GROUND INVESTIGATION REPORT

Proposed Educational Development
Boorley Gardens, Hampshire

Prepared for: Hampshire County Council

Date: October 2023

Report No: PO-23-014

terra firma
earth matters

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Document Control Sheet

Project Name : Proposed Educational Development

Site Location : Boorley Gardens, Hampshire

Project Ref : PO-23-014

Report Title : Ground Investigation Report

Report Ref : PO-23-014-GIR (Final)

Revision : 01

Date : October 2023

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Revision	Date	Description	Prepared	Reviewed	Approved
00	16/10/2023	Draft Issue	TC	PS	SH
01	01/11/2023	Final for issue	TC	PS	SH

EXECUTIVE SUMMARY

Proposals	Hampshire County Council (HCC) is proposing the construction of a new educational development within land at Boorley Gardens, Hampshire. The proposed development will consist of a new school building, car parking, playing fields and a MUGA with associated infrastructure.
Geology	The 1:50,000-scale Geological Map of the area shows the site to be underlain by the Wittering Formation of Ypresian Age. The BGS describes the Wittering Formation as greyish brown laminated clay: wavy- to lenticular bedded sand interbedded with clay in equal proportions; and fine-to medium grained sparsely glauconitic sand. No Superficial Deposits are shown to overlie the bedrock geology of the area.
Field Investigation	The site works were scoped by Hampshire County Council and comprised the following: Three cable percussive boreholes (CP01-CP03), Four mini percussive boreholes (WS102 to WS105), and Two hand excavated trial pits (HP01 and HP02). The site works were carried out at the site between the 18th and 22nd July 2023. It is understood that a second phase of exploratory works will be undertaken once the existing stockpiles have been removed. This will be to inform the near surface geological conditions including strength, provide CBR information and identify any additional contamination present. As of October 2023, it is currently not known when the second phase of works will commence. The ground conditions encountered comprised Topsoil or Made Ground (locally deeper across stockpiles) to a depth of between 0.25m and 2.80m, which was underlain by the Wittering Formation comprising soft becoming stiff fissured interbedded mottled yellowish orangish bluish greyish brown sandy silty gravelly CLAY to the maximum investigated depth of 17.00m. During the ground investigation groundwater strikes was encountered within CP01, CP02 and CP03 at varying depths of between 1.20 and 14.50 m bgl. Post investigation monitoring has shown shallow depths varying between 0.70m and 1.52m.
Chemical Testing & Evaluation	Hydrocarbon elevations were noted within the Made Ground deposits of WS102 where a potential former road was present and is considered a hotspot area where further investigation is recommended. It is also recommended that further assessment of soils beneath the stockpiles and compound area is undertaken to ensure that no soil contamination is present in areas not previously subject to investigation. Based on testing, the Topsoil tested is compliant within the low fertility range.
Waste Classification	Waste Classification has confirmed most samples can be considered Non-Hazardous (17 05 04), other than WS102 which has been classified Hazardous (17 05 03*).
Materials Management	Should the Topsoil stockpile material be designated for reuse on the site, an appropriate Materials Management Plan (MMP) will be required.

Gas Migration		Based on the initial three rounds of gas a provisional GSV of <0.0001 l/hr has been determined and would classify the site as very low risk and as 'Gas Characteristic Situation 1' in accordance with CIRIA guidance C665 (2007).
Engineering Recommendations	***Foundation and Floor Slab Solution***	It is recommended that a foundation solution for the proposed development comprise a piled solution founding within the competent Wittering Formation. Based on preliminary pile capacity values a 0.30 and 0.45 m diameter pile would have an ultimate bearing capacity of 305 and 508 kN respectively for a pile founding within the Wittering Formation at 10.00 m bgl, increasing to 872 and 1386 kN at 15.00m bgl. The above should be confirmed by a specialist piling contractor.
	Buried Concrete	Based on the above and using guidance within BRE Special Digest 1 (2005) it is recommended that any buried concrete within the site conforms to class DS1 and ACEC Class AC-1.

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SECTION 1 Introduction and Proposed Development

Hampshire County Council (HCC) is proposing the construction of a new educational development within land at Boorley Gardens, Hampshire. The proposed development will consist of a new school building, car parking, playing fields and a MUGA with associated infrastructure.

Hampshire County Council are the Consulting Structural Engineers for the proposed development.

Terra Firma have been commissioned as Geotechnical and Geo-Environmental Engineers to carry out a Ground Investigation of the site.

The main objectives of the ground investigation were to:

- Determine the type, strength and bearing characteristics of the near surface soils and underlying bedrock geology.
- Provide recommendations for a suitable and economic foundation/floor slab solution for the development.
- Provide recommendations regarding any other geo-technical aspects pertaining to the development.
- Collect representative samples for laboratory testing, and provide an evaluation of the results.

The Ground Investigation has been undertaken in accordance with the following advisory guidance:

- Code of Practice for Site Investigations - (BS 5930): 2015 + A1:2020
- Investigation of Potentially Contaminated Sites - CoP (BS 10175): 2011 + A2:2017
- Methods of test for soils for civil engineering purposes - In-situ tests (BS 1377-9):1999

In order to achieve the above objectives, Terra Firma carried out an assessment programme including a review of existing data, followed by a field investigation to determine the prevailing ground conditions and also to collect and analyses soil samples from selected locations around the site.

The scope of the works including the schedule for in-situ and laboratory testing was determined by HCC.

A comprehensive desk study, other than an inspection of geological maps, has not been requested or undertaken as part of this investigation. Nor has a preliminary risk assessment been completed.

1.1 Limitations and Exceptions of Investigation

Hampshire County Council has requested that a Ground Investigation Report (GIR) be performed in order to establish the ground conditions at the site and collect representative samples for laboratory analysis.

The Ground Investigation was conducted and this report has been prepared for the sole internal reliance of Hampshire County Council and their design and construction team. This report shall not be relied upon or transferred to any other parties without the express written authorisation of Terra Firma. If an unauthorised third party comes into possession of this report, they rely on it at their peril and the authors owe them no duty of care and skill.

The report represents the findings and opinions of experienced geo-environmental and geo-technical consultants. Terra Firma does not provide legal advice and the advice of lawyers may also be required.

The subsurface geological profiles, any contamination and other plots are generalised by necessity and have been based on the information found at the locations of the exploratory holes and depths sampled and tested.

The ground investigation was limited by the following site constraints:

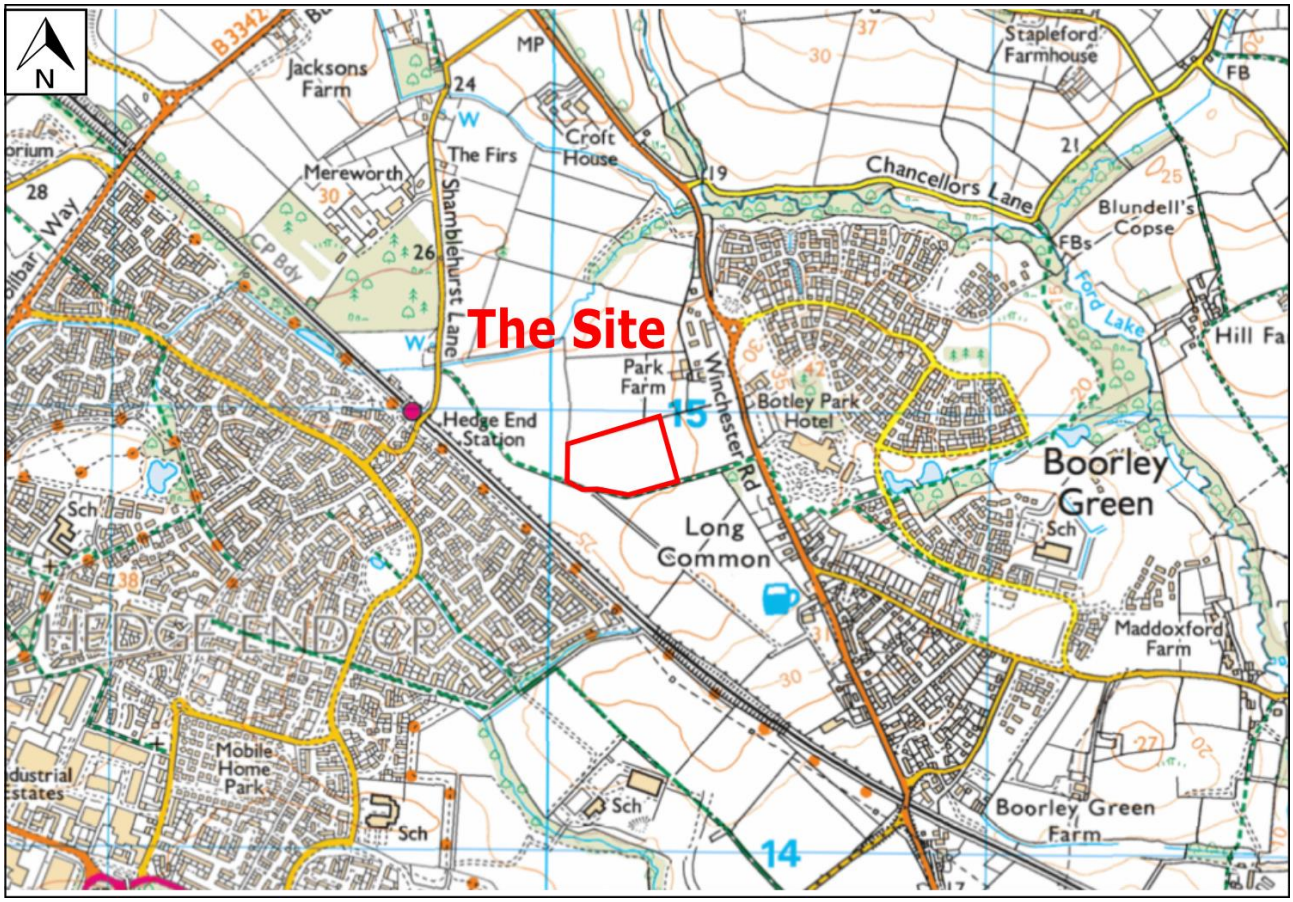
- The presence of existing buildings, stockpiles, structures and/or hard standing,
- The presence of access restrictions to the required locations,
- The presence of adverse weather conditions and subsequent soft ground, and
- The sensitive nature of the site (ecological).

SECTION 2 Site Setting

2.1 Physical Setting

The proposed development is to be located on land within property boundaries of the Boorley Gardens wider development, Hampshire, SO32 2DZ.

The site is centred approximately on National Grid Reference (NGR) 450217, 114883. The site location is presented in **Drawing 2.1** below.



Drawing 2.1: Site Location Plan

The site is roughly rectangular in shape with a plan area of approximately 3.5 hectares and sits at approximately 25 m above ordnance datum (aod).

The topography of the site is typically flat with a very gradual fall to the northwest. The topography of the surrounding area typically slopes towards the southeast.

The site is bound by agricultural fields to the north and west with the Boorley Gardens residential development to the east and south.

2.1.1 Current Use and Site Conditions

A walk-over survey was undertaken on the 15th of June 2023 by a Terra Firma Engineer. The site is accessed via the site compound entrance. At the time of the walk-over survey the site currently comprises overgrown side field to the site compound.

Photographs taken during the walk-over survey is shown in **Table 2.1** below:

Table 2.1: Walk-over Survey Photographs

Photo 1: On site. North orientation

Photo 2: On site. East orientation

Photo 3: On site. Northwest orientation

Photo 4: On site. west orientation

2.2 Geological Setting

The 1:50,000-scale Geological Map of the area shows the site to be underlain by the Wittering Formation of Ypresian Age. The BGS describes the Wittering Formation as greyish brown laminated clay: wavy- to lenticular bedded sand interbedded with clay in equal proportions; and fine-to medium grained sparsely glauconitic sand.

No Superficial Deposits are shown to overlie the bedrock geology of the area.

Due to the nature and history of the site the presence of significant made ground is not expected.

2.3 Feasibility Study

A Feasibility Study (Reference; P13332/Geo/Feas/Boorley) was undertaken by HCC in August 2022. A copy of this study has been included within **Annex A** of this report.

2.4 Previous Investigation

As detailed in the Feasibility Study there has been one previous investigation at the site, as summarised by Hampshire County Council below. Terra Firma have not reviewed the report and cannot comment on the accuracy of the summary or reporting.

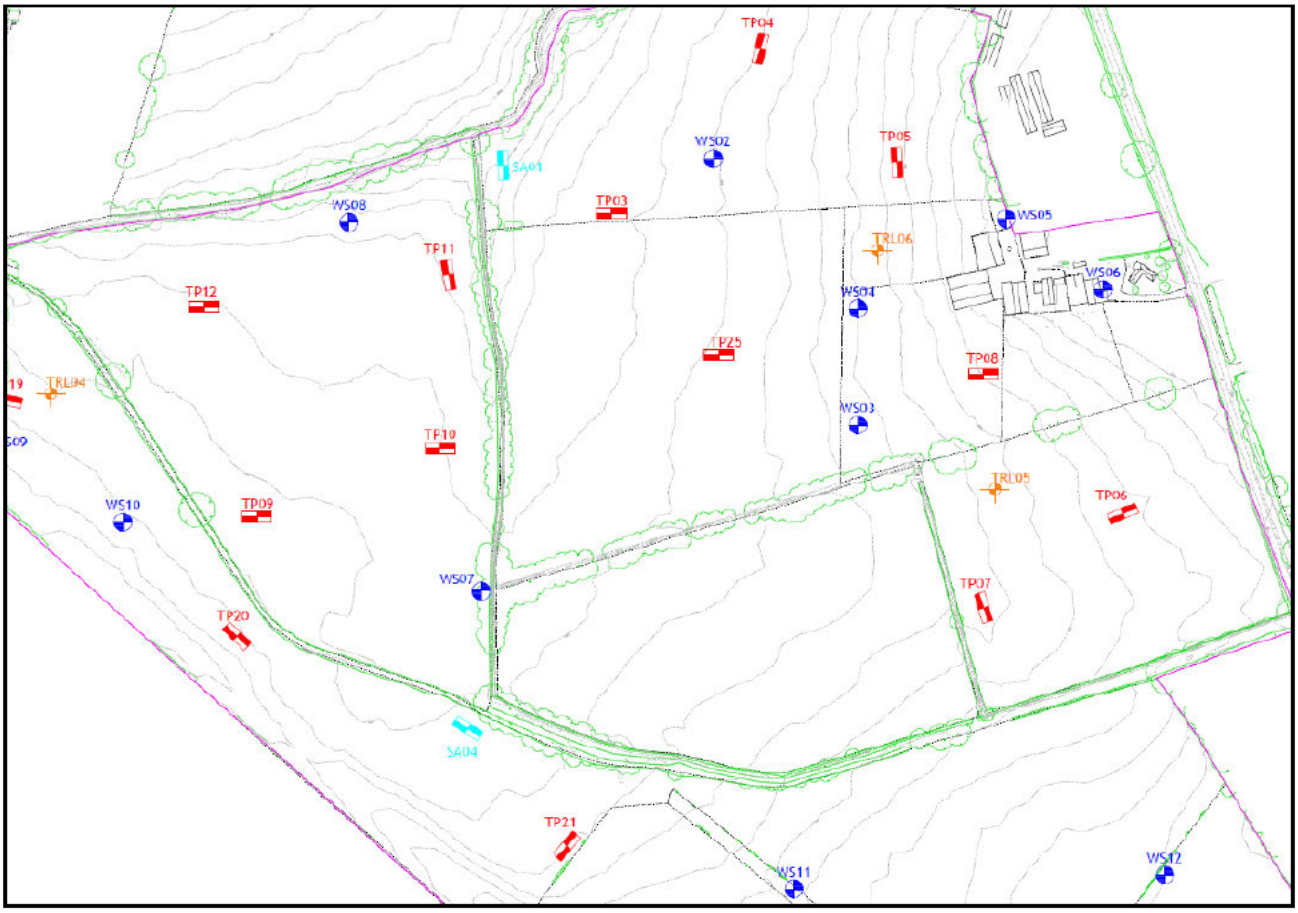
BRD Environmental Ltd

A site investigation by BRD Environmental Ltd was undertaken in September 2017 for the housing developers, Gleeson Strategic Land and Miller Homes for a wider residential development, as shown on the extract below (purple delineates the proposed school site).

BRD undertook fieldwork between 24th and 27th July 2017 comprising;

- Three days window sampling
- Three days machine pitting
- Six No. TRL DCPs
- Chemical and geotechnical testing
- Installation of monitoring pipes (50 mm diameter with gas taps and raised metal covers) have been installed in WS01, WS03, WS05, WS06, WS07, WS08, WS09, WS11, WS12 and WS15.
- Gas, groundwater and vapour monitoring visits took place on 8th, 17th and 23rd August 2017
- It is understood that gas monitoring has been continued

The exploratory hole locations are shown on the plan below.



TP07 appears to be the closest exploratory hole location to the proposed new school along with WS07 (standpipe installed) and TRL05. However, BRD did not specifically cover the area (nor did they included records of the window sampler logs) and it is recommended that a site investigation is carried out on the site with the proposals in mind.

The BRD investigation found;

- Topsoil / made ground overlying the Wittering Formation.

- Groundwater was encountered in the standpipe installed in WS07 at a depth of approximately 1.00 m in August 2017 and a slight seepage in TP07 at 1.10 m during excavation of the pit on 24th July 2017.
- The Wittering Formation predominantly comprised clays of low to high volume change potential (plasticity indices 19-56%).
- BRD advised that high volume change potential soils were assumed at the site.
- Minimum founding depth of 1.00 m but might need to deepen footings within zone of influence of felled trees, existing trees or proposed trees.
- A net allowable bearing pressure of 100 kPa might be achievable on firm clays of the Wittering Formation.
- Suspended floor slabs will be required in view of volume change potential of the clays.
- The Wittering Formation was found to be potentially pyritic given the sulphate results.
- Soils shallower than 2.50 m were assigned a sulphate class of DS-1 and AC-2Z by BRD and below 2.50 m, DS-4 and AC-3s.
- The soils below the site were not deemed suitable for soakaways due to presence of clays.
- A design CBR of 3% was recommended by BRD.
- Gas monitoring has recorded CO2 exceeding 5% in WS05 and it is understood from the BRD report that further gas monitoring was to be undertaken as a precaution.
- Asbestos and hydrocarbon contamination found in the farmyard.

Expected Ground Conditions

The closest exploratory BRD hole to the proposed school site is TP07. At this location 0.40 m of made ground was encountered, overlying soft clays to 2 m, in turn underlain by 200 mm of sand, and a firm clay, proven to a depth of 2.60 m.

Groundwater might be problematic for construction and was encountered around 1 m bgl in WS07.

Recommendations

Piled foundations may be required to overcome issues with groundwater during construction of foundations for the school and in view of anticipated proposed loadings.

It would be prudent to obtain further groundwater monitoring data for WS07 along with the additional gas data from the developer for the main site.

In view of very limited ground information for the actual propose school site it is recommended that a site investigation is undertaken that would allow the design of a piled foundation solution. It may also be useful to include the installation of standpipes to facilitate gas / groundwater monitoring.

A minimum of three gas monitoring visits (over a period of six weeks) should be undertaken to confirm the absence of any soil gas. In addition, samples of shallow soils should be taken for contamination testing including a couple of pesticide and herbicide suites and asbestos screening as a precaution to confirm the absence of contamination on site and assist in waste classification.

The investigation should comprise a minimum of one cable percussion boreholes to obtain information for pile design within the footprint of the new school building. Ideally three deep boreholes would be drilled if budget allows across the school site to allow for changes in layout of the site and to refine the pile parameters. Deep holes should be supplemented with a couple of days of window sampling to provide coverage for MUGA, sports pitch and hardstanding.

SECTION 3 Field Investigation

3.1 General

The site works were scoped by Hampshire County Council and comprised the following:

- Three cable percussive boreholes (CP01-CP03),
- Four mini percussive boreholes (WS102 to WS105), and
- Two hand excavated trial pits (HP01 and HP02).

The site works were carried out at the site between the 18th and 22nd July 2023.

It is understood that a second phase of exploratory works will be undertaken once the existing stockpiles have been removed. This will be to inform the near surface geological conditions including strength, provide CBR information and identify any additional contamination present. As of October 2023, it is currently not known when the second phase of works will commence.

Prior to the site works, the following Health and Safety measures were undertaken:

- Risk Assessment & Method Statement (RAMS) was issued and approved beforehand,
- Underground Utility Plans were obtained from the relevant Statutory Undertakers,
- Site Inductions were held with Miller Homes in order to provide information of the site specific Health and Safety requirements,
- Safety fencing was used to prevent unauthorised access into the site working area,
- Before any excavation, all exploratory hole locations were scanned using a Cable Avoidance Tool (CAT),
- Before any excavation, all exploratory holes were surveyed using Ground Penetrating Radar (GPR), and
- Before any drilling, a 1.20m deep inspection pit was excavated at each borehole location.

The exploratory holes were set out at locations provided by Hampshire County Council, and adjusted where necessary to take account of the site constraints detailed in Section 1.1.

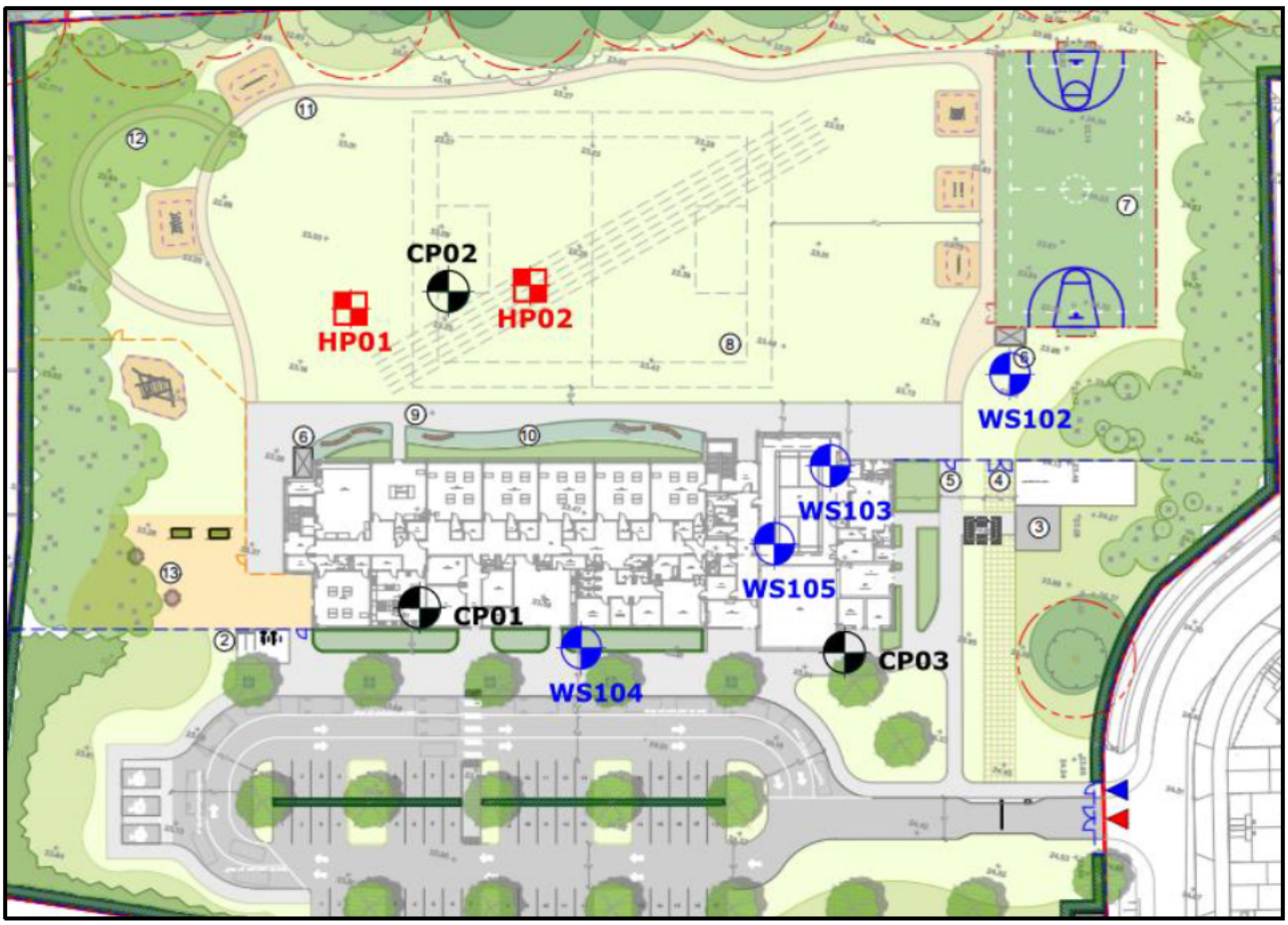
All exploratory hole co-ordinates and levels were picked up post-investigation by a qualified surveyor and presented in the table below:

Table 3.1: Exploratory Hole Co-ordinates

Exploratory Hole	Easting	Northing	Height AOD (m)
CP01	450186.7	114858.2	23.82
CP02	450177.7	114909.8	23.17
CP03	450250.3	114868.2	24.40
HP01	450164.2	114903.5	23.06
HP02	450188.3	114911.4	23.25
ws102	450264.5	114917.0	24.68
ws103	450240.8	114896.1	25.19
ws104	450210.2	114858.7	23.96
ws105	450236.7	114885.4	26.76

The site works were supervised by Terra Firma, who also logged the exploratory holes to the requirements of BS5930:2015 + A1:2020.

The exploratory hole logs are presented in **Annex B**, and their locations shown on **Drawing 3.1** below.



Drawing 3.1: Exploratory Hole Location Plan

3.2 Exploratory Holes

3.2.1 Cable Percussive Boreholes

The cable percussive boreholes (100 mm diameter) were sunk using a Dando 2000 drilling rig as described in EN ISO 22475-1:2006.

Standard Penetration Tests using either a split spoon or solid cone (SPT(S/C)) were undertaken at regular depths during the drilling in accordance with BS EN ISO 22476-3. Typically, tests were undertaken at the base of an inspection pit and every metre for the first 5m, and then every 1.5m thereafter, a final test was undertaken at the base of each borehole.

Undisturbed (U100) and disturbed bulk/small soil samples were taken at regular depths during the drilling. Water samples were taken at each water strike.

Boreholes CP01, CP02 and CP03 were installed with a gas and ground water monitoring pipe, the details of which are summarised in the section below.

During drilling, standing time/day works were incurred due to the following reasons:

- Site Inductions / Briefings (3 Hrs)
- Inspection Pits (3 Hrs)
- Backfilling Holes / Clear-up (3 Hrs)

3.2.2 Mini Percussive Boreholes

The windowless sampling boreholes were bored using an Archway Terrier drilling rig.

The windowless boreholes were used to recover soil samples. Standard Penetration Tests using either a split spoon or solid cone (SPT(S/C)) were undertaken at regular depths during the drilling in accordance with BS EN ISO 22476-3. Typically, tests were undertaken at the base of an inspection pit and every metre, a final test was undertaken at the base of each borehole.

All boreholes were backfilled using arisings and reinstated using arisings.

3.2.3 Borehole Installations

Groundwater and/or gas monitoring systems were installed in boreholes CP01, CP02 and CP03, terminating below both the depth of made ground and groundwater.

The standpipe installation details for the boreholes are as follows:

Table 3.2: Standpipe Installation Details

Borehole No.	Top of Response Zone (m bgl)	Bottom of Response Zone (m bgl)	Pipe Detail
CP01	2.00	5.00	Lockable Flush cover set in concrete surround Plain (50mm) to top of Response Zone with gas valve Slotted (50mm) Response Zone with geotextile sock and gravel surround Top/Bottom sealed with bentonite
CP02	1.00	5.00	
CP03	2.00	5.00	

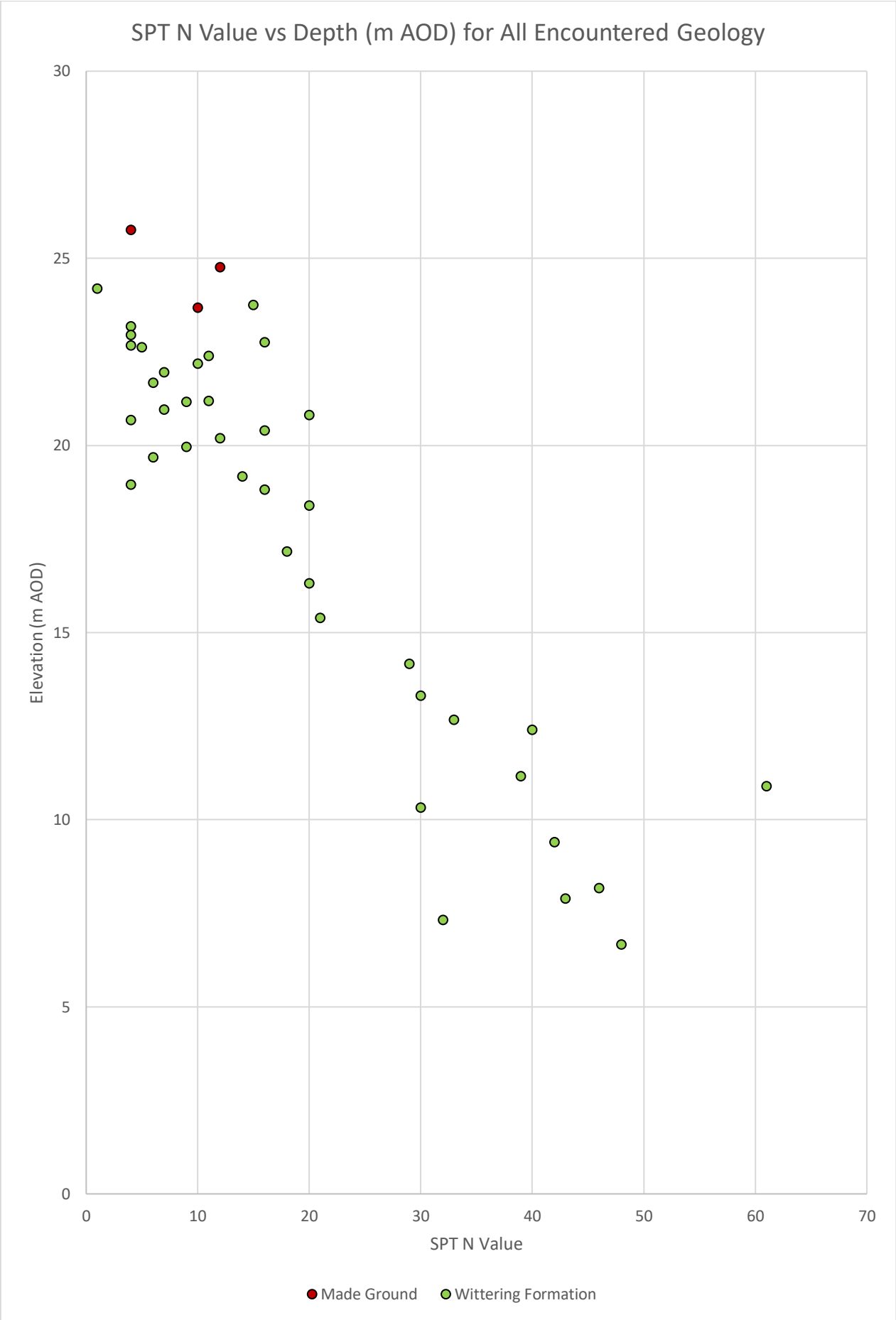
3.3 In-situ Testing

3.3.1 Strength Testing

<u>Standard Penetration Tests (SPT)</u>

SPT N Values taken within the Bedrock revealed an average N value of 28 (Range 5 to 61).

Drawing 3.2 below presents the distribution of SPT N values against depth (mbgl).



Drawing 3.2: SPT vs Depth

3.4 Sampling

3.4.1 Sampling Quality Assurance

Care was taken to ensure that sampling quality assurance occurred during site works. This included the following measures:

- The use of nitrile gloves at each sampling point.
- Stainless steel shovels were used to collect soil samples. The tool was cleaned with distilled water between each sample point.
- Soil samples were stored at a temperature below 4 degrees.
- Soil samples were stored within sample containers according to the chemical testing required.
- No head space was left in sample containers.

3.4.2 Soil Chemical Test Sampling Regime

During the intrusive investigation small disturbed soil samples were collected for chemical testing.

The sample locations and depths are illustrated in the table below:

Table 3.3: Chemical Test Sample Descriptions

Sample No.		Sample Type
WS102	0.20-0.40	Made Ground
WS102	0.80-0.85	Made Ground
WS102	1.70-1.75	Wittering Formation
WS103	0.10	Made Ground
WS103	0.50	Wittering Formation
WS104	0.00-0.20	Made Ground
WS104	0.40-0.60	Wittering Formation
HP01	0.00-0.30	Topsoil
HP02	0.00-0.30	Topsoil

3.4.3 Soil Property Test Sampling Regime

During the intrusive investigation bulk soil samples were collected for soil property testing.

The sample locations and depths are illustrated in the following table:

Table 3.4: Soil Property Test Sample Laboratory Descriptions

Sample No.		Sample Type	Description
CP01	2.00	Wittering Formation	Brown clayey SILT
CP01	4.00	Wittering Formation	Brown clayey SILT
CP01	6.00	Wittering Formation	Brown silty CLAY
CP01	9.00	Wittering Formation	Brown silty CLAY
CP02	1.20	Wittering Formation	Brown sandy silty CLAY
CP02	3.00	Wittering Formation	Brown clayey SILT
CP02	10.50	Wittering Formation	Brown slightly sandy silty CLAY
CP02	16.50	Wittering Formation	Brown fine to coarse sandy silty CLAY
CP02	16.50	Wittering Formation	Brown silty CLAY
CP03	1.20	Wittering Formation	Brown silty CLAY
CP03	2.00	Wittering Formation	Brown slightly gravelly fine to coarse sandy silty CLAY

CP03	4.00	Wittering Formation	Brown slightly sandy clayey SILT
CP03	5.00	Wittering Formation	Brown silty CLAY
CP03	7.50	Wittering Formation	Brown silty CLAY
CP03	13.50	Wittering Formation	Brown slightly gravelly fine to coarse sandy silty CLAY
CP03	16.50	Wittering Formation	Brown fine to coarse sandy silty CLAY
WS103	0.80	Wittering Formation	Brown silty CLAY
WS104	0.80	Wittering Formation	Brown silty CLAY
CP01	1.20	Wittering Formation	Brown fine to coarse gravelly fine to coarse sandy silty CLAY
CP01	12.00	Wittering Formation	Brown fine to medium gravelly silty CLAY
CP01	15.00	Wittering Formation	Brown fine to medium gravelly silty CLAY
CP02	5.00	Wittering Formation	Brown fine to medium gravelly silty CLAY
CP02	9.00	Wittering Formation	Brown silty CLAY
CP02	13.50	Wittering Formation	Brown silty CLAY

3.5 Groundwater and Gas Monitoring

Groundwater and gas monitoring wells were installed within CP01, CP02 and CP03. The monitoring pipes were 50mm diameter pipe comprising 1.00m to 2.00m plain pipe and the remainder slotted to 5.00m depth. A layer of bentonite was placed at the top and bottom of the response zone in order to seal it.

An initial programme of in-situ gas monitoring (3no. Visits) for the presence of methane, carbon dioxide and oxygen was implemented following completion of the installations. The barometric pressure of the atmosphere and flow rate was also measured at the time of monitoring.

Groundwater monitoring was also completed to assess groundwater levels across the site. The table below presents the standing groundwater levels recorded for each borehole.

Table 3.5: Summary of Groundwater Monitoring

	GWL (metres BGL)					
Date	21/08/23	31/08/23	28/09/23	30/10/2023	TBC	TBC
Time of Monitoring (GMT)	5:00PM	12:00PM	4:30PM	10:30	-	-
CP01	0.80	1.10	0.97	0.50	-	-
CP02	0.70	0.92	1.01	0.83	-	-
CP03	1.40	1.52	1.28	0.74	-	-

Notes:

- GWL (BGL) – Groundwater Level (Below Ground Level)

The results of the gas monitoring are presented in **Annex E.**

SECTION 4 Ground Conditions

4.1 Summary

The ground conditions encountered by the exploratory holes were variable across the site and but can in general be summarised as shown in the following table:

Table 4.1: Summary of Ground Conditions

Depth (mbgl)		Thickness (m)		Stratum	
From	To	Min	Max		
0.00	0.50	0.50		Grass over soft brown slightly gravelly CLAY	*Topsoil*
0.00 / 0.00	0.25 / 2.80	0.25	2.80	Very soft to firm mottled orange greyish blackish brown silty sandy gravelly CLAY Loose to medium dense grey reddish blackish brown clayey sandy GRAVEL Crushed concrete and brick fill	*Made Ground*
0.25 / 2.80	5.00 / >17.00	Unproven		Soft to stiff fissured interbedded mottled yellowish orangish bluish greyish brown sandy silty gravelly CLAY	*Wittering Formation*

4.2 Strata Details

4.2.1 Topsoil

The Topsoil layer was encountered within HP01, HP02 and CP02, although was absent within the remaining exploratory hole locations. It is understood that a topsoil strip had been undertaken at the site with all topsoil being stockpiled in the centre of the site.

The Topsoil comprised grass (within HP01 and HP02) overlying a soft brown slightly gravelly CLAY. The gravel sized fraction comprised fine to coarse subangular to subrounded flints.

4.2.2 Made Ground

The Made Ground was encountered within CP01, CP03, WS102, WS103, WS104 and WS105 and typically comprised either a very soft to firm mottled orangish greyish blackish brown silty sandy gravelly CLAY, a loose to medium dense grey reddish blackish brown clayey sandy GRAVEL or, crushed concrete and brick fill.

The Made Ground extended to depth of between 0.25 m and 1.35 m, except for WS102 and WS105 which was drilled through a stockpile And were 1.35 and 2.8 m thick (23.33 and 23.96 m AOD) respectively. The base of the made ground appeared to extend to levels of 24.94 m AOD to 22.62 m AOD

Fragments of wood and plastic were recorded within WS02, WS03 and WS04.

Within WS102 between 0.30 and 0.45 m bgl a layer of crushed tarmac with a very strong hydrocarbon odor was recorded. A PID reading of 29.5 ppm was measured from a sample taken.

4.2.3 Wittering Formation Bedrock Geology

The Bedrock Geology was encountered within all exploratory hole locations with the exception of the two hand pits which were used for topsoil sampling. The Wittering Formation was recorded underlying the Made Ground from between 0.25 to 2.80 m bgl to a maximum investigation depth of 17.00 m bgl.

The Wittering Formation was recorded as a soft to stiff fissured interbedded mottled yellowish orangish bluish greyish brown sandy silty gravelly CLAY.

4.3 Water Strikes

During site works, groundwater was encountered within CP01, CP02 and CP03 at depths of between 1.20m and 15.40m.

Groundwater encountered by the exploratory holes can in general be summarised as shown in the following table:

Table 4.2: Summary of Groundwater

Hole Location	Groundwater Strike Depth (mbgl)	Groundwater Depth (mbgl) after 20 mins	Comments	Water Bearing Strata
CP01	6.00	-	No Rise	Wittering Formation
CP02	3.00	-	No Rise	Wittering Formation
CP02	15.30	-	No Rise	Wittering Formation
CP03	1.20	-	No Rise	Wittering Formation
CP03	15.40	-	No Rise	Wittering Formation

SECTION 5 Laboratory Chemical Testing

5.1 General

During the recent site works, 12No. soil samples were taken and dispatched to the laboratories of Chemtest for laboratory chemical testing.

The following chemical testing was undertaken:

Table 5.1: Summary of Chemical Testing Suites		
Inorganics	Metals	Arsenic (As), Cadmium (Cd), Chromium (Cr), Hexavalent Chromium (CrVI), Copper (Cu), Lead (Pb), Mercury (Hg), Nickel (Ni), Selenium (Se), Zinc (Zn)
	General	pH (acidity), Cyanide (CN^-), Thiocyanate (SCN^-), Ammoniacal Nitrogen (NH_4-N), Sulphide (S^{2-}), Sulphur (S), Sulphate (SO^4), Organic Matter (OM)
Organics		Phenol, Poly-Aromatic Hydrocarbons (PAH), Petroleum Hydrocarbons (PH), Benzene, Toluene, Ethylbenzene, Xylene (BTEX), Methyl tert-butyl ether (MTBE), Pesticides
Miscellaneous		Asbestos ID
Topsoil Analysis		Soil Texture, Soil Fertility Properties, Phytotoxic Contaminants & Visible Contaminants

The results of the above chemical tests are presented in **Annex C** and evaluated below.

5.2 Evaluation of Analytical Results

5.2.1 Soils

A summary of the Inorganic (Metals) soil chemical test results are shown in the table below.

Table 5.2: Soil Chemical Test Results – Inorganics (Metals)					
Substance	Land Use / Guideline Values (mg/kg)	Measured Levels of Substances (mg/kg)		Number of exceedances	95% UCL
	POS-R	Min	Max		
Arsenic	79	3.4	19	0	-
Cadmium	220	<0.1	0.39	0	-
Chromium	1500	9.5	36	0	-
Chromium VI	21	<0.5	<0.5	0	-
Copper	12000	4.6	27	0	-
Lead	630	11	48	0	-
Mercury (Total)	120	<0.05	0.35	0	-
Nickel	230	2.5	18	0	-
Selenium	1100	<0.25	1.8	0	-
Zinc	81000	20	88	0	-

Notes

- C4SL - Provisional Category 4 Screening Levels
- S4UL - Suitable for Use Levels
- POS-R (Public Open Space – Residential)
- A total of 12 representative soil samples were tested for these substances

A summary of the Inorganic (General) soil chemical test results are shown in the table below.

Table 5.3: Soil Chemical Test Results – Inorganics (General)					
Substance	Land Use / Guideline Values (mg/kg)	Measured Levels of Substances (mg/kg)		Number of exceedances	95% UCL
	POS-R	Min	Max		
pH (pH Units)	Considered in BRE SD1, BS3882, BS8601 and/or UKWIR	6.6	10.1	0	-
Cyanide (Total)	0.5 (LoD)	<0.5	<0.5	0	-
Cyanide (Free)	0.5 (LoD)	<0.5	<0.5	0	-
Thiocyanate	5 (LoD)	<5	<5	0	-
Organic Matter	Considered in Organic Contaminant Guideline Value Assessment, BS3882 and/or BS8601	0.73	18	0	-
Ammoniacal Nitrogen	-	1.2	28	0	-
Sulphide	Considered in BRE SD1	2.6	36	0	-
Sulphur (%)	-	<0.010	0.38	0	-
Sulphate (Total) (%)	Considered in BRE SD1	0.024	0.52	0	-

Notes

- BRE SD1: 2005 - Concrete in Aggressive Ground
- BS 3882: 2015 - Specification for Topsoil
- BS 8601: 2013 - Specification for Subsoil and requirements for use
- UKWIR – Guidance for the Selection of Water Supply Pipe to be used in Brownfield Sites: 2010
- POS-R (Public Open Space – Residential)
- LoD (Limit of Detection)
- A total of 12 representative soil samples were tested for these substances

A summary of the Organic (General) soil chemical test results are shown in the table below.

Table 5.4: Soil Chemical Test Results – Organics (General)							
Substance		SOM	Land Use / Guideline Values (mg/kg)	Measured Levels of Substances (mg/kg)		Number of exceedances	95% UCL
			POS-R	Min	Max		
Total Phenol		1	440	<0.1	1.1	0	-
		2.5	690			0	
		6	1200			0	
Total PAH*			-	<2	2100	-	-
Total EPH (C10-C40)**		1	3800+	<10	3800	0	-
		2.5	3800+			0	
		6	3800+			0	
BTEX	Benzene		140	<0.001	<0.001	0	-
	Toluene	1	56000	<0.001	<0.001	0	-
		2.5	56000			0	
		6	56000			0	
	Ethylbenzene	1	24000	<0.001	<0.001	0	-
		2.5	24000			0	
		6	25000			0	

Xylene***	1	41000	<0.001	<0.001	0	-
	2.5	42000			0	
	6	43000			0	
Methyl tert-butyl ether (MTBE)	1	0.001 (LoD)	<0.001	<0.001	0	-
	2.5	0.001 (LoD)			0	
	6	0.001 (LoD)			0	

Notes

- C4SL - Provisional Category 4 Screening Levels
- S4UL - Suitable for Use Levels
- POS-R (Public Open Space – Residential)
- LoD - Limit of Detection
- SOM - Soil Organic Matter
- * Total PAH - Poly-Aromatic Hydrocarbons, EPA 16 (See Speciated PAH Results Table)
- ** Total EPH – Extractable Petroleum Hydrocarbons, Ali/Aro (See Speciated PH Results Table)
- + Based on worse-case Aromatic C_{16}-C_{21} fraction
- *** - Guideline Value based on worse case of O, M or P - Xylene
- - No comparable Guideline Value
- A total of 12 representative soil samples were tested for these substances

In order to accurately assess the risk from Total PAH, speciation was undertaken, which splits the total PAH concentration into its sixteen components.

A summary of the Organic (Speciated PAH) soil chemical test results are shown in the table below.

Table 5.5: Soil Chemical Test Results – Organics (Speciated PAH)

Substance	SOM	Land Use / Guideline Values (mg/kg)	Measured Levels of Substances (mg/kg)		Number of exceedances	95% UCL
		POS-R	Min	Max		
Naphthalene	1	4900	<0.1	20	0	-
	2.5	4900			0	
	6	4900			0	
Acenaphthylene	1	15000	<0.1	19	0	-
	2.5	15000			0	
	6	15000			0	
Acenaphthene	1	15000	<0.1	73	0	-
	2.5	15000			0	
	6	15000			0	
Fluorene	1	9900	<0.1	83	0	-
	2.5	9900			0	
	6	9900			0	
Phenanthrene	1	3100	<0.1	490	0	-
	2.5	3100			0	
	6	3100			0	
Anthracene	1	74000	<0.1	100	0	-
	2.5	74000			0	
	6	74000			0	
Fluoranthene	1	3100	<0.1	420	0	-
	2.5	3100			0	
	6	3100			0	
Pyrene	1	7400	<0.1	320	0	-

	2.5	7400			0	
	6	7400			0	
Benzo(a)anthracene	1	29	<0.1	89	0	28.8
	2.5	29			0	
	6	29			1	
Chrysene	1	57	<0.1	130	0	41.6
	2.5	57			0	
	6	57			1	
Benzo(b)fluoranthene	1	7.1	<0.1	93	0	29.9
	2.5	7.2			0	
	6	7.2			1	
Benzo(k)fluoranthene	1	190	<0.1	34	0	-
	2.5	190			0	
	6	190			0	
Benzo(a)pyrene		10	<0.1	71	1	28.8
Indeno(1,2,3-cd)pyrene	1	82	<0.1	50	0	-
	2.5	82			0	
	6	82			0	
Dibenzo(a,h)anthracene	1	0.57	<0.1	11	0	3.6
	2.5	0.57			0	
	6	0.58			1	
Benzo(g,h,i)perylene	1	640	<0.1	49	0	-
	2.5	640			0	
	6	640			0	

Notes

- C4SL - Provisional Category 4 Screening Levels
- S4UL - Suitable for Use Levels
- POS-R (Public Open Space – Residential)
- SOM - Soil Organic Matter
- A total of 12 representative soil samples were tested for these substances

In order to accurately assess the risk from Total PH, speciation was undertaken, which splits the Total PH concentration into carbon bandings in accordance with the Total Petroleum Hydrocarbon Criteria Working Croup (CWG).

A summary of the Organic (Speciated PH) soil chemical test results are shown in the table below.

Table 5.6: Soil Chemical Test Results – Organics (Speciated PH)

Substance		SOM	Land Use / Guideline Values (mg/kg)	Measured Levels of Substances (mg/kg)		Number of exceedances	95% UCL
			POS-R	Min	Max		
Aliphatic	VPH <C5-C6	1	570000	<1.0	<1.0	0	-
		2.5	590000			0	
		6	600000			0	
	VPH <C6-C8	1	600000	<1.0	<1.0	0	-
		2.5	610000			0	
		6	620000			0	
	VPH <C8-C10	1	13000	<1.0	<1.0	0	-
		2.5	13000			0	

		6	13000			0	
	EPH <C10-C12	1	13000	<1.0	42	0	-
		2.5	13000			0	
		6	13000			0	
	EPH <C12-C16	1	13000	<1.0	110	0	-
		2.5	13000			0	
		6	13000			0	
	EPH <C16-C21	1	250000	<1.0	45	0	-
		2.5	250000			0	
		6	250000			0	
	EPH <C21-C35	1	250000	<1.0	19	0	-
		2.5	250000			0	
		6	250000			0	
Aromatic	VPH <C5-C7	1	56000	<1.0	<1.0	0	-
		2.5	56000			0	
		6	56000			0	
	VPH <C7-C8	1	56000	<1.0	<1.0	0	-
		2.5	56000			0	
		6	56000			0	
	VPH <C8-C10	1	5000	<1.0	<1.0	0	-
		2.5	5000			0	
		6	5000			0	
	EPH <C10-C12	1	5000	<1.0	51	0	-
		2.5	5000			0	
		6	5000			0	
	EPH <C12-C16	1	5100	<1.0	460	0	-
		2.5	5100			0	
		6	5100			0	
	EPH <C16-C21	1	3800	<1.0	320	0	-
		2.5	3800			0	
		6	3800			0	
	EPH <C21-C35	1	3800	<1.0	2300	0	-
		2.5	3800			0	
		6	3800			0	

Notes

- S4UL - Suitable for Use Levels
- POS-R (Public Open Space – Residential)
- SOM - Soil Organic Matter
- VPH – Volatile Petroleum Hydrocarbons
- EPH – Extractable Petroleum Hydrocarbons
- A total of 8 representative soil samples were tested for these substances

A summary of the Miscellaneous (Asbestos) soil chemical test results are shown in the table below.

Table 5.7: Soil Chemical Test Results – Miscellaneous (Asbestos)

Sample No. & Depth (m)		ID Result	Comments
CP01	1.30	No Asbestos Detected	-
CP03	0.40	No Asbestos Detected	-
CP02	1.40	No Asbestos Detected	-
WS102	0.20-0.40	No Asbestos Detected	-
WS102	0.80-0.85	No Asbestos Detected	-

WS102	1.70-1.75	No Asbestos Detected	-
WS103	0.10	No Asbestos Detected	-
WS103	0.50	No Asbestos Detected	-
WS104	0.00-0.20	No Asbestos Detected	-
WS104	0.40-0.60	No Asbestos Detected	-
HP01	0.00-0.30	No Asbestos Detected	-
HP02	0.00-0.30	No Asbestos Detected	-

5.3 Contaminants of Concern in Soils

5.3.1 Soils

Contaminants of concern are those where the measured concentrations and 95% Upper Confidence Limit exceeds the relevant Tier 1 CLEA Soil Guideline Value or CIEH Generic Assessment Criteria.

It can be seen from Tables 5.2 to 5.7 that the following contaminants were identified at concentrations above the SGV for their respective screening criteria.

Table 5.8: Contamination Exceedances

Contaminant	Sample Details		Concentration detected (mg/kg)
	Location	Depth (m)	
Benzo[a]anthracene	WS102	0.20	89
Benzo[a]pyrene	WS102	0.20	71
Benzo[b]fluoranthene	WS102	0.20	93
Chrysene	WS102	0.20	130
Dibenz(a,h)Anthracene	WS102	0.20	11
Naphthalene	WS102	0.20	20

All the PAH contamination exceedances were located within WS102 where a potential former road was present. No other visual or olfactory contamination was noted within WS102 and the environmental sample at 0.80 m bgl returned no elevated concentrations of any contaminates.

When undertaking WS102, a strong hydrocarbon odor was noted with a PID reading of 29.5 PPM was recorded. Petroleum Hydrocarbon elevations, although below guideline values, were noted at decreasing amount with depth.

The Made Ground within WS102 at 0.20 m bgl is considered as a hotspot area of contamination where further investigation is recommended regardless of whether this material is to remain in place, reused or removed.

Plate 1 below shows the window sample recover for the top 1m of WS102 which includes the potential relic road material from 0.20 to 0.45 m bgl.

Plate 1 – Liner of WS102

5.4 Topsoil Testing

Topsoil testing in accordance with BS 3882:2015 was undertaken on the 2No. samples, which has been summarised below:

Table 5.9: Topsoil Test Results

Sample Location	Compliant with Multipurpose Range	Compliant with Acidic Range	Compliant with Low Fertility Range	Compliant with Calcareous Range
HP01	No	No	Yes	No
HP02	No	No	Yes	No

Based on the results, the topsoil does not fall within compliance of the multipurpose range due to low fertility. However, by nature the topsoil is compliant within the low fertility range.

In addition, the chemical Pesticide Screen testing for both samples did not detect any marker contaminants of concern.

5.5 Waste Classification

On the basis of the soils chemical test results, the soils were classified based on the identified hazard phases as defined in accordance with waste classification algorithms detailed in Environmental Agency publication WM3 (V.1.2, 2021), using the HazWaste Online software.

Using the results from the chemical analysis for the samples analysed, the following waste classification has been identified in the table below.

Table 5.10: Summary of Waste Classification

Sample Location	Sample Depth (m)	Waste Classification	EWC Code	Additional Comments
CP01	1.30	Non-Hazardous	17 05 04	-
CP02	0.40	Non-Hazardous	17 05 04	-
CP03	1.40	Non-Hazardous	17 05 04	-
WS102	0.20-0.40	Hazardous	17 05 03*	Hazard Properties 7 & 11
WS102	0.80-0.85	Non-Hazardous	17 05 04	-
WS102	1.70-1.75	Non-Hazardous	17 05 04	-
WS103	0.50	Non-Hazardous	17 05 04	-
WS103	0.10	Non-Hazardous	17 05 04	-
WS104	0.40-0.60	Non-Hazardous	17 05 04	-
WS104	0.00-0.20	Non-Hazardous	17 05 04	-
HP01	0.00-0.30	Non-Hazardous	17 05 04	-
HP02	0.00-0.30	Non-Hazardous	17 05 04	-

Conditions may exist between sampling points which are not representative of testing provided at the site. If anomalous materials are encountered at the site during excavation, the classification should be revisited.

It should be noted that the receiving landfill sites and the Environment Agency have ultimate authority in deciding whether a waste may be accepted, regardless of its classification.

HazWaste Online outputs are included in **Annex C.**

5.6 Materials Management

Should the Topsoil stockpile material be designated for reuse on the site, an appropriate Materials Management Plan (MMP) will be required. This can also provide details of disposal or reuse of materials off site at a suitable location if one is identified. Further testing as noted within Section 5.3.1 would enable development of a robust MMP to minimise disposal and transport costs. Soils should be verified to be suitable for the intended reuse, both chemically and physically. Reference should be made to "Technical Guidance WM3: Waste Classification – Guidance on the classification and assessment of waste" and the "Definition of Waste code of Practice" for further information.

It is also recommended that further assessment of soils beneath the stockpiles and compound area is undertaken to ensure that no soil contamination is present in areas not previously subject to investigation. This is particularly important in areas where elevated PAH/TPH was identified. This can be undertaken following their relocation and/or removal as a verification exercise to demonstrate underlying soils are suitable for their intended use.

For any soil movement, it is essential that a Method Statement to carefully manage stockpiles is agreed with appointed civils/groundworks contractors. Any soil movement should include the following:

- Photographic evidence of stockpile management and movement before/after,
- Staging of stockpiles is undertaken using impermeable (Visqueen or other proprietary) barrier to prevent direct soil contact,
- Runoff drainage from any stockpiles similarly sheeted should be managed to ensure soils do not become waterlogged. Soils can be covered and drainage bunds installed whilst stored, and
- A plant movement plan should be in place to minimise the risk of cross contamination when relocating or disposing of stockpiles.

SECTION 6 Geotechnical Laboratory Testing Results

6.1 General

A number of bulk and undisturbed samples were collected, and dispatched to the UKAS accredited laboratories of GSTL for soil property testing, in accordance with the following:

1. Methods of test for soils for civil engineering purposes – Parts 1 to 8 (BS 1377): 1999.

The results of the below property tests are presented in **Annex D** and discussed below.

6.1.1 Classification Testing

In order to assess the classification characteristics underlying the site, bulk samples were collected, and dispatched to the laboratory for the following soil property tests:

- 25No. Moisture Content (MC)
- 25No. Plasticity Index (P.I)
- 7No. Particle Size Distribution (PSD)
- 7No. Sedimentation Analysis (SA)
- 2No. Particle Density (PD)

A summary of the soil classification test results are shown in the tables below.

Table 6.1: Summary of Soil Plasticity Test Results

		Unit	Wittering Formation
Moisture Content		%	27 - 55
Plasticity	Liquid Limit	%	51 - 76
	Plastic Limit	%	21 - 32
	Plasticity Index	%	24 - 47
	% <425µm	%	71 - 100
	Modified PI	%	23.4 - 47

Table 6.2: Summary of Soil Grading & Density Test Results

		Location	CP01	CP02	CP02	CP03	CP03	CP03	CP03
		Depth (m)	1.20-1.65	10.50-10.95	16.50-16.95	2.00-2.45	4.00-4.45	13.50-13.95	16.50-16.95
		Unit	Wittering Formation						
PSD	Cobbles	%	0	0	0	0	0	0	0
	Gravels	%	23	0	0	3	0	1	0
	Sands	%	27	1	36	19	4	38	34
	Silt	%	22	23	24	30	51	23	30
	Clay	%	28	76	40	48	45	38	36
Bulk Density		Mg/m^3	-	-	-	2.62	2.63	-	-

In addition, in order to assess the aggressiveness of the underlying the site, bulk samples were collected and dispatched to the laboratory for the following soil chemical tests:

- 2No. BRE SD1 Suite B
- 8No. BRE SD1 Suite D

Table 6.3: Summary of Soil BRE Test Results												
		Location	CP01	CP01	CP02	CP02	CP02	CP02	CP02	CP02	CP03	CP03
		Depth (m)	1.30	6.00	1.20	3.00	5.00	9.00	13.50	16.50	1.40	10.50
		Unit	Wittering Formation									
BRE	Water Soluble Sulphate (SO4)	mg/l	64	120	1900	520	210	990	610	480	48	1300
	Acid Soluble Sulphate	%	0.022	0.05	0.61	0.12	0.07	0.21	0.12	0.28	0.049	0.29
	Total Sulphur	%	<0.01	0.06	2.6	0.20	0.34	1.14	0.33	0.22	0.025	0.45
	pH Value	-	6.9	5.5	5.1	5.4	6.4	6.9	7.2	7.2	6.8	6.6
	Water Soluble Chloride	mg/l	-	6.9	52	13	12	32	18	44	-	63
	Water Soluble Nitrate	mg/l	-	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-	<1.0
	Water Soluble Magnesium	mg/l	-	6.0	80	20	8.9	18	16	23	-	22

6.1.2 Compaction Testing

In order to assess the compaction characteristics underlying the site, bulk samples were collected and dispatched to the laboratory for the following soil property tests:

- 1No. Compaction Test (2.5kg Rammer)
- 1No. Moisture Condition Value (MCV)

A summary of the soil compaction test results are shown in the table below.

Table 6.4: Summary of Soil Compaction Test Results			
		Location	CP03
		Depth (m)	4.00-4.45
Test		Unit	Wittering Formation
2.5kg	Max Dry Density	Mg/m^3	1.77
	Optimum MC	%	13
Moisture Condition Value		%	10.2

6.1.3 Shear Strength Testing

In order to assess the shear strength characteristics underlying the site, undisturbed samples were collected and dispatched to the laboratory for the following soil property tests:

- 8No. Shear box (300mm)
- 7No. Unconsolidated Undrained Tri-axial (UU)

A summary of the shearbox test results are shown in the table below.

Table 6.5: Summary of Shearbox Test Results														
		Location	CP01			CP01			CP02			CP02		
		Depth (m)	12.00 – 12.45			15.00 – 15.45			1.20 – 1.65			3.00 – 3.45		
		Unit	Wittering Formation											
Confining Stresses (kPa)			120	240	480	25	50	100	12	24	48	30	60	120
Angle of Resistance	Peak	Φ	17			20			28			21		

Cohesion	Peak	kPa	23	10	10	11

Table 6.5: Summary of Shearbox Test Results														
		Location	CP02			CP02			CP02			CP03		
		Depth (m)	5.00 – 5.45			9.00			13.50 – 13.95			10.50 – 10.95		
		Unit	Wittering Formation											
Confining Stresses (kPa)			50	100	200	75	150	300	25	50	100	105	210	420
Angle of Resistance	Peak	Φ	24			10.5			16			12		
Cohesion	Peak	kPa	8			31			7			36		

A summary of the Unconsolidated Undrained Triaxial test results are shown in the table below.

Table 6.6: Summary of Undrained Unconsolidated Triaxial Test Results								
Unconsolidated Undrained (UU)	Location	CP01	CP01	CP01	CP01	CP03	CP03	CP03
	Depth (m)	2.00-2.45	4.00-4.45	6.00-6.45	9.00-9.45	1.20-1.65	5.00-5.45	7.50-7.95
	Unit	Wittering Formation						
Cell Pressure (kPa)		40	80	120	180	24	100	150
Undrained Shear Strength (kPa)		2	20	39	25	3	6	45

6.2 Notes on Geotechnical Testing

It should be noted that the reduced undrained shear strength from the undrained unconsolidated triaxial testing is likely due to the presence of silt, sand or sandy/silty layers/pockets within the undisturbed samples. This would provide a preferential failure plain within the sample that is not representative of the material when insitu.

The undrained unconsolidated triaxial tests have been used to inform the foundation design but more reliance has been placed on the standard penetration tests (SPT's) as they are understood to provide a better indication of the in-situ strength of the encountered geology.

SECTION 7 Engineering Recommendations

7.1 Preparation of Site

Prior to the main site works, a structural survey should be undertaken of any adjacent buildings and structures (road and pavement structures) including pictorial records. This should be updated throughout the site development phases.

The existing grass and scrub vegetation, including all roots and any trees to be removed (and not subject to preservation orders) should be grubbed up and removed from beneath the proposed buildings and roadways.

The existing compound hardcore material should be removed from beneath any proposed landscaped area. Subject to testing this material could potentially be used for structural purposes.

The reduced levels should be brought up to the required levels with well, compacted imported granular materials. Department of Transport (DoT) Type 2 sub-base or similar may be used and should be compacted in layers, in accordance with the Specification for Highway Works. Alternatively, appropriately selected inert imported fill could be used.

Allowances should be made for removing any 'soft spots/area' and their replacement with well compacted granular materials as previously described. The excavated materials will be unacceptable as structural fill and should be removed from site and taken to an appropriately licensed tip.

All materials to be removed from site should be subject to the appropriate Waste Acceptance Protocol (WAP) and taken to an appropriately licensed tip.

Contingencies should be made for the protection/diversion of any underground services present beneath the site, brought about as a result of the proposed works.

Contingencies should also be made for the protection and any necessary temporary/permanent support of nearby walls.

7.2 Foundation Solution

Based on the encountered ground conditions the following foundation solution is recommended.

Due to the presence of variable Made Ground and soft upper deposits underlying the site along with the likely high loads from proposed structure, the use of normal mass concrete shallow foundations founded at shallow depth will prove impractical and would lead to unacceptable settlements and are, therefore, not recommended.

We therefore recommend that a piled foundation solution be founded within the Wittering Formation. Piles should penetrate at least 2m into the Wittering Formation.

Due to the nature of the ground, the piles are likely to be a combination of skin friction (friction piles) and end-bearing pile.

Due to the nature of the site, precast concrete driven piles would be appropriate. However, if vibration from the driven piles is anticipated to be problematic and not tolerable with adjacent structures and the central/urban location of the site, a Continuous Flight Auger (CFA) pile should be adopted. However, this technique should be confirmed by a specialist piling contractor.

Pile depths will be a function of the required loads and pile diameters. Variations in the given pile lengths should also be expected.

The following table gives initial calculations for a 0.30m and 0.45m diameter piles into the Wittering Formation to be used for preliminary estimation only.

Table 7.1 Preliminary Pile Capacity Values

	Ultimate Pile Capacity, kN	
Depth, m	**0.30 m Diameter Pile**	**0.45 m Diameter Pile**
7.50	175	299
10.00	305	508
15.00	872	1386

Notes:

- Groundwater has conservatively been assumed at 0.50 m bgl
- An alpha value of 0.50, Nc of 9.00 and F1 of 4.50 has been used within the Wittering Formation
- The Topsoil Made Ground has been ignored in the calculations with the Wittering Formation being present from 2.5 m bgl
- As discussed in Section 6.2 the pile design has relied upon the in-situ SPT results.

Allowances should also be made for negative skin friction that could develop in the cohesive deposits.

It should be noted that while disturbance will be reduced using bored piles the load carrying capacity will also be reduced due to the effect of a loosening annulus around the pile. Casting concrete in situ will produce rough surfaces but this effect is diminished by the loosening of the surrounding material.

To counteract the reduction in load carrying capacity the diameter of the bored pile can be increased.

For the size and type of pile recommended founded within the competent Wittering Formation, the total settlements should not exceed 10mm, with differential movements between adjacent piles being less than half this value.

The above estimated working loads, type and length of piles should be confirmed by the specialist piling contractor. It may also be prudent to drive a number of test piles at selected locations to confirm their drivability, anticipated lengths and safe working loads.

Allowances should be made for an element of pre-excavation and/or re drilling of piles where obstructions are encountered in the made ground.

All foundation formations should be inspected by a suitably qualified Engineer before being concreted.

7.2.1 Expected Settlements

For the above given foundation solutions and bearing pressures, maximum total settlements of 25mm should result, with differential movements (δ/l) of the superstructure not exceeding 1:750 where δ is the differential settlement between two points of a foundation and l is the distance between these points.

7.2.2 Infrastructure

As mentioned in Section 7.2 it is considered that foundations are piled due to the underlying shallow ground conditions and likely high loadings.

Therefore, appropriate measures should be taken in order to prevent misalignment issues due to disproportionate settlement between the proposed development and associated infrastructure, which will not be piled.

In addition, it is recommended that for any hard standing or service entry points adjacent the proposed development that the prepared surface should be covered by a geo-grid and 'terram' prior to further infilling, in accordance with Section 8.4, in order to reinforce the formation.

7.2.3 Floor Slabs

Based on Plasticity testing outlined in Section 7.1.1, the underlying shallow deposits exhibit a Modified Plasticity Index of >10%. Therefore, floor slabs should be designed as suspended.

Void former may be required beneath suspended concrete floors due to the plastic nature of the surface cohesive soils.

Allowances should be made for the removal of any 'soft spots' and their replacement with a suitable concrete mix or well-compacted granular material in layers to the specification for Highway Works.

All foundation formations should be inspected by a suitably qualified Engineer before being concreted.

7.3 Excavations and Formations

Most shallow excavations should be possible with normal soil excavating machinery, although significant allowances should be made for a hydraulic breaker when excavating out any historic foundations, concrete floor slabs and other buried obstructions.

Post investigation groundwater was encountered between 0.70 and 1.58 m bgl.

Therefore, it is likely that groundwater may be encountered during foundation excavations. Any inflows should be dealt with using conventional pumping techniques.

It should also be noted that during times of high rainfall a higher groundwater table may be encountered.

The sides of any excavations deeper than 1.00m, especially within the granular deposits, should be supported by planking and strutting or other proprietary means.

The sub-formations/formations will be susceptible to loosening, softening and deterioration by exposure to weather (rain, frost and drying conditions), the action of water (flood water or removal of groundwater) and site traffic.

Formations should never be left unprotected and continuously exposed to rain causing degradation, or left exposed/uncovered overnight, unless permitted by a qualified engineer.

Construction plant and other vehicular traffic should not be operated on unprotected formations.
As a minimum the formation/excavation surfaces must be protected by a minimum thickness of 200mm of hard cover immediately after exposure.

Allowances should be made for trimming, re-trimming and re-compaction if necessary and for the removal of soft spots and their replacement with well compacted granular materials.

It is also recommended that if concerns still remain then a number of plate loading tests are carried out at formation level to confirm the suitability of the formations.

Allowances should be made for special precautions to prevent formation deterioration in addition to the above.

It is recommended that approval be gained from a qualified engineer of the formation condition before covering them with any subsequent construction.

7.4 Protection of Buried Concrete

The results of the BRE testing are given in Table 6.1 and the concrete design is class is summarised in the table below:

Table 7.2: Summary of Concrete Design Class

	Stratum	Wittering Formation	
	Unit	Min	Max
Total Sulphate	%	0.05	0.61
2:1 Sulphate	g/l	0.12	1.90
pH	-	5.1	7.2
Chloride	mg/l	6.9	63
Total Sulphur	%	0.06	0.26
Magnesium	mg/l	6.0	80
Nitrate	mg/l	<1.0	
Total Potential Sulphate	%	0.15	0.78
Oxidisable Sulphates >0.3%?		No	
Design Sulphate Class		**DS-1**	
ACEC Class		**AC-1**	

Groundwater was encountered at the site and it is conservatively deemed to be mobile.

Based on the above and using guidance within BRE Special Digest 1 (2005) it is recommended that any buried concrete within the site conforms to class DS1 and ACEC Class AC-1.

7.5 Evaluation of In-situ Gas Monitoring Results

As previously discussed, three gas-monitoring wells were installed to enable monitoring for the presence of methane, carbon dioxide and oxygen following completion of the fieldworks.

Based on the initial three rounds of gas monitoring at the site and in accordance with CIRIA guidance C665 (2007), titled 'Assessing risks posed by hazardous ground gases to buildings' a conservative Gas Screening Value (GSV) <0.0001 l/hr has been derived using the highest ground gas concentration (CH_4 / CO_2 at 0.1 %) and the highest flow rate recorded (<0.1l/h).

A provisional GSV of <0.0001 l/hr would classify the site as very low risk and as 'Gas Characteristic Situation 1' in accordance with CIRIA guidance C665 (2007).

The gas monitoring results are presented in **Annex E.**

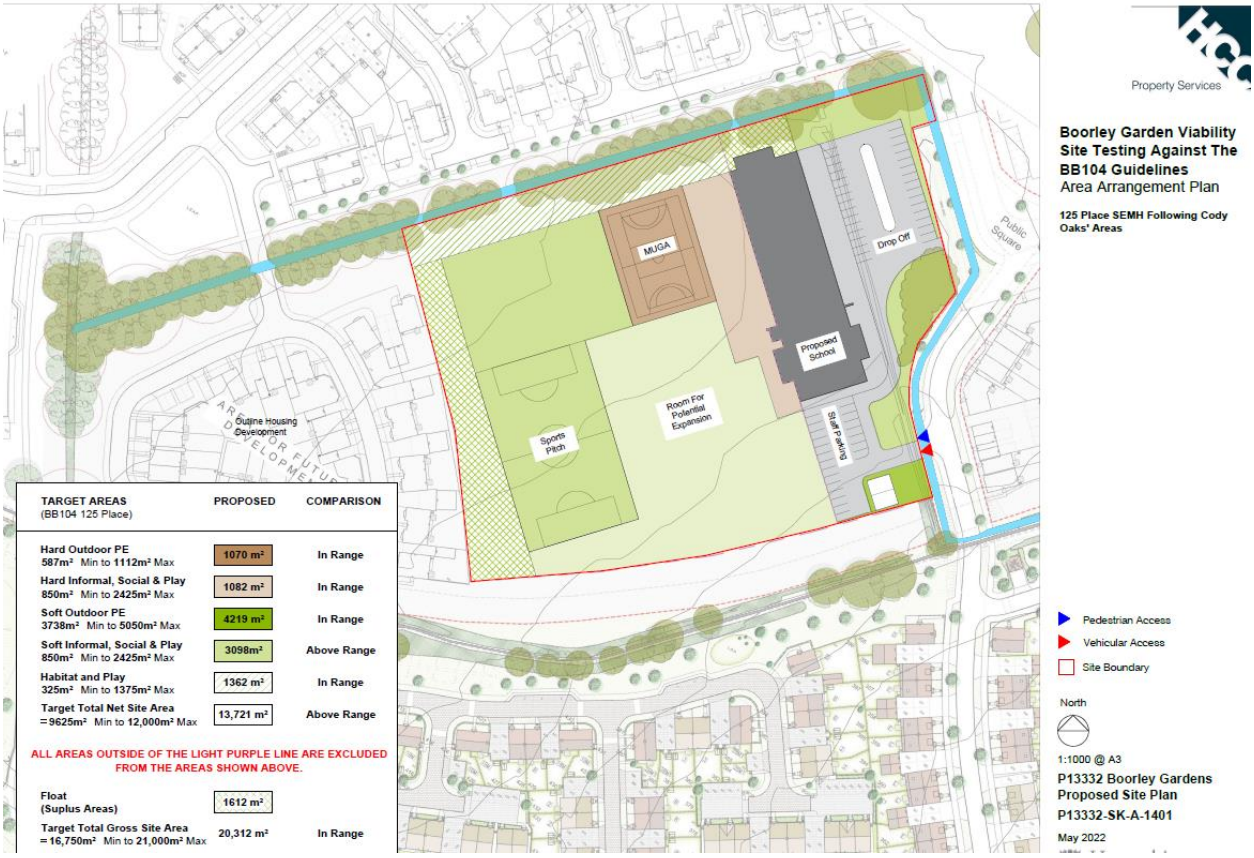
Annex A: Feasibility Study

9th August 2022

Reference; P13332/ Geo/Feas/Boorley

Feasibility Study: Boorley Gardens, Hedge End, SO32 2UA

The Geotechnics Group have been instructed to undertake a feasibility study for a parcel of land where a new school with sports pitch, MUGA and hardstanding is proposed.

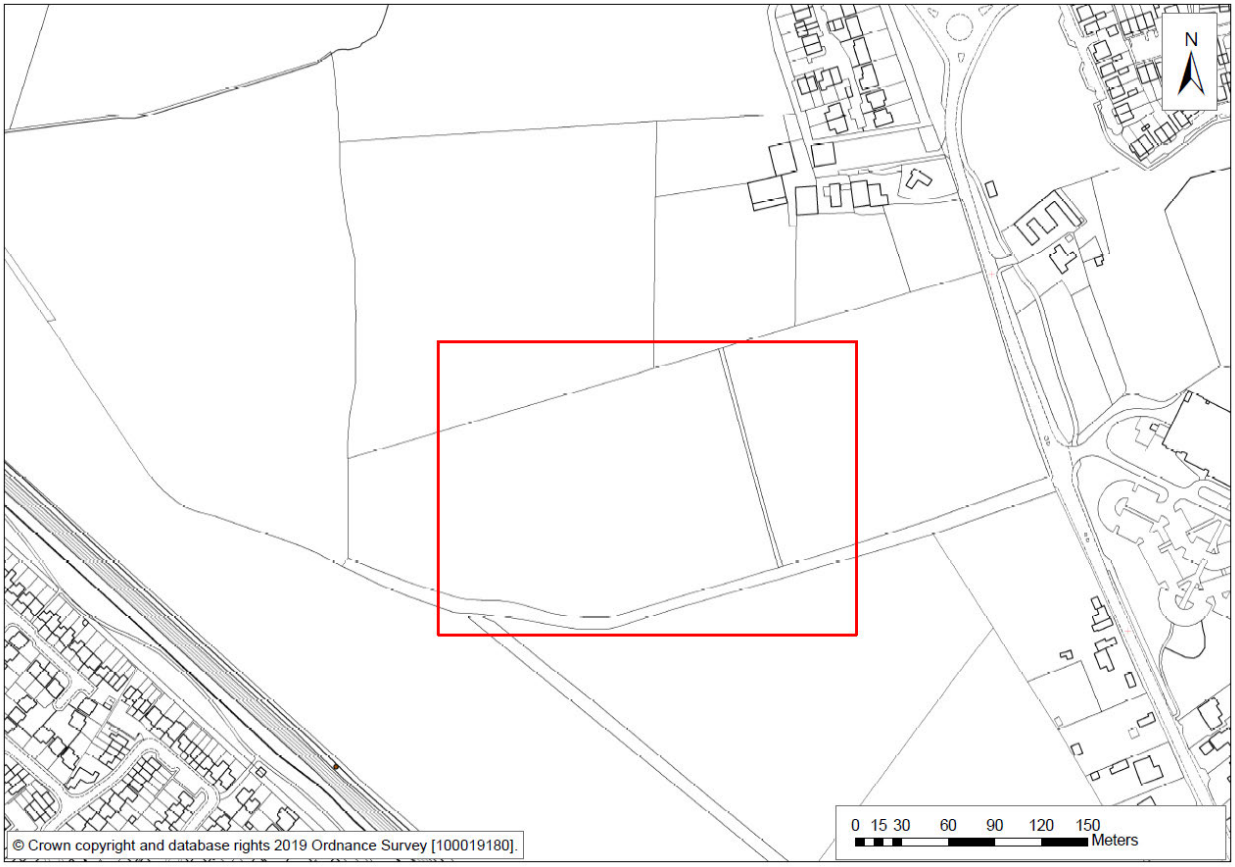


TARGET AREAS (BB104 125 Place)	PROPOSED	COMPARISON
Hard Outdoor PE 587m² Min to 1112m² Max	1070 m²	In Range
Hard Informal, Social & Play 850m² Min to 2425m² Max	1082 m²	In Range
Soft Outdoor PE 3738m² Min to 5050m² Max	4219 m²	In Range
Soft Informal, Social & Play 850m² Min to 2425m² Max	3098m²	Above Range
Habitat and Play 325m² Min to 1375m² Max	1362 m²	In Range
Target Total Net Site Area =9625m² Min to 12,000m² Max	13,721 m²	Above Range
ALL AREAS OUTSIDE OF THE LIGHT PURPLE LINE ARE EXCLUDED FROM THE AREAS SHOWN ABOVE.		
Float (Suplus Areas)	1612 m²	
Target Total Gross Site Area =16,750m² Min to 21,000m² Max	20,312 m²	In Range

Site Location

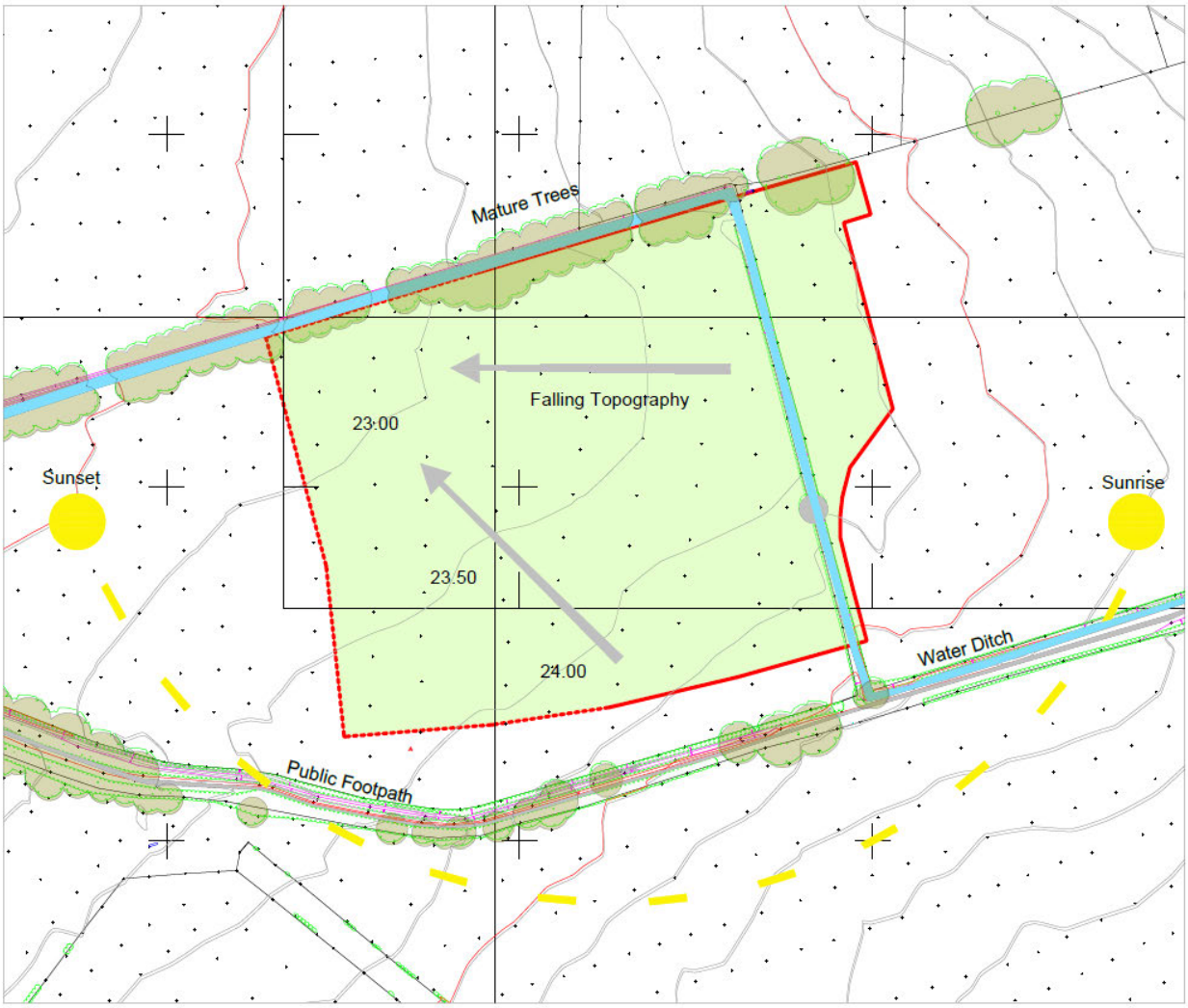
The proposed school site is located on farmland belonging to Park Farm, located to the northwest of Boorley Green Village on the western side of Winchester Road (B3354), approximately opposite Macdonald Botley Park Hotel and Spa. The site is located approximately 100 m to the southwest of Park Farm yard.

A railway line is located approximately 120 m southwest of the site, with the closest station being Hedge End located just to the northwest of the site. The approximate location of the site is shown within the red line boundary on the map below.



A site visit has not been undertaken as part of this feasibility study. Google Street View imagery available online indicates the site comprises a couple of fields, understood to have formed part of Park Farm.

It is understood from the provided topographical survey (extract included below) that the topography of the proposed school site is sloping generally in a northwest direction from 24 m AOD to 23 m AOD. A water ditch truncates the eastern portion of the site and follows the northern site boundary. Mature trees are present along the northern site perimeter.



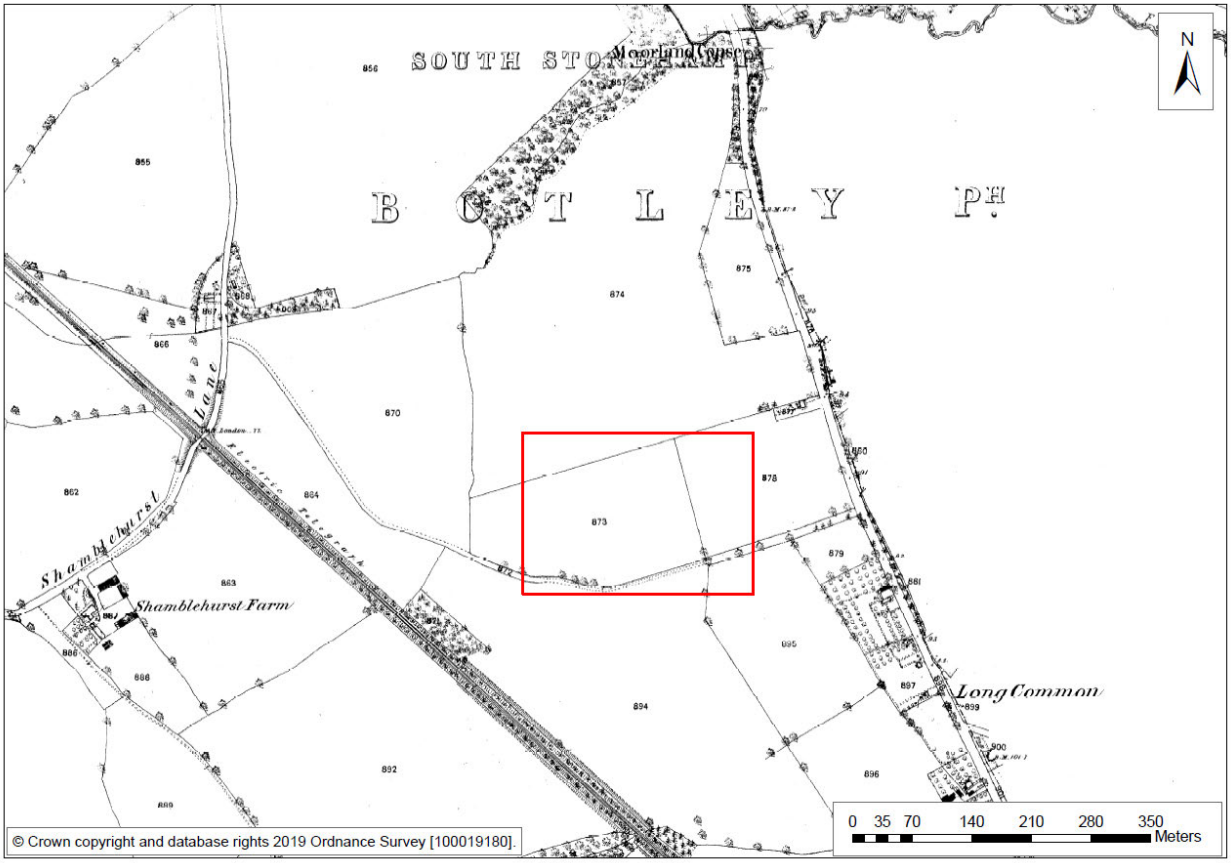
It is understood from the Design and Access Statement prepared for the wider development site that a water main (with easement) follows the alignment of the public footpath along the southern boundary of the proposed school site. The approximate location of the main is shown on the plan below by the blue line. This asset is owned by Southern Water. Service plans dated within three months should be obtained for any intrusive works and consultation with Southern Water on their easements will be required.

Site History

The history of the current school site has been established from historical maps from GIS and supplemented with information from the 2014 Opus desk study (report ref; E1589.00/LJE/CDS) undertaken for the wider site.

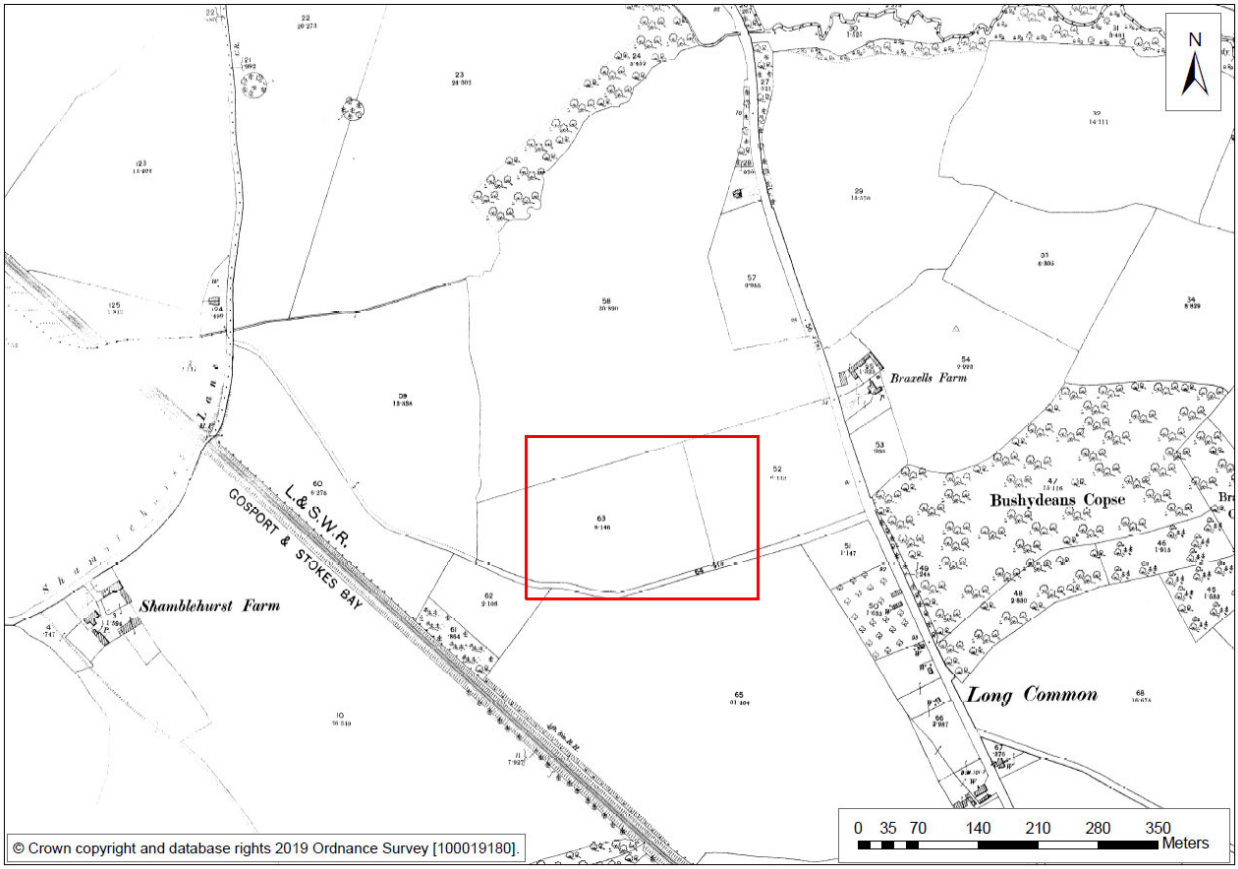
Epoch 1 map (1843-1893)

The earliest map studied shows the site to comprise a couple of fields surrounded by further fields. A railway line is located to the southwest of the site by this time.



Epoch 2 map (1891-1912)

By the time of the next map, no changes appear to the site. Some farm buildings, associated with Braxells Farm appears to the northeast of the site on the eastern side of the Winchester Road, adjacent to the Bushydeans Copse.



No changes appears to the site or immediate surrounding area on *Epoch 3 map (1904-1939) or Epoch 4 map (1919-1943).*

It is understood that buildings are first shown on the 1957 map to the northeast of the proposed school site, and by ~1963 the buildings are labelled as Park Farm.

Opus Desk Study

The desk study by Opus was undertaken for Gleeson Developments Ltd, Miller Homes Ltd and Welbeck Strategic Land LLP for the wider site development back in 2014.

The Opus desk study and walkover identified some potential sources of contamination in the farmyard of Park Farm, located approximately 100 m to the northeast of the proposed school site. This included;

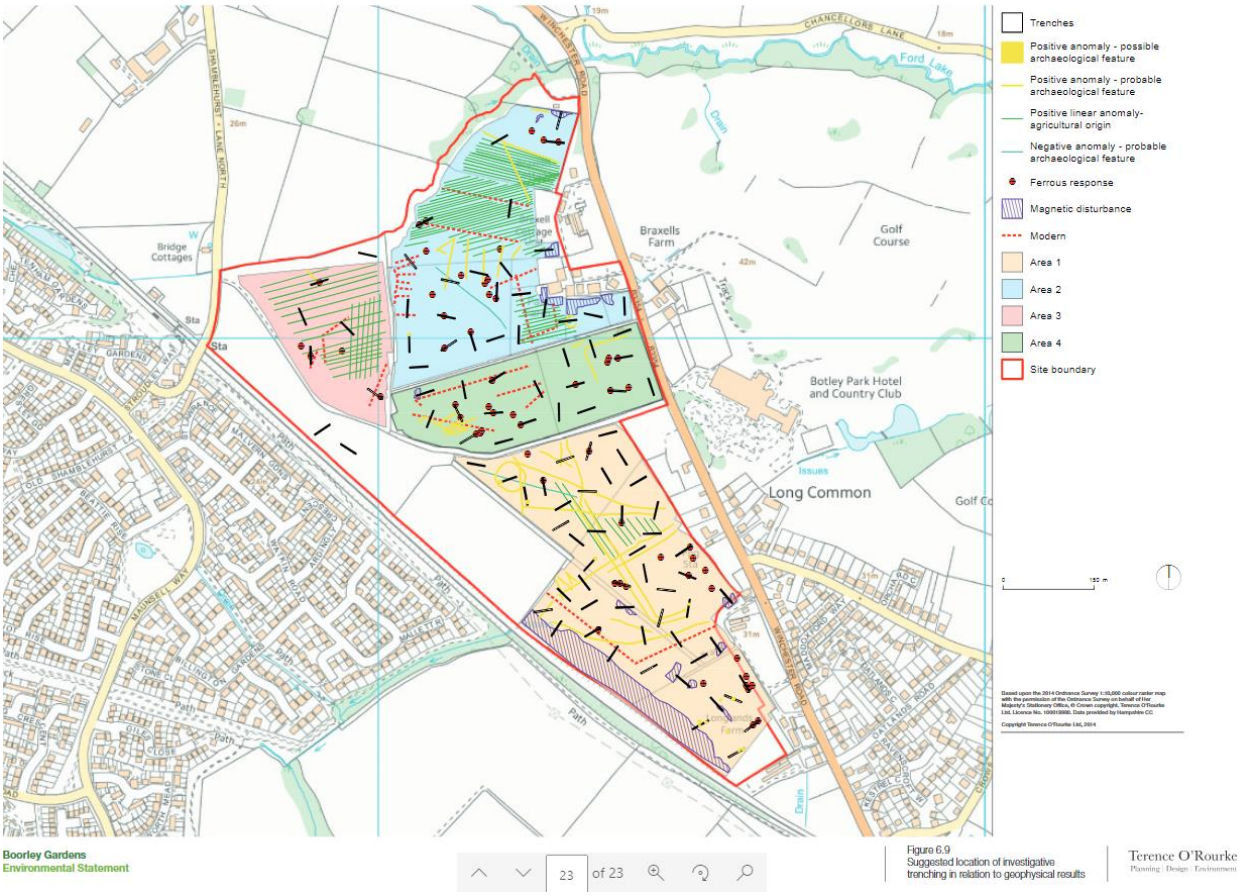
- Two above ground tanks, one for heating oil and the other for diesel.
- Farm buildings likely to contain asbestos containing materials (roofs).

An intrusive investigation by BRD Environmental Ltd in 2017 identified hydrocarbon and asbestos contamination within the farmyard area. Contamination was not identified on the wider development site at locations tested. However, note that no investigations were undertaken within the extents of the proposed school. The farmyard is located approximately 100 m within the farmyard and there is the potential for hydrocarbon contamination to migrate from its source.

Archaeology

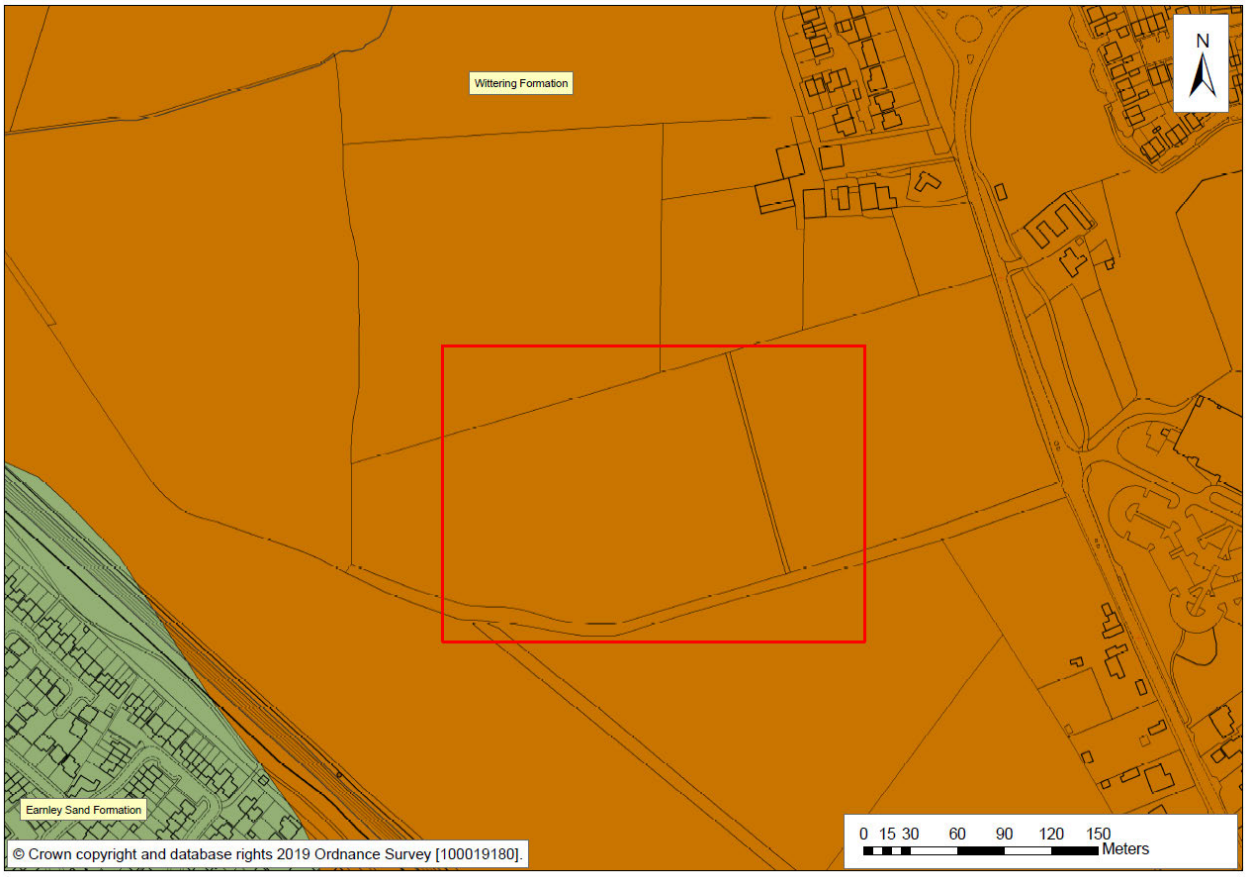
The site has been subject to a geophysical study by Bournemouth Archaeology in August / September 2014. The proposed school site fell into Area 4. The findings of which are;

Area 4: a number of overlapping and possibly intercutting positive anomalies of probable archaeological origin were observed in the western portion of field E. A distinctive anomaly in field F, close to the circular anomaly in field H, may represent a former ditch-like feature such as a livestock enclosure or field boundary.



Geology

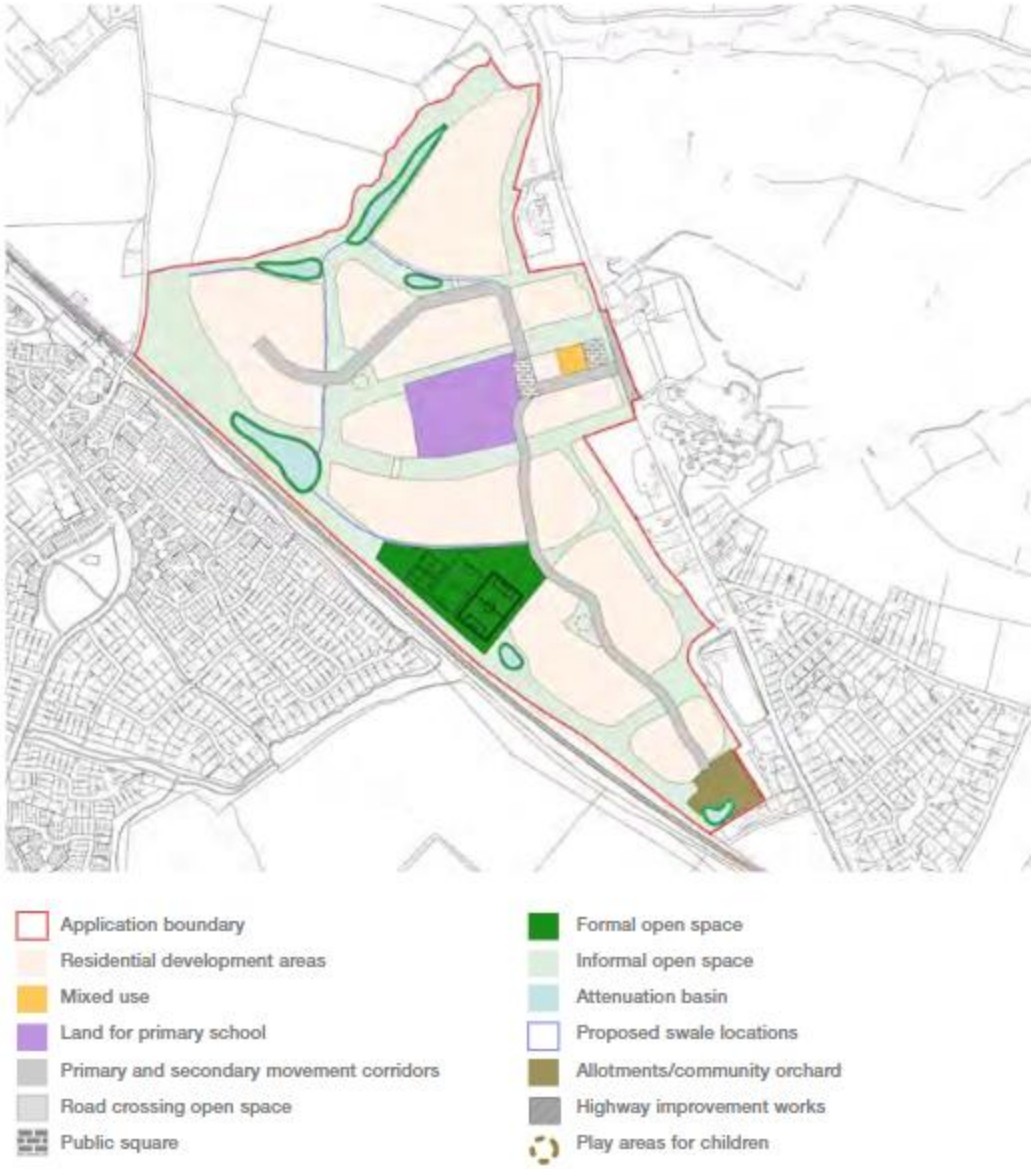
The geology map (extract below) indicates that the proposed school site is directly underlain by the Wittering Formation, described by BGS Lexicon as sand, silt and clay. To the southwest of the site, the Earnley Sand Formation (sand, silt and clay) outcrops.



There are no nearby BGS boreholes.

Site Investigations

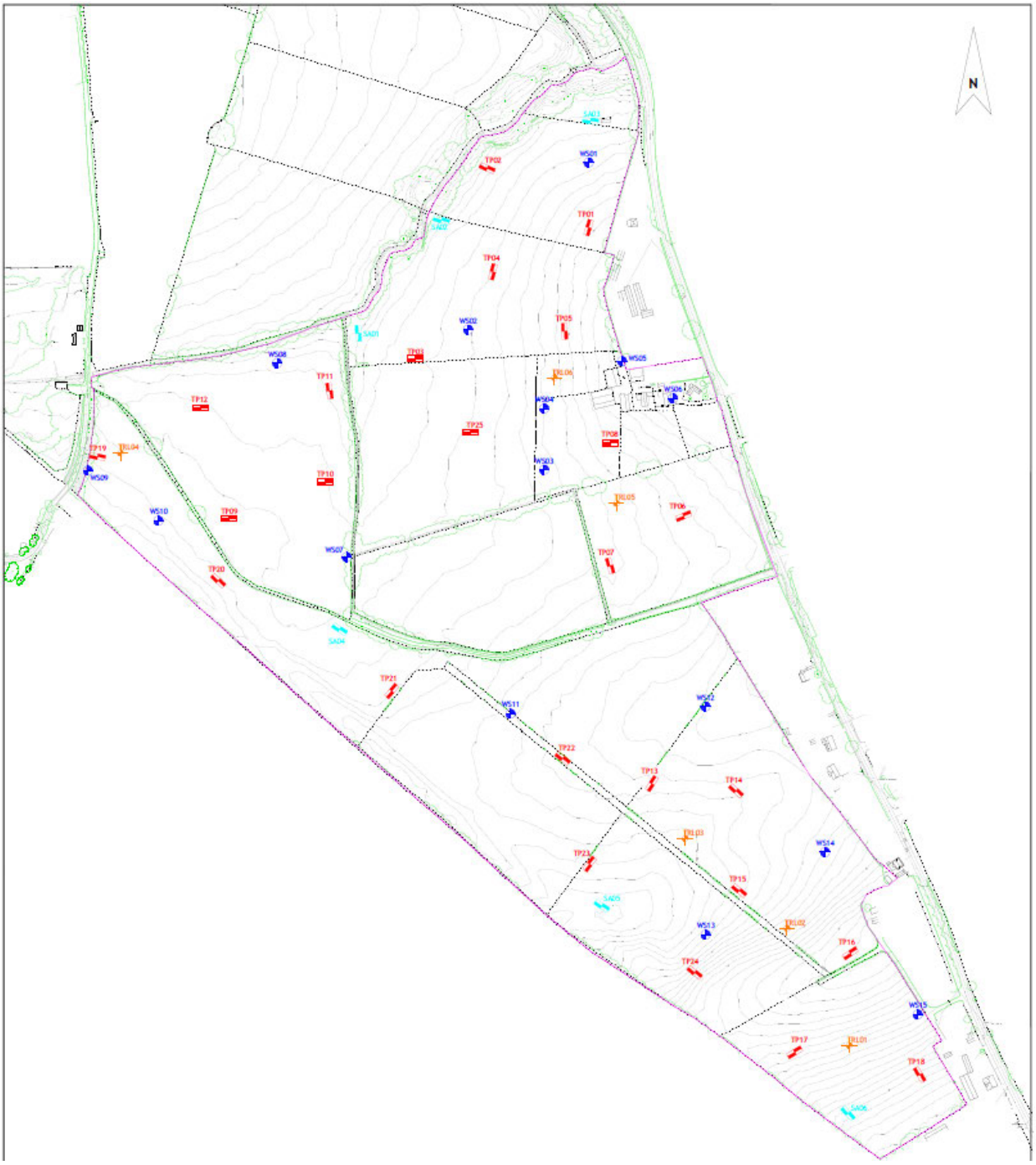
A site investigation by BRD Environmental Ltd was undertaken in September 2017 for the housing developers, Gleeson Strategic Land and Miller Homes for a wider residential development, as shown on the extract below (purple delineates the proposed school site).



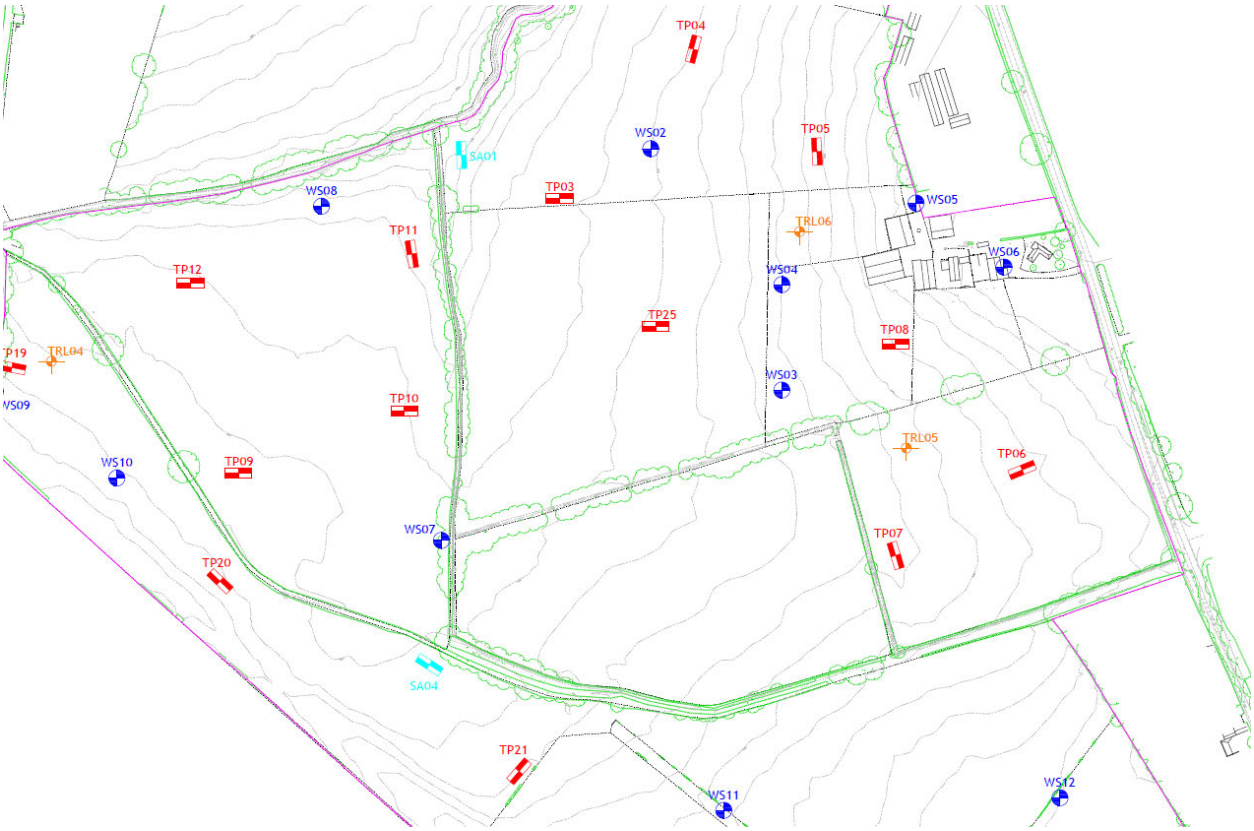
BRD undertook fieldwork between 24th and 27th July 2017 comprising;

- Three days window sampling
- Three days machine pitting
- Six No. TRL DCPs
- Chemical and geotechnical testing
- Installation of monitoring pipes (50 mm diameter with gas taps and raised metal covers) have been installed in WS01, WS03, WS05, WS06, WS07, WS08, WS09, WS11, WS12 and WS15.
- Gas, groundwater and vapour monitoring visits took place on 8th, 17th and 23rd August 2017
- It is understood that gas monitoring has been continued

The exploratory hole locations are shown on the plan below.



TP07 appears to be the closest exploratory hole location to the proposed new school along with WS07 (standpipe installed) and TRL05. However, BRD did not specifically cover the area (nor did they included records of the window sampler logs) and it is recommended that a site investigation is carried out on the site with the proposals in mind.



The BRD investigation found;

- Topsoil / made ground overlying the Wittering Formation.
- Groundwater was encountered in the standpipe installed in WS07 at a depth of approximately 1.00 m in August 2017 and a slight seepage in TP07 at 1.10 m during excavation of the pit on 24th July 2017.
- The Wittering Formation predominantly comprised clays of low to high volume change potential (plasticity indices 19-56%).
- BRD advised that high volume change potential soils were assumed at the site.
- Minimum founding depth of 1.00 m but might need to deepen footings within zone of influence of felled trees, existing trees or proposed trees.
- A net allowable bearing pressure of 100 kPa might be achievable on firm clays of the Wittering Formation.
- Suspended floor slabs will be required in view of volume change potential of the clays.
- The Wittering Formation was found to be potentially pyritic given the sulphate results.
- Soils shallower than 2.50 m were assigned a sulphate class of DS-1 and AC-2Z by BRD and below 2.50 m, DS-4 and AC-3s.
- The soils below the site were not deemed suitable for soakaways due to presence of clays.
- A design CBR of 3% was recommended by BRD.

- Gas monitoring has recorded CO2 exceeding 5% in WS05 and it is understood from the BRD report that further gas monitoring was to be undertaken as a precaution.
- Asbestos and hydrocarbon contamination found in the farmyard.

Unexploded Ordnance (UXO)

The site is in an area at low risk of unexploded ordnance, according to Zetica's online map tool, available at https://zeticauxo.com/downloads-and-resources/risk-maps/.

Environmental Data

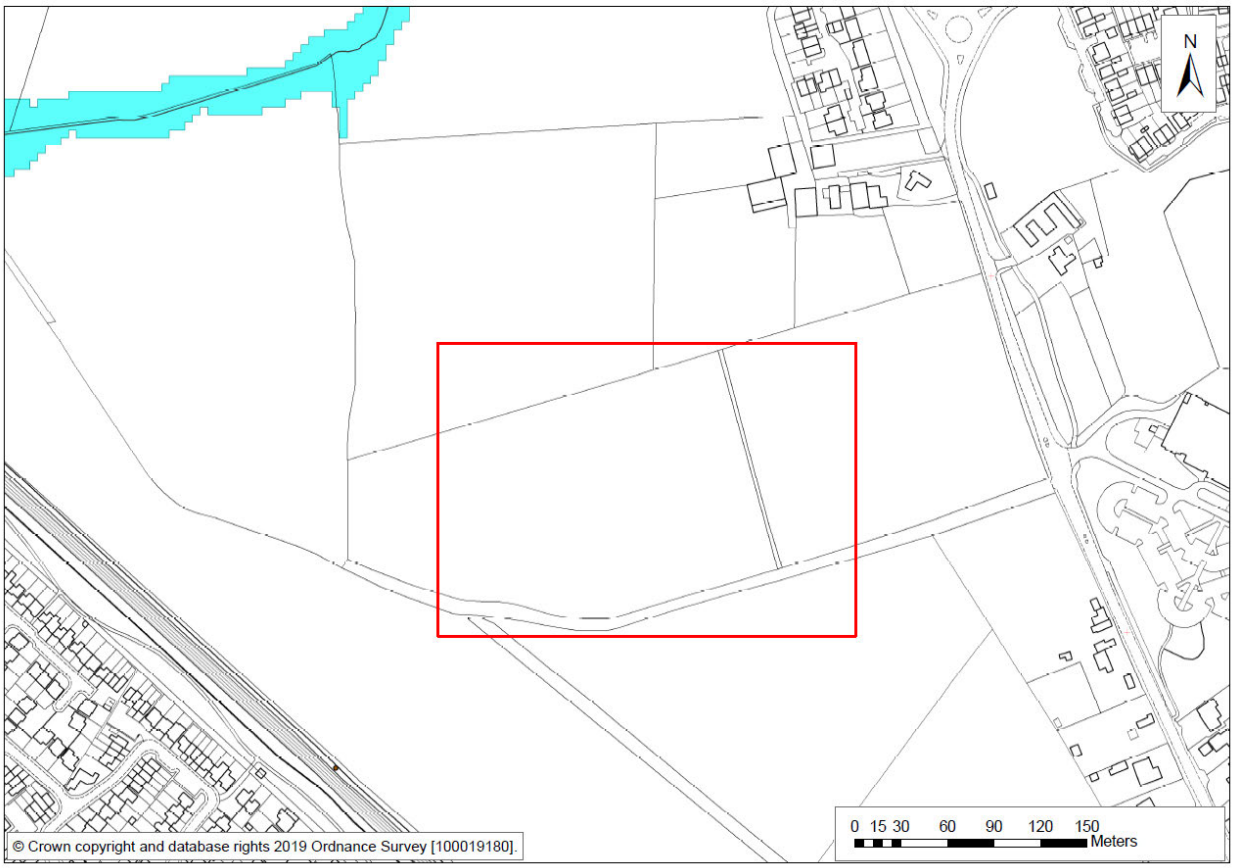
Radon

The site and immediate surrounding area are not at risk from radon gas (0-1%) and no precautions need to be taken in this regard.

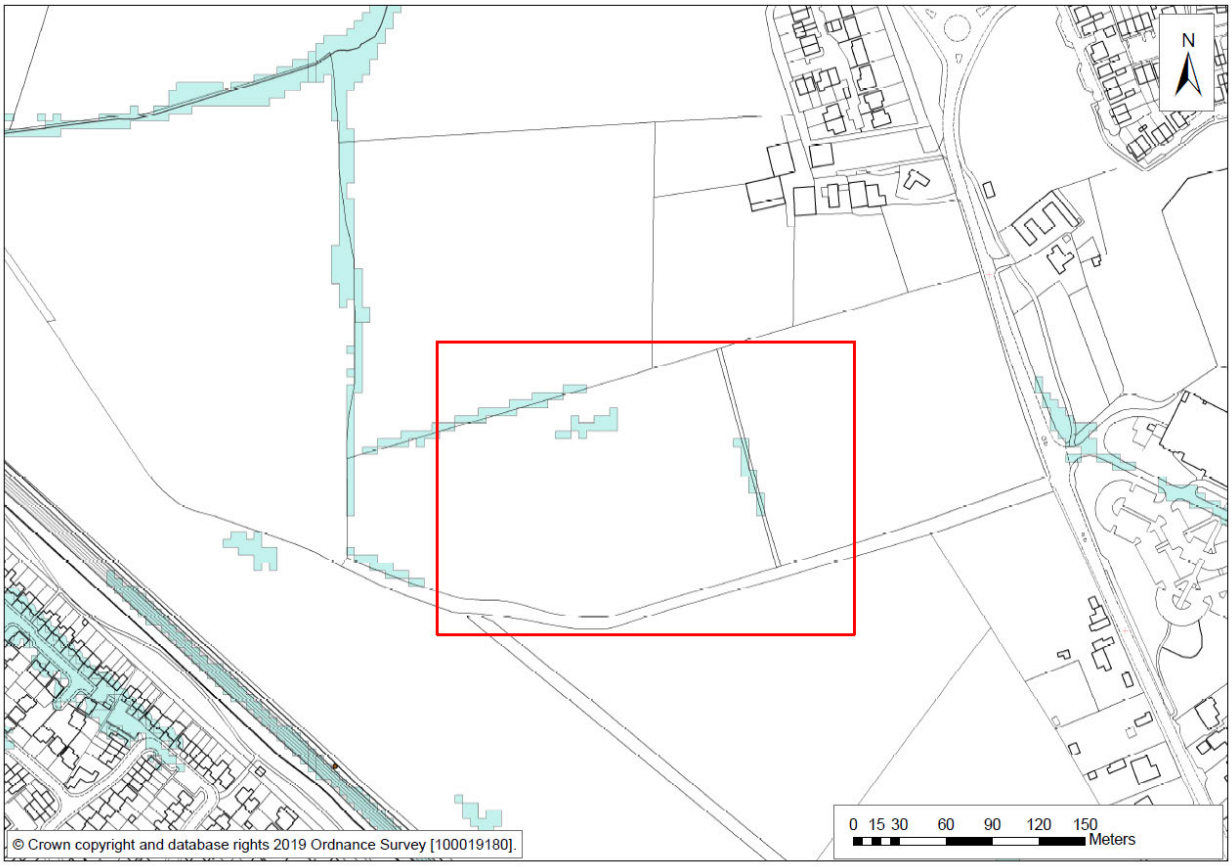
Hydrology and Hydrogeology

The Wittering Formation is assigned as a Secondary 'A' Aquifer but is not located within a Groundwater Source Protection Zone.

The site is located within a Flood Zone 1. A Flood Zone 2 is located 200 m northwest of the site, associated with Mooregreen Stream which runs along the northern boundary of the wider site to be developed with housing.



A potential risk of surface water flooding has also been identified at the site. The identified areas might be associated with ditches / watercourses.



Landfills

There are no records of any landfills within 250 m of the site and therefore no potential source of landfill gas has not been identified at the site.

Preliminary advice

Contamination

Potential contamination on site may include;

- Made Ground
- Herbicides and pesticides
- Spills / leaks from farm machinery
- Asbestos

Potential contamination from off-site sources;

- Railway land
- Hydrocarbons from farmyard

- No sources of soil or landfill gas have been identified at the site.

Expected Ground Conditions

The closest exploratory BRD hole to the proposed school site is TP07. At this location 0.40 m of made ground was encountered, overlying soft clays to 2 m, in turn underlain by 200 mm of sand, and a firm clay, proven to a depth of 2.60 m.

Groundwater might be problematic for construction and was encountered around 1 m bgl in WS07.

Recommendations

Piled foundations may be required to overcome issues with groundwater during construction of foundations for the school and in view of anticipated proposed loadings.

It would be prudent to obtain further groundwater monitoring data for WS07 along with the additional gas data from the developer for the main site.

In view of very limited ground information for the actual propose school site it is recommended that a site investigation is undertaken that would allow the design of a piled foundation solution. It may also be useful to include the installation of standpipes to facilitate gas / groundwater monitoring.

A minimum of three gas monitoring visits (over a period of six weeks) should be undertaken to confirm the absence of any soil gas. In addition, samples of shallow soils should be taken for contamination testing including a couple of pesticide and herbicide suites and asbestos screening as a precaution to confirm the absence of contamination on site and assist in waste classification.

The investigation should comprise a minimum of one cable percussion boreholes to obtain information for pile design within the footprint of the new school building. Ideally three deep boreholes would be drilled if budget allows across the school site to allow for changes in layout of the site and to refine the pile parameters. Deep holes should be supplemented with a couple of days of window sampling to provide coverage for MUGA, sports pitch and hardstanding.

Archaeologists may want to be in attendance during drilling of the boreholes. David Hopkins would be a good contact to confirm that with.

Consultation will be required with Southern Water before breaking ground.

New service searches should be obtained for the site.

Annex B: Exploratory Hole Logs

terrafirma(south) Consulting Geo-Technical & Geo-Environmental Engineers
Site Investigation Contractors

The Slate Barn, Lower Lowley,
Dunsford, Exeter, EX6 7BP
01647 252414
www.terrafirmasouth.co.uk

Borehole No.
CP01
Sheet 1 of 2

Project Name	Project No.	Date	Hole Type
Boorley Green School	PO-23-014	18/07/2023 to 19/07/2023	CP

Client	Co-ords	Water Strike Details			Logged By
Hampshire County Council	E: 450186.71	Depth Strike	After 20 mins	Remarks	TC
		6.00	0.00		

Contractor	Plant Used		Approved By
Terra Firma	Archway Window Sample Rig	N: 114858.24 L: 23.82	TC
			Scale 1:50

Samples and Results: Results	Type	Depth	Casing	Water	Depth, (Thickness)		Level	Stratum Description	Legend	Well
	D	0.50				(1.20)		Crushed concrete and brick fill **(Made Ground)**		
					1					
N=5 (1,1/1,1,1,2)	B SPTLS SPT(S) ES	1.20 - 1.65 1.20 - 1.65 1.20 1.30				1.20	22.62	Soft orangish brown slightly sandy CLAY. **(Wittering Formation)**		
	U	2.00 - 2.45			2	(1.80)				
	D	2.50								
N=20 (2,5/5,5,5,5)	B SPTLS SPT(S)	3.00 - 3.45 3.00 - 3.45 3.00			3	3.00	20.82	Firm greyish brown slightly sandy CLAY. **(Wittering Formation)**		
	U	4.00 - 4.45			4	(2.00)				
	D	4.50								
N=16 (3,3/3,4,4,5)	B SPTLS SPT(S)	5.00 - 5.45 5.00 - 5.45 5.00		6	5	5.00	18.82	Stiff greyish brown slightly sandy CLAY. **(Wittering Formation)**		
	D	5.70 - 5.95								
	U	6.00 - 6.45			6					
	D	6.50				(3.00)				
					7					
N=20 (3,4/4,5,5,6)	B SPTLS SPT(S)	7.50 - 7.95 7.50 - 7.95 7.50								
					8	8.00	15.82	Stiff bluish greyish brown slightly sandy CLAY. **(Wittering Formation)**		
	B SPTLS	9.00 - 9.45 9.00 - 9.45			9					
	D	9.50								
						(4.00)				

Chiselling Details			Remarks	Borehole Diameter	
Depth Top	To (m)	Duration	Groundwater encountered at 6m bgl.	Base Depth	Diameter
				17.00	600

Notes: For all symbols and abbreviations please see key sheet. All depths and measurements in metres. Stratum thicknesses given in brackets.

terrafirma(south) Consulting Geo-Technical & Geo-Environmental Engineers
Site Investigation Contractors

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Borehole No.
CP01

Project Name	Project No.	Date	Hole Type
Boorley Green School	PO-23-014	18/07/2023 to 19/07/2023	CP

Client	Co-ords	Water Strike Details			Logged By
Hampshire County Council	E: 450186.71	Depth Strike	After 20 mins	Remarks	TC
	N: 114858.24	6.00	0.00		
Contractor	L: 23.82				**Approved By**
Terra Firma					TC
Plant Used					Scale 1:50
Archway Window Sample Rig					

Samples and Results				Depth, (Thickness)		Level	Stratum Description	Legend	Well
Results	Type	Depth	Casing Water						
							Stiff bluish greyish brown slightly sandy CLAY. **(Wittering Formation)**		
N=30 (4,4/6,7,7,10)	B SPTLS SPT(S)	10.50 - 10.95 10.50 - 10.95 10.50		11					
	B U	12.00 - 12.45 12.00 - 12.50		12	12.00	11.82	Stiff bluish greyish brown sandy CLAY. **(Wittering Formation)**		
				13					
N=30 (4,5/5,7,8,10)	B SPTLS SPT(S)	13.50 - 13.95 13.50 - 13.95 13.50		14					
					(5.00)				
	B U	15.00 - 15.45 15.00 - 15.50		15					
				16					
N=32 (5,5/7,7,8,10)	B SPTLS SPT(S)	16.50 - 16.95 16.50 - 16.95 16.50							
				17	17.00	6.82	End of Borehole at 17.00m		
				18					
				19					

Chiselling Details			Remarks	Borehole Diameter	
Depth Top	To (m)	Duration	Groundwater encountered at 6m bgl.	Base Depth	Diameter
				17.00	600

Notes: For all symbols and abbreviations please see key sheet. All depths and measurements in metres. Stratum thicknesses given in brackets.

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Borehole No.
CP02
Sheet 1 of 2

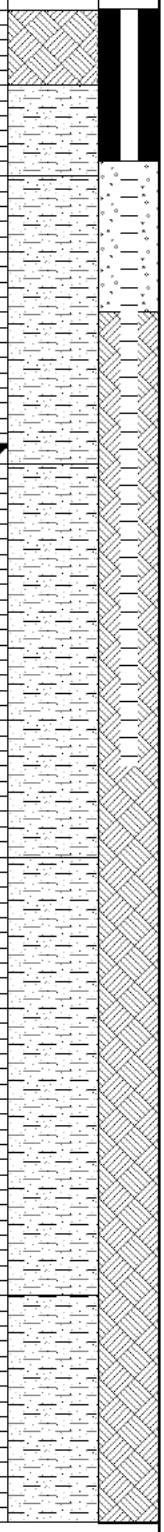
Project Name	Project No.	Date	Hole Type
Boorley Green School	PO-23-014	21/07/2023 to 22/07/2023	CP

Client	Co-ords	Water Strike Details			Logged By
Hampshire County Council	E: 450177.67	Depth Strike	After 20 mins	Remarks	KT
	N: 114909.76	3.00	0.00		Approved By
	L: 23.17	15.30	0.00		TC

Contractor	Plant Used	Scale
Lundy Site Investigation	Cable Rig	1:50

Samples and Results: Results	Type	Depth	Casing	Water	Depth, (Thickness)	Level	Stratum Description
					(0.50)		Soft brown slightly gravelly CLAY. Gravels are fine to course subangular to subrounded flints. **(Topsoil)**
	ES	0.40					
	D	0.50			0.50	22.67	Soft orangish brown slightly sandy CLAY with occasional brick fragments. **(Wittering Formation)**
					(0.60)		
					1 1.10	22.07	Soft orangish yellowish brown slightly sandy CLAY. **(Wittering Formation)**
	U	1.20 - 1.65					
	D	1.70					
N=9 (2,2/2,2,2,3)	B	2.00 - 2.45		3.00	2 (1.90)		
	SPTLS	2.00 - 2.45					
	SPT(S)	2.00					
	U	3.00 - 3.45			3 3.00	20.17	Firm greyish brown slightly sandy CLAY. **(Wittering Formation)**
	D	3.50					
N=14 (2,2/3,3,4,4)	B	4.00 - 4.45			4		
	SPTLS	4.00 - 4.45					
	SPT(S)	4.00			(2.60)		
	B	5.00 - 5.45			5		
	U	5.00 - 5.50					
					5.60	17.57	Stiff greyish brown slightly sandy CLAY. **(Wittering Formation)**
N=18 (3,3/4,4,4,6)	B	6.00 - 6.45			6		
	SPTLS	6.00 - 6.45					
	SPT(S)	6.00					
					7 (2.90)		
	U	7.50 - 7.95					
	D	8.00			8		
					8.50	14.67	Stiff bluish greyish brown slightly sandy CLAY. **(Wittering Formation)**
N=29 (4,4/5,6,8,10)	B	9.00 - 9.45			9		
	SPTLS	9.00 - 9.45					
	SPT(S)	9.00					

Legend / Well



Chiselling Details		
Depth Top	To (m)	Duration

Remarks
Groundwater encountered at 3m bgl and 15.30m bgl.

Notes: For all symbols and abbreviations please see key sheet. All depths and measurements in metres. Stratum thicknesses given in brackets.

Borehole Diameter	
Base Depth	Diameter
17.00	600

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Borehole No.
CP02
Sheet 2 of 2

Project Name	Project No.	Date	Hole Type
Boorley Green School	PO-23-014	21/07/2023 to 22/07/2023	CP

Client	Co-ords	Logged By
Hampshire County Council	E: 450177.67 N: 114909.76 L: 23.17	KT

Contractor	Plant Used	Approved By
Lundy Site Investigation	Cable Rig	TC

Scale 1:50

Water Strike Details

Depth Strike	After 20 mins	Remarks
3.00	0.00	
15.30	0.00	

Samples and Results				Depth, (Thickness)	Level	Stratum Description	Legend	Well
Results	Type	Depth	Casing Water					
N=33 (5,5/6,7,9,11)	B SPTLS SPT(S)	10.50 - 10.95 10.50 - 10.95 10.50		(4.50)		Stiff bluish greyish brown slightly sandy CLAY. **(Wittering Formation)**		
N=39 (4,6/9,10,10,10)	B SPTLS SPT(S)	12.00 - 12.45 12.00 - 12.45 12.00		13.00	10.17	Stiff bluish greyish brown sandy CLAY. **(Wittering Formation)**		
	B U	13.50 - 13.95 13.50 - 14.00						
N=46 (10,13/14,9,10,13)	B SPTLS SPT(S)	15.00 - 15.45 15.00 - 15.45 15.00	15.30	(4.00)				
N=48 (8,10/10,12,13,13)	B SPTLS SPT(S)	16.50 - 16.95 16.50 - 16.95 16.50		17.00	6.17	End of Borehole at 17.00m		

Chiselling Details		
Depth Top	To (m)	Duration

Remarks

Groundwater encountered at 3m bgl and 15.30m bgl.

Notes: For all symbols and abbreviations please see key sheet. All depths and measurements in metres. Stratum thicknesses given in brackets.

Borehole Diameter	
Base Depth	Diameter
17.00	600

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Borehole No.
CP03
Sheet 1 of 2

Project Name	Project No.	Date	Hole Type
Boorley Green School	PO-23-014	19/07/2023 to 20/07/2023	CP

Client	Co-ords	Logged By
Hampshire County Council	E: 450250.25 N: 114868.18 L: 24.40	KT

Contractor	Plant Used	Approved By
Lundy Site Investigation	Cable Rig	TC

Water Strike Details

Depth Strike	After 20 mins	Remarks
1.20	0.00	
15.40	0.00	

Scale 1:50

Samples and Results: Results	Type	Depth	Casing	Water	Depth, (Thickness)	Level	Stratum Description
	D	0.50			(1.20)		Crushed concrete and brick fill **(Made Ground)**
	U	1.20 - 1.65			1.20	23.20	Soft orangish brown slightly sandy CLAY. **(Wittering Formation)**
	ES	1.40					
	D	1.70			(1.30)		
N=11 (2,2/2,2,3,4)	B D SPTLS SPT(S)	2.00 - 2.45 2.00 - 2.45 2.00 - 2.45 2.00		1.2			
					2.50	21.90	Firm greyish brown slightly sandy CLAY. **(Wittering Formation)**
	B U	3.00 - 3.45 3.00 - 3.50					
N=16 (3,3/3,4,4,5)	B D SPTLS SPT(S)	4.00 - 4.45 4.00 - 4.45 4.00 - 4.45 4.00			(3.00)		
	U	5.00 - 5.45					
	D	5.50			5.50	18.90	Stiff greyish brown slightly sandy CLAY. **(Wittering Formation)**
N=20 (2,3/4,5,5,6)	B D SPTLS SPT(S)	6.00 - 6.45 6.00 - 6.45 6.00 - 6.45 6.00					
					(2.80)		
	U	7.50 - 7.95					
	D	8.00					
					8.30	16.10	Stiff bluish greyish brown slightly sandy CLAY. **(Wittering Formation)**
N=21 (3,4/4,5,6,6)	B D SPTLS SPT(S)	9.00 - 9.45 9.00 - 9.45 9.00 - 9.45 9.00					

Legend | Well

Chiselling Details

Depth Top	To (m)	Duration

Remarks

Groundwater encountered at 1.20m bgl and 15.40m bgl.

Notes: For all symbols and abbreviations please see key sheet. All depths and measurements in metres. Stratum thicknesses given in brackets.

Borehole Diameter

Base Depth	Diameter
17.00	600

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Borehole No.
CP03

Project Name	Project No.	Date	Hole Type
Boorley Green School	PO-23-014	19/07/2023 to 20/07/2023	CP
Client	**Co-ords**	**Water Strike Details**	**Logged By**
Hampshire County Council	E: 450250.25	Depth Strike: 1.20, 15.40 / After 20 mins: 0.00, 0.00 / Remarks:	KT
Contractor / **Plant Used**	N: 114868.18		**Approved By**
Lundy Site Investigation / Cable Rig	L: 24.40		TC
			Scale 1:50

Samples and Results: Results	Type	Depth	Casing	Water	Depth, (Thickness)	Level	Stratum Description	Legend	Well
	B U	10.50 - 10.95 10.50 - 11.00			(4.90)		Stiff bluish greyish brown slightly sandy CLAY. **(Wittering Formation)**		
N=40 (5,7/9,10,10,11)	B D SPTLS SPT(S)	12.00 - 12.45 12.00 - 12.45 12.00 - 12.45 12.00			13.20	11.20	Stiff bluish greyish brown sandy CLAY. **(Wittering Formation)**		
N=61 (7,12/12,17,17,15)	B D SPTLS SPT(S)	13.50 - 13.95 13.50 - 13.95 13.50 - 13.95 13.50							
N=42 (6,8/8,10,12,12)	B D SPTLS SPT(S)	15.00 - 15.45 15.00 - 15.45 15.00 - 15.45 15.00		15.4	(3.80)				
N=43 (5,7/9,11,11,12)	B D SPTLS SPT(S)	16.50 - 16.95 16.50 - 16.95 16.50 - 16.95 16.50			17.00	7.40	End of Borehole at 17.00m		

Chiselling Details: Depth Top	To (m)	Duration

Remarks
Groundwater encountered at 1.20m bgl and 15.40m bgl.

Notes: For all symbols and abbreviations please see key sheet. All depths and measurements in metres. Stratum thicknesses given in brackets.

Borehole Diameter: Base Depth	Diameter
17.00	600

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Borehole No.
HP01
Sheet 1 of 1

Project Name	**Project No.**	**Date**	**Hole Type**
Boorley Green School	PO-23-014	19/07/2023 to 19/07/2023	CP
Client	**Co-ords**	**Water Strike Details**	**Logged By**
Hampshire County Council	E: 450164.21	Depth Strike / After 20 mins / Remarks	TC
Contractor / **Plant Used**	N: 114903.45		**Approved By**
Terra Firma / Hand Tools	L: 23.06		TC
			Scale 1:50

Samples and Results: Results	Type	Depth	Casing	Water	Depth, (Thickness)	Level	Stratum Description	Legend	Well
	ES	0.00 - 0.30			(0.30) 0.30	22.76	Grass over dark blackish brown slightly sandy slightly gravelly CLAY with frequent rootlets **(Topsoil)**		

Chiselling Details: Depth Top	To (m)	Duration

Remarks

Notes: For all symbols and abbreviations please see key sheet. All depths and measurements in metres. Stratum thicknesses given in brackets.

Borehole Diameter: Base Depth	Diameter

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Borehole No.
HP02
Sheet 1 of 1

Project Name	Project No.	Date	Hole Type
Boorley Green School	PO-23-014	19/07/2023 to 19/07/2023	CP
Client	**Co-ords**	**Water Strike Details**	**Logged By**
Hampshire County Council	E: 450188.29	Depth Strike / After 20 mins / Remarks	TC
Contractor / **Plant Used**	N: 114911.44		**Approved By**
Terra Firma / Hand Tools	L: 23.25		TC
			Scale 1:50

Samples and Results: Results	Type	Depth	Casing	Water	Depth, (Thickness)	Level	Stratum Description	Legend	Well
	ES	0.00 - 0.30			(0.30) 0.30	22.95	Grass over dark blackish brown slightly sandy slightly gravelly CLAY with frequent rootlets **(Topsoil)**		
							()		

Chiselling Details: Depth Top	To (m)	Duration

Remarks

Notes: For all symbols and abbreviations please see key sheet. All depths and measurements in metres. Stratum thicknesses given in brackets.

Borehole Diameter: Base Depth	Diameter

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Borehole No.
WS102
Sheet 1 of 1

Project Name	Project No.	Date	Hole Type
Boorley Green School	PO-23-014	19/07/2023 to 19/07/2023	WS

Client	Co-ords	Water Strike Details			Logged By
Hampshire County Council	E: 450264.49	Depth Strike	After 20 mins	Remarks	TC
	N: 114917.02	0.80	0.35	1	
	L: 24.68				

Contractor	Plant Used	Approved By
Terra Firma	Archway Window Sample Rig	TC
		Scale 1:50

Samples and Results: Results	Type	Depth	Depth, (Thickness)	Level	Stratum Description	Legend	Well
	ES	0.20 - 0.40			Medium dense grey, brown and black slightly clayey sandy GRAVEL with occasional plastic and wood fragments. Gravel is subrounded to angular fine to medium of tarmac, brick, concrete and flint. **(Made Ground)**		
	ES	0.20 - 0.40			*0.30 to 0.45m - Crushed tarmac with a very strong hydrocarbon odour*		
					0.30 to 0.75m - pid 29.5ppm		
			(1.35)				
	ES	0.80			*0.80 to 0.85m - Large brick fragment*		
	ES	0.80 - 0.85			*0.90 to 0.95m - wood fragment*		
N=10 (1,1/2,3,3,2)	SPT(C)	1.00	1				
			1.35	23.33	Firm becoming stiff fissured interbedded orangish brown and dark grey slightly sandy silty CLAY with occasional lenses (>2mm} of light grey fine sand. **(Wittering Formation)**		
	ES	1.70					
	ES	1.70 - 1.75					
	D	1.90					
N=4 (1,1/1,1,1,1)	SPT(C)	2.00	2				
			(1.95)				
N=6 (1,2/2,1,1,2)	SPT(C)	3.00	3				
			3.30	21.38	Stiff dark bluish grey slightly sandy silty CLAY **(Wittering Formation)**		
N=4 (1,1/1,1,1,1)	SPT(C)	4.00	4		*4.00 to 4.75m - occasional lenses of loose grey clay*		
			(1.70)				
	D	4.50					
N=6 (1,1/2,1,1,2)	SPT(C)	5.00	5	5.00	19.68	End of Borehole at 5.00m	
			6				

Remarks

Borehole Diameter	
Base Depth	Diameter

Notes: For all symbols and abbreviations please see key sheet. All depths and measurements in metres. Stratum thicknesses given in brackets.

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Borehole No.
WS103
Sheet 1 of 1

Project Name	Project No.	Date	Hole Type
Boorley Green School	PO-23-014	19/07/2023 to 19/07/2023	WS

Client	Co-ords	Water Strike Details			Logged By
Hampshire County Council	E: 450240.83	Depth Strike	After 20 mins	Remarks	TC
	N: 114896.11	1.80	0.00	seepage	
	L: 25.19				

Contractor	Plant Used	Approved By
Terra Firma	Archway Window Sample Rig	TC
		Scale 1:50

Samples and Results: Results	Type	Depth	Depth, (Thickness)	Level	Stratum Description	Legend	Well
	ES	0.10	(0.25)		Loose reddish brown slightly clayey sandy GRAVEL with occasional fragments of wood and plastic. Gravel is subrounded to angular fine to coarse of brick, flint, concrete and granite. **(Made Ground)**		
			0.25	24.94	Very soft slightly sandy slightly gravelly CLAY. Gravel is subangular to subrounded fine to medium of mixed lithologies. **(Wittering Formation)**		
	ES	0.50					
	ES	0.50					
	D	0.80					
N=1 (1,0/0,0,0,1)	ES	1.00	1				
	SPT(C)	1.00					
	ES	1.20	(1.93)				
	ES	1.20					
N=4 (1,2/1,1,1,1)	SPT(C)	2.00	2				
			2.18	23.01	Soft orange slightly silty sandy CLAY. **(Wittering Formation)**		
			(1.27)				
N=10 (2,1/2,3,3,2)	SPT(C)	3.00	3				
			3.45	21.74	Firm grey slightly sandy silty CLAY with occasional lenses (>2mm} of light grey fine sand. **(Wittering Formation)**		
N=11 (1,2/3,4,3,1)	SPT(C)	4.00	4				
			(1.55)				
N=12 (1,2/3,3,3,3)	SPT(C)	5.00	5	5.00	20.19	End of Borehole at 5.00m	
			6				

Remarks

Borehole Diameter	
Base Depth	Diameter

Notes: For all symbols and abbreviations please see key sheet. All depths and measurements in metres. Stratum thicknesses given in brackets.

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Borehole No.
WS104
Sheet 1 of 1

Project Name	Project No.	Date	Hole Type
Boorley Green School	PO-23-014	19/07/2023 to 19/07/2023	WS

Client	Co-ords	Water Strike Details			Logged By
Hampshire County Council	E: 450210.19	Depth Strike	After 20 mins	Remarks	TC
	N: 114858.71	1.10	0.65	1	
	L: 23.96				

Contractor	Plant Used	Approved By
Terra Firma	Archway Window Sample Rig	TC
		Scale 1:50

Samples and Results			Depth, (Thickness)	Level	Stratum Description	Legend	Well
Results	Type	Depth					
	ES	0.00 - 0.20	(0.31)		Loose reddish brown slightly clayey sandy GRAVEL with occasional fragments of wood and plastic. Gravel is subrounded to angular fine to coarse of brick, flint, concrete and granite. **(Made Ground)**		
			0.31	23.65			
	ES	0.40 - 0.60			Soft becoming firm mottled orange brown and grey slightly silty slightly sandy CLAY. **(Wittering Formation)**		
HV = 50		0.50	(0.39)				
HV = 45		0.65					
			0.70	23.26			
	D	0.80 - 1.00			Soft mottled orange, brown and grey slightly silty sandy CLAY. **(Wittering Formation)**		
N=4 (1,1/1,1,1,1)	SPT(C)	1.00	1				
	D	1.55 - 1.65	(1.73)				
N=7 (1,1/2,2,2,1)	SPT(C)	2.00	2				
			2.43	21.53	Firm becoming stiff fissured interbedded orangish brown and dark grey slightly sandy silty CLAY with occasional lenses (>2mm} of light grey fine sand. **(Wittering Formation)**		
			(0.57)				
	D	2.80 - 2.90					
N=7 (1,1/2,1,1,3)	SPT(C)	3.00	3	3.00	20.96	Stiff dark bluish grey slightly sandy silty CLAY **(Wittering Formation)**	
	D	3.80 - 4.00					
N=9 (1,2/2,3,2,2)	SPT(C)	4.00	4	(2.00)			
	D	4.70 - 4.90					
N=4 (1,1/1,1,1,1)	SPT(C)	5.00	5	5.00	18.96	End of Borehole at 5.00m	
			6				

Remarks

Borehole Diameter	
Base Depth	Diameter

Notes: For all symbols and abbreviations please see key sheet. All depths and measurements in metres. Stratum thicknesses given in brackets.

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Borehole No.
WS105
Sheet 1 of 1

Project Name	Project No.	Date	Hole Type
Boorley Green School	PO-23-014	19/07/2023 to 19/07/2023	WS
Client	**Co-ords**	**Water Strike Details**	**Logged By**
Hampshire County Council	E: 450236.70	Depth Strike / After 20 mins / Remarks	TC
Contractor	**Plant Used**	N: 114885.36	**Approved By**
Terra Firma	Archway Window Sample Rig	L: 26.76	TC
			Scale 1:50

Samples and Results: Results	Type	Depth	Depth, (Thickness)	Level	Stratum Description	Legend	Well
			(1.00)		Soft becoming firm mottled orange brown and grey slightly silty slightly sandy CLAY. **(Made Ground)**		
N=4 (1,1/1,1,1,1)	SPT(C)	1.00	1 1.00	25.76	Soft brown slightly sandy slightly gravelly CLAY. Gravel is subangular fine to medium of mixed lithologies. **(Made Ground)**		
			(1.20)				
N=12 (1,2/2,3,3,4)	SPT(C)	2.00	2				
			2.20	24.56	Very soft dark blackish brown slightly sandy CLAY. **(Made Ground)**		
			(0.60)				
			2.80	23.96	Firm becoming soft brown becoming orangish brown slightly sandy CLAY. **(Wittering Formation)**		
N=15 (3,4/4,3,4,4)	SPT(C)	3.00	3				
			(0.60)				
			3.40	23.36	soft becoming firm mottled orange brown and grey slightly silty slightly sandy CLAY. **(Wittering Formation)**		
			(0.05)	23.31			
			3.45		Firm becoming stiff fissured interbedded orangish brown and dark grey slightly sandy silty CLAY with occasional lenses (>2mm} of light grey fine sand. **(Wittering Formation)**		
N=16 (3,4/4,4,4,4)	SPT(C)	4.00	4				
			(1.55)				
			5 5.00	21.76	End of Borehole at 5.00m		
			6				

Remarks

Borehole Diameter	
Base Depth	Diameter

Notes: For all symbols and abbreviations please see key sheet. All depths and measurements in metres. Stratum thicknesses given in brackets.

Annex B: Chemical Test Results

eurofins | Chemtest
Eurofins Chemtest Ltd
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.com

UKAS TESTING 2183

Amended Report

Report No.:	23-26258-3		
Initial Date of Issue:	16-Aug-2023	**Date of Re-Issue:**	25-Oct-2023
Re-Issue Details:	This report has been revised and directly supersedes 23-26258-2 in its entirety		
Client	Terra Firma		
Client Address:	t/a Terra Firma The Slate Barn Lower Lowley Dunsford Devon EX6 7BP		
Contact(s):	Info		
Project	PO-23-014 Boorley Green School		
Quotation No.:		**Date Received:**	04-Aug-2023
Order No.:	PO-23-014	**Date Instructed:**	04-Aug-2023
No. of Samples:	9		
Turnaround (Wkdays):	9	**Results Due:**	16-Aug-2023
Date Approved:	16-Aug-2023	**Subcon Results Due:**	16-Aug-2023
Approved By:			
[redacted]			
Details:	Stuart Henderson, Technical Manager		

Results - Soil

Project: PO-23-014 Boorley Green School

Client: Terra Firma				**Chemtest Job No.:**	23-26258	23-26258	23-26258	23-26258	23-26258	23-26258	23-26258	23-26258	23-26258
Quotation No.:				**Chemtest Sample ID.:**	1683611	1683612	1683613	1683614	1683615	1683616	1683617	1683618	1683619
Order No.: PO-23-014				Client Sample Ref.:	1	2	45	38	40	42	41		
				Sample Location:	WS102	WS102	WS102	WS103	WS103	WS104	WS104	HP01	HP02
				Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
				Top Depth (m):	0.20	0.80	1.70	0.50	0.10	0.40	0.00	0.00	0.00
				Bottom Depth (m):	0.40	0.85				0.60	0.20	0.30	0.30
				Date Sampled:	19-Jul-2023	19-Jul-2023	19-Jul-2023	19-Jul-2023	19-Jul-2023	19-Jul-2023	19-Jul-2023	19-Jul-2023	19-Jul-2023
				Asbestos Lab:	DURHAM	DURHAM	DURHAM	DURHAM	DURHAM	DURHAM	DURHAM	DURHAM	DURHAM
Determinand	**Accred.**	**SOP**	**Units**	**LOD**									
ACM Type	U	2192		N/A	-	-	-	-	-	-	-	-	-
Asbestos Identification	U	2192		N/A	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected
Moisture	N	2030	%	0.020	3.5	8.6	22	22	21	20	7.9	20	16
pH at 20C	U	2010		4.0	8.2	9.6	8.4	8.5	8.3	7.7	10.1	7.6	6.6
Total Sulphur	U	2175	%	0.010	0.38	0.22	0.077	0.037	0.070	0.019	0.30	0.074	0.073
Cyanide (Free)	U	2300	mg/kg	0.50	[B] < 0.50	[B] < 0.50	[B] < 0.50	[B] < 0.50	[B] < 0.50	[B] < 0.50	[B] < 0.50	[B] < 0.50	[B] < 0.50
Cyanide (Total)	U	2300	mg/kg	0.50	[B] < 0.50	[B] < 0.50	[B] < 0.50	[B] < 0.50	[B] < 0.50	[B] < 0.50	[B] < 0.50	[B] < 0.50	[B] < 0.50
Thiocyanate	U	2300	mg/kg	5.0	[B] < 5.0	[B] < 5.0	[B] < 5.0	[B] < 5.0	[B] < 5.0	[B] < 5.0	[B] < 5.0	[B] < 5.0	[B] < 5.0
Sulphide (Easily Liberatable)	N	2325	mg/kg	0.50	36	4.3	2.7	3.0	7.0	2.7	3.3	2.9	2.6
Ammoniacal Nitrogen	U	2425	mg/kg	0.50	6.3	4.8	7.0	12	28	11	1.2	9.3	12
Sulphate (Total)	U	2430	%	0.010	0.15	0.52	0.082	0.49	0.11	0.16	0.044	0.13	0.024
Arsenic	U	2455	mg/kg	0.5	5.6	11	19	8.9	10	7.3	8.8	5.0	3.6
Cadmium	U	2455	mg/kg	0.10	0.16	0.21	< 0.10	< 0.10	< 0.10	< 0.10	0.34	< 0.10	0.39
Chromium	U	2455	mg/kg	0.5	9.5	24	36	26	30	28	20	16	19
Copper	U	2455	mg/kg	0.50	27	21	8.8	7.0	12	5.4	20	4.6	7.7
Mercury	U	2455	mg/kg	0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.06	< 0.05	< 0.05	< 0.05	0.06
Nickel	U	2455	mg/kg	0.50	6.8	13	18	13	9.8	6.5	13	3.8	4.7
Lead	U	2455	mg/kg	0.50	24	29	44	46	31	11	48	21	23
Selenium	U	2455	mg/kg	0.25	< 0.25	0.65	1.8	0.68	0.76	0.65	0.53	0.32	0.56
Zinc	U	2455	mg/kg	0.50	56	88	62	40	52	31	85	20	27
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Organic Matter	U	2625	%	0.40	18	3.6	1.4	0.83	1.3	0.73	4.8	2.1	5.3
Total TPH >C6-C40	U	2670	mg/kg	10	[B] 3800	[B] 210	[B] 150	[B] < 10	[B] < 10	[B] < 10	[B] 250	[BC] < 10	[BC] < 10
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0		[B] < 1.0		[B] < 1.0	[BC] < 1.0	[BC] < 1.0
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0		[B] < 1.0		[B] < 1.0	[BC] < 1.0	[BC] < 1.0
Aliphatic TPH >C8-C10	N	2680	mg/kg	1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0		[B] < 1.0		[B] < 1.0	[BC] < 1.0	[BC] < 1.0
Aliphatic TPH >C10-C12	N	2680	mg/kg	1.0	[B] 42	[B] < 1.0	[B] < 1.0		[B] < 1.0		[B] < 1.0	[BC] < 1.0	[BC] < 1.0
Aliphatic TPH >C12-C16	N	2680	mg/kg	1.0	[B] 110	[B] < 1.0	[B] < 1.0		[B] < 1.0		[B] < 1.0	[BC] < 1.0	[BC] < 1.0
Aliphatic TPH >C16-C21	N	2680	mg/kg	1.0	[B] 45	[B] < 1.0	[B] < 1.0		[B] < 1.0		[B] < 1.0	[BC] < 1.0	[BC] < 1.0
Aliphatic TPH >C21-C35	N	2680	mg/kg	1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0		[B] < 1.0		[B] 120	[BC] < 1.0	[BC] < 1.0
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0		[B] < 1.0		[B] 91	[BC] < 1.0	[BC] < 1.0
Total Aliphatic Hydrocarbons	N	2680	mg/kg	5.0	[B] 200	[B] < 5.0	[B] < 5.0		[B] < 5.0		[B] 210	[BC] < 5.0	[BC] < 5.0
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0		[B] < 1.0		[B] < 1.0	[BC] < 1.0	[BC] < 1.0
Aromatic TPH >C7-C8	N	2680	mg/kg	1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0		[B] < 1.0		[B] < 1.0	[BC] < 1.0	[BC] < 1.0
Aromatic TPH >C8-C10	N	2680	mg/kg	1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0		[B] < 1.0		[B] < 1.0	[BC] < 1.0	[BC] < 1.0
Aromatic TPH >C10-C12	N	2680	mg/kg	1.0	[B] 51	[B] < 1.0	[B] < 1.0		[B] < 1.0		[B] < 1.0	[BC] < 1.0	[BC] < 1.0

Results - Soil

Project: PO-23-014 Boorley Green School

Client: Terra Firma			**Chemtest Job No.:**		23-26258	23-26258	23-26258	23-26258	23-26258	23-26258	23-26258	23-26258	23-26258
Quotation No.:			**Chemtest Sample ID.:**		1683611	1683612	1683613	1683614	1683615	1683616	1683617	1683618	1683619
Order No.: PO-23-014			Client Sample Ref.:		1	2	45	38	40	42	41		
			Sample Location:		WS102	WS102	WS102	WS103	WS103	WS104	WS104	HP01	HP02
			Sample Type:		SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
			Top Depth (m):		0.20	0.80	1.70	0.50	0.10	0.40	0.00	0.00	0.00
			Bottom Depth (m):		0.40	0.85				0.60	0.20	0.30	0.30
			Date Sampled:		19-Jul-2023	19-Jul-2023	19-Jul-2023	19-Jul-2023	19-Jul-2023	19-Jul-2023	19-Jul-2023	19-Jul-2023	19-Jul-2023
			Asbestos Lab:		DURHAM	DURHAM	DURHAM	DURHAM	DURHAM	DURHAM	DURHAM	DURHAM	DURHAM
Determinand	**Accred.**	**SOP**	**Units**	**LOD**									
Aromatic TPH >C12-C16	N	2680	mg/kg	1.0	[B] 460	[B] < 1.0	[B] < 1.0		[B] < 1.0		[B] < 1.0	[BC] < 1.0	[BC] < 1.0
Aromatic TPH >C16-C21	N	2680	mg/kg	1.0	[B] 320	[B] 11	[B] < 1.0		[B] < 1.0		[B] 5.0	[BC] < 1.0	[BC] < 1.0
Aromatic TPH >C21-C35	N	2680	mg/kg	1.0	[B] 2300	[B] < 1.0	[B] < 1.0		[B] < 1.0		[B] 140	[BC] < 1.0	[BC] < 1.0
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0	[B] 1700	[B] < 1.0	[B] < 1.0		[B] < 1.0		[B] 41	[BC] < 1.0	[BC] < 1.0
Total Aromatic Hydrocarbons	N	2680	mg/kg	5.0	[B] 4900	[B] 11	[B] < 5.0		[B] < 5.0		[B] 180	[BC] < 5.0	[BC] < 5.0
Total Petroleum Hydrocarbons	N	2680	mg/kg	10.0	[B] 5100	[B] 11	[B] < 10		[B] < 10		[B] 390	[BC] < 10	[BC] < 10
Naphthalene	U	2700	mg/kg	0.10	20	0.67	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthylene	U	2700	mg/kg	0.10	19	0.68	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthene	U	2700	mg/kg	0.10	73	0.84	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluorene	U	2700	mg/kg	0.10	83	0.86	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Phenanthrene	U	2700	mg/kg	0.10	490	4.8	< 0.10	< 0.10	< 0.10	< 0.10	0.94	< 0.10	< 0.10
Anthracene	U	2700	mg/kg	0.10	100	1.2	< 0.10	< 0.10	< 0.10	< 0.10	0.35	< 0.10	< 0.10
Fluoranthene	U	2700	mg/kg	0.10	420	4.7	< 0.10	< 0.10	< 0.10	< 0.10	1.8	< 0.10	< 0.10
Pyrene	U	2700	mg/kg	0.10	320	4.2	< 0.10	< 0.10	< 0.10	< 0.10	2.0	< 0.10	< 0.10
Benzo[a]anthracene	U	2700	mg/kg	0.10	89	2.2	< 0.10	< 0.10	< 0.10	< 0.10	2.6	< 0.10	< 0.10
Chrysene	U	2700	mg/kg	0.10	130	2.0	< 0.10	< 0.10	< 0.10	< 0.10	1.2	< 0.10	< 0.10
Benzo[b]fluoranthene	U	2700	mg/kg	0.10	93	2.4	< 0.10	< 0.10	< 0.10	< 0.10	1.5	< 0.10	< 0.10
Benzo[k]fluoranthene	U	2700	mg/kg	0.10	34	0.80	< 0.10	< 0.10	< 0.10	< 0.10	0.63	< 0.10	< 0.10
Benzo[a]pyrene	U	2700	mg/kg	0.10	71	1.8	< 0.10	< 0.10	< 0.10	< 0.10	1.2	< 0.10	< 0.10
Indeno(1,2,3-c,d)Pyrene	U	2700	mg/kg	0.10	50	2.3	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Dibenz(a,h)Anthracene	U	2700	mg/kg	0.10	11	0.30	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[g,h,i]perylene	U	2700	mg/kg	0.10	49	1.9	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Of 16 PAH's	U	2700	mg/kg	2.0	2100	32	< 2.0	< 2.0	< 2.0	< 2.0	12	< 2.0	< 2.0
Benzene	U	2760	µg/kg	1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0		[B] < 1.0		[B] < 1.0	[BC] < 1.0	[BC] < 1.0
Toluene	U	2760	µg/kg	1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0		[B] < 1.0		[B] < 1.0	[BC] < 1.0	[BC] < 1.0
Ethylbenzene	U	2760	µg/kg	1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0		[B] < 1.0		[B] < 1.0	[BC] < 1.0	[BC] < 1.0
m & p-Xylene	U	2760	µg/kg	1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0		[B] < 1.0		[B] < 1.0	[BC] < 1.0	[BC] < 1.0
o-Xylene	U	2760	µg/kg	1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0		[B] < 1.0		[B] < 1.0	[BC] < 1.0	[BC] < 1.0
Methyl Tert-Butyl Ether	U	2760	µg/kg	1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0		[B] < 1.0		[B] < 1.0	[BC] < 1.0	[BC] < 1.0
Pesticide Screen	N	2790		0.50								[BC] None Detected	[BC] None Detected
Total Phenols	U	2920	mg/kg	0.10	1.1	0.14	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10

Results - Topsoil Report

BS3882:2015

Chemtest Job No.: 23-26258
Chemtest Sample ID.: 1683618
Client Sample Ref.:
Sample Location: HP01
Client Sample ID.:
Top Depth (m): 0.00
Bottom Depth (m): 0.30
Date Sampled: 19-Jul-2023
Time Sampled:

Parameter	Units	Multipurpose Range			Result	Compliant with Multipurpose Range? (Y/N)	Compliant with Specific Purpose Range? (Y/N)		
Texture							**Acid**	**Low F**	**Calc.**
Clay content (Sub Contracted)	%				13				
Silt content (Sub Contracted)	%				46				
Sand content (Sub Contracted)	%				42				
Soil texture class		See Attached Chart			Sandy Silt Loam	YES			
Mass Loss on Ignition									
Clay 5-20%		3.0-20			3.3	YES	YES	YES	YES
Clay 20-35%		5.0-20							
Stone Content	**% m/m**								
>2mm (Sub Contracted)		0-30			4.5	YES			
>20mm (Sub Contracted)		0-10			2.0	YES			
>50mm (Sub Contracted)		0			< 0.10	YES			
Soil pH value		5.5-8.5			7.6	YES	NO	YES	YES
Carbonate (Calcareous only)	%				0.60				NO
Electrical Conductivity	µS/cm	If >3300 do ESP			1900	YES			
Available Nutrient Content									
Nitrogen %		>0.15			0.12	NO	NO		NO
Extractable phosphorus	mg/l	16-140			17	YES	YES	YES	YES
Extractable potassium	mg/l	121-1500			140	YES	YES		YES
Extractable magnesium	mg/l	51-600			110	YES	YES		YES
Carbon : Nitrogen Ratio		<20:1			16.5/1	YES	YES	YES	YES
Exchangeable sodium	**%**	<15			7.4				
Available Calcium	mg/l				290				
Available Sodium	mg/l				160				
Phytotoxic Contaminants (by soil pH)		**< 6.0**	**6.0-7.0**	**> 7.0**					
Zinc (Nitric Acid extract)	mg/kg	<200	<200	<300	39	YES			
Copper (Nitric Acid extract)	mg/kg	<100	<135	<200	10	YES			
Nickel (Nitric Acid extract)	mg/kg	<60	<75	<110	7.6	YES			
Visible Contaminants	**% mm**								
>2mm		<0.5			0.000	YES			
….. of which plastics		<0.25			0.000	YES			
….. man-made sharps		zero in 1kg			0.000	YES			

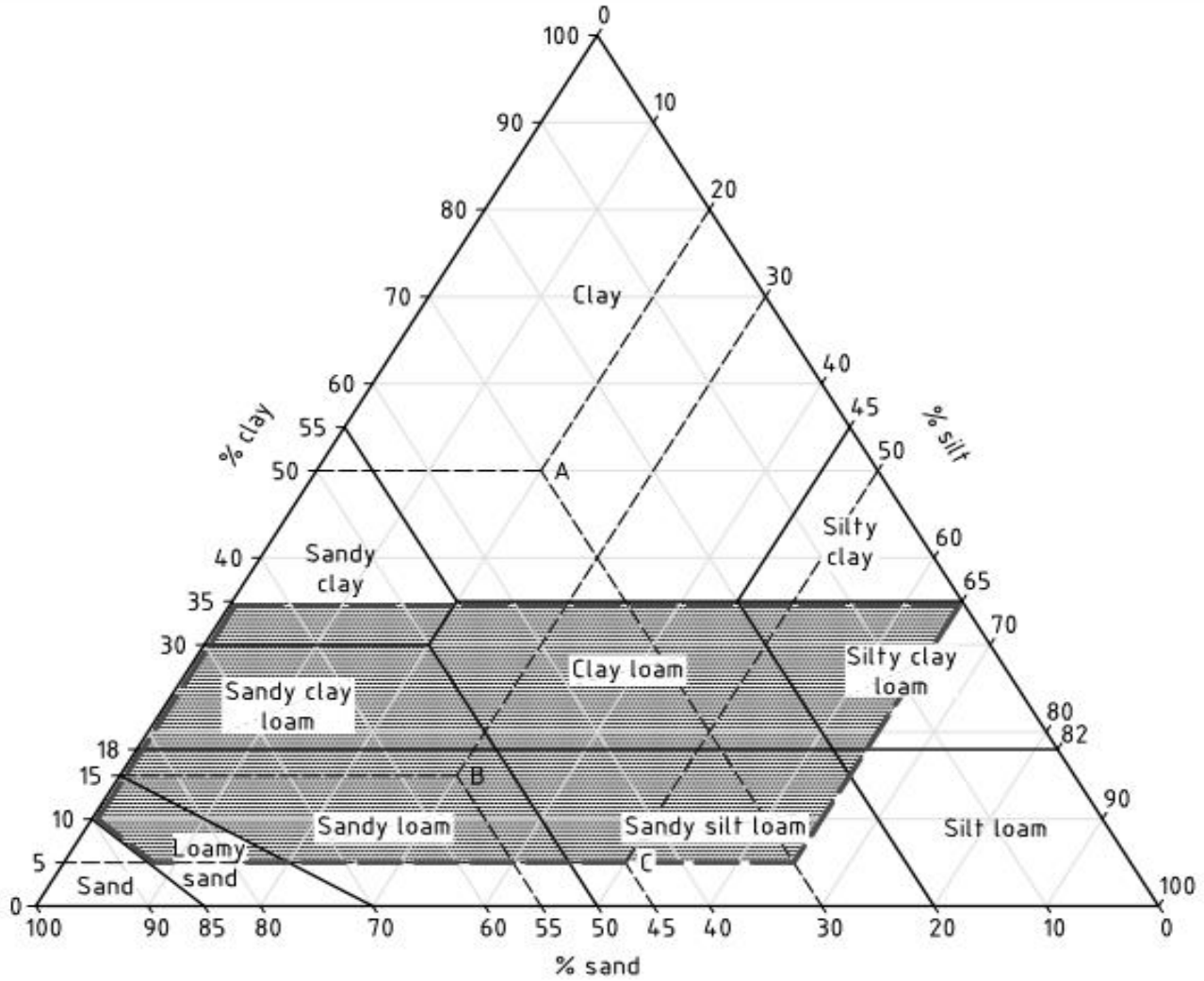
Results - Topsoil Report

BS3882:2015

Chemtest Job No.: 23-26258
Chemtest Sample ID.: 1683619
Client Sample Ref.:
Sample Location: HP02
Client Sample ID.:
Top Depth (m): 0.00
Bottom Depth (m): 0.30
Date Sampled: 19-Jul-2023
Time Sampled:

Parameter	Units	Multipurpose Range			Result	Compliant with Multipurpose Range? (Y/N)	Compliant with Specific Purpose Range? (Y/N)		
Texture							**Acid**	**Low F**	**Calc.**
Clay content (Sub Contracted)	%				12				
Silt content (Sub Contracted)	%				44				
Sand content (Sub Contracted)	%				45				
Soil texture class		See Attached Chart			Sandy Silt Loam	YES			
Mass Loss on Ignition									
Clay 5-20%		3.0-20			7.0	YES	YES	YES	YES
Clay 20-35%		5.0-20							
Stone Content	**% m/m**								
>2mm (Sub Contracted)		0-30			2.2	YES			
>20mm (Sub Contracted)		0-10			< 0.10	YES			
>50mm (Sub Contracted)		0			< 0.10	YES			
Soil pH value		5.5-8.5			6.6	YES	NO	YES	NO
Carbonate (Calcareous only)	%				< 0.10				NO
Electrical Conductivity	µS/cm	If >3300 do ESP			2000	YES			
Available Nutrient Content									
Nitrogen %		>0.15			0.26	YES	YES		YES
Extractable phosphorus	mg/l	16-140			13	NO	NO	YES	NO
Extractable potassium	mg/l	121-1500			160	YES	YES		YES
Extractable magnesium	mg/l	51-600			120	YES	YES		YES
Carbon : Nitrogen Ratio		<20:1			16.0/1	YES	YES	YES	YES
Exchangeable sodium	**%**	<15			7.1				
Available Calcium	mg/l				300				
Available Sodium	mg/l				160				
Phytotoxic Contaminants (by soil pH)		**< 6.0**	**6.0-7.0**	**> 7.0**					
Zinc (Nitric Acid extract)	mg/kg	<200	<200	<300	34	YES			
Copper (Nitric Acid extract)	mg/kg	<100	<135	<200	11	YES			
Nickel (Nitric Acid extract)	mg/kg	<60	<75	<110	5.3	YES			
Visible Contaminants	**% mm**								
>2mm		<0.5			0.000	YES			
….. of which plastics		<0.25			0.000	YES			
….. man-made sharps		zero in 1kg			0.000	YES			

Topsoil:
Texture Classification Chart



Key

Area within which the texture of topsoil is required to fall

NOTE Examples of textural classification are as follows.

- *Soil A with 30% sand, 20% silt and 50% clay is in the "clay" textural class.*
- *Soil B with 55% sand, 30% silt and 15% clay is in the "sandy loam" textural class.*
- *Soil C with 45% sand, 50% silt and 5% clay is in the "sandy silt loam" textural class.*

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Deviations

In accordance with UKAS Policy on Deviating Samples TPS 63. Chemtest have a procedure to ensure 'upon receipt of each sample a competent laboratory shall assess whether the sample is suitable with regard to the requested test(s)'. This policy and the respective holding times applied, can be supplied upon request.The reason a sample is declared as deviating is detailed below. Where applicable the analysis remains UKAS/MCERTs accredited but the results may be compromised.

Sample:	Sample Ref:	Sample ID:	Sample Location:	Sampled Date:	Deviation Code(s):	Containers Received:
1683611	1		WS102	19-Jul-2023	B	Amber Glass 250ml
1683611	1		WS102	19-Jul-2023	B	Amber Glass 60ml
1683611	1		WS102	19-Jul-2023	B	Plastic Tub 1000g
1683612	2		WS102	19-Jul-2023	B	Amber Glass 250ml
1683612	2		WS102	19-Jul-2023	B	Amber Glass 60ml
1683612	2		WS102	19-Jul-2023	B	Plastic Tub 500g
1683613	45		WS102	19-Jul-2023	B	Amber Glass 250ml
1683613	45		WS102	19-Jul-2023	B	Amber Glass 60ml
1683613	45		WS102	19-Jul-2023	B	Plastic Tub 1000g
1683614	38		WS103	19-Jul-2023	B	Amber Glass 250ml
1683614	38		WS103	19-Jul-2023	B	Amber Glass 60ml
1683614	38		WS103	19-Jul-2023	B	Plastic Tub 500g
1683615	40		WS103	19-Jul-2023	B	Amber Glass 250ml
1683615	40		WS103	19-Jul-2023	B	Amber Glass 60ml
1683615	40		WS103	19-Jul-2023	B	Plastic Tub 500g
1683616	42		WS104	19-Jul-2023	B	Amber Glass 250ml
1683616	42		WS104	19-Jul-2023	B	Amber Glass 60ml
1683616	42		WS104	19-Jul-2023	B	Plastic Tub 1000g
1683617	41		WS104	19-Jul-2023	B	Amber Glass 250ml
1683617	41		WS104	19-Jul-2023	B	Amber Glass 60ml
1683617	41		WS104	19-Jul-2023	B	Plastic Tub 1000g
1683618			HP01	19-Jul-2023	BC	Plastic Bag
1683619			HP02	19-Jul-2023	BC	Plastic Bag

Test Methods

SOP	Title	Parameters included	Method summary
2010	pH Value of Soils	pH at 20°C	pH Meter
2020	Electrical Conductivity	Electrical conductivity (EC) of aqueous extract or calcium sulphate solution for topsoil	Measurement of the electrical resistance of a 2:1 water/soil extract.
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.
2040	Soil Description(Requirement of MCERTS)	Soil description	As received soil is described based upon BS5930
2115	Total Nitrogen in Soils	Nitrogen	Determination by elemental analyser
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES
2175	Total Sulphur in Soils	Total Sulphur	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2192	Asbestos	Asbestos	Polarised light microscopy / Gravimetry
2260	Carbonate	Carbonate	Titration
2300	Cyanides & Thiocyanate in Soils	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Allkaline extraction followed by colorimetric determination using Automated Flow Injection Analyser.
2325	Sulphide in Soils	Sulphide	Steam distillation with sulphuric acid / analysis by 'Aquakem 600' Discrete Analyser, using N,N–dimethyl-p-phenylenediamine.
2400	Cations	Cations	ICP-MS
2420	Phosphate	Phosphate	Spectrophotometry - Discrete analyser
2425	Extractable Ammonium in soils	Ammonium	Extraction with potassium chloride solution / analysis by 'Aquakem 600' Discrete Analyser using sodium salicylate and sodium dichloroisocyanurate.
2430	Total Sulphate in soils	Total Sulphate	Acid digestion followed by determination of sulphate in extract by ICP-OES.
2450	Acid Soluble Metals in Soils	Metals, including: Arsenic; Barium; Beryllium; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Vanadium; Zinc	Acid digestion followed by determination of metals in extract by ICP-MS.
2455	Acid Soluble Metals in Soils	Metals, including: Arsenic; Barium; Beryllium; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Vanadium; Zinc	Acid digestion followed by determination of metals in extract by ICP-MS.
2490	Hexavalent Chromium in Soils	Chromium [VI]	Soil extracts are prepared by extracting dried and ground soil samples into boiling water. Chromium [VI] is determined by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazide.
2620	LOI 440	LOI 440 Trommel Fines	Determination of the proportion by mass that is lost from a soil by ignition at 440°C.
2625	Total Organic Carbon in Soils	Total organic Carbon (TOC)	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2670	Total Petroleum Hydrocarbons (TPH) in Soils by GC-FID	TPH (C6–C40); optional carbon banding, e.g. 3-band – GRO, DRO & LRO*TPH C8–C40	Dichloromethane extraction / GC-FID
2680	TPH A/A Split	Aliphatics: >C5–C6, >C6–C8,>C8–C10, >C10–C12, >C12–C16, >C16–C21, >C21–C35, >C35– C44Aromatics: >C5–C7, >C7–C8, >C8– C10, >C10–C12, >C12–C16, >C16– C21, >C21– C35, >C35– C44	Dichloromethane extraction / GCxGC FID detection

Test Methods

SOP	Title	Parameters included	Method summary
2700	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-FID	Acenaphthene; Acenaphthylene; Anthracene; Benzo[a]Anthracene; Benzo[a]Pyrene; Benzo[b]Fluoranthene; Benzo[ghi]Perylene; Benzo[k]Fluoranthene; Chrysene; Dibenz[ah]Anthracene; Fluoranthene; Fluorene; Indeno[123cd]Pyrene; Naphthalene; Phenanthrene; Pyrene	Dichloromethane extraction / GC-FID (GC-FID detection is non-selective and can be subject to interference from co-eluting compounds)
2760	Volatile Organic Compounds (VOCs) in Soils by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics.(cf. USEPA Method 8260)*please refer to UKAS schedule	Automated headspace gas chromatographic (GC) analysis of a soil sample, as received, with mass spectrometric (MS) detection of volatile organic compounds.
2790	Semi-Volatile Organic Compounds (SVOCs) in Soils by GC-MS	Semi-volatile organic compounds(cf. USEPA Method 8270)	Acetone/Hexane extraction / GC-MS
2920	Phenols in Soils by HPLC	Phenolic compounds including Resorcinol, Phenol, Methylphenols, Dimethylphenols, 1-Naphthol and TrimethylphenolsNote: chlorophenols are excluded.	60:40 methanol/water mixture extraction, followed by HPLC determination using electrochemical detection.

Report Information

Key

U	UKAS accredited
M	MCERTS and UKAS accredited
N	Unaccredited
S	This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
SN	This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
T	This analysis has been subcontracted to an unaccredited laboratory
I/S	Insufficient Sample
U/S	Unsuitable Sample
N/E	not evaluated
<	"less than"
>	"greater than"
SOP	Standard operating procedure
LOD	Limit of detection

Comments or interpretations are beyond the scope of UKAS accreditation
The results relate only to the items tested
Uncertainty of measurement for the determinands tested are available upon request
None of the results in this report have been recovery corrected
All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis
All Asbestos testing is performed at the indicated laboratory
Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

A - Date of sampling not supplied
B - Sample age exceeds stability time (sampling to extraction)
C - Sample not received in appropriate containers
D - Broken Container
E - Insufficient Sample (Applies to LOI in Trommel Fines Only)

Sample Retention and Disposal

All soil samples will be retained for a period of 30 days from the date of receipt
All water samples will be retained for 14 days from the date of receipt
Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:
customerservices@chemtest.com

eurofins | Chemtest
Eurofins Chemtest Ltd
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.com

UKAS TESTING 2183

Final Report

Report No.:	23-27172-1		
Initial Date of Issue:	21-Aug-2023		
Re-Issue Details:			
Client	Terra Firma		
Client Address:	t/a Terra Firma The Slate Barn Lower Lowley Dunsford Devon EX6 7BP		
Contact(s):	Info		
Project	PO-23-014 Boorley Green School		
Quotation No.:		**Date Received:**	14-Aug-2023
Order No.:	PO-23-014	**Date Instructed:**	14-Aug-2023
No. of Samples:	3		
Turnaround (Wkdays):	5	**Results Due:**	18-Aug-2023
Date Approved:	21-Aug-2023		
Approved By:			
[redacted]			
Details:	Stuart Henderson, Technical Manager		

Results - Soil

Project: PO-23-014 Boorley Green School

Client: Terra Firma			**Chemtest Job No.:**		23-27172	23-27172	23-27172
Quotation No.:			**Chemtest Sample ID.:**		1687802	1687803	1687804
Order No.: PO-23-014			Client Sample Ref.:		1	1	1
			Sample Location:		CP01	CP02	CP03
			Sample Type:		SOIL	SOIL	SOIL
			Top Depth (m):		1.30	0.40	1.40
			Date Sampled:		18-Jul-2023	21-Jul-2023	20-Jul-2023
			Asbestos Lab:		COVENTRY	COVENTRY	COVENTRY
Determinand	**Accred.**	**SOP**	**Units**	**LOD**			
ACM Type	U	2192		N/A	-	-	-
Asbestos Identification	U	2192		N/A	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected
Moisture	N	2030	%	0.020	21	19	18
pH	U	2010		4.0	6.7	6.6	6.7
pH (2.5:1)	N	2010		4.0	6.9		6.8
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010	0.064		0.048
Total Sulphur	U	2175	%	0.010	< 0.010	< 0.010	0.025
Cyanide (Free)	U	2300	mg/kg	0.50	[B] < 0.50	[B] < 0.50	[B] < 0.50
Cyanide (Total)	U	2300	mg/kg	0.50	[B] < 0.50	[B] < 0.50	[B] < 0.50
Thiocyanate	U	2300	mg/kg	5.0	[B] < 5.0	[B] < 5.0	[B] < 5.0
Sulphide (Easily Liberatable)	N	2325	mg/kg	0.50	2.8	2.7	2.8
Ammoniacal Nitrogen	U	2425	mg/kg	0.50	10	9.3	8.6
Sulphate (Total)	U	2430	%	0.010	0.080	0.061	0.079
Sulphate (Acid Soluble)	U	2430	%	0.010	0.022		0.049
Arsenic	U	2455	mg/kg	0.5	4.0	3.4	4.1
Cadmium	U	2455	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Chromium	U	2455	mg/kg	0.5	11	8.6	11
Copper	U	2455	mg/kg	0.50	12	9.5	12
Mercury	U	2455	mg/kg	0.05	0.35	0.23	0.28
Nickel	U	2455	mg/kg	0.50	3.0	2.5	3.4
Lead	U	2455	mg/kg	0.50	37	34	39
Selenium	U	2455	mg/kg	0.25	< 0.25	< 0.25	< 0.25
Zinc	U	2455	mg/kg	0.50	43	35	44
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50	< 0.50	< 0.50
Organic Matter	U	2625	%	0.40	4.0	3.8	2.7
Total TPH >C6-C40	U	2670	mg/kg	10	[B] < 10	[B] < 10	[B] < 10
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0		[B] < 1.0	
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0		[B] < 1.0	
Aliphatic TPH >C8-C10	N	2680	mg/kg	1.0		[B] < 1.0	
Aliphatic TPH >C10-C12	N	2680	mg/kg	1.0		[B] < 1.0	
Aliphatic TPH >C12-C16	N	2680	mg/kg	1.0		[B] < 1.0	
Aliphatic TPH >C16-C21	N	2680	mg/kg	1.0		[B] < 1.0	
Aliphatic TPH >C21-C35	N	2680	mg/kg	1.0		[B] 19	
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0		[B] < 1.0	
Total Aliphatic Hydrocarbons	N	2680	mg/kg	5.0		[B] 19	
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0		[B] < 1.0	
Aromatic TPH >C7-C8	N	2680	mg/kg	1.0		[B] < 1.0	

Results - Soil

Project: PO-23-014 Boorley Green School

Client: Terra Firma			**Chemtest Job No.:**		23-27172	23-27172	23-27172
Quotation No.:			**Chemtest Sample ID.:**		1687802	1687803	1687804
Order No.: PO-23-014			Client Sample Ref.:		1	1	1
			Sample Location:		CP01	CP02	CP03
			Sample Type:		SOIL	SOIL	SOIL
			Top Depth (m):		1.30	0.40	1.40
			Date Sampled:		18-Jul-2023	21-Jul-2023	20-Jul-2023
			Asbestos Lab:		COVENTRY	COVENTRY	COVENTRY
Determinand	**Accred.**	**SOP**	**Units**	**LOD**			
Aromatic TPH >C8-C10	N	2680	mg/kg	1.0		[B] < 1.0	
Aromatic TPH >C10-C12	N	2680	mg/kg	1.0		[B] < 1.0	
Aromatic TPH >C12-C16	N	2680	mg/kg	1.0		[B] < 1.0	
Aromatic TPH >C16-C21	N	2680	mg/kg	1.0		[B] < 1.0	
Aromatic TPH >C21-C35	N	2680	mg/kg	1.0		[B] 20	
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0		[B] < 1.0	
Total Aromatic Hydrocarbons	N	2680	mg/kg	5.0		[B] 20	
Total Petroleum Hydrocarbons	N	2680	mg/kg	10.0		[B] 39	
Naphthalene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Acenaphthylene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Acenaphthene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Fluorene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Phenanthrene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Anthracene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Fluoranthene	U	2700	mg/kg	0.10	0.35	0.28	0.26
Pyrene	U	2700	mg/kg	0.10	0.25	0.29	0.28
Benzo[a]anthracene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Chrysene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Benzo[b]fluoranthene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Benzo[k]fluoranthene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Benzo[a]pyrene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Indeno(1,2,3-c,d)Pyrene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Dibenz(a,h)Anthracene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Benzo[g,h,i]perylene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Total Of 16 PAH's	U	2700	mg/kg	2.0	< 2.0	< 2.0	< 2.0
Benzene	U	2760	µg/kg	1.0		[B] < 1.0	
Toluene	U	2760	µg/kg	1.0		[B] < 1.0	
Ethylbenzene	U	2760	µg/kg	1.0		[B] < 1.0	
m & p-Xylene	U	2760	µg/kg	1.0		[B] < 1.0	
o-Xylene	U	2760	µg/kg	1.0		[B] < 1.0	
Methyl Tert-Butyl Ether	U	2760	µg/kg	1.0		[B] < 1.0	
Total Phenols	U	2920	mg/kg	0.10	< 0.10	< 0.10	< 0.10

Deviations

In accordance with UKAS Policy on Deviating Samples TPS 63. Chemtest have a procedure to ensure 'upon receipt of each sample a competent laboratory shall assess whether the sample is suitable with regard to the requested test(s)'. This policy and the respective holding times applied, can be supplied upon request.The reason a sample is declared as deviating is detailed below. Where applicable the analysis remains UKAS/MCERTs accredited but the results may be compromised.

Sample:	Sample Ref:	Sample ID:	Sample Location:	Sampled Date:	Deviation Code(s):	Containers Received:
1687802	1		CP01	18-Jul-2023	B	Amber Glass 250ml
1687802	1		CP01	18-Jul-2023	B	Amber Glass 60ml
1687802	1		CP01	18-Jul-2023	B	Plastic Tub 1000g
1687803	1		CP02	21-Jul-2023	B	Amber Glass 250ml
1687803	1		CP02	21-Jul-2023	B	Amber Glass 60ml
1687803	1		CP02	21-Jul-2023	B	Plastic Tub 1000g
1687804	1		CP03	20-Jul-2023	B	Amber Glass 250ml
1687804	1		CP03	20-Jul-2023	B	Amber Glass 60ml
1687804	1		CP03	20-Jul-2023	B	Plastic Tub 1000g

Test Methods

SOP	Title	Parameters included	Method summary
2010	pH Value of Soils	pH	pH Meter
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.
2040	Soil Description(Requirement of MCERTS)	Soil description	As received soil is described based upon BS5930
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES
2175	Total Sulphur in Soils	Total Sulphur	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2192	Asbestos	Asbestos	Polarised light microscopy / Gravimetry
2220	Water soluble Chloride in Soils	Chloride	Aqueous extraction and measuremernt by 'Aquakem 600' Discrete Analyser using ferric nitrate / mercuric thiocyanate.
2300	Cyanides & Thiocyanate in Soils	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Allkaline extraction followed by colorimetric determination using Automated Flow Injection Analyser.
2325	Sulphide in Soils	Sulphide	Steam distillation with sulphuric acid / analysis by 'Aquakem 600' Discrete Analyser, using N,N–dimethyl-p-phenylenediamine.
2425	Extractable Ammonium in soils	Ammonium	Extraction with potassium chloride solution / analysis by 'Aquakem 600' Discrete Analyser using sodium salicylate and sodium dichloroisocyanurate.
2430	Total Sulphate in soils	Total Sulphate	Acid digestion followed by determination of sulphate in extract by ICP-OES.
2455	Acid Soluble Metals in Soils	Metals, including: Arsenic; Barium; Beryllium; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Vanadium; Zinc	Acid digestion followed by determination of metals in extract by ICP-MS.
2490	Hexavalent Chromium in Soils	Chromium [VI]	Soil extracts are prepared by extracting dried and ground soil samples into boiling water. Chromium [VI] is determined by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazide.
2625	Total Organic Carbon in Soils	Total organic Carbon (TOC)	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2670	Total Petroleum Hydrocarbons (TPH) in Soils by GC-FID	TPH (C6–C40); optional carbon banding, e.g. 3-band – GRO, DRO & LRO*TPH C8–C40	Dichloromethane extraction / GC-FID
2680	TPH A/A Split	Aliphatics: >C5–C6, >C6–C8,>C8–C10, >C10–C12, >C12–C16, >C16–C21, >C21–C35, >C35– C44Aromatics: >C5–C7, >C7–C8, >C8– C10, >C10–C12, >C12–C16, >C16– C21, >C21– C35, >C35– C44	Dichloromethane extraction / GCxGC FID detection
2700	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-FID	Acenaphthene; Acenaphthylene; Anthracene; Benzo[a]Anthracene; Benzo[a]Pyrene; Benzo[b]Fluoranthene; Benzo[ghi]Perylene; Benzo[k]Fluoranthene; Chrysene; Dibenz[ah]Anthracene; Fluoranthene; Fluorene; Indeno[123cd]Pyrene; Naphthalene; Phenanthrene; Pyrene	Dichloromethane extraction / GC-FID (GC-FID detection is non-selective and can be subject to interference from co-eluting compounds)
2760	Volatile Organic Compounds (VOCs) in Soils by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics.(cf. USEPA Method 8260)*please refer to UKAS schedule	Automated headspace gas chromatographic (GC) analysis of a soil sample, as received, with mass spectrometric (MS) detection of volatile organic compounds.

Test Methods

SOP	Title	Parameters included	Method summary
2920	Phenols in Soils by HPLC	Phenolic compounds including Resorcinol, Phenol, Methylphenols, Dimethylphenols, 1-Naphthol and TrimethylphenolsNote: chlorophenols are excluded.	60:40 methanol/water mixture extraction, followed by HPLC determination using electrochemical detection.

Report Information

Key

U	UKAS accredited
M	MCERTS and UKAS accredited
N	Unaccredited
S	This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
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<	"less than"
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Uncertainty of measurement for the determinands tested are available upon request
None of the results in this report have been recovery corrected
All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis
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Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

A - Date of sampling not supplied
B - Sample age exceeds stability time (sampling to extraction)
C - Sample not received in appropriate containers
D - Broken Container
E - Insufficient Sample (Applies to LOI in Trommel Fines Only)

Sample Retention and Disposal

All soil samples will be retained for a period of 30 days from the date of receipt
All water samples will be retained for 14 days from the date of receipt
Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:
customerservices@chemtest.com

Waste Classification Report

HazWasteOnline™ classifies waste as either **hazardous** or **non-hazardous** based on its chemical composition, related legislation and the rules and data defined in the current UK or EU technical guidance (Appendix C) (note that HP 9 Infectious is not assessed). It is the responsibility of the classifier named below to:

a) understand the origin of the waste
b) select the correct List of Waste code(s)
c) confirm that the list of determinands, results and sampling plan are fit for purpose
d) select and justify the chosen metal species (Appendix B)
e) correctly apply moisture correction and other available corrections
f) add the meta data for their user-defined substances (Appendix A)
g) check that the classification engine is suitable with respect to the national destination of the waste (Appendix C)

To aid the reviewer, the laboratory results, assumptions and justifications managed by the classifier are highlighted in pale yellow.

9TXRY-4NI4W-8W6XA

Job name

HWOL_23-27172-20231016 172702

Description/Comments

Project

PO-23-014

Site

Boorley Gardens

Classified by

Name:
Steven Hill
Date:
16 Oct 2023 16:53 GMT
Telephone:
01647 252414

Company:
TFW Group Ltd t/a Terra Firma (South)
The Slate Barn
Lower Lowley
Dunsford
EX6 7BP

HazWasteOnline™ provides a two day, hazardous waste classification course that covers the use of the software and both basic and advanced waste classification techniques. Certification has to be renewed every 3 years.

HazWasteOnline™ Certification: -

Course	Date
Hazardous Waste Classification	50% complete

Purpose of classification

2 - Material Characterisation

Address of the waste

Boorley Gardens **Post Code** N/A

SIC for the process giving rise to the waste

41201 Construction of commercial buildings

Description of industry/producer giving rise to the waste

Site Development

Description of the specific process, sub-process and/or activity that created the waste

Waste created during groundworks

Description of the waste

made ground / natural

Job summary

#	Sample name	Depth [m]	Classification Result	Hazard properties	Page
1	CP01-1-18/07/2023-1.30	1.30	Non Hazardous		3
2	CP02-1-21/07/2023-0.40	0.40	Non Hazardous		5
3	CP03-1-20/07/2023-1.40	1.40	Non Hazardous		8

Related documents

#	Name	Description
1	HWOL_23-27172-20231016 172702.hwol	Eurofins Chemtest .hwol file used to populate the Job
2	Example waste stream template for contaminated soils	waste stream template used to create this Job

Report

Created by: Steven Hill

Created date: 16 Oct 2023 16:53 GMT

Appendices	Page
Appendix A: Classifier defined and non GB MCL determinands	10
Appendix B: Rationale for selection of metal species	11
Appendix C: Version	12

Classification of sample: CP01-1-18/07/2023-1.30

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:
CP01-1-18/07/2023-1.30
Sample Depth:
1.30 m
Moisture content:
21%
(wet weight correction)

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 21% Wet Weight Moisture Correction applied (MC)

#		Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
1		arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		4	mg/kg	1.32	4.172	mg/kg	0.000417 %	✓	
2		cadmium { cadmium oxide }	048-002-00-0	215-146-2	1306-19-0		<0.1	mg/kg	1.142	<0.114	mg/kg	<0.0000114 %		<LOD
3		chromium in chromium(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		11	mg/kg	1.462	12.701	mg/kg	0.00127 %	✓	
4		chromium in chromium(VI) compounds { chromium (VI) compounds, with the exception of barium chromate and of compounds specified elsewhere in this Annex }	024-017-00-8				<0.5	mg/kg	2.27	<1.135	mg/kg	<0.000113 %		<LOD
5		copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		12	mg/kg	1.126	10.673	mg/kg	0.00107 %	✓	
6		lead { lead chromate }	082-004-00-2	231-846-0	7758-97-6	1	37	mg/kg	1.56	45.593	mg/kg	0.00292 %	✓	
7		mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		0.35	mg/kg	1.353	0.374	mg/kg	0.0000374 %	✓	
8		nickel { nickel chromate }	028-035-00-7	238-766-5	14721-18-7		3	mg/kg	2.976	7.054	mg/kg	0.000705 %	✓	
9		selenium { nickel selenate }	028-031-00-5	239-125-2	15060-62-5		<0.25	mg/kg	2.554	<0.638	mg/kg	<0.0000638 %		<LOD
10		zinc { zinc chromate }	024-007-00-3	236-878-9	13530-65-9		43	mg/kg	2.774	94.238	mg/kg	0.00942 %	✓	
11		TPH (C6 to C40) petroleum group			TPH		<10	mg/kg		<10	mg/kg	<0.001 %		<LOD
12		cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }	006-007-00-5				<0.5	mg/kg	1.884	<0.942	mg/kg	<0.0000942 %		<LOD
13		pH			PH		6.9	pH		6.9	pH	6.9 pH		
14		naphthalene	601-052-00-2	202-049-5	91-20-3		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		EU CLP index number	EC Number	CAS Number									
15	•	acenaphthylene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		**<LOD**
			205-917-1	208-96-8									
16	•	acenaphthene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		**<LOD**
			201-469-6	83-32-9									
17	•	fluorene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		**<LOD**
			201-695-5	86-73-7									
18	•	phenanthrene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		**<LOD**
			201-581-5	85-01-8									
19	•	anthracene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		**<LOD**
			204-371-1	120-12-7									
20	•	fluoranthene				0.35	mg/kg		0.276	mg/kg	0.0000276 %	✓	
			205-912-4	206-44-0									
21	•	pyrene				0.25	mg/kg		0.198	mg/kg	0.0000198 %	✓	
			204-927-3	129-00-0									
22		benzo[a]anthracene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		**<LOD**
		601-033-00-9	200-280-6	56-55-3									
23		chrysene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		**<LOD**
		601-048-00-0	205-923-4	218-01-9									
24		benzo[b]fluoranthene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		**<LOD**
		601-034-00-4	205-911-9	205-99-2									
25		benzo[k]fluoranthene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		**<LOD**
		601-036-00-5	205-916-6	207-08-9									
26		benzo[a]pyrene; benzo[def]chrysene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		**<LOD**
		601-032-00-3	200-028-5	50-32-8									
27	•	indeno[123-cd]pyrene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		**<LOD**
			205-893-2	193-39-5									
28		dibenz[a,h]anthracene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		**<LOD**
		601-041-00-2	200-181-8	53-70-3									
29	•	benzo[ghi]perylene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		**<LOD**
			205-883-8	191-24-2									
30		sulfur { sulfur }				<100	mg/kg		<100	mg/kg	<0.01 %		**<LOD**
		016-094-00-1	231-722-6	7704-34-9									
31		ammonia, anhydrous				10	mg/kg		7.9	mg/kg	0.00079 %	✓	
		007-001-00-5	231-635-3	7664-41-7									
32	•	monohydric phenols				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		**<LOD**
				P1186									
										Total:	0.0281 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
•	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
CLP: Note 1	Only the metal concentration has been used for classification

Supplementary Hazardous Property Information

HP 3(iv): Flammable "flammable gaseous waste: gaseous waste which is flammable in air at 20°C and a standard pressure of 101.3 kPa"

Force this Hazardous property to non hazardous because Non flamable <15.15%

Hazard Statements hit:

Flam. Gas 2; H221 "Flammable gas."

Because of determinand:

ammonia, anhydrous: (conc.: 0.00079%)

Classification of sample: CP02-1-21/07/2023-0.40

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:
CP02-1-21/07/2023-0.40
Sample Depth:
0.40 m
Moisture content:
19%
(wet weight correction)

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 19% Wet Weight Moisture Correction applied (MC)

#		Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
1		arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		3.4	mg/kg	1.32	3.636	mg/kg	0.000364 %	✓	
2		cadmium { cadmium oxide }	048-002-00-0	215-146-2	1306-19-0		<0.1	mg/kg	1.142	<0.114	mg/kg	<0.0000114 %		<LOD
3		chromium in chromium(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		8.6	mg/kg	1.462	10.181	mg/kg	0.00102 %	✓	
4		chromium in chromium(VI) compounds { chromium (VI) compounds, with the exception of barium chromate and of compounds specified elsewhere in this Annex }	024-017-00-8				<0.5	mg/kg	2.27	<1.135	mg/kg	<0.000113 %		<LOD
5		copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		9.5	mg/kg	1.126	8.664	mg/kg	0.000866 %	✓	
6		lead { lead chromate }	082-004-00-2	231-846-0	7758-97-6	1	34	mg/kg	1.56	42.957	mg/kg	0.00275 %	✓	
7		mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		0.23	mg/kg	1.353	0.252	mg/kg	0.0000252 %	✓	
8		nickel { nickel chromate }	028-035-00-7	238-766-5	14721-18-7		2.5	mg/kg	2.976	6.027	mg/kg	0.000603 %	✓	
9		selenium { nickel selenate }	028-031-00-5	239-125-2	15060-62-5		<0.25	mg/kg	2.554	<0.638	mg/kg	<0.0000638 %		<LOD
10		zinc { zinc chromate }	024-007-00-3	236-878-9	13530-65-9		35	mg/kg	2.774	78.647	mg/kg	0.00786 %	✓	
11		TPH (C6 to C40) petroleum group			TPH		<10	mg/kg		<10	mg/kg	<0.001 %		<LOD
12		tert-butyl methyl ether; MTBE; 2-methoxy-2-methylpropane	603-181-00-X	216-653-1	1634-04-4		<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<LOD
13		benzene	601-020-00-8	200-753-7	71-43-2		<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<LOD
14		toluene	601-021-00-3	203-625-9	108-88-3		<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<LOD
15		ethylbenzene	601-023-00-4	202-849-4	100-41-4		<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<LOD

#		Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
16		xylene	601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]		<0.002	mg/kg		<0.002	mg/kg	<0.0000002 %		**<LOD**
17		cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }	006-007-00-5				<0.5	mg/kg	1.884	<0.942	mg/kg	<0.0000942 %		**<LOD**
18		pH			PH		6.6	pH		6.6	pH	6.6 pH		
19		naphthalene	601-052-00-2	202-049-5	91-20-3		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		**<LOD**
20		acenaphthylene		205-917-1	208-96-8		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		**<LOD**
21		acenaphthene		201-469-6	83-32-9		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		**<LOD**
22		fluorene		201-695-5	86-73-7		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		**<LOD**
23		phenanthrene		201-581-5	85-01-8		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		**<LOD**
24		anthracene		204-371-1	120-12-7		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		**<LOD**
25		fluoranthene		205-912-4	206-44-0		0.28	mg/kg		0.227	mg/kg	0.0000227 %	✓	
26		pyrene		204-927-3	129-00-0		0.29	mg/kg		0.235	mg/kg	0.0000235 %	✓	
27		benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		**<LOD**
28		chrysene	601-048-00-0	205-923-4	218-01-9		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		**<LOD**
29		benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		**<LOD**
30		benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		**<LOD**
31		benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		**<LOD**
32		indeno[123-cd]pyrene		205-893-2	193-39-5		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		**<LOD**
33		dibenz[a,h]anthracene	601-041-00-2	200-181-8	53-70-3		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		**<LOD**
34		benzo[ghi]perylene		205-883-8	191-24-2		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		**<LOD**
35		sulfur { sulfur }	016-094-00-1	231-722-6	7704-34-9		<100	mg/kg		<100	mg/kg	<0.01 %		**<LOD**
36		ammonia, anhydrous	007-001-00-5	231-635-3	7664-41-7		9.3	mg/kg		7.533	mg/kg	0.000753 %	✓	
37		monohydric phenols			P1186		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		**<LOD**
											Total:	0.0257 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
CLP: Note 1	Only the metal concentration has been used for classification

Supplementary Hazardous Property Information

HP 3(iv): Flammable "flammable gaseous waste: gaseous waste which is flammable in air at 20°C and a standard pressure of 101.3 kPa"

Force this Hazardous property to non hazardous because Non flamable <15.15%

Hazard Statements hit:

Flam. Gas 2; H221 "Flammable gas."

Because of determinand:

ammonia, anhydrous: (conc.: 0.00075%)

Classification of sample: CP03-1-20/07/2023-1.40

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:
CP03-1-20/07/2023-1.40
Sample Depth:
1.40 m
Moisture content:
18%
(wet weight correction)

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 18% Wet Weight Moisture Correction applied (MC)

#		Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
1		arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		4.1	mg/kg	1.32	4.439	mg/kg	0.000444 %	✓	
2		cadmium { cadmium oxide }	048-002-00-0	215-146-2	1306-19-0		<0.1	mg/kg	1.142	<0.114	mg/kg	<0.0000114 %		<LOD
3		chromium in chromium(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		11	mg/kg	1.462	13.183	mg/kg	0.00132 %	✓	
4		chromium in chromium(VI) compounds { chromium (VI) compounds, with the exception of barium chromate and of compounds specified elsewhere in this Annex }	024-017-00-8				<0.5	mg/kg	2.27	<1.135	mg/kg	<0.000113 %		<LOD
5		copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		12	mg/kg	1.126	11.079	mg/kg	0.00111 %	✓	
6		lead { lead chromate }	082-004-00-2	231-846-0	7758-97-6	1	39	mg/kg	1.56	49.883	mg/kg	0.0032 %	✓	
7		mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		0.28	mg/kg	1.353	0.311	mg/kg	0.0000311 %	✓	
8		nickel { nickel chromate }	028-035-00-7	238-766-5	14721-18-7		3.4	mg/kg	2.976	8.298	mg/kg	0.00083 %	✓	
9		selenium { nickel selenate }	028-031-00-5	239-125-2	15060-62-5		<0.25	mg/kg	2.554	<0.638	mg/kg	<0.0000638 %		<LOD
10		zinc { zinc chromate }	024-007-00-3	236-878-9	13530-65-9		44	mg/kg	2.774	100.091	mg/kg	0.01 %	✓	
11		TPH (C6 to C40) petroleum group			TPH		<10	mg/kg		<10	mg/kg	<0.001 %		<LOD
12		cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }	006-007-00-5				<0.5	mg/kg	1.884	<0.942	mg/kg	<0.0000942 %		<LOD
13		pH			PH		6.8	pH		6.8	pH	6.8 pH		
14		naphthalene	601-052-00-2	202-049-5	91-20-3		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD

#		Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
15	•	acenaphthylene		205-917-1	208-96-8		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		**<LOD**
16	•	acenaphthene		201-469-6	83-32-9		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		**<LOD**
17	•	fluorene		201-695-5	86-73-7		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		**<LOD**
18	•	phenanthrene		201-581-5	85-01-8		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		**<LOD**
19	•	anthracene		204-371-1	120-12-7		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		**<LOD**
20	•	fluoranthene		205-912-4	206-44-0		0.26	mg/kg		0.213	mg/kg	0.0000213 %	✓	
21	•	pyrene		204-927-3	129-00-0		0.28	mg/kg		0.23	mg/kg	0.000023 %	✓	
22		benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		**<LOD**
23		chrysene	601-048-00-0	205-923-4	218-01-9		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		**<LOD**
24		benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		**<LOD**
25		benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		**<LOD**
26		benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		**<LOD**
27	•	indeno[123-cd]pyrene		205-893-2	193-39-5		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		**<LOD**
28		dibenz[a,h]anthracene	601-041-00-2	200-181-8	53-70-3		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		**<LOD**
29	•	benzo[ghi]perylene		205-883-8	191-24-2		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		**<LOD**
30		sulfur { sulfur }	016-094-00-1	231-722-6	7704-34-9		250	mg/kg		205	mg/kg	0.0205 %	✓	
31		ammonia, anhydrous	007-001-00-5	231-635-3	7664-41-7		8.6	mg/kg		7.052	mg/kg	0.000705 %	✓	
32	•	monohydric phenols			P1186		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		**<LOD**
											Total:	0.0396 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
•	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
CLP: Note 1	Only the metal concentration has been used for classification

Supplementary Hazardous Property Information

HP 3(iv): Flammable "flammable gaseous waste: gaseous waste which is flammable in air at 20°C and a standard pressure of 101.3 kPa"

Force this Hazardous property to non hazardous because Non flamable <15.15%

Hazard Statements hit:

Flam. Gas 2; H221 "Flammable gas."

Because of determinand:

ammonia, anhydrous: (conc.: 0.0007%)

Appendix A: Classifier defined and non GB MCL determinands

- **chromium(III) oxide (worst case)** (EC Number: 215-160-9, CAS Number: 1308-38-9)

Description/Comments: Data from C&L Inventory Database
Data source: https://echa.europa.eu/information-on-chemicals/cl-inventory-database/-/discli/details/33806
Data source date: 17 Jul 2015
Hazard Statements: Acute Tox. 4; H332 , Acute Tox. 4; H302 , Eye Irrit. 2; H319 , STOT SE 3; H335 , Skin Irrit. 2; H315 , Resp. Sens. 1; H334 , Skin Sens. 1; H317 , Repr. 1B; H360FD , Aquatic Acute 1; H400 , Aquatic Chronic 1; H410

- **TPH (C6 to C40) petroleum group** (CAS Number: TPH)

Description/Comments: Hazard statements taken from WM3 1st Edition 2015; Risk phrases: WM2 3rd Edition 2013
Data source: WM3 1st Edition 2015
Data source date: 25 May 2015
Hazard Statements: Flam. Liq. 3; H226 , Asp. Tox. 1; H304 , STOT RE 2; H373 , Muta. 1B; H340 , Carc. 1B; H350 , Repr. 2; H361d , Aquatic Chronic 2; H411

- **salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex**

GB MCL index number: 006-007-00-5
Description/Comments: Conversion factor based on a worst case compound: sodium cyanide
Additional Hazard Statement(s): EUH032 >= 0.2 %
Reason for additional Hazards Statement(s):
20 Nov 2021 - EUH032 >= 0.2 % hazard statement sourced from: WM3, Table C12.2

- **pH** (CAS Number: PH)

Description/Comments: Appendix C4
Data source: WM3 1st Edition 2015
Data source date: 25 May 2015
Hazard Statements: None.

- **acenaphthylene** (EC Number: 205-917-1, CAS Number: 208-96-8)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 17 Jul 2015
Hazard Statements: Acute Tox. 4; H302 , Acute Tox. 1; H330 , Acute Tox. 1; H310 , Eye Irrit. 2; H319 , STOT SE 3; H335 , Skin Irrit. 2; H315

- **acenaphthene** (EC Number: 201-469-6, CAS Number: 83-32-9)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 17 Jul 2015
Hazard Statements: Eye Irrit. 2; H319 , STOT SE 3; H335 , Skin Irrit. 2; H315 , Aquatic Acute 1; H400 , Aquatic Chronic 1; H410 , Aquatic Chronic 2; H411

- **fluorene** (EC Number: 201-695-5, CAS Number: 86-73-7)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 06 Aug 2015
Hazard Statements: Aquatic Acute 1; H400 , Aquatic Chronic 1; H410

- **phenanthrene** (EC Number: 201-581-5, CAS Number: 85-01-8)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 06 Aug 2015
Hazard Statements: Acute Tox. 4; H302 , Eye Irrit. 2; H319 , STOT SE 3; H335 , Carc. 2; H351 , Skin Sens. 1; H317 , Aquatic Acute 1; H400 , Aquatic Chronic 1; H410 , Skin Irrit. 2; H315

- **anthracene** (EC Number: 204-371-1, CAS Number: 120-12-7)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 17 Jul 2015
Hazard Statements: Eye Irrit. 2; H319 , STOT SE 3; H335 , Skin Irrit. 2; H315 , Skin Sens. 1; H317 , Aquatic Acute 1; H400 , Aquatic Chronic 1; H410

- **fluoranthene** (EC Number: 205-912-4, CAS Number: 206-44-0)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 21 Aug 2015
Hazard Statements: Acute Tox. 4; H302 , Aquatic Acute 1; H400 , Aquatic Chronic 1; H410

- **pyrene** (EC Number: 204-927-3, CAS Number: 129-00-0)

Description/Comments: Data from C&L Inventory Database; SDS Sigma Aldrich 2014
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 21 Aug 2015
Hazard Statements: Skin Irrit. 2; H315 , Eye Irrit. 2; H319 , STOT SE 3; H335 , Aquatic Acute 1; H400 , Aquatic Chronic 1; H410

- **indeno[123-cd]pyrene** (EC Number: 205-893-2, CAS Number: 193-39-5)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 06 Aug 2015
Hazard Statements: Carc. 2; H351

- **benzo[ghi]perylene** (EC Number: 205-883-8, CAS Number: 191-24-2)

Description/Comments: Data from C&L Inventory Database; SDS Sigma Aldrich 28/02/2015
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 23 Jul 2015
Hazard Statements: Aquatic Acute 1; H400 , Aquatic Chronic 1; H410

- **monohydric phenols** (CAS Number: P1186)

Description/Comments: Combined hazards statements from harmonised entries in CLP for phenol, cresols and xylenols (604-001-00-2, 604-004-00-9, 604-006-00-X)
Data source: CLP combined data
Data source date: 26 Mar 2019
Hazard Statements: Muta. 2; H341 , Acute Tox. 3; H331 , Acute Tox. 3; H311 , Acute Tox. 3; H301 , STOT RE 2; H373 , Skin Corr. 1B; H314 , Skin Corr. 1B; H314 >= 3 % , Skin Irrit. 2; H315 1 £ conc. < 3 % , Eye Irrit. 2; H319 1 £ conc. < 3 % , Aquatic Chronic 2; H411

- **ethylbenzene** (EC Number: 202-849-4, CAS Number: 100-41-4)

GB MCL index number: 601-023-00-4
Description/Comments:
Additional Hazard Statement(s): Carc. 2; H351
Reason for additional Hazards Statement(s):
20 Nov 2021 - Carc. 2; H351 hazard statement sourced from: IARC Group 2B (77) 2000

Appendix B: Rationale for selection of metal species

arsenic {arsenic trioxide}

Reasonable case CLP species based on hazard statements/molecular weight and most common (stable) oxide of arsenic. Industrial sources include: smelting; main precursor to other arsenic compounds (edit as required)

cadmium {cadmium oxide}

Reasonable case CLP species based on hazard statements/molecular weight, very low solubility in water. Industrial sources include: electroplating baths, electrodes for storage batteries, catalysts, ceramic glazes, phosphors, pigments and nematocides. (edit as required) Worst case compounds in CLP: cadmium sulphate, chloride, fluoride & iodide not expected as either very soluble and/or compound's industrial usage not related to site history (edit as required)

chromium in chromium(III) compounds {chromium(III) oxide (worst case)}

Reasonable case species based on hazard statements/molecular weight. Industrial sources include: tanning, pigment in paint, inks and glass (edit as required)

chromium in chromium(VI) compounds {chromium (VI) compounds, with the exception of barium chromate and of compounds specified elsewhere in this Annex}

Worst case species based on hazard statements/molecular weight (edit as required)

copper {dicopper oxide; copper (I) oxide}

Reasonable case CLP species based on hazard statements/molecular weight and insolubility in water. Industrial sources include: oxidised copper metal, brake pads, pigments, antifouling paints, fungicide. (edit as required) Worse case copper sulphate is very soluble and likely to have been leached away if ever present and/or not enough soluble sulphate detected. (edit as required)

lead {lead chromate}

Worst case CLP species based on hazard statements/molecular weight (edit as required)

mercury {mercury dichloride}

Worst case CLP species based on hazard statements/molecular weight (edit as required)

nickel {nickel chromate}

Worst case CLP species based on hazard statements/molecular weight (edit as required)

selenium {nickel selenate}

Worst case CLP species based on hazard statements/molecular weight (edit as required)

zinc {zinc chromate}

Worst case CLP species based on hazard statements/molecular weight (edit as required)

cyanides {salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex}

Harmonised group entry used as most reasonable case as complex cyanides and those specified elsewhere in the annex are not likely to be present in this soil: [Note conversion factor based on a worst case compound: sodium cyanide] (edit as required)

sulfur {sulfur}

Most likely species

Appendix C: Version

HazWasteOnline Classification Engine: WM3 1st Edition v1.2.GB - Oct 2021
HazWasteOnline Classification Engine Version: 2023.289.5779.10675 (16 Oct 2023)
HazWasteOnline Database: 2023.283.5774.10667 (10 Oct 2023)

This classification utilises the following guidance and legislation:
WM3 v1.2.GB - Waste Classification - 1st Edition v1.2.GB - Oct 2021
CLP Regulation - Regulation 1272/2008/EC of 16 December 2008
1st ATP - Regulation 790/2009/EC of 10 August 2009
2nd ATP - Regulation 286/2011/EC of 10 March 2011
3rd ATP - Regulation 618/2012/EU of 10 July 2012
4th ATP - Regulation 487/2013/EU of 8 May 2013
Correction to 1st ATP - Regulation 758/2013/EU of 7 August 2013
5th ATP - Regulation 944/2013/EU of 2 October 2013
6th ATP - Regulation 605/2014/EU of 5 June 2014
WFD Annex III replacement - Regulation 1357/2014/EU of 18 December 2014
Revised List of Waste 2014 - Decision 2014/955/EU of 18 December 2014
7th ATP - Regulation 2015/1221/EU of 24 July 2015
8th ATP - Regulation (EU) 2016/918 of 19 May 2016
9th ATP - Regulation (EU) 2016/1179 of 19 July 2016
10th ATP - Regulation (EU) 2017/776 of 4 May 2017
HP14 amendment - Regulation (EU) 2017/997 of 8 June 2017
13th ATP - Regulation (EU) 2018/1480 of 4 October 2018
14th ATP - Regulation (EU) 2020/217 of 4 October 2019
15th ATP - Regulation (EU) 2020/1182 of 19 May 2020
The Chemicals (Health and Safety) and Genetically Modified Organisms (Contained Use)(Amendment etc.) (EU Exit) Regulations 2020 - UK: 2020 No. 1567 of 16th December 2020
The Waste and Environmental Permitting etc. (Legislative Functions and Amendment etc.) (EU Exit) Regulations 2020 - UK: 2020 No. 1540 of 16th December 2020
GB MCL List - version 1.1 of 09 June 2021

Annex C: Soil Property Test Results

Laboratory Report

UKAS TESTING 2788

GSTL
GEOTECHNICAL SITE & TESTING LABORATORIES
A PHENNA GROUP COMPANY

Contract Number: 67887

Client Ref: **PO-23-014**
Client PO: **PO-23-014**

Date Received: **02-08-2023**
Date Completed: **31-08-2023**
Report Date: **31-08-2023**

Client: **Terrafirma South**
The Slate Barn
Lower Lowley
Dunsford
Exeter
EX6 7BP

This report has been checked and approved by:

[redacted]

Brendan Evans
Office Administrator

Contract Title: **Boorley Green School**
For the attention of: **Steven Hill**

Test Description	Qty
Moisture Content BS 1377:1990 - Part 2 : 3.2 - * UKAS	25
4 Point Liquid & Plastic Limit BS 1377:1990 - Part 2 : 4.3 & 5.3 - * UKAS	25
Particle Density (Gas Jar) BS 1377:1990 - Part 2 : 8.2 - * UKAS	2
PSD Wet Sieve method BS 1377:1990 - Part 2 : 9.2 - * UKAS	7
PSD: Sedimentation by pipette carried out with Wet Sieve (Wet Sieve must also be selected) BS 1377:1990 - Part 2 : 9.4 - * UKAS	7
BRE Suite D Brownfield Site (pyrite present) **includes pH, water & acid soluble sulphate, total sulphur, magnesium, chloride and nitrate** Sub-contracted Test	8
Dry Den/MC (2.5kg Rammer Method 1 litre mould/CBR Mould) BS 1377:1990 - Part 4 : 3.4 - * UKAS	1

Notes: **Observations and Interpretations are outside the UKAS Accreditation**
*** - denotes test included in laboratory scope of accreditation**
 # - denotes test carried out by approved contractor
@ - denotes non accredited tests

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 test report/certificate shall not be reproduced except in full, without the approval of GEO Site & Testing Services Ltd. Any opinions or interpretations stated - within this report/certificate are excluded from the laboratories UKAS accreditation.

Approved Signatories:
Brendan Evans (Office Administrator) - Darren Bourne (Quality Senior Technician) - Paul Evans (Director)
Richard John (Quality/Technical Manager) - Shaun Jones (Laboratory manager) - Shaun Thomas (Site Manager)
Wayne Honey (Human Resources/ Health and Safety Manager)

GEO Site & Testing Services Ltd
Units 3-4, Heol Aur, Dafen, Llanelli, Carmarthenshire, Wales SA14 8QN
Tel: 01554 784040 Fax: 01554 784041 info@gstl.co.uk gstl.co.uk

Laboratory Report

UKAS TESTING 2788

GSTL GEOTECHNICAL SITE & TESTING LABORATORIES A PHENNA GROUP COMPANY

Contract Number: 67887

Test Description	Qty
MCV at as received Moisture Content BS 1377:1990 - Part 4 : 5.4 - * UKAS	1
Quick Undrained Triaxial Compression test - single specimen at one confining pressure (100mm or 38mm diameter) BS 1377:1990 - Part 7 : 8 - * UKAS	7
Direct Shearbox - set of 3 - 60 x 60mm (3 days) BS 1377:1990 - Part 7 : 4 - * UKAS	8
Disposal of samples for job	1

Notes: **Observations and Interpretations are outside the UKAS Accreditation**
*** - denotes test included in laboratory scope of accreditation**
 # - denotes test carried out by approved contractor
@ - denotes non accredited tests

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Brendan Evans (Office Administrator) - Darren Bourne (Quality Senior Technician) - Paul Evans (Director)
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Wayne Honey (Human Resources/ Health and Safety Manager)

GEO Site & Testing Services Ltd
Units 3-4, Heol Aur, Dafen, Llanelli, Carmarthenshire, Wales SA14 8QN
Tel: 01554 784040 Fax: 01554 784041 info@gstl.co.uk gstl.co.uk

GSTL GEOTECHNICAL SITE & TESTING LABORATORIES	NATURAL MOISTURE, LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX (BS 1377:1990 - Part 2 : 4.3 & 5.3)	
Contract Number	67887	
Project Name	Boorley Green School	
Date Tested	14/08/2023	
	DESCRIPTIONS	

Sample/Hole Reference	Sample Number	Sample Type	Depth (m)			Descriptions
CP01	6	U	2.00	-	2.45	Brown clayey SILT
CP01	11	U	4.00	-	4.45	Brown clayey SILT
CP01	36	UT	6.00	-	6.45	Brown silty CLAY
CP01	37	UT	9.00	-	9.45	Brown silty CLAY
CP02	3	U	1.20	-	1.65	Brown sandy silty CLAY
CP02	8	U	3.00	-	3.45	Brown clayey SILT
CP02	25	B	10.50	-	10.95	Brown slightly sandy silty CLAY
CP02	35	B	16.50	-	16.95	Brown fine to coarse sandy silty CLAY
CP02	34	D	16.50	-	16.95	Brown silty CLAY
CP03	3	U	1.20	-	1.65	Brown silty CLAY
CP03	7	SPTLS	2.00	-	2.45	Brown slightly gravelly fine to coarse sandy silty CLAY
CP03	10	B	4.00	-	4.45	Brown slightly sandy clayey SILT
CP03	13	U	5.00	-	5.45	Brown silty CLAY
CP03	18	U	7.50	-	7.95	Brown silty CLAY
CP03	30	B	13.50	-	13.95	Brown slightly gravelly fine to coarse sandy silty CLAY
CP03	36	B	16.50	-	16.95	Brown fine to coarse sandy silty CLAY
WS103	6	D	0.80	-		Brown silty CLAY
WS104	10	D	0.80	-	1.00	Brown silty CLAY
CP01	28	B	1.20	-	1.65	Brown fine to coarse gravelly fine to coarse sandy silty CLAY
CP01		B	12.00	-		Brown fine to medium gravelly silty CLAY
CP01		B	15.00	-		Brown fine to medium gravelly silty CLAY
CP02		B	5.00	-		Brown fine to medium gravelly silty CLAY
CP02		B	9.00	-		Brown silty CLAY
CP02		B	13.50	-	14.00	Brown silty CLAY

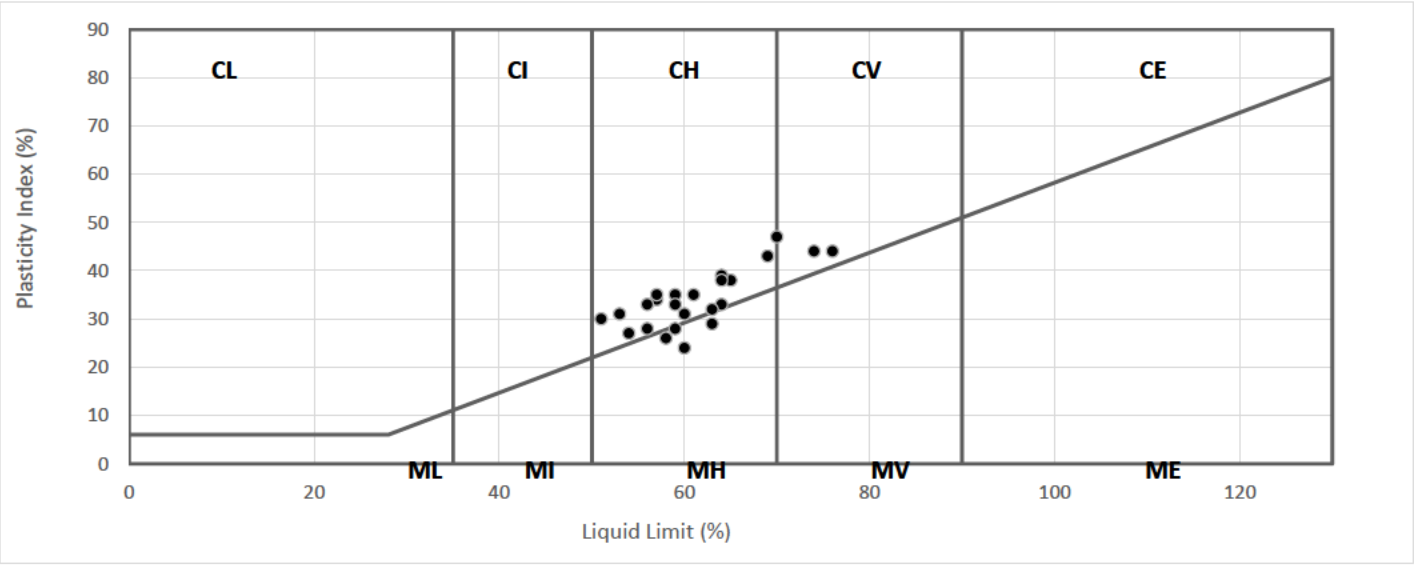
Operator
Clayton Jenkins

GSTL GEOTECHNICAL SITE & TESTING LABORATORIES	NATURAL MOISTURE, LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX (BS 1377:1990 - Part 2 : 4.3 & 5.3)	
Contract Number	67887	
Project Name	Boorley Green School	
Date Tested	14/08/2023	

Sample/Hole Reference	Sample Number	Sample Type	Depth (m)			Moisture Content %	Liquid Limit %	Plastic Limit %	Plasticity index %	Passing 0.425mm %	Remarks
CP01	6	U	2.00	-	2.45	40	58	32	26	100	MH High Plasticity
CP01	11	U	4.00	-	4.45	55	60	36	24	100	MH High Plasticity
CP01	36	UT	6.00	-	6.45	37	69	26	43	100	CH High Plasticity
CP01	37	UT	9.00	-	9.45	39	65	27	38	100	CH High Plasticity
CP02	3	U	1.20	-	1.65	29	57	23	34	100	CH High Plasticity
CP02	8	U	3.00	-	3.45	47	59	31	28	100	MH High Plasticity
CP02	25	B	10.50	-	10.95	20	64	25	39	100	CH High Plasticity
CP02	35	B	16.50	-	16.95	29	57	22	35	98	CH High Plasticity
CP02	34	D	16.50	-	16.95	29	59	24	35	100	CH High Plasticity
CP03	3	U	1.20	-	1.65	47	64	31	33	100	CH High Plasticity
CP03	7	SPTLS	2.00	-	2.45	39	61	26	35	90	CH High Plasticity
CP03	10	B	4.00	-	4.45	45	63	34	29	98	MH High Plasticity
CP03	13	U	5.00	-	5.45	38	63	31	32	100	CH High Plasticity
CP03	18	U	7.50	-	7.95	40	54	27	27	100	CH High Plasticity
CP03	30	B	13.50	-	13.95	33	60	29	31	97	CH High Plasticity
CP03	36	B	16.50	-	16.95	28	59	26	33	97	CH High Plasticity
WS103	6	D	0.80	-		27	53	22	31	100	CH High Plasticity
WS104	10	D	0.80	-	1.00	34	56	28	28	100	CH High Plasticity
CP01	28	B	1.20	-	1.65	33	56	23	33	71	CH High Plasticity
CP01		B	12.00	-		29	51	21	30	97	CH High Plasticity
CP01		B	15.00	-		47	74	30	44	94	CV Very High Plasticity
CP02		B	5.00	-		38	64	26	38	89	CH High Plasticity
CP02		B	9.00	-		28	70	23	47	100	CH/V High/HighPlasticity
CP02		B	13.50	-	14.00	45	76	32	44	100	CV Very High Plasticity

Symbols: NP : Non Plastic # : Liquid Limit and Plastic Limit Wet Sieved

PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION
BS 5930:2015+A1:2020



Operator
Clayton Jenkins

UKAS TESTING 2788

GSTL GEOTECHNICAL SITE & TESTING LABORATORIES	NATURAL MOISTURE, LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX (BS 1377:1990 - Part 2 : 4.3 & 5.3)	
Contract Number	67887	
Project Name	Boorley Green School	
Date Tested	31/08/2023	
	DESCRIPTIONS	

Sample/Hole Reference	Sample Number	Sample Type	Depth (m)			Descriptions
CP03		B	10.50	-		Brown silty CLAY
				-		
				-		
				-		
				-		
				-		
				-		
				-		
				-		
				-		
				-		
				-		
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				-		
				-		
				-		
				-		

Operator
Clayton Jenkins

GSTL GEOTECHNICAL SITE & TESTING LABORATORIES	NATURAL MOISTURE, LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX (BS 1377:1990 - Part 2 : 4.3 & 5.3)	
Contract Number	67887	
Project Name	Boorley Green School	
Date Tested	31/08/2023	

Sample/Hole Reference	Sample Number	Sample Type	Depth (m)			Moisture Content %	Liquid Limit %	Plastic Limit %	Plasticity index %	Passing 0.425mm %	Remarks
CP03		B	10.50	-		42	73	29	44	100	CV Very High Plasticity
				-							
				-							
				-							
				-							
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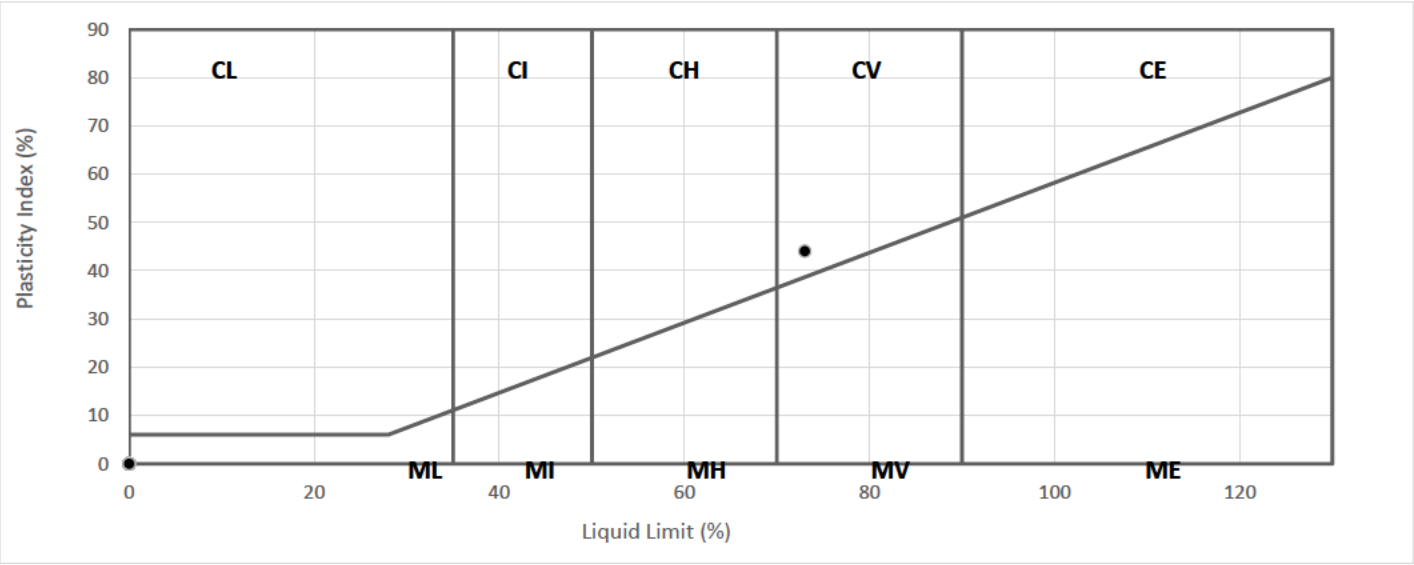
Symbols: NP : Non Plastic # : Liquid Limit and Plastic Limit Wet Sieved

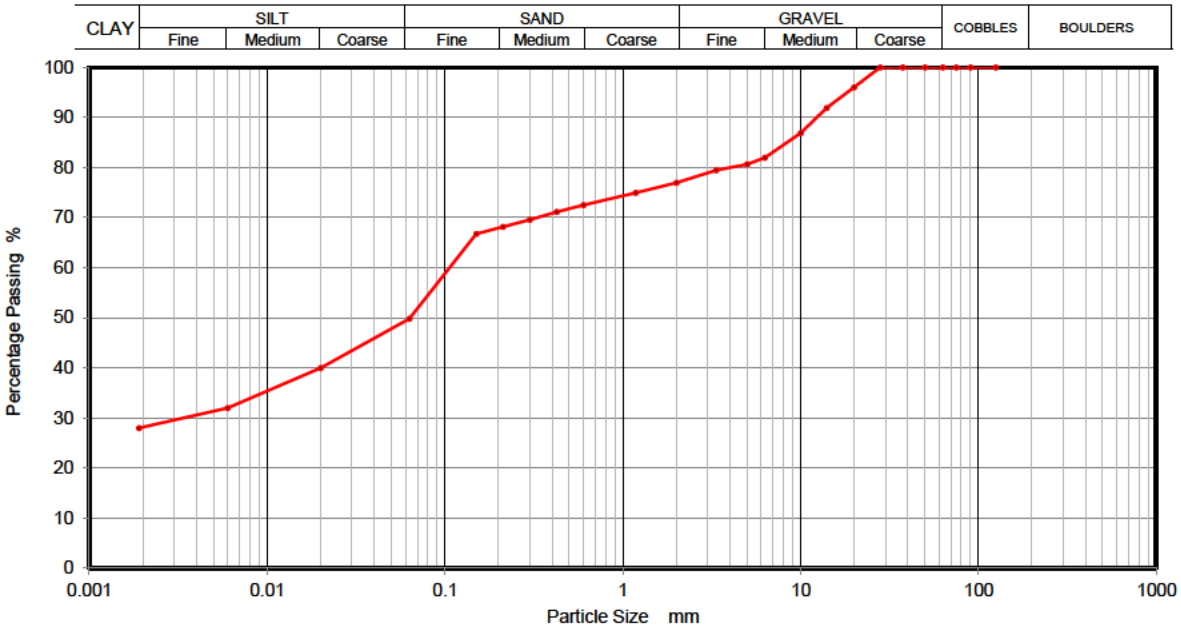
PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION
BS 5930:2015+A1:2020



Operator
Clayton Jenkins

UKAS TESTING 2788

GSTL GEOTECHNICAL SITE & TESTING LABORATORIES	PARTICLE SIZE DISTRIBUTION BS 1377 Part 2:1990 Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4	Contract Number	67887
		Borehole/Pit No.	CP01
Project Name	Boorley Green School	Sample No.	28
Soil Description	Brown fine to coarse gravelly fine to coarse sandy silty CLAY	Depth Top	1.20
		Depth Base	1.65
Date Tested	22/08/2023	Sample Type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0200	40
90	100	0.0060	32
75	100	0.0020	28
63	100		
50	100		
37.5	100		
28	100		
20	96		
14	92		
10	87		
6.3	82		
5	81		
3.35	79		
2	77		
1.18	75		
0.6	73		
0.425	71		
0.3	70		
0.212	68		
0.15	67		
0.063	50		

Sample Proportions	% dry mass
Cobbles	0
Gravel	23
Sand	27
Silt	22
Clay	28

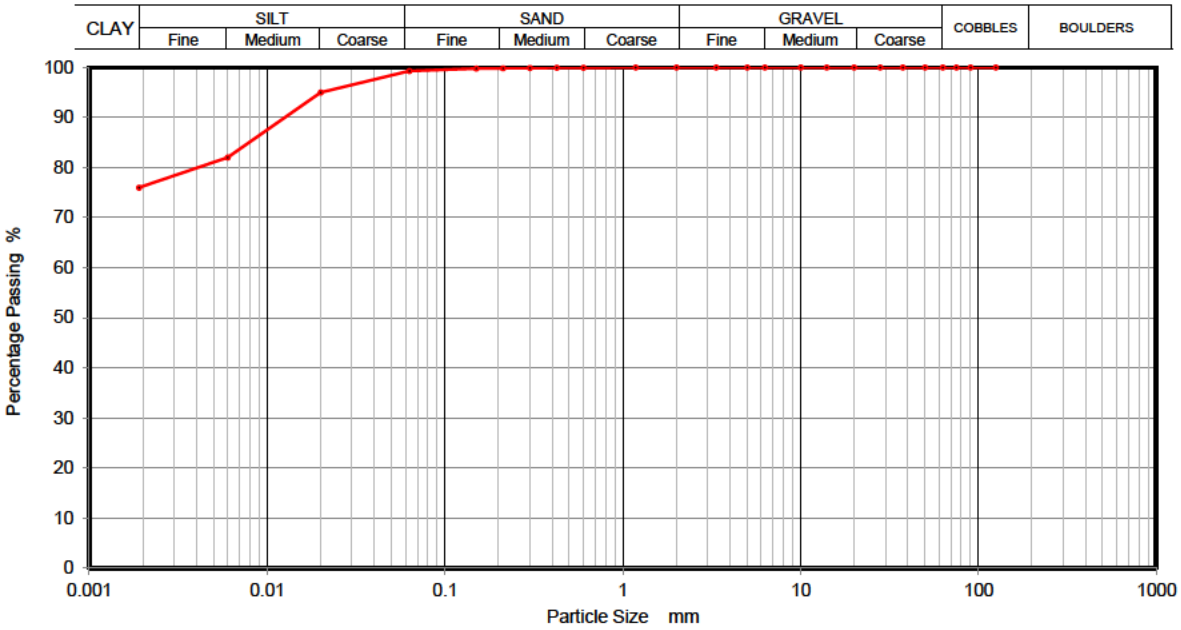
Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operator
David Edwards

UKAS TESTING 2788

GSTL GEOTECHNICAL SITE & TESTING LABORATORIES	PARTICLE SIZE DISTRIBUTION BS 1377 Part 2:1990 Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4	Contract Number	67887
		Borehole/Pit No.	CP02
Project Name	Boorley Green School	Sample No.	25
Soil Description	Brown slightly sandy silty CLAY	Depth Top	10.50
		Depth Base	10.95
Date Tested	08/08/2023	Sample Type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0200	95
90	100	0.0060	82
75	100	0.0020	76
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5	100		
3.35	100		
2	100		
1.18	100		
0.6	100		
0.425	100		
0.3	100		
0.212	100		
0.15	100		
0.063	99		

Sample Proportions	% dry mass
Cobbles	0
Gravel	0
Sand	1
Silt	23
Clay	76

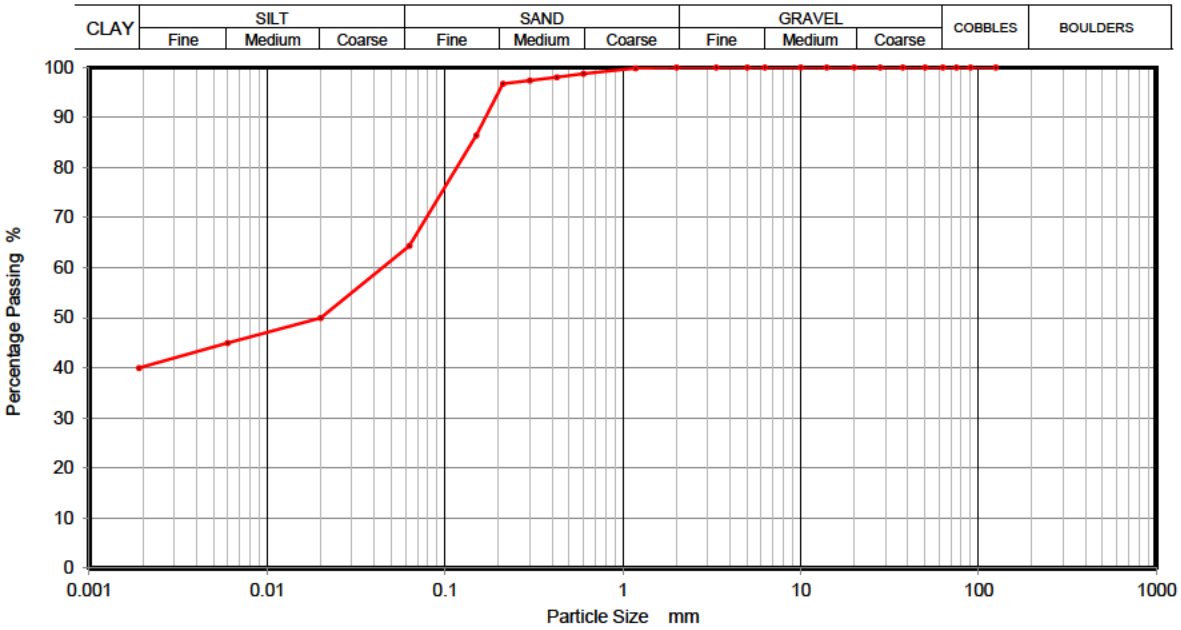
Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operator
David Edwards

UKAS TESTING 2788

GSTL GEOTECHNICAL SITE & TESTING LABORATORIES	PARTICLE SIZE DISTRIBUTION BS 1377 Part 2:1990 Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4	Contract Number	67887
		Borehole/Pit No.	CP02
Project Name	Boorley Green School	Sample No.	35
Soil Description	Brown fine to coarse sandy silty CLAY	Depth Top	16.50
		Depth Base	16.95
Date Tested	08/08/2023	Sample Type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0200	50
90	100	0.0060	45
75	100	0.0020	40
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5	100		
3.35	100		
2	100		
1.18	100		
0.6	99		
0.425	98		
0.3	97		
0.212	97		
0.15	86		
0.063	64		

Sample Proportions	% dry mass
Cobbles	0
Gravel	0
Sand	36
Silt	24
Clay	40

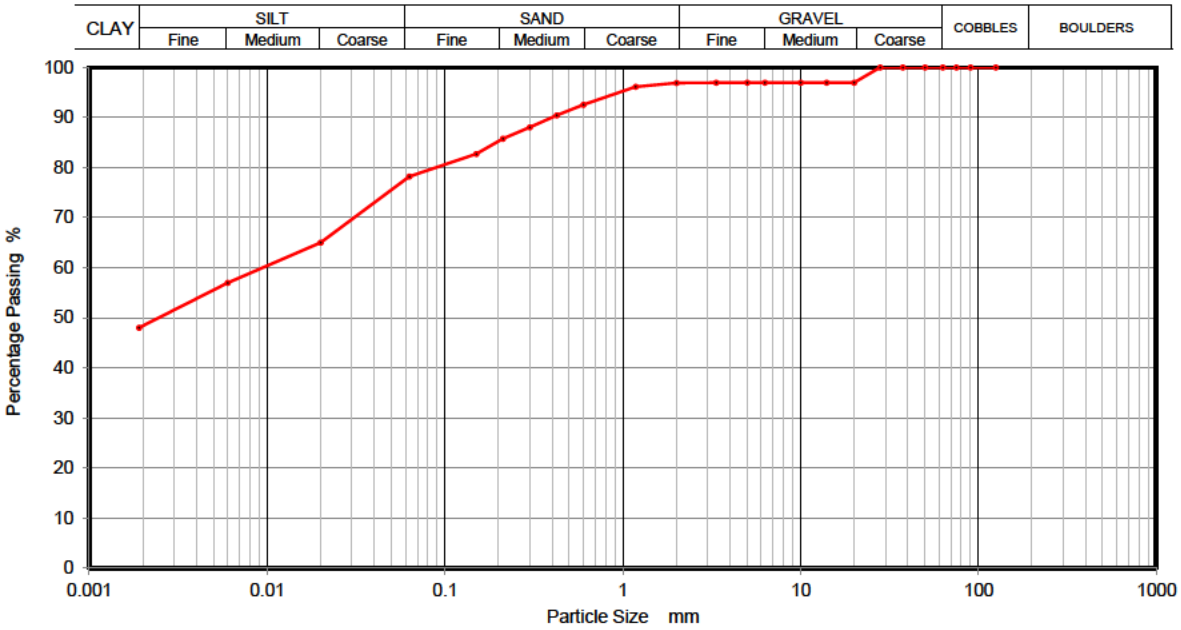
Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operator
David Edwards

UKAS TESTING 2788

GSTL GEOTECHNICAL SITE & TESTING LABORATORIES	PARTICLE SIZE DISTRIBUTION BS 1377 Part 2:1990 Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4	Contract Number	67887
		Borehole/Pit No.	CP03
Project Name	Boorley Green School	Sample No.	7
Soil Description	Brown slightly gravelly fine to coarse sandy silty CLAY	Depth Top	2.00
		Depth Base	2.45
Date Tested	08/08/2023	Sample Type	SPTLS



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0200	65
90	100	0.0060	57
75	100	0.0020	48
63	100		
50	100		
37.5	100		
28	100		
20	97		
14	97		
10	97		
6.3	97		
5	97		
3.35	97		
2	97		
1.18	96		
0.6	93		
0.425	90		
0.3	88		
0.212	86		
0.15	83		
0.063	78		

Sample Proportions	% dry mass
Cobbles	0
Gravel	3
Sand	19
Silt	30
Clay	48

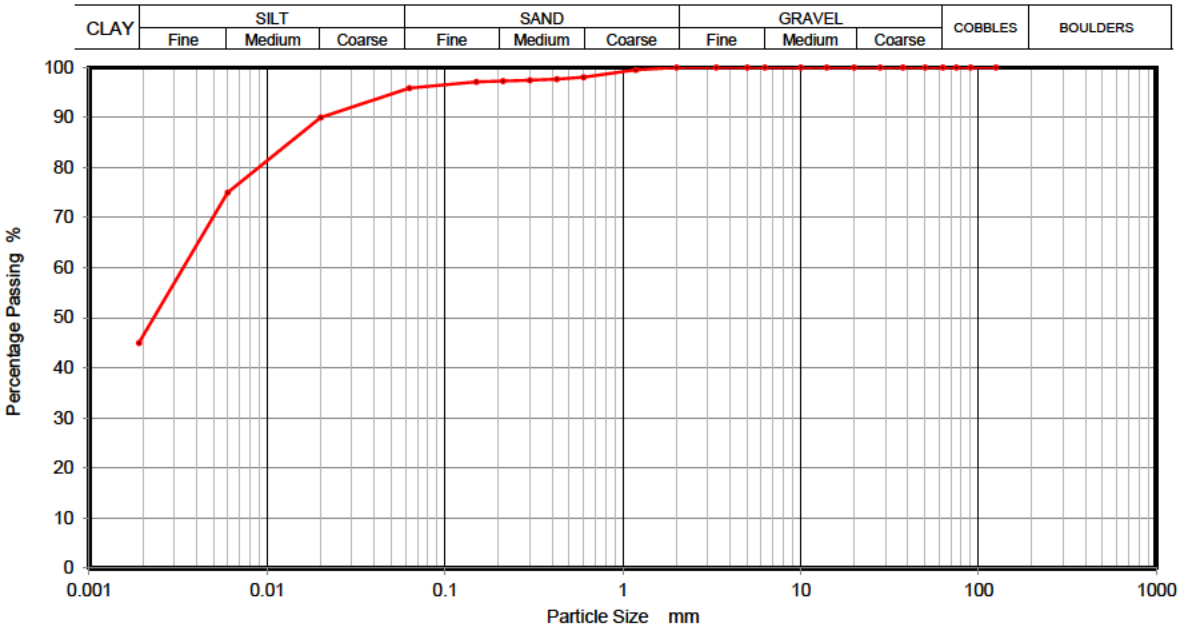
Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operator
David Edwards

UKAS TESTING 2788

GSTL GEOTECHNICAL SITE & TESTING LABORATORIES	PARTICLE SIZE DISTRIBUTION BS 1377 Part 2:1990 Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4	Contract Number	67887
		Borehole/Pit No.	CP03
Project Name	Boorley Green School	Sample No.	10
Soil Description	Brown slightly sandy clayey SILT	Depth Top	4.00
		Depth Base	4.45
Date Tested	08/08/2023	Sample Type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0200	90
90	100	0.0060	75
75	100	0.0020	45
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5	100		
3.35	100		
2	100		
1.18	99		
0.6	98		
0.425	98		
0.3	97		
0.212	97		
0.15	97		
0.063	96		

Sample Proportions	% dry mass
Cobbles	0
Gravel	0
Sand	4
Silt	51
Clay	45

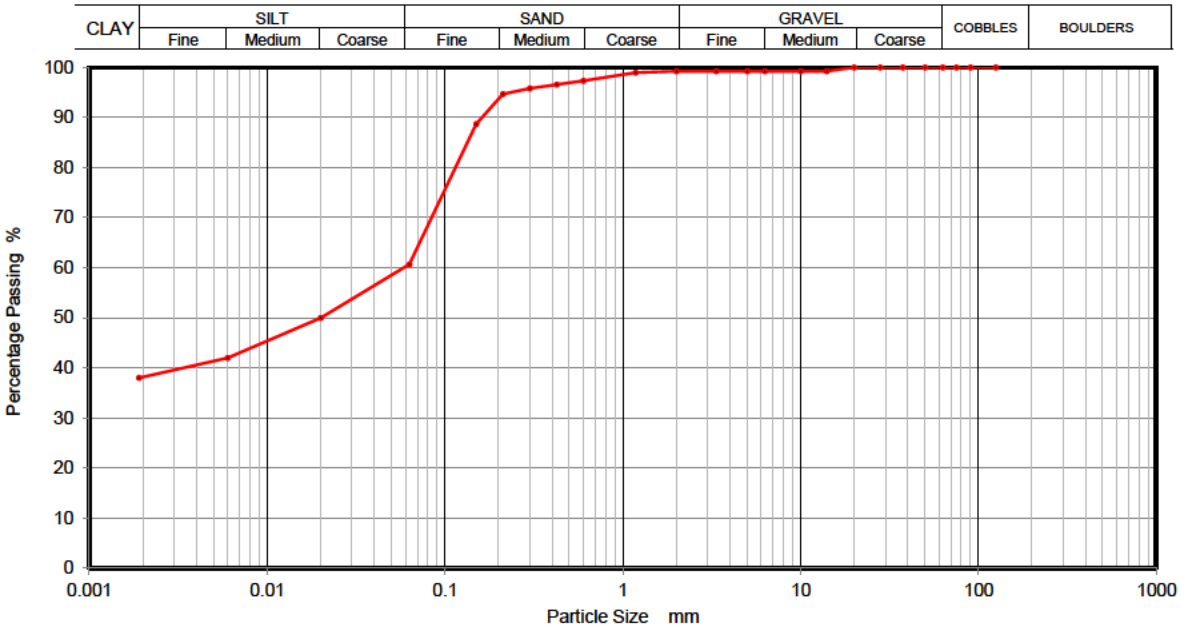
Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operator
David Edwards

UKAS TESTING 2788

GSTL GEOTECHNICAL SITE & TESTING LABORATORIES	PARTICLE SIZE DISTRIBUTION BS 1377 Part 2:1990 Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4	Contract Number	67887
		Borehole/Pit No.	CP03
Project Name	Boorley Green School	Sample No.	30
Soil Description	Brown slightly gravelly fine to coarse sandy silty CLAY	Depth Top	13.50
		Depth Base	13.95
Date Tested	08/08/2023	Sample Type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0200	50
90	100	0.0060	42
75	100	0.0020	38
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	99		
10	99		
6.3	99		
5	99		
3.35	99		
2	99		
1.18	99		
0.6	97		
0.425	97		
0.3	96		
0.212	95		
0.15	89		
0.063	61		

Sample Proportions	% dry mass
Cobbles	0
Gravel	1
Sand	38
Silt	23
Clay	38

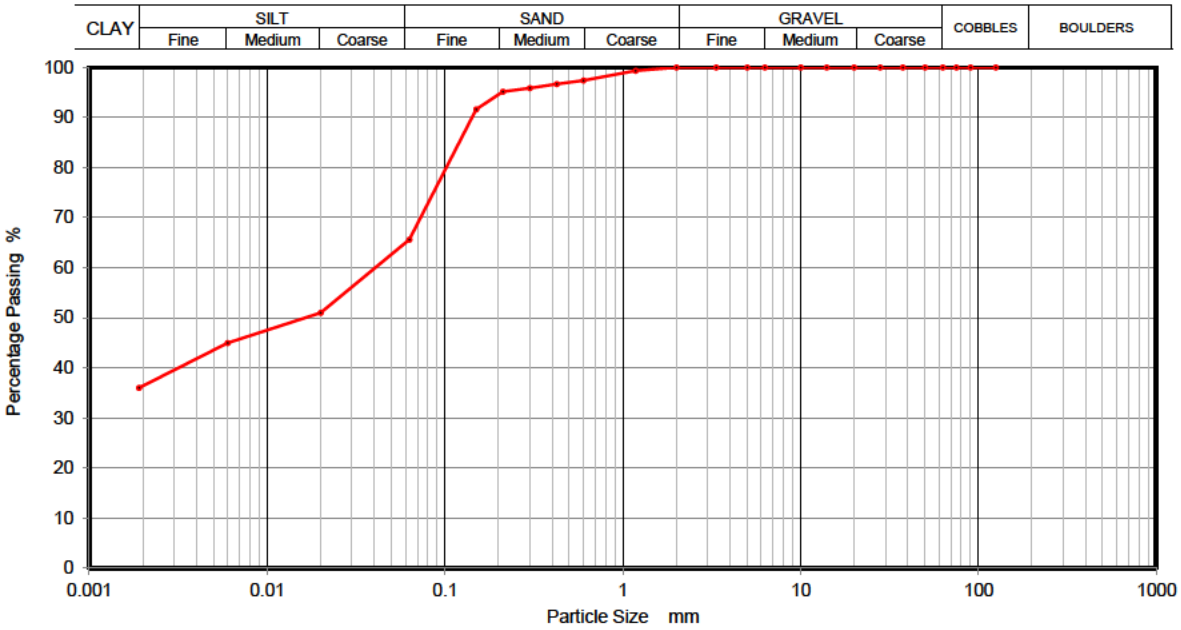
Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operator
David Edwards

UKAS TESTING 2788

GSTL GEOTECHNICAL SITE & TESTING LABORATORIES	PARTICLE SIZE DISTRIBUTION BS 1377 Part 2:1990 Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4	Contract Number	67887
		Borehole/Pit No.	CP03
Project Name	Boorley Green School	Sample No.	36
Soil Description	Brown fine to coarse sandy silty CLAY	Depth Top	16.50
		Depth Base	16.95
Date Tested	08/08/2023	Sample Type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0200	51
90	100	0.0060	45
75	100	0.0020	36
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5	100		
3.35	100		
2	100		
1.18	99		
0.6	97		
0.425	97		
0.3	96		
0.212	95		
0.15	92		
0.063	66		

Sample Proportions	% dry mass
Cobbles	0
Gravel	0
Sand	34
Silt	30
Clay	36

Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operator
David Edwards

UKAS TESTING 2788

GSTL GEOTECHNICAL SITE & TESTING LABORATORIES

PARTICLE DENSITY BY GAS JAR
(BS 1377 : PART 2 : 8.2 : 1990)

Contract Number	67887
Project Name	Boorley Green School
Date Tested	14/08/2023

Hole Reference	Sample Number	Sample Type	Depth (m)							Particle Density		Remarks
CP03	10	B	4.00	-	4.45					2.63		
CP03	7	SPTLS	2.00	-	2.45					2.62		
				-								
				-								
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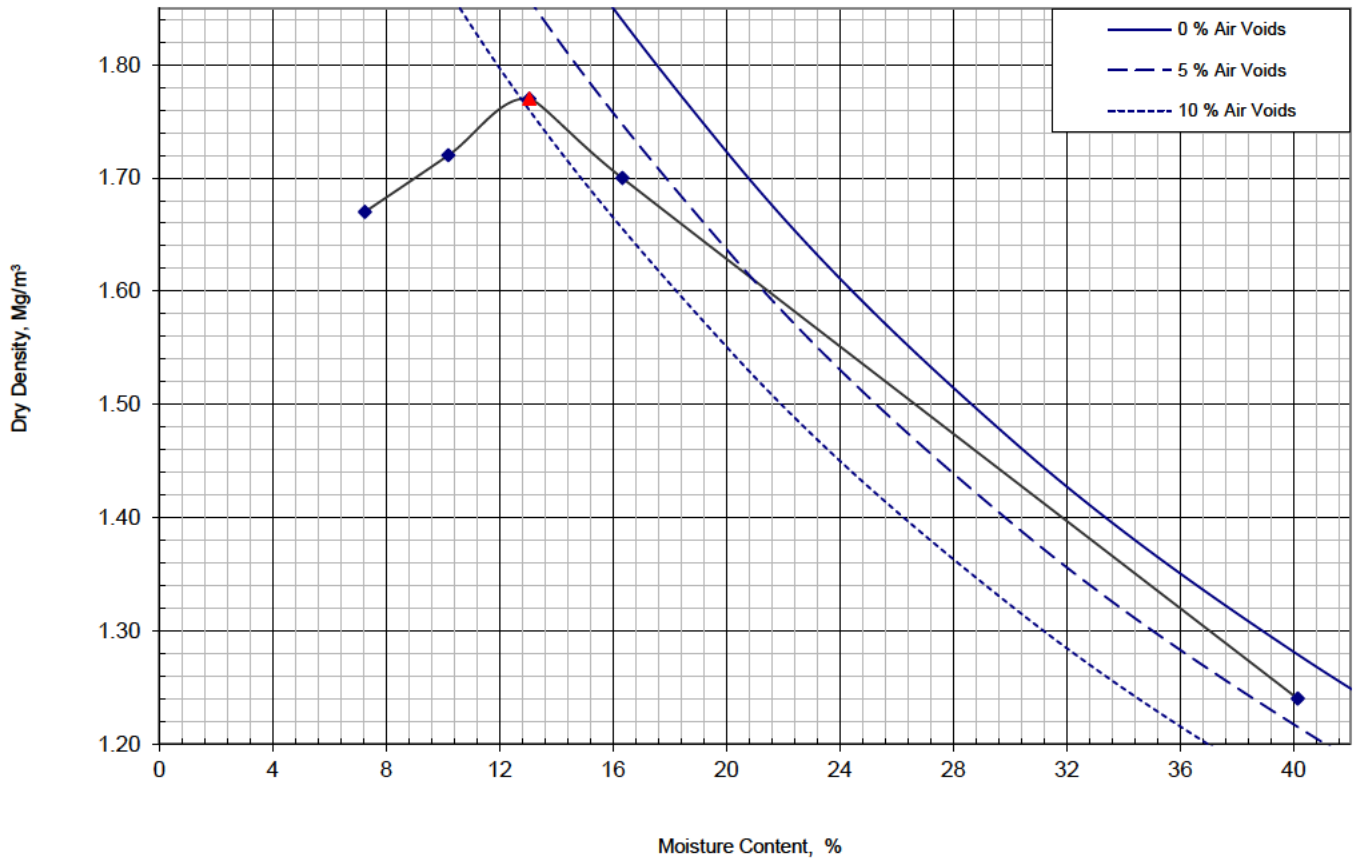
Key	Reported As
Moisture Content	%
Bulk Density	Mg/m^3
Dry Density	Mg/m^3
Particle Density	Mg/m^3
Air Voids	%

Operator
Conor Davison

UKAS TESTING 2788

GSTL GEOTECHNICAL SITE & TESTING LABORATORIES	Dry Density / Moisture Content Relationship BS 1377:Part 4:1990	Contract Number	67887
		Borehole / Pit No	CP03
Project Name	Boorley Green School	Sample No	10
Date Tested	13/08/2023	Depth Top	4.00
Compaction Method	2.5 Kg Rammer	Depth Base	4.45
Compaction Clause	BS1377:Part 4:1990, Clause 3.3	Sample Type	B
Sample Description	*See Sample Description Sheet	Single or Separate Sample Used	Single



Compaction Point	1	2	3	4	5							
Moisture Content	7.3	10	13	16	40							
Bulk Density	1.79	1.90	2.00	1.98	1.74							
Dry Density	1.67	1.72	1.77	1.70	1.24							

Initial Moisture Content	40	%
Maximum Dry Density	1.77	Mg/m3
Optimum Moisture Content	13	%
Particle Density	2.63 Measured	Mg/m3
Material Retained 37.5mm	0	%
Material Retained 20mm	0	%

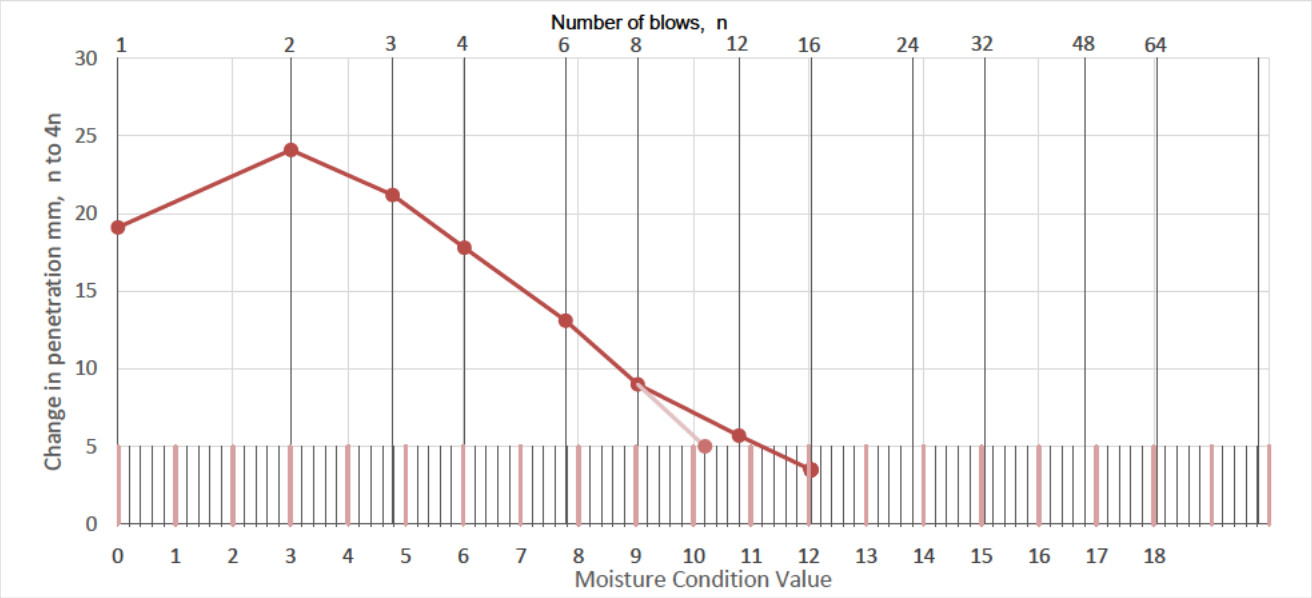
UKAS TESTING 2788

Operator
Conor

GSTL GEOTECHNICAL SITE & TESTING LABORATORIES	**Moisture Condition Value** **BS1377:Part4:1990:Clause 5.4**	Contract Number	67887
		Borehole/Pit No.	CP03
Project Name	Boorley Green School	Sample No.	10
Soil Description	*See Sample Description Sheet	Depth Top	4.00
		Depth Base	4.45
Date Tested	14/08/2023	Sample Type	B

Number of blows	Penetration mm	Change in Penetration n to 4n blows
1	94.2	19.1
2	86.9	24.1
3	80.7	21.2
4	75.1	17.8
6	68.2	13.1
8	62.8	9.0
12	59.5	5.7
16	57.3	3.5
24	55.1	
32	53.8	
48	53.8	
64	53.8	
96		
128		
192		
256		

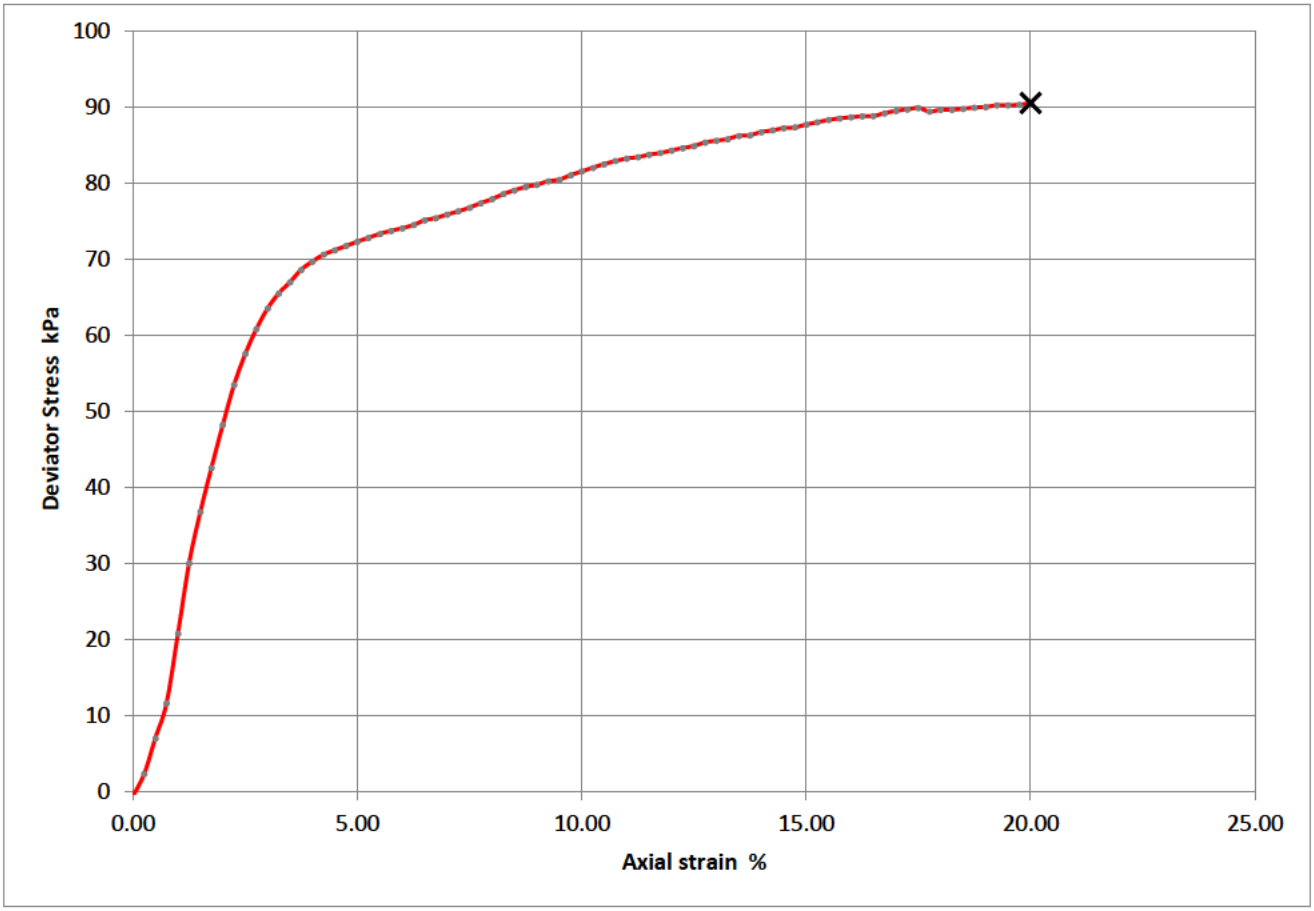
Material Retained 20mm (%)	**0**
Moisture Content (%)	**40**
MCV Value (%)	**10.2**



Operator
Conor

UKAS TESTING 2788

GSTL GEOTECHNICAL SITE & TESTING LABORATORIES	Single Stage Unconsolidated-Undrained Triaxial Test BS 1377 : 1990 Part 7 : 8	Contract Number	67887
		Borehole/Pit No.	CP03
Project Name	Boorley Green School	Sample No.	18
Soil Description	Brown crumbly CLAY	Depth Top (m)	7.50
		Depth Base (m)	7.95
Date Tested	10/08/2023	Sample Type	U
		Operator	Jordan



Moisture Content (%)	41
Bulk Density (Mg/m^3)	1.70
Dry Density (Mg/m^3)	1.20
Specimen Length (mm)	207.29
Specimen Diameter (mm)	102.47
Cell Pressure (kPa)	150
Deviator Stress (kPa)	91
Undrained Shear Strength (kPa)	45
Failure Strain (%)	20
Mode Of Failure	Compound
Membrane Used/Thickness	Rubber/0.2mm
Rate of Strain (%/min)	1.33

Notes.
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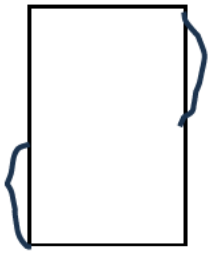
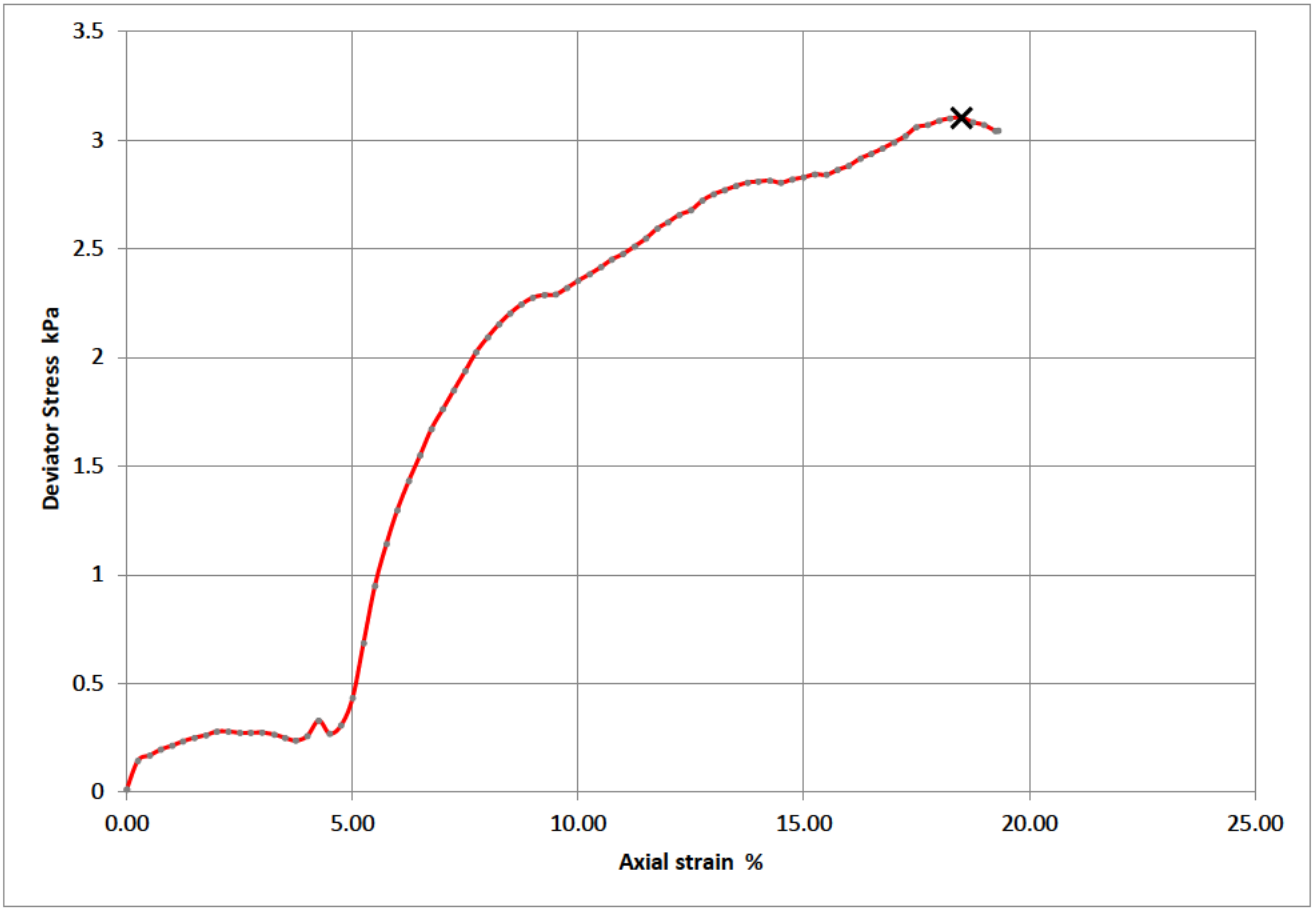


Failure Sketch.

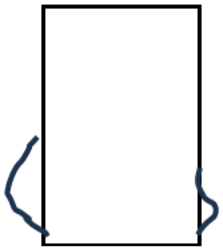
UKAS TESTING 2788

GSTL GEOTECHNICAL SITE & TESTING LABORATORIES	Single Stage Unconsolidated-Undrained Triaxial Test BS 1377 : 1990 Part 7 : 8	Contract Number	67887
		Borehole/Pit No.	CP01
Project Name	Boorley Green School	Sample No.	6
Soil Description	Brownish Grey Crumbly CLAY	Depth Top (m)	2.00
		Depth Base (m)	2.45
Date Tested	10/08/2023	Sample Type	U
		Operator	Jordan



Moisture Content (%)	50
Bulk Density (Mg/m^3)	1.81
Dry Density (Mg/m^3)	1.20
Specimen Length (mm)	207.09
Specimen Diameter (mm)	101.26
Cell Pressure (kPa)	40
Deviator Stress (kPa)	3
Undrained Shear Strength (kPa)	2
Failure Strain (%)	19
Mode Of Failure	Plastic
Membrane Used/Thickness	Rubber/0.2mm
Rate of Strain (%/min)	1.33

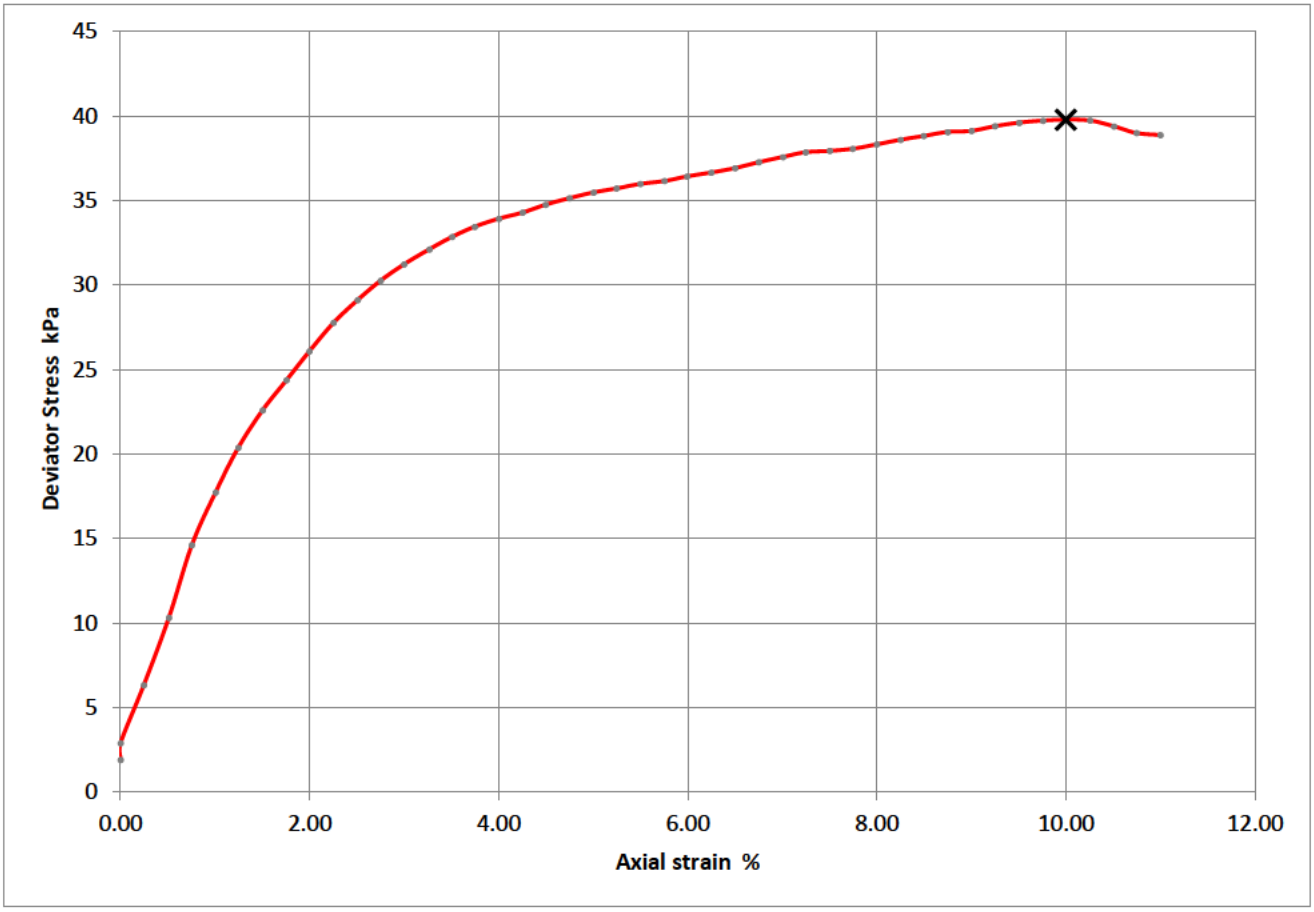
Notes.



Failure Sketch.

UKAS TESTING 2788

GSTL GEOTECHNICAL SITE & TESTING LABORATORIES	Single Stage Unconsolidated-Undrained Triaxial Test BS 1377 : 1990 Part 7 : 8	Contract Number	67887
		Borehole/Pit No.	CP01
Project Name	Boorley Green School	Sample No.	11
Soil Description	Brownish Grey Brittle CLAY	Depth Top (m)	4.00
		Depth Base (m)	4.45
Date Tested	10/08/2023	Sample Type	U
		Operator	Jordan



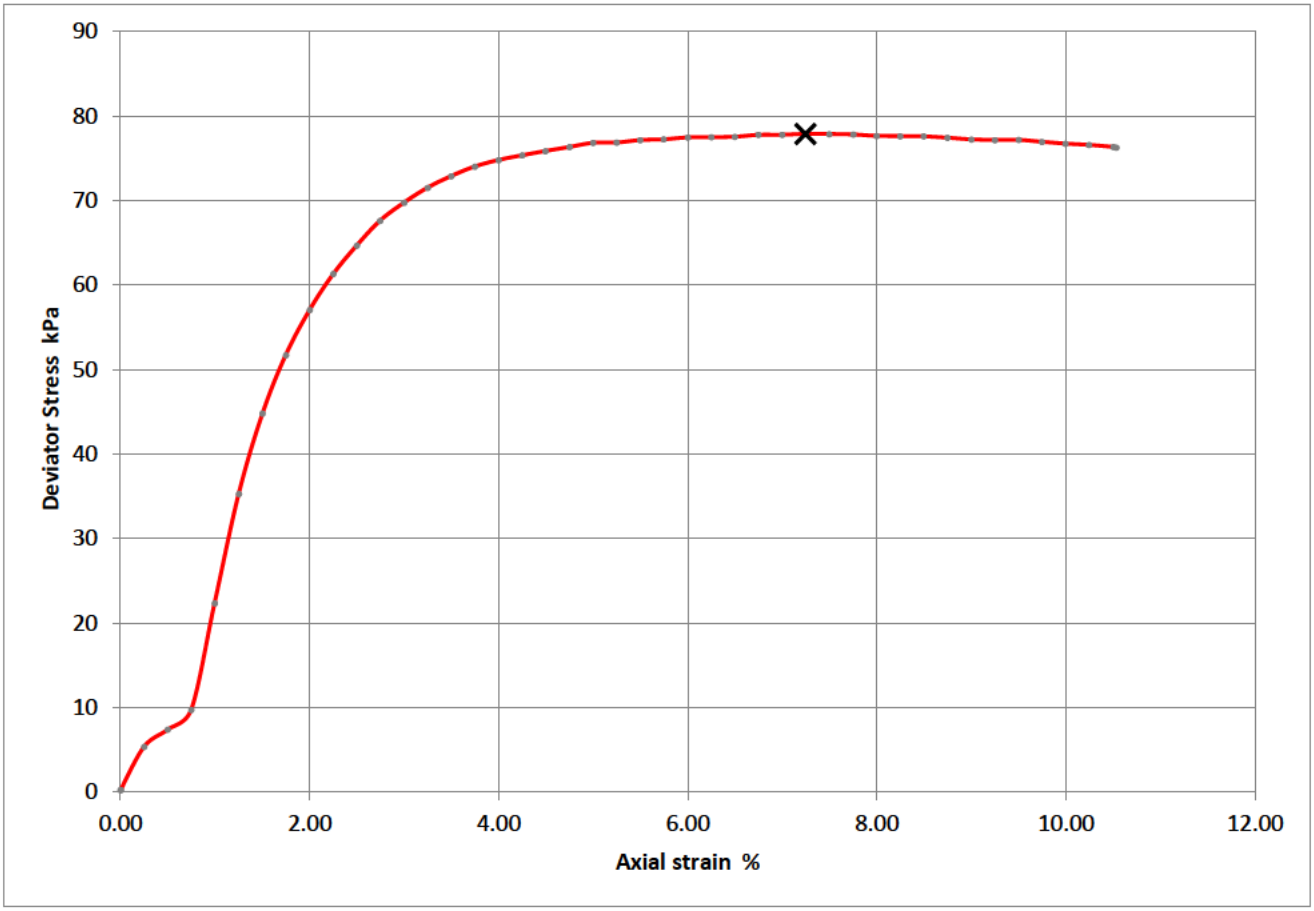
Moisture Content (%)	54
Bulk Density (Mg/m^3)	1.69
Dry Density (Mg/m^3)	1.09
Specimen Length (mm)	208.08
Specimen Diameter (mm)	101.34
Cell Pressure (kPa)	80
Deviator Stress (kPa)	40
Undrained Shear Strength (kPa)	20
Failure Strain (%)	10
Mode Of Failure	Compound
Membrane Used/Thickness	Rubber/0.2mm
Rate of Strain (%/min)	1.32

Notes.

Failure Sketch.

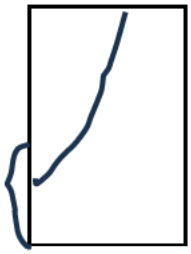
UKAS TESTING 2788

GSTL GEOTECHNICAL SITE & TESTING LABORATORIES	Single Stage Unconsolidated-Undrained Triaxial Test BS 1377 : 1990 Part 7 : 8	Contract Number	67887
		Borehole/Pit No.	CP01
Project Name	Boorley Green School	Sample No.	36
Soil Description	Grey Silty CLAY	Depth Top (m)	6.00
		Depth Base (m)	6.45
Date Tested	10/08/2023	Sample Type	U
		Operator	Jordan



Moisture Content (%)	38
Bulk Density (Mg/m^3)	1.71
Dry Density (Mg/m^3)	1.24
Specimen Length (mm)	207.84
Specimen Diameter (mm)	101.31
Cell Pressure (kPa)	120
Deviator Stress (kPa)	78
Undrained Shear Strength (kPa)	39
Failure Strain (%)	7
Mode Of Failure	Compound
Membrane Used/Thickness	Rubber/0.2mm
Rate of Strain (%/min)	1.32

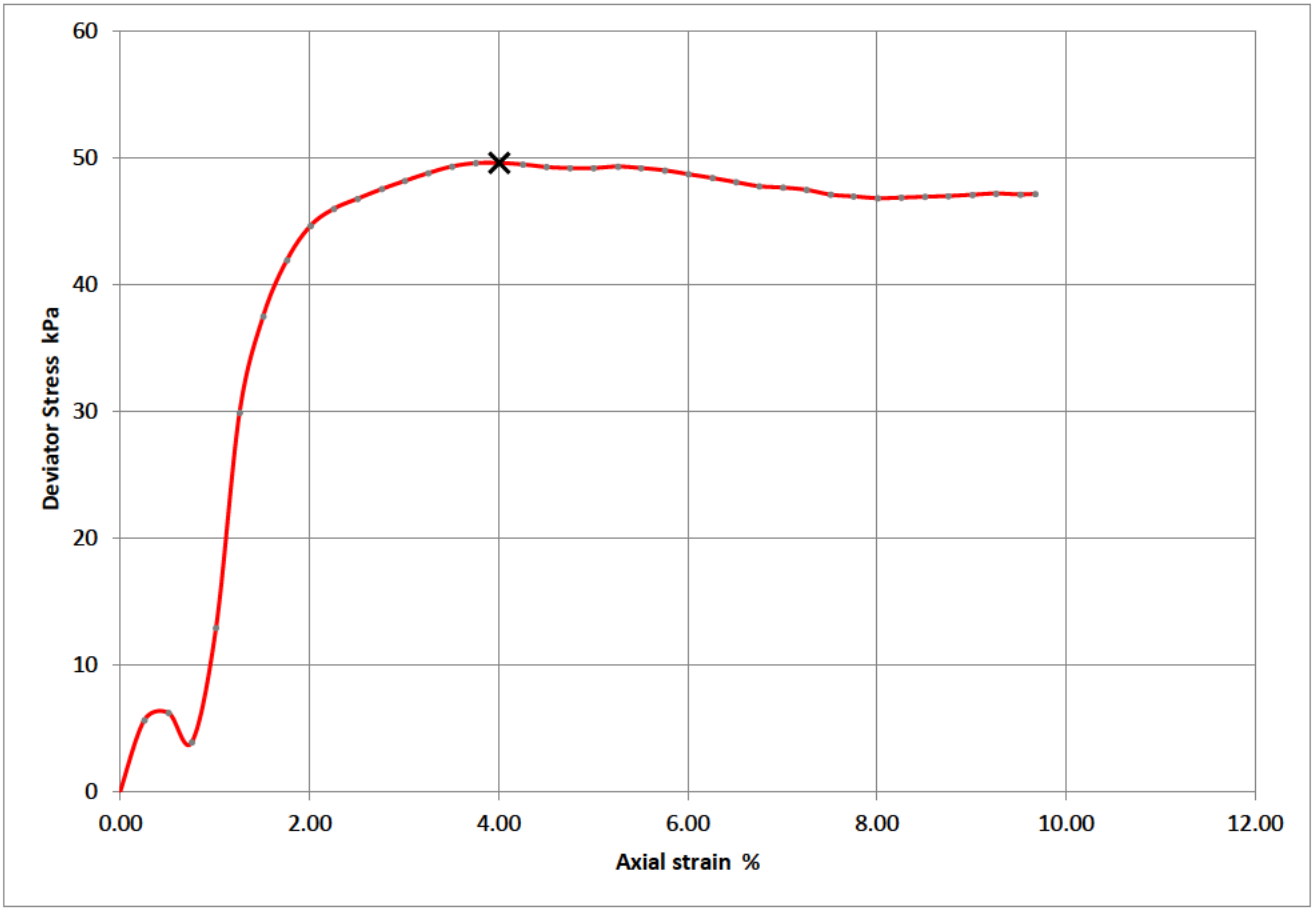
Notes.



Failure Sketch.

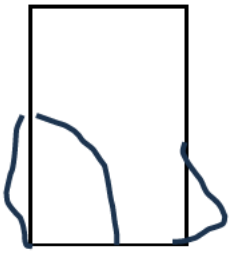
UKAS TESTING 2788

GSTL GEOTECHNICAL SITE & TESTING LABORATORIES	Single Stage Unconsolidated-Undrained Triaxial Test BS 1377 : 1990 Part 7 : 8	Contract Number	67887
		Borehole/Pit No.	CP01
Project Name	Boorley Green School	Sample No.	37
Soil Description	Brownish Grey Crumbly CLAY	Depth Top (m)	9.00
		Depth Base (m)	9.45
Date Tested	10/08/2023	Sample Type	U
		Operator	Jordan



Moisture Content (%)	39
Bulk Density (Mg/m^3)	1.80
Dry Density (Mg/m^3)	1.30
Specimen Length (mm)	206.85
Specimen Diameter (mm)	101.77
Cell Pressure (kPa)	180
Deviator Stress (kPa)	50
Undrained Shear Strength (kPa)	25
Failure Strain (%)	4
Mode Of Failure	Compound
Membrane Used/Thickness	Rubber/0.2mm
Rate of Strain (%/min)	1.33

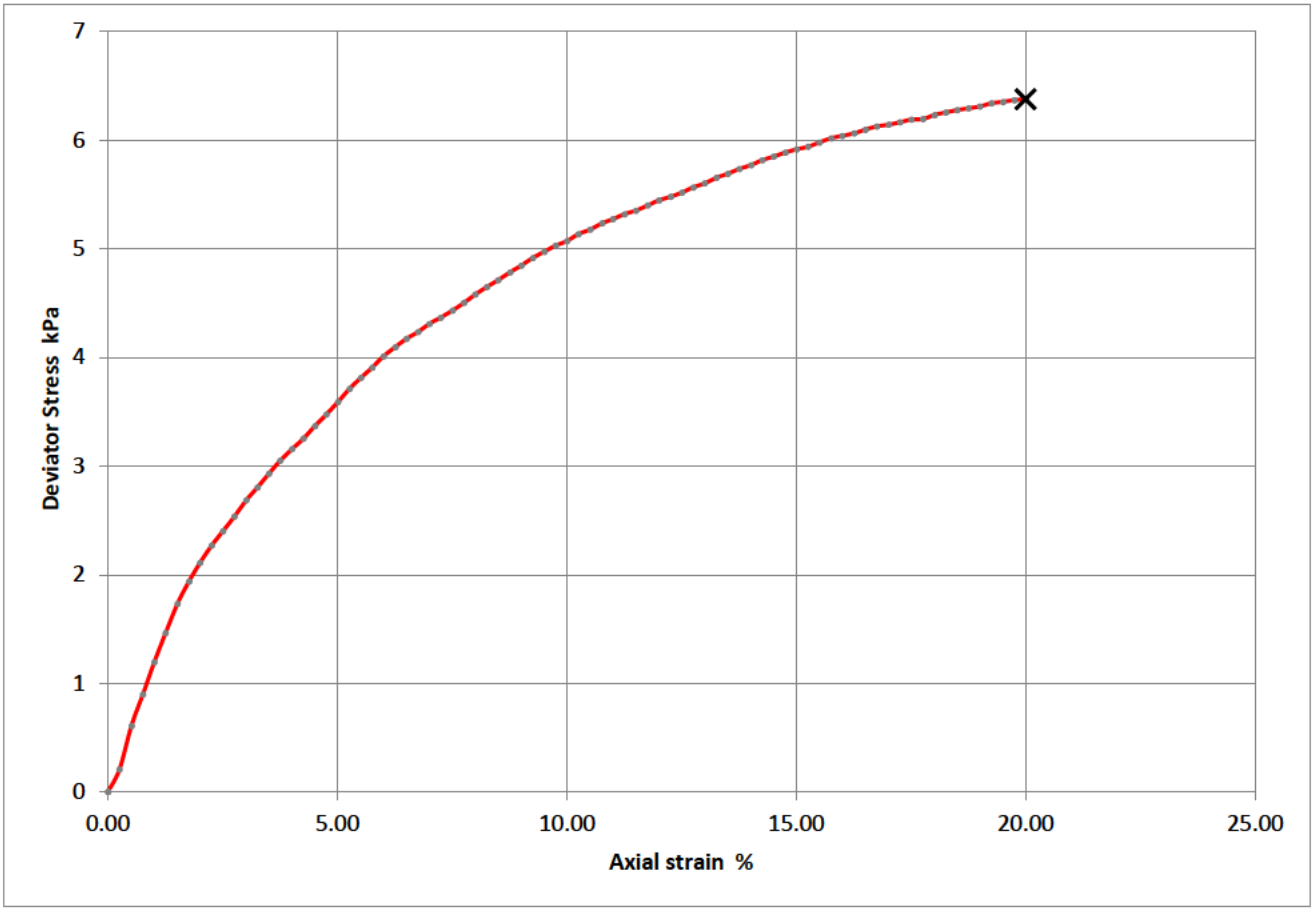
Notes.



Failure Sketch.

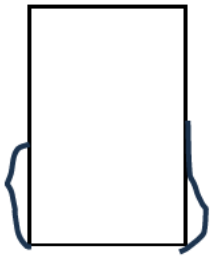
UKAS TESTING 2788

GSTL GEOTECHNICAL SITE & TESTING LABORATORIES	Single Stage Unconsolidated-Undrained Triaxial Test BS 1377 : 1990 Part 7 : 8	Contract Number	67887
		Borehole/Pit No.	CP03
Project Name	Boorley Green School	Sample No.	3
Soil Description	Greyish Brown Silty Wet CLAY	Depth Top (m)	1.20
		Depth Base (m)	1.65
Date Tested	10/08/2023	Sample Type	U
		Operator	Jordan



Moisture Content (%)	39
Bulk Density (Mg/m^3)	1.75
Dry Density (Mg/m^3)	1.26
Specimen Length (mm)	207.92
Specimen Diameter (mm)	103.92
Cell Pressure (kPa)	24
Deviator Stress (kPa)	6
Undrained Shear Strength (kPa)	3
Failure Strain (%)	20
Mode Of Failure	Plastic
Membrane Used/Thickness	Rubber/0.2mm
Rate of Strain (%/min)	1.32

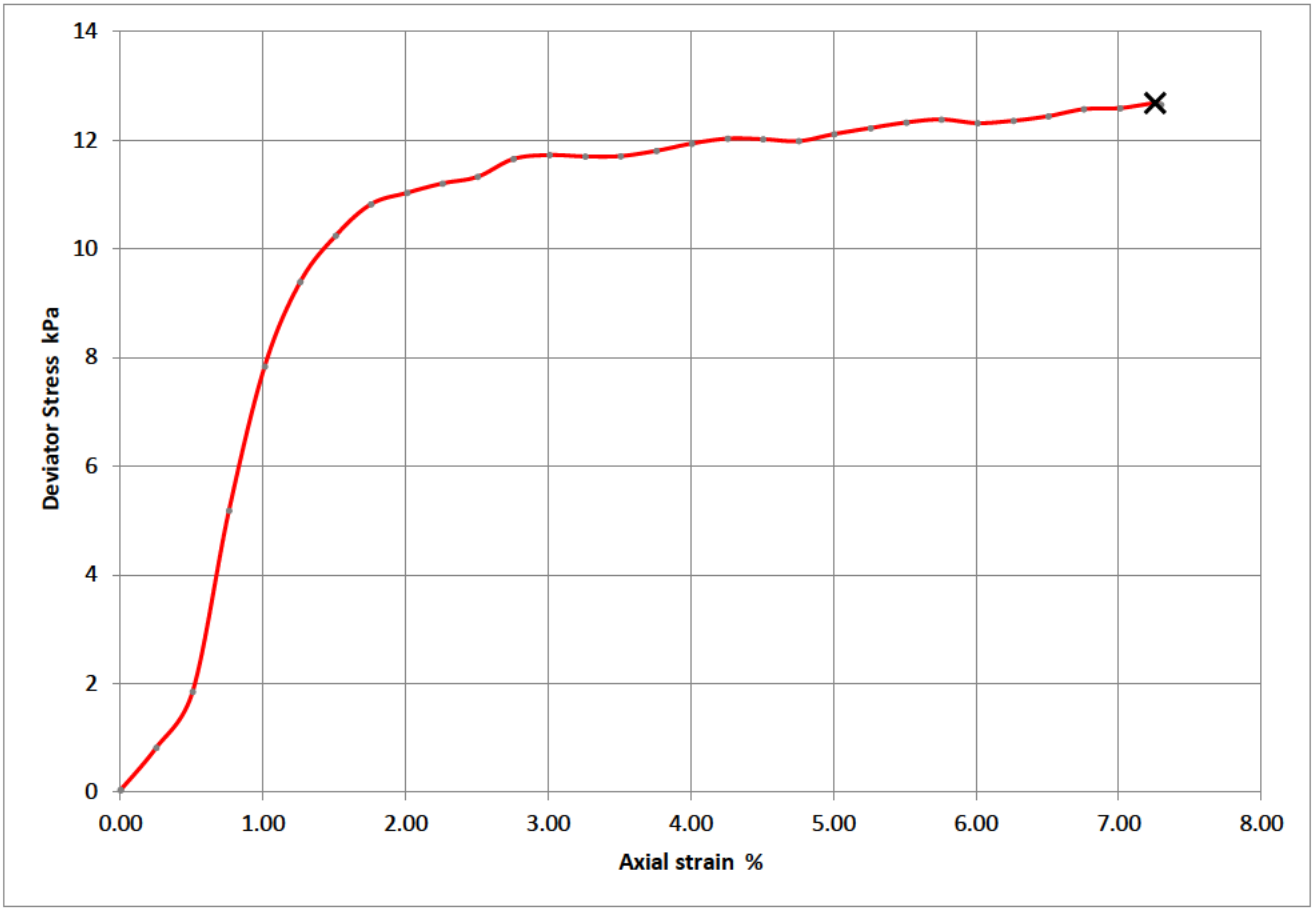
Notes.



Failure Sketch.

UKAS TESTING 2788

GSTL GEOTECHNICAL SITE & TESTING LABORATORIES	Single Stage Unconsolidated-Undrained Triaxial Test BS 1377 : 1990 Part 7 : 8	Contract Number	67887
		Borehole/Pit No.	CP03
Project Name	Boorley Green School	Sample No.	13
Soil Description	Brownish Grey Crumbly CLAY	Depth Top (m)	5.00
		Depth Base (m)	5.45
Date Tested	10/08/2023	Sample Type	U
		Operator	Jordan



Moisture Content (%)	38
Bulk Density (Mg/m^3)	1.57
Dry Density (Mg/m^3)	1.14
Specimen Length (mm)	207.48
Specimen Diameter (mm)	102.26
Cell Pressure (kPa)	100
Deviator Stress (kPa)	13
Undrained Shear Strength (kPa)	6
Failure Strain (%)	7
Mode Of Failure	Compound
Membrane Used/Thickness	Rubber/0.2mm
Rate of Strain (%/min)	1.33

Notes.

Failure Sketch.

UKAS TESTING 2788

Test Report: MS DIRECT SHEARBOX TEST.BS1377:Part 7:4.5 :1990.

Borehole Number:	CP01	Depth from (m):	12.00
Sample Number :		Depth to (m):	12.45

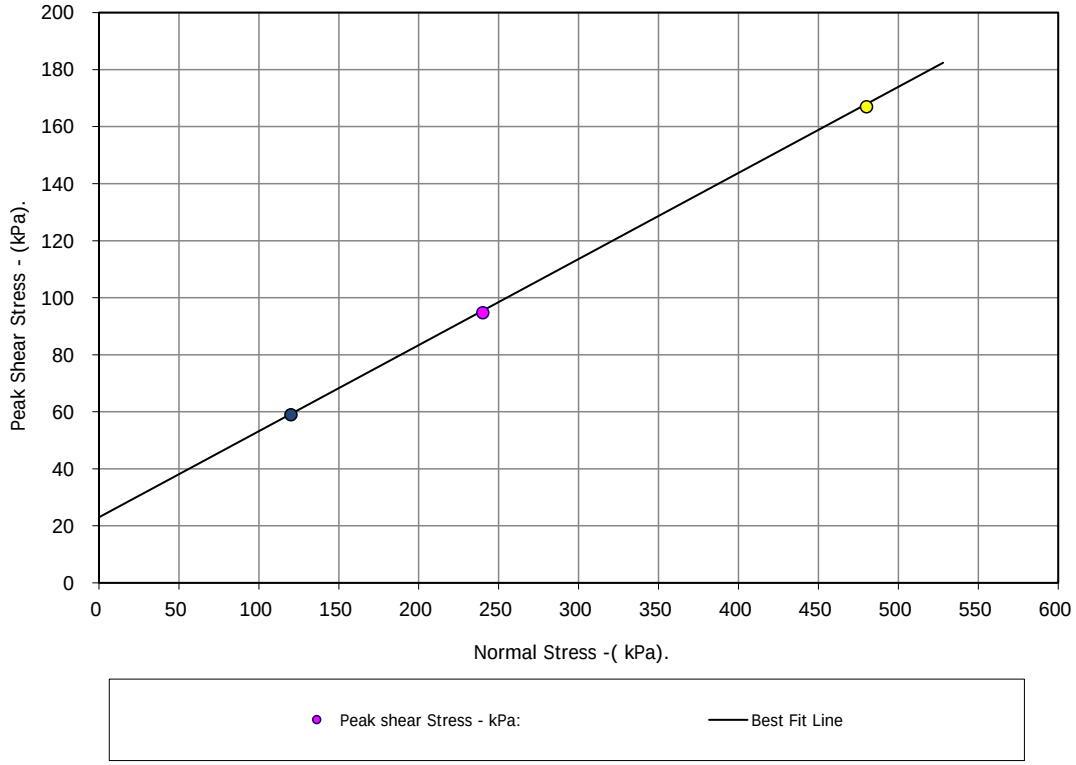
Sample Type:	B
Particle Density - Mg/m3:	2.65 (Assumed)
Specimen Tested:	Submerged, Remoulded (Light Tamping) Material above 2mm removed.

Sample Description:
Brown silty CLAY

STAGE	**1**	**2**	**3**
Initial Conditions			
Height - mm:	24.80	24.80	24.80
Length - mm:	60.00	60.00	60.00
Moisture Content - %:	28	28	28
Bulk Density - Mg/m3:	1.56	1.56	1.56
Dry Density - Mg/m3:	1.22	1.22	1.22
Voids Ratio:	1.1744	1.1744	1.1744
Degree of Saturation - %:	62.89	62.89	62.89
Normal Pressure- kPa	120	240	480
Consolidation			
Consolidated Height - mm:	22.15	20.06	19.13
Shear			
Rate of Horizontal Displacement (mm/min)	0.200	0.200	0.200
Horizontal Displacement at Peak Shear Stress (mm)	5.14	5.05	3.43
Peak shear Stress - kPa:	59	95	167

PEAK	
Angle of Shearing Resistance:(θ)	**17**
Effective Cohesion - kPa:	**23**

FAILURE CONDITIONS



UKAS TESTING 2788

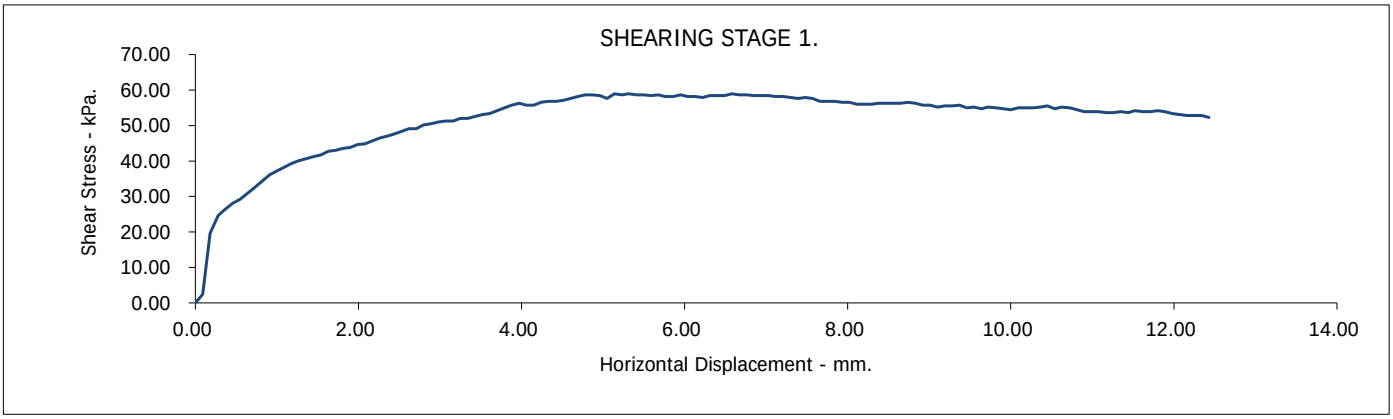
Contract No.: **67887**

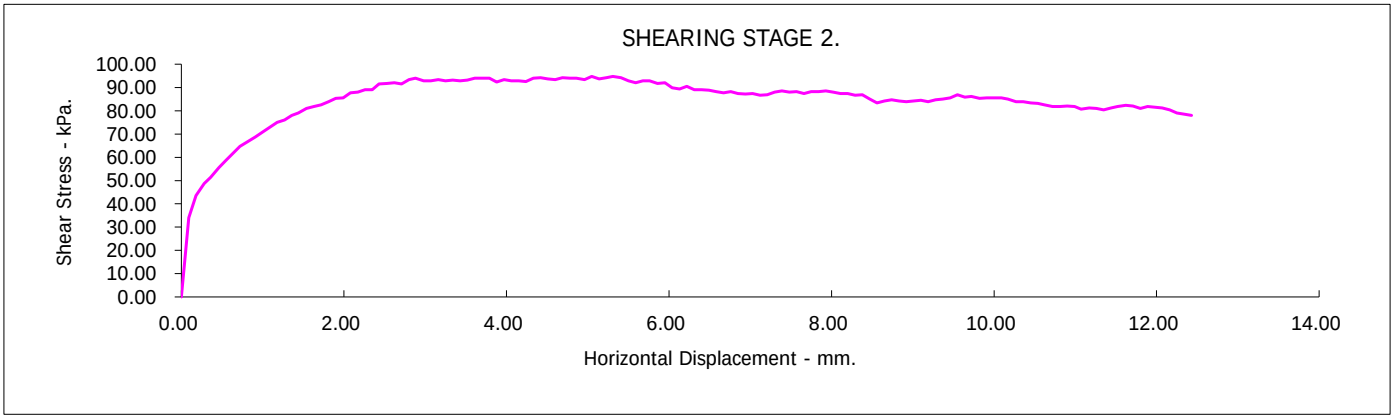
GSTL GEOTECHNICAL SITE & TESTING LABORATORIES

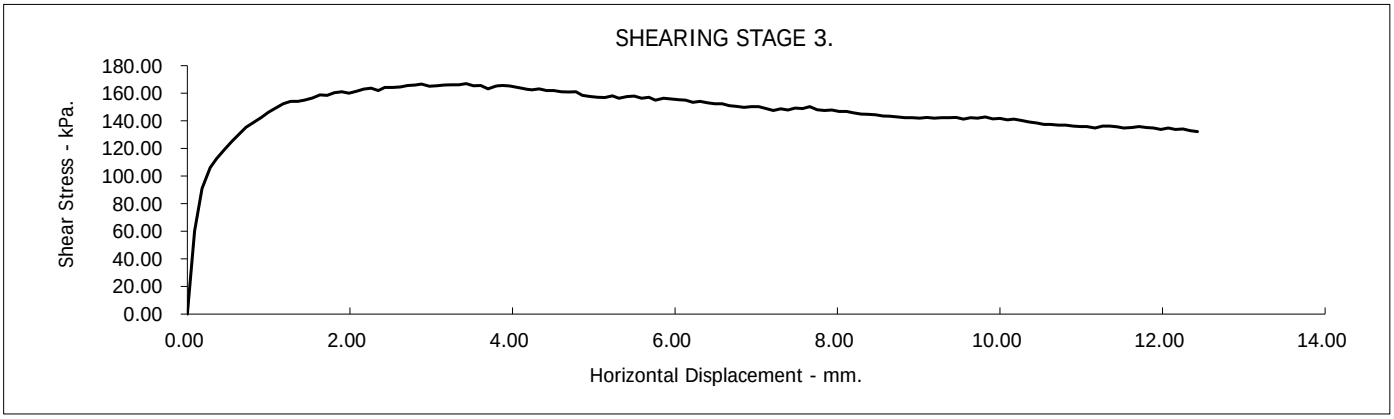
Boorley Green School

Client Ref Number: **PO-23-014**

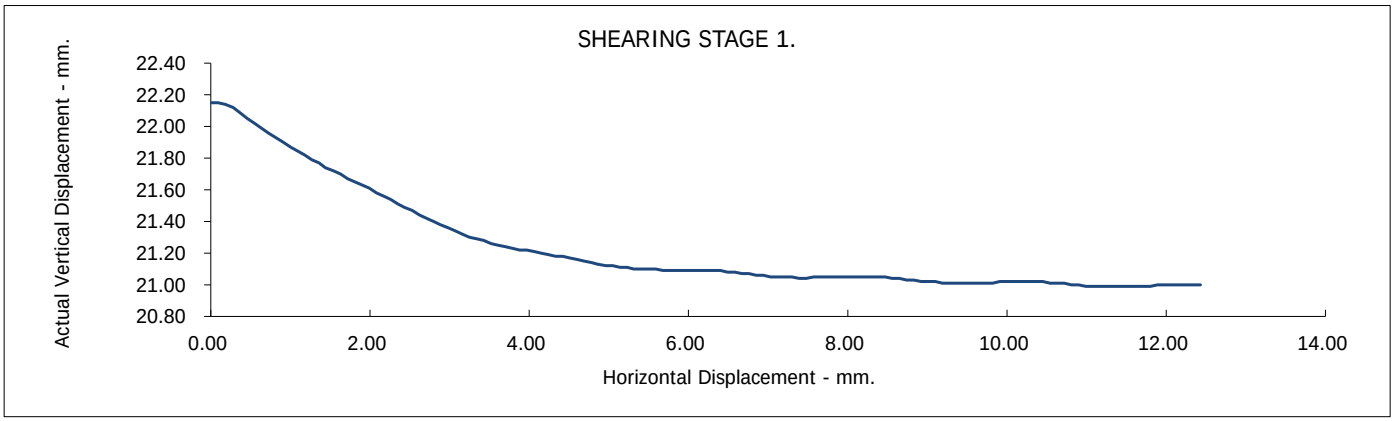
Borehole Number:	CP01	Depth from (m):	12.00
Sample Number :		Depth to (m):	12.45

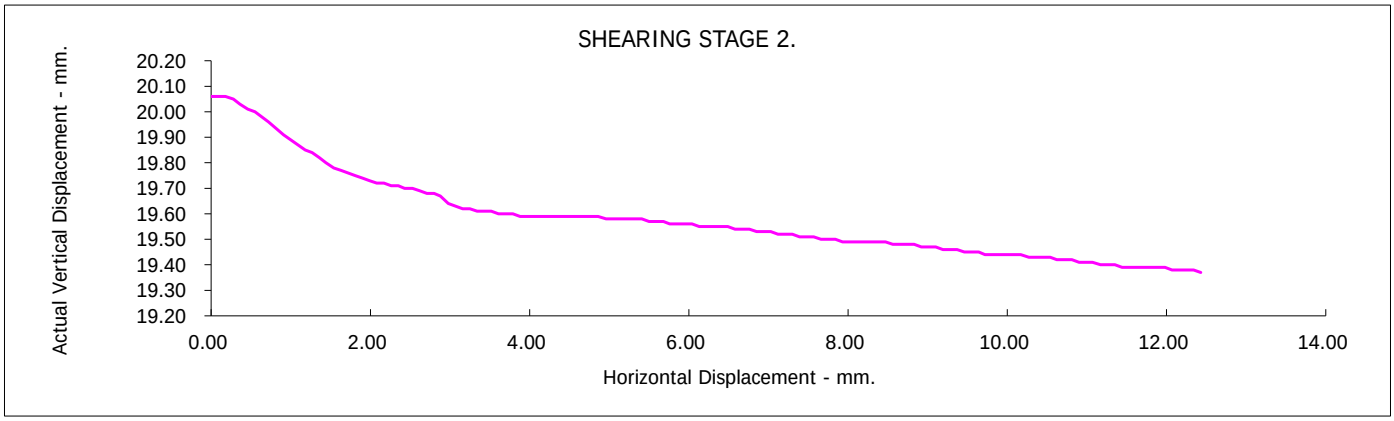


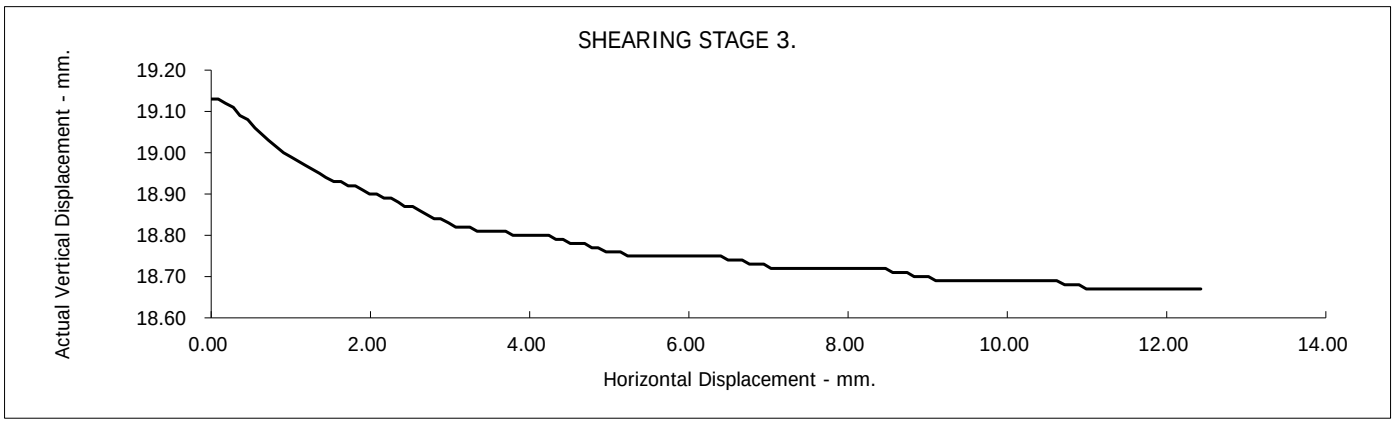




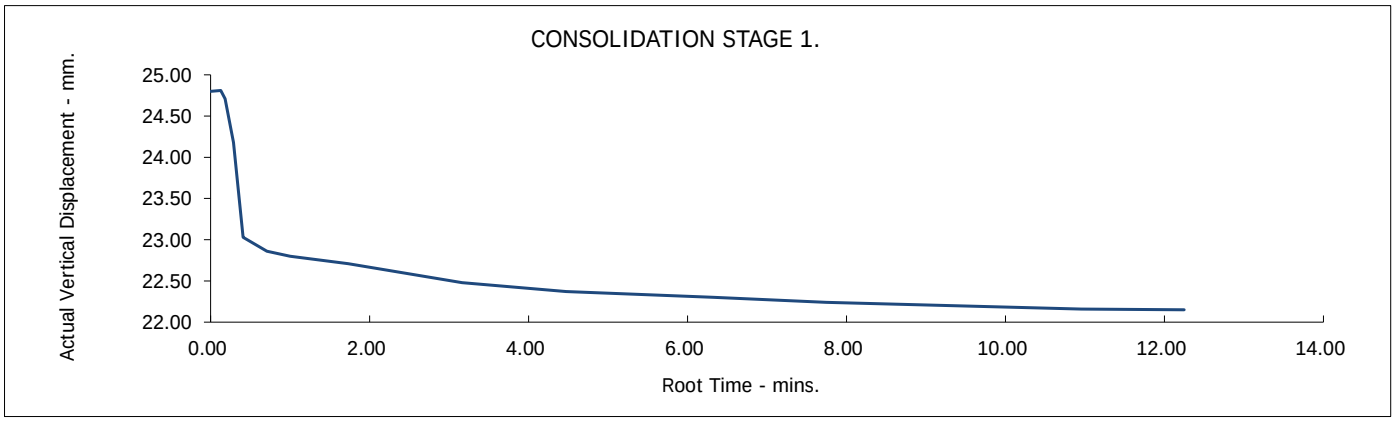
Borehole Number:	CP01	Depth from (m):	12.00
Sample Number :		Depth to (m):	12.45

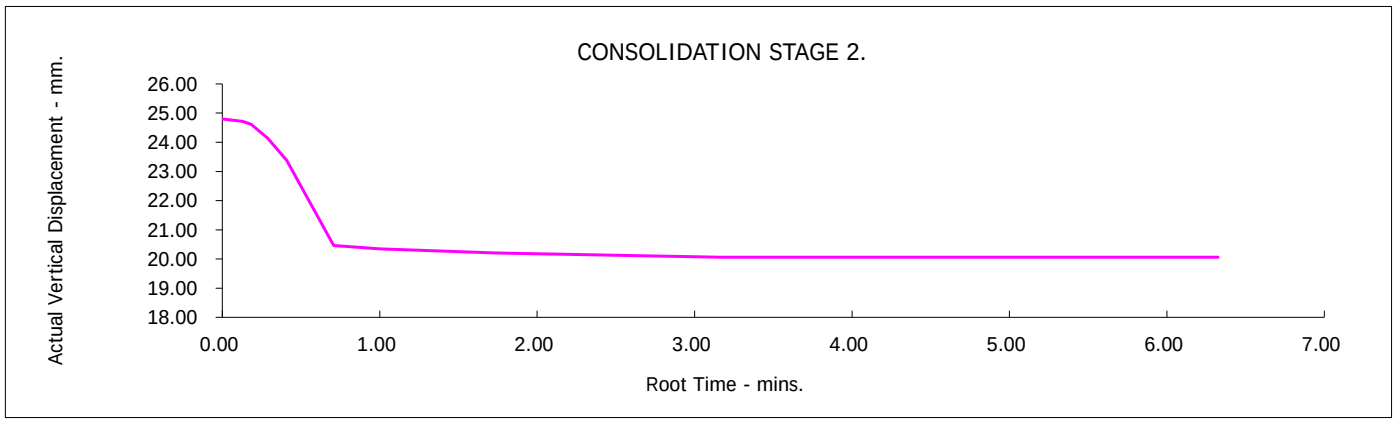


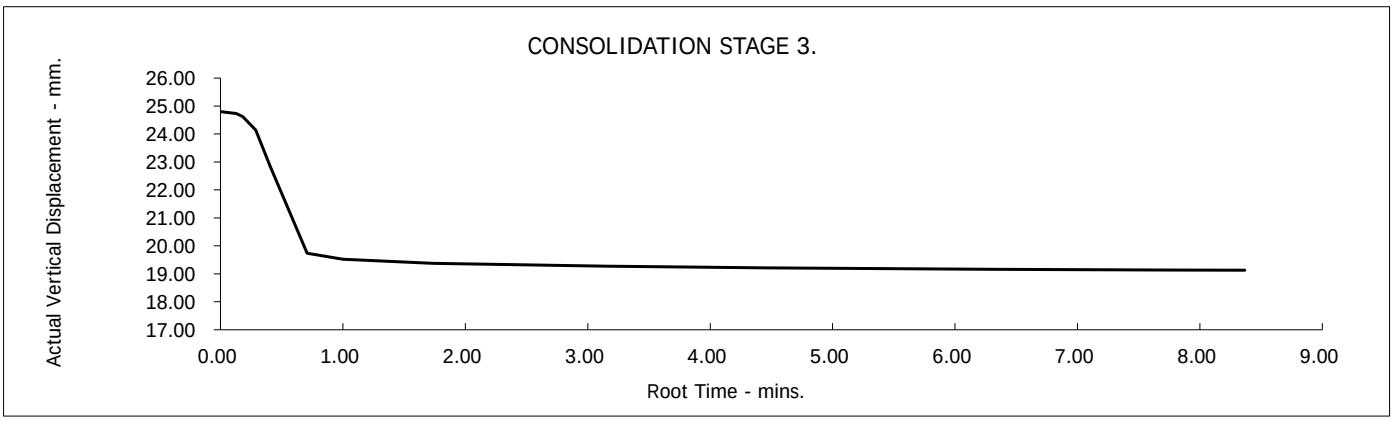




Borehole Number:	CP01	Depth from (m):	12.00
Sample Number :		Depth to (m):	12.45







Test Report: MS DIRECT SHEARBOX TEST.BS1377:Part 7:4.5 :1990.

Borehole Number:	CP01	Depth from (m):	15.00
Sample Number :		Depth to (m):	15.45

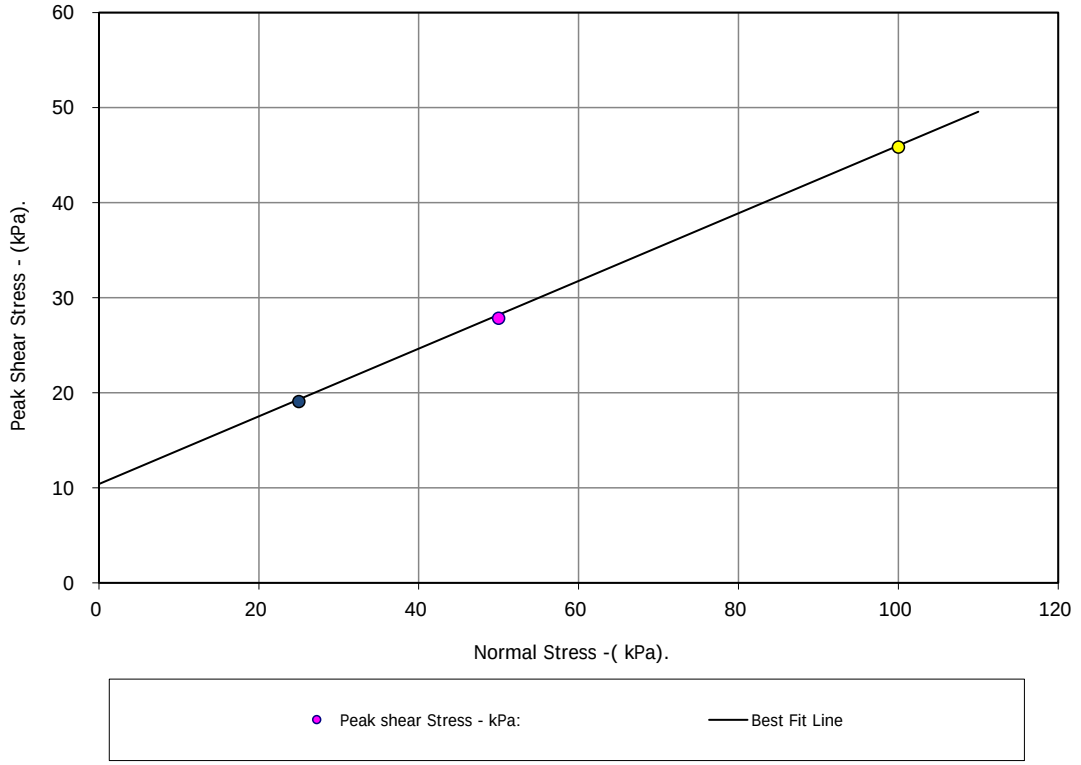
Sample Type:	B
Particle Density - Mg/m3:	2.65 (Assumed)
Specimen Tested:	Submerged, Remoulded (Light Tamping) Material above 2mm removed.

Sample Description:
Brown CLAY

STAGE	**1**	**2**	**3**
Initial Conditions			
Height - mm:	24.80	24.80	24.80
Length - mm:	60.00	60.00	60.00
Moisture Content - %:	45	45	45
Bulk Density - Mg/m3:	1.63	1.63	1.63
Dry Density - Mg/m3:	1.12	1.12	1.12
Voids Ratio:	1.3563	1.3563	1.3563
Degree of Saturation - %:	88.23	88.23	88.23
Normal Pressure- kPa	25	50	100
Consolidation			
Consolidated Height - mm:	22.84	21.65	18.54
Shear			
Rate of Horizontal Displacement (mm/min)	0.200	0.200	0.200
Horizontal Displacement at Peak Shear Stress (mm)	8.65	10.17	7.30
Peak shear Stress - kPa:	19	28	46

PEAK	
Angle of Shearing Resistance:(θ)	**20**
Effective Cohesion - kPa:	**10**

FAILURE CONDITIONS



UKAS TESTING 2788

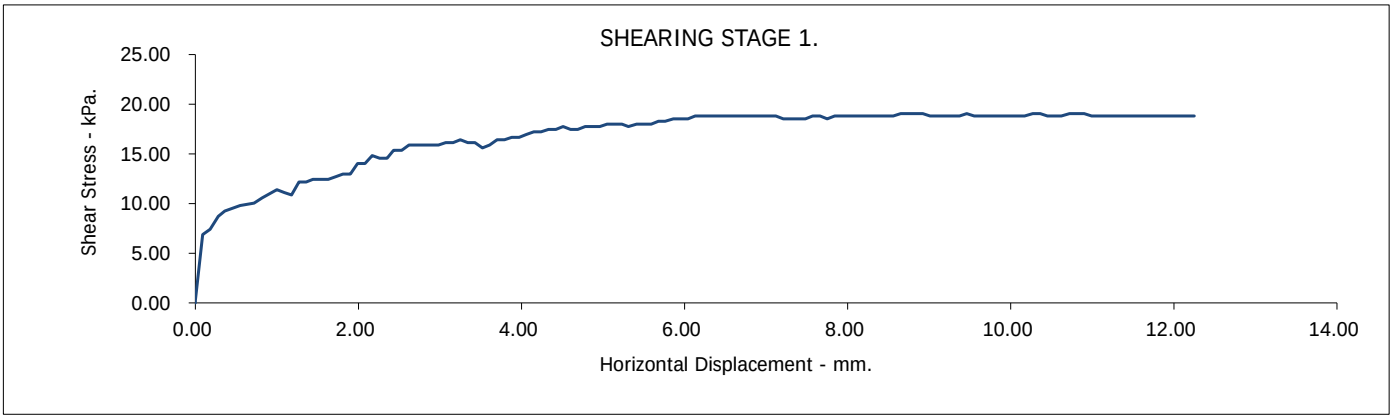
Contract No.: **67887**

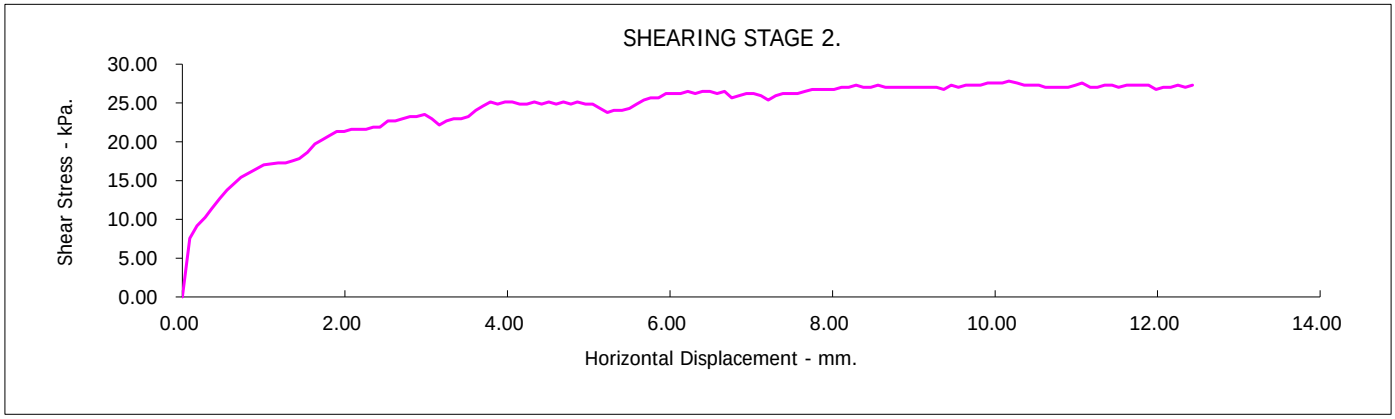
Boorley Green School

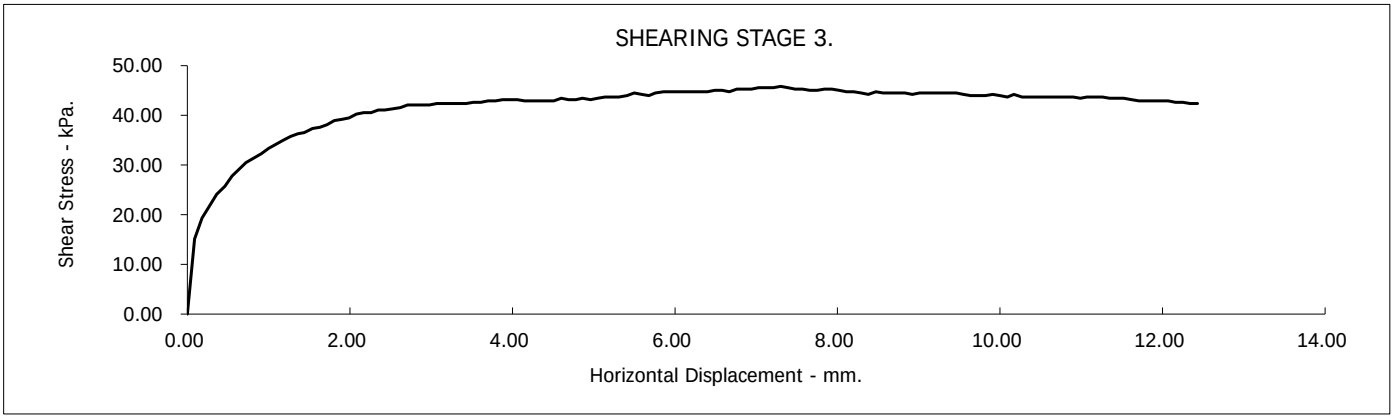
Client Ref Number: **PO-23-014**

GSTL GEOTECHNICAL SITE & TESTING LABORATORIES

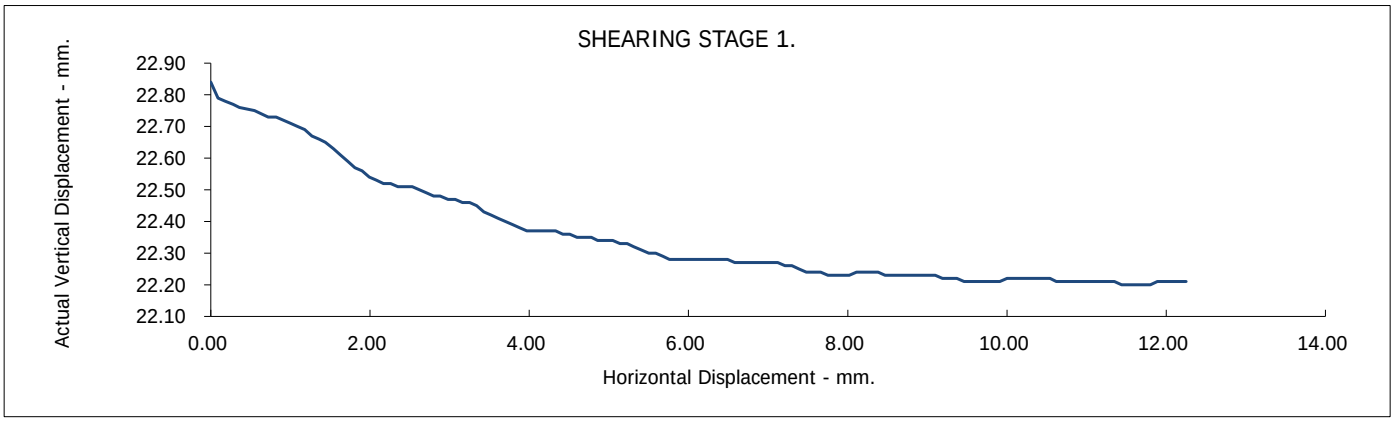
Borehole Number:	CP01	Depth from (m):	15.00
Sample Number :		Depth to (m):	15.45

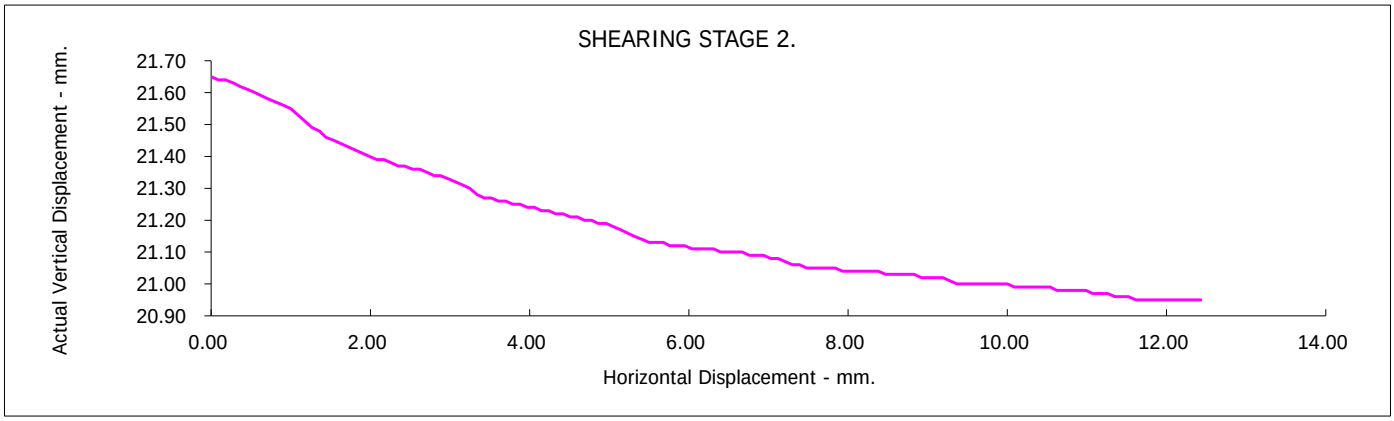


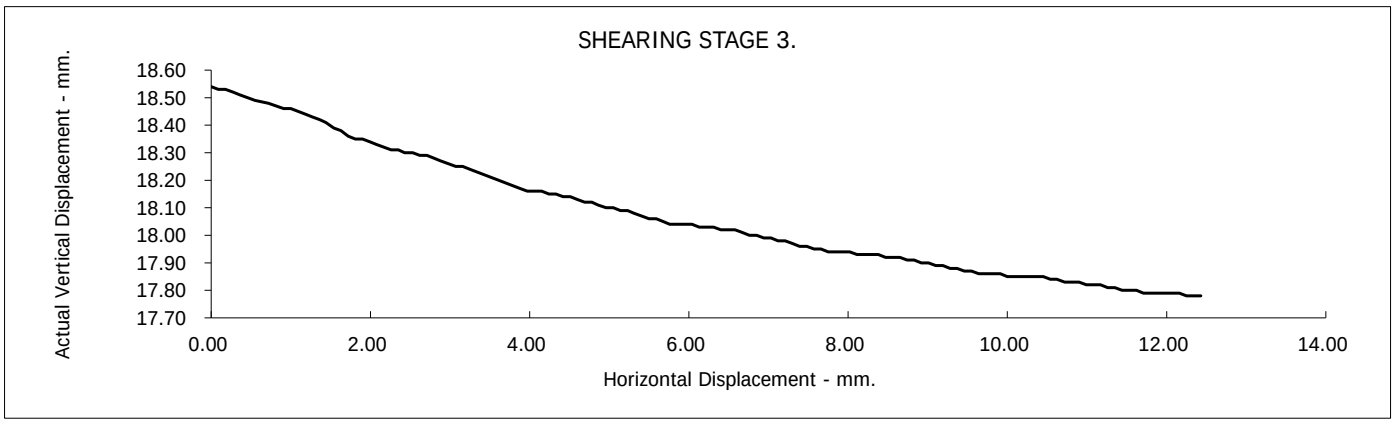




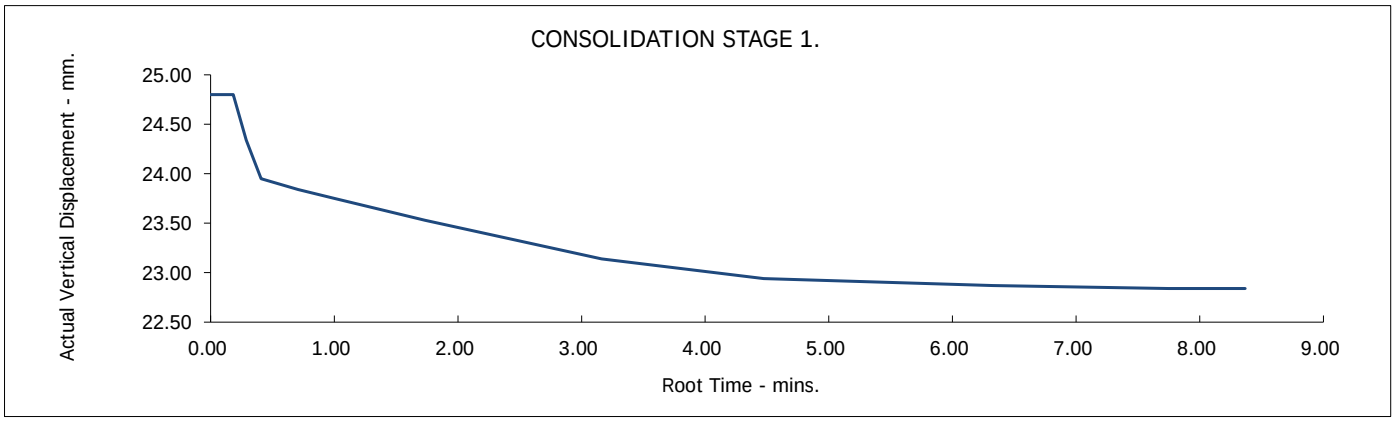
Borehole Number:	CP01	Depth from (m):	15.00
Sample Number :		Depth to (m):	15.45

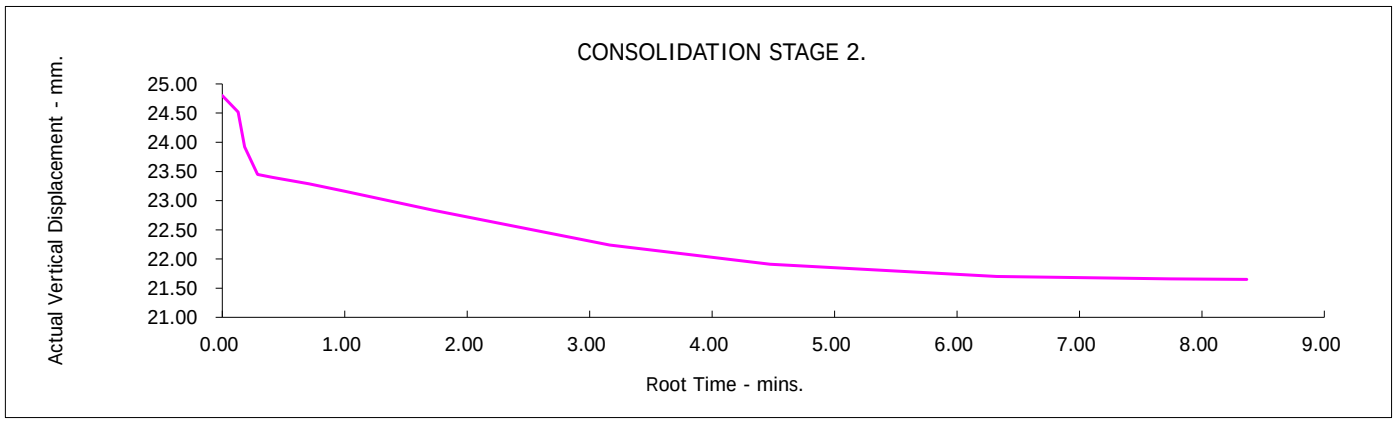


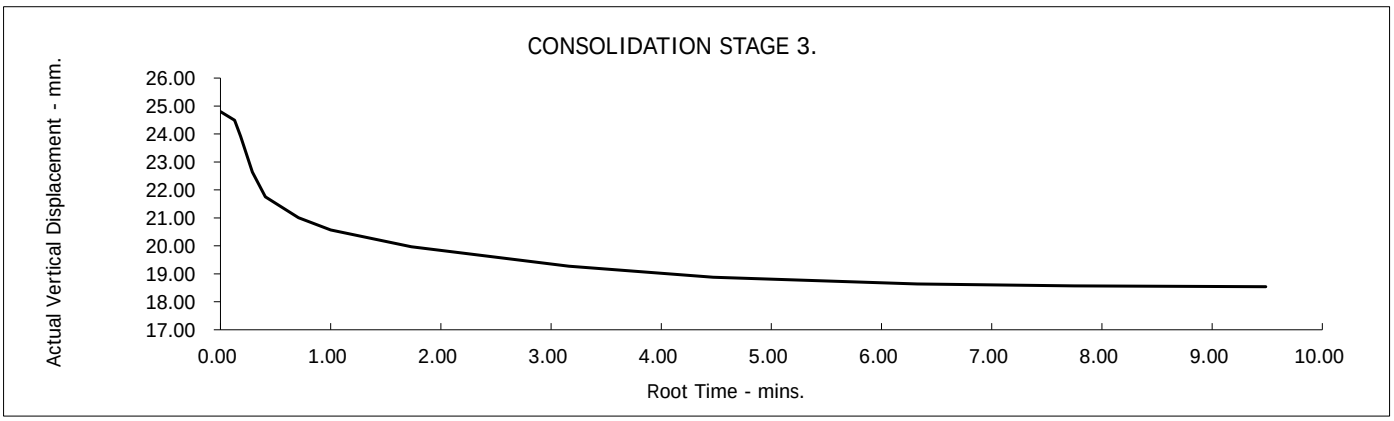




Borehole Number:	CP01	Depth from (m):	15.00
Sample Number :		Depth to (m):	15.45







Test Report: MS DIRECT SHEARBOX TEST.BS1377:Part 7:4.5 :1990.

Borehole Number:	CP02	Depth from (m):	1.20
Sample Number :		Depth to (m):	1.65

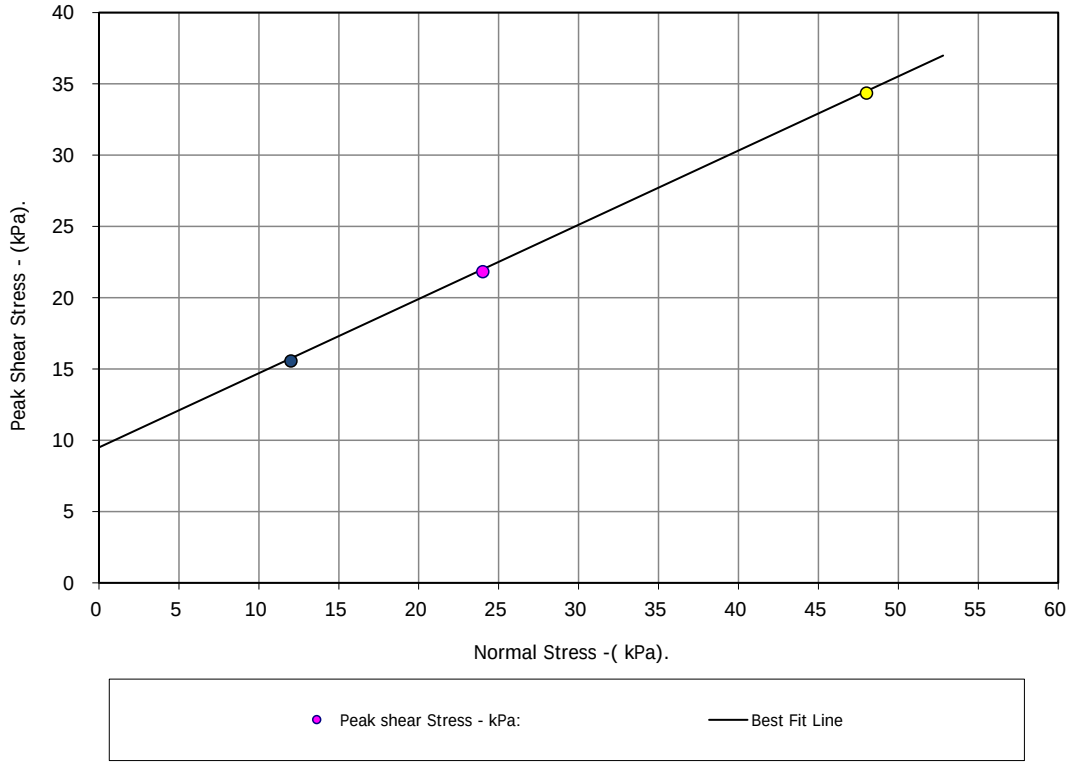
Sample Type:	U
Particle Density - Mg/m3:	2.65 (Assumed)
Specimen Tested:	Submerged, Remoulded (Light Tamping) Material above 2mm removed.

Sample Description:
Brown silty CLAY

STAGE	**1**	**2**	**3**
Initial Conditions			
Height - mm:	24.80	24.80	24.80
Length - mm:	60.00	60.00	60.00
Moisture Content - %:	26	26	26
Bulk Density - Mg/m3:	1.86	1.86	1.86
Dry Density - Mg/m3:	1.48	1.48	1.48
Voids Ratio:	0.7943	0.7943	0.7943
Degree of Saturation - %:	87.15	87.15	87.15
Normal Pressure- kPa	12	24	48
Consolidation			
Consolidated Height - mm:	24.50	24.32	23.94
Shear			
Rate of Horizontal Displacement (mm/min)	0.200	0.200	0.200
Horizontal Displacement at Peak Shear Stress (mm)	0.36	1.80	2.61
Peak shear Stress - kPa:	16	22	34

PEAK	
Angle of Shearing Resistance:(θ)	**28**
Effective Cohesion - kPa:	**10**

FAILURE CONDITIONS



UKAS TESTING 2788

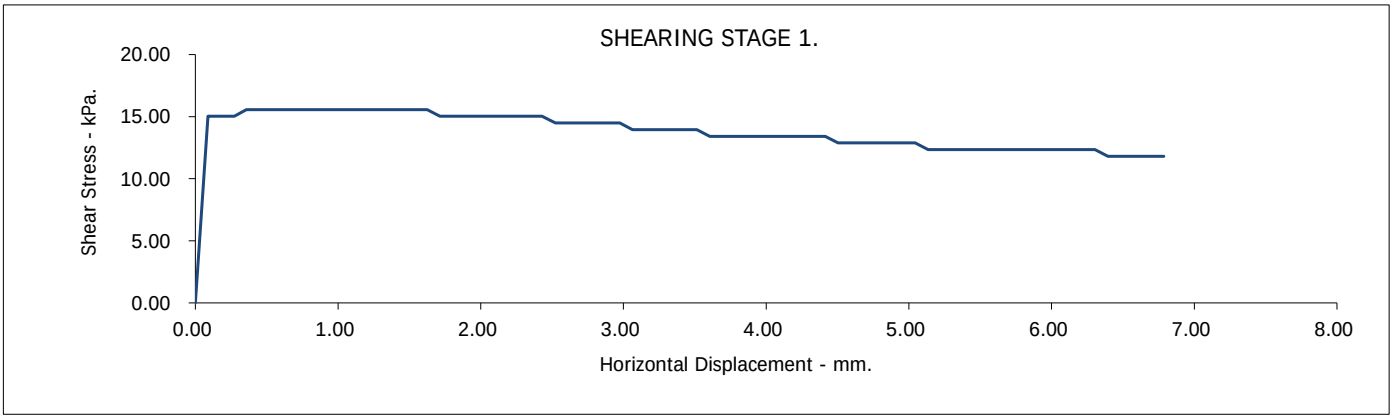
Contract No.: **67887**

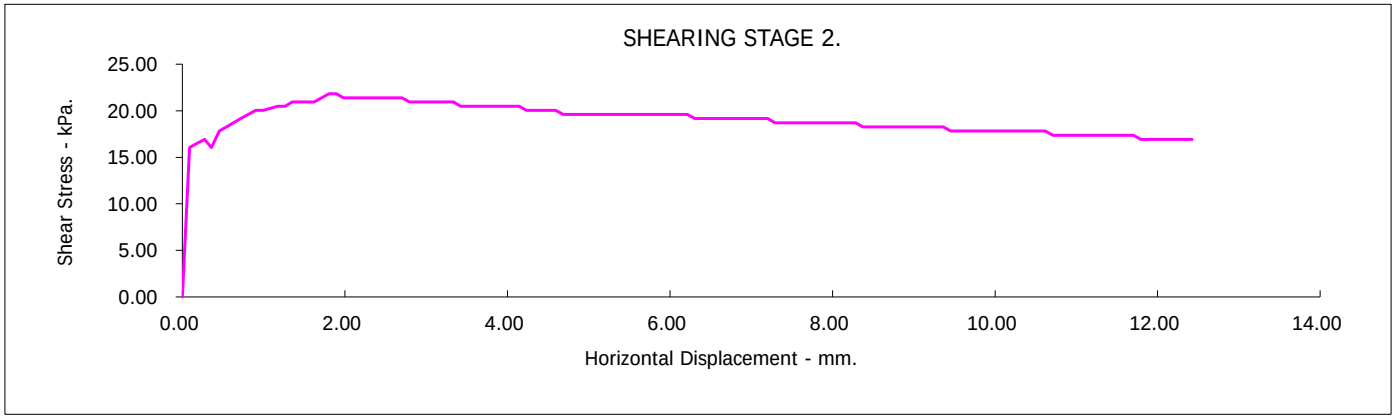
Boorley Green School

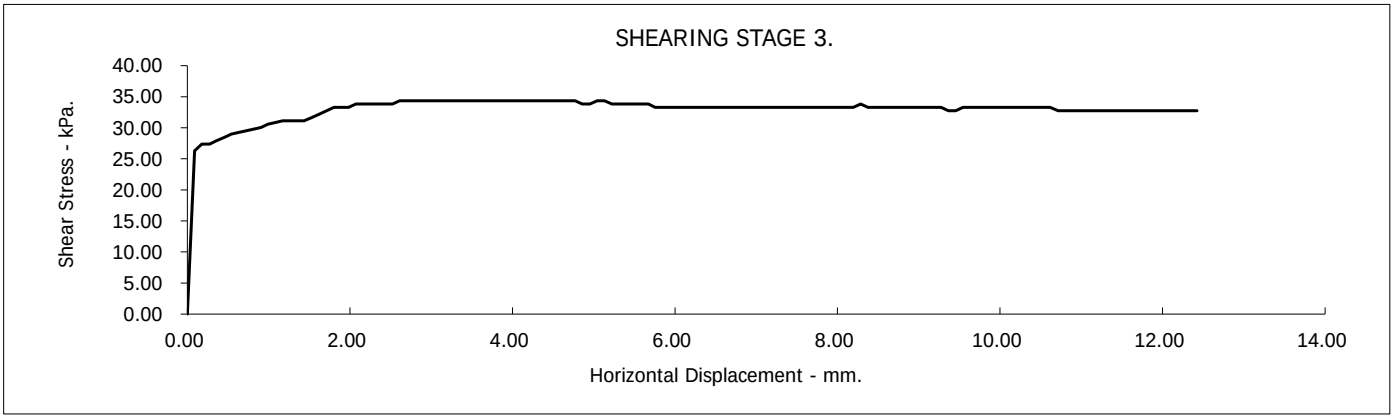
Client Ref Number: **PO-23-014**

GSTL GEOTECHNICAL SITE & TESTING LABORATORIES

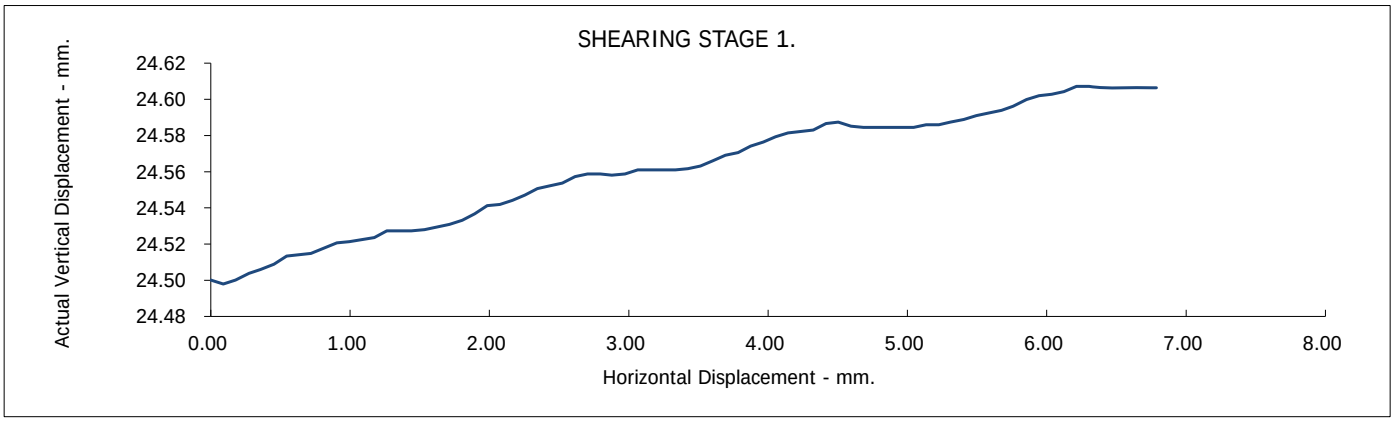
Borehole Number:	CP02	Depth from (m):	1.20
Sample Number :		Depth to (m):	1.65

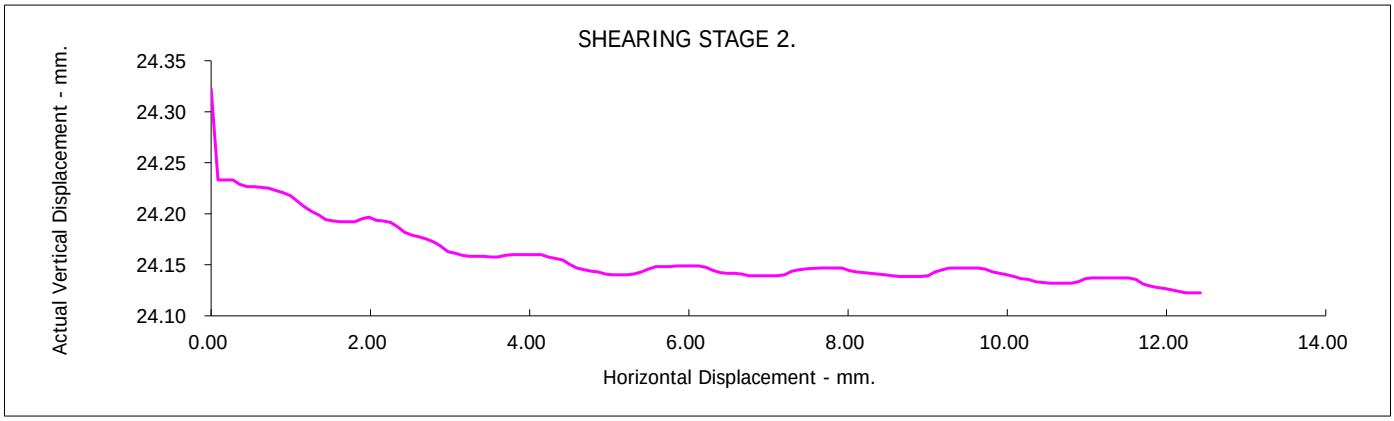


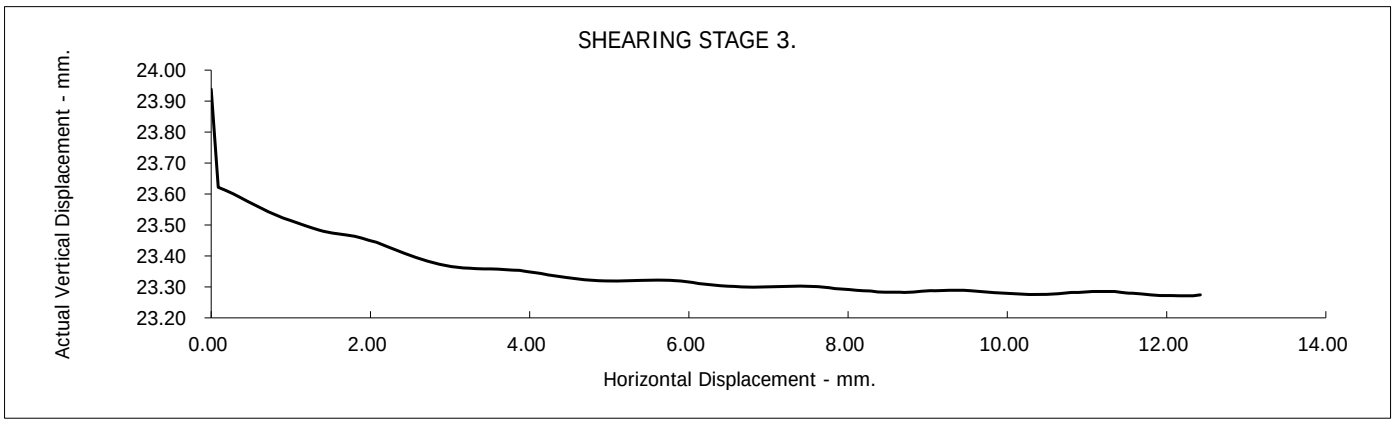




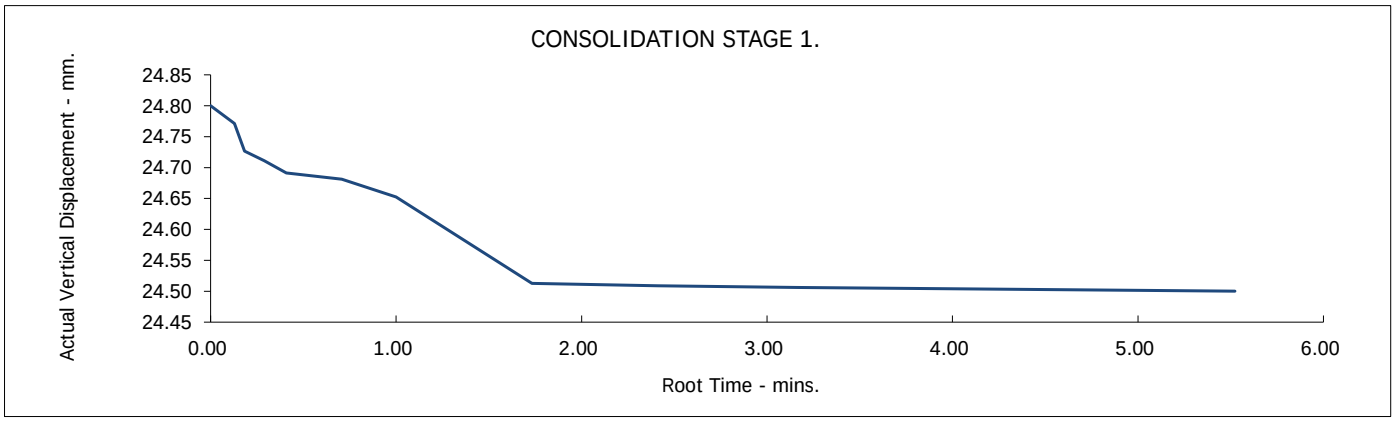
Borehole Number:	CP02	Depth from (m):	1.20
Sample Number :		Depth to (m):	1.65

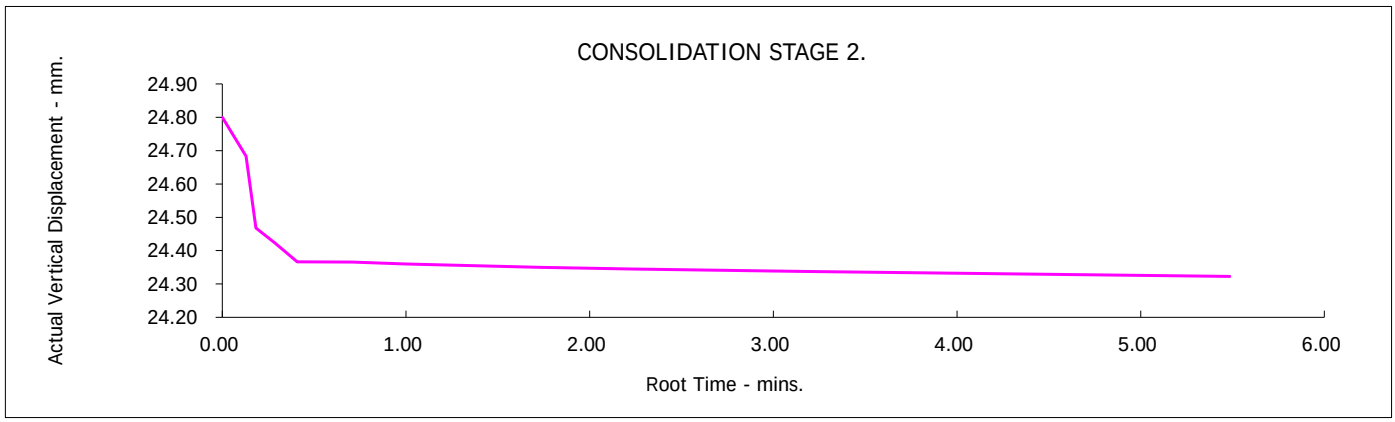


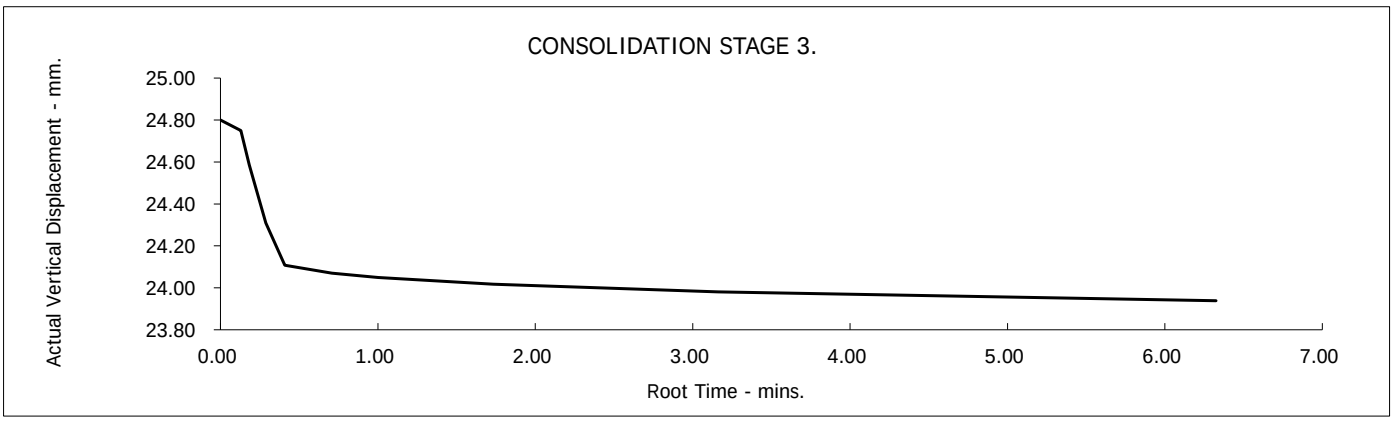




Borehole Number:	CP02	Depth from (m):	1.20
Sample Number :		Depth to (m):	1.65







Test Report: MS DIRECT SHEARBOX TEST.BS1377:Part 7:4.5 :1990.

Borehole Number:	CP02	Depth from (m):	3.00
Sample Number :	8.0	Depth to (m):	3.45

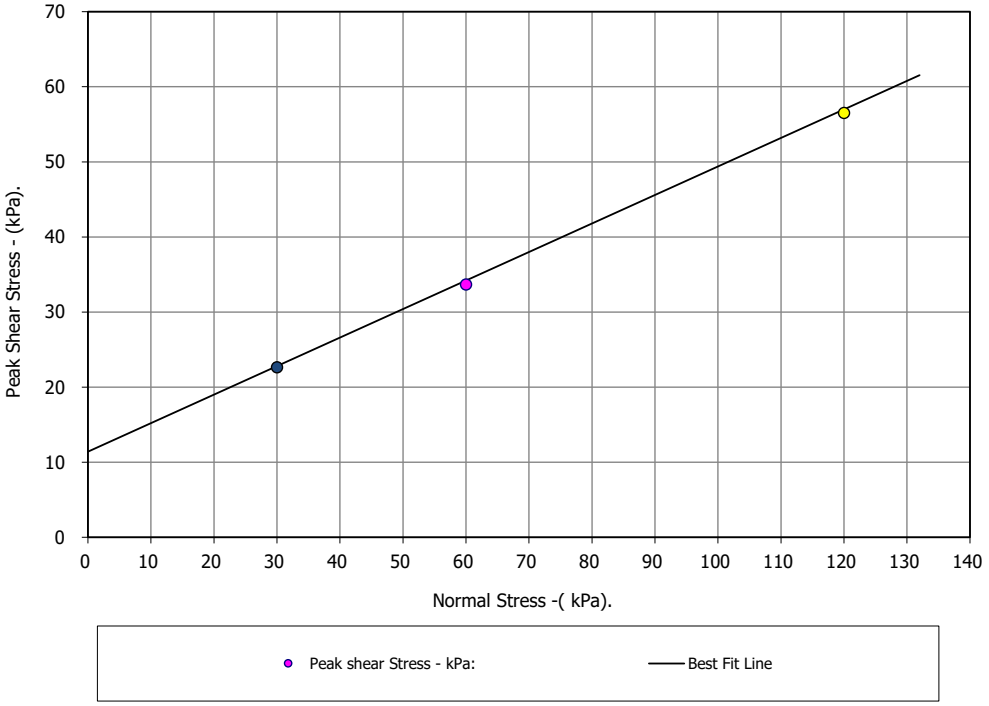
Sample Type:	U
Particle Density - Mg/m3:	2.65 (Assumed)
Specimen Tested:	Submerged, Remoulded (Light Tamping) Material above 2mm removed.

Sample Description:
Brown silty CLAY

STAGE	**1**	**2**	**3**
Initial Conditions			
Height - mm:	24.80	24.80	24.80
Length - mm:	60.00	60.00	60.00
Moisture Content - %:	35	35	35
Bulk Density - Mg/m3:	1.62	1.62	1.62
Dry Density - Mg/m3:	1.20	1.20	1.20
Voids Ratio:	1.2078	1.2078	1.2078
Degree of Saturation - %:	76.30	76.30	76.30
Normal Pressure- kPa	30	60	120
Consolidation			
Consolidated Height - mm:	24.40	23.93	22.52
Shear			
Rate of Horizontal Displacement (mm/min)	0.200	0.200	0.200
Horizontal Displacement at Peak Shear Stress (mm)	1.89	2.34	2.52
Peak shear Stress - kPa:	23	34	57

PEAK	
Angle of Shearing Resistance:(θ)	**21**
Effective Cohesion - kPa:	**11**

FAILURE CONDITIONS



UKAS TESTING 2788

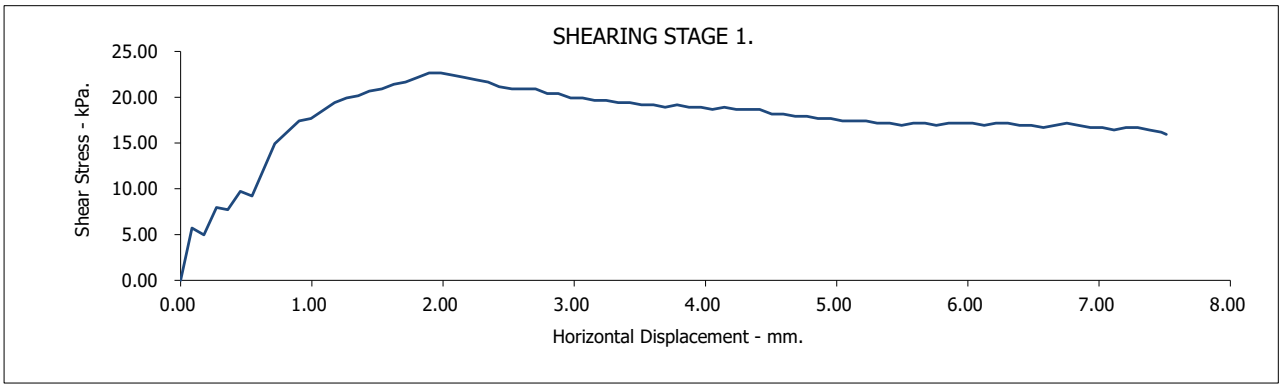
Contract No.: **67887**

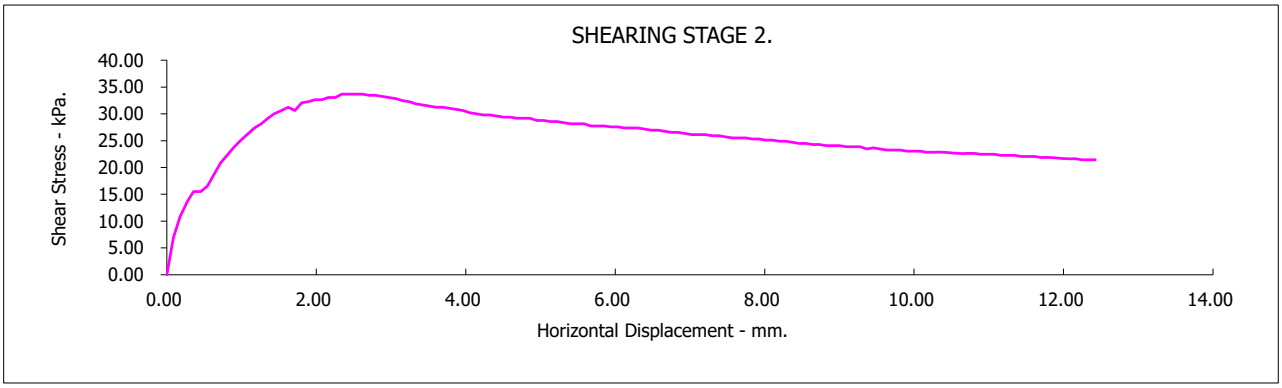
Boorley Green School

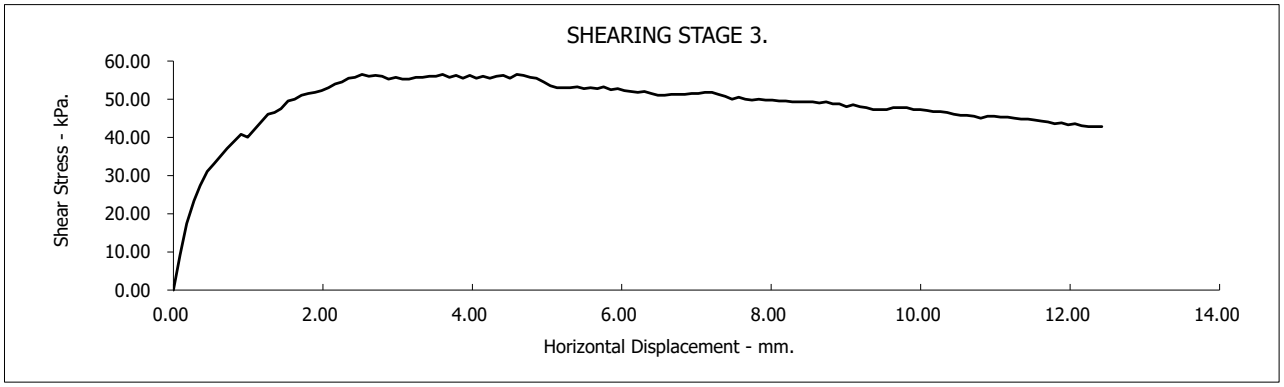
Client Ref Number: **PO-23-014**

GSTL GEOTECHNICAL SITE & TESTING LABORATORIES

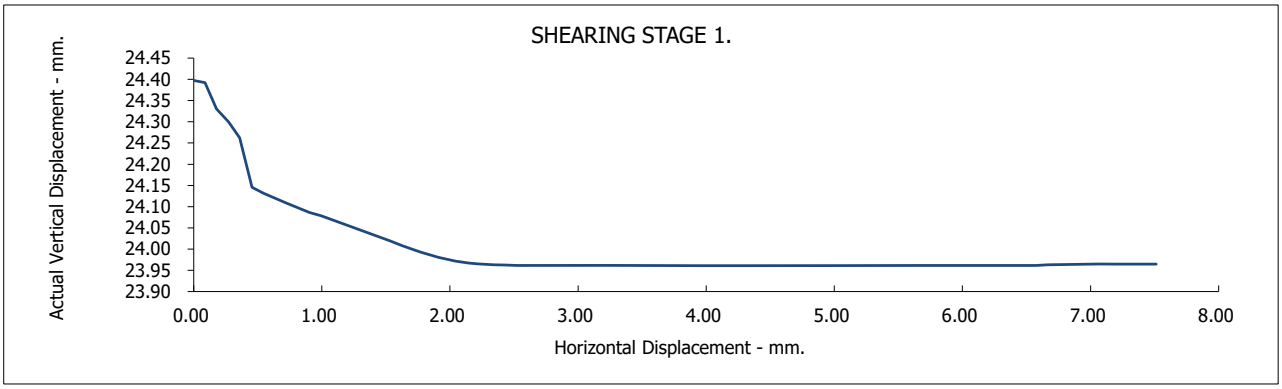
Borehole Number:	CP02	Depth from (m):	3.00
Sample Number :	8	Depth to (m):	3.45

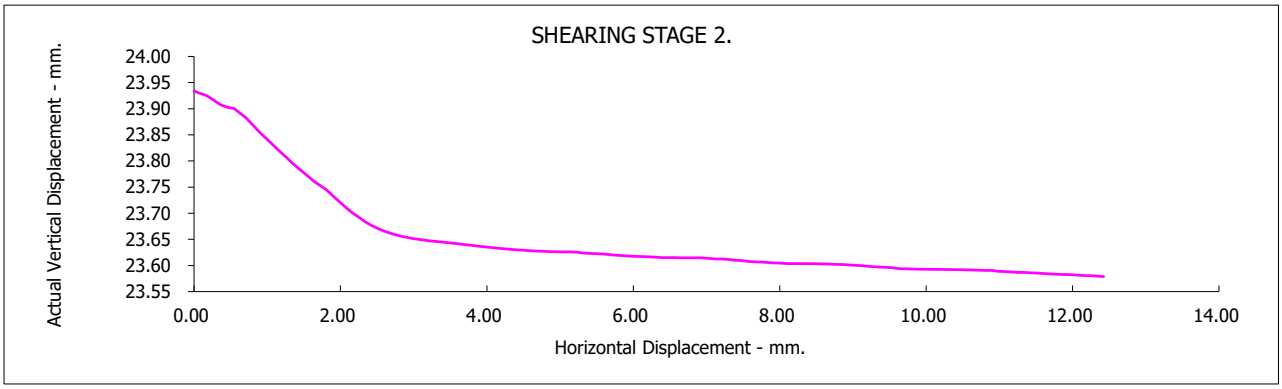


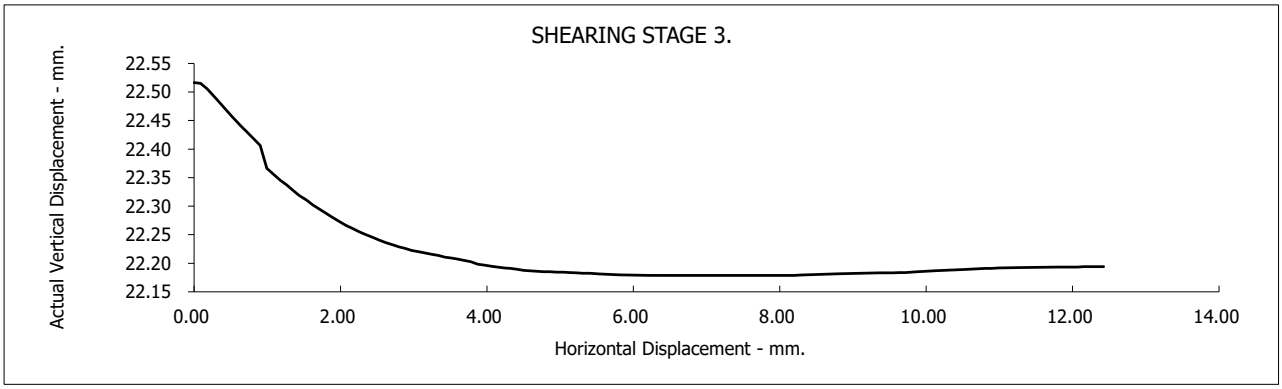




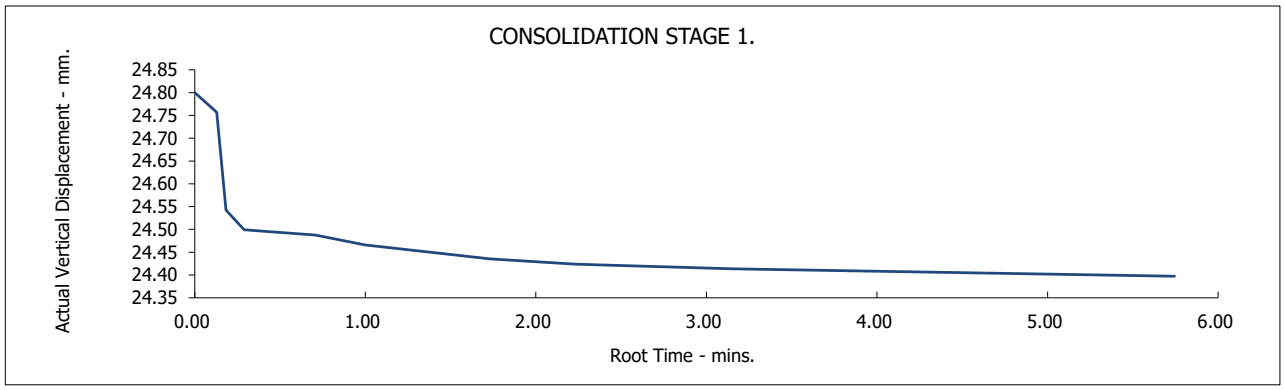
Borehole Number:	CP02	Depth from (m):	3.00
Sample Number :	8	Depth to (m):	3.45

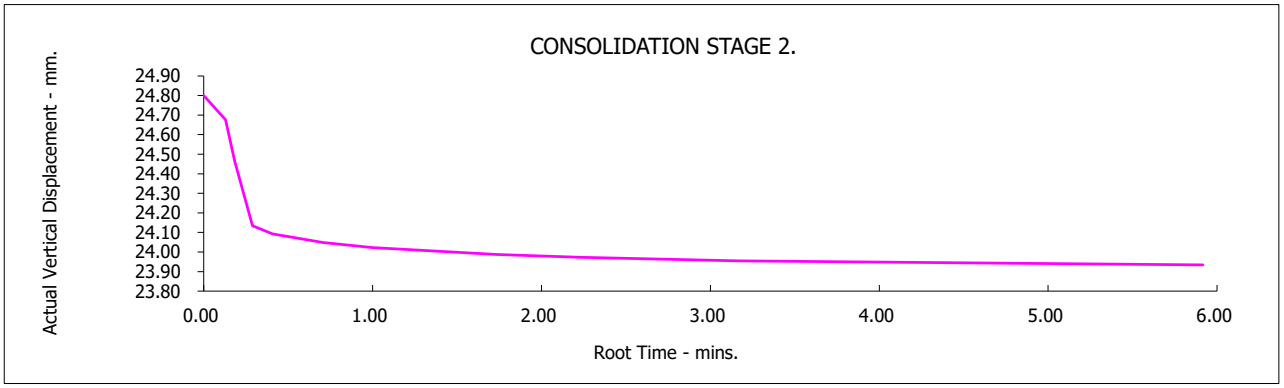


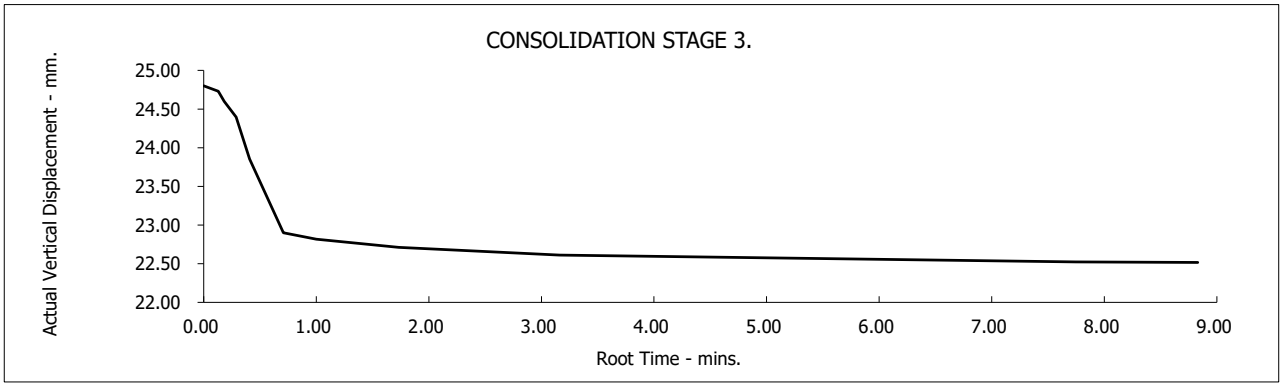




Borehole Number:	CP02	Depth from (m):	3.00
Sample Number :	8	Depth to (m):	3.45







Test Report: MS DIRECT SHEARBOX TEST.BS1377:Part 7:4.5 :1990.

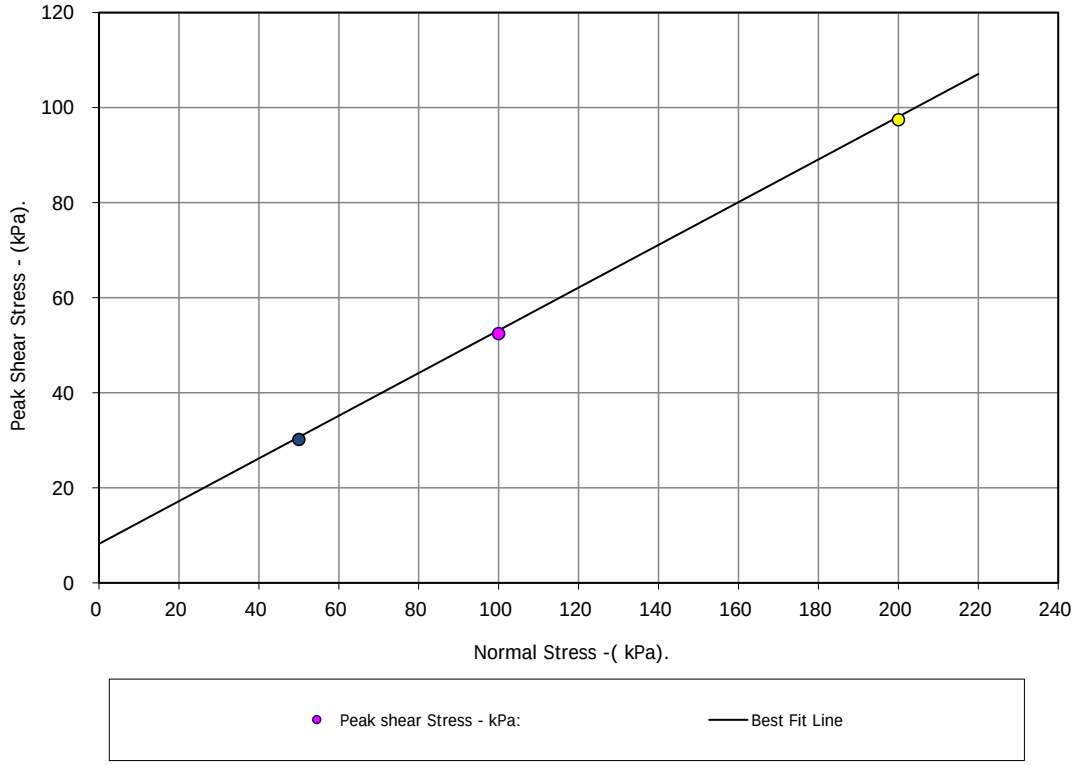
Borehole Number:	CP02	Depth from (m):	5.00
Sample Number :		Depth to (m):	5.45
Sample Type:	B		
Particle Density - Mg/m3:	2.65 (Assumed)		
Specimen Tested:	Submerged, Remoulded (Light Tamping) Material above 2mm removed.		

Sample Description:
Brown silty CLAY

STAGE	**1**	**2**	**3**
Initial Conditions			
Height - mm:	24.80	24.80	24.80
Length - mm:	60.00	60.00	60.00
Moisture Content - %:	35	35	35
Bulk Density - Mg/m3:	1.76	1.76	1.76
Dry Density - Mg/m3:	1.31	1.31	1.31
Voids Ratio:	1.0212	1.0212	1.0212
Degree of Saturation - %:	89.57	89.57	89.57
Normal Pressure- kPa	50	100	200
Consolidation			
Consolidated Height - mm:	22.77	21.47	20.08
Shear			
Rate of Horizontal Displacement (mm/min)	0.200	0.200	0.200
Horizontal Displacement at Peak Shear Stress (mm)	6.13	9.10	9.55
Peak shear Stress - kPa:	30	52	97

PEAK	
Angle of Shearing Resistance:(θ)	**24**
Effective Cohesion - kPa:	**8**

FAILURE CONDITIONS



UKAS TESTING 2788

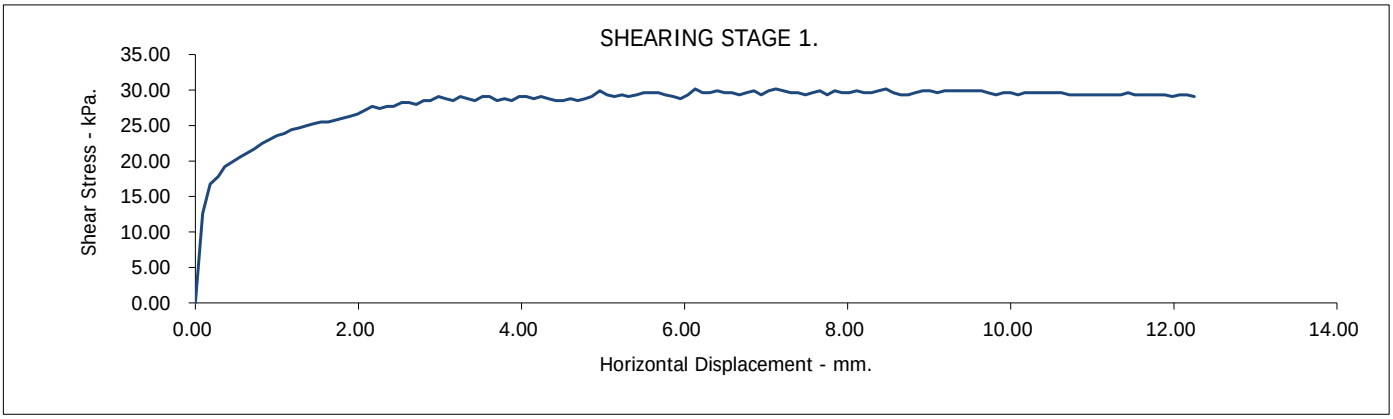
Contract No.: **67887**

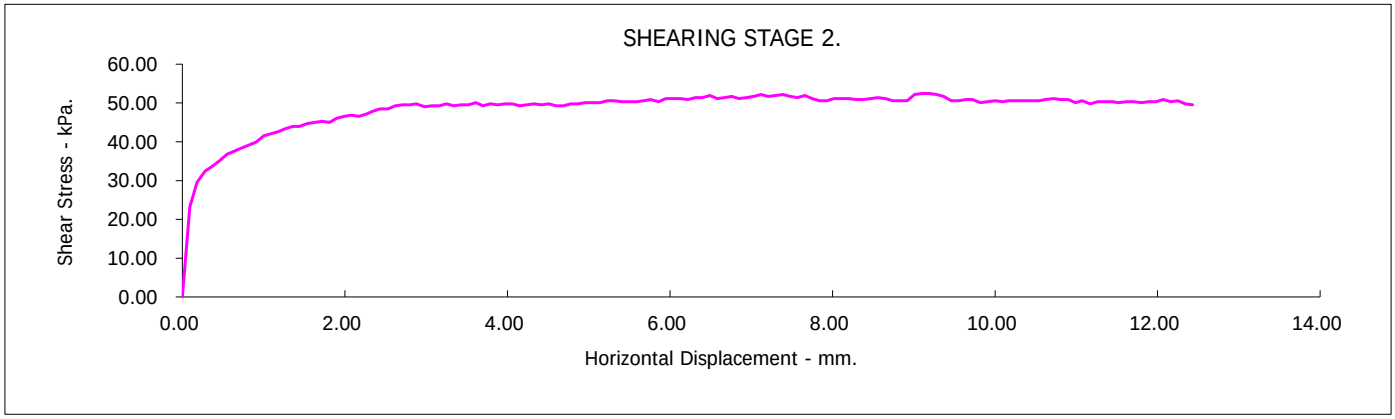
GSTL GEOTECHNICAL SITE & TESTING LABORATORIES

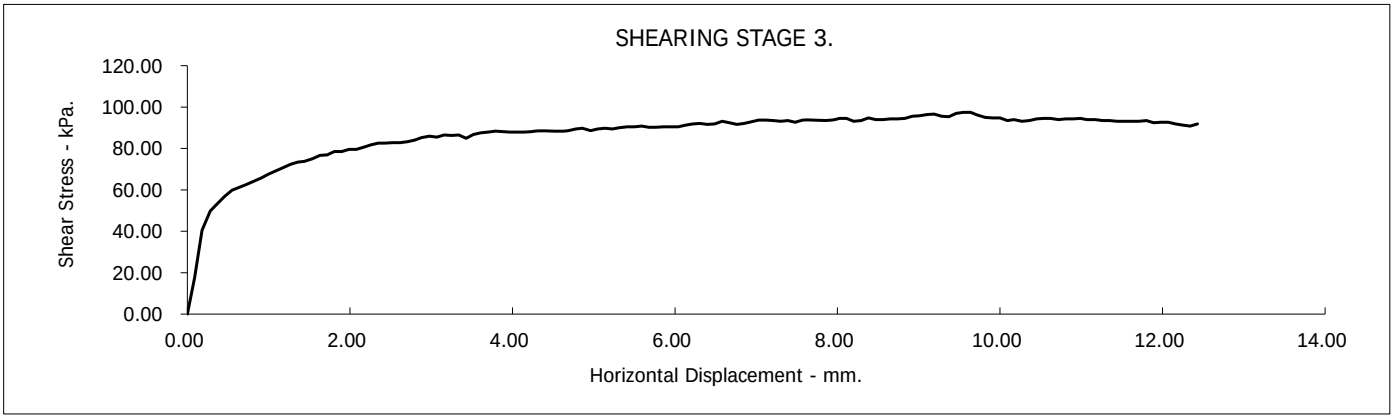
Boorley Green School

Client Ref Number: **PO-23-014**

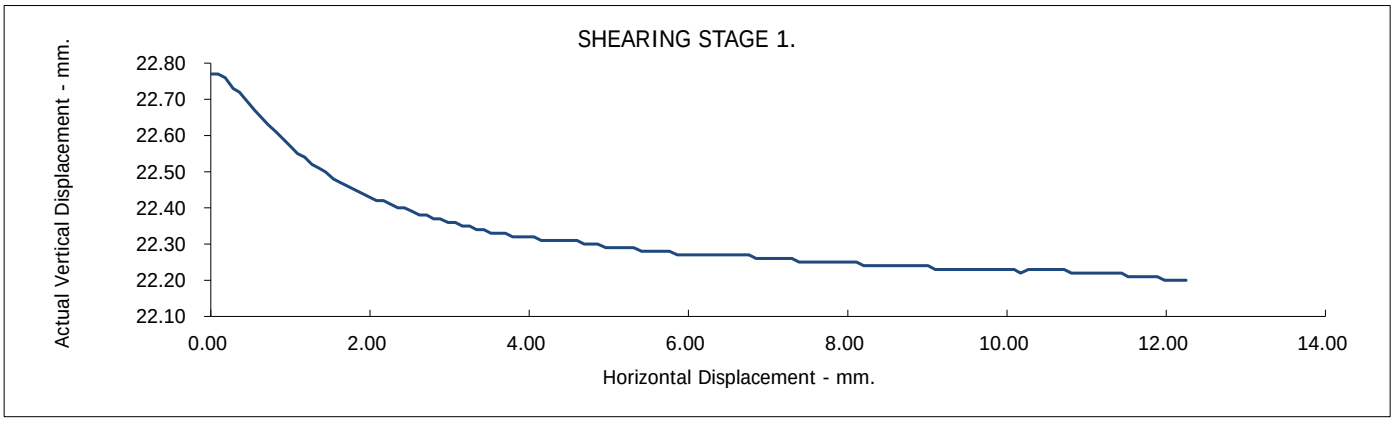
Borehole Number:	CP02	Depth from (m):	5.00
Sample Number :		Depth to (m):	5.45

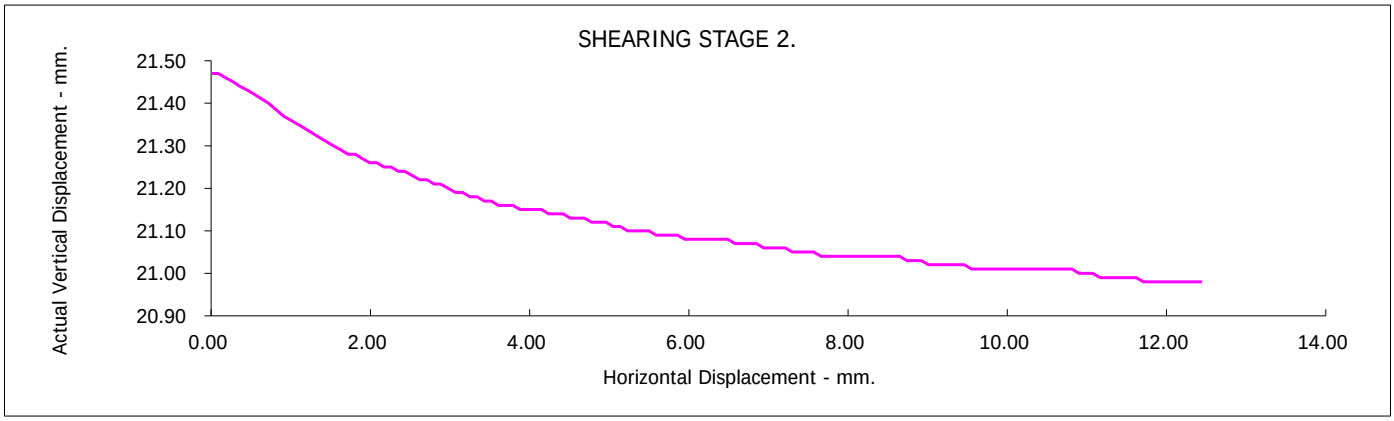


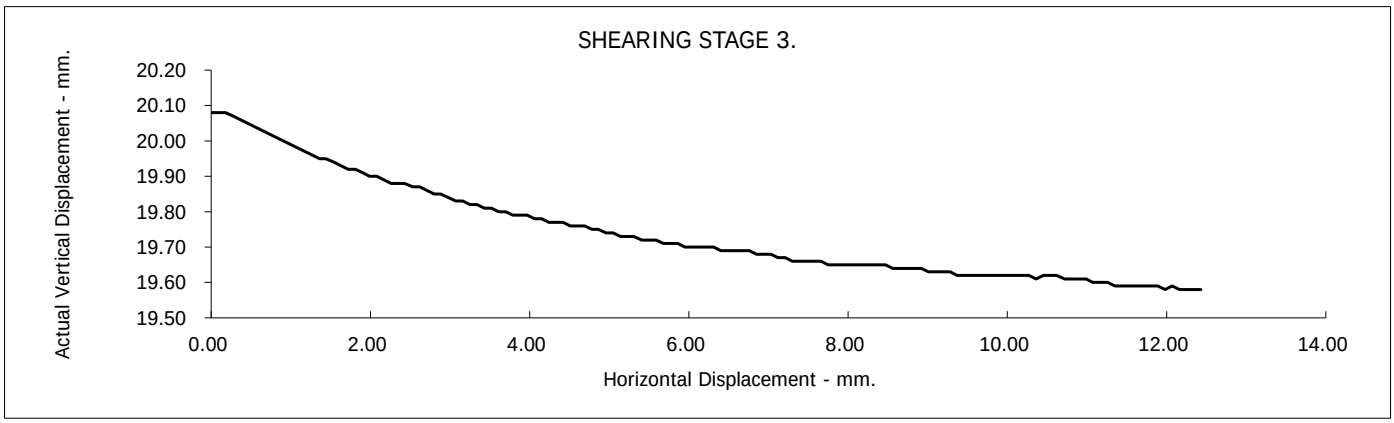




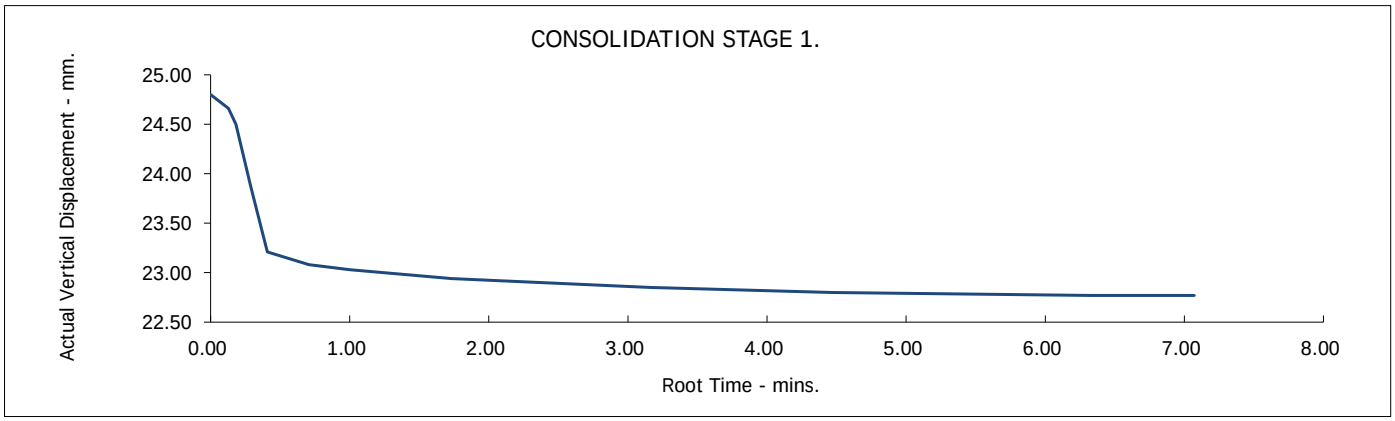
Borehole Number:	CP02	Depth from (m):	5.00
Sample Number :		Depth to (m):	5.45

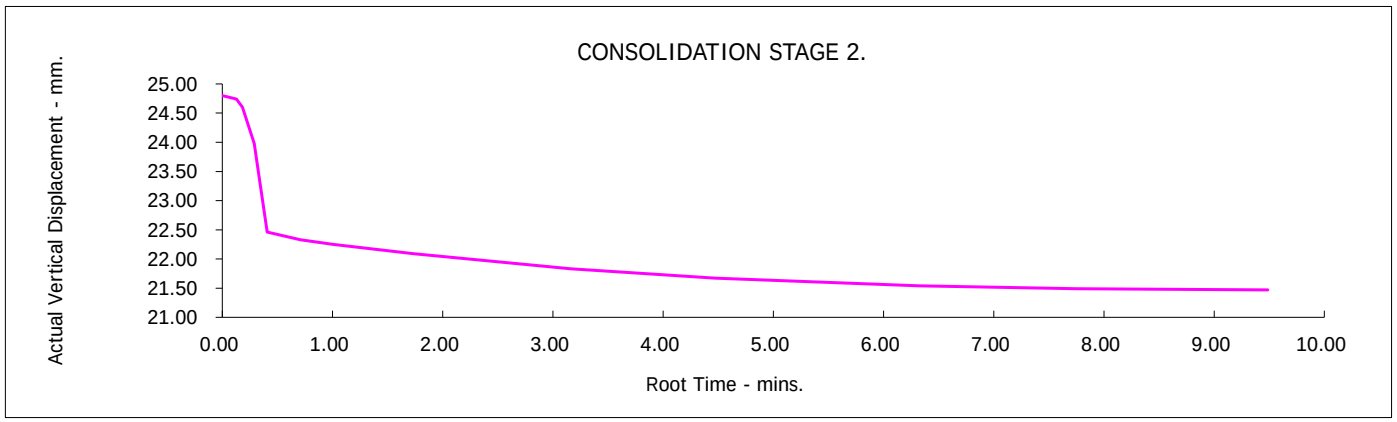


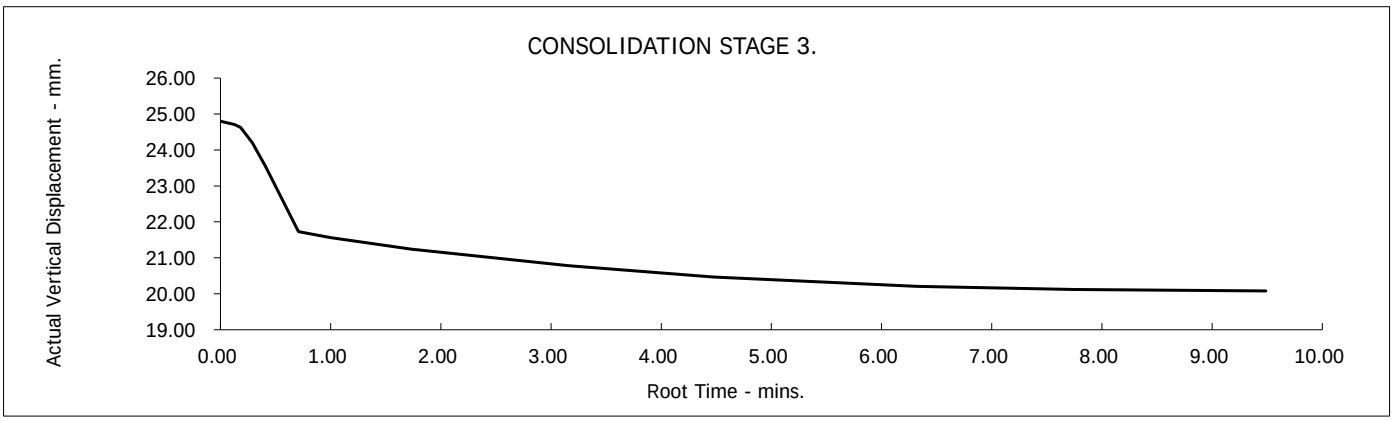




Borehole Number:	CP02	Depth from (m):	5.00
Sample Number :		Depth to (m):	5.45







Test Report: MS DIRECT SHEARBOX TEST.BS1377:Part 7:4.5 :1990.

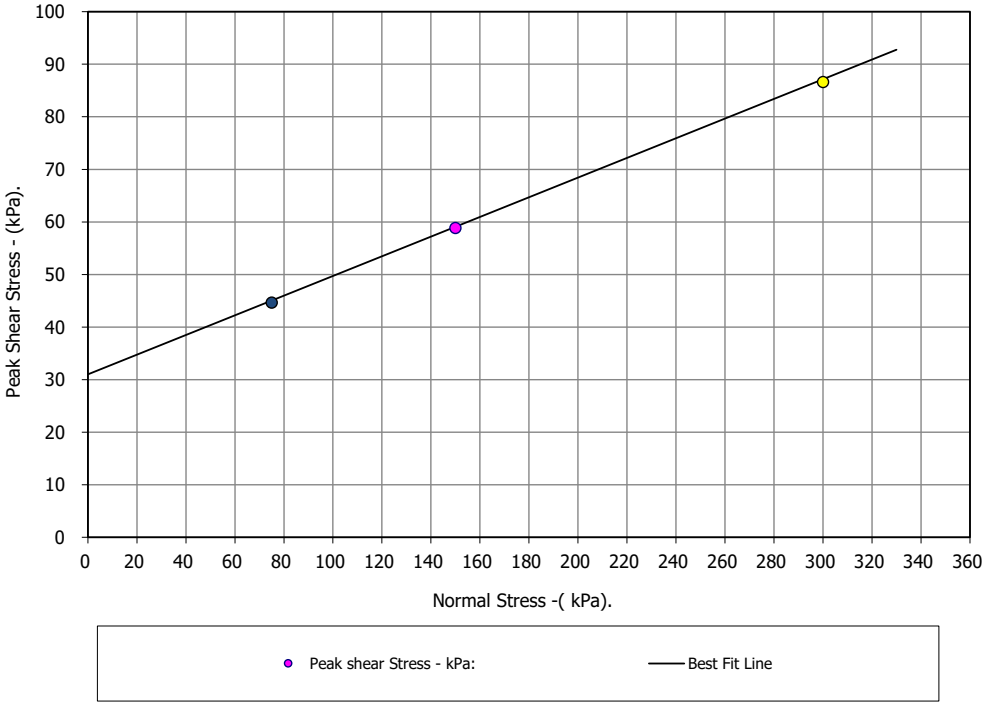
Borehole Number:	CP02	Depth from (m):	9.00
Sample Number :		Depth to (m):	
Sample Type:	B		
Particle Density - Mg/m3:	2.65 (Assumed)		
Specimen Tested:	Submerged, Remoulded (Light Tamping) Material above 2mm removed.		

Sample Description:
Grey CLAY

STAGE	**1**	**2**	**3**
Initial Conditions			
Height - mm:	24.80	24.80	24.80
Length - mm:	60.00	60.00	60.00
Moisture Content - %:	27	27	27
Bulk Density - Mg/m3:	1.69	1.69	1.69
Dry Density - Mg/m3:	1.34	1.34	1.34
Voids Ratio:	0.9839	0.9839	0.9839
Degree of Saturation - %:	72.10	72.10	72.10
Normal Pressure- kPa	75	150	300
Consolidation			
Consolidated Height - mm:	24.31	21.87	20.53
Shear			
Rate of Horizontal Displacement (mm/min)	0.200	0.200	0.200
Horizontal Displacement at Peak Shear Stress (mm)	3.79	3.79	2.35
Peak shear Stress - kPa:	45	59	87

PEAK	
Angle of Shearing Resistance:(θ)	**10.5**
Effective Cohesion - kPa:	**31**

FAILURE CONDITIONS



UKAS TESTING 2788

GSTL GEOTECHNICAL SITE & TESTING LABORATORIES

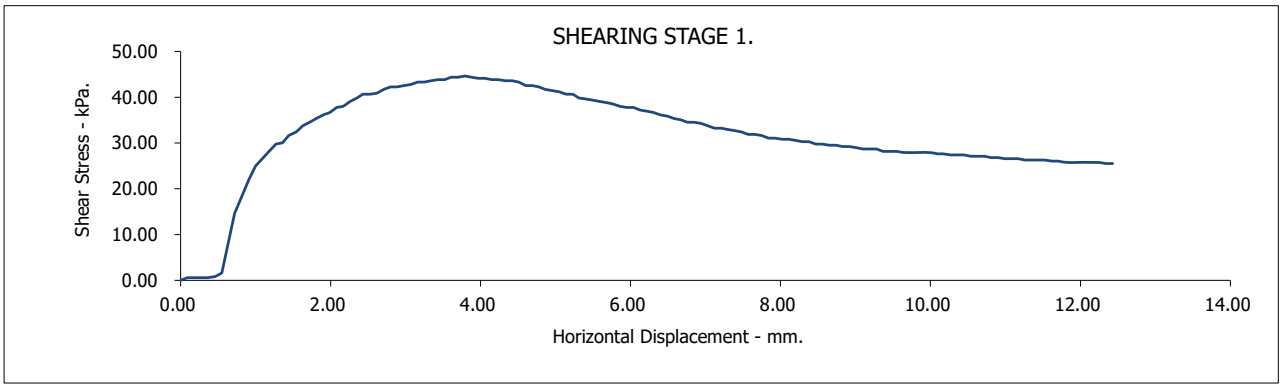
Boorley Green School

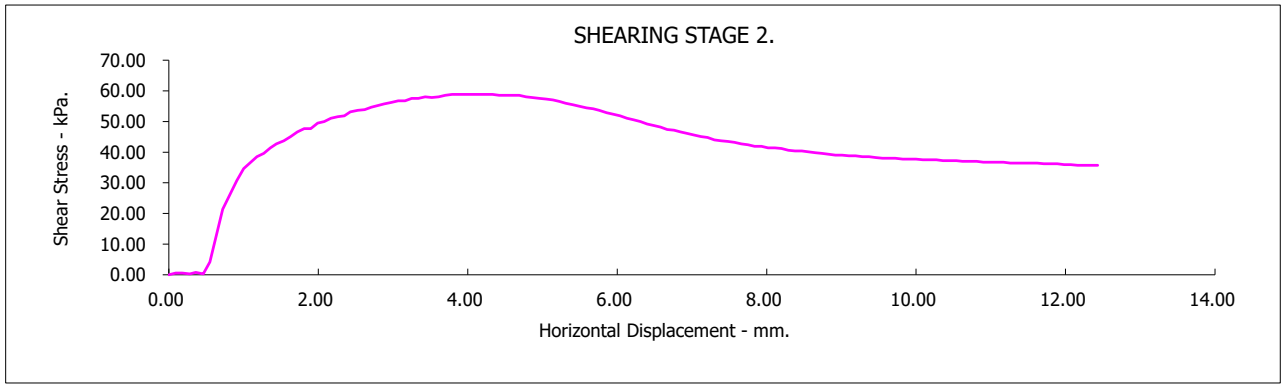
Contract No.: **67887**

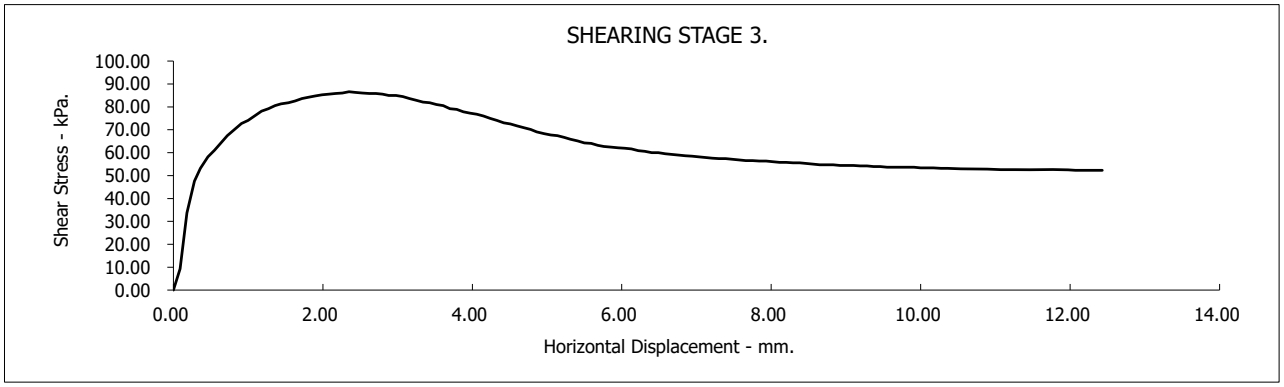
Client Ref Number: **PO-23-014**

Borehole Number: CP02
Sample Number :

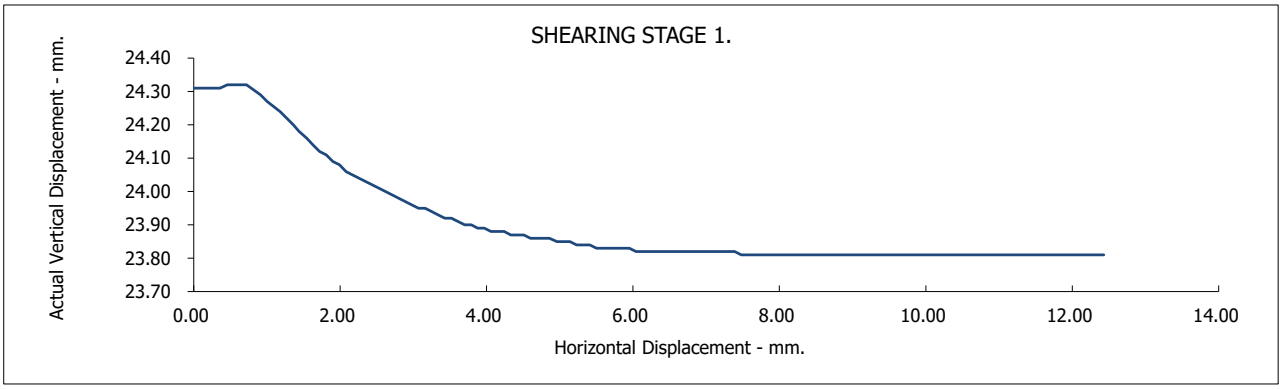
Depth from (m): 9.00
Depth to (m):

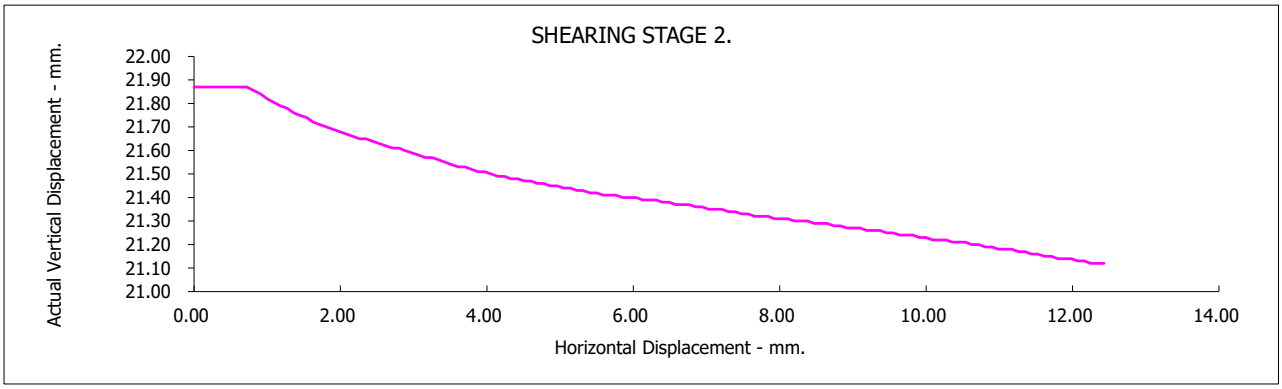


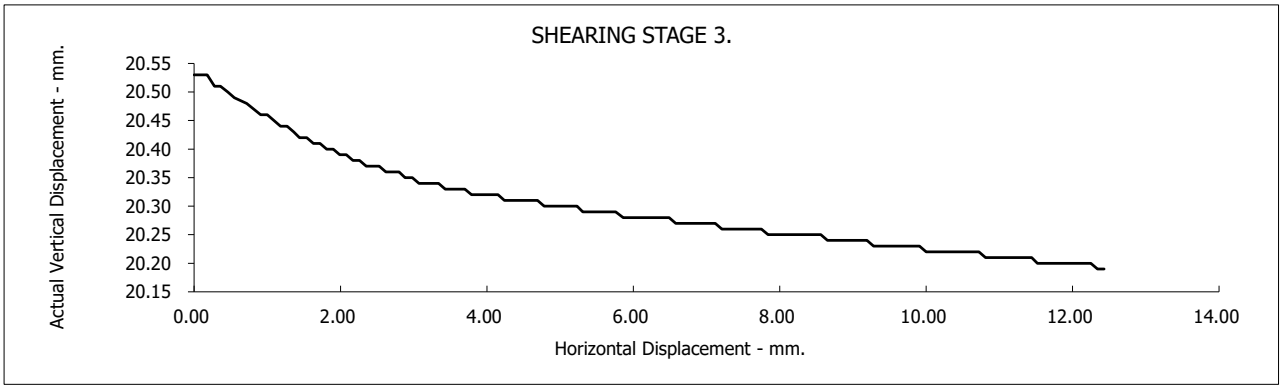




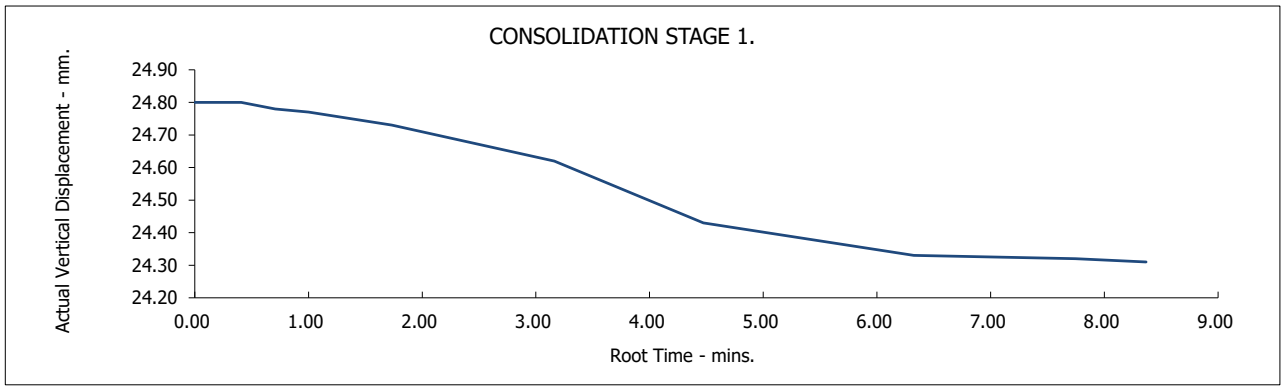
Borehole Number: CP02 Depth from (m): 9.00
Sample Number : Depth to (m):

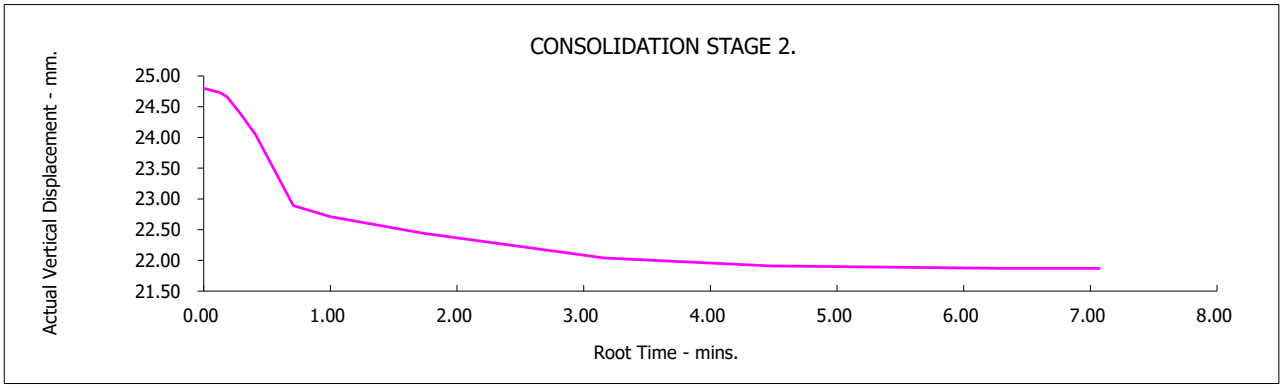


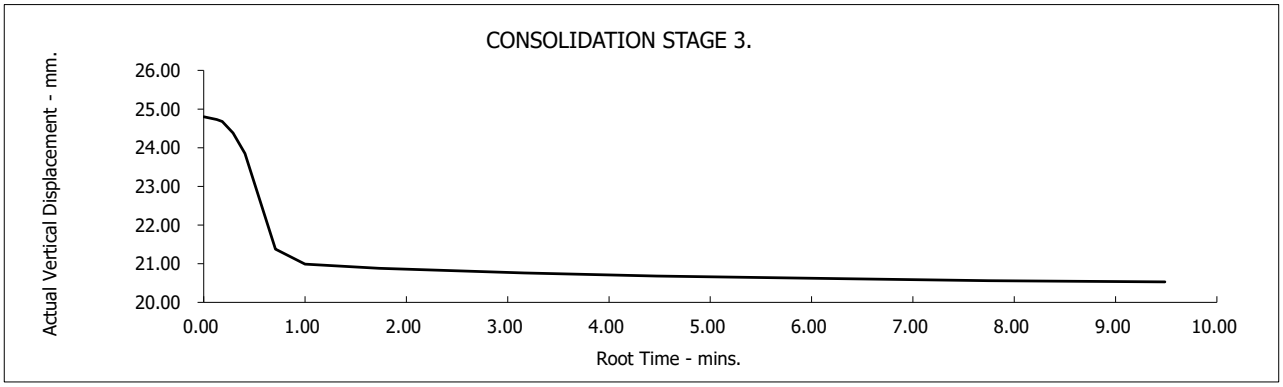




Borehole Number:	CP02	Depth from (m):	9.00
Sample Number :		Depth to (m):	







Test Report: MS DIRECT SHEARBOX TEST.BS1377:Part 7:4.5 :1990.

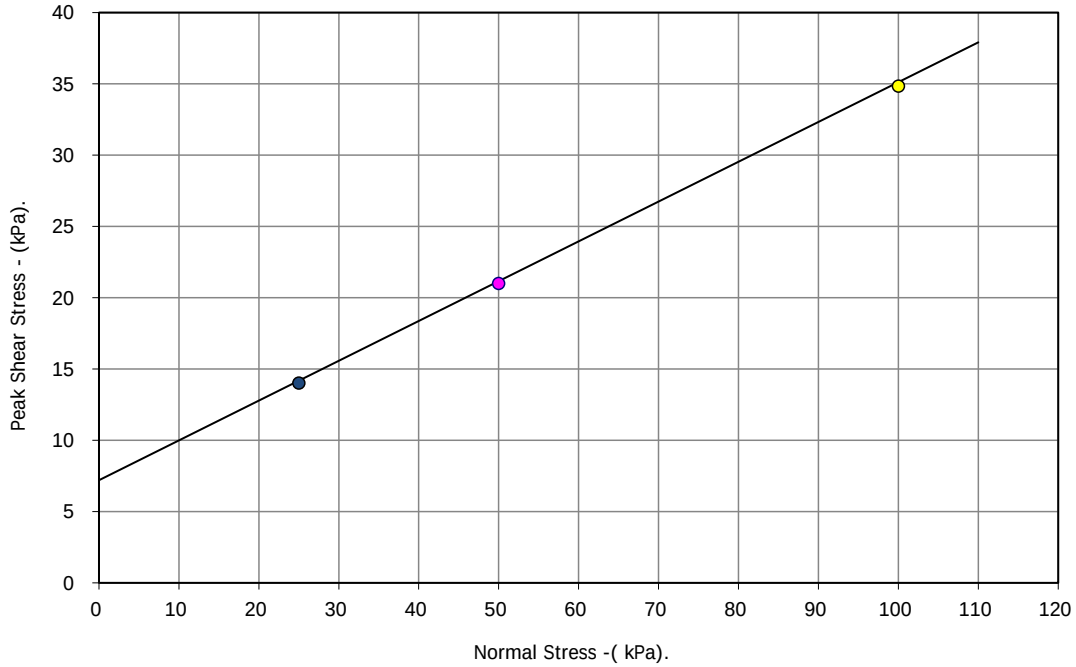
Borehole Number:	CP02	Depth from (m):	13.50
Sample Number :		Depth to (m):	13.95
Sample Type:	B		
Particle Density - Mg/m3:	2.65 (Assumed)		
Specimen Tested:	Submerged, Remoulded (Light Tamping) Material above 2mm removed.		

Sample Description:
Grey CLAY

STAGE	**1**	**2**	**3**
Initial Conditions			
Height - mm:	24.80	24.80	24.80
Length - mm:	60.00	60.00	60.00
Moisture Content - %:	46	46	46
Bulk Density - Mg/m3:	1.64	1.64	1.64
Dry Density - Mg/m3:	1.12	1.12	1.12
Voids Ratio:	1.3645	1.3645	1.3645
Degree of Saturation - %:	89.21	89.21	89.21
Normal Pressure- kPa	25	50	100
Consolidation			
Consolidated Height - mm:	19.11	22.01	20.98
Shear			
Rate of Horizontal Displacement (mm/min)	0.200	0.200	0.200
Horizontal Displacement at Peak Shear Stress (mm)	8.65	9.72	5.41
Peak shear Stress - kPa:	14	21	35

PEAK	
Angle of Shearing Resistance:(θ)	**16**
Effective Cohesion - kPa:	**7**

FAILURE CONDITIONS



UKAS TESTING 2788

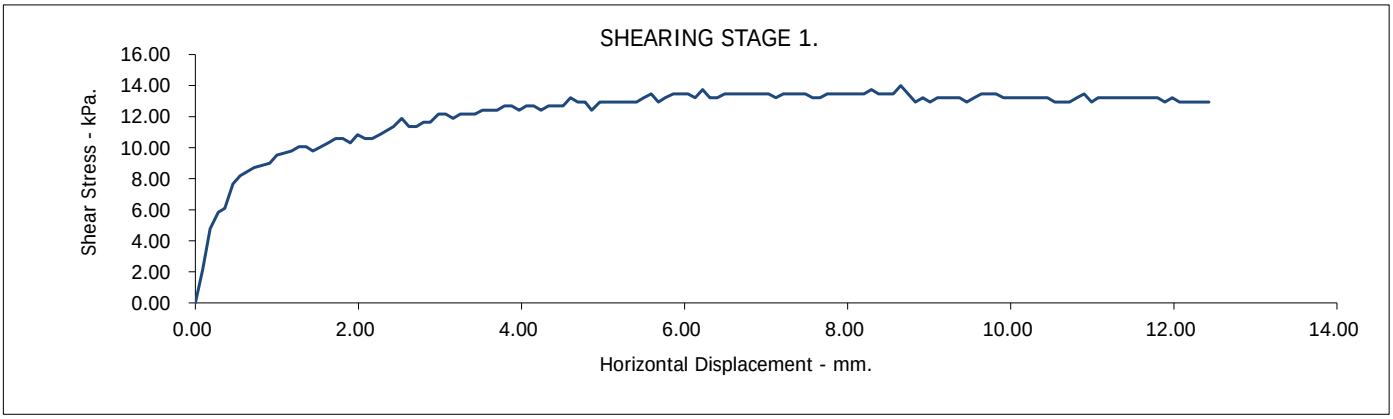
Contract No.: **67887**

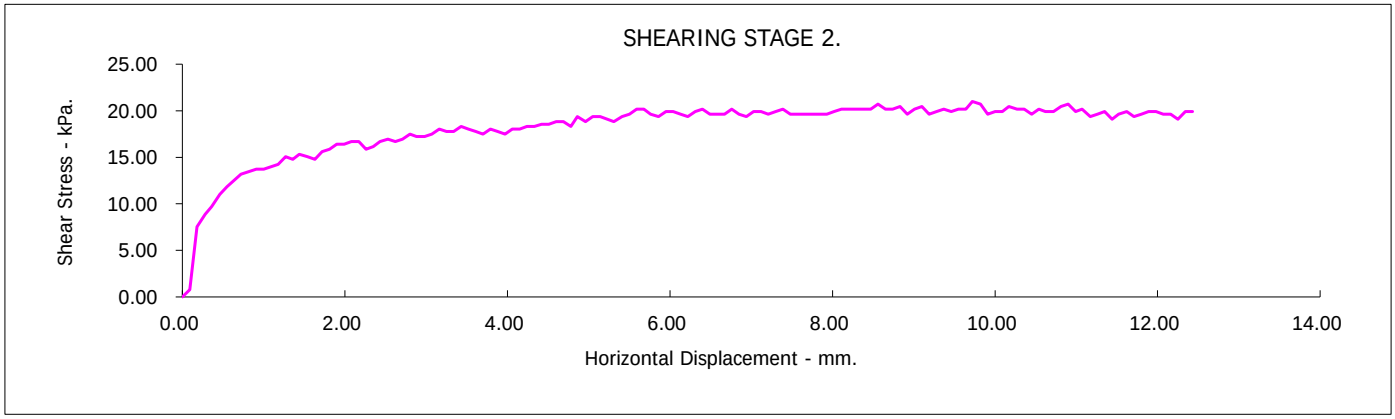
Boorley Green School

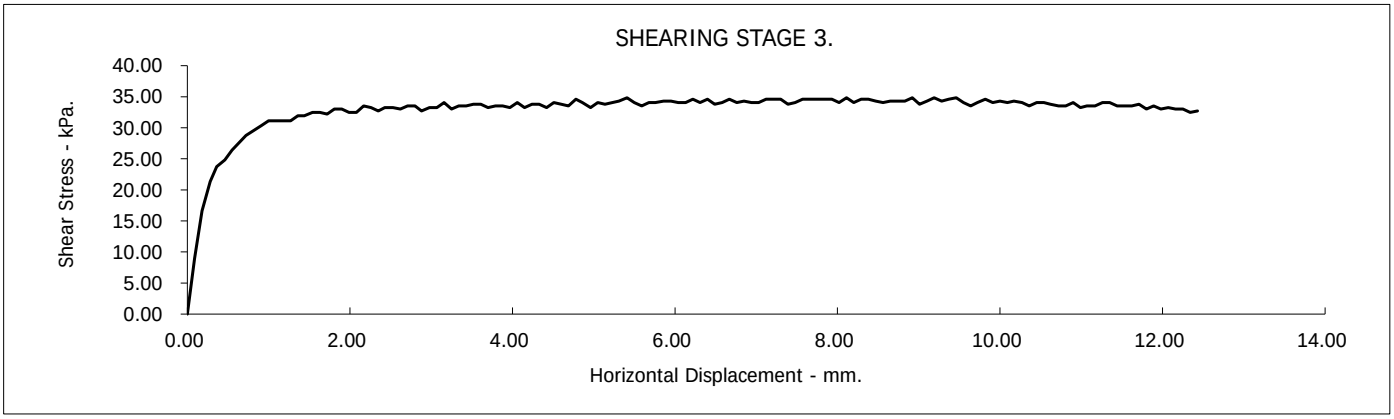
Client Ref Number: **PO-23-014**

GSTL GEOTECHNICAL SITE & TESTING LABORATORIES

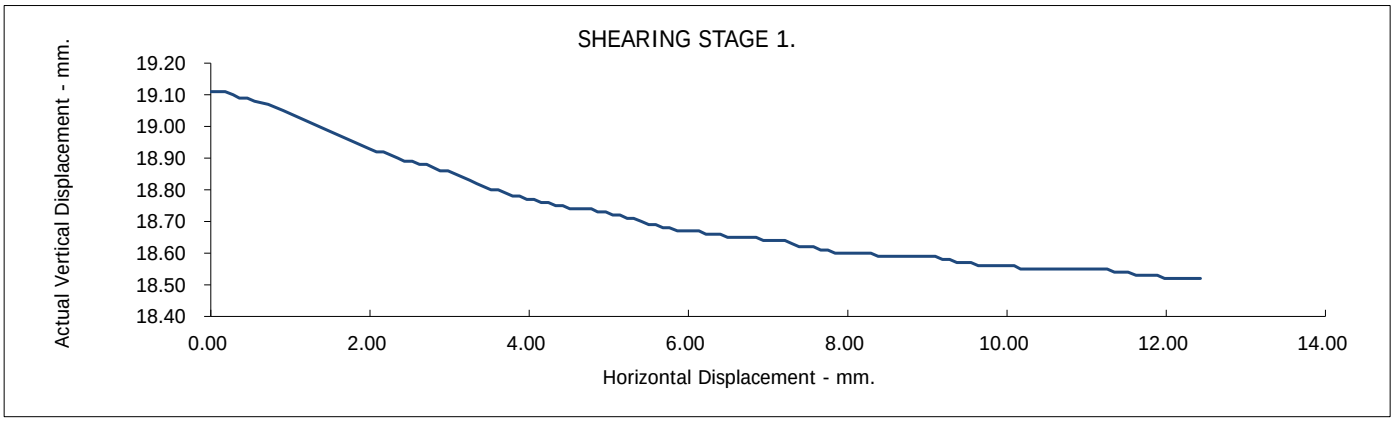
Borehole Number:	CP02	Depth from (m):	13.50
Sample Number :		Depth to (m):	13.95

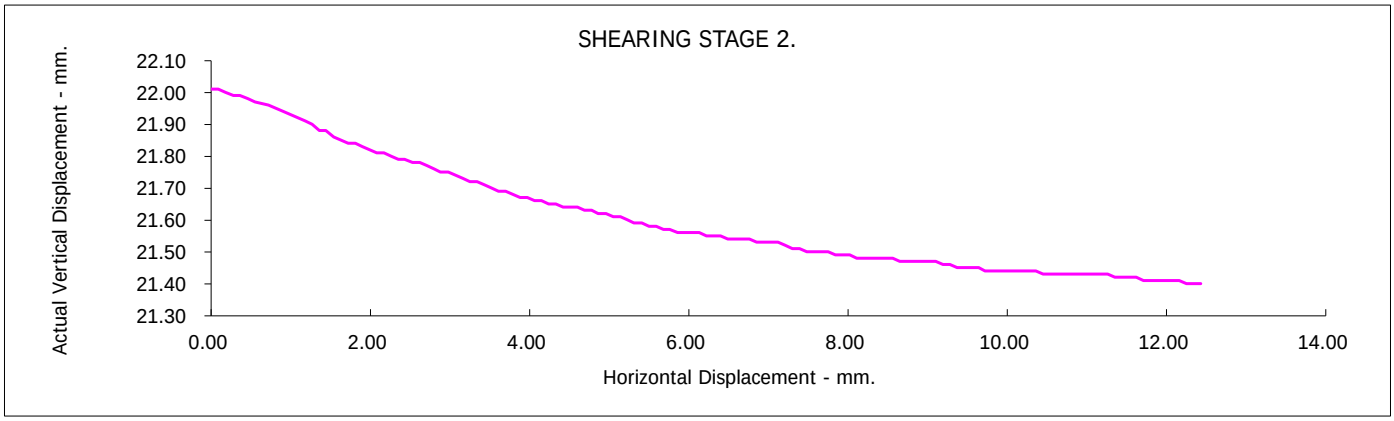


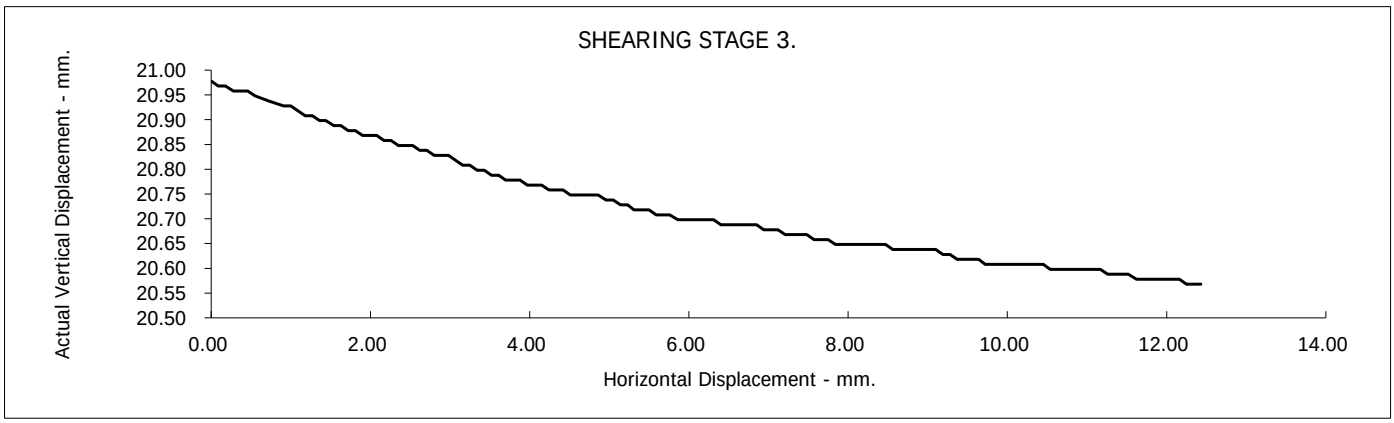




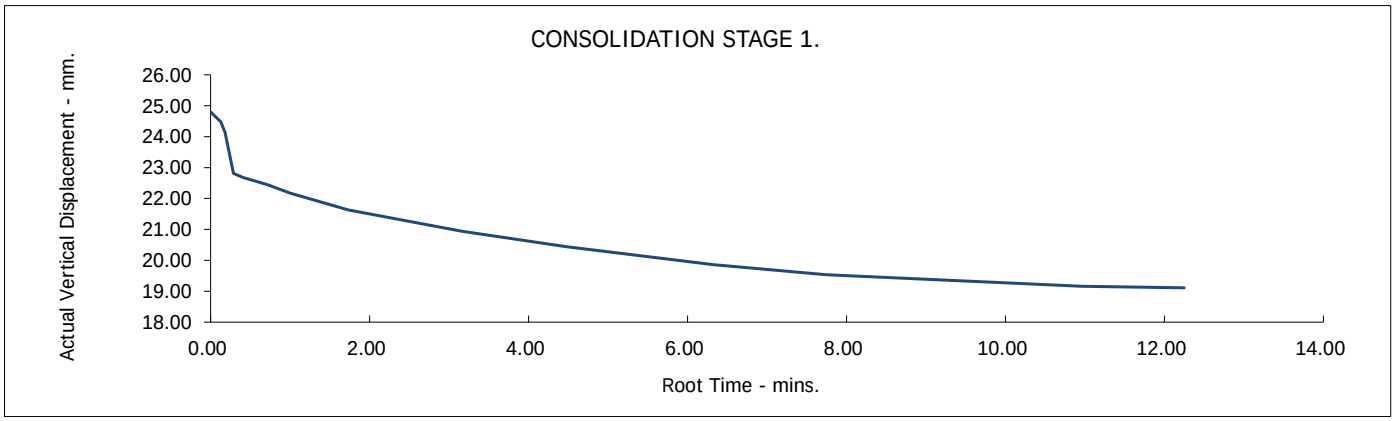
Borehole Number:	CP02	Depth from (m):	13.50
Sample Number :		Depth to (m):	13.95

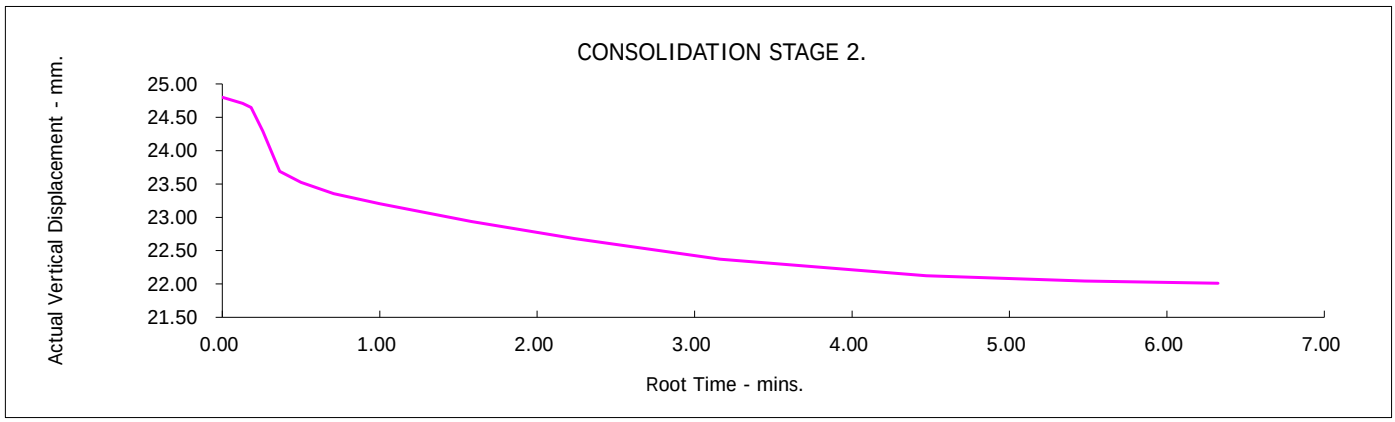


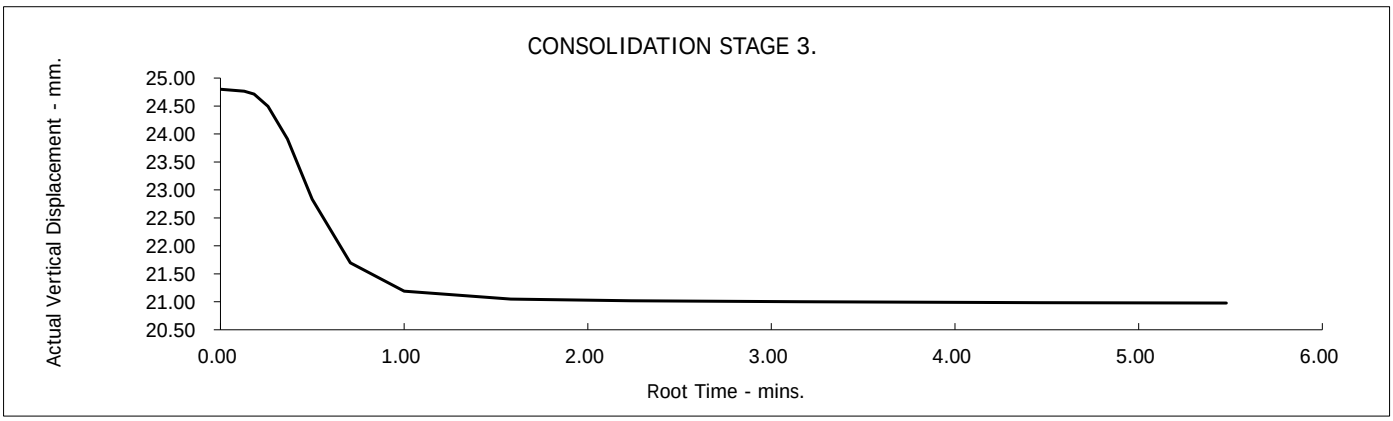




Borehole Number:	CP02	Depth from (m):	13.50
Sample Number :		Depth to (m):	13.95







Test Report: MS DIRECT SHEARBOX TEST.BS1377:Part 7:4.5 :1990.

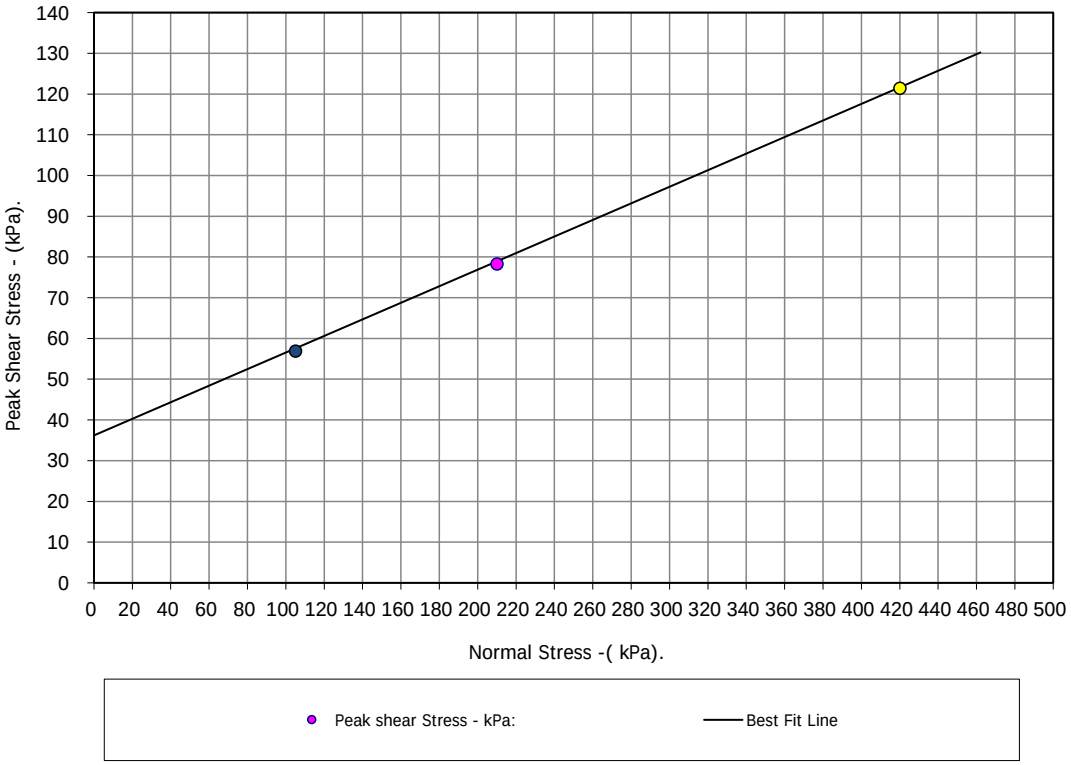
Borehole Number:	CP03	Depth from (m):	10.50
Sample Number :		Depth to (m):	10.95
Sample Type:	B		
Particle Density - Mg/m3:	2.65 (Assumed)		
Specimen Tested:	Submerged, Remoulded (Light Tamping) Material above 2mm removed.		

Sample Description:
Brown silty CLAY

STAGE	**1**	**2**	**3**
Initial Conditions			
Height - mm:	24.80	24.80	24.80
Length - mm:	60.00	60.00	60.00
Moisture Content - %:	35	35	35
Bulk Density - Mg/m3:	1.72	1.72	1.72
Dry Density - Mg/m3:	1.27	1.27	1.27
Voids Ratio:	1.0840	1.0840	1.0840
Degree of Saturation - %:	86.74	86.74	86.74
Normal Pressure- kPa	105	210	420
Consolidation			
Consolidated Height - mm:	22.48	21.46	20.13
Shear			
Rate of Horizontal Displacement (mm/min)	0.200	0.200	0.200
Horizontal Displacement at Peak Shear Stress (mm)	2.53	2.62	1.99
Peak shear Stress - kPa:	57	78	121

PEAK	
Angle of Shearing Resistance:(θ)	**12**
Effective Cohesion - kPa:	**36**

FAILURE CONDITIONS



UKAS TESTING 2788

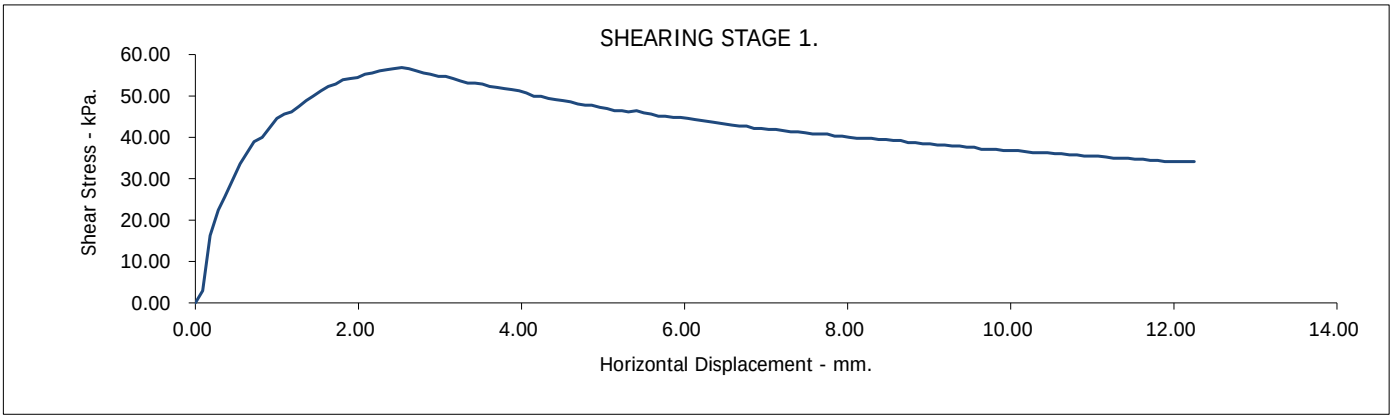
Contract No.: **67887**

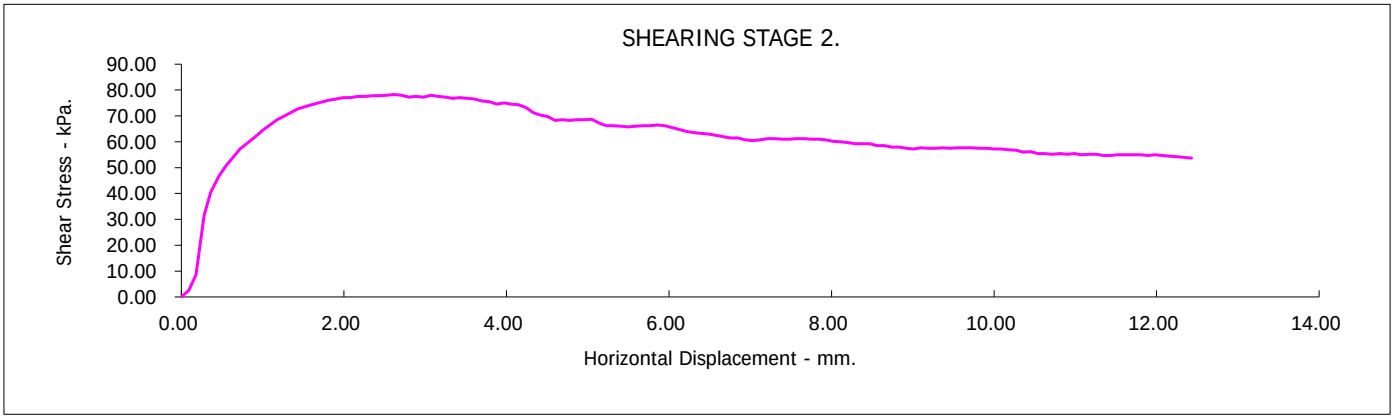
Boorley Green School

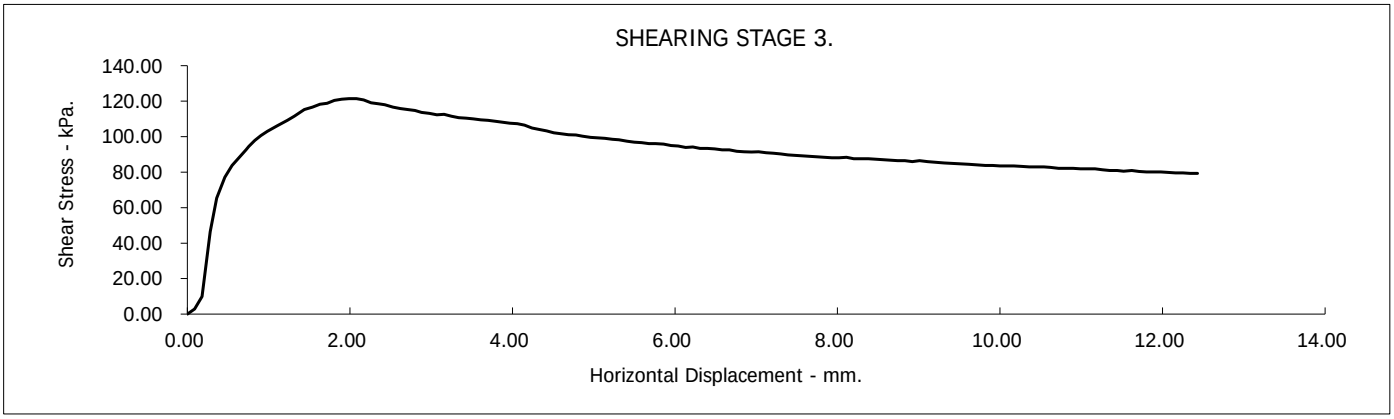
Client Ref Number: **PO-23-014**

GSTL GEOTECHNICAL SITE & TESTING LABORATORIES

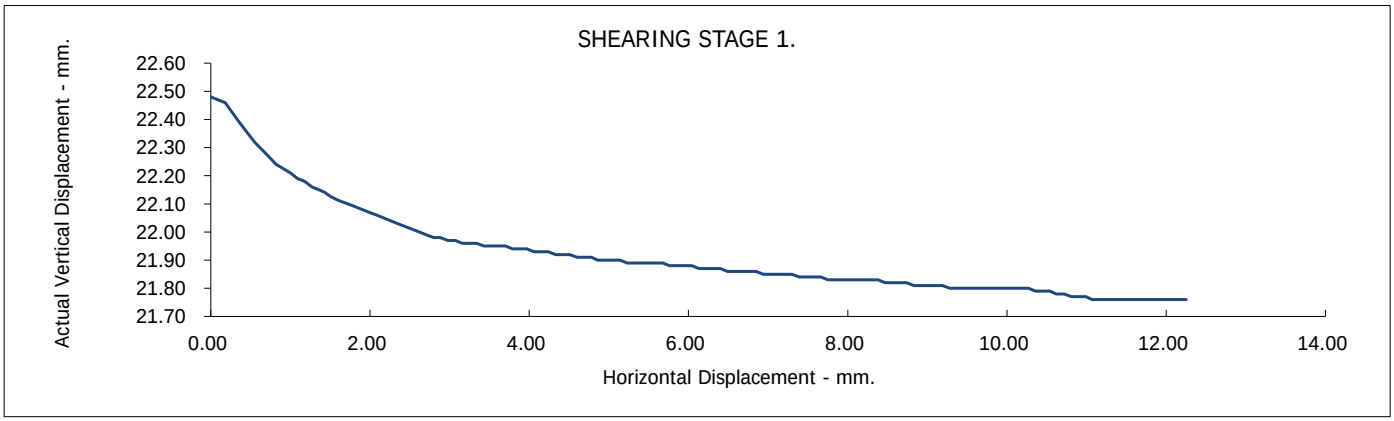
Borehole Number:	CP03	Depth from (m):	10.50
Sample Number :		Depth to (m):	10.95

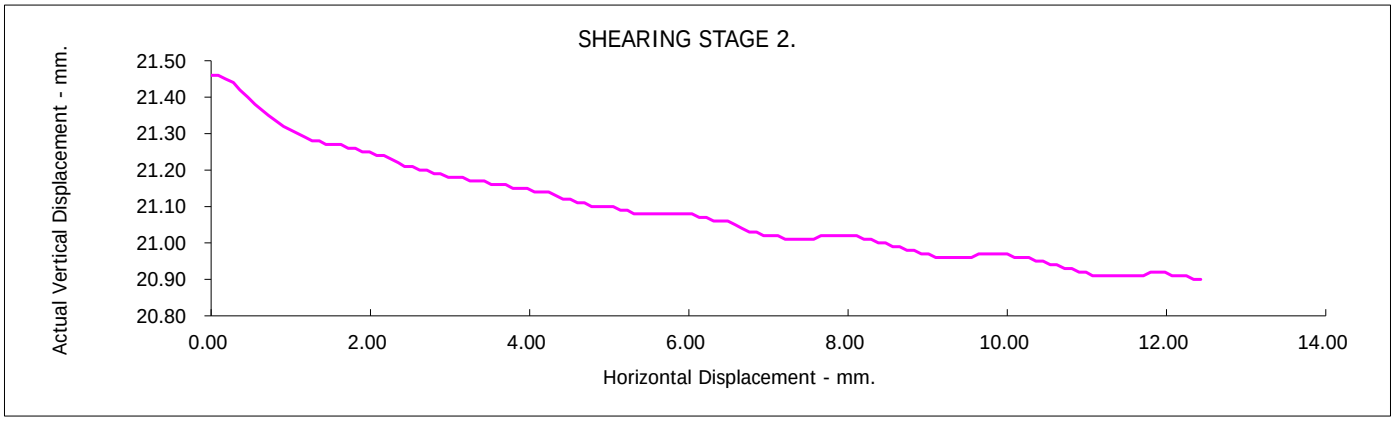


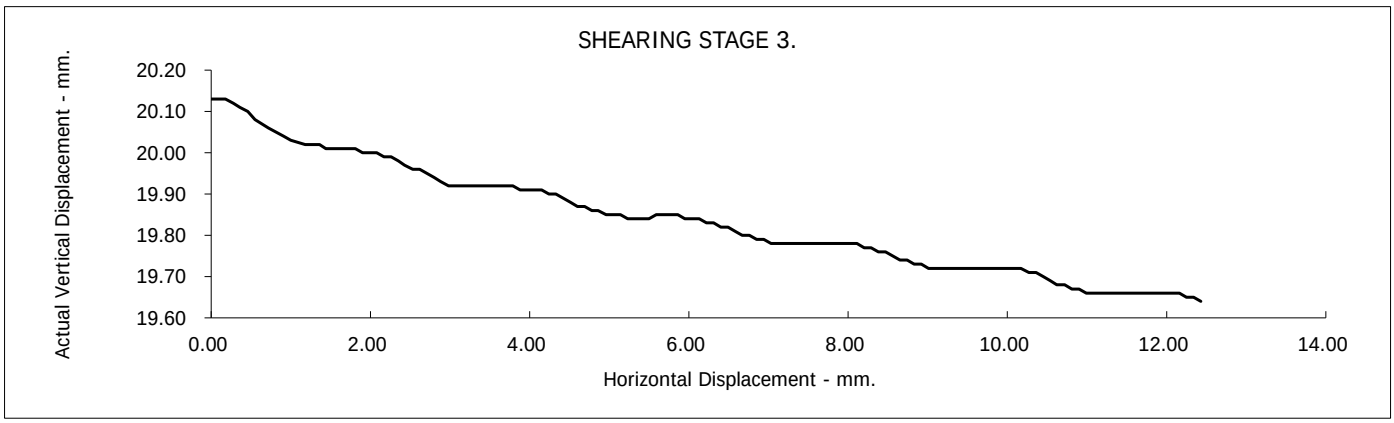




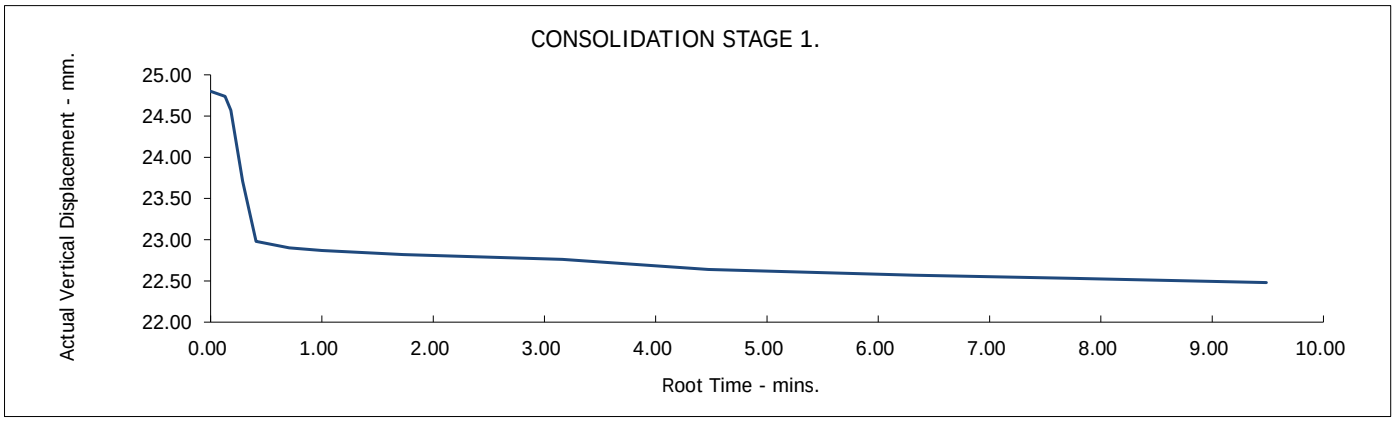
Borehole Number:	CP03	Depth from (m):	10.50
Sample Number :		Depth to (m):	10.95

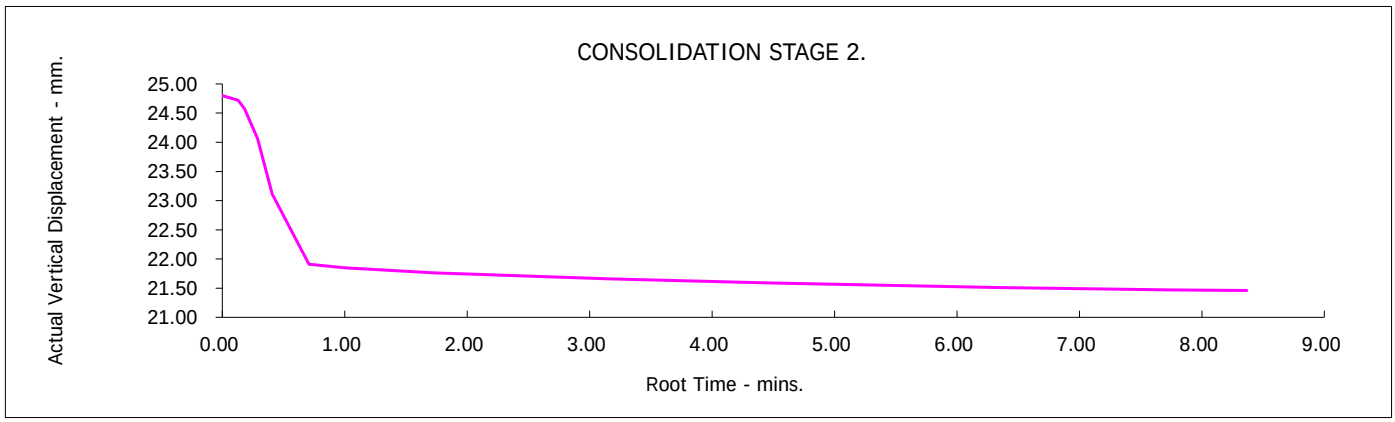


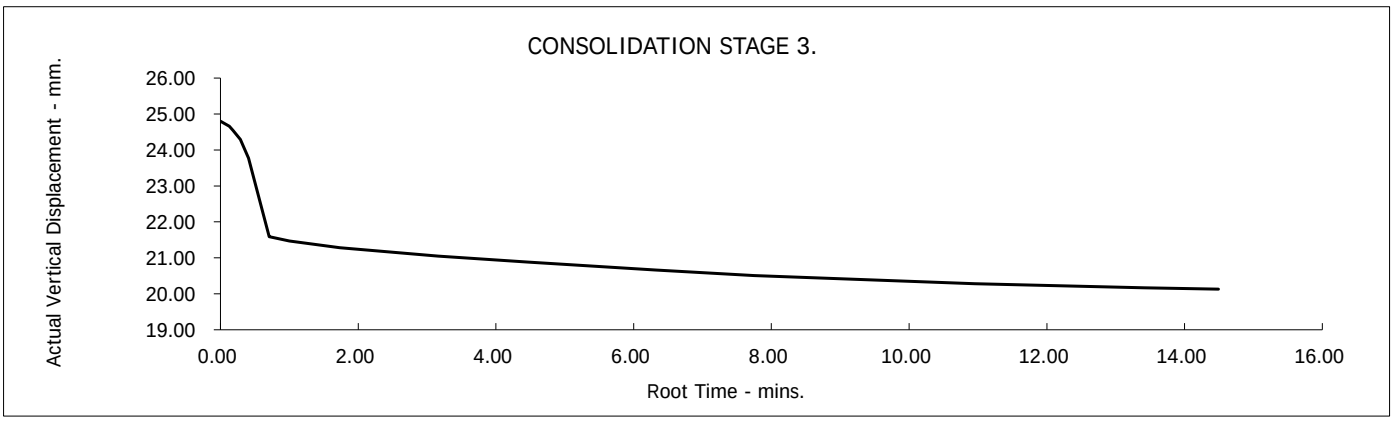




Borehole Number:	CP03	Depth from (m):	10.50
Sample Number :		Depth to (m):	10.95







4161

7 - 11 Harding Street
Leicester
LE1 4DH

GSTL
Unit 3-4 Heol Aur
Dafen Ind Estate
Dafen
SA14 8QN

Analytical Test Report:	**L23/04697/GSL - 23-36730**

Your Project Reference:	**PO-23-014 - Boorley Green School**		
Your Order Number:	67887	Samples Received / Instructed:	23/08/2023 / 23/08/2023
Report Issue Number:	1	Sample Tested:	23/08 to 04/09/2023
Samples Analysed:	8 soil samples	Report issued:	04/09/2023

[redacted]

James Gane
Analytical Services Manager
CTS Group

Notes:

General

Please refer to Methodologies page for details pertaining to the analytical methods undertaken.

Samples will be retained for 14 days after issue of this report unless otherwise requested.

Moisture Content was determined in accordance with CTS method statement MS - CL - Sample Prep, oven dried at <30˚C.

Moisture Content is reported as a percentage of the dry mass of soil, this calculation is in accordance with BS1377, Part 2, 1990, Clause 3.2

Where specification limits are included these are for guidance only. Where a measured value has been highlighted this is not implying acceptance or failure and certainty of measurement values have not been taken into account.

Uncertainty of measurement values are available on request.

Samples were supplied by customer, results apply to the samples as received.

Deviating Samples

On receipt samples are compared against our sample holding and handling protocols, where any deviations have been noted these are reported on our deviating sample page (if present)

Accreditation Key

UKAS = UKAS Accreditation, MCERTS = MCERTS Accreditation, u = Unaccredited

MCERTS Accreditation only covers the SAND, CLAY and LOAM matrices

Date of Issue: 29.08.2023

Issued by: J. Gane

Issue No: 4

Rev No: 3

CTS Group
7 - 11 Harding Street
Leicester
LE1 4DH

4161

L23/04697/GSL - 23-36730

Project Reference - PO-23-014 - Boorley Green School

Analytical Test Results - Chemical Analysis

Lab Reference			311674	311675	311676	311677	311678	311679	311680
Client Sample ID			-	-	-	-	-	-	-
Client Sample Location			CP01	CP02	CP02	CP02	CP02	CP02	CP02
Client Sample Type			UT	U	U	B	B	B	D
Client Sample Number			36	3	8	-	-	-	34
Depth - Top (m)			6.00	1.20	3.00	5.00	9.00	13.50	16.50
Depth - Bottom (m)			6.65	1.65	3.45	5.40	9.00	14.00	16.95
Date of Sampling			-	-	-	-	-	-	-
Time of Sampling			-	-	-	-	-	-	-
Sample Matrix			Clay	Clay	Clay	Clay	Clay	Clay	Clay
Determinant	**Units**	**Accreditation**							
Water soluble sulphate (as SO_4)	(mg/l)	u	120	1900	520	210	990	610	480
Acid Soluble Sulphate	(%)	u	0.05	0.61	0.12	0.07	0.21	0.12	0.28
Total Sulphur	(%)	UKAS	0.06	2.60	0.20	0.34	1.14	0.33	0.22
pH Value	pH Units	MCERTS	5.5	5.1	5.4	6.4	6.9	7.2	7.2
Water Soluble Chloride	(mg/l)	u	6.9	52	13	12	32	18	44
Water Soluble Nitrate (As NO_3)	(mg/l)	u	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Water Soluble Magnesium	(mg/l)	u	6.0	80	20	8.9	18	16	23

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Analytical Test Results - Chemical Analysis

Lab Reference			**311681**
Client Sample ID			-
Client Sample Location			CP03
Client Sample Type			B
Client Sample Number			-
Depth - Top (m)			10.50
Depth - Bottom (m)			11.00
Date of Sampling			-
Time of Sampling			-
Sample Matrix			Clay
Determinant	**Units**	**Accreditation**	
Water soluble sulphate (as SO_4)	(mg/l)	u	1300
Acid Soluble Sulphate	(%)	u	0.29
Total Sulphur	(%)	UKAS	0.45
pH Value	pH Units	MCERTS	6.6
Water Soluble Chloride	(mg/l)	u	63
Water Soluble Nitrate (As NO_3)	(mg/l)	u	< 1.0
Water Soluble Magnesium	(mg/l)	u	22

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Sample Descriptions

Lab Reference	Client Sample ID	Client Sample Location	Client Sample Type	Client Sample Number	Description	Moisture Content (%)	Stone Content (%)	Passing 2mm test sieve (%)
311674	-	CP01	UT	36	Brown silty clay	-	-	100
311675	-	CP02	U	3	Grey clayey silt	-	-	100
311676	-	CP02	U	8	Greyish brown clayey sandy silt	-	-	100
311677	-	CP02	B	-	Grey slightly sandy silty clay	-	-	100
311678	-	CP02	B	-	Grey silty clay	-	-	9.7
311679	-	CP02	B	-	Grey clayey sandy silt	-	-	100
311680	-	CP02	D	34	Grey clayey sandy silt	-	-	100
311681	-	CP03	B	-	Grey clayey sandy silt	-	-	100

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Sample Comments

Lab Reference	Client Sample ID	Client Sample Location	Client Sample Type	Client Sample Number	Comments
311674	-	CP01	UT	36	
311675	-	CP02	U	3	
311676	-	CP02	U	8	
311677	-	CP02	B	-	
311678	-	CP02	B	-	
311679	-	CP02	B	-	
311680	-	CP02	D	34	
311681	-	CP03	B	-	

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Analysis Methodologies

Test Code	Test Name / Reference	Sample condition for analysis	Sample Preperation	Test Details
ANIONSS	MS - CL - Anions by Aquakem (2:1Extract)	Oven dried	Passing 2mm test sieve	Determination of Anions (inc Sulphate, chloride etc.) in soils by Aquakem. Analysis is based on a 2:1 water to soil extraction ratio
PHS	MS - CL - pH in Soils	As received	Passing 10mm test sieve	Determination of pH in soils using a pH probe (using a 1:3 soil to water extraction)
ASSO4S	MS - CL - Acid Soluble Sulphate	Oven Dried	Passing 2mm test sieve	Determination of total sulphate in soils by acid extraction followed by ICP analysis
SAMPLEPREP	MS - CL - Sample Preparation	-	-	Preparation of samples (including determination of moisture content) to allow for subsequent analysis
1377TS-ELT	BS1377 Total Sulphur Content by HTC	Oven dried	BS1377 : Part 1 : 2016	Total Sulphur Content testing of Soil in accordance with BS 1377 : Part 3 : 2018 + A1 : 2021 Clause 7.10 (using Eltra CS-800 Analyser)

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Sample Deviations

Deviations are listed below against each sample and associated test method, where deviation(s) are noted it means data may not be representative of the sample at the time of sampling and it is possible that results provided may be compromised.

Observations on receipt

A - No date of sampling provided
C - Received in inappropriate container
H - Contains headspace
T - Temperature on receipt exceeds storage temperature
R - Sample(s) received with less than 96 hours for testing to commence/complete, any result formally classed as deviating will be marked with an X against the applicable test (i.e. RX)

Observations whist in laboratory

X - Exceeds sampling to extraction or analysis timescales

Lab Reference	Client Sample ID	Client Sample Location	Client Sample Type	Client Sample Number	Test	Deviations
311674	-	CP01	UT	36		AA
311674	-	CP01	UT	36	BS1377 Total Sulphur Content by HTC	AA
311674	-	CP01	UT	36	MS - CL - Acid Soluble Sulphate	AA
311674	-	CP01	UT	36	MS - CL - Anions by Aquakem (2:1Extract)	AA
311674	-	CP01	UT	36	MS - CL - Sample Preparation	AA
311674	-	CP01	UT	36	MS - CL - pH in Soils	AA
311675	-	CP02	U	3		AA
311675	-	CP02	U	3	BS1377 Total Sulphur Content by HTC	AA
311675	-	CP02	U	3	MS - CL - Acid Soluble Sulphate	AA
311675	-	CP02	U	3	MS - CL - Anions by Aquakem (2:1Extract)	AA
311675	-	CP02	U	3	MS - CL - Sample Preparation	AA
311675	-	CP02	U	3	MS - CL - pH in Soils	AA
311676	-	CP02	U	8		AA
311676	-	CP02	U	8	BS1377 Total Sulphur Content by HTC	AA
311676	-	CP02	U	8	MS - CL - Acid Soluble Sulphate	AA
311676	-	CP02	U	8	MS - CL - Anions by Aquakem (2:1Extract)	AA
311676	-	CP02	U	8	MS - CL - Sample Preparation	AA
311676	-	CP02	U	8	MS - CL - pH in Soils	AA
311677	-	CP02	B	-		AA
311677	-	CP02	B	-	BS1377 Total Sulphur Content by HTC	AA
311677	-	CP02	B	-	MS - CL - Acid Soluble Sulphate	AA
311677	-	CP02	B	-	MS - CL - Anions by Aquakem (2:1Extract)	AA
311677	-	CP02	B	-	MS - CL - Sample Preparation	AA
311677	-	CP02	B	-	MS - CL - pH in Soils	AA
311678	-	CP02	B	-		AA
311678	-	CP02	B	-	BS1377 Total Sulphur Content by HTC	AA
311678	-	CP02	B	-	MS - CL - Acid Soluble Sulphate	AA
311678	-	CP02	B	-	MS - CL - Anions by Aquakem (2:1Extract)	AA
311678	-	CP02	B	-	MS - CL - Sample Preparation	AA
311678	-	CP02	B	-	MS - CL - pH in Soils	AA
311679	-	CP02	B	-		AA
311679	-	CP02	B	-	BS1377 Total Sulphur Content by HTC	AA
311679	-	CP02	B	-	MS - CL - Acid Soluble Sulphate	AA
311679	-	CP02	B	-	MS - CL - Anions by Aquakem (2:1Extract)	AA
311679	-	CP02	B	-	MS - CL - Sample Preparation	AA
311679	-	CP02	B	-	MS - CL - pH in Soils	AA
311680	-	CP02	D	34		AA
311680	-	CP02	D	34	BS1377 Total Sulphur Content by HTC	AA

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Sample Deviations

Deviations are listed below against each sample and associated test method, where deviation(s) are noted it means data may not be representative of the sample at the time of sampling and it is possible that results provided may be compromised.

Observations on receipt

A - No date of sampling provided
C - Received in inappropriate container
H - Contains headspace
T - Temperature on receipt exceeds storage temperature
R - Sample(s) received with less than 96 hours for testing to commence/complete, any result formally classed as deviating will be marked with an X against the applicable test (i.e. RX)

Observations whist in laboratory

X - Exceeds sampling to extraction or analysis timescales

Lab Reference	Client Sample ID	Client Sample Location	Client Sample Type	Client Sample Number	Test	Deviations
311680	-	CP02	D	34	MS - CL - Acid Soluble Sulphate	AA
311680	-	CP02	D	34	MS - CL - Anions by Aquakem (2:1Extract)	AA
311680	-	CP02	D	34	MS - CL - Sample Preparation	AA
311680	-	CP02	D	34	MS - CL - pH in Soils	AA
311681	-	CP03	B	-		AA
311681	-	CP03	B	-	BS1377 Total Sulphur Content by HTC	AA
311681	-	CP03	B	-	MS - CL - Acid Soluble Sulphate	AA
311681	-	CP03	B	-	MS - CL - Anions by Aquakem (2:1Extract)	AA
311681	-	CP03	B	-	MS - CL - Sample Preparation	AA
311681	-	CP03	B	-	MS - CL - pH in Soils	AA

Annex D: Gas Monitoring Results

In Situ Gas Monitoring Pro Forma

terrafirma(south)

Site:	Boorley Gardens School						
Job No:	PO-23-014						
Date/Time of Visit:	21/08/2023 @ 17:00						
Atmospheric Pressure (mb):		Trend	Start	Finish	- 24 Hrs	- 48 Hrs	- 72 Hrs
		Rising	1022	1022	1023	1018	1009
Weather Conditions:	Partly cloudy						
Ground Conditions:	Partly wet						
Technician:	JI						
Instrument:	Geotechnical Instruments Gas Analyser (GA5000) – Serial No. GS01105						

BH / WS No.	Flow l/hr		Methane (CH_4) % V/V			Carbon Dioxide (CO_2) % V/V			Oxygen (O_2) % V/V			Water Level (mbgl)	Well Depth (mbgl)	Other Gases (ppm)		
			Peak	Steady (mins)		Peak	Steady (mins)		Min	Steady (mins)				H2S	CO	VOC
CP01	1	0.0	0.1	1	0.1	0.0	1	0.0	19.9	1	19.9	0.80	5.0	0	0	0
	2	0.0		2	0.1		2	0.0		2	20.0					
	3	0.0		3	0.1		3	0.0		3	20.1					
	10	0.0		10	0.1		10	0.0		10	20.2					
CP02	1	0.0	0.1	1	0.1	0.1	1	0.1	20.0	1	20.0	0.70	5.0	0	0	0
	2	0.0		2	0.1		2	0.1		2	20.1					
	3	0.0		3	0.1		3	0.1		3	20.1					
	10	0.0		10	0.1		10	0.1		10	20.2					
CP03	1	0.0	0.0	1	0.0	0.1	1	0.1	19.8	1	19.8	1.40	5.0	0	0	0
	2	0.0		2	0.0		2	0.1		2	20.0					
	3	0.0		3	0.0		3	0.1		3	20.0					
	10	0.0		10	0.0		10			10	20.0					
	1			1			1			1						
	2			2			2			2						
	3			3			3			3						
	10			10			10			10						
	1			1			1			1						
	2			2			2			2						
	3			3			3			3						
	10			10			10			10						

Notes:

In Situ Gas Monitoring Pro Forma

terrafirma(south)

Site:	Boorley Gardens School						
Job No:	PO-23-014						
Date/Time of Visit:	05/09/2023 12:08pm						
Atmospheric Pressure (mb):		Trend	Start	Finish	- 24 Hrs	- 48 Hrs	- 72 Hrs
		Falling	1016	1016	1020	1026	1021
Weather Conditions:	Wet Sunny						
Ground Conditions:	Wet						
Technician:	KT						
Instrument:	Geotechnical Instruments Gas Analyser (GA5000) – Serial No. GS01105						

BH / WS No.	Flow l/hr		Methane (CH_4) % V/V			Carbon Dioxide (CO_2) % V/V			Oxygen (O_2) % V/V			Water Level (mbgl)	Well Depth (mbgl)	Other Gases (ppm)		
			Peak	Steady (mins)		Peak	Steady (mins)		Min	Steady (mins)				H2S	CO	VOC
CP01	1	0.0	0.1	1	0.1	0	1	0.0	20.2	1	20.2	1.1	5.0	0	0	0
	2	0.0		2	0.1		2	0.0		2	20.3					
	3	0.0		3	0.1		3	0.0		3	20.3					
	10	0.0		10	0.1		10	0.0		10	20.4					
CP02	1	0.0	0.1	1	0.1	0.1	1	0.1	20.5	1	20.5	0.92	5.0	0	0	0
	2	0.0		2	0.1		2	0.1		2	20.6					
	3	0.0		3	0.1		3	0.1		3	20.7					
	10	0.0		10	0.1		10	0.1		10	20.6					
CP03	1	0.0	0	1	0.0	0.1	1	0.1	20.1	1	20.1	1.58	5.0	0	0	0
	2	0.0		2	0.0		2	0.1		2	20.2					
	3	0.0		3	0.0		3	0.1		3	20.2					
	10	0.0		10	0.0		10	0.1		10	20.2					
	1			1			1			1						
	2			2			2			2						
	3			3			3			3						
	10			10			10			10						
	1			1			1			1						
	2			2			2			2						
	3			3			3			3						
	10			10			10			10						

Notes:

In Situ Gas Monitoring Pro Forma

terrafirma(south)

Site:	Boorley Gardens School						
Job No:	PO-23-014						
Date/Time of Visit:	28/09/2023 04:28PM						
Atmospheric Pressure (mb):		Trend	Start	Finish	- 24 Hrs	- 48 Hrs	- 72 Hrs
		Variable	1014	1014	1010	1017	1020
Weather Conditions:	Wet Sunny						
Ground Conditions:	Wet						
Technician:	KT						
Instrument:	Geotechnical Instruments Gas Analyser (GA5000) – Serial No. GS01105						

BH / WS No.	Flow l/hr		Methane (CH_4) % V/V			Carbon Dioxide (CO_2) % V/V			Oxygen (O_2) % V/V			Water Level (mbgl)	Well Depth (mbgl)	Other Gases (ppm)		
			Peak	Steady (mins)		Peak	Steady (mins)		Min	Steady (mins)				H2S	CO	VOC
CP01	1	0.0	0.1	1	0.1	0.1	1	0.1	19.9	1	19.9	0.97	5.0	0	0	0
	2	0.0		2	0.1		2	0.1		2	20					
	3	0.0		3	0.1		3	0.1		3	20.1					
	10	0.0		10	0.1		10	0.1		10	20.1					
CP02	1	0.0	0.1	1	0.1	0.1	1	0.1	20.3	1	20.3	1.01	5.0	0	0	0
	2	0.0		2	0.1		2	0.1		2	20.4					
	3	0.0		3	0.1		3	0.1		3	20.4					
	10	0.0		10	0.1		10	0.1		10	20.5					
CP03	1	0.0	0	1	0.0	0.1	1	0.1	20.2	1	20.2	1.28	5.0	0	0	0
	2	0.0		2	0.0		2	0.1		2	20.3					
	3	0.0		3	0.0		3	0.1		3	20.4					
	10	0.0		10	0.0		10	0.1		10	20.5					
	1			1			1			1						
	2			2			2			2						
	3			3			3			3						
	10			10			10			10						
	1			1			1			1						
	2			2			2			2						
	3			3			3			3						
	10			10			10			10						

Notes:

In Situ Gas Monitoring Pro Forma

terrafirma(south)

Site:	Boorley Gardens School						
Job No:	PO-23-014						
Date/Time of Visit:	30/10/2023						
Atmospheric Pressure (mb):	**995**	Trend	Start	Finish	- 24 Hrs	- 48 Hrs	- 72 Hrs
			995	995	989	988	988
Weather Conditions:	.						
Ground Conditions:	Wet						
Technician:	KT						
Instrument:	Geotechnical Instruments Gas Analyser (GA5000) – Serial No. GS01105						

BH / WS No.	**Flow** l/hr		**Methane (CH_4)** % V/V			**Carbon Dioxide (CO_2)** % V/V			**Oxygen (O_2)** % V/V			**Water Level** (mbgl)	**Well Depth** (mbgl)	**Other Gases (ppm)**		
			Peak	**Steady (mins)**		**Peak**	**Steady (mins)**		**Min**	**Steady (mins)**				**H2S**	**CO**	**VOC**
CP01	1		0.1	1	0.1	0.1	1	0.1	20.1	1	20.1	**0.50**	**5.00**			
	2			2	0.1		2	0.1		2	20.0					
	3			3	0.1		3	0.1		3	20.1					
	10			10			10			10						
CP02	1		0.1	1	0.1	0.1	1	0.1	20.1	1	20.1	**0.83**	**5.00**			
	2			2	0.1		2	0.1		2	20.1					
	3			3	0.1		3	0.1		3	20.1					
	10			10			10			10						
CP03	1		0.1	1	0.1	0.1	1	0.1	19.9	1	20.0	**0.74**	**5.00**			
	2			2	0.1		2	0.1		2	19.9					
	3			3	0.1		3	0.1		3	20.0					
	10			10			10			10						
	1			1			1			1						
	2			2			2			2						
	3			3			3			3						
	10			10			10			10						
	1			1			1			1						
	2			2			2			2						
	3			3			3			3						
	10			10			10			10						

Notes: