273.0
4.7	291.8	15.2	263.7
5.2	302.6	15.6	253.4
5.7	308.7	16.1	244.4
6.2	313.5	16.6	235.2
6.6	319.9	17.1	226.0
7.1	325.8	17.5	216.7
7.6	330.7	18.0	206.6
8.1	331.6	18.5	197.2
8.5	333.2	19.0	181.9
9.0	333.8	19.4	164.3
9.5	332.3	19.9	149.7

Remarks

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GEOTECHNICS

LABORATORY RESULTS - Unconsolidated Undrained Triaxial Test

Project: HEMPLAND PRIMARY

Project No: PC218325

Hole	CP02
Sample Depth	5.00-5.45m
Sample Type	UT
Sample Ref	C77760

Remarks

10/02/2022

GEOTECHNICS

LABORATORY RESULTS - Unconsolidated Undrained Triaxial Test

Project: HEMPLAND PRIMARY

Project No: PC218325

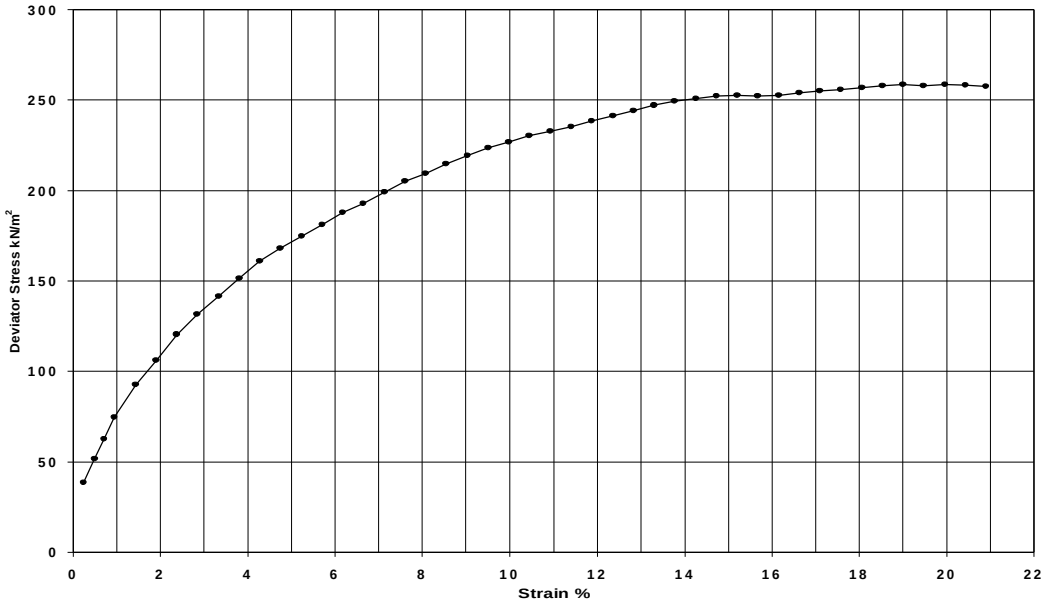
Hole	CP03
Sample Depth	2.00-2.45m
Sample Type	UT
Sample Ref	C77755

Sample Description

The following samples were combined to perform this test:

Brown mottled light grey slightly sandy CLAY.

BS EN ISO 17892-8:2018



		Stage 1	Stage 2	Stage 3
Test Type		Single Stage		
Sample Condition		Undisturbed		
Orientation of sample		Vertical		
Initial Diameter	(mm)	103.69		
Initial Length	(mm)	210.44		
Initial Water Content	(%)	14.3		
Initial Bulk Density	(Mg/m³)	2.25		
Initial Dry Density	(Mg/m³)	1.97		
Particle Density	(Mg/m³)	2.65 Assumed		
Cell Pressure	(kPa)	40		
'Specimen Height' at start of Shearing Stage	(mm)	210.42		
Membrane Thickness/Correction	(mm/kPa)	100 / 0.0000		
Rate of Strain	(%/min)	1.9		
Corrected Deviator Stress	(kPa)	259		
Undrained Shear Strength	(kPa)	129		
Strain at Failure	(%)	19 (excess)		
Failure Zone Water Content	(%)			
Water Content (after test)	(%)	13.6		
Mode of Failure		Plastic		

Strain %	Corrected Deviator Stress kN/m²	Strain %	Corrected Deviator Stress kN/m²
0.2	38.7	10.0	226.9
0.5	51.6	10.5	230.4
0.7	63.0	10.9	232.7
1.0	74.5	11.4	235.4
1.4	93.0	11.9	238.7
1.9	106.3	12.4	241.6
2.4	120.6	12.8	244.5
2.9	131.7	13.3	247.3
3.3	141.6	13.8	249.4
3.8	151.4	14.3	250.8
4.3	161.0	14.7	252.3
4.8	168.4	15.2	252.8
5.2	174.7	15.7	252.3
5.7	181.3	16.2	252.6
6.2	187.9	16.6	254.0
6.7	193.2	17.1	255.1
7.1	199.2	17.6	256.0
7.6	205.2	18.1	256.9
8.1	209.7	18.5	257.9
8.6	214.8	19.0	258.7
9.0	219.7	19.5	258.2
9.5	223.7	20.0	258.7

Remarks AGS Gravel larger than one sixth of the diameter of the sample present, this may affect the test results.

10/02/2022

GEOTECHNICS

LABORATORY RESULTS - Unconsolidated Undrained Triaxial Test

Project: HEMPLAND PRIMARY

Project No: PC218325

Hole	CP03
Sample Depth	2.00-2.45m
Sample Type	UT
Sample Ref	C77755

Remarks

10/02/2022

GEOTECHNICS

LABORATORY RESULTS - Unconsolidated Undrained Triaxial Test

Project: HEMPLAND PRIMARY

Project No: PC218325

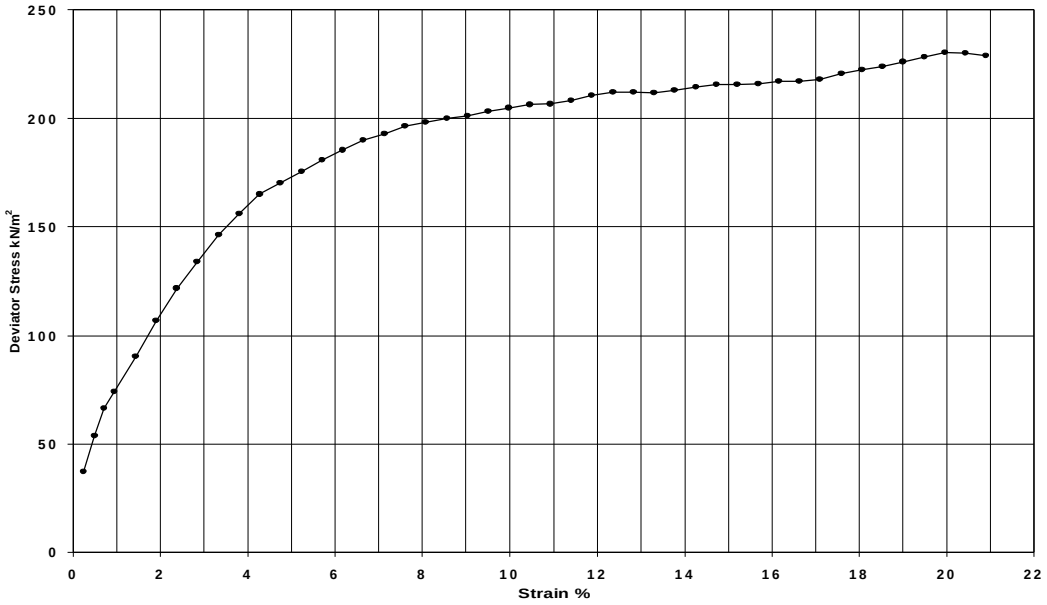
Hole	CP03
Sample Depth	6.00-6.45m
Sample Type	UT
Sample Ref	C77754

Sample Description

The following samples were combined to perform this test:

Brown slightly sandy slightly gravelly CLAY.

BS EN ISO 17892-8:2018



		Stage 1	Stage 2	Stage 3
Test Type		Single Stage		
Sample Condition		Undisturbed		
Orientation of sample		Vertical		
Initial Diameter	(mm)	102.59		
Initial Length	(mm)	210.38		
Initial Water Content	(%)	12.0		
Initial Bulk Density	(Mg/m³)	2.23		
Initial Dry Density	(Mg/m³)	1.99		
Particle Density	(Mg/m³)	2.65 Assumed		
Cell Pressure	(kPa)	120		
'Specimen Height' at start of Shearing Stage	(mm)	210.30		
Membrane Thickness/Correction	(mm/kPa)	100 / 0.0000		
Rate of Strain	(%/min)	1.9		
Corrected Deviator Stress	(kPa)	230		
Undrained Shear Strength	(kPa)	115		
Strain at Failure	(%)	20 (excess)		
Failure Zone Water Content	(%)			
Water Content (after test)	(%)	12.0		
Mode of Failure		Plastic		

Strain %	Corrected Deviator Stress kN/m²	Strain %	Corrected Deviator Stress kN/m²
0.2	37.5	10.0	205.0
0.5	53.8	10.5	206.3
0.7	66.3	10.9	206.7
1.0	74.1	11.4	208.0
1.4	90.4	11.9	210.5
1.9	106.7	12.4	212.0
2.4	121.6	12.8	211.9
2.9	134.1	13.3	211.8
3.3	146.3	13.8	212.9
3.8	156.2	14.3	214.5
4.3	164.9	14.7	215.6
4.8	170.3	15.2	215.5
5.2	175.6	15.7	215.8
5.7	181.1	16.2	217.1
6.2	185.5	16.6	217.2
6.7	189.8	17.1	218.0
7.1	192.8	17.6	220.7
7.6	196.4	18.1	222.6
8.1	198.3	18.5	224.0
8.6	200.1	19.0	226.2
9.0	201.3	19.5	228.1
9.5	203.3	20.0	230.4

Remarks AGS Gravel larger than one sixth of the diameter of the sample present, this may affect the test results.

10/02/2022

GEOTECHNICS

LABORATORY RESULTS - Unconsolidated Undrained Triaxial Test

Project: HEMPLAND PRIMARY

Project No: PC218325

Hole	CP03
Sample Depth	6.00-6.45m
Sample Type	UT
Sample Ref	C77754

Remarks

10/02/2022

GEOTECHNICS

LABORATORY RESULTS - Unconsolidated Undrained Triaxial Test

Project: HEMPLAND PRIMARY

Project No: PC218325

Hole	CP04
Sample Depth	6.00-6.45m
Sample Type	UT
Sample Ref	C77761

Sample Description

The following samples were combined to perform this test:

Brown slightly sandy slightly gravelly CLAY.

BS EN ISO 17892-8:2018

		Stage 1	Stage 2	Stage 3
Test Type		Single Stage		
Sample Condition		Undisturbed		
Orientation of sample		Vertical		
Initial Diameter	(mm)			
Initial Length	(mm)			
Initial Water Content	(%)			
Initial Bulk Density	(Mg/m^3)			
Initial Dry Density	(Mg/m^3)			
Particle Density	(Mg/m^3)	2.65 Assumed		
Cell Pressure	(kPa)	120		
'Specimen Height' at start of Shearing Stage	(mm)			
Membrane Thickness/Correction	(mm/kPa)	0 / 0.0000		
Rate of Strain	(%/min)	2.0		
Corrected Deviator Stress	(kPa)			
Undrained Shear Strength	(kPa)			
Strain at Failure	(%)			
Failure Zone Water Content	(%)			
Water Content (after test)	(%)			
Mode of Failure				

Strain %	Corrected Deviator Stress kN/m^2	Strain %	Corrected Deviator Stress kN/m^2

Remarks

10/02/2022

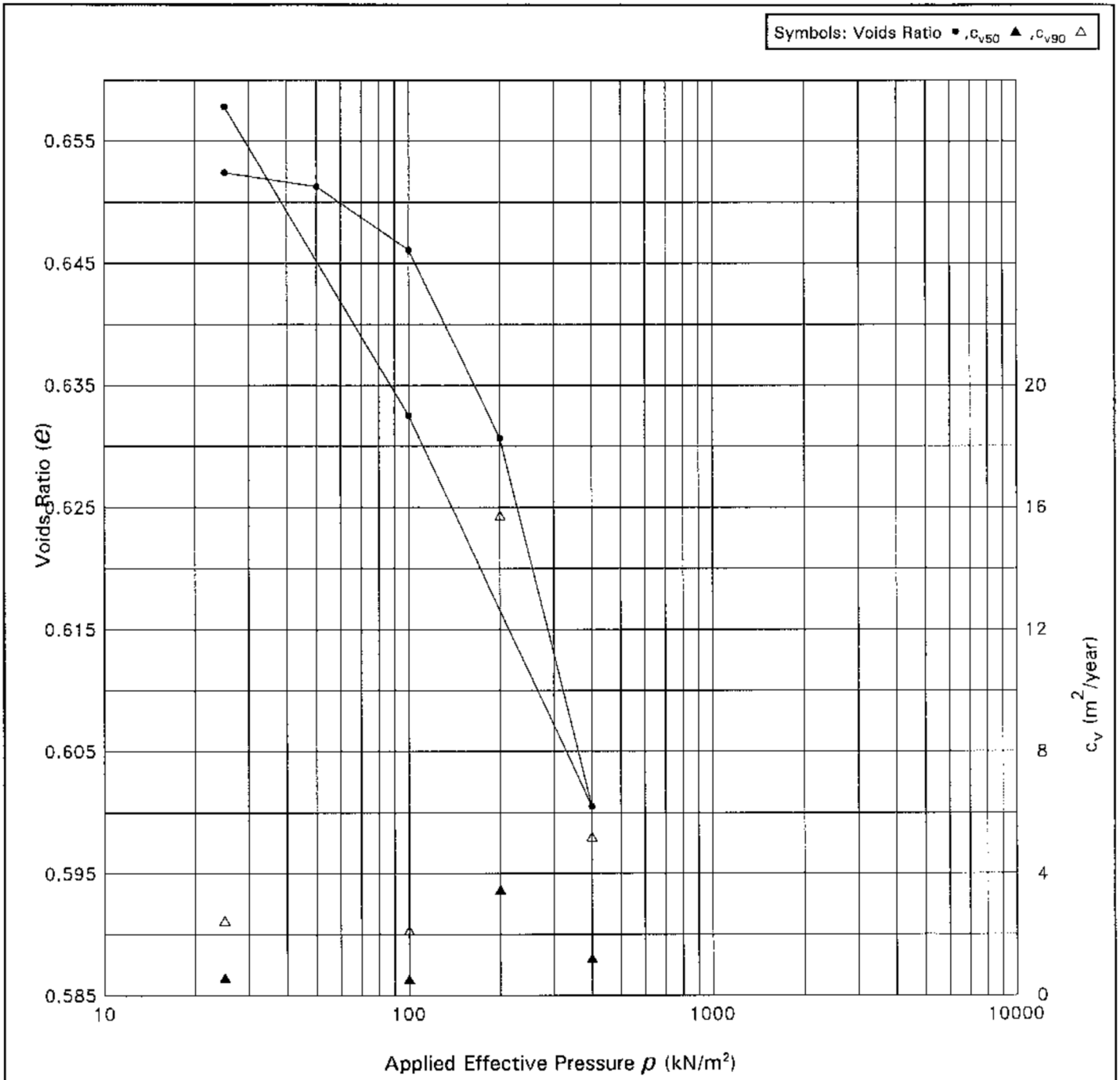
GEOTECHNICS

LABORATORY RESULTS - *Consolidation e/logp Plot*

Project HEMPLAND PRIMARY

Client Mott McDonald

Project No PC218325
Borehole CP02
Sample Depth 1.20 - 1.65 m
Sample Type UT



Applied Pressure kN/m²	0-25	25-50	50-100	100-200	200-400	400-100	100-25			
m_v m^2/MN	0.20	0.03	0.06	0.09	0.09	0.07	0.21			
c_{v50} Log Time m^2/yr	-	-	-	3.47	1.20	0.53	0.58			
c_{v90} Root Time m^2/yr	-	-	-	15.73	5.21	2.13	2.45			
Voids Ratio	0.652	0.651	0.646	0.631	0.601	0.633	0.658			

Description
C77756 Dark Brown slightly sandy CLAY with layered silt partings

Specimen Diameter	74.610	mm
Initial Height	18.690	mm
Particle Density	2.65 Assumed	
Initial Voids Ratio	0.661	

Initial Water Content	25.35	%
Final Water Content	28.84	%
Initial Saturation	100	%
Initial Bulk Density	2.00	Mg/m^3
Initial Dry Density	1.60	Mg/m^3

Remarks Laboratory temperature 20°C ± 3°C
Specimen cut vertically from base of sample
Test performed in accordance with BS EN ISO 17892-5:2017

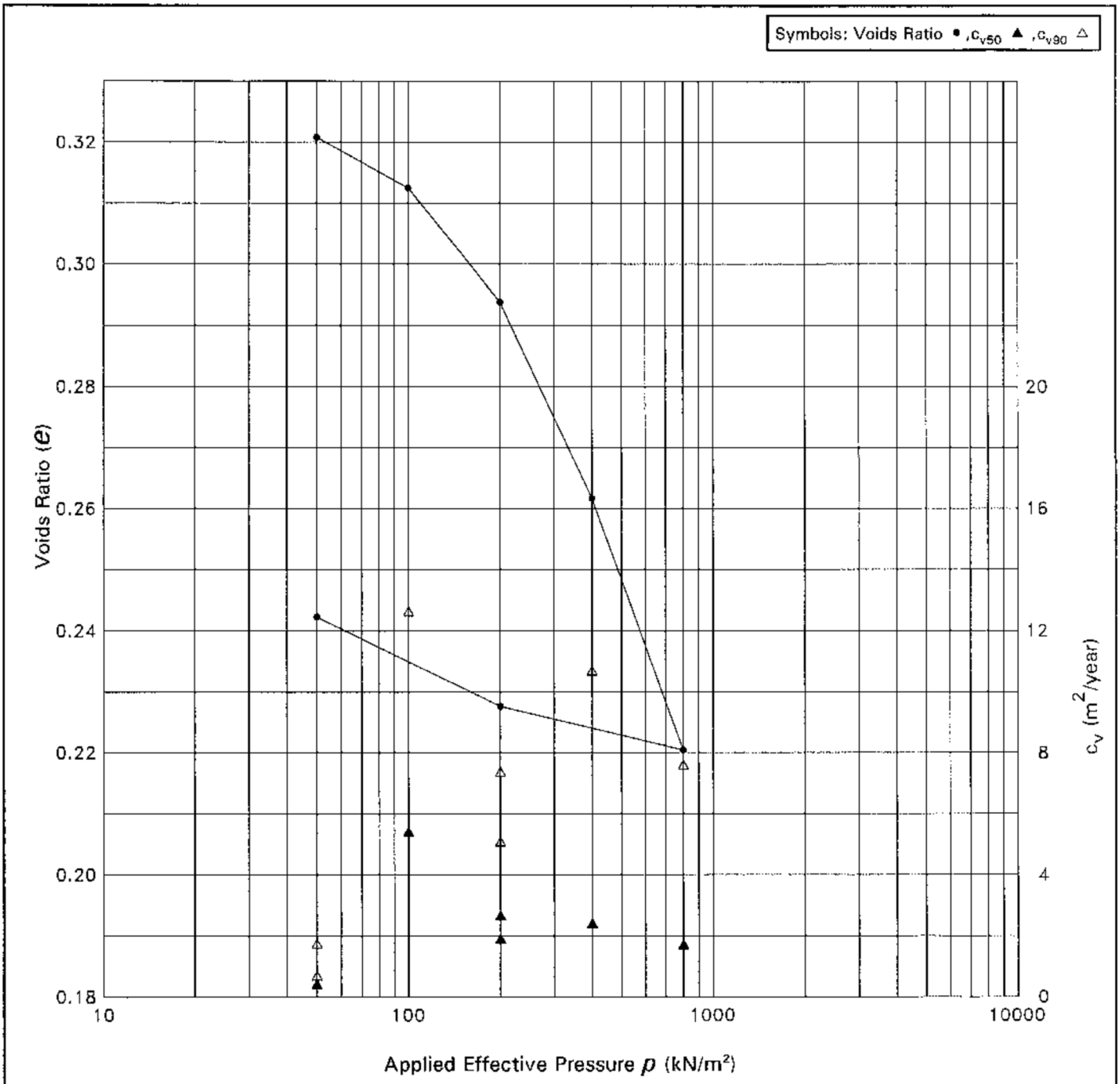
geotechnics

LABORATORY RESULTS - *Consolidation e/logp Plot*

Project HEMPLAND PRIMARY

Client Mott McDonald

Project No PC218325
Borehole CP03
Sample Depth 4.00 - 4.45 m
Sample Type UT



Applied Pressure kN/m²	0-50	50-100	100-200	200-400	400-800	800-200	200-50			
m_v m^2/MN	0.21	0.13	0.14	0.12	0.08	0.01	0.08			
c_{v50} Log Time m^2/yr	-	5.41	2.66	2.41	1.72	1.90	0.42			
c_{v90} Root Time m^2/yr	-	12.63	7.37	10.69	7.60	5.08	1.74			
Voids Ratio	0.321	0.312	0.294	0.262	0.220	0.228	0.242			

Description
C77752 Dark brown very gravelly CLAY

Specimen Diameter	74.520	mm
Initial Height	18.790	mm
Particle Density	2.65 Assumed	
Initial Voids Ratio	0.335	

Initial Water Content	13.91	%
Final Water Content	13.91	%
Initial Saturation	100	%
Initial Bulk Density	2.26	Mg/m³
Initial Dry Density	1.99	Mg/m³

Remarks Laboratory temperature 20°C ± 3°C
Specimen cut vertically from base of sample
Test performed in accordance with BS EN ISO 17892-5:2017

geotechnics

LABORATORY RESULTS - Test Remarks

Project HEMPLAND PRIMARY **Project No:** PC218325

Sample				Laboratory Remark
Hole	Depth (Specimen Depth) m	Type	Sample Ref	
CP01	4.00-4.45 (4.00-4.45)	UT	C77757	Quick Undrained Triaxial Test - Gravel larger than one sixth of the diameter of the sample present, this may affect the test results.
CP03	2.00-2.45 (2.00-2.45)	UT	C77755	Quick Undrained Triaxial Test - Gravel larger than one sixth of the diameter of the sample present, this may affect the test results.
CP03	6.00-6.45 (6.00-6.45)	UT	C77754	Quick Undrained Triaxial Test - Gravel larger than one sixth of the diameter of the sample present, this may affect the test results.

Remarks

Certificate of Analysis

Certificate Number 21-27209 *Issued:* 07-Jan-22

Client Geotechnics LTD
203 Torrington Avenue
Tile Hill
Coventry
CV4 9AP

Our Reference 21-27209

Client Reference PC218325

Order No OC32255

Contract Title Hempland Primary School

Description 12 Soil samples.

Date Received 23-Dec-21

Date Started 23-Dec-21

Date Completed 07-Jan-22

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

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

Approved By [redacted]

Adam Fenwick
Contracts Manager

UKAS TESTING
2139

Summary of Chemical Analysis
Soil Samples

Our Ref 21-27209
Client Ref PC218325
Contract Title Hempland Primary School

Test	Method	LOD	Units	Lab No	1952829	1952831	1952833	1952834	1952836	1953385	1953386	1953387
				.Sample ID	CP01	CP02	CP04	WS01	WS03	CP01	CP03	CP04
				Depth	3.50	1.70	2.50	2.50	3.50	0.80	1.00	0.80
				Other ID								
				Sample Type	D	D	D	D	D	ES	ES	ES
				Sampling Date	n/s	n/s	n/s	n/s	n/s	24/11/2021	23/11/2021	22/11/2021
				Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s
Inorganics												
pH	DETSC 2008#		pH		11.7	11.6	10.2	8.6	9.4	7.3	9.1	7.8
Sulphate Aqueous Extract as SO4	DETSC 2076#	10	mg/l		930	1100	450	470	250	60	68	56

Key: # -MCERTS (accreditation only applies if report carries the MCERTS logo). n/s -not supplied.

Summary of Asbestos Analysis
Soil Samples

Our Ref 21-27209
Client Ref PC218325
Contract Title Hempland Primary School

Lab No	Sample ID	Material Type	Result	Comment*	Analyst
1952828	CP01 0.80	SOIL	NAD	none	Michael Kay
1952830	CP02 0.50	SOIL	NAD	none	Michael Kay
1952832	CP04 0.80	SOIL	NAD	none	Michael Kay
1952835	WS03 0.50-1.00	SOIL	NAD	none	Michael Kay

Crocidolite = Blue Asbestos, Amosite = Brown Asbestos, Chrysotile = White Asbestos. Anthophyllite, Actinolite and Tremolite are other forms of Asbestos. Samples are analysed by DETSC 1101 using polarised light microscopy in accordance with HSG248 and documented in-house methods. NAD = No Asbestos Detected. Where a sample is NAD, the result is based on analysis of at least 2 sub-samples and should be taken to mean 'no asbestos detected in sample'. Key: * - not included in laboratory scope of accreditation.

Information in Support of the Analytical Results

Our Ref 21-27209
Client Ref PC218325
Contract Hempland Primary School

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1952828	CP01 0.80 SOIL		PT 1L		
1952829	CP01 3.50 SOIL		PT 1L	Sample date not supplied, Anions 2:1 (30 days), pH + Conductivity (7 days)	
1952830	CP02 0.50 SOIL		PT 1L		
1952831	CP02 1.70 SOIL		PT 1L	Sample date not supplied, Anions 2:1 (30 days), pH + Conductivity (7 days)	
1952832	CP04 0.80 SOIL		PT 1L		
1952833	CP04 2.50 SOIL		PT 1L	Sample date not supplied, Anions 2:1 (30 days), pH + Conductivity (7 days)	
1952834	WS01 2.50 SOIL		PT 1L	Sample date not supplied, Anions 2:1 (30 days), pH + Conductivity (7 days)	
1952835	WS03 0.50-1.00 SOIL		PT 1L		
1952836	WS03 3.50 SOIL		PT 1L	Sample date not supplied, Anions 2:1 (30 days), pH + Conductivity (7 days)	
1953385	CP01 0.80 SOIL	24/11/21	GJ 250ml, GJ 60ml, PT 1L	pH + Conductivity (7 days)	
1953386	CP03 1.00 SOIL	23/11/21	GJ 250ml, GJ 60ml, PT 1L	Anions 2:1 (30 days), pH + Conductivity (7 days)	
1953387	CP04 0.80 SOIL	22/11/21	GJ 250ml, GJ 60ml, PT 1L	Anions 2:1 (30 days), pH + Conductivity (7 days)	

Key: P-Plastic T-Tub G-Glass J-Jar

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

Soil Analysis Notes

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

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

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

Disposal

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

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

End of Report

APPENDIX 8

Laboratory Test Results - Contamination

Certificate of Analysis

Certificate Number	21-25403	*Issued:*	07-Dec-21

Client Geotechnics LTD
203 Torrington Avenue
Tile Hill
Coventry
CV4 9AP

Our Reference	21-25403
Client Reference	PC218325
Order No	OC31890
Contract Title	Hempland Primary School
Description	4 Soil samples, 1 Leachate sample.
Date Received	29-Nov-21
Date Started	29-Nov-21
Date Completed	07-Dec-21
Test Procedures	Identified by prefix DETSn (details on request).

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

Approved By [redacted]

Adam Fenwick
Contracts Manager

UKAS TESTING
2139

Summary of Chemical Analysis
Soil Samples

Our Ref 21-25403
Client Ref PC218325
Contract Title Hempland Primary School

			Lab No	1940506	1940507	1940508	1940509
			.Sample ID	CP02	CP03	CP04	CP04
			Depth	0.20	0.20	0.30	1.50
			Other ID				
			Sample Type	SOIL	SOIL	SOIL	SOIL
			Sampling Date	24/11/2021	23/11/2021	22/11/2021	22/11/2021
			Sampling Time	n/s	n/s	n/s	n/s
Test	Method	LOD	Units				
Metals							
Antimony	DETSC 2301*	1	mg/kg	< 1.0	< 1.0	< 1.0	< 1.0
Arsenic	DETSC 2301#	0.2	mg/kg	11	9.9	7.8	7.4
Barium	DETSC 2301#	1.5	mg/kg	130	96	130	91
Beryllium	DETSC 2301#	0.2	mg/kg	0.9	0.7	0.6	0.5
Boron, Water Soluble	DETSC 2311#	0.2	mg/kg	0.5	0.4	< 0.2	< 0.2
Chromium III	DETSC 2301*	0.15	mg/kg	20	15	9.8	18
Chromium, Hexavalent	DETSC 2204*	1	mg/kg	< 1.0	< 1.0	< 1.0	< 1.0
Copper	DETSC 2301#	0.2	mg/kg	45	39	17	20
Iron	DETSC 2301	25	mg/kg	23000	16000	14000	17000
Lead	DETSC 2301#	0.3	mg/kg	110	92	34	16
Molybdenum	DETSC 2301#	0.4	mg/kg	1.0	0.9	1.1	0.5
Nickel	DETSC 2301#	1	mg/kg	16	12	12	16
Selenium	DETSC 2301#	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Vanadium	DETSC 2301#	0.8	mg/kg	27	22	16	17
Zinc	DETSC 2301#	1	mg/kg	55	57	27	60
Inorganics							
pH	DETSC 2008#		pH	7.5	7.7	8.2	8.2
Cyanide, Free	DETSC 2130#	0.1	mg/kg	0.1	0.3	< 0.1	< 0.1
Total Organic Carbon	DETSC 2084#	0.5	%	2.2	4.2	1.0	0.7
Sulphate Aqueous Extract as SO4	DETSC 2076#	10	mg/l	11	19	54	35
Sulphur as S, Total	DETSC 2320	0.01	%	0.02	0.06	0.18	0.02
Petroleum Hydrocarbons							
Aliphatic C5-C6	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic C6-C8	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic C10-C12	DETSC 3072#	1.5	mg/kg	< 1.5	< 1.5	< 1.5	< 1.5
Aliphatic C12-C16	DETSC 3072#	1.2	mg/kg	< 1.2	< 1.2	< 1.2	< 1.2
Aliphatic C16-C21	DETSC 3072#	1.5	mg/kg	< 1.5	< 1.5	< 1.5	< 1.5
Aliphatic C21-C35	DETSC 3072#	3.4	mg/kg	< 3.4	< 3.4	< 3.4	< 3.4
Aliphatic C5-C35	DETSC 3072*	10	mg/kg	< 10	< 10	< 10	< 10
Aromatic C5-C7	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic C7-C8	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic C10-C12	DETSC 3072#	0.9	mg/kg	< 0.9	< 0.9	< 0.9	< 0.9
Aromatic C12-C16	DETSC 3072#	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Aromatic C16-C21	DETSC 3072#	0.6	mg/kg	< 0.6	< 0.6	< 0.6	< 0.6
Aromatic C21-C35	DETSC 3072#	1.4	mg/kg	< 1.4	< 1.4	< 1.4	< 1.4
Aromatic C5-C35	DETSC 3072*	10	mg/kg	< 10	< 10	< 10	< 10
TPH Ali/Aro Total C5-C35	DETSC 3072*	10	mg/kg	< 10	< 10	< 10	< 10
PAHs							
Naphthalene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03

Key: * -not accredited. # -MCERTS (accreditation only applies if report carries the MCERTS logo). n/s -not supplied.

Summary of Chemical Analysis
Soil Samples

Our Ref 21-25403
Client Ref PC218325
Contract Title Hempland Primary School

			Lab No	1940506	1940507	1940508	1940509
			.Sample ID	CP02	CP03	CP04	CP04
			Depth	0.20	0.20	0.30	1.50
			Other ID				
			Sample Type	SOIL	SOIL	SOIL	SOIL
			Sampling Date	24/11/2021	23/11/2021	22/11/2021	22/11/2021
			Sampling Time	n/s	n/s	n/s	n/s
Test	Method	LOD	Units				
Acenaphthylene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Acenaphthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Fluorene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Phenanthrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Anthracene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Fluoranthene	DETSC 3303#	0.03	mg/kg	0.05	0.03	< 0.03	< 0.03
Pyrene	DETSC 3303#	0.03	mg/kg	0.04	< 0.03	< 0.03	< 0.03
Benzo(a)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Chrysene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(b)fluoranthene	DETSC 3303#	0.03	mg/kg	0.04	< 0.03	< 0.03	< 0.03
Benzo(k)fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(a)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Indeno(1,2,3-c,d)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Dibenzo(a,h)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(g,h,i)perylene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
PAH - USEPA 16, Total	DETSC 3303	0.1	mg/kg	< 0.10	< 0.10	< 0.10	< 0.10
Phenols							
Phenol - Monohydric	DETSC 2130#	0.3	mg/kg	< 0.3	0.7	< 0.3	< 0.3
VOCs							
Vinyl Chloride	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
1,1 Dichloroethylene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Trans-1,2-dichloroethylene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
1,1-dichloroethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Cis-1,2-dichloroethylene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
2,2-dichloropropane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Bromochloromethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Chloroform	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
1,1,1-trichloroethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
1,1-dichloropropene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Carbon tetrachloride	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Benzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
1,2-dichloroethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Trichloroethylene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
1,2-dichloropropane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Dibromomethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Bromodichloromethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
cis-1,3-dichloropropene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Toluene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
trans-1,3-dichloropropene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
1,1,2-trichloroethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Tetrachloroethylene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
1,3-dichloropropane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01

Key: * -not accredited. # -MCERTS (accreditation only applies if report carries the MCERTS logo). n/s -not supplied.

Summary of Chemical Analysis
Soil Samples

Our Ref 21-25403
Client Ref PC218325
Contract Title Hempland Primary School

			Lab No	1940506	1940507	1940508	1940509
			.Sample ID	CP02	CP03	CP04	CP04
			Depth	0.20	0.20	0.30	1.50
			Other ID				
			Sample Type	SOIL	SOIL	SOIL	SOIL
			Sampling Date	24/11/2021	23/11/2021	22/11/2021	22/11/2021
			Sampling Time	n/s	n/s	n/s	n/s
Test	Method	LOD	Units				
Dibromochloromethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
1,2-dibromoethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Chlorobenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
1,1,1,2-tetrachloroethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Ethylbenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
m+p-Xylene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
o-Xylene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Styrene	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Bromoform	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Isopropylbenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Bromobenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
1,2,3-trichloropropane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
n-propylbenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
2-chlorotoluene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
1,3,5-trimethylbenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
4-chlorotoluene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Tert-butylbenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
1,2,4-trimethylbenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
sec-butylbenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
p-isopropyltoluene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
1,3-dichlorobenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
1,4-dichlorobenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
n-butylbenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
1,2-dichlorobenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
1,2-dibromo-3-chloropropane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
1,2,4-trichlorobenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Hexachlorobutadiene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
1,2,3-trichlorobenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
MTBE	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01

Key: * -not accredited. # -MCERTS (accreditation only applies if report carries the MCERTS logo). n/s -not supplied.

Summary of Chemical Analysis
Leachate Samples

Our Ref 21-25403
Client Ref PC218325
Contract Title Hempland Primary School

Test	Method	LOD	Units	Lab No 1940510
				.Sample ID CP02
				Depth 0.20
				Other ID
				Sample Type LEACHATE
				Sampling Date 24/11/2021
				Sampling Time n/s
Preparation				
BS EN 12457 10:1	DETSC 1009*			Y
Metals				
Antimony, Dissolved	DETSC 2306	0.17	ug/l	< 0.17
Arsenic, Dissolved	DETSC 2306	0.16	ug/l	0.97
Barium, Dissolved	DETSC 2306	0.26	ug/l	5.0
Beryllium, Dissolved	DETSC 2306*	0.1	ug/l	< 0.1
Boron, Dissolved	DETSC 2306*	12	ug/l	< 12
Calcium, Dissolved	DETSC 2306	0.09	mg/l	6.3
Chromium, Dissolved	DETSC 2306	0.25	ug/l	< 0.25
Chromium III, Dissolved	DETSC 2306*	1	ug/l	< 1.0
Chromium, Hexavalent	DETSC 2203	7	ug/l	< 7.0
Copper, Dissolved	DETSC 2306	0.4	ug/l	0.7
Iron, Dissolved	DETSC 2306	5.5	ug/l	45
Lead, Dissolved	DETSC 2306	0.09	ug/l	0.53
Magnesium, Dissolved	DETSC 2306	0.02	mg/l	0.29
Manganese, Dissolved	DETSC 2306	0.22	ug/l	1.2
Molybdenum, Dissolved	DETSC 2306	1.1	ug/l	< 1.1
Nickel, Dissolved	DETSC 2306	0.5	ug/l	< 0.5
Selenium, Dissolved	DETSC 2306	0.25	ug/l	< 0.25
Vanadium, Dissolved	DETSC 2306	0.6	ug/l	1.4
Zinc, Dissolved	DETSC 2306	1.3	ug/l	1.8
Inorganics				
pH	DETSC 2008		pH	6.6
Cyanide, Total	DETSC 2130	40	ug/l	< 40
Cyanide, Free	DETSC 2130	20	ug/l	< 20
Ammoniacal Nitrogen as N	DETSC 2207	0.015	mg/l	0.046
Chloride	DETSC 2055	0.1	mg/l	0.81
Fluoride	DETSC 2055	0.1	mg/l	0.20
Sulphate as SO4	DETSC 2055	0.1	mg/l	1.2
Sulphide	DETSC 2208	10	ug/l	< 10
Phenols				
Phenol	DETSC 3451*	0.1	ug/l	< 0.10
4-Chloro-3-methylphenol	DETSC 3451*	0.1	ug/l	< 0.10
2,4-Dichlorophenol	DETSC 3451*	0.1	ug/l	< 0.10
2,4-Dimethylphenol	DETSC 3451*	0.1	ug/l	< 0.10
p-cresol	DETSC 3451*	0.1	ug/l	< 0.10
2,6-Dimethylphenol	DETSC 3451*	0.1	ug/l	< 0.10
2,6-Dichlorophenol	DETSC 3451*	0.1	ug/l	< 0.10
2,4,6-Trichlorophenol	DETSC 3451*	0.1	ug/l	< 0.10

Key: * -not accredited. n/s -not supplied.

Summary of Asbestos Analysis
Soil Samples

Our Ref 21-25403
Client Ref PC218325
Contract Title Hempland Primary School

Lab No	Sample ID	Material Type	Result	Comment*	Analyst
1940506	CP02 0.20	SOIL	NAD	none	D Wilkinson
1940507	CP03 0.20	SOIL	NAD	none	D Wilkinson
1940508	CP04 0.30	SOIL	NAD	none	D Wilkinson
1940509	CP04 1.50	SOIL	NAD	none	D Wilkinson

Crocidolite = Blue Asbestos, Amosite = Brown Asbestos, Chrysotile = White Asbestos. Anthophyllite, Actinolite and Tremolite are other forms of Asbestos. Samples are analysed by DETSC 1101 using polarised light microscopy in accordance with HSG248 and documented in-house methods. NAD = No Asbestos Detected. Where a sample is NAD, the result is based on analysis of at least 2 sub-samples and should be taken to mean 'no asbestos detected in sample'. Key: * - not included in laboratory scope of accreditation.

Information in Support of the Analytical Results

Our Ref 21-25403
Client Ref PC218325
Contract Hempland Primary School

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1940506	CP02 0.20 SOIL	24/11/21	GJ 250ml, GJ 60ml, PT 1L		
1940507	CP03 0.20 SOIL	23/11/21	GJ 250ml, GJ 60ml, PT 1L		
1940508	CP04 0.30 SOIL	22/11/21	GJ 250ml, GJ 60ml, PT 1L		
1940509	CP04 1.50 SOIL	22/11/21	GJ 250ml, GJ 60ml, PT 1L		
1940510	CP02 0.20 LEACHATE	24/11/21	GJ 250ml, GJ 60ml, PT 1L		

Key: G-Glass P-Plastic J-Jar T-Tub

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

Soil Analysis Notes

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

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

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

Disposal

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

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

End of Report

Certificate of Analysis

Certificate Number	21-25807	*Issued:*	10-Dec-21

Client Geotechnics LTD
203 Torrington Avenue
Tile Hill
Coventry
CV4 9AP

Our Reference	21-25807
Client Reference	PC218325
Order No	OC31949
Contract Title	Hempland Primary School
Description	8 Soil samples, 2 Leachate samples.
Date Received	03-Dec-21
Date Started	03-Dec-21
Date Completed	10-Dec-21
Test Procedures	Identified by prefix DETSn (details on request).

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

Approved By [redacted]

Adam Fenwick
Contracts Manager

UKAS TESTING
2139

Summary of Chemical Analysis
Soil Samples

Our Ref 21-25807
Client Ref PC218325
Contract Title Hempland Primary School

			Lab No	1943249	1943250	1943251	1943252	1943253	1943254
			.Sample ID	CP01	CP01	WS01	WS01	WS02	WS02
			Depth	0.30	0.80	0.10	0.55	0.30	1.00
			Other ID						
			Sample Type	ES	ES	ES	ES	ES	ES
			Sampling Date	25/11/2021	25/11/2021	26/11/2021	26/11/2021	26/11/2021	26/11/2021
			Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s
Test	Method	LOD	Units						
Metals									
Antimony	DETSC 2301*	1	mg/kg	1.4	1.4	2.2	2.2	1.8	2.1
Arsenic	DETSC 2301#	0.2	mg/kg	8.3	5.9	12	8.5	9.2	8.9
Barium	DETSC 2301#	1.5	mg/kg	92	93	150	180	200	180
Beryllium	DETSC 2301#	0.2	mg/kg	0.5	0.8	1.2	1.6	0.9	1.1
Boron, Water Soluble	DETSC 2311#	0.2	mg/kg	0.5	0.5	< 0.2	0.4	0.5	0.3
Chromium III	DETSC 2301*	0.15	mg/kg	11	19	23	33	19	25
Chromium, Hexavalent	DETSC 2204*	1	mg/kg	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Copper	DETSC 2301#	0.2	mg/kg	18	24	38	30	36	30
Iron	DETSC 2301	25	mg/kg	21000	21000	27000	38000	19000	31000
Lead	DETSC 2301#	0.3	mg/kg	15	36	110	34	92	20
Molybdenum	DETSC 2301#	0.4	mg/kg	2.6	0.6	1.1	0.5	1.4	0.6
Nickel	DETSC 2301#	1	mg/kg	12	15	20	47	17	31
Selenium	DETSC 2301#	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Vanadium	DETSC 2301#	0.8	mg/kg	17	25	33	39	29	29
Zinc	DETSC 2301#	1	mg/kg	19	37	67	69	62	62
Inorganics									
pH	DETSC 2008#		pH	8.2	7.4	7.4	7.9	7.3	8.1
Cyanide, Free	DETSC 2130#	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Total Organic Carbon	DETSC 2084#	0.5	%	1.0	1.0	3.6	1.2	4.1	1.2
Sulphate Aqueous Extract as SO4	DETSC 2076#	10	mg/l	97	58	30	39	29	46
Sulphur as S, Total	DETSC 2320	0.01	%	0.23	0.04	0.04	0.02	0.04	0.02
Petroleum Hydrocarbons									
Aliphatic C5-C6	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic C6-C8	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic C10-C12	DETSC 3072#	1.5	mg/kg	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5
Aliphatic C12-C16	DETSC 3072#	1.2	mg/kg	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2
Aliphatic C16-C21	DETSC 3072#	1.5	mg/kg	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5
Aliphatic C21-C35	DETSC 3072#	3.4	mg/kg	28	< 3.4	< 3.4	< 3.4	< 3.4	< 3.4
Aliphatic C5-C35	DETSC 3072*	10	mg/kg	28	< 10	< 10	< 10	< 10	< 10
Aromatic C5-C7	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic C7-C8	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic C10-C12	DETSC 3072#	0.9	mg/kg	< 0.9	< 0.9	< 0.9	< 0.9	< 0.9	< 0.9
Aromatic C12-C16	DETSC 3072#	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Aromatic C16-C21	DETSC 3072#	0.6	mg/kg	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6
Aromatic C21-C35	DETSC 3072#	1.4	mg/kg	< 1.4	< 1.4	< 1.4	< 1.4	< 1.4	< 1.4
Aromatic C5-C35	DETSC 3072*	10	mg/kg	< 10	< 10	< 10	< 10	< 10	< 10
TPH Ali/Aro Total C5-C35	DETSC 3072*	10	mg/kg	28	< 10	< 10	< 10	< 10	< 10
PAHs									
Naphthalene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	0.05	< 0.03

Key: * -not accredited. # -MCERTS (accreditation only applies if report carries the MCERTS logo). n/s -not supplied.

Summary of Chemical Analysis
Soil Samples

Our Ref 21-25807
Client Ref PC218325
Contract Title Hempland Primary School

				Lab No	1943249	1943250	1943251	1943252	1943253	1943254
				.Sample ID	CP01	CP01	WS01	WS01	WS02	WS02
				Depth	0.30	0.80	0.10	0.55	0.30	1.00
				Other ID						
				Sample Type	ES	ES	ES	ES	ES	ES
				Sampling Date	25/11/2021	25/11/2021	26/11/2021	26/11/2021	26/11/2021	26/11/2021
				Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s
Test	Method	LOD	Units							
Acenaphthylene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Acenaphthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	0.06	< 0.03
Fluorene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	0.06	< 0.03
Phenanthrene	DETSC 3303#	0.03	mg/kg	0.03	< 0.03	< 0.03	< 0.03	0.69	< 0.03
Anthracene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	0.20	< 0.03
Fluoranthene	DETSC 3303#	0.03	mg/kg	0.08	< 0.03	< 0.03	< 0.03	1.2	< 0.03
Pyrene	DETSC 3303#	0.03	mg/kg	0.10	< 0.03	< 0.03	< 0.03	1.1	< 0.03
Benzo(a)anthracene	DETSC 3303#	0.03	mg/kg	0.10	< 0.03	< 0.03	< 0.03	0.85	0.04
Chrysene	DETSC 3303	0.03	mg/kg	0.06	< 0.03	< 0.03	< 0.03	0.88	< 0.03
Benzo(b)fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	1.2	< 0.03
Benzo(k)fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	0.61	< 0.03
Benzo(a)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	1.6	< 0.03
Indeno(1,2,3-c,d)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	0.70	< 0.03
Dibenzo(a,h)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	0.19	< 0.03
Benzo(g,h,i)perylene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	0.73	< 0.03
PAH - USEPA 16, Total	DETSC 3303	0.1	mg/kg	0.34	< 0.10	< 0.10	< 0.10	10	< 0.10
Phenols										
Phenol - Monohydric	DETSC 2130#	0.3	mg/kg	< 0.3	< 0.3	< 0.3	< 0.3	0.4	< 0.3
VOCs										
Vinyl Chloride	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
1,1 Dichloroethylene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Trans-1,2-dichloroethylene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
1,1-dichloroethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Cis-1,2-dichloroethylene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
2,2-dichloropropane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Bromochloromethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Chloroform	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
1,1,1-trichloroethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
1,1-dichloropropene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Carbon tetrachloride	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
1,2-dichloroethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Trichloroethylene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
1,2-dichloropropane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Dibromomethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Bromodichloromethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
cis-1,3-dichloropropene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Toluene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
trans-1,3-dichloropropene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
1,1,2-trichloroethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Tetrachloroethylene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
1,3-dichloropropane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01

Key: * -not accredited. # -MCERTS (accreditation only applies if report carries the MCERTS logo). n/s -not supplied.

Summary of Chemical Analysis
Soil Samples

Our Ref 21-25807
Client Ref PC218325
Contract Title Hempland Primary School

			Lab No	1943249	1943250	1943251	1943252	1943253	1943254
			.Sample ID	CP01	CP01	WS01	WS01	WS02	WS02
			Depth	0.30	0.80	0.10	0.55	0.30	1.00
			Other ID						
			Sample Type	ES	ES	ES	ES	ES	ES
			Sampling Date	25/11/2021	25/11/2021	26/11/2021	26/11/2021	26/11/2021	26/11/2021
			Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s
Test	Method	LOD	Units						
Dibromochloromethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
1,2-dibromoethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Chlorobenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
1,1,1,2-tetrachloroethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Ethylbenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
m+p-Xylene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
o-Xylene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Styrene	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Bromoform	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Isopropylbenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Bromobenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
1,2,3-trichloropropane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	0.02	< 0.01	< 0.01	< 0.01
n-propylbenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
2-chlorotoluene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
1,3,5-trimethylbenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
4-chlorotoluene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Tert-butylbenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
1,2,4-trimethylbenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
sec-butylbenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
p-isopropyltoluene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
1,3-dichlorobenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
1,4-dichlorobenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
n-butylbenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
1,2-dichlorobenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
1,2-dibromo-3-chloropropane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
1,2,4-trichlorobenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Hexachlorobutadiene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
1,2,3-trichlorobenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
MTBE	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01

Summary of Chemical Analysis
Soil Samples

Our Ref 21-25807
Client Ref PC218325
Contract Title Hempland Primary School

Test	Method	LOD	Units	Lab No 1943255	Lab No 1943256
				.Sample ID WS03	.Sample ID WS03
				Depth 0.30	Depth 0.80
				Other ID	Other ID
				Sample Type ES	Sample Type ES
				Sampling Date 26/11/2021	Sampling Date 26/11/2021
				Sampling Time n/s	Sampling Time n/s
Metals					
Antimony	DETSC 2301*	1	mg/kg	< 1.0	1.4
Arsenic	DETSC 2301#	0.2	mg/kg	3.7	7.1
Barium	DETSC 2301#	1.5	mg/kg	31	110
Beryllium	DETSC 2301#	0.2	mg/kg	< 0.2	1.1
Boron, Water Soluble	DETSC 2311#	0.2	mg/kg	< 0.2	0.2
Chromium III	DETSC 2301*	0.15	mg/kg	4.0	23
Chromium, Hexavalent	DETSC 2204*	1	mg/kg	< 1.0	< 1.0
Copper	DETSC 2301#	0.2	mg/kg	6.3	25
Iron	DETSC 2301	25	mg/kg	5500	24000
Lead	DETSC 2301#	0.3	mg/kg	8.7	18
Molybdenum	DETSC 2301#	0.4	mg/kg	0.5	0.5
Nickel	DETSC 2301#	1	mg/kg	4.6	25
Selenium	DETSC 2301#	0.5	mg/kg	< 0.5	< 0.5
Vanadium	DETSC 2301#	0.8	mg/kg	11	29
Zinc	DETSC 2301#	1	mg/kg	21	51
Inorganics					
pH	DETSC 2008#		pH	8.4	7.6
Cyanide, Free	DETSC 2130#	0.1	mg/kg	< 0.1	< 0.1
Total Organic Carbon	DETSC 2084#	0.5	%	3.5	0.6
Sulphate Aqueous Extract as SO4	DETSC 2076#	10	mg/l	63	46
Sulphur as S, Total	DETSC 2320	0.01	%	0.10	0.02
Petroleum Hydrocarbons					
Aliphatic C5-C6	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01
Aliphatic C6-C8	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01
Aliphatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01
Aliphatic C10-C12	DETSC 3072#	1.5	mg/kg	< 1.5	< 1.5
Aliphatic C12-C16	DETSC 3072#	1.2	mg/kg	< 1.2	< 1.2
Aliphatic C16-C21	DETSC 3072#	1.5	mg/kg	< 1.5	< 1.5
Aliphatic C21-C35	DETSC 3072#	3.4	mg/kg	< 3.4	< 3.4
Aliphatic C5-C35	DETSC 3072*	10	mg/kg	< 10	< 10
Aromatic C5-C7	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01
Aromatic C7-C8	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01
Aromatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01
Aromatic C10-C12	DETSC 3072#	0.9	mg/kg	1.4	< 0.9
Aromatic C12-C16	DETSC 3072#	0.5	mg/kg	6.4	< 0.5
Aromatic C16-C21	DETSC 3072#	0.6	mg/kg	54	< 0.6
Aromatic C21-C35	DETSC 3072#	1.4	mg/kg	650	< 1.4
Aromatic C5-C35	DETSC 3072*	10	mg/kg	710	< 10
TPH Ali/Aro Total C5-C35	DETSC 3072*	10	mg/kg	710	< 10
PAHs					
Naphthalene	DETSC 3303#	0.03	mg/kg	0.06	< 0.03

Key: * -not accredited. # -MCERTS (accreditation only applies if report carries the MCERTS logo). n/s -not supplied.

Summary of Chemical Analysis
Soil Samples

Our Ref 21-25807
Client Ref PC218325
Contract Title Hempland Primary School

			Lab No	1943255	1943256
			.Sample ID	WS03	WS03
			Depth	0.30	0.80
			Other ID		
			Sample Type	ES	ES
			Sampling Date	26/11/2021	26/11/2021
			Sampling Time	n/s	n/s
Test	Method	LOD	Units		
Acenaphthylene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03
Acenaphthene	DETSC 3303#	0.03	mg/kg	0.04	< 0.03
Fluorene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03
Phenanthrene	DETSC 3303#	0.03	mg/kg	0.19	< 0.03
Anthracene	DETSC 3303	0.03	mg/kg	0.05	< 0.03
Fluoranthene	DETSC 3303#	0.03	mg/kg	0.30	< 0.03
Pyrene	DETSC 3303#	0.03	mg/kg	0.45	< 0.03
Benzo(a)anthracene	DETSC 3303#	0.03	mg/kg	0.10	0.03
Chrysene	DETSC 3303	0.03	mg/kg	0.26	< 0.03
Benzo(b)fluoranthene	DETSC 3303#	0.03	mg/kg	0.11	< 0.03
Benzo(k)fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03
Benzo(a)pyrene	DETSC 3303#	0.03	mg/kg	0.06	< 0.03
Indeno(1,2,3-c,d)pyrene	DETSC 3303#	0.03	mg/kg	0.03	< 0.03
Dibenzo(a,h)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03
Benzo(g,h,i)perylene	DETSC 3303#	0.03	mg/kg	0.08	< 0.03
PAH - USEPA 16, Total	DETSC 3303	0.1	mg/kg	1.7	< 0.10
Phenols					
Phenol - Monohydric	DETSC 2130#	0.3	mg/kg	< 0.3	< 0.3
VOCs					
Vinyl Chloride	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
1,1 Dichloroethylene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
Trans-1,2-dichloroethylene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
1,1-dichloroethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
Cis-1,2-dichloroethylene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
2,2-dichloropropane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
Bromochloromethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
Chloroform	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
1,1,1-trichloroethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
1,1-dichloropropene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
Carbon tetrachloride	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
Benzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
1,2-dichloroethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
Trichloroethylene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
1,2-dichloropropane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
Dibromomethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
Bromodichloromethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
cis-1,3-dichloropropene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
Toluene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
trans-1,3-dichloropropene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
1,1,2-trichloroethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
Tetrachloroethylene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
1,3-dichloropropane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01

Summary of Chemical Analysis
Soil Samples

Our Ref 21-25807
Client Ref PC218325
Contract Title Hempland Primary School

			Lab No	1943255	1943256
			.Sample ID	WS03	WS03
			Depth	0.30	0.80
			Other ID		
			Sample Type	ES	ES
			Sampling Date	26/11/2021	26/11/2021
			Sampling Time	n/s	n/s
Test	Method	LOD	Units		
Dibromochloromethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
1,2-dibromoethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
Chlorobenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
1,1,1,2-tetrachloroethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
Ethylbenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
m+p-Xylene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
o-Xylene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
Styrene	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01
Bromoform	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
Isopropylbenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
Bromobenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
1,2,3-trichloropropane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
n-propylbenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
2-chlorotoluene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
1,3,5-trimethylbenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
4-chlorotoluene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
Tert-butylbenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
1,2,4-trimethylbenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
sec-butylbenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
p-isopropyltoluene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
1,3-dichlorobenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
1,4-dichlorobenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
n-butylbenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
1,2-dichlorobenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
1,2-dibromo-3-chloropropane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
1,2,4-trichlorobenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
Hexachlorobutadiene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
1,2,3-trichlorobenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
MTBE	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01

Summary of Chemical Analysis
Leachate Samples

Our Ref 21-25807
Client Ref PC218325
Contract Title Hempland Primary School

Test	Method	LOD	Units	Lab No 1943257	Lab No 1943258
				.Sample ID CP01	.Sample ID WS02
				Depth 0.30	Depth 1.00
				Other ID	Other ID
				Sample Type ES	Sample Type ES
				Sampling Date 25/11/2021	Sampling Date 26/11/2021
				Sampling Time n/s	Sampling Time n/s
Preparation					
BS EN 12457 10:1	DETSC 1009*			Y	Y
Metals					
Antimony, Dissolved	DETSC 2306	0.17	ug/l	0.22	< 0.17
Arsenic, Dissolved	DETSC 2306	0.16	ug/l	2.0	0.43
Barium, Dissolved	DETSC 2306	0.26	ug/l	10	6.6
Beryllium, Dissolved	DETSC 2306*	0.1	ug/l	< 0.1	< 0.1
Boron, Dissolved	DETSC 2306*	12	ug/l	< 12	< 12
Calcium, Dissolved	DETSC 2306	0.09	mg/l	30	10
Chromium, Dissolved	DETSC 2306	0.25	ug/l	2.8	0.67
Chromium III, Dissolved	DETSC 2306*	1	ug/l	2.8	< 1.0
Chromium, Hexavalent	DETSC 2203	7	ug/l	< 7.0	< 7.0
Copper, Dissolved	DETSC 2306	0.4	ug/l	4.6	1.4
Iron, Dissolved	DETSC 2306	5.5	ug/l	1300	290
Lead, Dissolved	DETSC 2306	0.09	ug/l	3.1	1.9
Magnesium, Dissolved	DETSC 2306	0.02	mg/l	3.2	1.3
Manganese, Dissolved	DETSC 2306	0.22	ug/l	42	12
Molybdenum, Dissolved	DETSC 2306	1.1	ug/l	< 1.1	< 1.1
Nickel, Dissolved	DETSC 2306	0.5	ug/l	2.2	0.9
Selenium, Dissolved	DETSC 2306	0.25	ug/l	< 0.25	< 0.25
Vanadium, Dissolved	DETSC 2306	0.6	ug/l	3.8	1.1
Zinc, Dissolved	DETSC 2306	1.3	ug/l	300	110
Inorganics					
pH	DETSC 2008		pH	7.3	7.2
Cyanide, Total	DETSC 2130	40	ug/l	< 40	< 40
Cyanide, Free	DETSC 2130	20	ug/l	< 20	< 20
Ammoniacal Nitrogen as N	DETSC 2207	0.015	mg/l	0.073	0.043
Chloride	DETSC 2055	0.1	mg/l	2.0	0.90
Fluoride	DETSC 2055	0.1	mg/l	< 0.10	< 0.10
Sulphate as SO4	DETSC 2055	0.1	mg/l	4.7	1.7
Sulphide	DETSC 2208	10	ug/l	< 10	< 10
Phenols					
Phenol	DETSC 3451*	0.1	ug/l	< 0.10	< 0.10
4-Chloro-3-methylphenol	DETSC 3451*	0.1	ug/l	< 0.10	< 0.10
2,4-Dichlorophenol	DETSC 3451*	0.1	ug/l	< 0.10	< 0.10
2,4-Dimethylphenol	DETSC 3451*	0.1	ug/l	< 0.10	< 0.10
p-cresol	DETSC 3451*	0.1	ug/l	< 0.10	< 0.10
2,6-Dimethylphenol	DETSC 3451*	0.1	ug/l	< 0.10	< 0.10
2,6-Dichlorophenol	DETSC 3451*	0.1	ug/l	< 0.10	< 0.10
2,4,6-Trichlorophenol	DETSC 3451*	0.1	ug/l	< 0.10	< 0.10

Key: * -not accredited. n/s -not supplied.

Summary of Asbestos Analysis
Soil Samples

Our Ref 21-25807
Client Ref PC218325
Contract Title Hempland Primary School

Lab No	Sample ID	Material Type	Result	Comment*	Analyst
1943249	CP01 0.30	SOIL	NAD	none	Keith Wilson
1943250	CP01 0.80	SOIL	NAD	none	Keith Wilson
1943251	WS01 0.10	SOIL	NAD	none	Keith Wilson
1943252	WS01 0.55	SOIL	NAD	none	Keith Wilson
1943253	WS02 0.30	SOIL	NAD	none	Keith Wilson
1943254	WS02 1.00	SOIL	NAD	none	Keith Wilson
1943255	WS03 0.30	SOIL	NAD	none	Keith Wilson
1943256	WS03 0.80	SOIL	NAD	none	Keith Wilson

Crocidolite = Blue Asbestos, Amosite = Brown Asbestos, Chrysotile = White Asbestos. Anthophyllite, Actinolite and Tremolite are other forms of Asbestos. Samples are analysed by DETSC 1101 using polarised light microscopy in accordance with HSG248 and documented in-house methods. NAD = No Asbestos Detected. Where a sample is NAD, the result is based on analysis of at least 2 sub-samples and should be taken to mean 'no asbestos detected in sample'. Key: * - not included in laboratory scope of accreditation.

Information in Support of the Analytical Results

Our Ref 21-25807
Client Ref PC218325
Contract Hempland Primary School

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1943249	CP01 0.30 SOIL	25/11/21	GJ 250ml, GJ 60ml, PT 1L	Total Sulphur ICP (7 days), pH + Conductivity (7 days), VOC (7 days)	
1943250	CP01 0.80 SOIL	25/11/21	GJ 250ml, GJ 60ml, PT 1L	Total Sulphur ICP (7 days), pH + Conductivity (7 days), VOC (7 days)	
1943251	WS01 0.10 SOIL	26/11/21	GJ 250ml, GJ 60ml, PT 1L		
1943252	WS01 0.55 SOIL	26/11/21	GJ 250ml, GJ 60ml, PT 1L		
1943253	WS02 0.30 SOIL	26/11/21	GJ 250ml, GJ 60ml, PT 1L		
1943254	WS02 1.00 SOIL	26/11/21	GJ 250ml, GJ 60ml, PT 1L		
1943255	WS03 0.30 SOIL	26/11/21	GJ 250ml, GJ 60ml, PT 1L		
1943256	WS03 0.80 SOIL	26/11/21	GJ 250ml, GJ 60ml, PT 1L		
1943257	CP01 0.30 LEACHATE	25/11/21	GJ 250ml, GJ 60ml, PT 1L		
1943258	WS02 1.00 LEACHATE	26/11/21	GJ 250ml, GJ 60ml, PT 1L		

Key: G-Glass P-Plastic J-Jar T-Tub

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

Soil Analysis Notes

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

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

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

Disposal

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

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

End of Report

Certificate of Analysis

Certificate Number 21-25912 *Issued:* 13-Dec-21

Client Geotechnics LTD
203 Torrington Avenue
Tile Hill
Coventry
CV4 9AP

Our Reference 21-25912

Client Reference PC218325

Order No OC32015

Contract Title Hempland Primary School

Description 3 Water samples.

Date Received 06-Dec-21

Date Started 06-Dec-21

Date Completed 13-Dec-21

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

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

Approved By [redacted]

Adam Fenwick
Contracts Manager

UKAS TESTING
2139

Summary of Chemical Analysis
Water Samples

Our Ref 21-25912
Client Ref PC218325
Contract Title Hempland Primary School

Test	Method	LOD	Units	Lab No 1944053	1944054	1944055
				.Sample ID CP01	CP03	CP04
				Depth 1.92	5.00	1.10
				Other ID		
				Sample Type WATER	WATER	WATER
				Sampling Date 02/12/2021	02/12/2021	02/12/2021
				Sampling Time n/s	n/s	n/s
Metals						
Antimony, Dissolved	DETSC 2306	0.17	ug/l	1.4	4.2	2.5
Arsenic, Dissolved	DETSC 2306	0.16	ug/l	1.0	1.3	4.1
Barium, Dissolved	DETSC 2306	0.26	ug/l	200	210	180
Beryllium, Dissolved	DETSC 2306*	0.1	ug/l	< 0.1	< 0.1	< 0.1
Boron, Dissolved	DETSC 2306*	12	ug/l	80	58	45
Calcium, Dissolved	DETSC 2306	0.09	mg/l	100	150	87
Chromium, Dissolved	DETSC 2306	0.25	ug/l	1.2	2.6	0.55
Chromium III, Dissolved	DETSC 2306*	1	ug/l	1.2	2.6	< 1.0
Chromium, Hexavalent	DETSC 2203	7	ug/l	< 7.0	< 7.0	< 7.0
Copper, Dissolved	DETSC 2306	0.4	ug/l	1.8	4.4	1.5
Iron, Dissolved	DETSC 2306	5.5	ug/l	53	31	120
Lead, Dissolved	DETSC 2306	0.09	ug/l	0.19	0.14	0.36
Magnesium, Dissolved	DETSC 2306	0.02	mg/l	28	17	16
Manganese, Dissolved	DETSC 2306	0.22	ug/l	180	29	550
Molybdenum, Dissolved	DETSC 2306	1.1	ug/l	2.7	10	3.2
Nickel, Dissolved	DETSC 2306	0.5	ug/l	2.5	1.5	2.8
Selenium, Dissolved	DETSC 2306	0.25	ug/l	29	37	1.5
Vanadium, Dissolved	DETSC 2306	0.6	ug/l	2.0	0.7	1.0
Zinc, Dissolved	DETSC 2306	1.3	ug/l	63	140	50
Inorganics						
pH	DETSC 2008		pH	7.1	7.2	7.2
Cyanide, Total	DETSC 2130	40	ug/l	< 40	< 40	< 40
Cyanide, Free	DETSC 2130	20	ug/l	< 20	< 20	< 20
Total Hardness as CaCO3	DETSC 2303	0.1	mg/l	367	454	284
Ammoniacal Nitrogen as N	DETSC 2207	0.015	mg/l	1.2	0.15	0.042
Chloride	DETSC 2055	0.1	mg/l	69	41	19
Fluoride	DETSC 2055	0.1	mg/l	0.28	0.29	0.38
Sulphate as SO4	DETSC 2055	0.1	mg/l	220	210	54
Sulphide	DETSC 2208	10	ug/l	42	38	37

Key: * -not accredited. n/s -not supplied.

Summary of Chemical Analysis
Water Samples

Our Ref 21-25912
Client Ref PC218325
Contract Title Hempland Primary School

Test	Method	LOD	Units	Lab No 1944053	1944054	1944055
				.Sample ID CP01	CP03	CP04
				Depth 1.92	5.00	1.10
				Other ID		
				Sample Type WATER	WATER	WATER
				Sampling Date 02/12/2021	02/12/2021	02/12/2021
				Sampling Time n/s	n/s	n/s
Petroleum Hydrocarbons						
Aliphatic C5-C6	DETSC 3322	0.1	ug/l	< 0.1	< 0.1	< 0.1
Aliphatic C6-C8	DETSC 3322	0.1	ug/l	< 0.1	< 0.1	< 0.1
Aliphatic C8-C10	DETSC 3322	0.1	ug/l	< 0.1	< 0.1	< 0.1
Aliphatic C10-C12	DETSC 3072*	1	ug/l	< 1.0	< 1.0	< 1.0
Aliphatic C12-C16	DETSC 3072*	1	ug/l	< 1.0	< 1.0	< 1.0
Aliphatic C16-C21	DETSC 3072*	1	ug/l	< 1.0	< 1.0	< 1.0
Aliphatic C21-C35	DETSC 3072*	1	ug/l	< 1.0	< 1.0	< 1.0
Aliphatic C5-C35	DETSC 3072*	10	ug/l	< 10	< 10	< 10
Aromatic C5-C7	DETSC 3322	0.1	ug/l	< 0.1	< 0.1	< 0.1
Aromatic C7-C8	DETSC 3322	0.1	ug/l	< 0.1	< 0.1	< 0.1
Aromatic C8-C10	DETSC 3322	0.1	ug/l	< 0.1	< 0.1	< 0.1
Aromatic C10-C12	DETSC 3072*	1	ug/l	< 1.0	< 1.0	< 1.0
Aromatic C12-C16	DETSC 3072*	1	ug/l	< 1.0	< 1.0	< 1.0
Aromatic C16-C21	DETSC 3072*	1	ug/l	< 1.0	< 1.0	< 1.0
Aromatic C21-C35	DETSC 3072*	1	ug/l	< 1.0	< 1.0	< 1.0
Aromatic C5-C35	DETSC 3072*	10	ug/l	< 10	< 10	< 10
TPH Ali/Aro Total C5-C35	DETSC 3072*	10	ug/l	< 10	< 10	< 10
PAHs						
Naphthalene	DETSC 3304	0.05	ug/l	< 0.05	< 0.05	< 0.05
Acenaphthylene	DETSC 3304	0.01	ug/l	0.04	< 0.01	< 0.01
Acenaphthene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01	< 0.01
Fluorene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01	< 0.01
Phenanthrene	DETSC 3304	0.01	ug/l	0.07	< 0.01	0.01
Anthracene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01	< 0.01
Fluoranthene	DETSC 3304	0.01	ug/l	0.06	< 0.01	0.02
Pyrene	DETSC 3304	0.01	ug/l	0.25	0.02	0.06
Benzo(a)anthracene	DETSC 3304*	0.01	ug/l	< 0.01	< 0.01	< 0.01
Chrysene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01	< 0.01
Benzo(b)fluoranthene	DETSC 3304	0.01	ug/l	0.01	< 0.01	< 0.01
Benzo(k)fluoranthene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01	< 0.01
Benzo(a)pyrene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01	< 0.01
Indeno(1,2,3-c,d)pyrene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01	< 0.01
Dibenzo(a,h)anthracene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01	< 0.01
Benzo(g,h,i)perylene	DETSC 3304	0.01	ug/l	0.03	0.03	0.02
PAH Total	DETSC 3304	0.2	ug/l	0.45	< 0.20	< 0.20

Key: * -not accredited. n/s -not supplied.

Information in Support of the Analytical Results

Our Ref 21-25912
Client Ref PC218325
Contract Hempland Primary School

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1944053	CP01 1.92 WATER	02/12/21	GB 1L x2, GV x2, PB 1L	pH/Cond/TDS (1 days)	
1944054	CP03 5.00 WATER	02/12/21	GB 1L x2, GV x2, PB 1L	pH/Cond/TDS (1 days)	
1944055	CP04 1.10 WATER	02/12/21	GB 1L x2, GV x2, PB 1L	pH/Cond/TDS (1 days)	

Key: G-Glass P-Plastic B-Bottle V-Vial

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

Disposal

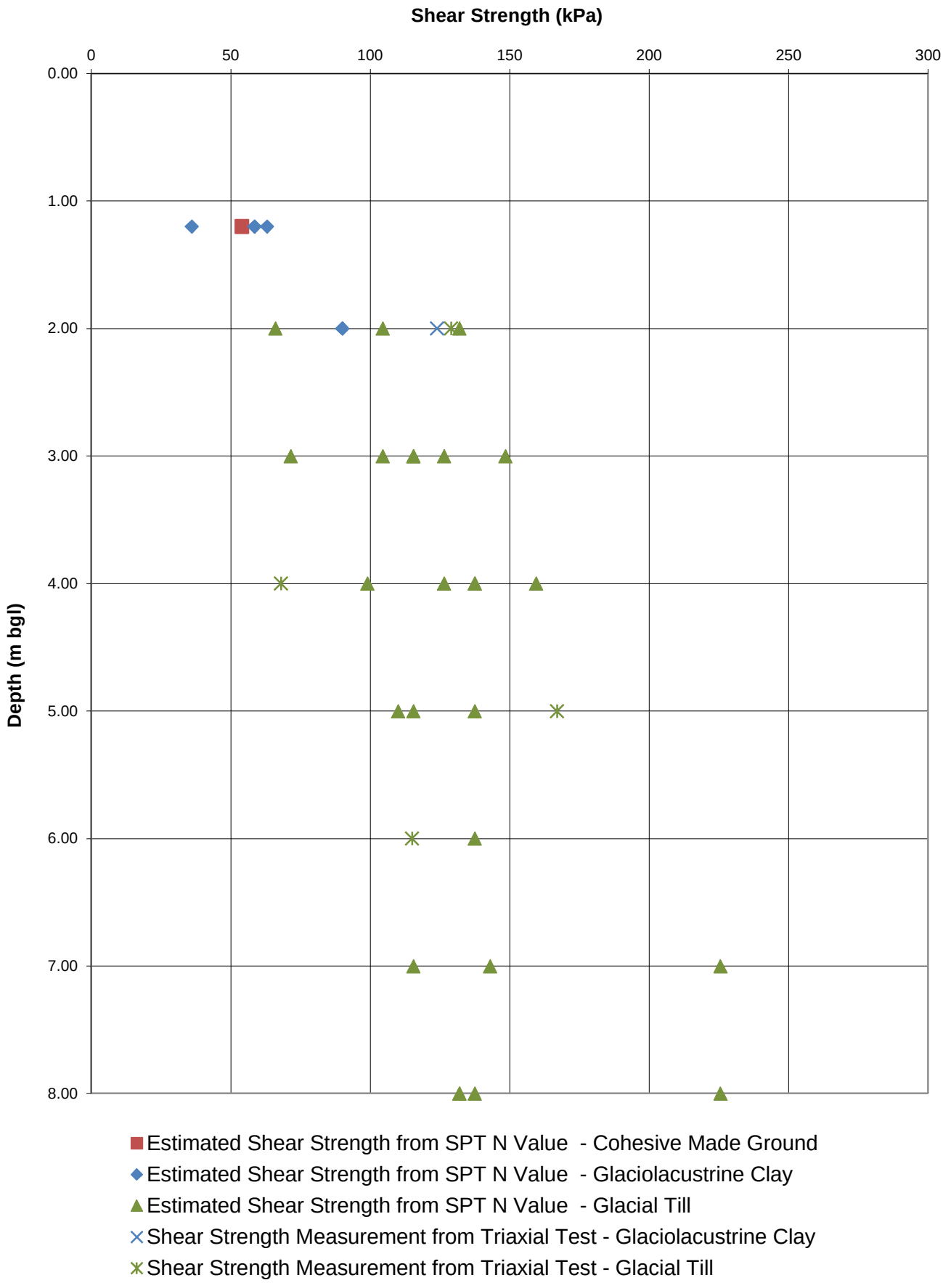
From the issue date of this test certificate, samples will be held for the following times prior to disposal :-

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

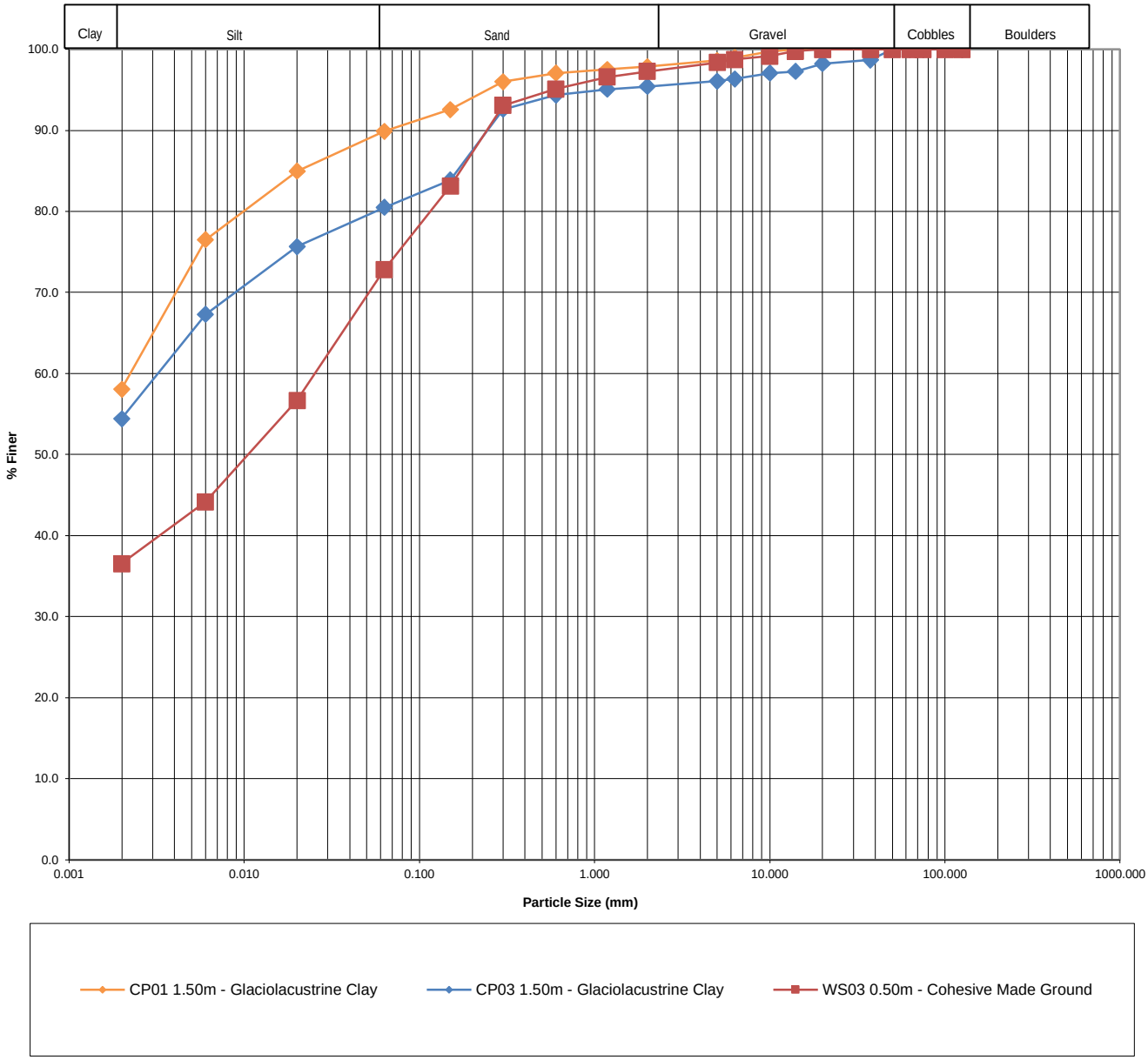
End of Report

APPENDIX 9

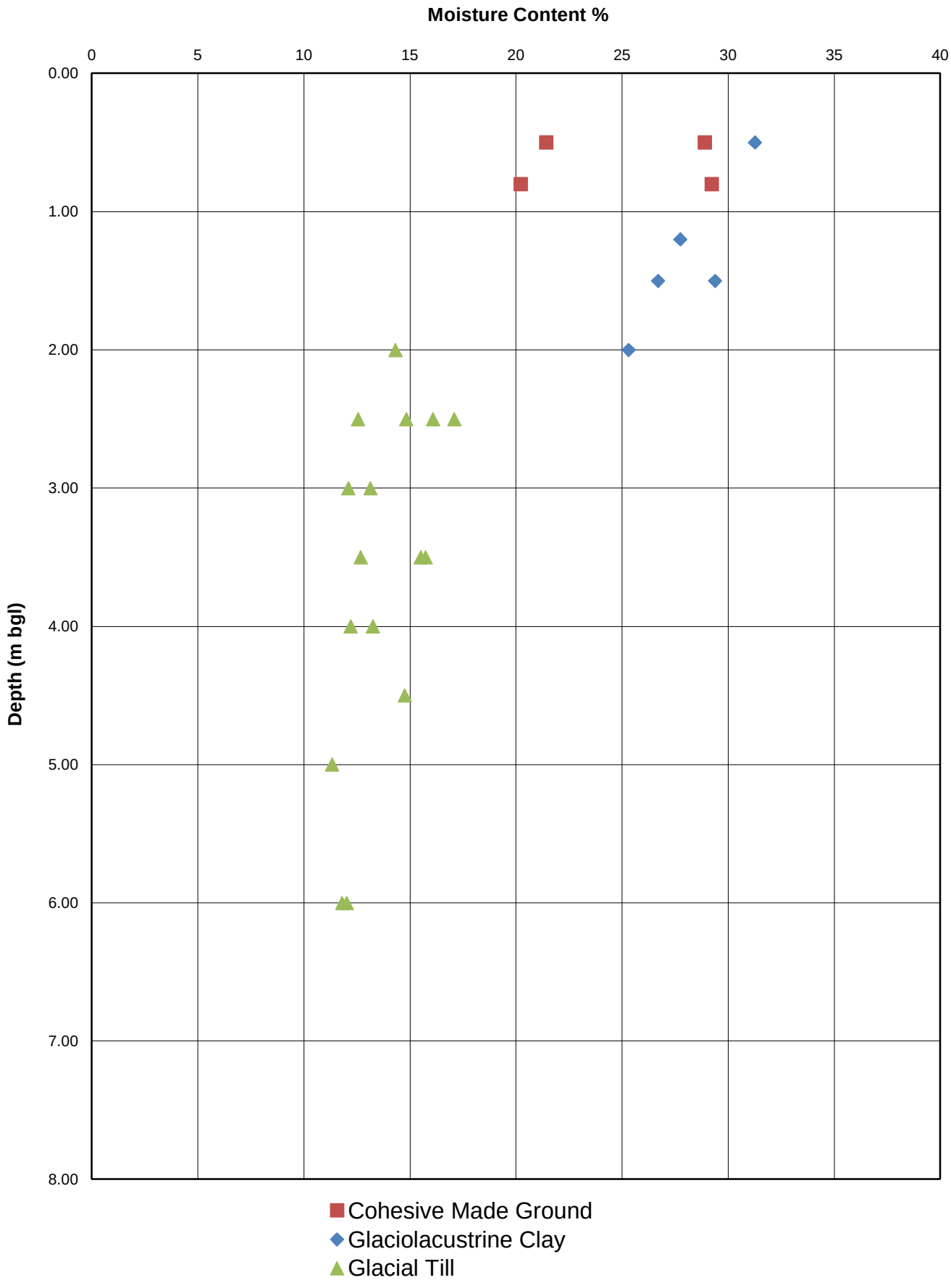
Ground Parameter Data Plots and Summary Tables



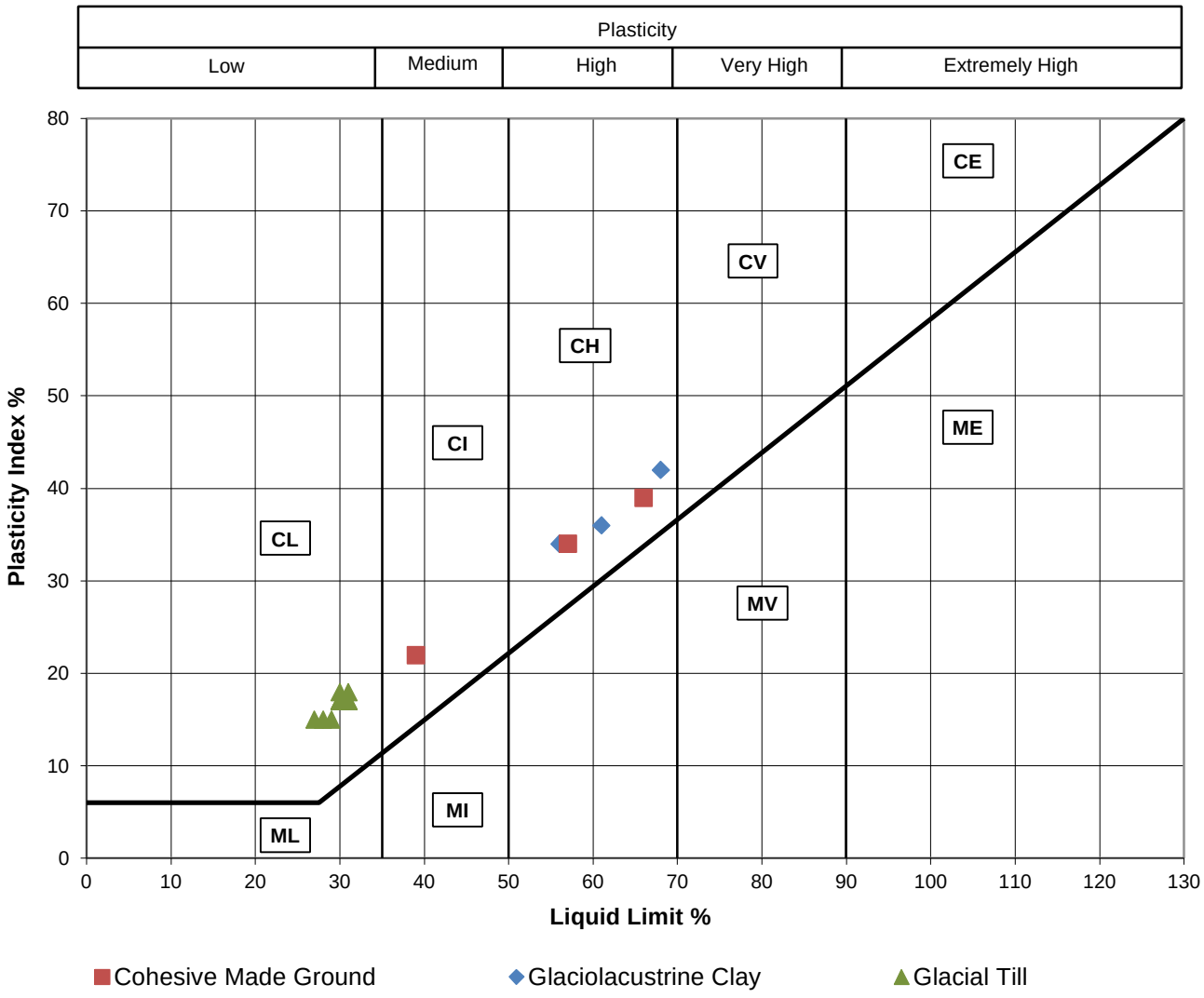
Job No	PC218325	HEMPLAND PRIMARY Plot of Shear Strength - Depth Profile	GEOTECHNICS
Date	21/02/2022		
Figure	1		



Job No	PC218325	HEMPLAND PRIMARY Summary of Particle Size Distribution Analyses	GEOTECHNICS
Date	21/02/2022		
Figure	2		



Job No	PC218325	HEMPLAND PRIMARY Plot of Moisture Content - Depth Profile	GEOTECHNICS
Date	13/04/2022		
Figure	3		



Soil Type		Plasticity Characteristics	
C	Clay	L	Low
		I	Intermediate
M	Silt	H	High
		V	Very High
		E	Extremely High

Job No	PC218325	HEMPLAND PRIMARY Plasticity Index	GEOTECHNICS
Date	21/02/2022		
Figure	4		

DATA SHEET

Project: Hempland Primary School
Project No.: PC218325

Table 1: Summary of Measured and Derived Parameters
Cohesive Made Ground

Parameter	Number of Tests	Range	Average	Figure Number	Remarks
Water Content (%)	4	20 - 29	25	3	
Atterberg Limits					
Liquid Limit (%)	3	39 - 66	54		
Plastic Limit (%)	3	17 - 27	22.3		
Plasticity Index (%)	3	22 - 39	31.7		
Modified Plasticity Index (%)	3	18.7 - 38.6	30.0	4	
Particle Size Distribution				2	
% Cobbles	1	0			
% Gravel	1	3			
% Sand	1	24			
% Silt	1	36			
% Clay	1	37			
SPT N Value	2	12			
Undrained Shear Strength (kN/m²)					
Estimated from SPT N Values	2	54			After Stroud & Butler (1978) where f1 = 4.5
Compaction Tests					
Optimum Water Content (%)	1	20.0	20.0		
Maximum Dry Density (Mg/m^3)	1	1.70	1.70		
Chemical Conditions					
pH	2	7.3 - 7.8	7.55		
Water soluble sulphate content (mg/l)	2	56 - 60	58		

DATA SHEET

Project: Hempland Primary School
Project No.: PC218325

Table 2: Summary of Measured and Derived Parameters
Glaciolacustrine Clay

Parameter	Number of Tests	Range	Average	Figure Number	Remarks
Water Content (%)	5	25.3 - 31.3	28.1	3	
Atterberg Limits					
Liquid Limit (%)	3	56 - 68	61.7		
Plastic Limit (%)	3	22 - 26	24.3		
Plasticity Index (%)	3	34 - 42	37.3		
Modified Plasticity Index (%)	3	31.3 - 42	36.3	4	
Particle Size Distribution					
% Cobbles	2	0	0		
% Gravel	2	2 - 5	3.5		
% Sand	2	8 - 14	11		
% Silt	2	27 - 32	29.5		
% Clay	2	54 - 58	56	2	
Bulk Density	1	2.01			From triaxial test specimens
SPT N Value	6	8 - 20	15		
Undrained Shear Strength (kN/m²)					
From Quick Undrained Triaxial tests	1	124			
Estimated from SPT N Values	6	36 - 90	66	1	After Stroud & Butler (1978) where f1 = 4.5
Compaction Tests					
Optimum Water Content (%)	1	23.0			
Maximum Dry Density (Mg/m^3)	1	1.55			
Chemical Conditions					
pH	2	9.1 - 11.6	10.35		
Water soluble sulphate content (mg/l)	2	68 - 1100	584		

DATA SHEET

Project: Hempland Primary School
Project No.: PC218325

Table 3: Summary of Measured and Derived Parameters
Glacial Till

Parameter	Number of Tests	Range	Average	Figure Number	Remarks
Water Content (%)	16	11.3 - 17.1	13.7	3	
Atterberg Limits					
Liquid Limit (%)	11	27 - 31	29.7		
Plastic Limit (%)	11	12 - 14	13.1		
Plasticity Index (%)	11	15 - 18	16.6		
Modified Plasticity Index (%)	11	11.7 - 16.2	14.3	4	
Bulk Density	4	2.19 - 2.25	2.23		From triaxial test specimens
SPT N Value	25	12 - 41	24		
Undrained Shear Strength (kN/m^2)					
From Quick Undrained Triaxial tests	4	68 - 167	119.8		
Estimated from SPT N Values	25	66 - 225.5	130	1	After Stroud & Butler (1978) where f1 = 5.5
Chemical Conditions					
pH	4	8.6 - 11.7	10.0		
Water soluble sulphate content (mg/l)	4	250 - 930	525		

APPENDIX 10

Chemical Statistical Analysis & Summary of Soil Leachate Analysis Tier 1 Screening

GEOTECHNICS
geotechnical and geoenvironmental specialists

Site: Pinewood School, Ware, Hertfordshire

CHEMICAL STATISTICAL ANALYSIS - based on CLEA v1.06 (Sandy Loam 1.0% SOM)

Job No: PC218325

Analyte	Limit of Detection	Geotechnics												Statistical Analysis					SGV / GAC Statistical Results			SGV / GAC Criteria Source		LQM/CIEH S4UL Screening Criteria		LQM/CIEH S4UL Screening Criteria		LQM/CIEH S4UL Criteria Source	
		25/11/21	25/11/21	24/11/21	23/11/21	22/11/21	22/11/21	26/11/21	26/11/21	26/11/21	26/11/21	26/11/21	26/11/21	n	Standard Deviation	Minimum	Average	Maximum	Maximum	Residential Without Veg. Uptake Tier I Screening Criteria	Pass/ Fail	Source of Screening Criteria	Source of Toxicological Data	Residential without Home Grown Produce	Pass / Fail	POS(park)	Pass / Fail	Source of Screening Crite	Source of Toxicological Data
		CP01	CP01	CP02	CP03	CP04	CP04	WS01	WS01	WS02	WS02	WS03	WS03																
		0.30	0.80	0.20	0.20	0.30	1.50	0.10	0.55	0.30	1.00	0.30	0.80																
Asbestos Screen	Positive / Negative	Negative	Negative	Negative	Negative	Negative	Negative	Negative	Negative	Negative	Negative	Negative	Negative		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Metals																													
Arsenic (total)	<0.2 mg/kg	8.3	5.9	11	9.9	7.8	7.4	12	8.5	9.2	8.9	3.7	7.1	12	2.22	3.7	8.2	12.0	12	35	Pass	SC050021*	SC050021	40	Pass	170	Pass	CLEA v1.06	LQM/CIEH 2014
Boron (water soluble)	<0.2 mg/kg	0.5	0.5	0.5	0.4	0.2	0.2	0.2	0.4	0.5	0.3	0.2	0.2	12	0.14	0.2	0.3	0.5	0.5	10300	Pass	CLEA v1.06	LQM 2009	11000	Pass	46000	Pass	CLEA v1.06	LQM/CIEH 2014
Chromium (hexavalent)	<1 mg/kg	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	12	0.00	1.0	1.0	1.0	1	4.3	Pass	CLEA v1.06	LQM 2009	6	Pass	220	Pass	CLEA v1.06	LQM/CIEH 2014
Chromium (total) (III for S4ULs)	<0.15 mg/kg	11	19	20	15	9.8	18	23	33	19	25	4	23	12	7.69	4.0	18.3	33.0	33	3010	Pass	CLEA v1.06	LQM 2009	910	Pass	33000	Pass	CLEA v1.06	LQM/CIEH 2014
Copper (total)	<0.2 mg/kg	18	24	45	39	17	20	38	30	36	30	6.3	25	12	11.11	6.3	27.4	45.0	45	6200	Pass	CLEA v1.06	LQM 2009	7100	Pass	44000	Pass	CLEA v1.06	LQM/CIEH 2014
Lead (total)	<0.3 mg/kg	15	36	110	92	34	16	110	34	92	20	8.7	18	12	39.81	8.7	48.8	110.0	110	N/A	-	-	-	-		-	Pass	-	-
Nickel (total)	<1 mg/kg	12	15	16	12	12	16	20	47	17	31	4.6	25	12	11.11	4.6	19.0	47.0	47	59	Pass	CLEA v1.071	EFSA	180	Pass	800	Pass	CLEA v1.06	LQM/CIEH 2014
Selenium (total)	<0.5 mg/kg	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	12	0.00	0.5	0.5	0.5	0.5	595	Pass	SC050021*	SC050021	430	Pass	1800	Pass	CLEA v1.06	LQM/CIEH 2014
Zinc (total)	<1 mg/kg	19	37	55	57	27	60	67	69	62	62	21	51	12	18.09	19.0	48.9	69.0	69.0	40300	Pass	CLEA v1.06	LQM 2009	40000	Pass	170000	Pass	CLEA v1.06	LQM/CIEH 2014
Antimony	<1 mg/kg	1.4	1.4	1.0	1.0	1.0	1.0	2.2	2.2	1.8	2.1	1.0	1.4	12	0.49	1.0	1.5	2.2	2.2	550	Pass	CLEA v1.06	EIC/AGS/CL:AIRE	-	-	-	-	-	-
Barium	<1.5 mg/kg	92	93	130	96	130	91	150	180	200	180	31	110	12	48.14	31.0	123.6	200.0	200	1300	Pass	CLEA v1.06	EIC/AGS/CL:AIRE	-	-	-	-	-	-
Molybdenum	<0.4 mg/kg	2.6	0.6	1	0.9	1.1	0.5	1.1	0.5	1.4	0.6	0.5	0.5	12	0.61	0.5	0.9	2.6	2.6	670	Pass	CLEA v1.06	EIC/AGS/CL:AIRE	-	-	-	-	-	-
Vanadium	<0.8 mg/kg	17	25	27	22	16	17	33	39	29	29	11	29	12	8.11	11.0	24.5	39.0	39	188	Pass	CLEA v1.06	LQM 2009	1200	Pass	5000	Pass	CLEA v1.06	LQM/CIEH 2014
Inorganic																								-	-	-	-		
pH Value	pH Units	8.2	7.4	7.5	7.7	8.2	8.2	7.4	7.9	7.3	8.1	8.4	7.6	12	0.39	7.30	7.83	8.40	8.4	-	-	-	-	-	-	-	-	-	-
Cyanide (free)	<0.11 mg/kg	0.1	0.1	0.1	0.3	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	12	0.06	0.10	0.12	0.30	0.3	34	Pass	ATRISK SOIL	ATRISK SOIL	-	-	-	-	-	-
Sulphur (total)	<0.01 %	0.23	0.04	0.02	0.06	0.18	0.02	0.04	0.02	0.04	0.02	0.1	0.02	12	0.07	0.02	0.07	0.23	0.23	-	-								
Sulphate (2:1)	<10 mg/l	97	58	11	19	54	35	30	39	29	46	63	46	12	22.79	11	44	97	97	-	-	-	-	-	-	-	-	-	-
Organic																								-	-	-	-		
TOC	<0.5 %	1	1	2.2	4.2	1	0.7	3.6	1.2	4.1	1.2	3.5	0.6	12	1.41	0.6	2.0	4.2	4.20	-	-	-	-	-	-	-	-	-	-
Phenol (Total Monohydric)	<0.3 mg/kg	0.3	0.3	0.3	0.7	0.3	0.3	0.3	0.3	0.4	0.3	0.3	0.3	12	0.12	0.3	0.3	0.7	0.70	310	Pass	CLEA v1.06	SC050021	750	Pass	760	Pass	CLEA v1.06	LQM/CIEH 2014
PAH																													
Naphthalene	<0.03 mg/kg	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.05	0.03	0.06	0.03	12	0.01	0.03	0.03	0.06	0.06	1.64	Pass	CLEA v1.06	LQM 2009	2.3	Pass	1200	Pass	CLEA v1.06	LQM/CIEH 2014
Acenaphthylene	<0.03 mg/kg	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	12	0.00	0.03	0.03	0.03	0.03	1950	Pass	CLEA v1.06	LQM 2009	2900	Pass	29000	Pass	CLEA v1.06	LQM/CIEH 2014
Acenaphthene	<0.03 mg/kg	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.06	0.03	0.04	0.03	12	0.01	0.03	0.03	0.06	0.06	2020	Pass	CLEA v1.06	LQM 2009	3000	Pass	29000	Pass	CLEA v1.06	LQM/CIEH 2014
Fluorene	<0.03 mg/kg	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.06	0.03	0.03	0.03	12	0.01	0.03	0.03	0.06	0.06	1850	Pass	CLEA v1.06	LQM 2009	2800	Pass	20000	Pass	CLEA v1.06	LQM/CIEH 2014
Phenanthrene	<0.03 mg/kg	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.69	0.03	0.19	0.03	12	0.19	0.03	0.10	0.69	0.69	837	Pass	CLEA v1.06	LQM 2009	1300	Pass	6200	Pass	CLEA v1.06	LQM/CIEH 2014
Anthracene	<0.03 mg/kg	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.2	0.03	0.05	0.03	12	0.05	0.03	0.05	0.20	0.20	19800	Pass	CLEA v1.06	LQM 2009	31000	Pass	150000	Pass	CLEA v1.06	LQM/CIEH 2014
Fluoranthene	<0.03 mg/kg	0.08	0.03	0.05	0.03	0.03	0.03	0.03	0.03	1.2	0.03	0.3	0.03	12	0.34	0.03	0.16	1.20	1.20	972	Pass	CLEA v1.06	LQM 2009	1500	Pass	6300	Pass	CLEA v1.06	LQM/CIEH 2014
Pyrene	<0.03 mg/kg	0.1	0.03	0.04	0.03	0.03	0.03	0.03	0.03	1.1	0.03	0.45	0.03	12	0.32	0.03	0.16	1.10	1.10	2330	Pass	CLEA v1.06	LQM 2009	3700	Pass	15000	Pass	CLEA v1.06	LQM/CIEH 2014
Benz(a)anthracene	<0.03 mg/kg	0.1	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.85	0.04	0.1	0.03	12	0.23	0.03	0.11	0.85	0.85	3.71	Pass	CLEA v1.06	LQM 2009	11	Pass	49	Pass	CLEA v1.06	LQM/CIEH 2014
Chrysene	<0.03 mg/kg	0.06	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.88	0.03	0.26	0.03	12	0.25	0.03	0.12	0.88	0.88	8.84	Pass	CLEA v1.06	LQM 2009	30	Pass	93	Pass	CLEA v1.06	LQM/CIEH 2014
Benzo(b)fluoranthene	<0.03 mg/kg	0.03	0.03	0.04	0.03	0.03	0.03	0.03	0.03	1.2	0.03	0.11	0.03	12	0.34	0.03	0.14	1.20	1.20	7	Pass	CLEA v1.06	LQM 2009	3.9	Pass	13	Pass	CLEA v1.06	LQM/CIEH 2014
Benzo(k)fluoranthene	<0.03 mg/kg	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.61	0.03	0.03	0.03	12	0.17	0.03	0.08	0.61	0.61	10	Pass	CLEA v1.06	LQM 2009	110	Pass	370	Pass	CLEA v1.06	LQM/CIEH 2014
Benzo(a)pyrene	<0.03 mg/kg	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	1.6	0.03	0.06	0.03	12	0.45	0.03	0.16	1.60	1.60	1	Fail	CLEA v1.06	LQM 2009	3.2	Pass	11	Pass	CLEA v1.06	LQM/CIEH 2014
Indeno(123cd)pyrene	<0.03 mg/kg	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.7	0.03	0.03	0.03	12	0.19	0.03	0.09	0.70	0.70	4.17	Pass	CLEA v1.06	LQM 2009	45	Pass	150	Pass	CLEA v1.06	LQM/CIEH 2014
Dibenzo(ah)anthracene	<0.03 mg/kg	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.19	0.03	0.03	0.03	12	0.05	0.03	0.04	0.19	0.19	0.87	Pass	CLEA v1.06	LQM 2009	0.31	Pass	1.1	Pass	CLEA v1.06	LQM/CIEH 2014
Benzo(ghi)perylene	<0.03 mg/kg	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.73	0.03	0.08	0.03	12	0.20	0.03	0.09	0.73	0.73	46.8	Pass	CLEA v1.06	LQM 2009	360	Pass	1400	Pass	CLEA v1.06	LQM/CIEH 2014
Aliphatic >C_5 - C_6	<0.01 mg/kg	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	12	0.00	0.01	0.01	0.01	0.01	30	Pass	CLEA v1.06	LQM 2009	42	Pass	95000	Pass	CLEA v1.06	LQM/CIEH 2014
Aliphatic >C_6 - C_8	<0.01 mg/kg	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	12	0.00	0.01	0.01	0.01	0.01	73	Pass	CLEA v1.06	LQM 2009	100	Pass	150000	Pass	CLEA v1.06	LQM/CIEH 2014
Aliphatic >C_8 - C_{10}	<0.01 mg/kg	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	12	0.00	0.01	0.01	0.01	0.01	19	Pass	CLEA v1.06	LQM 2009	27	Pass	14000	Pass	CLEA v1.06	LQM/CIEH 2014
Aliphatic >C_{10} - C_{12}	<1 .5mg/kg	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	12	0.00	1.5	1.5	2	2	93	Pass	CLEA v1.06	LQM 2009	130	Pass	21000	Pass	CLEA v1.06	LQM/CIEH 2014
Aliphatic >C_{12} - C_{16}	<1.2 mg/kg	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	12	0.00	1.2	1.2	1	1	745	Pass	CLEA v1.06	LQM 2009	1100	Pass	25000	Pass	CLEA v1.06	LQM/CIEH 2014
Aliphatic >C_{16} - C_{21}	<1 .5 mg/kg	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	12	0.00	1.5	1.5	2	2	45000	Pass	CLEA v1.06	LQM 2009	65000	Pass	450000	Pass	CLEA v1.06	LQM/CIEH 2014
Aliphatic >C_{21} - C_{35}	<3.4 mg/kg	28	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	12	7.10	3.4	5.5	28	28	45000	Pass	CLEA v1.06	LQM 2009	65000	Pass	450000	Pass	CLEA v1.06	LQM/CIEH 2014
Aromatic C_5 - C_7	<0.01 mg/kg	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	12	0.00	0.01	0.01	0.01	0.01	263	Pass	CLEA v1.06	LQM 2009	370	Pass	76000	Pass	CLEA v1.06	LQM/CIEH 2014
Aromatic C_7 - C_8	<0.01 mg/kg	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	12	0.00	0.01	0.01	0.01	0.01	607	Pass	CLEA v1.06	LQM 2009	860	Pass	87000	Pass	CLEA v1.06	LQM/CIEH 2014
Aromatic >C_8 - C_{10}	<10.01mg/kg	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	12	0.00	0.01	0.01	0.01	0.01	33	Pass	CLEA v1.06	LQM 2009	47	Pass	7200	Pass	CLEA v1.06	LQM/CIEH 2014
Aromatic >C_{10} - C_{12}	<0.9mg/kg	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	1.4	0.9	12	0.14	1	1	1	1.4	177	Pass	CLEA v1.06	LQM 2009	250	Pass	9200	Pass	CLEA v1.06	LQM/CIEH 2014
Aromatic >C_{12} - C_{16}	<0.5 mg/kg	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	6.4	0.5	12	1.70	1	1	6	6.4	1780	Pass	CLEA v1.06	LQM 2009	1800	Pass	10000	Pass	CLEA v1.06	LQM/CIEH 2014
Aromatic >C_{16} - C_{21}	<0.6 mg/kg	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	54	0.6	12	15.42	1	5	54	54	1290	Pass	CLEA v1.06	LQM 2009	1900	Pass	7600	Pass	CLEA v1.06	LQM/CIEH 2014
Aromatic >C_{21} - C_{35}	<1.4 mg/kg	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	650	1.4	12	187.23	1	55	650	650	1330	Pass	CLEA v1.06	LQM 2009	1900	Pass	7800	Pass	CLEA v1.06	LQM/CIEH 2014
VOCs																													
1,2,3-Trichloropropane	< 0.01 mg/kg	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.01																
All other VOCs below LODs.																													

Below Detection Limits.
Exceeded GAC/SGV
Exceeded pC4SL / S4ULs
Assessment criteria for pH, Sulphide and Sulphate are not based on human health. Sulphate criteria assumes DS-1 ACEC classification for concrete.

Notes

1. Generic Qualitative Assessment Criteria have been used where appropriate based on the current CLEA 1.06 Model (default values, sandy loam 1%SOM). Where no CLEA generic guideline value has been calculated no assessment has been made. The results presented show maximum and mean concentrations. This is to provide a reasonable prediction of the range of data rather than to provide any detailed statistical appraisal.
2. Results lower than detection limit are shaded in grey.
3. When the test result is recorded as being less than the detection limit, the result used for the analysis is the detection limit.
4. Cyanide (total)*, in the absence of a GQAC based on current CLEA 1.06 Model, the Atrisk Soil Value for Cyanide (free) has been used.
5. For metals, where an SGV has been published, this value has been used. Note that the published SGVs do not include the residential without plant uptake scenario. CLEA v1.06 has therefore been used to derive GACs for this scenario. For organics, CLEA v1.06 has been used (as the SGV assumes 6% SOM)
6. pC4SL based on adjusted toxicology and expsoure assumptions
7. pC4SL for benzene assumes 6% SOM

Job No: PC218325
Site: Hempland Primary School, York
Summary of Water Analysis - Tier 1 Screening

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Sample Location	Units	Minimum Reporting Value	Drinking Water Standard (or closest value)	EQS Freshwater	Esturies and coastal waters	Other	Soil Leaching Analysis			Groundwater Samples		
							CP01	CP02	W S02	CP01	CP03	CP04
							0.3	0.2	1	1.92	5.00	1.10
							25/11/2021	24/11/2021	26/11/2021	02/12/2021	02/12/2021	02/12/2021
Water Quality												
pH	pH units	-	-	-	-	-	7.30	6.60	7.20	7.1	7.2	7.2
Metals												
Arsenic	ug/l	-	10	50	25	50	2.00	0.97	0.43	1	1.3	4.1
Chromium (Total)	ug/l	-	50	Sum of III and VI		-	2.80	0.25	0.67	1.2	2.6	0.55
Chromium (III)	ug/l	-	50	4.7	-		2.8	1	1	1.2	2.6	1
Chromium (VI)	ug/l	-		3.4	0.6		7	7	7	7	7	7
Copper	ug/l	-	2000	1*	3.76 (where DOC <1mg/l)	28	4.6	0.7	1.4	1.8	4.4	1.5
					3.76+((DOC/2)-0.5) where DOC >1mg/l							
Iron	ug/l	-	200	1000	1000		1300.0	45.0	290.0	53	31	120
Lead	ug/l	-	10	1.2}	1.3	-	3.10	0.53	1.90	0.19	0.14	0.36
Manganese	ug/l	-	50	123*	-	500	42.00	1.20	12.00	180	29	550
Nickel	ug/l	-	20	4*	8.6	200	2.2	0.5	0.9	2.5	1.5	2.8
Selenium	ug/l	-	10	-	-	10	0.25	0.25	0.25	29	37	1.5
Zinc	ug/l	-	3000¬	10.9*	6.8	500	300.0	1.8	110.0	63	140	50
Inorganic												
Chloride	mg/l	-	250	-	-	250	2.0	0.8	0.9	69	41	19
Ammoniacal Nitrogen as N	mg/l	-	50	1	1	-	0.07	0.05	0.04	1.2	0.15	0.042
Total Cyanide	ug/l	-	50	1	1	70	40	40	40	40	40	40
Organics												
Phenol	ug/l	0.1	-	7.7	7.7	300	0.1	0.1	0.1	-	-	-
4-Chloro-3-methylphenol	ug/l	-	-	-	-	-	0.1	0.1	0.1	-	-	-
2,4-Dichlorophenol	ug/l	0.1	-	4.20	-	-	0.1	0.1	0.1	-	-	-
2,4-Dimethylphenol	ug/l	-	-	-	-	-	0.1	0.1	0.1	-	-	-
p-cresol	ug/l	-	-	-	-	-	0.1	0.1	0.1	-	-	-
2,6-Dimethylphenol	ug/l	-	-	-	-	-	0.1	0.1	0.1	-	-	-
2,6-Dichlorophenol	ug/l	-	-	-	-	-	0.1	0.1	0.1	-	-	-
2,4,6-Trichlorophenol	ug/l	-	-	-	-	-	0.1	0.1	0.1	-	-	-
Petroluem Hydrocarbons												
Aliphatic C5-C6	ug/l	-	10	10	10		-	-	-	0.1	0.1	0.1
Aliphatic C6-C8	ug/l	-	10	10	10		-	-	-	0.1	0.1	0.1
Aliphatic C8-C10	ug/l	-	10	10	10		-	-	-	0.1	0.1	0.1
Aliphatic C10-C12	ug/l	-	10	10	10		-	-	-	1	1	1
Aliphatic C12-C16	ug/l	-	10	10	10		-	-	-	1	1	1
Aliphatic C16-C21	ug/l	-	10	10	10		-	-	-	1	1	1
Aliphatic C21-C35	ug/l	-	10	10	10		-	-	-	1	1	1
Aromatic C5-C7	ug/l	-	10	10	10		-	-	-	0.1	0.1	0.1
Aromatic C7-C8	ug/l	-	10	10	10		-	-	-	0.1	0.1	0.1
Aromatic C8-C10	ug/l	-	10	10	10		-	-	-	0.1	0.1	0.1
Aromatic C10-C12	ug/l	-	10	10	10		-	-	-	1	1	1
Aromatic C12-C16	ug/l	-	10	10	10		-	-	-	1	1	1
Aromatic C16-C21	ug/l	-	10	10	10		-	-	-	1	1	1
Aromatic C21-C35	ug/l	-	10	10	10		-	-	-	1	1	1
PAHs												
Naphthalene	ug/l	-	-	2	2		-	-	-	0.05	0.05	0.05
Acenaphthylene	ug/l	-	-	-	-		-	-	-	0.04	0.01	0.01
Acenaphthene	ug/l	-	-	-	-		-	-	-	0.01	0.01	0.01
Fluorene	ug/l	-	-	-	-		-	-	-	0.01	0.01	0.01
Phenanthrene	ug/l	-	-	-	-		-	-	-	0.07	0.01	0.01
Anthracene	ug/l	-	-	0.1	0.1		-	-	-	0.01	0.01	0.01
Fluoranthene	ug/l	-	-	0.0063	0.0063		-	-	-	0.06	0.01	0.02
Pyrene	ug/l	-	-	-	-		-	-	-	0.25	0.02	0.06
Benzo(a)anthracene	ug/l	-	-	-	-		-	-	-	0.01	0.01	0.01
Chrysene	ug/l	-	-	-	-		-	-	-	0.01	0.01	0.01
Benzo(b)fluoranthene	ug/l	-	0.10	BaP	BaP		-	-	-	0.01	0.01	0.01
Benzo(k)fluoranthene	ug/l	-	0.10	BaP	BaP		-	-	-	0.01	0.01	0.01
Benzo(a)pyrene	ug/l	-	0.01	0.00017	0.00017		-	-	-	0.01	0.01	0.01
Indeno(1,2,3-c,d)pyrene	ug/l	-	0.10	BaP	BaP		-	-	-	0.01	0.01	0.01

Note:

Fail: Above UK EQS

Fail: Above UK DWS

Result below Detection Limit

EQS for cadmium is dependent on hardness <40 mg/l <0.08ug/l. 40 to <50mg/l 0.08ug/l. 50 to <100 mg/l 0.09ug/l. 100-<200mg/l 0.15ug/l. >500mg/l 0.25ug/l

* EQS for substances based on CaCO3 Hardness and second stage asessment with m-BAT tool required if exceeded

Total of 4 Drinking Water Standard PAHs: Benzo[b]fluoranthene, Benzo[k]fluoranthene, Indeno[1,2,3-cd]pyrene, Benzo[ghi]perylene

¬ The Surface Waters (Abstraction for Drinking Water) (Classification) Regulations 1996

~ Drinking Water Inspectorate(2006) DWI1/10/18 (odour threshold)

+ WHO Guidelines for drinking water quality - 4th ed

} - bioavailable

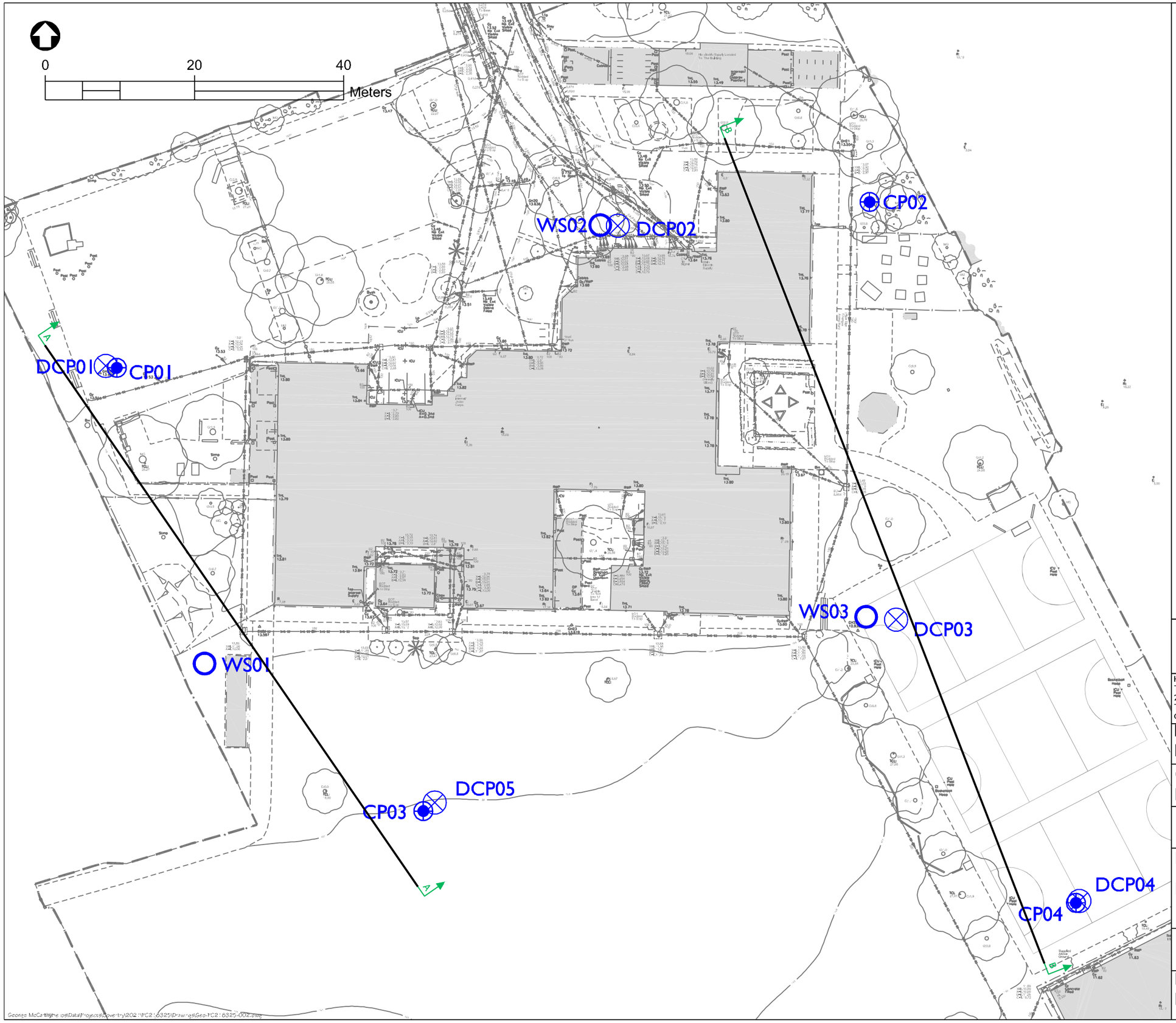
APPENDIX 11

Proposed Layout Plan

Possible location of redevelopment

APPENDIX 12

Exploratory Hole Location Plan



Key

- Cable Percussive Borehole
- Dynamic Cone Penetrometer
- Window Sample Borehole

Hole ID	Easting (mE)	Northing (mN)	Level (mOD)
CP01	462516.20	452976.51	13.65
CP02	462617.10	452998.72	13.47
CP03	462557.28	452917.08	13.01
CP04	462644.77	452904.80	12.08
DCP01	462514.72	452976.75	13.67
DCP02	462583.36	452995.52	13.57
DCP03	462620.66	452942.74	12.96
DCP04	462645.23	452905.05	12.08
DCP05	462558.82	452918.24	12.97
WS01	462527.98	452936.86	13.36
WS02	462581.01	452995.63	13.58
WS03	462616.65	452943.12	13.01

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Engineer:
Mott MacDonald Ltd

Client:
Department for Education

Project:
Hempland Primary School

Drawing Title:
EXPLORATORY HOLE LOCATION PLAN

Scale: 1:500@A3

Date:
February 2022

Project No:
PC218325

File Name:
Geo-PC218325-002(1)

APPENDIX 13

Investigation Techniques and General Notes

INVESTIGATION TECHNIQUES

INTRODUCTION

The following brief review of Ground Investigation techniques, generally used as part of most Site Investigations in the UK, summarises their methodology, advantages and limitations. Detailed descriptions of the techniques are available and can be provided on request. This review should be read in conjunction with the accompanying General Notes.

TRIAL PITS

The trial pit is amongst the simplest yet most effective means of identifying shallow ground conditions on a site. Its advantages include simplicity, speed, potential accuracy and cost-effectiveness. The trial pit is most commonly formed using a back-acting excavator which can typically determine ground conditions to some 4 metres below ground level. Hand excavation is often used to locate, expose and detail existing foundations, features or services. In general, it is difficult to extend pits significantly below the water table in predominantly granular soils, where flows can cause instability. Unless otherwise stated, the trial pits will not have been provided with temporary side support during their construction. Under such circumstances, entrance into the pit is not permitted and hence observations will have been made from the ground surface and samples taken from the excavator bucket.

Where access for personnel is required to allow close observation of the exposed strata, the taking of samples and the carrying out of in situ tests, the sides of the trial pits (Observation Pits in BS 5930:2015) will be made safe using temporary supports or the sides battered back to a stable angle. Some limited access to such Trial Pits (Observation Pits) at depths less than 1m may be allowed in stable conditions or where the sides are benched or battered back to a safe angle.

Trends in strata type, level and thickness can be determined, shear surfaces identified and the behaviour of plant, excavation sides and excavated materials can be related to the construction process. They are particularly valuable in land slip investigations. Some types of in situ test can be undertaken in such pits and large disturbed or block samples obtained.

CABLE PERCUSSION BORING

The light Cable Percussion technique of soft ground boring, typically at a diameter of 150mm, is a well-established simple and flexible method of boring vertical holes and generally allows data to be obtained in respect of strata conditions other than rock. A tubular cutter (for cohesive soils) or shell with a flap valve (for granular soils) is repeatedly lifted and dropped using a winch and rope operating from an "A" frame. Soil which enters these tools is regularly removed and either sampled for subsequent examination or test, or laid to one side for later removal off site and licensed disposal or, if permitted by the Client, use as backfill. Steel casing will have been used to prevent collapse of the borehole sides where necessary. A degree of disturbance of soil and mixing of layers is inevitable and the presence of very thin layers of different soils within a particular stratum may not be identified. Changes in strata type can only be detected on recognition of a change in soil samples at the surface, after the interface has been passed. For the foregoing reasons, depth measurements should not be considered to be more accurate than 0.10 metre. The technique can determine ground conditions to depths in excess of 30 metres under suitable circumstances and usually causes less surface disturbance than trial pitting.

In cohesive soils cylindrical samples are retrieved by driving or pushing in 100mm nominal diameter tubes. In soft soils, piston sampling or vane testing may be undertaken. In granular soils and often in cohesive materials, in situ Standard Penetration Tests (SPT's) are performed. The SPT records the number of standard blows required to drive a 50mm diameter open or cone ended probe for 300mm after an initial 150mm penetration. A modified method of recording is used in denser strata. Small disturbed samples are obtained throughout.

ROTARY DRILLING

Rotary Drilling to produce cores by rotating an annular diamond-impregnated tube or barrel into the ground is the technique most appropriate to the forming of site investigation boreholes through rock or other hard strata. It has the advantage of being able to be used vertically or at an angle. Core diameters of less than 100mm are most common for site investigation purposes. Core is normally retrieved in plastic lining tubes. A flushing fluid such as air, water or foam is used to cool the bit and carry cuttings to the surface. Depths in excess of 60 metres can be achieved under suitable circumstances using rotary techniques, with minimal surface disturbance.

Examination of cores allows detailed rock description and generally enables angled discontinuity surfaces to be observed. However, vertical holes do not necessarily reveal the presence of vertical or near-vertical fissures or joint discontinuities. The core type and/or techniques used will depend on the ground conditions. Where open hole rotary drilling is employed, descriptions of strata result from examination at the surface of small particles ejected from the borehole in the flushing medium. In consequence, no indication of fissuring, bedding, consistency or degree of weathering can be obtained.

DYNAMIC SAMPLING

This technique involves the driving of an open-ended tube into the ground and retrieval of the soil which enters the tube. It was previously called window or windowless sampling. The term "window sample" arose from the original device which had a "window" or slot cut into the side of the tube through which samples were taken. This was superseded by the use of a thin-walled plastic liner to retrieve the soil sample from within a sampler (windowless sampling) which has a solid wall. Line diameters range from 36 to 86mm. Such samples can be used for qualitative logging, selection of samples for classification and chemical analysis and for obtaining a rudimentary assessment of strength.

Driving devices can be hand-held or machine mounted and the drive tubes are typically in 1m lengths. Depending on the type of rig used, the hole formed can be cased to prevent collapse of the borehole sides. Where the type of rig does not allow the insertion of casing, the success of this technique can be limited when soils and groundwater conditions are such that the sides of the hole collapse on withdrawal of the sampler. Obstructions within the ground, the density of the material or its strength can also limit the depth and rate of penetration of this light-weight investigation technique. Nevertheless, it is a valuable tool where access is constrained such as within buildings or on embankments. Depths of up to 10m can be achieved in suitable circumstances depending on the rig type but depths of 5m to 6m are more common.

EXPLORATORY HOLE RECORDS

The data obtained by these techniques are generally presented on Trial Pit, Borehole, Drillhole or Dynamic Sample Records. The descriptions of strata result from information gathered from a number of sources which may include published geological data, preliminary field observations and descriptions, in situ test results, laboratory test results and specimen descriptions. A key to the symbols and abbreviations used accompanies the records. The descriptions on the exploratory hole records accommodate but may not necessarily be identical to those on any preliminary records or the laboratory summaries.

The records show ground conditions at the exploratory hole locations. The degree to which they can be used to represent conditions between or beyond such holes, however, is a matter for geological interpretation rather than factual reporting and the associated uncertainties must be recognised.

DYNAMIC PROBING

This technique typically measures the number of blows of a standard weight falling over a standard height to advance a cone-ended rod over sequential standard distances (typically 100mm). Some devices measure the penetration of the probe per standard blow. It is essentially a profiling tool and is best used in conjunction with other investigation techniques where site-specific correlation can be used to delineate the distribution of soft or loose soils or the upper horizon of a dense or strong layer such as rock.

Both machine-driven and hand-driven equipment is available, the selection depending upon access restrictions and the depth of penetration required. It is particularly useful where access for larger equipment is not available, disturbance is to be minimised or where there are cost constraints. No samples are recovered and some techniques leave a sacrificial cone head in the ground. As with other lightweight techniques, progress is limited in strong or dense soils. The results are presented both numerically and graphically. Depths of up to 10m are commonly achieved in suitable circumstances.

The hand-driven DCP probing device has been calibrated by the Highways Agency to provide a profile of CBR values over a range of depths.

INSTRUMENTATION

The most common form of instrument used in site investigation is either the standpipe or else the standpipe piezometer which can be installed in investigation holes. They are used to facilitate monitoring of groundwater levels and water sampling over a period of time following site work. Normally a standpipe would be formed using rigid plastic tubing which has been perforated or slotted over much of its length whilst a standpipe piezometer would have a filter tip which would be placed at a selected level and the hole sealed above and sometimes below to isolate the zone of interest. Groundwater levels are determined using an electronic "dip meter" to measure the depth to the water surface from ground level. Piezometers can also be used to measure permeability. They are simple and inexpensive instruments for long term monitoring but response times can limit their use in tidal areas and access to the ground surface at each instrument is necessary. Remote reading requires more sophisticated hydraulic, electronic or pneumatic equipment.

Settlement can be monitored using surface or buried target plates whilst lateral movement over a range of depths is monitored using slip indicator or inclinometer equipment.

GENERAL NOTES

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4. The assessment of the significance of the factual data, where called for, is provided to assist the Client and their Engineer and/or Advisers in the preparation of their designs.

5. The report is based on the ground conditions encountered in the exploratory holes together with the results of field and laboratory testing in the context of the proposed development. The data from any commissioned desk study and site reconnaissance are also drawn upon. There may be special conditions appertaining to the site, however, which are not revealed by the investigation and which may not be taken into account in the report.

6. Methods of construction and/or design other than those proposed by the designers or referred to in the report may require consideration during the evolution of the proposals and further assessment of the geotechnical and any geoenvironmental data would be required to provide discussion and evaluations appropriate to these methods.

7. The accuracy of results reported depends upon the technique of measurement, investigation and test used and these values should not be regarded necessarily as characteristics of the strata as a whole (see accompanying notes on Investigation Techniques). Where such measurements are critical, the technique of investigation will need to be reviewed and supplementary investigation undertaken in accordance with the advice of the Company where necessary.

8. The samples selected for laboratory test are prepared and tested in accordance with the relevant Clauses and Parts of BS EN ISO 17892 and BS 1377 Parts 1 to 8, where appropriate, in Geotechnics Limited's UKAS accredited Laboratory, where possible. A list of tests is given.

9. Tests requiring the use of another laboratory having UKAS accreditation where possible are identified.

10. Any unavoidable variations from specified procedures are identified in the report.

11. Specimens are cut vertically, where this is relevant and can be identified, unless otherwise stated

12. All the data required by the test procedures are recorded on individual test sheets but the results in the report are presented in summary form to aid understanding and assimilation for design purposes. Where all details are required, these can be made available.

13. Whilst the report may express an opinion on possible configurations of strata between or beyond exploratory holes, or on the possible presence of features based on either visual, verbal, written, cartographical, photographic or published evidence, this is for guidance only and no liability can be accepted for its accuracy.

14. The Code of Practice for Ground Investigations – BS 5930:2015 calls for man-made soils to be described as Anthropogenic Ground with soils placed in an un-controlled manner classified as Made Ground and soils placed in a controlled manner as Fill. In view of the difficulty in always accurately determining the origin of man-made soils in exploratory holes, Geotechnics Limited classify such materials as Made Ground. Where soils can be clearly identified as being placed in a controlled manner then further classification of the soils as Fill has been added to the Exploratory Hole Records.

15. Classification of man-made soils is based on the inspection of retrieved samples or exposed excavations. Where it is obvious that foreign matter such as paper, plastic or metal is present, classification is clear. Frequently, however, for man-made soils that arise from the adjacent ground or from the backfilling of excavations, their visual characteristics can closely resemble those of undisturbed ground. Other evidence such as site history, exploratory hole location or other tests may need to be drawn upon to provide clarification. For these reasons, classification of soils on the exploratory hole records as either Made Ground or naturally occurring strata, the boundary between them and any interpretation that this gives rise to should be regarded as provisional and subject to re-evaluation in the light of further data.

16. The classification of materials as Topsoil is generally based on visual description and should not be interpreted to mean that the material so described complies with the criteria for Topsoil used in BS 3882:2015. Specific testing would be necessary where such a definition is a requirement.

17. Ground conditions should be monitored during the construction of the works and the report should be re-evaluated in the light of these data by the supervising geotechnical engineers.

18. Any comments on groundwater conditions are based on observations made at the time of the investigation, unless specifically stated otherwise. It should be noted, however, that the observations are subject to the method and speed of boring, drilling or excavation and that groundwater levels will vary due to seasonal or other effects.

19. Any bearing capacities for conventional spread foundations which are given in the report and interpreted from the investigation are for bases at a minimum depth of 1m below finished ground level in naturally occurring strata and at broadly similar levels throughout individual structures, unless otherwise stated. Typically they are based on serviceability criteria taking account of an assessment of the shear strength and/or density data obtained by the investigation. The foundations should be designed in accordance with the good practice embodied in BS 8004:2015 - Foundations, supplemented for housing by NHBC Standards. Foundation design is an iterative process and bearing pressures may need adjustment or other measures may need to be taken in the context of final layouts and levels prior to finalisation of proposals.

20. Unless specifically stated, the investigation does not take account of the possible effects of mineral extraction or of gases from fill or natural sources within, below or outside the site.

21. The costs or economic viability of the proposals referred to in the report, or of the solutions put forward to any problems encountered, will depend on very many factors in addition to geotechnical or geoenvironmental considerations and hence their evaluation is outside the scope of the report.