



Priority Schools, PSBP2 – Education Funding Agency

Mace Limited

Meadow High School, Hillingdon

**Intrusive Geo-Environmental and
Geotechnical Site Investigation**

Factual and Interpretative Report



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Geotechnical Site Investigation**

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Draft Rev o 18/01/2017	Author/s: Emma Small Reviewed: Lydia Evans Richard Puchner Approved: Neil Morris	Initial draft issued to Mace without final gas monitoring data and ground water testing results.	N/A – Gas/groundwater monitoring ongoing and full data set to be added to the Final report.
Final Rev o 09/02/2017	Author/s: Emma Small Reviewed: Lydia Evans Richard Puchner Approved: Neil Morris	Final version issued to Mace.	Gas data updated (Sections 5.9, 6.4, 6.5, 8.0 Appendix H). A further three ground gas monitoring visits recommended to re-evaluate the GSV and site Characteristic Situation as per Section 8. Additional groundwater monitoring recommended as per Section 8.

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1 Introduction

1.1 Background

Opus International Consultants (UK) Limited, (also referred to herein as “Opus” for the purposes of this report) was commissioned by Mace Limited (also referred to as “Mace” or “the Client” for the purposes of this report) to undertake intrusive ground investigation works at a number of schools in the south east of England. The works were undertaken in order to define the ground related risks underlying the selected development area of the schools, providing relevant information for the design and construction of the proposed scheme.

The works were carried out under the supervision of Opus. The scope and specification for the Ground Investigation was determined by the Client and implemented by Opus in accordance with instructions provided.

1.2 Objectives

The objectives of the investigation are:

- To provide a detailed understanding of the ground conditions at the site to define the ground related risks in order to make suitable cost allowances for the most likely foundation solution and to identify any risks and costs associated with land contamination and ground gases.

1.3 Limitations

This report has been produced in accordance with the requirements identified within the Education Funding Authority (EFA) Priority Schools Building Programme 2 (“PSBP2”) Tender and the site specific Works Package document. Opus were not aware of the precise nature of the development proposals, and in particular the position of new buildings/extensions on the site was yet to be determined. As such the exploratory hole positions, depths and various samples and tests have been specified by Mace to give general coverage of the site and inform the master planning for future development. Further more detailed investigations, samples and tests may be required at a later date once specific development proposals have been finalised, to provide design parameters where specified by the Project Engineer to inform the final design process.

The report has been produced on behalf of Mace and no responsibility to any Third Party for all or any part is accepted. If any unauthorised Third Party comes into possession of this report, they rely on it at their own risk and the authors owe them no duty of care or skill.

Whilst this report may express an opinion on the possible configuration of strata, contaminants or groundwater between or beyond exploratory hole positions, or on the possible presence of features based on visual, verbal or published evidence, this is for guidance only and no liability can be accepted for any inaccuracy.

This report has been prepared on the understanding that the development is to remain as an educational facility. Should the proposed site usage change significantly from this, the contents of this report will require review and amendment as appropriate.

The comments on groundwater conditions are based on observations made at the time of the investigation. It should be noted, however, that groundwater levels may vary from those reported due to seasonal, tidal or other effects.

The site plans enclosed in this report should not be used for scaling purposes.

A copy of the Opus Conditions and Limitations are presented in Appendix I.

2 The Site

2.1 Location & Access

The study area is located at Meadow High School, Royal Lane, Hillingdon. The site is centred on approximate National Grid Reference (NGR) 506498, 181716.

Access to the site can be gained via either of the two main entrances located off Royal Lane directly to the east of the site. A third entrance was used for access to the rear of the site off Peel Way to the north.

A site location plan is presented in the Drawings section of this report referenced J-M3932.12_100.

2.2 Site Description

The site comprises a complex of buildings and roadways together with soft and hard landscaped areas.

The school buildings occupy the central area of the site and comprise 1-2 story brick built classrooms. Temporary classrooms are present in the southern area of the site, and in the north western area. Parking and a turning area is present to the east of the buildings. Tennis courts are present along the southern site boundary and a sports pitch is located in the western area of the site.

A number of semi mature and mature trees were noted to lie within the eastern site boundary, in the northern area of the site and centrally located within the grassed areas, with some saplings and semi mature trees noted within the remainder of the site.

Vehicular and pedestrian access to the site is possible from the two main entrances located immediately off Royal Lane to the east, and off Peel Way to the north.

The site varies in level from 31.69mAOD in the south west to 35.33m AOD in the north east with gentle slopes across the site from north east to south west, and from east to west.

3 Background Information

3.1 Sources of Information

The following sources of information have been consulted as part of the desk study for the site;

- (a) Mott MacDonald Geoenvironmental Desk Study dated July 2015 – referenced PSBP2/EVT/WGEP/102462/A
- (b) Interactive British Geological Survey (BGS) Geology of Britain Viewer webpage.
- (c) British Geological Survey 1:50,000 Sheet 255 ‘Beaconsfield’.
- (d) BRE 211 (2015) – Radon, guidance on protective measures for new dwellings.

3.2 Summary of Desk Study Information

The salient issues identified within the Mott MacDonald Geoenvironmental Desk Study dated July 2015 and referenced PSBP2/EVT/WGEP/102462/A have been summarised in the following sections. It should be noted that Opus have been provided with the report text only and that the supporting appendices have not been made available for review or comment.

3.2.1 Site History

The historic review undertaken by Mott MacDonald identified the following activities that may have given rise to land contamination at the site:

On site: The site was undeveloped until 1975 when the main school building and school house, were first constructed. A tank was present on the site located adjacent to the main school building’s northern façade, which is understood to have been a water tank.

Off site: The surrounding land was predominantly occupied by undeveloped fields in the early map editions. Royal Lane existed from the first available mapping dated 1865 along its current alignment, and along the eastern site boundary. Residential development of the surrounding land started to occur from the 1930’s with the density of housing increasing by the mid 1960’s. Allotment gardens were noted within the surrounding land during this period of development. Hillingdon Hospital first appeared around the 1960’s, located approximately 200m north east of the site.

A number of gravel pits were noted to have been located to the south of the site, the closest being situated approximately 200m from the southern site boundary. A sewage works was located 400m west of the site between 1938 and 1960. No historical activity was identified by the historical search undertaken by Mott MacDonald to have occurred either on site or within the local vicinity.

3.2.2 Geology

According to the interactive BGS Geology of Britain Viewer webpage for the region, 1:50,000 scale, Bedrock and Superficial; and the published geological mapping (BGS Sheet 255 ‘Beaconsfield’ 1:50,000) the site is shown to underlain by superficial deposits of the Langley Silt Member. Alluvium is mapped approximately 200m west of the site and superficial deposits of the Boyn Hill Gravel are

shown approximately 100m north east of the site. The superficial deposits are underlain by the solid geology of the London Clay Formation.

Located approximately 300m south of the site an area of 'Worked Ground' is present.

3.2.3 Hydrogeology

The Langley Silt and the London Clay Formation are both classified by the Environment Agency (EA) as unproductive strata. The Boyn Hill Gravel to the north east of the site is designated as a Secondary A Aquifer.

The site is not located within an Environment Agency designated Groundwater Source Protection Zone (GSPZ). The nearest GSPZ is an Outer Zone (Zone 2) located approximately 250m north east of the site.

3.2.4 Hydrology

The closest surface water feature to the site is a drain running north to south along the western site boundary. The drain makes a dogleg to the west, approximately 100m south of the site where it runs in a westerly direction to the River Pinn. The River Pinn is located approximately 220m west of the site and runs from north to south.

The site is considered to be located within an EA defined Flood Risk Zone 1, indicating low risk of flooding from fluvial or tidal sources, however due to the size of the site, a full flood risk assessment is recommended prior to redevelopment.

3.2.5 Radon

Reference has been made to Annex A of the BR211 Radon: Guidance on protective measures for new dwellings (2015 edition). Although this guidance was not prepared for non-domestic buildings, the protection from radon at work is specified in the Ionising Radiations Regulations 1999 legislation made under the Health and Safety at Work Act administered by the Health and Safety Executive (HSE) and it is therefore considered prudent to consult this guidance.

The BR211 indicates that the site is within a lower probability radon area as less than 1% of homes are above the action level therefore no radon protective measures are necessary in the construction of new dwellings or extensions.

3.2.6 Environmental Sensitivity

No sensitive land use has been reported within 1km of the site.

3.3 Unexploded Ordnance (UXO)

The Mott MacDonald Report made reference to Zetica's UXB Risk Map and concluded that the site was located within a low bomb risk area and no further risk assessment was considered necessary.

3.4 Identified Potential Pollutant Linkages

The Mott MacDonald Report states that there may be a requirement to understand ground and groundwater quality in the area and the quality of the Made Ground at the site through ground

investigation. Any new build will require an understanding of potential risks from off-site sources and whether groundwater has been impacted under the site.

The report indicates that the information available does not suggest that there are significant contaminated land risks at the site, although potential localised leaks and spills within plant rooms may warrant further investigation.

3.5 Preliminary Geotechnical Comments

The Mott MacDonald's report does not give any specific information regarding geotechnical constraints to the site. The report references an Envirocheck Report (not available to Opus at the time of writing) which indicates there is a moderate potential for compressible ground stability hazards. This is considered to be associated with the Langley Silt deposits. The report recommends that the potential for soft ground should be investigated further and considered in relation to foundation design.

Mott MacDonald have also highlighted that aggressive ground conditions may be present associated with the London Clay Formation. The potential presence of pyrite and high concentrations of sulphates in the London Clay Formation may be aggressive to concrete foundations and Mott MacDonald has recommended further investigation.

4 Investigation Methodology

4.1 Clearance of Underground Services

Before any intrusive ground investigation works were undertaken, Opus positioned the exploratory hole locations using plans provided by Mace. Utility plans were made available that were reviewed prior to marking out the exploratory hole locations and kept on site for the duration of the works for reference.

A Cable Avoidance Tool (CAT) and Genny were used by Opus to scan each working area prior to a 1.0m to 1.2m bgl deep inspection pit being excavated with hand tools for the windowless sampling holes and cable percussion boreholes.

Where services were identified within the immediate area of a proposed exploratory hole, the positions were moved a safe distance away.

4.2 Exploratory Holes

The ground investigation comprised the advancement of four windowless sample holes (WSO1 to WSO4), four Dynamic Cone Penetrometer (DCP) tests (DPO1 to DPO4) and four cable percussion boreholes (BHO1 and BHO4).

All exploratory holes and sampling strategies were advanced and completed by approved subcontractors under the direct supervision of Opus in accordance with the Works Package and those instructions included within the appropriate Permit to Work.

All efforts were made to minimise disturbance to the school's access ways prior to advancing the exploratory holes within these areas.

Where exploratory holes were located on grass areas (sports field) ground protection measures were used to protect the service and prevent rutting/damage to the grass/soft ground.

The locations of all exploratory holes are presented on drawing ref. J-M3932.12_101, dated January 2017, a copy of which is included in the Drawings section.

The windowless sampling holes and Dynamic Cone Penetrometer (DCP) tests were advanced by Dynamic Sampling Ltd, on the 19th December 2016.

The DCP tests were undertaken prior to carrying out the window sample hole. The DCP tests were carried out using a Transport Research Laboratory (TRL) DCP to assess the in-situ California Bearing Ratio (CBR) value of the underlying near surface strata. On completion of the TRL DCP a hand excavated service pit was carried out to a depth of 1.00m bgl.

The windowless sample holes were then advanced using a tracked drilling rig from the base of the hand excavated service pit to refusal at 1.40m to 2.00m below ground level (bgl). Window sample boreholes WSO1 and WSO4 were installed with shallow gas monitoring wells comprising a 19mm plain pipe surrounded by a bentonite seal from 0.10m bgl to 0.50m bgl, and 19mm slotted pipe in a gravel surround to 1.00m bgl. A bentonite seal was placed beneath the pipes. Gas taps were placed at the top of the pipes and a flush cover was cemented in at the surface. Window sample boreholes WSO2 and WSO3 were backfilled with bentonite pellets on completion and surface layers reinstated.

The cable percussion boreholes were advanced by A G Brown Drilling between the 16th and the 21st December 2016 using a Dando 2000 Cable Percussive Rig and were advanced to a maximum depth of between 15.00 bgl. On completion, two of the boreholes (BH02 and BH04) were installed with a combined gas and groundwater monitoring well comprising a 50mm plain pipe in a bentonite seal from existing ground level to 1.00m bgl and 50mm slotted pipe in a gravel surround to 4.50m bgl. Below the pipe the boreholes were backfilled with bentonite. The well was fitted with a gas tap and a flush lockable cover at ground level to provide protection. The remaining boreholes were backfilled with bentonite upon completion. All works were completed under the supervision of Opus.

All exploratory holes were logged by a qualified Opus Geo-Environmental Engineer generally in accordance with BS 5930:2015 'Code of Practice for Site Investigations', incorporating requirements of BS EN ISO 14688-1+2:2002+2004 'Geotechnical Investigation and Testing – Identification and Classification of Soil', and BS EN ISO 14689-1:2003 'Geotechnical Investigation and Testing – Identification and Classification of Rock'.

In-situ tests comprising SPT testing was carried out in all the window sample and cable percussive boreholes. It should be noted that SPT 'N' values quoted within the borehole logs presented in Appendix 'B', and referenced within this report, are presented as corrected values generally in accordance with BS EN 22476 Part 3, to account for the rig efficiency, borehole depth, overburden factors etc. Further correction of the 'N' values should therefore not be necessary. Raw field data is archived within the Opus project file, and can be provided on request.

Undisturbed and disturbed samples were taken at selected intervals from the strata encountered, placed in appropriate containers and submitted for geotechnical and chemical testing. All samples were labelled following standard protocols to ensure the site location, borehole location, sample depth, sample type, date and job reference were all clearly identifiable.

Soil samples collected for chemical analysis were stored in cool boxes chilled with ice packs to preserve sample integrity as far as reasonably practicable. Subsequently the samples were transported to the laboratory under QA / QC controlled conditions employing a chain of custody system to ensure sample integrity prior to the laboratory testing.

The exploratory hole logs and DCP results are presented in Appendices 'B' and 'C' Respectively.

4.3 Exploratory Hole Locations

All exploratory hole positions were set out on site by Opus in accordance with the positions selected by Mace which were sketched onto Ordnance Survey drawings.

Topographical survey drawings were provided to Opus by Mace and Opus transposed the sketch positions onto these. Where the positions were found to be located on structures not previously shown on the Ordnance Survey plans, the exploratory holes were moved to the closest accessible position. Upon receipt of underground utility survey drawings from Mace, the exploratory hole positions were reviewed and moved, where possible, 5m away from indicated services.

All final positions are shown on the exploratory hole drawing as appended to this report. Coordinates are shown on the logs in Appendix B where accuracies are expected to be +/- 1m to 2m horizontally. Vertical elevations shown on the logs in Appendix B were obtained from extrapolation between spot levels on the topographical survey drawings. Accuracy is expected to be +/-20 to 30mm vertically.

4.4 Chemical Testing – Soil and Soil Leachate

As part of the assessment for potential contamination at the site, selected samples were subjected to appropriate soil total and soil leachate chemical analysis. The analyses were carried out at the UKAS / MCERTS accredited laboratory of i2 Analytical.

The following analyses were carried out on selected soil samples:

Table 4.1: Scheduled Soil Analyses

Analyses	No. of samples
Metals and Metalloids	13
Total Phenols	13
Speciated PAH's	10
TPH CWG including BTEX and MTBE	13
VOC's	13
Asbestos Screen	13
pH Value	13

The following analyses were carried out on selected soil leachate samples:

Table 4.2: Scheduled Soil Leachate Analyses

Analyses	No. of samples
Metals and Metalloids	10
Total Phenols	10
Speciated Phenols	10
pH Value	10

The results of the soil and soil leachate chemical analysis are presented in Appendix 'D'.

4.5 Chemical Testing – Groundwater

Table 4.3: Scheduled Groundwater Analyses

Analyses	No. of samples
Metals and Metalloids	2
General Inorganics	2

Post site investigation groundwater samples were retrieved from two of the groundwater monitoring wells. The groundwater sample laboratory analysis certificates are presented in Appendix D.

4.6 Ground Gas and Groundwater Monitoring

Gas and groundwater level monitoring was undertaken in four monitoring wells (BH02, BH04, WSo1 and WSo4) during three return visits to site.

Methane, carbon dioxide, oxygen, carbon monoxide and hydrogen sulphide concentrations will be measured using a calibrated HDG5-GA5059 Gas Analyser, with atmospheric pressure and gas flow rates also recorded.

The results of the ground gas / groundwater monitoring are presented as Appendix H.

4.7 Geotechnical Laboratory Testing

Representative samples were obtained for all soil types encountered. The Engineer scheduled the samples, which were despatched for geotechnical testing at the UKAS accredited laboratory of i2 Analytical Services, for the following analysis:

Table 4.4: Scheduled Geotechnical Analyses

Analyses	No. of samples
Moisture Content	22
Liquid Limit, Plastic Limit and Plasticity Index	19
Determination of California Bearing Ratio	8
Dry density / Moisture Content Relationship	8
Particle Size Distribution Analysis	12
Hydrometer	3
One Dimensional Consolidation Test	8
Quick Undrained Triaxial Test	4
Pyritic Sulphate Suite (Suite D)	8

The results of the pH and water soluble sulphate analysis are presented in Appendix 'D' with the remainder of the geotechnical analysis presented in Appendix 'E'.

5 Results of the Investigation

5.1 Ground Conditions

The encountered sub-surface strata generally corroborated the BGS geological mapping for the solid geology. The superficial deposits differed and the site was predominantly underlain by the Boyn Hill Gravels with only thin inconsistent layers of the Langley Silt found to be present. A summary of the strata encountered in the exploratory holes is as follows.

5.1.1 Topsoil

Made Ground was encountered in BH01, BH03, BH04, WSO1 and WSO3 from the surface to a maximum depth of 0.45m bgl within WSO1. The Topsoil generally comprised a soft brown slightly gravelly sandy clay or a dark brown clayey slightly gravelly fine to medium sand with frequent roots and rootlets. The sand was fine to coarse, and the gravel is fine to coarse angular to rounded flint.

5.1.2 Made Ground

Made Ground was encountered in BH02 and WSO1 to WSO4 inclusive from the surface, or beneath the initial layer of Topsoil.

At the surface of WSO2 a layer of concrete was present, and at the surface of WSO4 a layer of asphalt was present. These layers were penetrated using a hydraulic breaker. The concrete and asphalt were both 0.10m thick.

At the surface of BH02 a thin layer (0.05m thick) of gravel was present within the car park.

The Made Ground encountered beneath the surface layers of hardstanding or Topsoil within WSO1 to WSO4 inclusive generally comprised an orange, black or brown gravelly sand, a grey black gravel, a firm to stiff orange brown very gravelly clay. The gravel consisted of asphalt, concrete, clinker, brick, flint and chalk. The Made Ground was proved to depths of between 0.90m and 1.10m bgl.

5.1.3 Alluvium

Strata identified as Alluvium was encountered within BH02, underlying the Made Ground from 0.05m to 0.08m bgl and comprised a firm greenish grey silty sandy organic clay. The gravel consisted of fine to coarse angular to rounded flint.

5.1.4 Langley Silt

The Langley Silt was encountered underlying the Topsoil, Made Ground or Alluvium within all the exploratory holes from 0.20m and 1.90m bgl. The Langley Silt generally comprised a soft to firm orange brown and brown slightly gravelly clay or a firm orange brown slightly sandy clay with occasional roots. The gravel, where present consisted of fine to coarse angular to rounded flint.

SPT 'N' values obtained during the investigation within the cohesive Langley Silt revealed a range of corrected 'N' values of 6 to 37 indicating a soft to very stiff consistency cohesive strata.

5.1.5 Boyn Hill Gravel

The Boyn Hill Gavel was encountered underling the Langley Silt within all the exploratory holes from 1.20m and 1.90m bgl. The Boyn Hill Gravel generally comprised a medium dense to very dense orange brown sand and gravel, the gravel where present comprised fine to coarse angular to rounded flint.

SPT 'N' values obtained during the investigation within the granular Boyn Hill Gravel revealed corrected 'N' values of 14 to 68 indicating a medium dense to very dense granular strata.

The base of the Boyn Hill Gravel was proved within BHO1 to BHO4 at depths of between 3.60m and 4.40m bgl. The four window sample boreholes were abandoned within the Boyn Hill Gravel at depths of 1.40m and 2.00m bgl due to refusal of the equipment.

5.1.6 London Clay Formation

The London Clay Formation was encountered within BHO1 to BHO4 inclusive at depths of between 3.60m and 4.40m bgl and proved to a maximum depth of 15.00m bgl at the base of the boreholes. The London Clay Formation encountered within comprised a stiff fissured grey clay with frequent silt and fine sand partings.

SPT 'N' values obtained during the investigation within the cohesive London Clay Formation revealed corrected 'N' values of 17 to 30 indicating a firm to stiff cohesive strata. It is noted that the SPT 'N' values generally increase with depth through the London Clay Formation.

5.2 Groundwater Observations

Water was added during drilling of the cable percussive borehole therefore a groundwater strike was not recorded. The groundwater level on completion of drilling, following removal of casing was between 2.20m and 2.40m bgl. Most of the window sample boreholes were dry during and on completion of drilling, except for WSO3 and WSO4 where water was encountered at 2.00m and 1.70m.

Subsequent monitoring of the wells installed in BHO2, BHO4, WSO1 and WSO4 during the monitoring visits recorded the following standing water levels:

Table 5.1: Recorded Standing Groundwater Levels

Visit	Standing Groundwater Level (m bgl)			
	BHO2	BHO4	WSO1	WSO4
15/12/2016	1.43	1.64	1.01	DRY
23/01/2017	1.53	1.63	0.82	1.06
27/01/2017	1.61	1.69	0.91	1.18

Groundwater sampling was carried out within BH2 and BH4 on the 23rd January 2017. Prior to sampling, the installation was purged of 3 well volumes of water. The samples were placed in 500ml amber glass jars, 1 litre plastic bottles and vials. The samples were stored in cool boxes chilled with ice packs to preserve sample integrity as far as reasonably practicable. Subsequently the samples

were transported to the laboratory under QA / QC controlled conditions employing a chain of custody system to ensure sample integrity prior to the laboratory testing.

5.3 Field Observations

Significant visual and/or olfactory evidence of contamination was not generally noted within the Made Ground materials or natural soils during the advancement of the exploratory holes.

Live roots were noted within BH01 to 0.80m bgl.

5.4 TRL DCP Results

Dynamic cone penetrometer tests were undertaken at four locations across the site at the position of the window sample boreholes. The tests were carried out from either ground level or immediately below hardstanding to a maximum depth of up to 1.00m.

The results within the near surface Made Ground and Topsoil from ground level to 0.30m bgl gave calculated CBR values of between 4% and 9%, these represent the cohesive Topsoil within WSO1 and WSO3, and the Made Ground within WSO2 and WSO4.

From approximately 0.30m bgl to 0.50m bgl the CBR values varied greatly from 4% to 108%, the higher values are when large pieces of gravel were encountered by the probe tip and should not be used as a design value.

Deeper materials (beyond 0.50m) typically gave calculated CBR values of between 11% and 18%, representing both the Made Ground and the natural strata of the Langley Silt.

The DCP testing results are presented as Appendix 'C'.

5.5 Chemical Testing - Soil

The procedure of assessing the risk to human health entails the initial comparison of results to the Environment Agency Soil Guideline Values (SGV's), DEFRA Category 4 Screening Levels, Opus In-House Tier 1 Screening Values (IHSV's) and Land Quality Management (LQM) & Chartered Institute for Environmental Health (CIEH) 'Suitable 4 Use Levels' (S4UL's) derived using CLEA 1.06 to be protective of human health. If any potentially significant concentrations are recorded, the results are subjected to statistical analysis in accordance with the CL:AIRE and CIEH document entitled 'Guidance on Comparing Soil Contamination with a Critical Concentration', published in May 2008.

TPH CWG, BTEX and VOC analysis cannot be assessed by statistical means due to the samples analysed being targeted and hence not being part of a general screen. Any elevated concentrations detected as a result of the targeted sampling and analysis would skew the statistical analysis and general distribution of the data set giving a false representation of the distribution of TPHCWG and BTEX contamination at the site.

The proposed end use of the site, which is a school, does not strictly fit any of the Generic Assessment Criteria end land use scenarios. However, it has been considered appropriate by Opus to compare the laboratory analysis results to the Generic Assessment Criteria for a residential land use without plant uptake at this stage to provide a preliminary and conservative assessment of any significant contamination given the intended end use of the site.

The statistical analysis model as outlined below is only undertaken where exceedances of the Tier I Screening values are identified. Where the objective is to demonstrate 'suitability for use', the Null and Alternative Hypotheses are as follows:

- Null Hypothesis: "Is the true mean concentration more than or equal to that of the critical concentration?"
- Alternative Hypothesis: "Is the true mean concentration less than the critical concentration?"

Soil Organic Matter (SOM) analysis has not been undertaken as part of the investigation however to provide a conservative level of assessment and based on the soil descriptions, an SOM% of 1% has been adopted in order to select appropriate screening values for organic based contaminants.

The soil results have initially be screened against the Opus Human Health Generic Assessment Criteria table presented in Appendix 'F' and the ESI spreadsheets are presented within Appendix 'G' as required.

5.5.1 Metals

Eight samples of Made Ground, four samples of Topsoil and one sample of natural strata were analysed for a standard metals suite. The generic screen has identified one slightly elevated result of Lead within the sample of Made Ground taken from WSo1 at 0.50m. The subsequent statistical analysis identified that the true mean concentration is less than the critical concentration and therefore, it is not considered that the Made Ground poses a risk of lead contamination to future site users; hence, no remedial action is considered necessary for metals with respect to human health.

5.5.2 Speciated PAH's

Eight samples of Made Ground, four samples or Topsoil and one sample of natural strata were analysed for the USEPA 16 most carcinogenic PAH congeners. Elevated concentrations were recorded in three of the Made Ground samples soil sample as detailed in Table 5.2.

Table 5.2 Exceedances of Screening Analysis for PAH

Determinand	Screening Value (mg/kg)	Elevated Concentration (mg/kg)	Sample Reference	Strata Type
Naphthalene	2.3	3.9	WSo2/0.3m	Made Ground
Benzo(b)fluoranthene	3.9	4.1	WSo1/0.5m	Made Ground
Dibenz(a,h)anthracene	0.31	0.43	WSo1/0.5m	Made Ground
		0.34	WSo2/0.90m	Made Ground

The subsequent statistical analysis of the Naphthalene, Benzo(b)fluoranthene and Dibenz(a,h)anthracene data sets within the Made Ground has confirmed the Null Hypothesis, meaning that the true mean concentration is equal or greater than the critical concentration. The generic screen and statistical analysis therefore indicates a potential risk to human health with respect to the identified, elevated PAH's within the Made Ground beneath the site. The results are discussed further within Section 6 of this report.

5.5.3 Cyanide and Total Phenol

Eight samples of Made Ground, four samples of Topsoil and one sample of natural strata were analysed for Cyanide and total Phenol. None of the concentrations were recorded above the lower laboratory detection limit. Hence, no remedial action is considered necessary for Cyanide or Total Phenol with respect to human health.

5.5.4 Speciated TPH, BTEX and MTBE

Eight samples of Made Ground, four samples of Topsoil and one sample of natural strata were analysed for speciated TPH, BTEX and MTBE. None of the concentrations were recorded above the relevant SGV's. Hence, no remedial action is considered necessary for TPH's with respect to human health.

5.5.5 VOC's

Eight samples of Made Ground, four samples of Topsoil and one sample of natural strata were analysed for VOC's.

No VOC concentration was detected above either the laboratory's method detection limit or the relevant generic screening criteria. Hence, no remedial action is considered necessary for VOC's with respect to human health.

5.5.6 Asbestos Screen

Thirteen samples were analysed for the presence of asbestos fibres. Asbestos was not detected within any of the samples tested therefore remedial measures relating to asbestos will not be required.

5.6 Chemical Testing – Soil Leachate

The results of the chemical analysis of ten soil leachate samples have initially been assessed against the UK Drinking Water Standards 2000 (UKDWS) or World Health Organisation (WHO) values. UKDWS values have been used in the first instance as the school is located over a Secondary A Aquifer (within the Boyn Hill Gravel). The site is not located within a source protection zone for groundwater.

This screening allows potential 'contaminants of concern' to be identified with regard to Controlled Waters.

5.6.1 Metals

The soil leachate test results from the eight samples of Made Ground, two samples of Topsoil and one sample of natural strata tested were analysed for a suite of metals. The results gave concentrations that were all below the UKDWS.

5.6.2 Speciated and Total Phenols

The soil leachate test results from eight samples of Made Ground, two samples of Topsoil and one sample of natural strata were analysed for Speciated and Total Phenols. The concentrations of Speciated and Total Phenols did not exceed the lower laboratory detection limits.

5.6.3 Free and Total Cyanide

The soil leachate test results from eight samples of Made Ground, two samples of Topsoil and one sample of natural strata were analysed for Free and Total Cyanide. The concentrations of Free and Total Cyanide did not exceed the lower laboratory detection limits.

5.7 Chemical Testing – Groundwater

Three groundwater level monitoring visits have been undertaken in total between 4th January and 27th January 2017, during which two groundwater samples were collected from monitoring wells BHO2 and BHO4.

The highest groundwater level was measured at 0.82m begl in WSO1 on the 23rd January 2017. Monitoring well WSO4 was noted to be dry during the first monitoring visit.

An oil/water interface probe was used to determine whether any floating product was present. No product layer was detected by the interface probe within any of the monitoring wells.

For the purpose of discussing the groundwater results in terms of the risks posed by the site to controlled waters, the groundwater results have been compared to the most stringent standards published on the Environment Agency's web based Chemical Standards Database, these generally being the UK Drinking Water Standards 2000 (UKDWS) or World Health Organisation (WHO) values. The UKDWS values have been used in the first instance as the school is located over a Secondary A Aquifer (within the Boyn Hill Gravel).

The water results from the sample collected were analysed for a range of inorganic and heavy metal contaminants. Concentrations of manganese were present at slightly elevated levels above the guideline value of 500µg/l for one sample:

- BH4 720µg/l

However, it is noted that the use of UKDWS provides very conservative values as the compliance point is at a consumer's drinking water tap. Given that the site is not located within a Groundwater Source Protection Zone and drinking water will not be taken directly from the Secondary A Aquifer, it is considered that the site poses a low risk to controlled waters.

5.8 Geotechnical Testing

The results of the geotechnical testing for pH and sulphate carried out during this investigation are included alongside the chemical testing data in Appendix D. All other geotechnical laboratory results are contained in Appendix E.

5.8.1 Sulphate Testing

The sulphate and pH values determined for selected samples taken from across the site have recorded values in the following ranges:

Table 5.3 Summary of Sulphate and pH testing

<u>Soils</u>	
Sulphur	0.008 to 7.56%
Acid Soluble Sulphate	0.008 to 0.067%
Water Soluble Sulphate	0.02 to 22mg/l
pH	7.1 to 8.0
<u>Soil Leachate</u>	
Sulphate	2.9 to 42mg/l
pH	7.5 to 10.0
<u>Water</u>	
Sulphate	37 to 78mg/l
pH	7.1 to 7.3

5.8.2 Plasticity Index and Moisture Content Testing

The results from the 19No. Plasticity Index tests and moisture content determinations for the strata encountered on site have recorded the following ranges:

Modified Plasticity Index	15 – 37%
Moisture Content	16 - 28%

The seven results tested from samples of Langley Silt gave a modified plasticity indices of between 15% and 36% indicating a low to medium shrinkage potential. The results tested of the cohesive London Clay Formation have a modified plasticity index of between 13% and 37% indicating a low to medium volume change potential variable strata. The two lower values from within the London Clay Formation were taken from the boundary with the Boyn Hill Gravel therefore are more granular and have a low shrinkage potential. The samples taken below this boundary typically indicate a medium shrinkage potential for the London Clay Formation.

5.8.3 Multistage Triaxial's

The results from the multistage triaxial tests indicate that the London Clay Formation is between 104kPa and 203kPa indicating a high strength cohesive strata.

5.8.4 Oedometers

The oedometer results have revealed M_v values of between $0.2 \text{ m}^2/\text{MN}$ to $0.039 \text{ m}^2/\text{MN}$.

5.8.5 Particle Size Distribution

The results from the Particle Size Distribution (PSD) analysis corroborate field descriptions.

5.8.6 California Bearing Ratio

The results from the 8No. CBR tests have recorded CBR values in the range of 0.8 – 8.4%, with the highest CBR value recorded in BH01. The lowest values were recorded in WSO4 and WSO5.

The lower CBR values are considered to represent samples of silty sand or clay laminations within the sand matrix.

5.8.7 Dry Density / Moisture Content Relationship

The results from the 8No. Dry Density and Moisture Content relationship tests indicate a Maximum Dry Density in the range of 1.52 – 1.75mg/m³ and an Optimum Moisture Content in the range of 15 – 22% (mean 19%).

Geotechnical recommendations relating to the available results are included within Section 7 of this report.

5.9 Ground Gas Monitoring Results

Gas monitoring results have been compared to guidance presented in CIRIA Report C665, Assessing Risks Posed by Hazardous Ground Gases to Buildings, 2007. CIRIA C665 indicates that ground gas protection measures may be necessary in new buildings on sites where methane concentrations exceed a threshold value of 1% v/v and/or where carbon dioxide concentrations exceed a threshold value of 5% v/v. The gas flow rate is also considered in the required level of protection.

Maximum methane (CH₄) and carbon dioxide (CO₂) concentrations, as percentage volume in air (%v/v), minimum oxygen (O₂) concentrations (%v/v), maximum carbon monoxide (CO) and hydrogen sulphide (H₂S) concentrations, in parts per million (ppm), and gas flow rates in litres per hour (l/hr) have been monitored in BH02, BH04, WSO1 and WSO4 over a total of three return visits to date.

The results of the gas monitoring visits are presented in Appendix G and are summarised as follows:

- Carbon dioxide has been recorded in all four wells at concentrations between <0.1% v/v and 2.3% v/v.
- Methane, Carbon Monoxide, and Hydrogen Sulphide have not been recorded above the instrument's detection limit (<0.1% Methane and <1ppm Carbon Monoxide and Hydrogen Sulphide). Depleted oxygen levels were recorded within WSO4 ranging between <0.1% v/v to 5.7% v/v during the monitoring period.
- No gas flow was recorded above 0.0 l/hr in BH02, BH04 and WSO4 however in WSO1 a peak flow of 10.2l/hr was recorded during the first visit.

The atmospheric pressure recorded across the monitoring visits ranged between 1001mb to 1020mb.

6 Environmental Assessment

6.1 Soil

Elevated levels of PAH's were identified within soil samples taken from WSo1 at 0.50m bgl and in WSo2 at 0.30m bgl. The elevated concentrations of Naphthalene are considered to represent outliers within the dataset and are not representative of the Made Ground across the site. However, the elevated concentrations reported for Benzo(b)fluoranthene and Dibenz(ghi)perylene are indicated by the statistical assessment to be representative of the Made Ground across the site and therefore, future site users could potentially be at risk from PAH contamination within the shallow soils on site. Exploratory hole WSo1 is located in a small grassed area positioned centrally within the site and WSo2 is located within the parking area to the north east.

It is the opinion of Opus that the Made Ground currently located below concrete hardstanding or capped with Topsoil on site does not pose a risk to the health of current site users. Should these areas become playing fields or frequently used areas of soft landscaping, there might exist a direct exposure pathway in the form of dermal contact, inhalation of contaminated fugitive dust and accidental soil ingestion. In order to mitigate against this Opus has provided the below options for consideration:

- 1) where areas are to be developed as soft landscaping in the future then emplace a clean capping layer (likely to be of 600mm) within areas where Made Ground exists,
- 2) Complete a Detailed Quantitative Risk Assessment. This would involve modelling the site specific parameters such as exposure duration and age range of the receptor.

6.2 Soil Leachate

Soil leachate analysis was undertaken as part of the agreed scope of works for the site. The results of the analysis have been compared against appropriate UK drinking water standards. The generic screen has determined that none of the results are above UKDWS therefore do not need to be considered further. The outcome of the below groundwater analysis will more accurately assess the metals concentrations in the dissolved phase.

6.3 Groundwater

Groundwater sample analysis was undertaken as part of the agreed scope of works for the site. The results of the analysis have been compared against appropriate UK Drinking Water Standards given that the site is located on a Secondary A Aquifer.

The generic screen has identified manganese at levels that slightly exceed the UKDWS within one groundwater sample. However, it is considered that this concentration does not pose an unacceptable risk to controlled waters due to the sample comprising groundwater, whereas the UKDWS are based on the compliance point being at a consumer's tap.

Based on the results obtained further investigation and groundwater sampling should be carried out to include a larger suite of tests. PAH contamination has been identified within the Made Ground. Therefore it would be considered prudent to test the groundwater for PAH content during any future works to confirm the absence of any significant PAH contamination within the groundwater beneath the site.

6.4 Ground Gas

The ground gas potential for the site and surrounding area is considered to be of negligible risk, due to the limited levels of biodegradable material encountered within either the Made Ground or natural soils and lack of any significant ground gas source identified within influencing distance of the site.

The three monitoring visits carried out to date have recorded a maximum carbon dioxide concentration of 2.3% v/v (BH1) and no detectable concentration of methane.

The maximum carbon dioxide concentration of 2.3% v/v and a maximum gas flow rate of 10.2l/hr (limit of detection) have been selected to calculate an initial Gas Screening Values (GSV) for the site in accordance with CIRIA Report C665 and BS8485:2015 to determine the required level of carbon dioxide protection measures for the proposed future site development. However, it should be noted that the elevated gas flow rate may be anomalous. Further testing will be required to confirm the gas regime in accordance with the CIRIA guidance. Only three gas monitoring visits were carried out and to comply with the guidance at least 6 monitoring visits would be required.

The GSV is calculated as follows:

$$\text{GSV} = \text{Gas Concentration}/100 \times \text{Flow Rate}$$

Based on elevated values, the GSV for carbon dioxide (0.24) puts the site within 'Characteristic Situation 2' in accordance with CIRIA 665.

Characteristic Situation 2 requires some ground gas protection measures within the proposed buildings. These could include ground bearing floor slab (suspended, non-suspended or raft) with at least 1200g DPM ² and underfloor venting or a beam and block or pre cast concrete floor slab and 2000 g DPM/reinforced gas membrane and underfloor venting, all joints and penetrations sealed, or possibly underfloor venting or pressurisation in combination with the above depending on the proposed use.

It is noted that depleted oxygen levels were recorded within monitoring well WSO4 throughout the monitoring exercise. Therefore, construction and maintenance workers who are required to work within manholes and other subsurface confined spaces should be made aware that a low oxygen environment could potentially exist with precautions taken to ensure their welfare.

6.5 Updated Conceptual Site Model

The updated Conceptual Site Model is based on the information obtained from the intrusive investigation.

Table 6.5 Updated Source Pathway-Receptor Relationships

Source Material/Activity	Potential Contaminant	Pathways	Receptor	Risk
Soil				
Made Ground (localised on site)	PAH's	Ingestion, inhalation (contaminated dust), dermal contact.	Site Occupiers (staff and pupils),	Medium if areas of contamination become surfaced with soft landscaping
Water				
Made Ground	PAH's	Ingestion, dermal contact.	Secondary A Aquifer	Low, but additional testing recommended to confirm
Ground Gas				
Ground Gas	Made Ground	Ingestion, inhalation (contaminated dust), dermal contact.	Site Occupiers (staff and pupils) Construction Workers, Maintenance Workers	Low

6.6 Health & Safety

During the construction of the development, a high standard of health and safety awareness should be maintained in order to protect construction workers from exposure to potentially contaminated soil. It is therefore recommended that the appropriate precautions given in Health and Safety Executive Report HS(G)66 'Protection of workers and the general public during the redevelopment of contaminated land' are adopted.

It is our judgement that The Construction Design and Management (CDM) Regulations 2007 (regulation 3) will apply to this project. As a designer, we have a responsibility to inform you of your duties to which you are subject by virtue of the Regulations as specified in regulation 11 (1).

We therefore draw your attention to the CDM Regulations 2007 and the Approved Codes of Practice contained therein.

The following basic health and safety measures should be adopted as a minimum during the site development works:

- Basic Personal Protective Equipment (PPE) including hard hats, gloves, coveralls and steel toe-capped boots to be worn at all times;
- Eating, drinking and smoking to be forbidden at all times except in designated mess areas; and,
- Breathing equipment to be available for those working in confined or unventilated spaces.

If ground conditions should differ significantly from those encountered during the intrusive investigation, including the discovery of any visible or odorous contamination, site redevelopment works should be suspended until the suspect material has been inspected and assessed by a competent Geo-Environmental Engineer.

6.7 Disposal and Re-use of Soil

The reuse of Made Ground as engineered fill should be undertaken in accordance with an appropriate Environment Agency licence as defined in the statutory guidance on the 'Definition of Waste' or CL:AIRE Code of Practice.

Any materials designated for off-site disposal are likely to require classification by the Waste Acceptance Criteria (WAC) in accordance with the Landfill Regulations. No WAC testing has been undertaken as part of this investigation.

6.8 Liaison with Regulators

It is recommended that this report be submitted to the Local Authority Environmental Health Officer for review and comment prior to any irrevocable action taking place.

6.9 Water Supply Pipes

If new water service pipes are required for the proposed development it is recommended that the water supply utility company is contacted for confirmation of pipe type prior to any construction work commencing on the site.

The use of recycled aggregate material made from road planning's should be avoided for backfilling around services.

6.10 Environmental Protection

The following environmental protection measures should be adopted as a minimum during the site redevelopment works:

- Covering and dampening of spoil to prevent the spread of dust;
- Made Ground and natural soils should be stockpiled separately to avoid cross-contamination of material that may be retained on site or for waste disposal purposes;
- Containment of surface water runoff to prevent the pollution of surface water drains, sewers etc.; and
- Cleaning and washing of boots, vehicle wheels and other equipment at site entry and exit points to prevent the spread of mud.

7 Geotechnical Assessment

7.1 Foundation Design

Opus is not aware as to the precise details or form of construction that may be utilised for the proposed development. Subject to review, as and when these details become available, a range of foundation options may therefore be appropriate. The following discussion of foundation options should therefore be regarded as preliminary and subject to review as and when the detail of the intended development and the associated foundation loadings are known.

The Topsoil, Made Ground and Alluvium proven during the investigation is considered to be unsuitable for the support of foundations. The maximum proven depth of these deposits on site is 1.00m bgl within WSo3.

The soft to firm clay of the Langley Silt was encountered to a maximum depth of 1.90m bgl within BH04 overlying the medium dense to very dense Boyn Hill Gravels. The stiff cohesive London Clay Formation underlies the Boyn Hill Gravels at depths of between 3.60m and 4.50m bgl.

Based on field observations and in-situ SPT data, the Boyn Hill Gravel is considered to be a suitable founding strata for new developments, while reduced loads may be placed onto the Langley Silt at a shallower depth. For indicative purposes, based on the SPT 'N' values, laboratory test results and the above, allowable ground bearing pressures have been calculated using the following assumptions:

- » Made Ground and any locally soft strata is fully penetrated by foundations.
- » The building constructed is a two story traditional brick structure with 1.00m wide foundations.
- » Strip line loads with intermittent pads at nominal distances of 6.00m.
- » Ground bearing slabs.

If the building design as assumed above were to change as such that the ground bearing pressures would grossly exceed the current analysis, further assessment should undertaken to determine if the foundation design would need to change.

For indicative purposes, based on the SPT 'N' values, laboratory test results, and the above assumptions (i.e. the Topsoil, Made Ground, Alluvium and any locally soft strata is fully penetrated by foundations), traditional 1.00m wide strip foundations bearing onto the Boyn Hill sands and gravels at a depth of 1.50m to 2.00m bgl may be designed using an allowable net bearing pressure of 150kN/m² allowing for a maximum settlement of 25mm.

Depending on the actual proposed foundation design loads, foundations could be placed within the Langley Silt at 1.00m bgl with a reduced bearing capacity. For traditional 1.00m wide strip foundations bearing onto the clays of the Langley Silt at 1.00m bgl foundations may be designed using an allowable net bearing pressure of 50kN/m².

If foundations are placed within the Langley Silt, due to the variable nature of the strata it is recommended that reinforcement is used within the foundations to prevent differential settlement.

In accordance with EC7, any values must be checked against the actual proposed factored foundation design loads, and a settlement calculation undertaken. At this stage, the foundation loadings are not known and hence the foundation depths cannot be confirmed until this information is available.

7.2 Floor Slab Design

Where Made Ground and Topsoil are no deeper than 0.60m bgl ground bearing floor slabs should be suitable for the proposed development. If ground bearing slabs are adopted, any near surface soft/loose strata should be suitably compacted and the design should take into account any clay strata across the site.

If proposed planting is close to the buildings then a raised floor slab (block and beam) may be the preferred solution.

Final designs for the floor slabs should be carried out by a suitably qualified Engineer based on the findings of this investigation and with reference to the anticipated loadings and serviceability requirements for the structure.

7.3 Building Near Trees

There are occasional semi mature / mature trees within the site boundary and also a number of mature trees around the perimeter of the site. Although the general strata identified on site is predominantly granular. The cohesive nature of the Langley Silt within the top two meters will have an influence on the foundation design with regards to existing and proposed planting.

If any roots are encountered within foundation trenches in cohesive strata then the foundations should be redesigned by a suitably qualified Engineer to account for the potential influence of shrinking and swelling clay strata. Where tree and shrubs are proposed, foundations should be deepened to account for their influence.

The volume change potential of both the Langley Silt and the London Clay Formation is low to medium. If foundations are placed at shallow depths within the Langley Silt a minimum foundation depth of 0.90m begl where foundations are outside of the influence of new planting. Where restricted new planting is proposed within influencing distance of the foundations a minimum foundation depth of 1.25m begl should be adopted.

7.4 Demolition and Construction

Where any significant obstructions (old foundations, drain runs, basement structures etc.) are encountered then these should be chased out and the position, extent and depth of any resultant voids should be recorded for future reference as this could influence foundation designs for the proposed development. Where deep voids are to be in-filled the advice of an Engineer should be sought to ensure that a suitable earthworks specification is achieved so as to minimise impacts of designs for foundations / floor slabs etc.

It is generally anticipated that excavations within the near surface strata should be readily achieved using conventional plant (JCB 3CX or similar). However, obstructions (old foundations, drain runs, basement structures etc.) associated with previous phases of development may be encountered and may require a higher specification of plant and /or breaking out. Should excavations be taken to

greater depths, care should be taken with regards to collapsing trenches and therefore shoring methods may be required for stabilisation.

Groundwater was encountered during the investigation and during the subsequent monitoring visit at a minimum depth of 1.01m, therefore entries should be anticipated within any excavations. It is considered that sump and pump dewatering techniques should be adequate within the top 2.00m, below 2.00m bgl groundwater entry is likely to be fast and ideally if possible excavations should be kept shallow. If excavations need to be greater than 2.00m bgl a suitable solution to remove the water and prevent sidewall collapse will need to be established.

7.5 Concrete Specification

The results of the pH and sulphate analysis have been assessed for potential aggression to buried concrete in accordance with the Building Research Establishment: Special Digest 1: Concrete in Aggressive Ground. It is considered, with reference to the desk study review findings, that the site can be classified as a brownfield, pyritic site with regard to aggressive ground risks.

With reference to BRE Special Digest No 1 “Concrete in Aggressive Ground” and with reference to the results obtained during the investigation, the Made Ground, Topsoil, Alluvium, Langley Silt and the Boyn Hill Gravel can be classified as Design Sulphate class DS-1 and ACES Class AC-1s assuming mobile groundwater conditions.

If piled foundations are chosen as the preferred method to support the proposed development, a Design Sulphate class DS-5 and ACES Class AC-5 assuming mobile groundwater conditions should be adopted for any below ground concrete within the London Clay Formation.

If piled foundations are used any arisings of the London Clay Formation from the piling should not be placed against any concrete structures.

The specific concrete mixes for the Design Concrete Class (DCC) to be used on site will be determined by the site specific concrete requirements in terms of the required durability and structural performance. These are assessed in terms of the Structural Performance Level (SPL) and any need for Additional Protective Measures (APM), detailed in Part 2 with further guidance in Parts 3 and 4 of BRE Special Digest 1.

7.6 Pavement Design

The CBR values based on laboratory test results will be included within our final report.

With reference to in-situ CBR values obtained during the ground investigation using the TRL DCP and remoulded CBR's carried out within the laboratory it is suggested that a CBR design value of around 1-2% should be assumed for the design of any access roads/pavements founded within the Made Ground or near surface natural strata. This assumes that any below ground obstructions will be grubbed up and any voids or soft spots will be backfilled and compacted with suitable crushed aggregate to achieve an appropriate standard of compaction.

7.7 Soakaways/Drainage

Based on the presence of Boyn Hill Gravel, soakaways may be a viable drainage option for the site. It is noted that groundwater levels are shallow and this may limit the potential capacity and size of

any proposed soakaways. Soak away testing should be carried out in accordance with BRE 365 to confirm the infiltration rates.

7.8 Earthworks

Based on the laboratory testing results of the shallow silty sand material (Optimum Moisture Content of 19%) a suitable earthworks specification would allow placement and compaction when moisture contents are in the range of 17 – 21%.

It should be noted that some of the results lie outside of this range and that material in some areas may need wetting up or drying out.

7.9 Design Recommendations

Any design recommendations made within this report are considered the most appropriate considering a number of factors including investigation findings, financial and safety implications. All design recommendations are considered to be achievable within a safe system of work. During construction due consideration should be taken in relation to the safety implications inherent in the chosen construction method.

Any design recommendations suggested within this report should be carried out in line with current best practice and regulatory requirements. It is considered that the contractor carrying out any recommendations contained within this report will be aware of the standard construction processes involved and have detailed knowledge of the relevant health and safety measures.

8 Recommendations

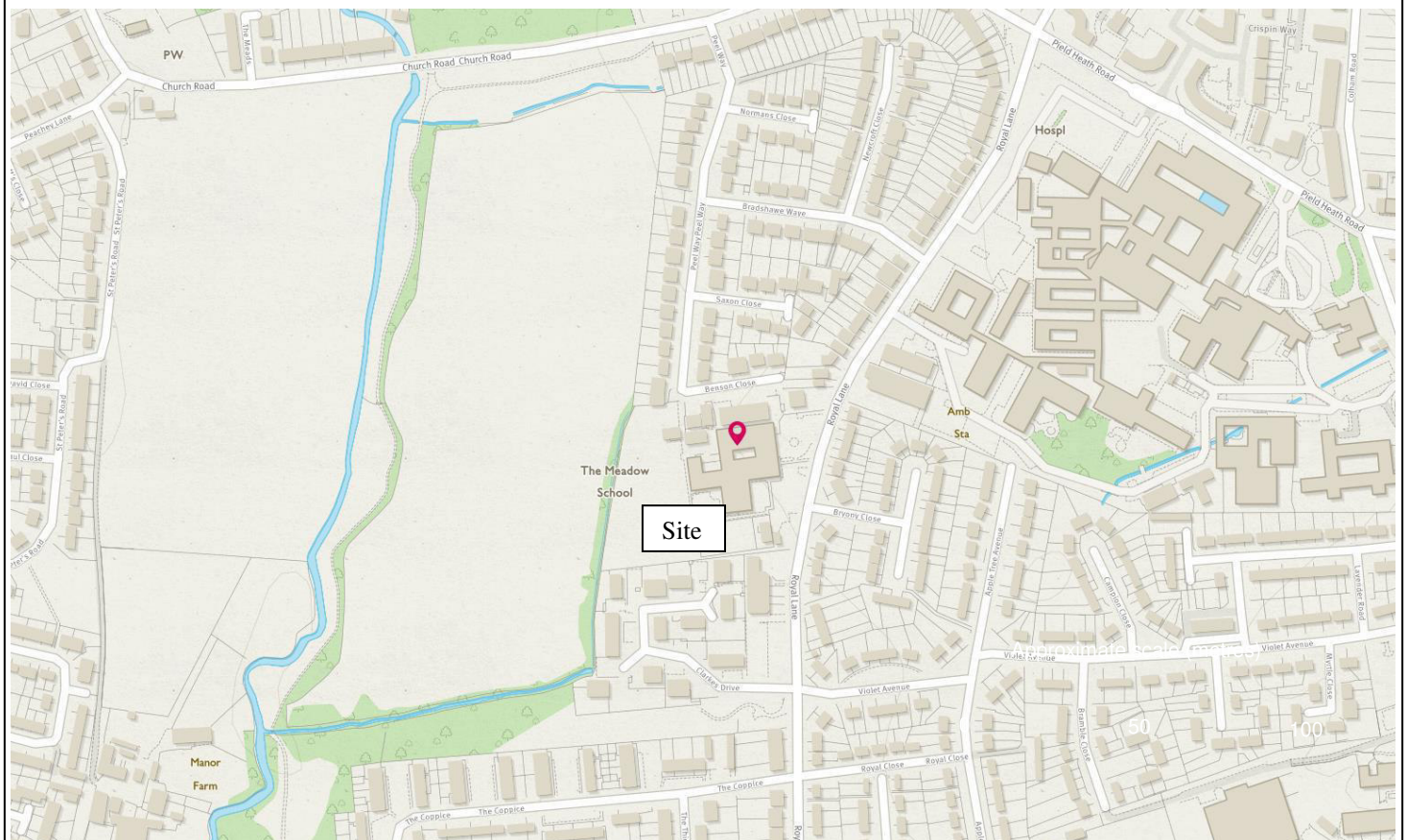
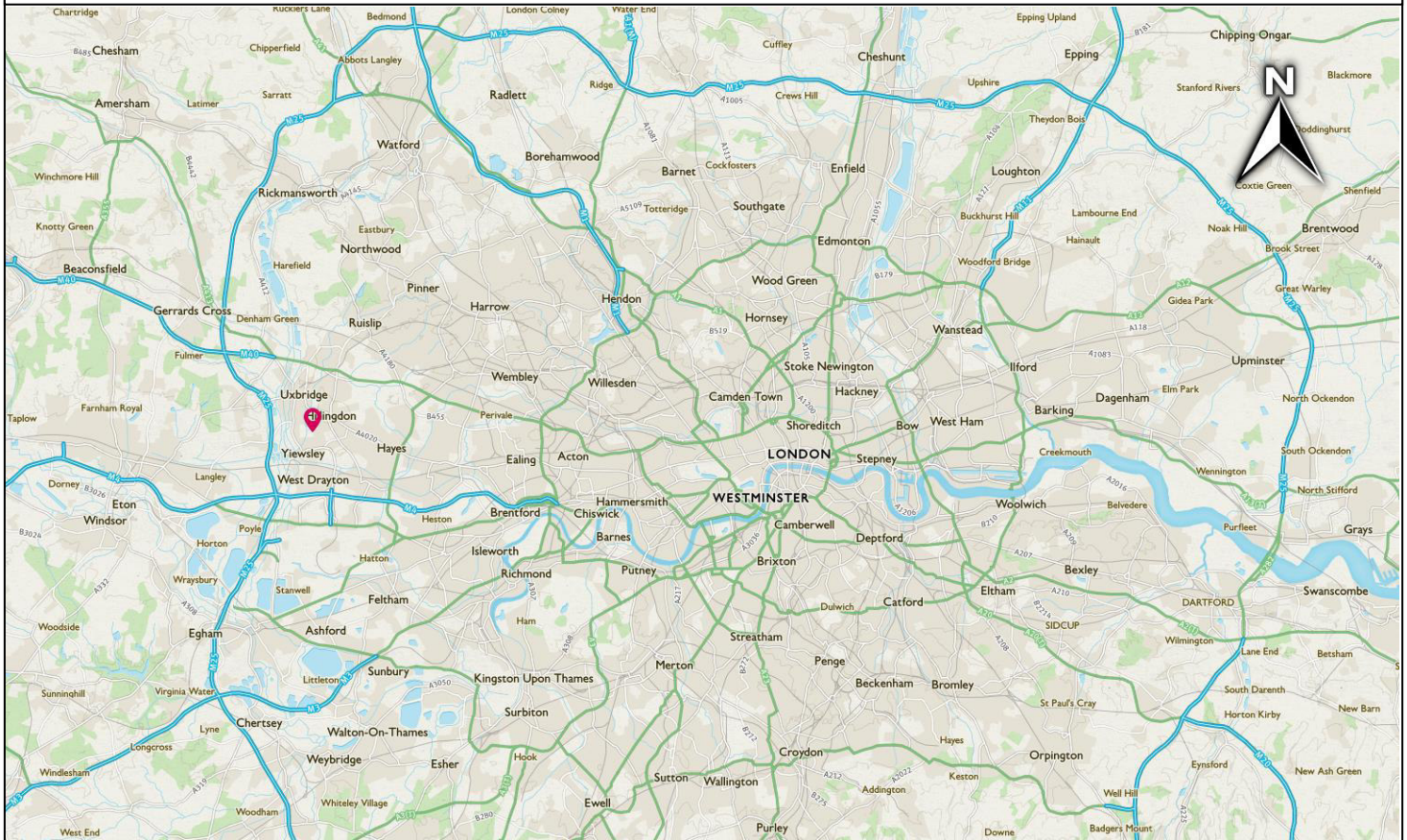
The following further works have been recommended prior to the development of the site:

- Complete a Detailed Quantitative Risk Assessment (DQRA) to accurately model the risks to the future site users from the elevated PAH concentrations.
- Carry out further groundwater sampling and testing to establish if any PAH contamination identified within the Made Ground has migrated into the groundwater within the Secondary A Aquifer.
- Carry out a further three ground gas monitoring visits to re-evaluate the GSV values Characteristic Situation.
- Finalisation of geotechnical designs for the proposed development with reference to a finalised planning layout, the magnitude of imposed structural loadings, and following consultation with a design engineer.
- Submission of this report to the Local Authority Environmental Health Officer for review and comment prior to any irrevocable action taking place.
- Confirmation of the water supply pipe specification with the appropriate authorities prior to construction.
- Further more detailed investigations, samples and tests may be required at a later date once specific development proposals have been finalised to provide design parameters where specified by the Project Engineer to inform the final design process.

DRAWINGS

Site Locality

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	BY	CHECKED	DATE
DESIGN	HZ	RP	Jan 17
DRAWN	HZ	RP	Jan 17
APPROVED: NM			
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Milton Keynes
MK1 1SW

Site: Meadow High School, Hillingdon

Client: Mace Limited

Status: Final Report

File: J-M3932.12

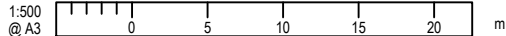
Scale: Not to scale

Date: 19th January 2017

Drawing Number: MK J-M3932.12_100_R1

Key:

-  OPUS approximate window sample borehole location (December 2016)
-  OPUS approximate window sample borehole location (December 2016) with gas monitoring installation
-  OPUS approximate cable percussive borehole location (December 2016)
-  OPUS approximate cable percussive borehole location (December 2016) with ground water / gas monitoring installation
-  OPUS approximate dynamic cone penetration location (December 2016)



Revision	Amendment	Approved	Revision Date
R0	First Issue - Draft	RP	03/01/17



 Milton Keynes Office +44 1908 373 383		1 South House Bond Avenue Milton Keynes MK1 1SW	
Drawn	Designed	Approved	Revision Date
HBZ	ES	RP	03/01/17
Project No.	Scale		Drawing No.
J-M3932.12	1:500 @ A3		J-M3932.12_101

Project Meadow High School Hillingdon	
Sheet Exploratory Hole Location Plan	
Drawing No.	Revision
J-M3932.12_101	R0

APPENDIX A

Selected Site Photographs



Photograph 1:
View east over car parking area from WSo2



Photograph 2:
View of WSo1 looking south toward school building



Photograph 3:
View north over school complex from WSo1



Photograph 4:
View west toward playing field from WSo1



Photograph 5:
View of rig setup at BH03



Photograph 6:
WSo1 1.0 – 2.0m



**Photograph 7:
WSO1 Installation**



**Photograph 8:
WSO1 Reinstatement**



**Photograph 9:
WSo4 Installation**

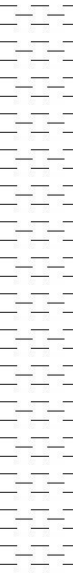
APPENDIX B

Exploratory Hole Logs

Exploratory Hole ID: BH01	Client: Mace Limited		 www.opusinternational.co.uk	
Job No: J-M3932.12	Site: Meadow High School			
Drilling Equipment/ Excavation Method: Cable Percussive Rig		Co-ords: 506442E - 181709N	Start Date: 20/12/2016	End Date: 20/12/2016
		Ground Level (mAOD): 32.760	Backfill Date: 20/12/2016	Field Records: ES
			Logged: ES	Chkd: RP
				Appr: NM

Strata Description	Depth (m)	Level (m)	Legend	Sample Type	Sample Depth (m)	Tests	Groundwater Records	Backfill Details
Grass over TOPSOIL comprising soft brown slightly gravelly, slightly sandy CLAY with frequent roots and rootlets. Sand is fine to coarse. Gravel is fine angular flint.	0.35	32.41		ES1	0.10			
				B1	0.40 - 0.80			
	0.80	31.96		ES2	0.50			
				B2	0.80 - 1.10			
Soft becoming firm orange brown and brown mottled slightly gravelly CLAY with occasional roots. Gravel is fine to coarse angular to rounded flint. (LANGLEY SILT MEMBER)				B3	1.20 - 1.60	N=33 (C)		
Firm orange brown gravelly CLAY. Gravel is fine to coarse angular to rounded flint. (LANGLEY SILT MEMBER)	1.80	30.96		B4	2.00 - 2.50	N=68 (C)		
				B5	3.10 - 3.50	N=64 (C)		
Very dense orange brown SAND and GRAVEL. Sand is fine to coarse. Gravel is fine to coarse, angular to rounded flint. (BOYN HILL GRAVEL MEMBER)				B6	4.00 - 4.40	N=24 (C)		
	3.90	28.86		D1	4.60			
Firm orange brown very gravelly CLAY. Gravel is fine to coarse, angular to rounded flint. (BOYN HILL GRAVEL MEMBER)	4.30	28.46		S5	5.10	N=17 (S)		
Stiff fissured grey CLAY with frequent silt and fine sand partings. (LONDON CLAY FORMATION)				U1	6.60 - 7.00	U Blows=23		
				D2	7.10			
				S6	8.10	N=23 (S)		
				U2	9.60 - 10.00	U Blows=28		

Remarks: 1. Hand excavated service pit to 1.20m bgl. 2. Borehole cased with 150mm casing to 4.40m bgl. 3. Water added from 1.80m to 3.00m bgl - 150 litres. 4. Groundwater strike at 3.00m bgl, slow inflow rate. Groundwater level on completion 2.20m bgl. 5. Borehole completed at the scheduled depth of 15.00m bgl. 6. Borehole backfilled with bentonite on completion. 7. Corrected SPT 'N' values N60 shown in accordance with BS EN 22476 Part 3. 8. Density and strength descriptions are reported in accordance with the guidance stated in BS 5930:2015 incorporating requirements of BS EN ISO 14688-1:2002, BS EN ISO 14688-2:2004 and BS EN ISO 14689-1:2003.	Sample Type Key D - Disturbed Representative B - Bulk Representative S - Spot Non-Representative W - Water U - Undisturbed Representative J - Jar Sample ES - Environmental Sample	Test Type Key (C) - Cone SPT (S) - Spoon SPT P - Pocket Penetrometer Reading PID - PID Reading V - Hand Shear Vane Reading
	Sheet: Sheet 1 of 2	

Exploratory Hole ID: BH01	Client: Mace Limited	OPUS www.opusinternational.co.uk							
Job No: J-M3932.12	Site: Meadow High School	Start Date: 20/12/2016				End Date: 20/12/2016			
Drilling Equipment/ Excavation Method: Cable Percussive Rig		Co-ords: 506442E - 181709N				Backfill Date: 20/12/2016		Field Records: ES	
		Ground Level (mAOD): 32.760				Logged: ES		Chkd: RP Appr: NM	
Strata Description	Depth (m)	Level (m)	Legend	Sample Type	Sample Depth (m)	Tests	Groundwater Records	Backfill Details	
		15.00		D3	10.10	N=26 (S) U Blows=31			
				S7	11.20				
				U3	12.50 - 12.90				
				D4	13.00				
				S8	14.00				
		17.76		S9	14.90	N=30 (S)			
Remarks: 1. Hand excavated service pit to 1.20m bgl. 2. Borehole cased with 150mm casing to 4.40m bgl. 3. Water added from 1.80m to 3.00m bgl - 150 litres. 4. Groundwater strike at 3.00m bgl, slow inflow rate. Groundwater level on completion 2.20m bgl. 5. Borehole completed at the scheduled depth of 15.00m bgl. 6. Borehole backfilled with bentonite on completion. 7. Corrected SPT 'N' values N60 shown in accordance with BS EN 22476 Part 3. 8. Density and strength descriptions are reported in accordance with the guidance stated in BS 5930:2015 incorporating requirements of BS EN ISO 14688-1:2002, BS EN ISO 14688-2:2004 and BS EN ISO 14689-1:2003.									
Sample Type Key D - Disturbed Representative B - Bulk Representative S - Spot Non-Representative W - Water U - Undisturbed Representative J - Jar Sample ES - Environmental Sample						Test Type Key (C) - Cone SPT (S) - Spoon SPT P - Pocket Penetrometer Reading PID - PID Reading V - Hand Shear Vane Reading			
Sheet:						Sheet 2 of 2			

Exploratory Hole ID: BH02	Client: Mace Limited	 www.opusinternational.co.uk						
Job No: J-M3932.12	Site: Meadow High School							
Drilling Equipment/ Excavation Method: Cable Percussive Rig		Co-ords: 506543E - 181693N	Backfill Date: 21/12/2016	Field Records: ES/RP				
Ground Level (mAOD): 33.710		Logged: ES/RP	Chkd: RP	Appr: NM				
Strata Description	Depth (m)	Level (m)	Legend	Sample Type	Sample Depth (m)	Tests	Groundwater Records	Backfill Details
MADE GROUND comprising black sandy fine to coarse, angular flint, concrete, asphalt GRAVEL. Sand is fine to coarse.	0.10	33.61		ES1	0.05			
Firm greenish grey silty sandy organic CLAY with a faint organic odour. Sand is fine to coarse. (ALLUVIUM)	0.80	32.91		B1 ES2 B2	0.20 - 0.50 0.40 0.70 - 1.00			
Firm orange brown gravelly CLAY. Gravel is fine to coarse angular to rounded flint. (LANGLEY SILT MEMBER)	1.80	31.91		B3	1.30 - 1.70	N=37 (C)		
Very dense orange brown SAND and GRAVEL. Sand is fine to coarse. Gravel is fine to coarse, angular to rounded flint. (BOYN HILL GRAVEL MEMBER)	2.80	30.91		B4	2.10 - 2.50	N=68 (C)		
Firm orange brown very gravelly CLAY. Gravel is fine to coarse, angular to rounded flint. (BOYN HILL GRAVEL MEMBER)	3.60	30.11		B5	3.20 - 3.60	N=38 (C)		
Stiff fissured grey CLAY with frequent silt and fine sand partings. (LONDON CLAY FORMATION)	3.90	29.81		D1 U1	3.80 4.00 - 4.40	U Blows=17		
Stiff fissured bluish grey CLAY with frequent silt and fine sand partings. (LONDON CLAY FORMATION)				D2	4.40			
				S4	5.10	N=24 (C)		
				U2	6.50 - 6.90	U Blows=22		
				D3	7.00			
				S5	8.20	N=24 (S)		
				U3	9.60 - 10.00	U Blows=28		
Remarks:		Sample Type Key D - Disturbed Representative B - Bulk Representative S - Spot Non-Representative W - Water U - Undisturbed Representative J - Jar Sample ES - Environmental Sample			Test Type Key (C) - Cone SPT (S) - Spoon SPT P - Pocket Penetrometer Reading PID - PID Reading V - Hand Shear Vane Reading			
1. Hand excavated service pit to 1.20m bgl. 2. Borehole cased with 150mm casing to 4.40m bgl. 3. Water added from 1.80m to 3.10m bgl - 150 litres. 4. Groundwater strike at 3.10m bgl, slow inflow rate. Borehole dry on completion. 5. Borehole completed at the scheduled depth of 15.00m bgl. 6. Monitoring pipe installed to 4.50m bgl, response zone from 1.00m to 4.50m bgl. 7. Corrected SPT 'N' values N60 shown in accordance with BS EN 22476 Part 3. 8. Density and strength descriptions are reported in accordance with the guidance stated in BS 5930:2015 incorporating requirements of BS EN ISO 14688-1:2002, BS EN ISO 14688-2:2004 and BS EN ISO 14689-1:2003.		Sheet:			Sheet 1 of 2			

Exploratory Hole ID: BH02	Client: Mace Limited					OPUS www.opusinternational.co.uk						
Job No: J-M3932.12	Site: Meadow High School											
Drilling Equipment/ Excavation Method: Cable Percussive Rig					Co-ords: 506543E - 181693N		Start Date: 20/12/2016		End Date: 21/12/2016			
					Ground Level (mAOD): 33.710		Backfill Date: 21/12/2016		Field Records: ES/RP			
					Logged: ES/RP		Chkd: RP		Appr: NM			
Strata Description					Depth (m)	Level (m)	Legend	Sample Type	Sample Depth (m)	Tests	Groundwater Records	Backfill Details
					15.00	18.71		D4	10.10	N=27 (S)		
								S6	11.00			
								U4	12.60 - 13.00			
								D5	13.10			
								S7	13.90	N=28 (S)		
					15.00	18.71		S8	15.00	N=30 (S)		
Remarks:					Sample Type Key D - Disturbed Representative B - Bulk Representative S - Spot Non-Representative W - Water U - Undisturbed Representative J - Jar Sample ES - Environmental Sample				Test Type Key (C) - Cone SPT (S) - Spoon SPT P - Pocket Penetrometer Reading PID - PID Reading V - Hand Shear Vane Reading			
1. Hand excavated service pit to 1.20m bgl. 2. Borehole cased with 150mm casing to 4.40m bgl. 3. Water added from 1.80m to 3.10m bgl - 150 litres. 4. Groundwater strike at 3.10m bgl, slow inflow rate. Borehole dry on completion. 5. Borehole completed at the scheduled depth of 15.00m bgl. 6. Monitoring pipe installed to 4.50m bgl, response zone from 1.00m to 4.50m bgl. 7. Corrected SPT 'N' values N60 shown in accordance with BS EN 22476 Part 3. 8. Density and strength descriptions are reported in accordance with the guidance stated in BS 5930:2015 incorporating requirements of BS EN ISO 14688-1:2002, BS EN ISO 14688-2:2004 and BS EN ISO 14689-1:2003.					Sheet: Sheet 2 of 2							

Exploratory Hole ID: BH03	Client: Mace Limited		 www.opusinternational.co.uk									
Job No: J-M3932.12	Site: Meadow High School											
Drilling Equipment/ Excavation Method: Cable Percussive Rig		Co-ords: 506449E - 181638N	Backfill Date: 16/12/2016	End Date: 16/12/2016								
		Ground Level (mAOD): 32.280	Logged: ES	Chkd: RP								
			Field Records: ES									
Strata Description	Depth (m)	Level (m)	Legend	Sample Type	Sample Depth (m)	Tests	Groundwater Records	Backfill Details				
Grass over TOPSOIL comprising soft brown slightly gravelly, slightly sandy CLAY with frequent roots and rootlets. Sand is fine to coarse. Gravel is fine angular flint.	0.20	32.08		ES1	0.10	N=14 (C)						
Soft becoming firm orange brown and brown mottled slightly gravelly CLAY with occasional roots. Gravel is fine to coarse angular to rounded flint. (LANGLEY SILT MEMBER)	1.20	31.08		B1	0.40 - 0.70							
				ES2	0.40							
				B2	0.70 - 1.00							
Firm orange brown gravelly CLAY. Gravel is fine to coarse angular to rounded flint. (LANGLEY SILT MEMBER)	1.80	30.48		B3	1.30 - 1.60	N=44 (C)						
Very dense orange brown SAND and GRAVEL. Sand is fine to coarse. Gravel is fine to coarse, angular to rounded flint. (BOYN HILL GRAVEL MEMBER)	3.80	28.48		B4	2.10 - 2.50							
				B5	3.10 - 3.50							
				Medium dense orange brown clayey fine to coarse angular to rounded GRAVEL. (BOYN HILL GRAVEL MEMBER)	4.40	27.88		B6	4.10 - 4.40	N=26 (C)		
Stiff fissured grey CLAY with frequent silt and fine sand partings. (LONDON CLAY FORMATION)				D1	4.60	U Blows=22						
				U1	5.00 - 5.30							
				D2	5.40							
								S5	6.50	N=21 (S)		
								U2	8.00 - 8.40			
								D3	8.50			
				S6	9.50	N=22 (S)						
Remarks:		Sample Type Key D - Disturbed Representative B - Bulk Representative S - Spot Non-Representative W - Water U - Undisturbed Representative J - Jar Sample ES - Environmental Sample		Test Type Key (C) - Cone SPT (S) - Spoon SPT P - Pocket Penetrometer Reading PID - PID Reading V - Hand Shear Vane Reading								
1. Hand excavated service pit to 1.20m bgl. 2. Borehole cased with 150mm casing to 4.50m bgl. 3. Water added from 2.30m to 3.80m bgl - 150 litres. 4. Groundwater strike at 3.50m bgl, slow inflow rate. Borehole dry on completion. 5. Borehole completed at the scheduled depth of 15.00m bgl. 6. Borehole backfilled with bentonite on completion. 7. Corrected SPT 'N' values N60 shown in accordance with BS EN 22476 Part 3. 8. Density and strength descriptions are reported in accordance with the guidance stated in BS 5930:2015 incorporating requirements of BS EN ISO 14688-1:2002, BS EN ISO 14688-2:2004 and BS EN ISO 14689-1:2003.		Sheet: Sheet 1 of 2										

Exploratory Hole ID: BH03	Client: Mace Limited		OPUS www.opusinternational.co.uk						
Job No: J-M3932.12	Site: Meadow High School								
Drilling Equipment/ Excavation Method: Cable Percussive Rig		Co-ords: 506449E - 181638N		Start Date: 16/12/2016		End Date: 16/12/2016			
		Ground Level (mAOD): 32.280		Backfill Date: 16/12/2016		Field Records: ES			
				Logged: ES		Chkd: RP		Appr: NM	
Strata Description	Depth (m)	Level (m)	Legend	Sample Type	Sample Depth (m)	Tests	Groundwater Records	Backfill Details	
				U3	11.00 - 11.50	U Blows=29			
				D4	11.60				
				D5 S7	12.50	N=27 (S)			
				D6	13.60				
				U4 D7	14.10 - 14.50 14.50	U Blows=31			
	15.00	17.28		S8	15.00	N=29 (S)			
Remarks: 1. Hand excavated service pit to 1.20m bgl. 2. Borehole cased with 150mm casing to 4.50m bgl. 3. Water added from 2.30m to 3.80m bgl - 150 litres. 4. Groundwater strike at 3.50m bgl, slow inflow rate. Borehole dry on completion. 5. Borehole completed at the scheduled depth of 15.00m bgl. 6. Borehole backfilled with bentonite on completion. 7. Corrected SPT 'N' values N60 shown in accordance with BS EN 22476 Part 3. 8. Density and strength descriptions are reported in accordance with the guidance stated in BS 5930:2015 incorporating requirements of BS EN ISO 14688-1:2002, BS EN ISO 14688-2:2004 and BS EN ISO 14689-1:2003.				Sample Type Key D - Disturbed Representative B - Bulk Representative S - Spot Non-Representative W - Water U - Undisturbed Representative J - Jar Sample ES - Environmental Sample			Test Type Key (C) - Cone SPT (S) - Spoon SPT P - Pocket Penetrometer Reading PID - PID Reading V - Hand Shear Vane Reading		
				Sheet: Sheet 2 of 2					

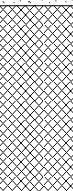
Exploratory Hole ID:	Client: Mace Limited	 OPUS www.opusinternational.co.uk						
BH04	Site: Meadow High School							
Job No:		Start Date:	End Date:					
J-M3932.12		19/12/2016	19/12/2016					
Drilling Equipment/ Excavation Method:	Co-ords:	Backfill Date:	Field Records:					
Cable Percussive Rig	506534E - 181634N	19/12/2016	ES					
	Ground Level (mAOD):	Logged:	Chkd:					
	33.400	ES	RP					
			Appr:					
			NM					
Strata Description	Depth (m)	Level (m)	Legend	Sample Type	Sample Depth (m)	Tests	Groundwater Records	Backfill Details
Grass over TOPSOIL comprising dark brown slightly clayey slightly gravelly fine to medium SAND with frequent roots and rootlets. Gravel is fine to medium subangular to subrounded of flint.	0.40	33.00		ES1	0.20			
Soft becoming firm orange brown and brown mottled slightly gravelly CLAY with occasional roots. Gravel is fine to coarse angular to rounded flint. (LANGLEY SILT MEMBER)	1.10	32.30		B1 ES2 B2	0.40 - 0.70 0.50 0.70 - 1.10	N=26 (C)		
Firm orange brown gravelly CLAY. Gravel is fine to coarse angular to rounded flint. (LANGLEY SILT MEMBER)	1.90	31.50		B3	1.30 - 1.70	N=68 (C)		
Orange brown SAND and GRAVEL. Sand is fine to coarse. Gravel is fine to coarse, angular to rounded flint. (BOYN HILL GRAVEL MEMBER)				B4	2.00 - 2.40	N=65 (C)		
				B5	3.10 - 3.50	N=24 (C)		
				B6	4.00 - 4.30	N=17 (S)		
Orange brown clayey fine to coarse angular to rounded GRAVEL. (BOYN HILL GRAVEL MEMBER)	4.30	29.10		D1	4.30			
Stiff fissured grey CLAY with frequent silt and fine sand partings. (LONDON CLAY FORMATION)	4.50	28.90		S5	4.90			
				U1	6.50	U Blows=25		
				D2	7.00			
				S6	8.00	N=23 (S)		
				U2	9.60 - 10.45	U Blows=27		
Remarks:				Sample Type Key D - Disturbed Representative B - Bulk Representative S - Spot Non-Representative W - Water U - Undisturbed Representative J - Jar Sample ES - Environmental Sample		Test Type Key (C) - Cone SPT (S) - Spoon SPT P - Pocket Penetrometer Reading PID - PID Reading V - Hand Shear Vane Reading		
1. Hand excavated service pit to 1.20m bgl. 2. Borehole cased with 150mm casing to 4.40m bgl. 3. Water added from 2.10m to 3.80m bgl - 150 litres. 4. Groundwater strike at 2.50m bgl, slow inflow rate. Borehole dry on completion. 5. Borehole completed at the scheduled depth of 15.00m bgl. 6. Monitoring pipe installed to 4.50m bgl, response zone from 1.00m to 4.50m bgl. 7. Corrected SPT 'N' values N60 shown in accordance with BS EN 22476 Part 3. 8. Density and strength descriptions are reported in accordance with the guidance stated in BS 5930:2015 incorporating requirements of BS EN ISO 14688-1:2002, BS EN ISO 14688-2:2004 and BS EN ISO 14689-1:2003.				Sheet:		Sheet 1 of 2		

Exploratory Hole ID: BH04	Client: Mace Limited					 www.opusinternational.co.uk						
Job No: J-M3932.12	Site: Meadow High School											
Drilling Equipment/ Excavation Method: Cable Percussive Rig					Co-ords: 506534E - 181634N		Start Date: 19/12/2016		End Date: 19/12/2016			
					Ground Level (mAOD): 33.400		Backfill Date: 19/12/2016		Field Records: ES			
					Logged: ES		Chkd: RP		Appr: NM			
Strata Description					Depth (m)	Level (m)	Legend	Sample Type	Sample Depth (m)	Tests	Groundwater Records	Backfill Details
					15.00	18.40		D3	10.10	N=27 (S) U Blows=29		
								S7	11.10			
								U3	12.50 - 12.95			
								D4	13.00			
								S8	14.10	N=28 (S)		
								S9	15.00	N=30 (S)		
Remarks:					Sample Type Key D - Disturbed Representative B - Bulk Representative S - Spot Non-Representative W - Water U - Undisturbed Representative J - Jar Sample ES - Environmental Sample				Test Type Key (C) - Cone SPT (S) - Spoon SPT P - Pocket Penetrometer Reading PID - PID Reading V - Hand Shear Vane Reading			
1. Hand excavated service pit to 1.20m bgl. 2. Borehole cased with 150mm casing to 4.40m bgl. 3. Water added from 2.10m to 3.80m bgl - 150 litres. 4. Groundwater strike at 2.50m bgl, slow inflow rate. Borehole dry on completion. 5. Borehole completed at the scheduled depth of 15.00m bgl. 6. Monitoring pipe installed to 4.50m bgl, response zone from 1.00m to 4.50m bgl. 7. Corrected SPT 'N' values N60 shown in accordance with BS EN 22476 Part 3. 8. Density and strength descriptions are reported in accordance with the guidance stated in BS 5930:2015 incorporating requirements of BS EN ISO 14688-1:2002, BS EN ISO 14688-2:2004 and BS EN ISO 14689-1:2003.					Sheet: Sheet 2 of 2							

Exploratory Hole ID:	Client: Mace Limited		 www.opusinternational.co.uk	
WS01	Site: Meadow High School			
Job No:	J-M3932.12		Start Date:	End Date:
		19/12/2016		19/12/2016
Drilling Equipment/ Excavation Method:		Co-ords:	Backfill Date:	Field Records:
Tracked Windowless Sampling Rig		506474E - 181696N	19/12/2016	LSB
		Ground Level (mAOD):	Logged:	Chkd:
		33.150	LSB	RP
				Appr:
				NM

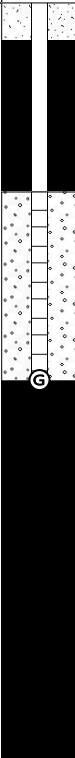
Strata Description	Depth (m)	Level (m)	Legend	Sample Type	Sample Depth (m)	Tests	Groundwater Records	Backfill Details
Grass over TOPSOIL comprising dark brown slightly clayey slightly gravelly fine to medium SAND. Gravel is fine to medium subangular to subrounded of flint.				ES1	0.20			
MADE GROUND comprising orange black brown very gravelly fine to medium SAND. Gravel is fine to coarse angular to subrounded of brick, concrete, sandstone and flint.	0.45	32.70		B1 ES2	0.45 - 0.70 0.50			
MADE GROUND comprising firm grey black slightly silty slightly sandy gravelly CLAY. Gravel is fine to coarse subangular to subrounded of brick and chalk.	0.70	32.45		B2	0.70 - 1.10			
				ES3	1.00			
Soft to firm orange brown slightly sandy CLAY. (LANGLEY SILT MEMBER)	1.10	32.05		ES4 D1	1.20 1.40	N=7 (C)		
Very dense orange brown SAND and GRAVEL. Sand is fine to coarse. Gravel is fine to coarse, angular to subrounded of flint. (BOYN HILL GRAVEL MEMBER)	1.80	31.35		D2	1.90			
	2.00	31.15				N=68 (C)		

Remarks: 1. Hand excavated service pit to 1.20m bgl. 2. Borehole not cased. 4. Borehole dry during and on completion. 5. Borehole abandoned at 2.00m bgl due to refusal. 6. Monitoring pipe installed to 1.00m bgl, response zone from 0.50m to 1.00m bgl. 7. Corrected SPT 'N' values N60 shown in accordance with BS EN 22476 Part 3. 8. Density and strength descriptions are reported in accordance with the guidance stated in BS 5930:2015 incorporating requirements of BS EN ISO 14688-1:2002, BS EN ISO 14688-2:2004 and BS EN ISO 14689-1:2003.	Sample Type Key D - Disturbed Representative B - Bulk Representative S - Spot Non-Representative W - Water U - Undisturbed Representative J - Jar Sample ES - Environmental Sample	Test Type Key (C) - Cone SPT (S) - Spoon SPT P - Pocket Penetrometer Reading PID - PID Reading V - Hand Shear Vane Reading
	Sheet: Sheet 1 of 1	

Exploratory Hole ID: WS02	Client: Mace Limited		 www.opusinternational.co.uk					
Job No: J-M3932.12	Site: Meadow High School							
Drilling Equipment/ Excavation Method: Tracked Windowless Sampling Rig		Co-ords: 506536E - 181731N	Start Date: 19/12/2016	End Date: 19/12/2016				
		Ground Level (mAOD): 33.310	Backfill Date: 19/12/2016	Field Records: LSB				
			Logged: LSB	Chkd: RP				
				Appr: NM				
Strata Description	Depth (m)	Level (m)	Legend	Sample Type	Sample Depth (m)	Tests	Groundwater Records	Backfill Details
MADE GROUND comprising grey CONCRETE.	0.10	33.21		B1 ES1	0.30 - 0.60 0.30	N=26 (C) N=68 (C)		
MADE GROUND comprising grey black medium to coarse subangular GRAVEL of asphalt, concrete and clinker.								
MADE GROUND comprising firm to stiff orange brown sandy very gravelly CLAY. Gravel is fine to coarse subangular to subrounded of brick, flint and chalk.	0.60	32.71		B2	0.60 - 0.90			
Firm orange mottled grey slightly silty sandy CLAY. (LANGLEY SILT MEMBER)	0.90	32.41		ES2 D1	0.90 1.00			
Medium dense, becoming very dense range brown SAND and GRAVEL. Sand is fine to coarse. Gravel is fine to coarse, angular to subrounded of flint. (BOYN HILL GRAVEL MEMBER)	1.20 1.40	32.11 31.91		D2	1.30			
Remarks: 1. Hand excavated service pit to 1.20m bgl. 2. Borehole not cased. 4. Borehole dry during and on completion. 5. Borehole abandoned at 1.40m bgl due to refusal. 6. Borehole backfilled with arisings upon completion. 7. Corrected SPT 'N' values N60 shown in accordance with BS EN 22476 Part 3. 8. Density and strength descriptions are reported in accordance with the guidance stated in BS 5930:2015 incorporating requirements of BS EN ISO 14688-1:2002, BS EN ISO 14688-2:2004 and BS EN ISO 14689-1:2003. Sample Type Key D - Disturbed Representative B - Bulk Representative S - Spot Non-Representative W - Water U - Undisturbed Representative J - Jar Sample ES - Environmental Sample Test Type Key (C) - Cone SPT (S) - Spoon SPT P - Pocket Penetrometer Reading PID - PID Reading V - Hand Shear Vane Reading								
Sheet:						Sheet 1 of 1		

Exploratory Hole ID: WS03	Client: Mace Limited		 www.opusinternational.co.uk					
Job No: J-M3932.12	Site: Meadow High School							
Drilling Equipment/ Excavation Method: Tracked Windowless Sampling Rig		Co-ords: 506470E - 181670N		Start Date: 19/12/2016	End Date: 19/12/2016			
		Ground Level (mAOD): 33.160		Backfill Date: 19/12/2016	Field Records: LSB			
				Logged: LSB	Chkd: RP			
				Appr: NM				
Strata Description	Depth (m)	Level (m)	Legend	Sample Type	Sample Depth (m)	Tests	Groundwater Records	Backfill Details
Grass over TOPSOIL comprising dark brown slightly clayey slightly gravelly fine to medium SAND. Gravel is fine to medium subangular to subrounded of flint.	0.40	32.76		ES1	0.10	N=6 (C)		
MADE GROUND comprising orange brown gravelly fine to medium SAND. Gravel is fine to coarse subangular to subrounded of sandstone and brick.				B1 ES2	0.50 - 0.70 0.50			
Firm orange brown slightly sandy CLAY. (LANGLEY SILT MEMBER)	1.00	32.16	D1 ES3	1.10 1.20				
Very dense orange brown SAND and GRAVEL. Sand is fine to coarse. Gravel is fine to coarse, angular to subrounded of flint. (BOYN HILL GRAVEL MEMBER)	1.80	31.36		D2	1.80			
	2.00	31.16			N=68 (C)			
Remarks:				Sample Type Key D - Disturbed Representative B - Bulk Representative S - Spot Non-Representative W - Water U - Undisturbed Representative J - Jar Sample ES - Environmental Sample		Test Type Key (C) - Cone SPT (S) - Spoon SPT P - Pocket Penetrometer Reading PID - PID Reading V - Hand Shear Vane Reading		
1. Hand excavated service pit to 1.20m bgl. 2. Borehole not cased. 4. Groundwater strike at 2.00m bgl, slow inflow rate. Groundwater level on completion 2.00m bgl. 5. Borehole abandoned at 2.00m bgl due to refusal. 6. Borehole backfilled with arisings upon completion. 7. Corrected SPT 'N' values N60 shown in accordance with BS EN 22476 Part 3. 8. Density and strength descriptions are reported in accordance with the guidance stated in BS 5930:2015 incorporating requirements of BS EN ISO 14688-1:2002, BS EN ISO 14688-2:2004 and BS EN ISO 14689-1:2003.				Sheet: Sheet 1 of 1				

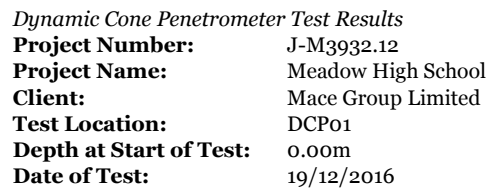
Exploratory Hole ID: WS04	Client: Mace Limited		 www.opusinternational.co.uk	
Job No: J-M3932.12	Site: Meadow High School			
Drilling Equipment/ Excavation Method: Tracked Windowless Sampling Rig		Co-ords: 506491E - 181628N	Start Date: 19/12/2016	End Date: 19/12/2016
		Ground Level (mAOD): 32.570	Backfill Date: 19/12/2016	Field Records: LSB
			Logged: LSB	Chkd: RP
				Appr: NM

Strata Description	Depth (m)	Level (m)	Legend	Sample Type	Sample Depth (m)	Tests	Groundwater Records	Backfill Details
MADE GROUND comprising grey black ASPHALT.	0.10	32.47		ES1	0.20	N=14 (C)		
MADE GROUND comprising grey black sandy fine to coarse angular to subrounded GRAVEL of concrete.	0.40	32.17		B1	0.40 - 0.70			
MADE GROUND comprising firm slightly silty sandy gravelly CLAY. Gravel is fine to coarse subangular to subrounded of brick, flint and chalk.				ES2	0.60			
Firm orange brown slightly sandy CLAY. (LANGLEY SILT MEMBER)	1.00	31.57		ES3	1.10			
Medium dense, becoming very dense orange brown SAND and GRAVEL. Sand is fine to coarse. Gravel is fine to coarse, angular to subrounded of flint. (BOYN HILL GRAVEL MEMBER)	1.20	31.37		D1	1.40			
	2.00	30.57				N=68 (C)		

Remarks: 1. Hand excavated service pit to 1.20m bgl. 2. Borehole not cased. 4. Groundwater strike at 1.70m bgl, slow inflow rate. Groundwater level on completion 1.70m bgl. 5. Borehole abandoned at 2.00m bgl due to refusal. 6. Monitoring pipe installed to 1.00m bgl, response zone from 0.50m to 1.00m bgl. 7. Corrected SPT 'N' values N60 shown in accordance with BS EN 22476 Part 3. 8. Density and strength descriptions are reported in accordance with the guidance stated in BS 5930:2015 incorporating requirements of BS EN ISO 14688-1:2002, BS EN ISO 14688-2:2004 and BS EN ISO 14689-1:2003.	Sample Type Key D - Disturbed Representative B - Bulk Representative S - Spot Non-Representative W - Water U - Undisturbed Representative J - Jar Sample ES - Environmental Sample	Test Type Key (C) - Cone SPT (S) - Spoon SPT P - Pocket Penetrometer Reading PID - PID Reading V - Hand Shear Vane Reading
	Sheet: Sheet 1 of 1	

APPENDIX C

TRL DCP Test Results

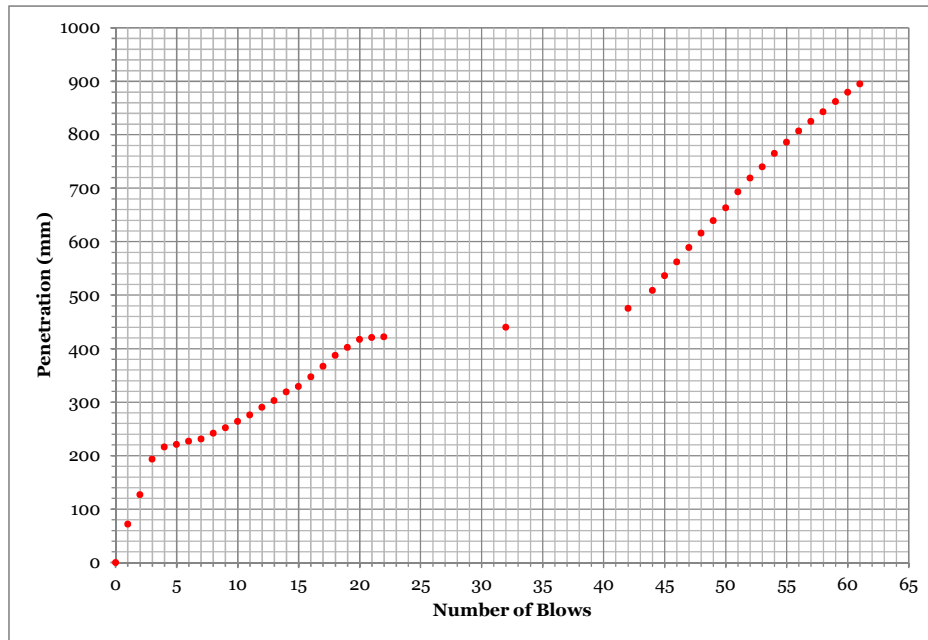
[illegible][illegible]



Dynamic Cone Penetrometer Test Results

Project Number: J-M3932.12
Project Name: Meadow High School
Client: Mace Group Limited
Test Location: DCP01
Depth at Start of Test: 0.00m
Date of Test: 19/12/2016

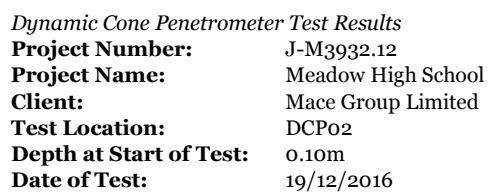
Blows vs Penetration Graph



Range Top	Range Bottom	Blow count	CBR(%)	Stratum
0	216	4	4.45512	Clayey gravelly SAND
216	417	16	20.8102	Clayey gravelly SAND
417	475	22	108.392	Clayey gravelly SAND
475	895	19	11.4516	Gravelly SAND

Notes

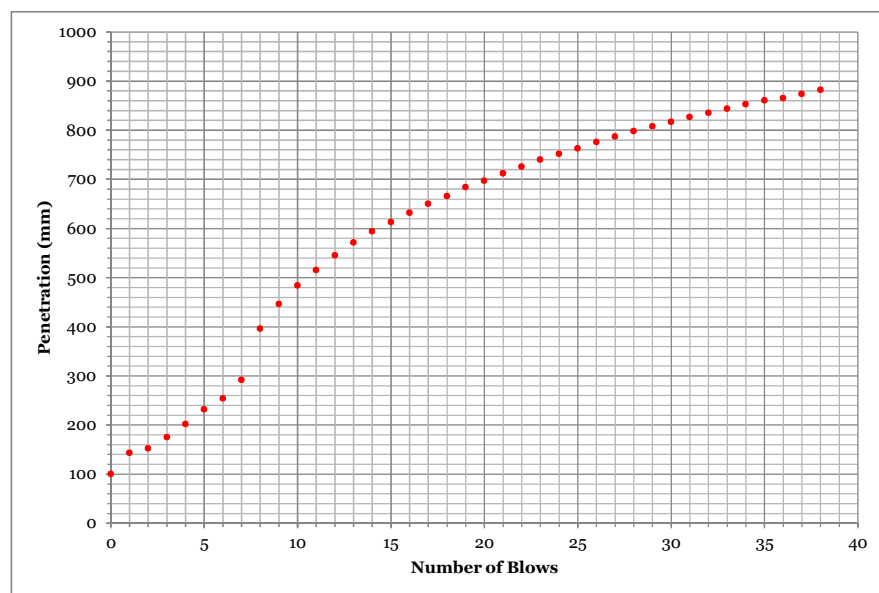
Test commenced from ground level.

[illegible][illegible]



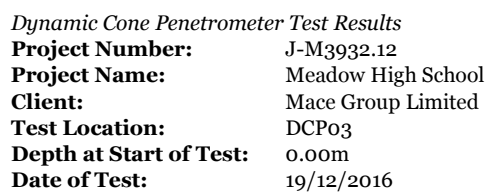
Dynamic Cone Penetrometer Test Results
Project Number: J-M3932.12
Project Name: Meadow High School
Client: Mace Group Limited
Test Location: DCP02
Depth at Start of Test: 0.10m
Date of Test: 19/12/2016

Blows vs Penetration Graph



Range Top	Range Bottom	Blow count	CBR(%)	Stratum
100	292	7	9.11631	GRAVEL
292	484	3	3.72278	GRAVEL
484	882	28	18.2629	GRAVEL and sandy gravelly CLAY

Notes
Test commenced at 0.1m bgl following breaking out of hardstanding.

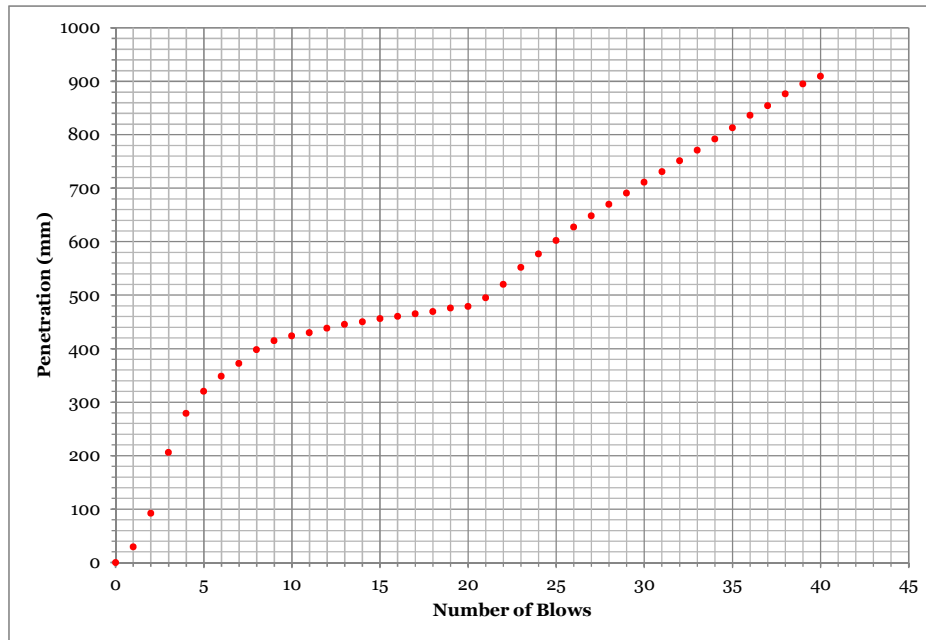
[illegible][illegible]



Dynamic Cone Penetrometer Test Results

Project Number: J-M3932.12
Project Name: Meadow High School
Client: Mace Group Limited
Test Location: DCP03
Depth at Start of Test: 0.00m
Date of Test: 19/12/2016

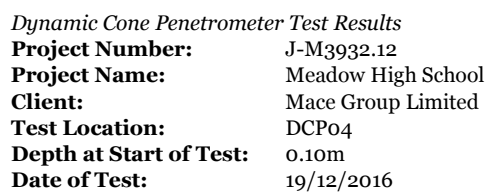
Blows vs Penetration Graph



Range Top	Range Bottom	Blow count	CBR(%)	Stratum
0	398	8	4.85836	Clayey gravelly SAND
398	479	12	40.126	Gravelly SAND
479	909	20	11.7927	Gravelly SAND

Notes

Test commenced from ground level.

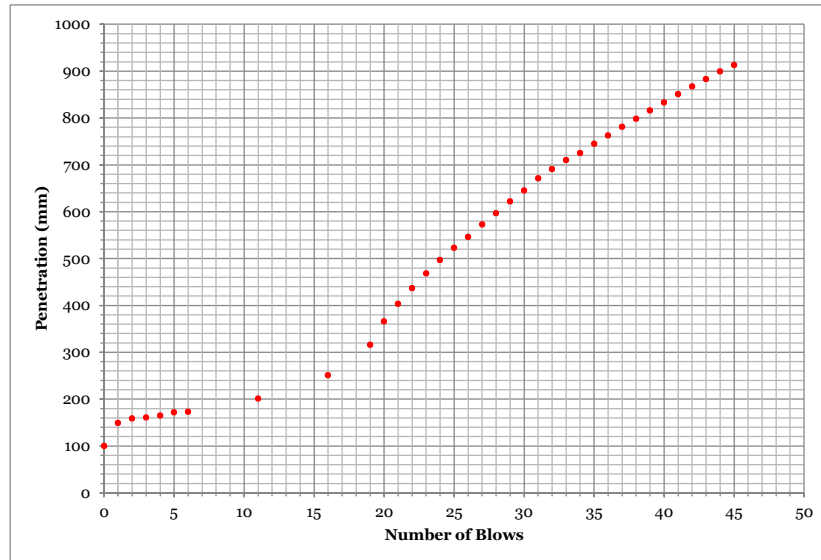
[illegible][illegible]



Dynamic Cone Penetrometer Test Results

Project Number: J-M3932.12
Project Name: Meadow High School
Client: Mace Group Limited
Test Location: DCP04
Depth at Start of Test: 0.10m
Date of Test: 19/12/2016

Blows vs Penetration Graph



Range Top	Range Bottom	Blow count	CBR(%)	Stratum
100	149	1	4.937	Sandy GRAVEL
149	173	5	57.5345	Sandy GRAVEL
173	251	10	34.4394	Sandy GRAVEL
251	913	29	11.069	Sandy GRAVEL and silty sandy gravelly CLAY

Notes
Test commenced at 0.1m bgl following breaking out of hardstanding.

APPENDIX D

Chemical Analysis Results

**Emma Small**

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e: reception@i2analytical.com

e: Emma.Small@opusinternational.co.uk

Analytical Report Number : 16-35834

Project / Site name:	Meadow School	Samples received on:	16/12/2016
Your job number:	J-M3932.12	Samples instructed on:	16/12/2016
Your order number:	MK PO 20615	Analysis completed by:	23/12/2016
Report Issue Number:	1	Report issued on:	23/12/2016
Samples Analysed:	1 soil sample		

Signed:

Rexona Rahman
Reporting Manager
For & on behalf of i2 Analytical Ltd.

Signed:

Emma Winter
Assistant Reporting Manager
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :	soils	- 4 weeks from reporting
	leachates	- 2 weeks from reporting
	waters	- 2 weeks from reporting
	asbestos	- 6 months from reporting

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Analytical Report Number: 16-35834

Project / Site name: Meadow School

Your Order No: MK PO 20615

Lab Sample Number				675863				
Sample Reference				BH03				
Sample Number				None Supplied				
Depth (m)				0.10				
Date Sampled				16/12/2016				
Time Taken				0900				
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1				
Moisture Content	%	N/A	NONE	19				
Total mass of sample received	kg	0.001	NONE	0.96				

Asbestos in Soil	Type	N/A	ISO 17025	Not-detected				
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General Inorganics

pH - Automated	pH Units	N/A	MCERTS	7.6				
Free Cyanide	mg/kg	1	MCERTS	< 1				
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.039				
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	38.7				
Total Sulphur	%	0.005	MCERTS	0.031				

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0				
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Heavy Metals / Metalloids

Antimony (aqua regia extractable)	mg/kg	1	ISO 17025	< 1.0				
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	15				
Barium (aqua regia extractable)	mg/kg	1	MCERTS	67				
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	0.58				
Boron (water soluble)	mg/kg	0.2	MCERTS	1.3				
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2				
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0				
Chromium (III)	mg/kg	1	NONE	21				
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	23				
Copper (aqua regia extractable)	mg/kg	1	MCERTS	22				
Iron (aqua regia extractable)	mg/kg	40	MCERTS	20000				
Lead (aqua regia extractable)	mg/kg	1	MCERTS	52				
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	0.6				
Molybdenum (aqua regia extractable)	mg/kg	0.25	MCERTS	0.95				
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	13				
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0				
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	31				
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	48				

Analytical Report Number: 16-35834

Project / Site name: Meadow School

Your Order No: MK PO 20615

Lab Sample Number				675863				
Sample Reference				BH03				
Sample Number				None Supplied				
Depth (m)				0.10				
Date Sampled				16/12/2016				
Time Taken				0900				
Analytical Parameter (Soil Analysis)				Units	Limit of detection	Accreditation Status		

Monoaromatics

Benzene	ug/kg	1	MCERTS	< 1.0				
Toluene	ug/kg	1	MCERTS	< 1.0				
Ethylbenzene	ug/kg	1	MCERTS	< 1.0				
p & m-xylene	ug/kg	1	MCERTS	< 1.0				
o-xylene	ug/kg	1	MCERTS	< 1.0				
MTBE (Methyl Tertiary Butyl Ether)	ug/kg	1	MCERTS	< 1.0				

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.1	MCERTS	< 0.1				
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.1	MCERTS	< 0.1				
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.1	MCERTS	< 0.1				
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0				
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0				
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	< 8.0				
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	< 8.0				
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	< 10				

TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.1	MCERTS	< 0.1				
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.1	MCERTS	< 0.1				
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.1	MCERTS	< 0.1				
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0				
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0				
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	< 10				
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	< 10				
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	< 10				

Analytical Report Number: 16-35834

Project / Site name: Meadow School

Your Order No: MK PO 20615

Lab Sample Number				675863				
Sample Reference				BH03				
Sample Number				None Supplied				
Depth (m)				0.10				
Date Sampled				16/12/2016				
Time Taken				0900				
Analytical Parameter (Soil Analysis)				Units	Limit of detection	Accreditation Status		

VOCs

Chloromethane	µg/kg	1	ISO 17025	< 1.0				
Chloroethane	µg/kg	1	NONE	< 1.0				
Bromomethane	µg/kg	1	ISO 17025	< 1.0				
Vinyl Chloride	µg/kg	1	NONE	< 1.0				
Trichlorofluoromethane	µg/kg	1	NONE	< 1.0				
1,1-Dichloroethene	µg/kg	1	NONE	< 1.0				
1,1,2-Trichloro 1,2,2-Trifluoroethane	µg/kg	1	ISO 17025	< 1.0				
Cis-1,2-dichloroethene	µg/kg	1	MCERTS	< 1.0				
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	< 1.0				
1,1-Dichloroethane	µg/kg	1	MCERTS	< 1.0				
2,2-Dichloropropane	µg/kg	1	MCERTS	< 1.0				
Trichloromethane	µg/kg	1	MCERTS	< 1.0				
1,1,1-Trichloroethane	µg/kg	1	MCERTS	< 1.0				
1,2-Dichloroethane	µg/kg	1	MCERTS	< 1.0				
1,1-Dichloropropene	µg/kg	1	MCERTS	< 1.0				
Trans-1,2-dichloroethene	µg/kg	1	NONE	< 1.0				
Benzene	µg/kg	1	MCERTS	< 1.0				
Tetrachloromethane	µg/kg	1	MCERTS	< 1.0				
1,2-Dichloropropane	µg/kg	1	MCERTS	< 1.0				
Trichloroethene	µg/kg	1	MCERTS	< 1.0				
Dibromomethane	µg/kg	1	MCERTS	< 1.0				
Bromodichloromethane	µg/kg	1	MCERTS	< 1.0				
Cis-1,3-dichloropropene	µg/kg	1	ISO 17025	< 1.0				
Trans-1,3-dichloropropene	µg/kg	1	ISO 17025	< 1.0				
Toluene	µg/kg	1	MCERTS	< 1.0				
1,1,2-Trichloroethane	µg/kg	1	MCERTS	< 1.0				
1,3-Dichloropropane	µg/kg	1	ISO 17025	< 1.0				
Dibromochloromethane	µg/kg	1	ISO 17025	< 1.0				
Tetrachloroethene	µg/kg	1	NONE	< 1.0				
1,2-Dibromoethane	µg/kg	1	ISO 17025	< 1.0				
Chlorobenzene	µg/kg	1	MCERTS	< 1.0				
1,1,1,2-Tetrachloroethane	µg/kg	1	MCERTS	< 1.0				
Ethylbenzene	µg/kg	1	MCERTS	< 1.0				
p & m-Xylene	µg/kg	1	MCERTS	< 1.0				
Styrene	µg/kg	1	MCERTS	< 1.0				
Tribromomethane	µg/kg	1	NONE	< 1.0				
o-Xylene	µg/kg	1	MCERTS	< 1.0				
1,1,2,2-Tetrachloroethane	µg/kg	1	MCERTS	< 1.0				
Isopropylbenzene	µg/kg	1	MCERTS	< 1.0				
Bromobenzene	µg/kg	1	MCERTS	< 1.0				
n-Propylbenzene	µg/kg	1	ISO 17025	< 1.0				
2-Chlorotoluene	µg/kg	1	MCERTS	< 1.0				
4-Chlorotoluene	µg/kg	1	MCERTS	< 1.0				
1,3,5-Trimethylbenzene	µg/kg	1	ISO 17025	< 1.0				
tert-Butylbenzene	µg/kg	1	MCERTS	< 1.0				
1,2,4-Trimethylbenzene	µg/kg	1	ISO 17025	< 1.0				
sec-Butylbenzene	µg/kg	1	MCERTS	< 1.0				
1,3-Dichlorobenzene	µg/kg	1	ISO 17025	< 1.0				
p-Isopropyltoluene	µg/kg	1	ISO 17025	< 1.0				
1,2-Dichlorobenzene	µg/kg	1	MCERTS	< 1.0				
1,4-Dichlorobenzene	µg/kg	1	MCERTS	< 1.0				
Butylbenzene	µg/kg	1	MCERTS	< 1.0				
1,2-Dibromo-3-chloropropane	µg/kg	1	ISO 17025	< 1.0				
1,2,4-Trichlorobenzene	µg/kg	1	MCERTS	< 1.0				
Hexachlorobutadiene	µg/kg	1	MCERTS	< 1.0				
1,2,3-Trichlorobenzene	µg/kg	1	ISO 17025	< 1.0				



Analytical Report Number : 16-35834

Project / Site name: Meadow School

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
675863	BH03	None Supplied	0.10	Brown loam and clay with gravel and vegetation.

Analytical Report Number : 16-35834

Project / Site name: Meadow School

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with disperion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES.	In-house method based on Second Site Properties version 3	L038-PL	D	MCERTS
BTEX and MTBE in soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS
Cations in soil by ICP-OES	Determination of cations in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Cr (III) in soil	In-house method by calculation from total Cr and Cr VI.	In-house method by calculation	L080-PL	W	NONE
Free cyanide in soil	Determination of free cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
Hexavalent chromium in soil	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazine followed by colorimetry.	In-house method	L080-PL	W	MCERTS
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Moisture Content	Moisture content, determined gravimetrically.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L019-UK/PL	W	NONE
Monohydric phenols in soil	Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L099-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests, 2:1 water:soil extraction, analysis by ICP-OES.	L038-PL	D	MCERTS
Total Sulphur in soil as %	Determination of total sulphur in soil by extraction with aqua-regia, potassium bromide/bromate followed by ICP-OES.	In-house method based on BS1377 Part 3, 1990, and MEWAM 2006 Methods for the Determination of Metals in Soil	L038	W	MCERTS
TPHCWG (Soil)	Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method	L076-PL	W	MCERTS
Volatile organic compounds in soil	Determination of volatile organic compounds in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.

For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.

Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

Iss No 16-35834-1 Meadow School J-M3932.12

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The results included within the report are representative of the samples submitted for analysis.

Page 6 of 6

**Emma Small**

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f: 01923 237404
e: reception@i2analytical.com

Analytical Report Number : 16-35980

Project / Site name:	Meadow High School	Samples received on:	19/12/2016
Your job number:	J-M3932.12	Samples instructed on:	19/12/2016
Your order number:	MK PO 20615	Analysis completed by:	28/12/2016
Report Issue Number:	1	Report issued on:	28/12/2016
Samples Analysed:	10 leachate samples - 12 soil samples		

Signed:

Rexona Rahman
Reporting Manager
For & on behalf of i2 Analytical Ltd.

Signed:

Emma Winter
Assistant Reporting Manager
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :	soils	- 4 weeks from reporting
	leachates	- 2 weeks from reporting
	waters	- 2 weeks from reporting
	asbestos	- 6 months from reporting

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Analytical Report Number: 16-35980

Project / Site name: Meadow High School

Your Order No: MK PO 20615

Lab Sample Number				676858	676859	676860	676861	676862
Sample Reference				WS01 ES2	WS01 ES3	WS02 ES1	WS02 ES2	WS03 ES2
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.50	1.00	0.30	0.90	0.50
Date Sampled				19/12/2016	19/12/2016	19/12/2016	19/12/2016	19/12/2016
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	N/A	NONE	20	20	14	17	16
Total mass of sample received	kg	0.001	NONE	0.89	1.1	0.81	1.0	0.98

Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected	Not-detected	Not-detected
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General Inorganics

pH - Automated	pH Units	N/A	MCERTS	9.9	8.2	9.5	8.2	8.6
Free Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1	< 1	< 1
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.12	0.20	0.21	0.051	0.15
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	119	205	215	51.0	145
Total Sulphur	%	0.005	MCERTS	0.057	0.072	0.071	0.010	0.064

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
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Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	0.31	0.23	3.9	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.1	MCERTS	0.20	< 0.10	0.37	< 0.10	< 0.10
Acenaphthene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	0.36	< 0.10	< 0.10
Fluorene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	0.65	< 0.10	< 0.10
Phenanthrene	mg/kg	0.1	MCERTS	1.8	0.50	4.1	< 0.10	< 0.10
Anthracene	mg/kg	0.1	MCERTS	0.47	< 0.10	0.82	< 0.10	< 0.10
Fluoranthene	mg/kg	0.1	MCERTS	4.1	0.95	6.3	< 0.10	0.54
Pyrene	mg/kg	0.1	MCERTS	4.7	0.94	7.3	< 0.10	0.55
Benzo(a)anthracene	mg/kg	0.1	MCERTS	2.1	0.42	2.0	< 0.10	0.40
Chrysene	mg/kg	0.05	MCERTS	2.0	0.37	2.3	< 0.05	0.40
Benzo(b)fluoranthene	mg/kg	0.1	MCERTS	4.1	0.61	3.2	< 0.10	0.48
Benzo(k)fluoranthene	mg/kg	0.1	MCERTS	2.5	0.31	2.2	< 0.10	0.44
Benzo(a)pyrene	mg/kg	0.1	MCERTS	5.0	0.58	3.8	< 0.10	0.51
Indeno(1,2,3-cd)pyrene	mg/kg	0.1	MCERTS	3.9	0.54	3.2	< 0.10	0.45
Dibenz(a,h)anthracene	mg/kg	0.1	MCERTS	0.43	< 0.10	0.34	< 0.10	< 0.10
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	4.9	0.68	4.5	< 0.05	0.48

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	1.6	MCERTS	36.4	6.13	45.2	< 1.60	4.25
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Heavy Metals / Metalloids

Antimony (aqua regia extractable)	mg/kg	1	ISO 17025	1.1	< 1.0	< 1.0	< 1.0	< 1.0
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	11	10	7.9	11	12
Barium (aqua regia extractable)	mg/kg	1	MCERTS	120	90	83	77	58
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	0.84	0.91	1.1	0.70	0.51
Boron (water soluble)	mg/kg	0.2	MCERTS	1.2	7.2	0.6	0.4	0.7
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	0.2	< 0.2	< 0.2	0.4	11
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
Chromium (III)	mg/kg	1	NONE	22	26	21	29	23
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	24	28	21	29	23
Copper (aqua regia extractable)	mg/kg	1	MCERTS	69	44	100	13	19
Iron (aqua regia extractable)	mg/kg	40	MCERTS	21000	20000	17000	27000	17000
Lead (aqua regia extractable)	mg/kg	1	MCERTS	320	87	38	14	45
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	0.3	< 0.3	< 0.3	< 0.3
Molybdenum (aqua regia extractable)	mg/kg	0.25	MCERTS	2.1	1.3	4.3	0.79	0.89
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	30	21	41	14	15
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	48	42	45	53	37
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	90	67	32	32	57

Analytical Report Number: 16-35980

Project / Site name: Meadow High School

Your Order No: MK PO 20615

Lab Sample Number				676858	676859	676860	676861	676862
Sample Reference				WS01 ES2	WS01 ES3	WS02 ES1	WS02 ES2	WS03 ES2
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.50	1.00	0.30	0.90	0.50
Date Sampled				19/12/2016	19/12/2016	19/12/2016	19/12/2016	19/12/2016
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					

Monoaromatics

Benzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
p & m-xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
o-xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	1.3	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	8.5	< 2.0	< 2.0	< 2.0	< 2.0
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	26	< 8.0	< 8.0	< 8.0	< 8.0
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	130	< 8.0	< 8.0	< 8.0	< 8.0
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	170	< 10	< 10	< 10	< 10

TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	< 1.0	4.0	< 1.0	< 1.0
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	7.3	< 2.0	6.4	< 2.0	3.3
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	41	< 10	19	< 10	< 10
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	240	17	24	< 10	15
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	290	21	54	< 10	24



Analytical Report Number: 16-35980

Project / Site name: Meadow High School

Your Order No: MK PO 20615

Lab Sample Number				676858	676859	676860	676861	676862
Sample Reference				WS01 ES2	WS01 ES3	WS02 ES1	WS02 ES2	WS03 ES2
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.50	1.00	0.30	0.90	0.50
Date Sampled				19/12/2016	19/12/2016	19/12/2016	19/12/2016	19/12/2016
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					

VOCs

Chloromethane	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloroethane	µg/kg	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromomethane	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Vinyl Chloride	µg/kg	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trichlorofluoromethane	µg/kg	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethene	µg/kg	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,2-Trichloro 1,2,2-Trifluoroethane	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Cis-1,2-dichloroethene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethane	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2,2-Dichloropropane	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trichloromethane	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,1-Trichloroethane	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloroethane	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloropropene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trans-1,2-dichloroethene	µg/kg	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Benzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Tetrachloromethane	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloropropane	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trichloroethene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Dibromomethane	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromodichloromethane	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Cis-1,3-dichloropropene	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trans-1,3-dichloropropene	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,2-Trichloroethane	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,3-Dichloropropane	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Dibromochloromethane	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Tetrachloroethene	µg/kg	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dibromoethane	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chlorobenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,1,2-Tetrachloroethane	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
p & m-Xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Styrene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Tribromomethane	µg/kg	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
o-Xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,2,2-Tetrachloroethane	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Isopropylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromobenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
n-Propylbenzene	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2-Chlorotoluene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
4-Chlorotoluene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,3,5-Trimethylbenzene	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
tert-Butylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2,4-Trimethylbenzene	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
sec-Butylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,3-Dichlorobenzene	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
p-Isopropyltoluene	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichlorobenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,4-Dichlorobenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Butylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dibromo-3-chloropropane	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2,4-Trichlorobenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Hexachlorobutadiene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2,3-Trichlorobenzene	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

Analytical Report Number: 16-35980

Project / Site name: Meadow High School

Your Order No: MK PO 20615

Lab Sample Number				676863	676864	676865	676866	676867
Sample Reference				WS03 ES3	WS04 ES1	WS04 ES2	BH01 ES1	BH01 ES2
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.20	0.20	0.60	0.10	0.50
Date Sampled				19/12/2016	19/12/2016	19/12/2016	19/12/2016	19/12/2016
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	N/A	NONE	19	5.3	16	21	18
Total mass of sample received	kg	0.001	NONE	1.0	0.82	1.1	0.95	1.2

Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected	Not-detected	Not-detected
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General Inorganics

pH - Automated	pH Units	N/A	MCERTS	8.1	8.2	7.3	7.0	7.8
Free Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1	< 1	< 1
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.085	0.024	0.020	0.019	0.042
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	85.2	24.2	19.6	19.2	41.5
Total Sulphur	%	0.005	MCERTS	0.011	0.045	0.019	0.050	0.013

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
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Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	-
Acenaphthylene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	-
Acenaphthene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	-
Fluorene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	-
Phenanthrene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	0.30	-
Anthracene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	-
Fluoranthene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	0.76	-
Pyrene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	0.65	-
Benzo(a)anthracene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	0.41	-
Chrysene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	0.35	-
Benzo(b)fluoranthene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	0.40	-
Benzo(k)fluoranthene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	0.22	-
Benzo(a)pyrene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	0.36	-
Indeno(1,2,3-cd)pyrene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	0.27	-
Dibenz(a,h)anthracene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	-
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	0.32	-

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	1.6	MCERTS	< 1.60	< 1.60	< 1.60	4.04	-
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Heavy Metals / Metalloids

Antimony (aqua regia extractable)	mg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	13	5.0	9.3	12	15
Barium (aqua regia extractable)	mg/kg	1	MCERTS	85	89	76	84	100
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	0.96	< 0.06	0.66	0.72	1.3
Boron (water soluble)	mg/kg	0.2	MCERTS	0.5	0.6	1.2	1.4	1.4
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	0.3	< 0.2	0.2	< 0.2
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
Chromium (III)	mg/kg	1	NONE	36	11	25	24	34
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	36	11	26	24	34
Copper (aqua regia extractable)	mg/kg	1	MCERTS	18	13	19	25	22
Iron (aqua regia extractable)	mg/kg	40	MCERTS	35000	10000	23000	22000	34000
Lead (aqua regia extractable)	mg/kg	1	MCERTS	15	9.0	40	72	27
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Molybdenum (aqua regia extractable)	mg/kg	0.25	MCERTS	0.91	0.54	0.74	0.95	0.85
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	22	6.0	15	15	26
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	53	18	40	40	57
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	48	39	45	65	60

Analytical Report Number: 16-35980

Project / Site name: Meadow High School

Your Order No: MK PO 20615

Lab Sample Number				676863	676864	676865	676866	676867
Sample Reference				WS03 ES3	WS04 ES1	WS04 ES2	BH01 ES1	BH01 ES2
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.20	0.20	0.60	0.10	0.50
Date Sampled				19/12/2016	19/12/2016	19/12/2016	19/12/2016	19/12/2016
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Monoaromatics								
Benzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
p & m-xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
o-xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Petroleum Hydrocarbons								
TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	1.1	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	5.3	< 2.0	< 2.0	< 2.0
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	< 8.0	17	< 8.0	< 8.0	< 8.0
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	< 8.0	90	< 8.0	< 8.0	< 8.0
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	< 10	110	< 10	< 10	< 10
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	7.1	< 2.0	< 2.0	< 2.0
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	< 10	26	< 10	< 10	< 10
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	< 10	190	< 10	< 10	< 10
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	< 10	230	< 10	10	< 10



Analytical Report Number: 16-35980

Project / Site name: Meadow High School

Your Order No: MK PO 20615

Lab Sample Number				676863	676864	676865	676866	676867
Sample Reference				WS03 ES3	WS04 ES1	WS04 ES2	BH01 ES1	BH01 ES2
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.20	0.20	0.60	0.10	0.50
Date Sampled				19/12/2016	19/12/2016	19/12/2016	19/12/2016	19/12/2016
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
VOCs								
Chloromethane	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloroethane	µg/kg	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromomethane	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Vinyl Chloride	µg/kg	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trichlorofluoromethane	µg/kg	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethene	µg/kg	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,2-Trichloro 1,2,2-Trifluoroethane	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Cis-1,2-dichloroethene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethane	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2,2-Dichloropropane	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trichloromethane	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,1-Trichloroethane	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloroethane	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloropropene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trans-1,2-dichloroethene	µg/kg	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Benzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Tetrachloromethane	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloropropane	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trichloroethene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Dibromomethane	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromodichloromethane	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Cis-1,3-dichloropropene	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trans-1,3-dichloropropene	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,2-Trichloroethane	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,3-Dichloropropane	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Dibromochloromethane	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Tetrachloroethene	µg/kg	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dibromoethane	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chlorobenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,1,2-Tetrachloroethane	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
p & m-Xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Styrene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Tribromomethane	µg/kg	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
o-Xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,2,2-Tetrachloroethane	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Isopropylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromobenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
n-Propylbenzene	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2-Chlorotoluene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
4-Chlorotoluene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,3,5-Trimethylbenzene	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
tert-Butylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2,4-Trimethylbenzene	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
sec-Butylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,3-Dichlorobenzene	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
p-Isopropyltoluene	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichlorobenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,4-Dichlorobenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Butylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dibromo-3-chloropropane	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2,4-Trichlorobenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Hexachlorobutadiene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2,3-Trichlorobenzene	µg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

Analytical Report Number: 16-35980

Project / Site name: Meadow High School

Your Order No: MK PO 20615

Lab Sample Number				676868	676869			
Sample Reference				BH04 ES1	BH04 ES2			
Sample Number				None Supplied	None Supplied			
Depth (m)				0.20	0.50			
Date Sampled				19/12/2016	19/12/2016			
Time Taken				None Supplied	None Supplied			
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1	< 0.1			
Moisture Content	%	N/A	NONE	14	13			
Total mass of sample received	kg	0.001	NONE	1.0	0.94			

Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected			
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General Inorganics

pH - Automated	pH Units	N/A	MCERTS	7.2	7.8			
Free Cyanide	mg/kg	1	MCERTS	< 1	< 1			
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.017	0.015			
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	17.4	14.9			
Total Sulphur	%	0.005	MCERTS	0.021	0.009			

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0			
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Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	-			
Acenaphthylene	mg/kg	0.1	MCERTS	< 0.10	-			
Acenaphthene	mg/kg	0.1	MCERTS	< 0.10	-			
Fluorene	mg/kg	0.1	MCERTS	< 0.10	-			
Phenanthrene	mg/kg	0.1	MCERTS	< 0.10	-			
Anthracene	mg/kg	0.1	MCERTS	< 0.10	-			
Fluoranthene	mg/kg	0.1	MCERTS	< 0.10	-			
Pyrene	mg/kg	0.1	MCERTS	< 0.10	-			
Benzo(a)anthracene	mg/kg	0.1	MCERTS	< 0.10	-			
Chrysene	mg/kg	0.05	MCERTS	< 0.05	-			
Benzo(b)fluoranthene	mg/kg	0.1	MCERTS	< 0.10	-			
Benzo(k)fluoranthene	mg/kg	0.1	MCERTS	< 0.10	-			
Benzo(a)pyrene	mg/kg	0.1	MCERTS	< 0.10	-			
Indeno(1,2,3-cd)pyrene	mg/kg	0.1	MCERTS	< 0.10	-			
Dibenz(a,h)anthracene	mg/kg	0.1	MCERTS	< 0.10	-			
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	-			

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	1.6	MCERTS	< 1.60	-			
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Heavy Metals / Metalloids

Antimony (aqua regia extractable)	mg/kg	1	ISO 17025	< 1.0	< 1.0			
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	9.6	14			
Barium (aqua regia extractable)	mg/kg	1	MCERTS	88	66			
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	0.63	0.79			
Boron (water soluble)	mg/kg	0.2	MCERTS	3.8	0.6			
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	0.3	< 0.2			
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	< 4.0			
Chromium (III)	mg/kg	1	NONE	27	37			
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	28	37			
Copper (aqua regia extractable)	mg/kg	1	MCERTS	30	18			
Iron (aqua regia extractable)	mg/kg	40	MCERTS	23000	37000			
Lead (aqua regia extractable)	mg/kg	1	MCERTS	68	17			
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3			
Molybdenum (aqua regia extractable)	mg/kg	0.25	MCERTS	0.95	0.52			
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	16	19			
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0			
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	37	52			
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	86	74			

Analytical Report Number: 16-35980

Project / Site name: Meadow High School

Your Order No: MK PO 20615

Lab Sample Number				676868	676869			
Sample Reference				BH04 ES1	BH04 ES2			
Sample Number				None Supplied	None Supplied			
Depth (m)				0.20	0.50			
Date Sampled				19/12/2016	19/12/2016			
Time Taken				None Supplied	None Supplied			
Analytical Parameter (Soil Analysis)				Units	Limit of detection	Accreditation Status		
Monoaromatics								
Benzene				ug/kg	1	MCERTS	< 1.0	< 1.0
Toluene				ug/kg	1	MCERTS	< 1.0	< 1.0
Ethylbenzene				ug/kg	1	MCERTS	< 1.0	< 1.0
p & m-xylene				ug/kg	1	MCERTS	< 1.0	< 1.0
o-xylene				ug/kg	1	MCERTS	< 1.0	< 1.0
MTBE (Methyl Tertiary Butyl Ether)				ug/kg	1	MCERTS	< 1.0	< 1.0
Petroleum Hydrocarbons								
TPH-CWG - Aliphatic >EC5 - EC6				mg/kg	0.1	MCERTS	< 0.1	< 0.1
TPH-CWG - Aliphatic >EC6 - EC8				mg/kg	0.1	MCERTS	< 0.1	< 0.1
TPH-CWG - Aliphatic >EC8 - EC10				mg/kg	0.1	MCERTS	< 0.1	< 0.1
TPH-CWG - Aliphatic >EC10 - EC12				mg/kg	1	MCERTS	< 1.0	< 1.0
TPH-CWG - Aliphatic >EC12 - EC16				mg/kg	2	MCERTS	2.0	< 2.0
TPH-CWG - Aliphatic >EC16 - EC21				mg/kg	8	MCERTS	< 8.0	< 8.0
TPH-CWG - Aliphatic >EC21 - EC35				mg/kg	8	MCERTS	< 8.0	< 8.0
TPH-CWG - Aliphatic (EC5 - EC35)				mg/kg	10	MCERTS	10	< 10
TPH-CWG - Aromatic >EC5 - EC7				mg/kg	0.1	MCERTS	< 0.1	< 0.1
TPH-CWG - Aromatic >EC7 - EC8				mg/kg	0.1	MCERTS	< 0.1	< 0.1
TPH-CWG - Aromatic >EC8 - EC10				mg/kg	0.1	MCERTS	< 0.1	< 0.1
TPH-CWG - Aromatic >EC10 - EC12				mg/kg	1	MCERTS	< 1.0	1.7
TPH-CWG - Aromatic >EC12 - EC16				mg/kg	2	MCERTS	3.3	5.9
TPH-CWG - Aromatic >EC16 - EC21				mg/kg	10	MCERTS	15	< 10
TPH-CWG - Aromatic >EC21 - EC35				mg/kg	10	MCERTS	17	< 10
TPH-CWG - Aromatic (EC5 - EC35)				mg/kg	10	MCERTS	36	20

Analytical Report Number: 16-35980

Project / Site name: Meadow High School

Your Order No: MK PO 20615

Lab Sample Number				676868	676869			
Sample Reference				BH04 ES1	BH04 ES2			
Sample Number				None Supplied	None Supplied			
Depth (m)				0.20	0.50			
Date Sampled				19/12/2016	19/12/2016			
Time Taken				None Supplied	None Supplied			
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
VOCs								
Chloromethane	µg/kg	1	ISO 17025	< 1.0	< 1.0			
Chloroethane	µg/kg	1	NONE	< 1.0	< 1.0			
Bromomethane	µg/kg	1	ISO 17025	< 1.0	< 1.0			
Vinyl Chloride	µg/kg	1	NONE	< 1.0	< 1.0			
Trichlorofluoromethane	µg/kg	1	NONE	< 1.0	< 1.0			
1,1-Dichloroethene	µg/kg	1	NONE	< 1.0	< 1.0			
1,1,2-Trichloro 1,2,2-Trifluoroethane	µg/kg	1	ISO 17025	< 1.0	< 1.0			
Cis-1,2-dichloroethene	µg/kg	1	MCERTS	< 1.0	< 1.0			
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	< 1.0	< 1.0			
1,1-Dichloroethane	µg/kg	1	MCERTS	< 1.0	< 1.0			
2,2-Dichloropropane	µg/kg	1	MCERTS	< 1.0	< 1.0			
Trichloromethane	µg/kg	1	MCERTS	< 1.0	< 1.0			
1,1,1-Trichloroethane	µg/kg	1	MCERTS	< 1.0	< 1.0			
1,2-Dichloroethane	µg/kg	1	MCERTS	< 1.0	< 1.0			
1,1-Dichloropropene	µg/kg	1	MCERTS	< 1.0	< 1.0			
Trans-1,2-dichloroethene	µg/kg	1	NONE	< 1.0	< 1.0			
Benzene	µg/kg	1	MCERTS	< 1.0	< 1.0			
Tetrachloromethane	µg/kg	1	MCERTS	< 1.0	< 1.0			
1,2-Dichloropropane	µg/kg	1	MCERTS	< 1.0	< 1.0			
Trichloroethene	µg/kg	1	MCERTS	< 1.0	< 1.0			
Dibromomethane	µg/kg	1	MCERTS	< 1.0	< 1.0			
Bromodichloromethane	µg/kg	1	MCERTS	< 1.0	< 1.0			
Cis-1,3-dichloropropene	µg/kg	1	ISO 17025	< 1.0	< 1.0			
Trans-1,3-dichloropropene	µg/kg	1	ISO 17025	< 1.0	< 1.0			
Toluene	µg/kg	1	MCERTS	< 1.0	< 1.0			
1,1,2-Trichloroethane	µg/kg	1	MCERTS	< 1.0	< 1.0			
1,3-Dichloropropane	µg/kg	1	ISO 17025	< 1.0	< 1.0			
Dibromochloromethane	µg/kg	1	ISO 17025	< 1.0	< 1.0			
Tetrachloroethene	µg/kg	1	NONE	< 1.0	< 1.0			
1,2-Dibromoethane	µg/kg	1	ISO 17025	< 1.0	< 1.0			
Chlorobenzene	µg/kg	1	MCERTS	< 1.0	< 1.0			
1,1,1,2-Tetrachloroethane	µg/kg	1	MCERTS	< 1.0	< 1.0			
Ethylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0			
p & m-Xylene	µg/kg	1	MCERTS	< 1.0	< 1.0			
Styrene	µg/kg	1	MCERTS	< 1.0	< 1.0			
Tribromomethane	µg/kg	1	NONE	< 1.0	< 1.0			
o-Xylene	µg/kg	1	MCERTS	< 1.0	< 1.0			
1,1,2,2-Tetrachloroethane	µg/kg	1	MCERTS	< 1.0	< 1.0			
Isopropylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0			
Bromobenzene	µg/kg	1	MCERTS	< 1.0	< 1.0			
n-Propylbenzene	µg/kg	1	ISO 17025	< 1.0	< 1.0			
2-Chlorotoluene	µg/kg	1	MCERTS	< 1.0	< 1.0			
4-Chlorotoluene	µg/kg	1	MCERTS	< 1.0	< 1.0			
1,3,5-Trimethylbenzene	µg/kg	1	ISO 17025	< 1.0	< 1.0			
tert-Butylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0			
1,2,4-Trimethylbenzene	µg/kg	1	ISO 17025	< 1.0	< 1.0			
sec-Butylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0			
1,3-Dichlorobenzene	µg/kg	1	ISO 17025	< 1.0	< 1.0			
p-Isopropyltoluene	µg/kg	1	ISO 17025	< 1.0	< 1.0			
1,2-Dichlorobenzene	µg/kg	1	MCERTS	< 1.0	< 1.0			
1,4-Dichlorobenzene	µg/kg	1	MCERTS	< 1.0	< 1.0			
Butylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0			
1,2-Dibromo-3-chloropropane	µg/kg	1	ISO 17025	< 1.0	< 1.0			
1,2,4-Trichlorobenzene	µg/kg	1	MCERTS	< 1.0	< 1.0			
Hexachlorobutadiene	µg/kg	1	MCERTS	< 1.0	< 1.0			
1,2,3-Trichlorobenzene	µg/kg	1	ISO 17025	< 1.0	< 1.0			



Analytical Report Number: 16-35980

Project / Site name: Meadow High School

Your Order No: MK PO 20615

Lab Sample Number				676870	676871	676872	676873	676874
Sample Reference				WS01 ES2	WS01 ES3	WS02 ES1	WS02 ES2	WS03 ES2
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.50	1.00	0.30	0.90	0.50
Date Sampled				19/12/2016	19/12/2016	19/12/2016	19/12/2016	19/12/2016
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Leachate Analysis)	Units	Limit of detection	Accreditation Status					

General Inorganics

pH	pH Units	N/A	ISO 17025	7.9	8.1	10.0	7.8	8.0
Total Cyanide	µg/l	10	ISO 17025	< 10	< 10	< 10	< 10	< 10
Free Cyanide	µg/l	10	ISO 17025	< 10	< 10	< 10	< 10	< 10
Sulphate as SO ₄	mg/l	0.1	ISO 17025	14	11	30	20	36
Sulphide	µg/l	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Chloride	mg/l	0.15	ISO 17025	2.3	5.0	5.8	7.7	2.4
Fluoride	µg/l	50	NONE	1000	710	680	750	780
Ammoniacal Nitrogen as N	µg/l	15	NONE	71	900	38	45	250

Phenols by GC-MS

Phenol	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
2,4,5-Trichlorophenol	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
2,4,6-Trichlorophenol	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
2,4-Dichlorophenol	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
2,4-Dimethylphenol	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
2-Chlorophenol	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
2-Methylphenol	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
2-Nitrophenol	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
4-Chloro-3-methylphenol	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
4-Methylphenol	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05

Total Phenols

Total Phenols (GC-MS)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
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Heavy Metals / Metalloids

Antimony (dissolved)	µg/l	1.7	ISO 17025	5.0	2.0	< 1.7	< 1.7	< 1.7
Arsenic (dissolved)	µg/l	1.1	ISO 17025	3.0	7.7	8.5	< 1.1	3.1
Barium (dissolved)	µg/l	0.05	ISO 17025	11	41	8.6	7.5	18
Beryllium (dissolved)	µg/l	0.2	ISO 17025	< 0.2	< 0.2	< 0.2	0.2	0.3
Boron (dissolved)	µg/l	10	ISO 17025	< 10	970	13	< 10	15
Cadmium (dissolved)	µg/l	0.08	ISO 17025	< 0.08	< 0.08	< 0.08	< 0.08	0.65
Chromium (hexavalent)	µg/l	5	NONE	< 5.0	< 5.0	21	< 5.0	< 5.0
Chromium (III)	µg/l	1	NONE	1.6	1.3	9.8	< 1.0	7.7
Chromium (dissolved)	µg/l	0.4	ISO 17025	1.6	1.3	30	0.4	7.7
Copper (dissolved)	µg/l	0.7	ISO 17025	39	24	23	11	37
Iron (dissolved)	mg/l	0.004	ISO 17025	0.44	0.60	0.11	0.038	0.94
Lead (dissolved)	µg/l	1	ISO 17025	8.7	1.8	2.6	< 1.0	6.4
Manganese (dissolved)	µg/l	0.06	ISO 17025	4.7	430	0.96	2.4	10
Mercury (dissolved)	µg/l	0.5	ISO 17025	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Molybdenum (dissolved)	µg/l	0.4	ISO 17025	4.5	6.6	16	2.6	4.9
Nickel (dissolved)	µg/l	0.3	ISO 17025	2.0	3.3	< 0.3	< 0.3	4.3
Selenium (dissolved)	µg/l	4	ISO 17025	< 4.0	< 4.0	7.0	4.5	< 4.0
Vanadium (dissolved)	µg/l	1.7	ISO 17025	4.7	3.4	25	< 1.7	5.2
Zinc (dissolved)	µg/l	0.4	ISO 17025	8.5	13	2.7	3.4	12
Calcium (dissolved)	mg/l	0.012	ISO 17025	22	30	26	14	39
Magnesium (dissolved)	mg/l	0.005	ISO 17025	0.26	2.0	< 0.005	1.4	1.4



Analytical Report Number: 16-35980

Project / Site name: Meadow High School

Your Order No: MK PO 20615

Lab Sample Number				676875	676876	676877	676878	676879
Sample Reference				WS03 ES3	WS04 ES1	WS04 ES2	BH01 ES1	BH04 ES1
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.20	0.20	0.60	0.10	0.20
Date Sampled				19/12/2016	19/12/2016	19/12/2016	19/12/2016	19/12/2016
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Leachate Analysis)	Units	Limit of detection	Accreditation Status					

General Inorganics

pH	pH Units	N/A	ISO 17025	7.8	8.0	8.1	7.5	7.7
Total Cyanide	µg/l	10	ISO 17025	< 10	< 10	< 10	< 10	< 10
Free Cyanide	µg/l	10	ISO 17025	< 10	< 10	< 10	< 10	< 10
Sulphate as SO ₄	mg/l	0.1	ISO 17025	42	4.8	3.1	5.1	2.9
Sulphide	µg/l	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Chloride	mg/l	0.15	ISO 17025	0.39	1.1	1.7	3.9	3.3
Fluoride	µg/l	50	NONE	970	490	610	640	610
Ammoniacal Nitrogen as N	µg/l	15	NONE	17	170	5200	28	17

Phenols by GC-MS

Phenol	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
2,4,5-Trichlorophenol	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
2,4,6-Trichlorophenol	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
2,4-Dichlorophenol	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
2,4-Dimethylphenol	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
2-Chlorophenol	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
2-Methylphenol	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
2-Nitrophenol	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
4-Chloro-3-methylphenol	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
4-Methylphenol	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05

Total Phenols

Total Phenols (GC-MS)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
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Heavy Metals / Metalloids

Antimony (dissolved)	µg/l	1.7	ISO 17025	< 1.7	< 1.7	2.6	< 1.7	< 1.7
Arsenic (dissolved)	µg/l	1.1	ISO 17025	< 1.1	4.1	4.4	3.8	1.5
Barium (dissolved)	µg/l	0.05	ISO 17025	9.5	120	45	9.4	11
Beryllium (dissolved)	µg/l	0.2	ISO 17025	< 0.2	< 0.2	< 0.2	< 0.2	0.2
Boron (dissolved)	µg/l	10	ISO 17025	92	< 10	86	37	38
Cadmium (dissolved)	µg/l	0.08	ISO 17025	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08
Chromium (hexavalent)	µg/l	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Chromium (III)	µg/l	1	NONE	< 1.0	< 1.0	< 1.0	1.8	1.7
Chromium (dissolved)	µg/l	0.4	ISO 17025	< 0.4	< 0.4	0.5	1.8	1.7
Copper (dissolved)	µg/l	0.7	ISO 17025	14	17	31	41	38
Iron (dissolved)	mg/l	0.004	ISO 17025	0.026	0.025	0.45	1.6	1.9
Lead (dissolved)	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	6.4	6.1
Manganese (dissolved)	µg/l	0.06	ISO 17025	3.9	5.6	190	9.1	8.9
Mercury (dissolved)	µg/l	0.5	ISO 17025	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Molybdenum (dissolved)	µg/l	0.4	ISO 17025	1.2	2.5	1.9	2.7	1.8
Nickel (dissolved)	µg/l	0.3	ISO 17025	< 0.3	< 0.3	1.9	3.9	3.3
Selenium (dissolved)	µg/l	4	ISO 17025	5.2	< 4.0	< 4.0	< 4.0	< 4.0
Vanadium (dissolved)	µg/l	1.7	ISO 17025	< 1.7	4.9	3.4	5.4	3.7
Zinc (dissolved)	µg/l	0.4	ISO 17025	6.2	2.7	8.5	14	11
Calcium (dissolved)	mg/l	0.012	ISO 17025	27	12	40	11	12
Magnesium (dissolved)	mg/l	0.005	ISO 17025	1.5	0.81	1.9	0.45	0.38



Analytical Report Number : 16-35980

Project / Site name: Meadow High School

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
676858	WS01 ES2	None Supplied	0.50	Brown loam and clay with gravel and brick.
676859	WS01 ES3	None Supplied	1.00	Brown clay and loam with brick.
676860	WS02 ES1	None Supplied	0.30	Black sandy gravel.**
676861	WS02 ES2	None Supplied	0.90	Light brown clay and sand.
676862	WS03 ES2	None Supplied	0.50	Light brown loam and sand with gravel and vegetation.
676863	WS03 ES3	None Supplied	1.20	Brown clay and sand.
676864	WS04 ES1	None Supplied	0.20	Grey gravelly sand.
676865	WS04 ES2	None Supplied	0.60	Brown loam and clay.
676866	BH01 ES1	None Supplied	0.10	Brown loam and clay with gravel and vegetation.
676867	BH01 ES2	None Supplied	0.50	Light brown clay and sand.
676868	BH04 ES1	None Supplied	0.20	Brown loam and clay with gravel and vegetation.
676869	BH04 ES2	None Supplied	0.50	Light brown clay and sand.

**Non MCerts matrix

Analytical Report Number : 16-35980

Project / Site name: Meadow High School

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Ammoniacal Nitrogen as N in leachate	Determination of Ammonium/Ammonia/ Ammoniacal Nitrogen by the discrete analyser (colorimetric) salicylate/nitroprusside method.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L082-PL	W	NONE
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with disperion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Boron in leachate	Determination of boron in leachate. Sample acidified and followed by ICP-OES.	In-house method based on MEWAM	L039-PL	W	ISO 17025
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES.	In-house method based on Second Site Properties version 3	L038-PL	D	MCERTS
BS EN 12457-1 (2:1) Leachate Prep	2:1 (as recieved, moisture adjusted) end over end extraction with water for 24 hours. Eluate filtered prior to analysis.	In-house method based on BSEN12457-1.	L043-PL	W	NONE
BTEX and MTBE in soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS
Cations in soil by ICP-OES	Determination of cations in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Chloride in leachate	Determination of Chloride colorimetrically by discrete analyser.	In house based on MEWAM Method ISBN 0117516260.	L082-PL	W	ISO 17025
Cr (III) in soil	In-house method by calculation from total Cr and Cr VI.	In-house method by calculation	L080-PL	W	NONE
Fluoride in leachate	Determination of fluoride in leachate by 1:1ratio with a buffer solution followed by Ion Selective Electrode.	In-house method based on Use of Total Ionic Strength Adjustment Buffer for Electrode Determination"	L033-PL	W	NONE
Free cyanide in leachate	Determination of free cyanide by distillation followed by colorimetry.	In-house method	L080-PL	W	ISO 17025
Free cyanide in soil	Determination of free cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
Hexavalent chromium in leachate	Determination of hexavalent chromium in leachate by acidification, addition of 1,5 diphenylcarbazine followed by colorimetry.	In-house method	L080-PL	W	NONE
Hexavalent chromium in soil	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazine followed by colorimetry.	In-house method	L080-PL	W	MCERTS
Metals by ICP-OES in leachate	Determination of metals in leachate by acidification followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Moisture Content	Moisture content, determined gravimetrically.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L019-UK/PL	W	NONE

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The results included within the report are representative of the samples submitted for analysis.

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Analytical Report Number : 16-35980

Project / Site name: Meadow High School

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Monohydric phenols in soil	Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	MCERTS
pH at 20oC in leachate	Determination of pH in leachate by electrometric measurement.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L005-PL	W	ISO 17025
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L099-PL	D	MCERTS
Phenols, speciated, in leachate, by GCMS	Determination of speciated phenols in leachate by extraction in hexane followed by GC-MS.	In-house method based on USEPA 8270	L070-PL	W	NONE
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Sulphate in leachates	Determination of sulphate in leachate by acidification followed by ICP-OES.	In-house method based on MEWAM 1986 Methods for the Determination of Metals in Soil""	L039-PL	W	ISO 17025
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests, 2:1 water:soil extraction, analysis by ICP-OES.	L038-PL	D	MCERTS
Sulphide in leachate	Determination of sulphide in leachate by ion selective electrode.	In-house method	L010-PL	W	NONE
Total cyanide in leachate	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	ISO 17025
Total Sulphur in soil as %	Determination of total sulphur in soil by extraction with aqua-regia, potassium bromide/bromate followed by ICP-OES.	In-house method based on BS1377 Part 3, 1990, and MEWAM 2006 Methods for the Determination of Metals in Soil	L038	W	MCERTS
TPHCWG (Soil)	Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method	L076-PL	W	MCERTS
Volatile organic compounds in soil	Determination of volatile organic compounds in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.

For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.

Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

Sample Deviation Report



Sample ID	Other ID	Sample Type	Job	Sample Number	Sample Deviation Code	test_name	test_ref	Test Deviation code
WS04 ES1		S	16-35980	676864	b	BTEX and MTBE in soil (Monoaromatics)	L073B-PL	b
WS04 ES1		S	16-35980	676864	b	Monohydric phenols in soil	L080-PL	b
WS04 ES1		S	16-35980	676864	b	Speciated EPA-16 PAHs in soil	L064-PL	b
WS04 ES1		S	16-35980	676864	b	TPHCWG (Soil)	L076-PL	b
WS04 ES1		S	16-35980	676864	b	Volatile organic compounds in soil	L073B-PL	b

**Emma Small**

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Analytical Report Number : 17-36644

Project / Site name:	Meadow School	Samples received on:	04/01/2017
Your job number:	J-M932.12	Samples instructed on:	04/01/2017
Your order number:	MK PO 20615	Analysis completed by:	11/01/2017
Report Issue Number:	1	Report issued on:	11/01/2017
Samples Analysed:	8 soil samples		

Signed:

Rexona Rahman
Reporting Manager
For & on behalf of i2 Analytical Ltd.

Signed:

Emma Winter
Assistant Reporting Manager
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils	- 4 weeks from reporting
leachates	- 2 weeks from reporting
waters	- 2 weeks from reporting
asbestos	- 6 months from reporting

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Analytical Report Number: 17-36644

Project / Site name: Meadow School

Your Order No: MK PO 20615

Lab Sample Number				682121	682122	682123	682124	682125
Sample Reference				BH01	BH02	BH03	BH04	WS01
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				4.60	6.50-6.90	8.00-8.40	6.50-6.90	1.40
Date Sampled				20/12/2016	21/12/2016	16/12/2016	19/12/2016	19/12/2016
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	N/A	NONE	21	20	16	20	18
Total mass of sample received	kg	0.001	NONE	0.34	2.0	2.0	2.0	0.33

General Inorganics

	pH Units	N/A	MCERTS	7.5	7.7	7.4	7.5	7.1
pH - Automated								
Total Sulphate as SO ₄	%	0.005	MCERTS	0.037	0.048	0.067	0.034	0.017
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.11	0.21	0.32	0.15	0.020
Water Soluble Chloride (2:1) (leachate equivalent)	mg/l	0.5	MCERTS	8.6	22	18	4.3	3.6
Total Sulphur	%	0.005	MCERTS	0.313	0.392	7.56	0.633	0.008
Water Soluble Nitrate (2:1) as N (leachate equivalent)	mg/l	2	NONE	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0

Heavy Metals / Metalloids

Magnesium (water soluble)	mg/kg	5	NONE	25	63	92	44	< 5.0
Magnesium (leachate equivalent)	mg/l	2.5	NONE	12	32	46	22	< 2.5

Analytical Report Number: 17-36644

Project / Site name: Meadow School

Your Order No: MK PO 20615

Lab Sample Number				682126	682127	682128		
Sample Reference				WS02	WS03	WS04		
Sample Number				None Supplied	None Supplied	None Supplied		
Depth (m)				1.30	1.10	1.40		
Date Sampled				19/12/2016	19/12/2016	19/12/2016		
Time Taken				None Supplied	None Supplied	None Supplied		
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1		
Moisture Content	%	N/A	NONE	8.0	20	7.4		
Total mass of sample received	kg	0.001	NONE	1.1	0.33	1.3		

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	7.5	7.4	8.0		
Total Sulphate as SO ₄	%	0.005	MCERTS	0.008	0.031	0.017		
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.024	0.083	0.064		
Water Soluble Chloride (2:1) (leachate equivalent)	mg/l	0.5	MCERTS	5.4	1.4	3.0		
Total Sulphur	%	0.005	MCERTS	0.008	0.011	0.009		
Water Soluble Nitrate (2:1) as N (leachate equivalent)	mg/l	2	NONE	< 2.0	3.5	< 2.0		

Heavy Metals / Metalloids

Magnesium (water soluble)	mg/kg	5	NONE	< 5.0	5.3	< 5.0		
Magnesium (leachate equivalent)	mg/l	2.5	NONE	< 2.5	2.7	< 2.5		



Analytical Report Number : 17-36644

Project / Site name: Meadow School

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
682121	BH01	None Supplied	4.60	Brown clay.
682122	BH02	None Supplied	6.50-6.90	Brown clay and sand.
682123	BH03	None Supplied	8.00-8.40	Brown clay and sand.
682124	BH04	None Supplied	6.50-6.90	Brown clay and sand.
682125	WS01	None Supplied	1.40	Brown clay.
682126	WS02	None Supplied	1.30	Brown clay and sand with gravel.
682127	WS03	None Supplied	1.10	Brown clay.
682128	WS04	None Supplied	1.40	Brown clay and sand with gravel.

Analytical Report Number : 17-36644

Project / Site name: Meadow School

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Chloride, water soluble, in soil	Determination of Chloride colorimetrically by discrete analyser.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests. 2:1 extraction.	L082-PL	D	MCERTS
Magnesium, water soluble, in soil	Determination of water soluble magnesium by extraction with water followed by ICP-OES.	In-house method based on TRL 447	L038-PL	D	NONE
Moisture Content	Moisture content, determined gravimetrically.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L019-UK/PL	W	NONE
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L099-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests, 2:1 water:soil extraction, analysis by ICP-OES.	L038-PL	D	MCERTS
Total Sulphate in soil as %	Determination of total sulphate in soil by extraction with 10% HCl followed by ICP-OES.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests"	L038	D	MCERTS
Total Sulphur in soil as %	Determination of total sulphur in soil by extraction with aqua-regia, potassium bromide/bromate followed by ICP-OES.	In-house method based on BS1377 Part 3, 1990, and MEWAM 2006 Methods for the Determination of Metals in Soil	L038	W	MCERTS
Water Soluble Nitrate (2:1) as N in soil	Determination of nitrate by reaction with sodium salicylate and colorimetry.	In-house method based on Examination of Water and Wastewater & Polish Standard Method PN-82/C-04579.08, 2:1 extraction.	L078-PL		NONE

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.

For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.

Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

Sample Deviation Report



Sample ID	Other ID	Sample Type	Job	Sample Number	Sample Deviation Code	test_name	test_ref	Test Deviation code
BH01		S	17-36644	682121	c	Water Soluble Nitrate (2:1) as N in soil	L078-PL	c
BH02		S	17-36644	682122	c	Water Soluble Nitrate (2:1) as N in soil	L078-PL	c
BH03		S	17-36644	682123	c	Water Soluble Nitrate (2:1) as N in soil	L078-PL	c
BH04		S	17-36644	682124	c	Water Soluble Nitrate (2:1) as N in soil	L078-PL	c
WS01		S	17-36644	682125	c	Water Soluble Nitrate (2:1) as N in soil	L078-PL	c
WS02		S	17-36644	682126	c	Water Soluble Nitrate (2:1) as N in soil	L078-PL	c
WS03		S	17-36644	682127	c	Water Soluble Nitrate (2:1) as N in soil	L078-PL	c
WS04		S	17-36644	682128	c	Water Soluble Nitrate (2:1) as N in soil	L078-PL	c

APPENDIX E

Geotechnical Analysis Results



TEST CERTIFICATE

Determination of Moisture Content

Tested in Accordance with BS 1377-2:1990: Clause 3.2

i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS



Client: Opus International Consultants (UK) Ltd
Client Address: 1 South House
Bond Avenue
Milton Keynes
MK1 1SW
Contact: Emma Small
Site Name: Meadow School
Site Address: Not Given

Client Reference: J-M3932.12
Job Number: 17-36655
Date Sampled: 16/12 - 21/12/2016
Date Received: 04/01/2017
Date Tested: 16/01/2017
Sampled By: ES/EDH

Test results

Laboratory Reference	Sample Reference	Location	Depth Top [m]	Depth Base [m]	Sample Type	Description	Moisture Content [%]
682149	Not Given	BH01	4.6	Not Given	B	Brown slightly gravelly CLAY	25
682150	Not Given	BH01	7.1	Not Given	B	Brown CLAY	26
682152	Not Given	BH01	9.6	10	U	Greyish brown CLAY	26
682153	Not Given	BH01	5.1	Not Given	B	Brown CLAY	26
682159	Not Given	BH01	4	4.4	B	Brown gravelly slightly sandy CLAY	22
682160	Not Given	BH02	3.8	Not Given	B	Brown slightly gravelly CLAY	27
682161	Not Given	BH02	4.4	Not Given	B	Brown CLAY	27
682162	Not Given	BH02	7	Not Given	B	Brown CLAY	27
682165	Not Given	BH02	5.1	Not Given	B	Brown CLAY	26
682171	Not Given	BH03	5.4	Not Given	B	Brown CLAY	27

Remarks

Approved:

Mirosława Pytlik
PL Head of
Geotechnical Section

Date Reported: 18/01/2017

Signed:

Sushil Sharda
Technical Manager
(Geotechnical Division)

for and on behalf of i2 Analytical Ltd

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TEST CERTIFICATE

Determination of Moisture Content

Tested in Accordance with BS 1377-2:1990: Clause 3.2

i2 Analytical Ltd
7 Woodshots Meadow
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Watford Herts WD18 8YS



Client: Opus International Consultants (UK) Ltd
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Bond Avenue
Milton Keynes
MK1 1SW
Contact: Emma Small
Site Name: Meadow School
Site Address: Not Given

Client Reference: J-M3932.12
Job Number: 17-36655
Date Sampled: 16/12 - 19/12/2016
Date Received: 04/01/2017
Date Tested: 16/01/2017
Sampled By: ES/EDH

Test results

Laboratory Reference	Sample Reference	Location	Depth Top [m]	Depth Base [m]	Sample Type	Description	Moisture Content [%]
682172	Not Given	BH03	8.5	Not Given	B	Brown CLAY	28
682175	Not Given	BH03	6.5	Not Given	B	Brown CLAY	28
682181	Not Given	BH03	4.1	4.4	B	Brown very gravelly CLAY	19
682182	Not Given	BH04	4.4	Not Given	B	Orangish brown slightly gravelly CLAY	27
682183	Not Given	BH04	7	Not Given	B	Brown CLAY	26
682187	Not Given	BH04	0.7	1.1	B	Orangish brown slightly gravelly slightly sandy CLAY	23
682188	Not Given	BH04	1.3	1.7	B	Brown gravelly slightly sandy CLAY	16
682193	Not Given	WS01	0.7	1.1	B	Mottled brown slightly gravelly slightly sandy CLAY	20
682194	Not Given	WS01	1.4	Not Given	D	Orangish brown sandy CLAY	24
682196	Not Given	WS02	0.6	0.9	B	Yellowish brown to grey slightly gravelly CLAY	25

Remarks

Approved:

Mirosława Pytlik
PL Head of
Geotechnical Section

Date Reported: 18/01/2017

Signed:

Sushil Sharda
Technical Manager
(Geotechnical Division)

for and on behalf of i2 Analytical Ltd

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TEST CERTIFICATE

Determination of Moisture Content

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Contact: Emma Small
Site Name: Meadow School
Site Address: Not Given

Client Reference: J-M3932.12
Job Number: 17-36655
Date Sampled: 19/12/2016
Date Received: 04/01/2017
Date Tested: 16/01/2017
Sampled By: ES/EDH

Test results

Laboratory Reference	Sample Reference	Location	Depth Top [m]	Depth Base [m]	Sample Type	Description	Moisture Content [%]
682197	Not Given	WS02	1	Not Given	D	Orangish brown to grey slightly gravelly CLAY	23
682199	Not Given	WS03	1.1	Not Given	D	Brown slightly sandy CLAY	26

Remarks

Approved:

Mirosława Pytlik
PL Head of
Geotechnical Section

Date Reported: 18/01/2017

Signed:

Sushil Sharda
Technical Manager
(Geotechnical Division)

for and on behalf of i2 Analytical Ltd

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TEST CERTIFICATE

Determination of Liquid and Plastic Limits

i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS



Tested in Accordance with BS1377-2: 1990: Clause 4.4 & 5: One Point Method

4041

Client: Opus International Consultants (UK) Ltd
Client Address: 1 South House
Bond Avenue
Milton Keynes
MK1 1SW
Contact: Emma Small
Site Name: Meadow School
Site Address: Not Given

Client Reference: J-M3932.12
Job Number: 17-36655
Date Sampled: 20/12/2016
Date Received: 04/01/2017
Date Tested: 13/01/2017
Sampled By: ES/EDH

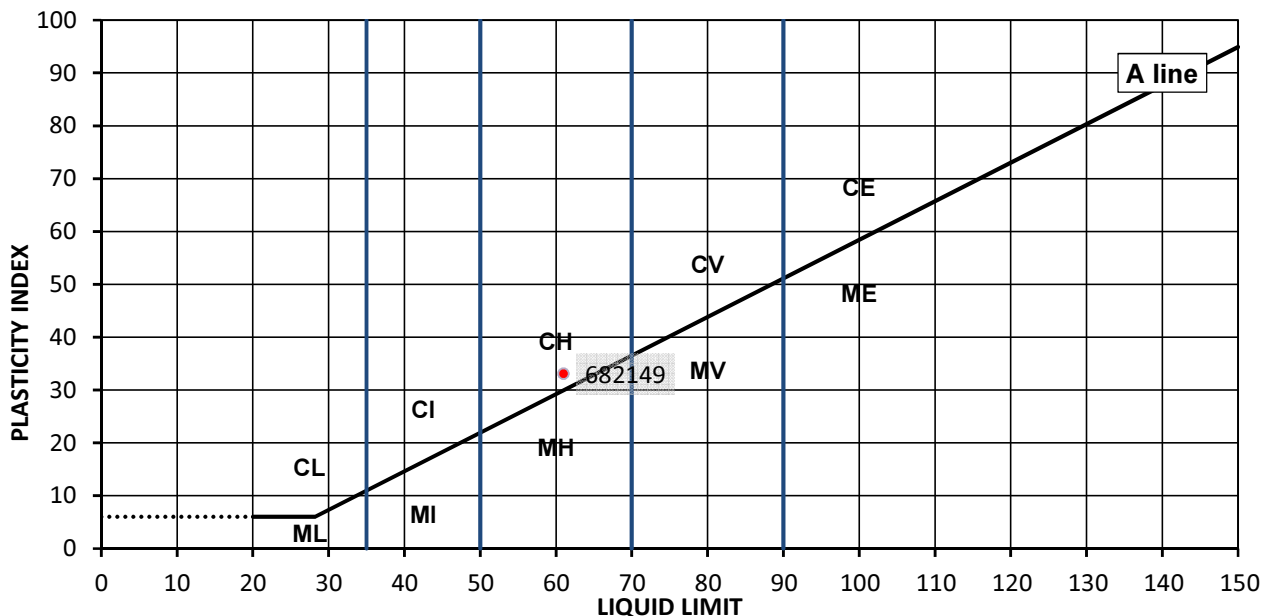
TEST RESULTS

Laboratory Reference: 682149
Sample Reference: Not Given

Description: Brown slightly gravelly CLAY
Location: BH01
Sample Preparation: Tested after >425um removed by hand

Sample Type: B
Depth Top [m]: 4.6
Depth Base [m]: Not Given

As Received Moisture Content [%]	Liquid Limit [%]	Plastic Limit [%]	Plasticity Index [%]	% Passing 425µm BS Test Sieve
25	61	28	33	96



Legend, based on BS 5930:2015 Code of practice for site investigations

	Plasticity	Liquid Limit
C	Clay	below 35
M	Silt	35 to 50
	L Low	50 to 70
	I Medium	70 to 90
	H High	exceeding 90
	V Very high	
	E Extremely high	
	Organic	O append to classification for organic material (eg CHO)

Remarks

Approved:

Mirosława Pytlík
PL Head of
Geotechnical Section

Signed:

Sushil Sharda
Technical Manager
(Geotechnical Division)

Date Reported: 18/01/2017

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TEST CERTIFICATE

Determination of Liquid and Plastic Limits

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7 Woodshots Meadow
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Watford Herts WD18 8YS



Tested in Accordance with BS1377-2: 1990: Clause 4.4 & 5: One Point Method

4041

Client: Opus International Consultants (UK) Ltd
Client Address: 1 South House
Bond Avenue
Milton Keynes
MK1 1SW
Contact: Emma Small
Site Name: Meadow School
Site Address: Not Given

Client Reference: J-M3932.12
Job Number: 17-36655
Date Sampled: 20/12/2016
Date Received: 04/01/2017
Date Tested: 13/11/2017
Sampled By: ES/EDH

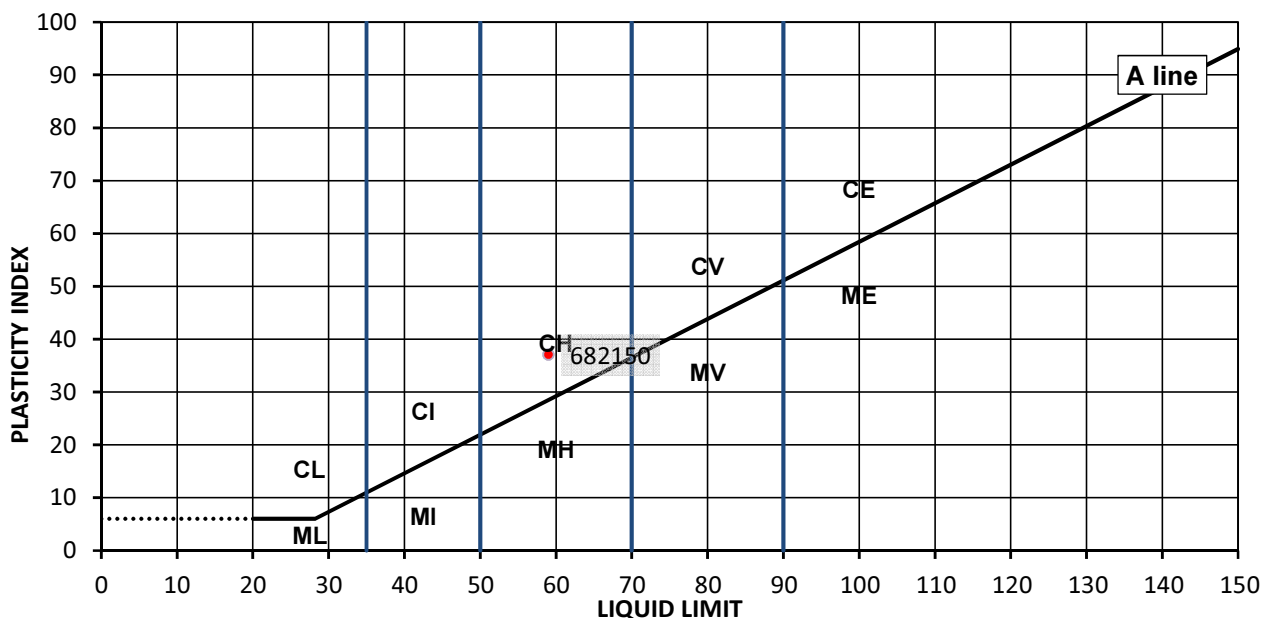
TEST RESULTS

Laboratory Reference: 682150
Sample Reference: Not Given

Description: Brown CLAY
Location: BH01
Sample Preparation: Tested in natural condition

Sample Type: B
Depth Top [m]: 7.1
Depth Base [m]: Not Given

As Received Moisture Content [%]	Liquid Limit [%]	Plastic Limit [%]	Plasticity Index [%]	% Passing 425µm BS Test Sieve
26	59	22	37	100



Legend, based on BS 5930:2015 Code of practice for site investigations

	Plasticity	Liquid Limit
C	Clay	below 35
M	Silt	35 to 50
	L	Low
	I	Medium
	H	High
	V	Very high
	E	Extremely high
		exceeding 90
	Organic	O
		append to classification for organic material (eg CHO)

Remarks

Approved:

Mirosława Pytlík
PL Head of
Geotechnical Section

Signed:

Sushil Sharda
Technical Manager
(Geotechnical Division)

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TEST CERTIFICATE

Determination of Liquid and Plastic Limits

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Croxley Green Business Park
Watford Herts WD18 8YS



Tested in Accordance with BS1377-2: 1990: Clause 4.4 & 5: One Point Method

4041

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Milton Keynes
MK1 1SW
Contact: Emma Small
Site Name: Meadow School
Site Address: Not Given

Client Reference: J-M3932.12
Job Number: 17-36655
Date Sampled: 20/12/2016
Date Received: 04/01/2017
Date Tested: 16/01/2017
Sampled By: ES/EDH

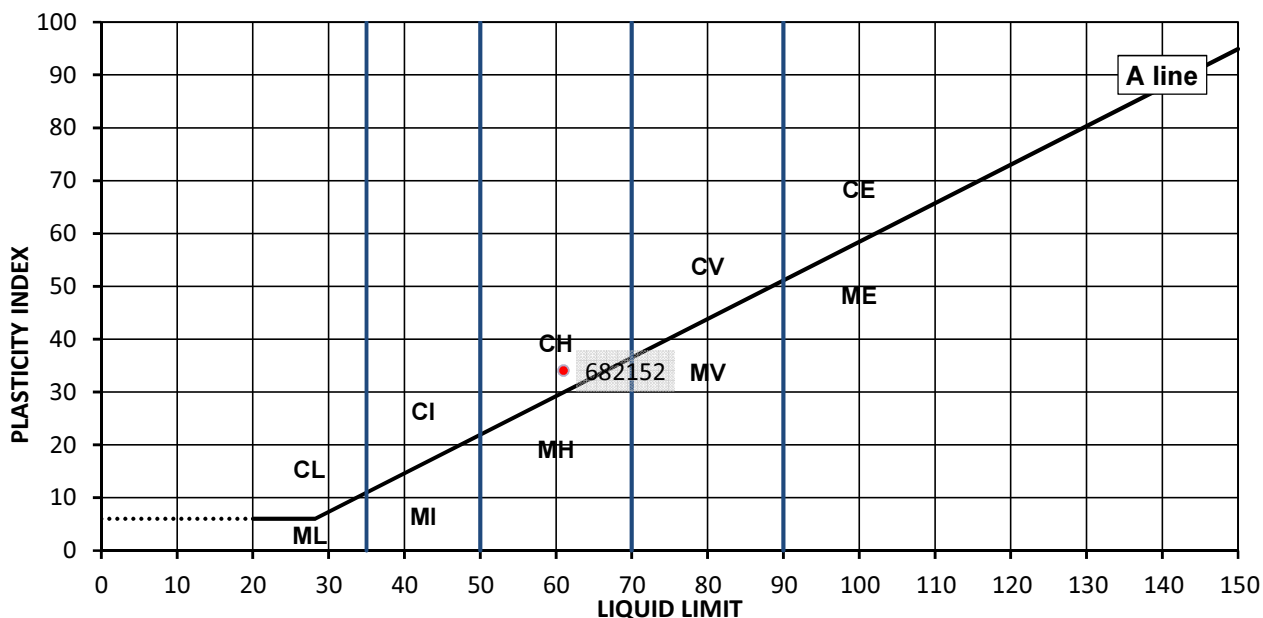
TEST RESULTS

Laboratory Reference: 682152
Sample Reference: Not Given

Description: Greyish brown CLAY
Location: BH01
Sample Preparation: Tested in natural condition

Sample Type: U
Depth Top [m]: 9.6
Depth Base [m]: 10

As Received Moisture Content [%]	Liquid Limit [%]	Plastic Limit [%]	Plasticity Index [%]	% Passing 425µm BS Test Sieve
26	61	27	34	100



Legend, based on BS 5930:2015 Code of practice for site investigations

	Plasticity	Liquid Limit
C	Clay	below 35
M	Silt	35 to 50
	L	Low
	I	Medium
	H	High
	V	Very high
	E	Extremely high
		exceeding 90
Organic	O	append to classification for organic material (eg CHO)

Remarks

Approved:

Mirosława Pytlík
PL Head of
Geotechnical Section

Signed:

Sushil Sharda
Technical Manager
(Geotechnical Division)

Date Reported: 18/01/2017

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TEST CERTIFICATE

Determination of Liquid and Plastic Limits

i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS



Tested in Accordance with BS1377-2: 1990: Clause 4.4 & 5: One Point Method

4041

Client: Opus International Consultants (UK) Ltd
Client Address: 1 South House
Bond Avenue
Milton Keynes
MK1 1SW
Contact: Emma Small
Site Name: Meadow School
Site Address: Not Given

Client Reference: J-M3932.12
Job Number: 17-36655
Date Sampled: 20/12/2016
Date Received: 04/01/2017
Date Tested: 13/11/2017
Sampled By: ES/EDH

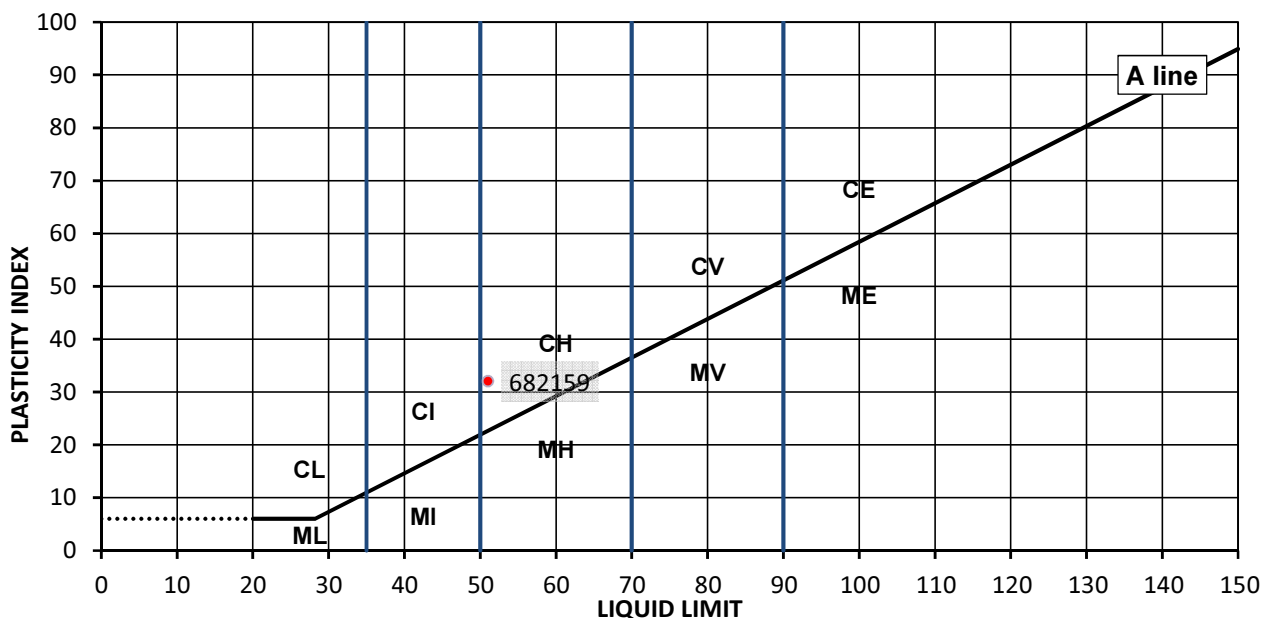
TEST RESULTS

Laboratory Reference: 682159
Sample Reference: Not Given

Description: Brown gravelly slightly sandy CLAY
Location: BH01
Sample Preparation: Tested after washing to remove >425um

Sample Type: B
Depth Top [m]: 4
Depth Base [m]: 4.4

As Received Moisture Content [%]	Liquid Limit [%]	Plastic Limit [%]	Plasticity Index [%]	% Passing 425µm BS Test Sieve
22	51	19	32	52



Legend, based on BS 5930:2015 Code of practice for site investigations

		Plasticity	Liquid Limit
C	Clay	L Low	below 35
M	Silt	I Medium	35 to 50
		H High	50 to 70
		V Very high	70 to 90
		E Extremely high	exceeding 90
	Organic	O append to classification for organic material (eg CHO)	

Remarks

Approved:

Mirosława Pytlík
PL Head of
Geotechnical Section

Signed:

Sushil Sharda
Technical Manager
(Geotechnical Division)

Date Reported: 18/01/2017

for and on behalf of i2 Analytical Ltd

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TEST CERTIFICATE

Determination of Liquid and Plastic Limits

i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS



Tested in Accordance with BS1377-2: 1990: Clause 4.4 & 5: One Point Method

4041

Client: Opus International Consultants (UK) Ltd
Client Address: 1 South House
Bond Avenue
Milton Keynes
MK1 1SW
Contact: Emma Small
Site Name: Meadow School
Site Address: Not Given

Client Reference: J-M3932.12
Job Number: 17-36655
Date Sampled: 21/12/2016
Date Received: 04/01/2017
Date Tested: 13/01/2017
Sampled By: ES/EDH

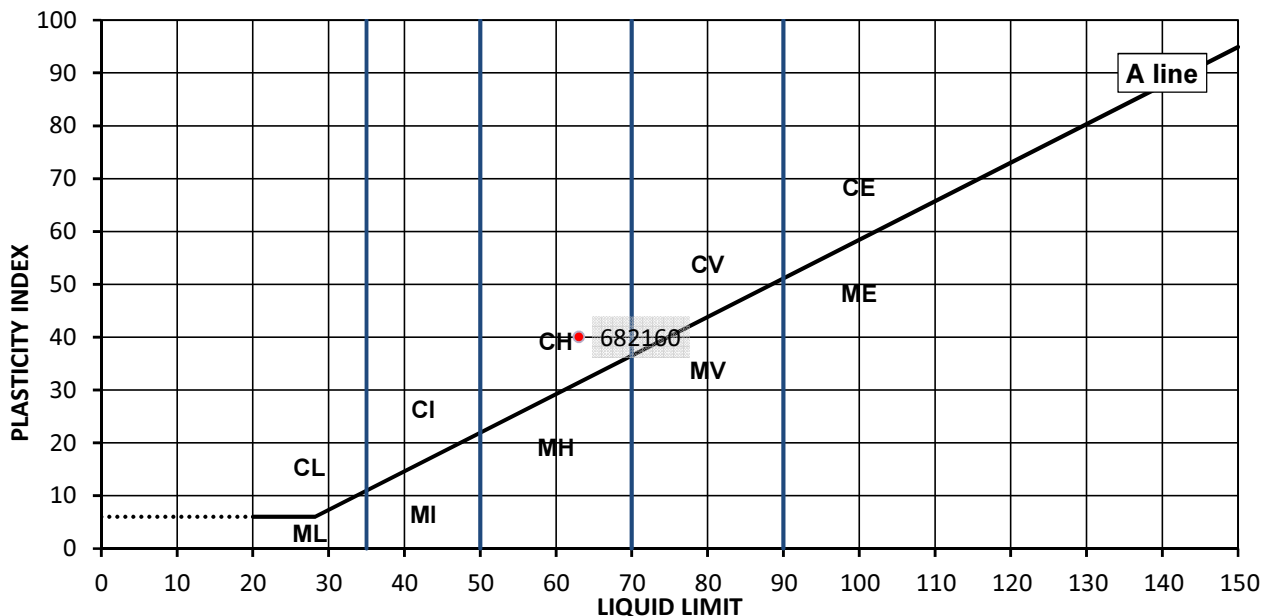
TEST RESULTS

Laboratory Reference: 682160
Sample Reference: Not Given

Description: Brown slightly gravelly CLAY
Location: BH02
Sample Preparation: Tested after >425um removed by hand

Sample Type: B
Depth Top [m]: 3.8
Depth Base [m]: Not Given

As Received Moisture Content [%]	Liquid Limit [%]	Plastic Limit [%]	Plasticity Index [%]	% Passing 425µm BS Test Sieve
27	63	23	40	76



Legend, based on BS 5930:2015 Code of practice for site investigations

	Plasticity	Liquid Limit
C	Clay	below 35
M	Silt	35 to 50
	L	Low
	I	Medium
	H	High
	V	Very high
	E	Extremely high
		exceeding 90
	Organic	
	O	append to classification for organic material (eg CHO)

Remarks

Approved:

Mirosława Pytlík
PL Head of
Geotechnical Section

Signed:

Sushil Sharda
Technical Manager
(Geotechnical Division)

Date Reported: 18/01/2017

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Watford Herts WD18 8YS



Tested in Accordance with BS1377-2: 1990: Clause 4.4 & 5: One Point Method

4041

Client: Opus International Consultants (UK) Ltd
Client Address: 1 South House
Bond Avenue
Milton Keynes
MK1 1SW
Contact: Emma Small
Site Name: Meadow School
Site Address: Not Given

Client Reference: J-M3932.12
Job Number: 17-36655
Date Sampled: 21/12/2016
Date Received: 04/01/2017
Date Tested: 16/01/2017
Sampled By: ES/EDH

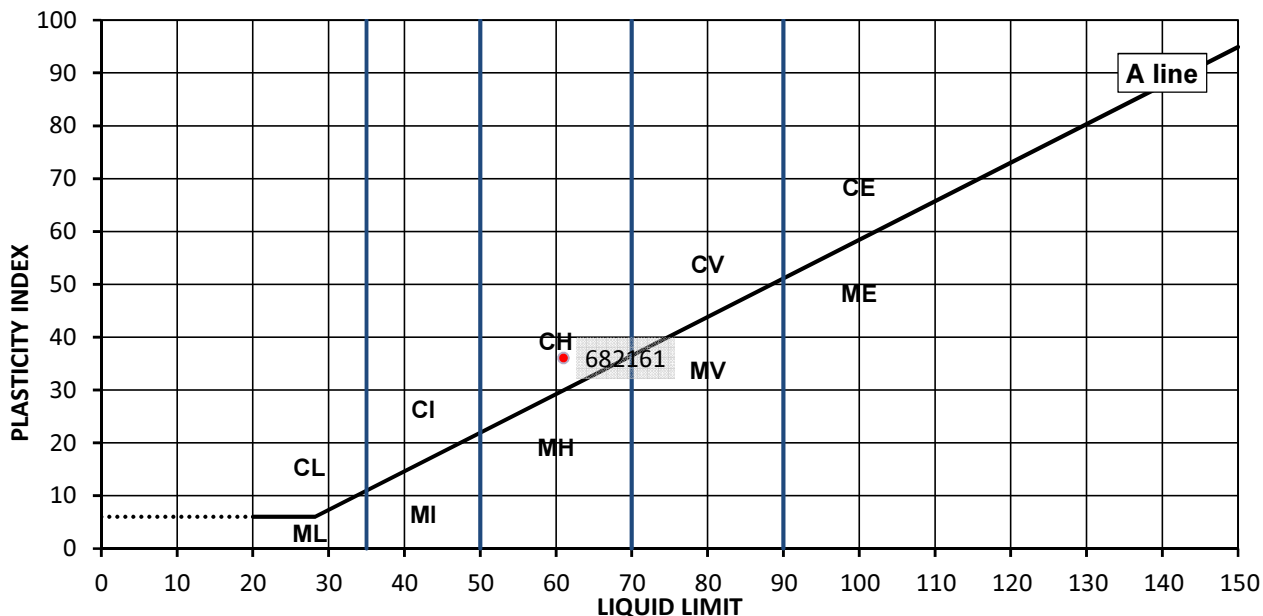
TEST RESULTS

Laboratory Reference: 682161
Sample Reference: Not Given

Description: Brown CLAY
Location: BH02
Sample Preparation: Tested in natural condition

Sample Type: B
Depth Top [m]: 4.4
Depth Base [m]: Not Given

As Received Moisture Content [%]	Liquid Limit [%]	Plastic Limit [%]	Plasticity Index [%]	% Passing 425µm BS Test Sieve
27	61	25	36	100



Legend, based on BS 5930:2015 Code of practice for site investigations

	Plasticity	Liquid Limit
C	Clay	below 35
M	Silt	35 to 50
	L	Low
	I	Medium
	H	High
	V	Very high
	E	Extremely high
		exceeding 90
Organic	O	append to classification for organic material (eg CHO)

Remarks

Approved:

Mirosława Pytlík
PL Head of
Geotechnical Section

Signed:

Sushil Sharda
Technical Manager
(Geotechnical Division)

Date Reported: 18/01/2017

for and on behalf of i2 Analytical Ltd

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TEST CERTIFICATE

Determination of Liquid and Plastic Limits

i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS



Tested in Accordance with BS1377-2: 1990: Clause 4.4 & 5: One Point Method

4041

Client: Opus International Consultants (UK) Ltd
Client Address: 1 South House
Bond Avenue
Milton Keynes
MK1 1SW
Contact: Emma Small
Site Name: Meadow School
Site Address: Not Given

Client Reference: J-M3932.12
Job Number: 17-36655
Date Sampled: 21/12/2016
Date Received: 04/01/2017
Date Tested: 16/01/2017
Sampled By: ES/EDH

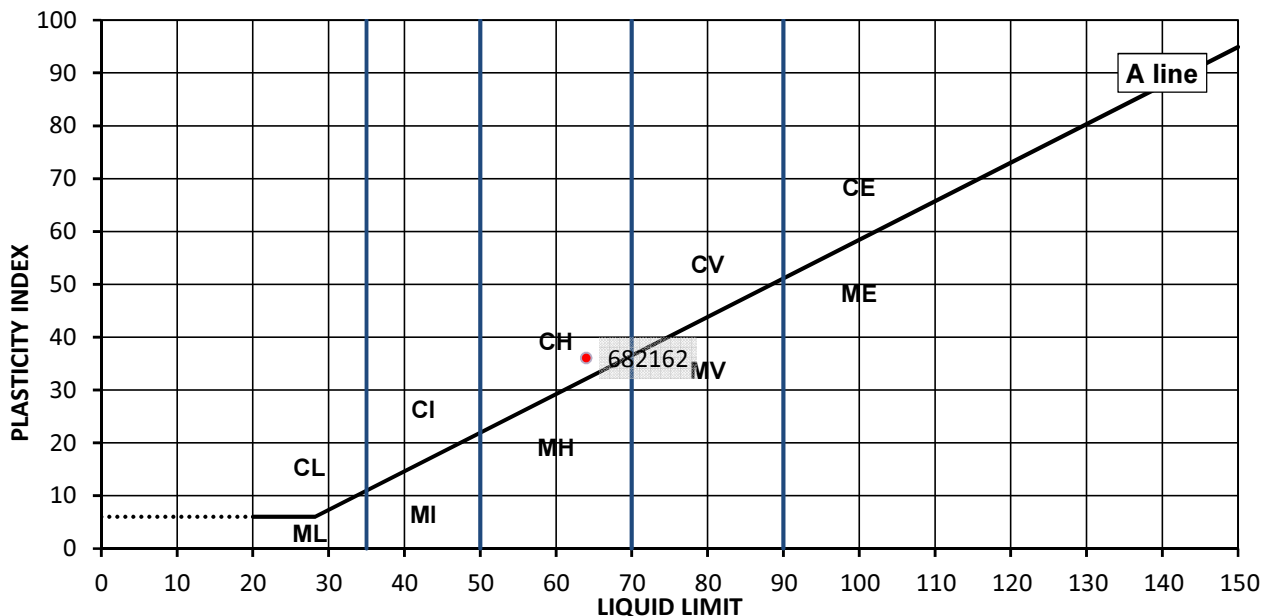
TEST RESULTS

Laboratory Reference: 682162
Sample Reference: Not Given

Description: Brown CLAY
Location: BH02
Sample Preparation: Tested in natural condition

Sample Type: B
Depth Top [m]: 7
Depth Base [m]: Not Given

As Received Moisture Content [%]	Liquid Limit [%]	Plastic Limit [%]	Plasticity Index [%]	% Passing 425µm BS Test Sieve
27	64	28	36	100



Legend, based on BS 5930:2015 Code of practice for site investigations

	Plasticity	Liquid Limit
C	Clay	below 35
M	Silt	35 to 50
	L Low	50 to 70
	I Medium	70 to 90
	H High	exceeding 90
	V Very high	
	E Extremely high	
Organic	O	append to classification for organic material (eg CHO)

Remarks

Approved:

Mirosława Pytlík
PL Head of
Geotechnical Section

Signed:

Sushil Sharda
Technical Manager
(Geotechnical Division)

Date Reported: 18/01/2017

for and on behalf of i2 Analytical Ltd

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TEST CERTIFICATE

Determination of Liquid and Plastic Limits

i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS



Tested in Accordance with BS1377-2: 1990: Clause 4.4 & 5: One Point Method

4041

Client: Opus International Consultants (UK) Ltd
Client Address: 1 South House
Bond Avenue
Milton Keynes
MK1 1SW
Contact: Emma Small
Site Name: Meadow School
Site Address: Not Given

Client Reference: J-M3932.12
Job Number: 17-36655
Date Sampled: 16/12/2016
Date Received: 04/01/2017
Date Tested: 16/01/2017
Sampled By: ES/EDH

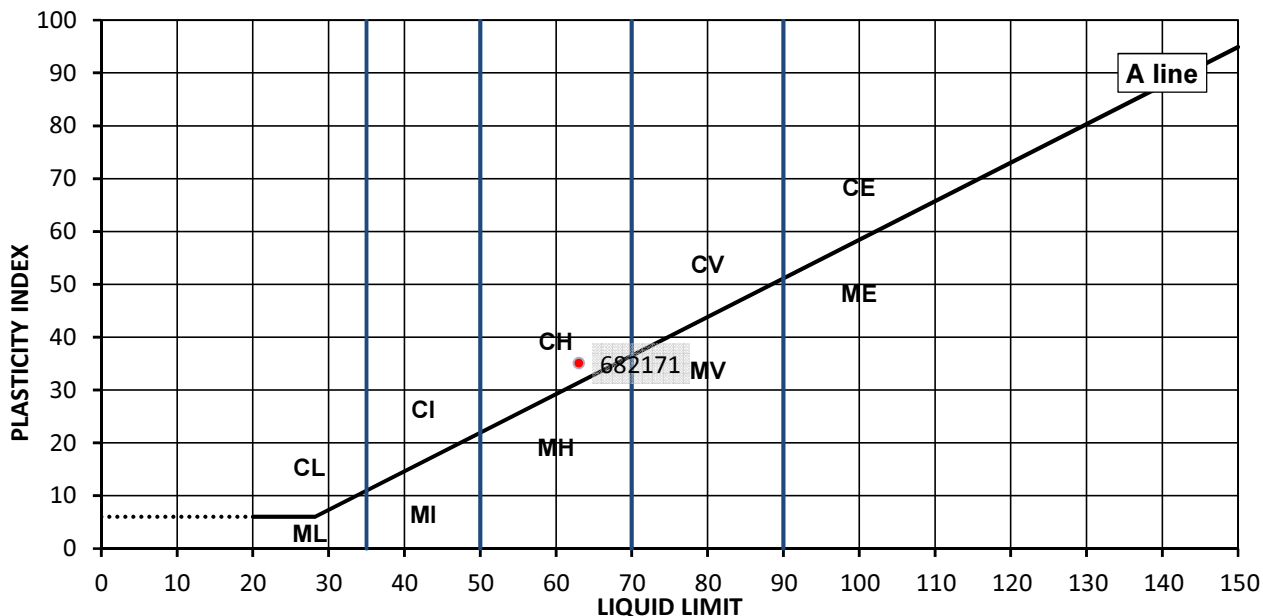
TEST RESULTS

Laboratory Reference: 682171
Sample Reference: Not Given

Description: Brown CLAY
Location: BH03
Sample Preparation: Tested in natural condition

Sample Type: B
Depth Top [m]: 5.4
Depth Base [m]: Not Given

As Received Moisture Content [%]	Liquid Limit [%]	Plastic Limit [%]	Plasticity Index [%]	% Passing 425µm BS Test Sieve
27	63	28	35	100



Legend, based on BS 5930:2015 Code of practice for site investigations

	Plasticity	Liquid Limit
C	Clay	below 35
M	Silt	35 to 50
	L	Low
	I	Medium
	H	High
	V	Very high
	E	Extremely high
	O	append to classification for organic material (eg CHO)
	Organic	

Remarks

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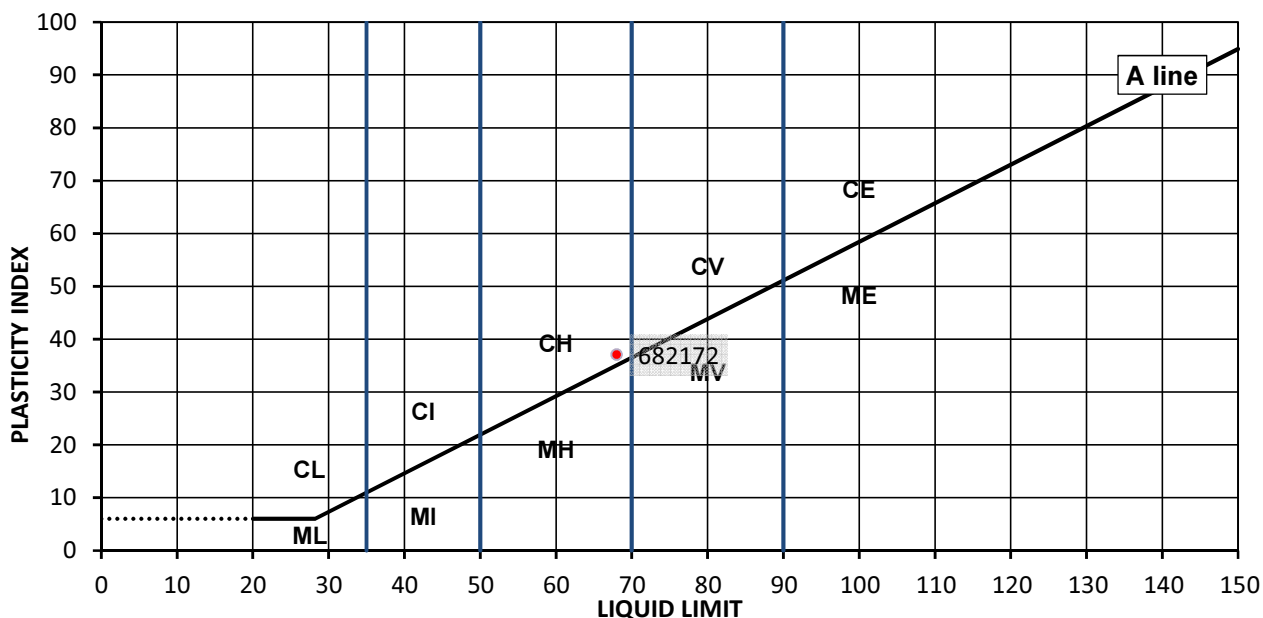
TEST RESULTS

Laboratory Reference: 682172
Sample Reference: Not Given

Description: Brown CLAY
Location: BH03
Sample Preparation: Tested in natural condition

Sample Type: B
Depth Top [m]: 8.5
Depth Base [m]: Not Given

As Received Moisture Content [%]	Liquid Limit [%]	Plastic Limit [%]	Plasticity Index [%]	% Passing 425µm BS Test Sieve
28	68	31	37	100



Legend, based on BS 5930:2015 Code of practice for site investigations

	Plasticity	Liquid Limit
C	Clay	below 35
M	Silt	35 to 50
	L	Low
	I	Medium
	H	High
	V	Very high
	E	Extremely high
		exceeding 90
Organic	O	append to classification for organic material (eg CHO)

Remarks

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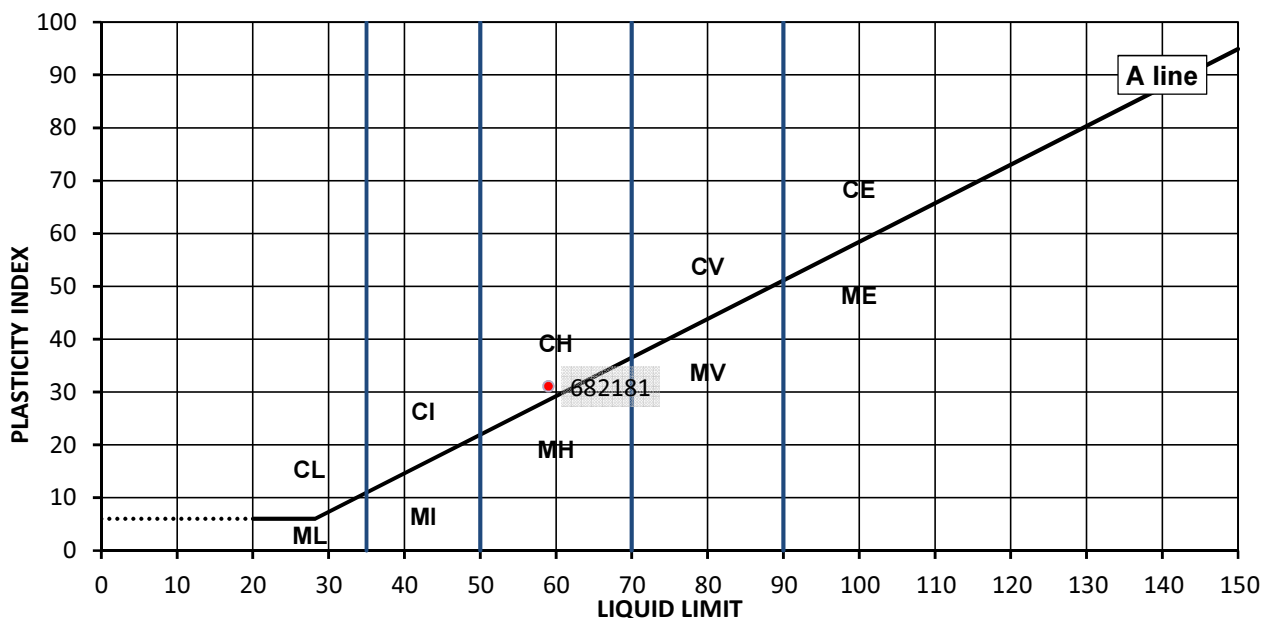
TEST RESULTS

Laboratory Reference: 682181
Sample Reference: Not Given

Description: Brown very gravelly CLAY
Location: BH03
Sample Preparation: Tested after washing to remove >425um

Sample Type: B
Depth Top [m]: 4.1
Depth Base [m]: 4.4

As Received Moisture Content [%]	Liquid Limit [%]	Plastic Limit [%]	Plasticity Index [%]	% Passing 425µm BS Test Sieve
19	59	28	31	41



Legend, based on BS 5930:2015 Code of practice for site investigations

	Plasticity	Liquid Limit
C	Clay	below 35
M	Silt	35 to 50
	L Low	50 to 70
	I Medium	70 to 90
	H High	exceeding 90
	V Very high	
	E Extremely high	
Organic	O	append to classification for organic material (eg CHO)

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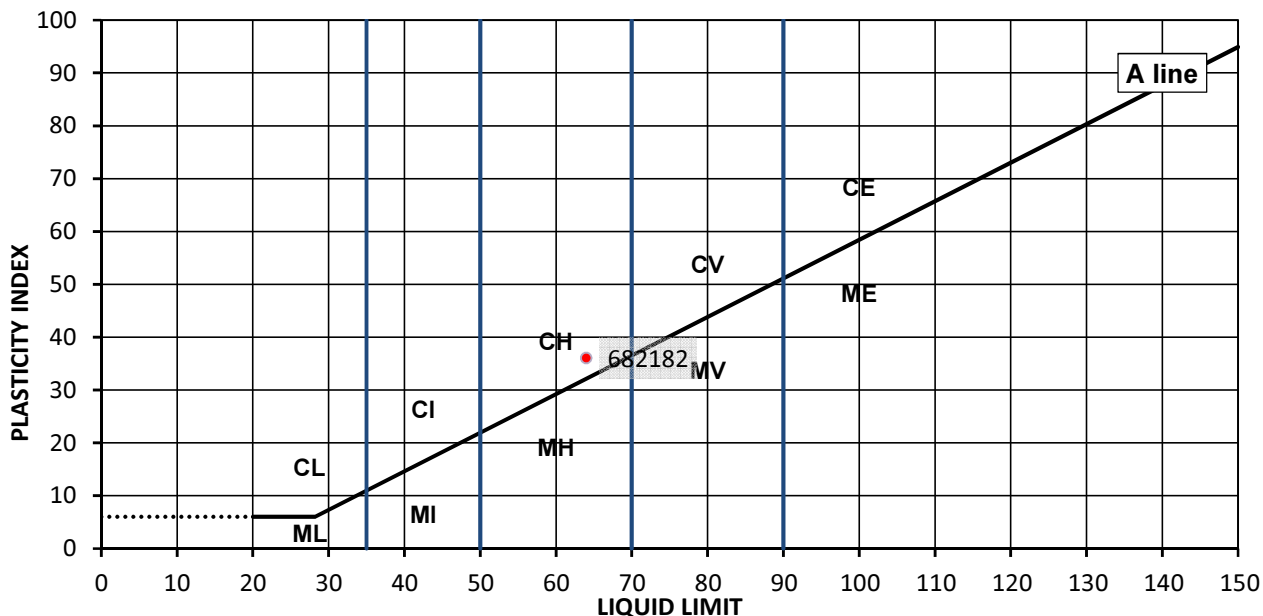
TEST RESULTS

Laboratory Reference: 682182
Sample Reference: Not Given

Description: Orangish brown slightly gravelly CLAY
Location: BH04
Sample Preparation: Tested after washing to remove >425um

Sample Type: B
Depth Top [m]: 4.4
Depth Base [m]: Not Given

As Received Moisture Content [%]	Liquid Limit [%]	Plastic Limit [%]	Plasticity Index [%]	% Passing 425µm BS Test Sieve
27	64	28	36	80



Legend, based on BS 5930:2015 Code of practice for site investigations

Plasticity		Liquid Limit
C	Clay	below 35
M	Silt	35 to 50
		50 to 70
		70 to 90
		exceeding 90
	Organic	
	O	append to classification for organic material (eg CHO)

Remarks

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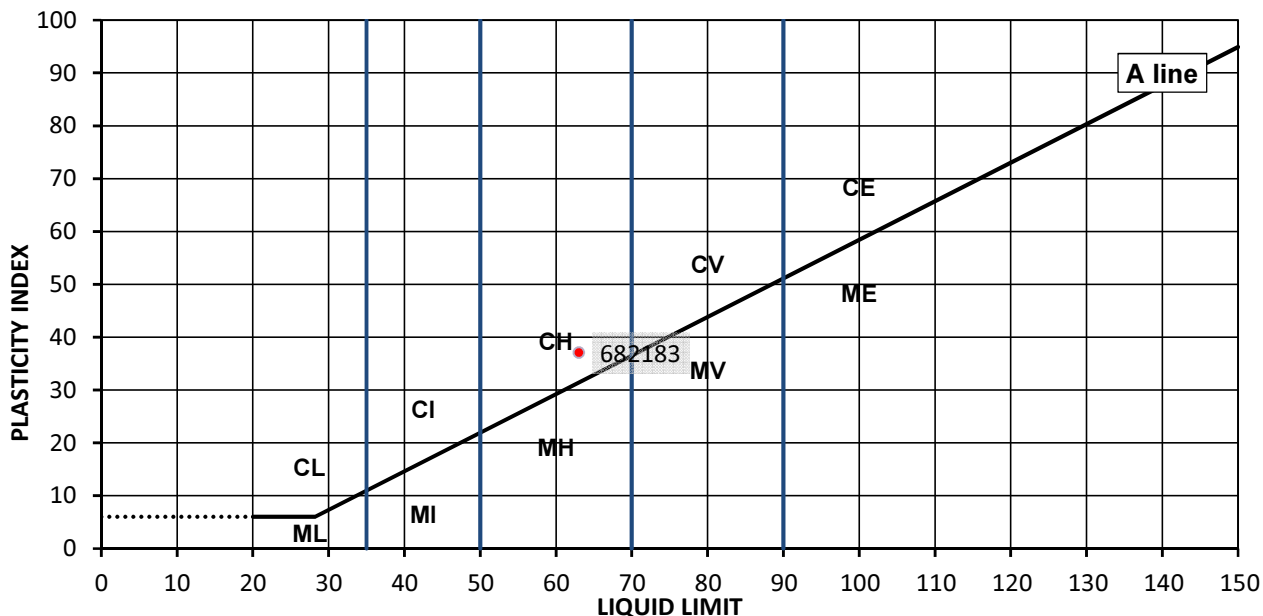
TEST RESULTS

Laboratory Reference: 682183
Sample Reference: Not Given

Description: Brown CLAY
Location: BH04
Sample Preparation: Tested in natural condition

Sample Type: B
Depth Top [m]: 7
Depth Base [m]: Not Given

As Received Moisture Content [%]	Liquid Limit [%]	Plastic Limit [%]	Plasticity Index [%]	% Passing 425µm BS Test Sieve
26	63	26	37	100



Legend, based on BS 5930:2015 Code of practice for site investigations

	Plasticity	Liquid Limit
C	Clay	below 35
M	Silt	35 to 50
	L Low	50 to 70
	I Medium	70 to 90
	H High	exceeding 90
	V Very high	
	E Extremely high	
	Organic	O append to classification for organic material (eg CHO)

Remarks

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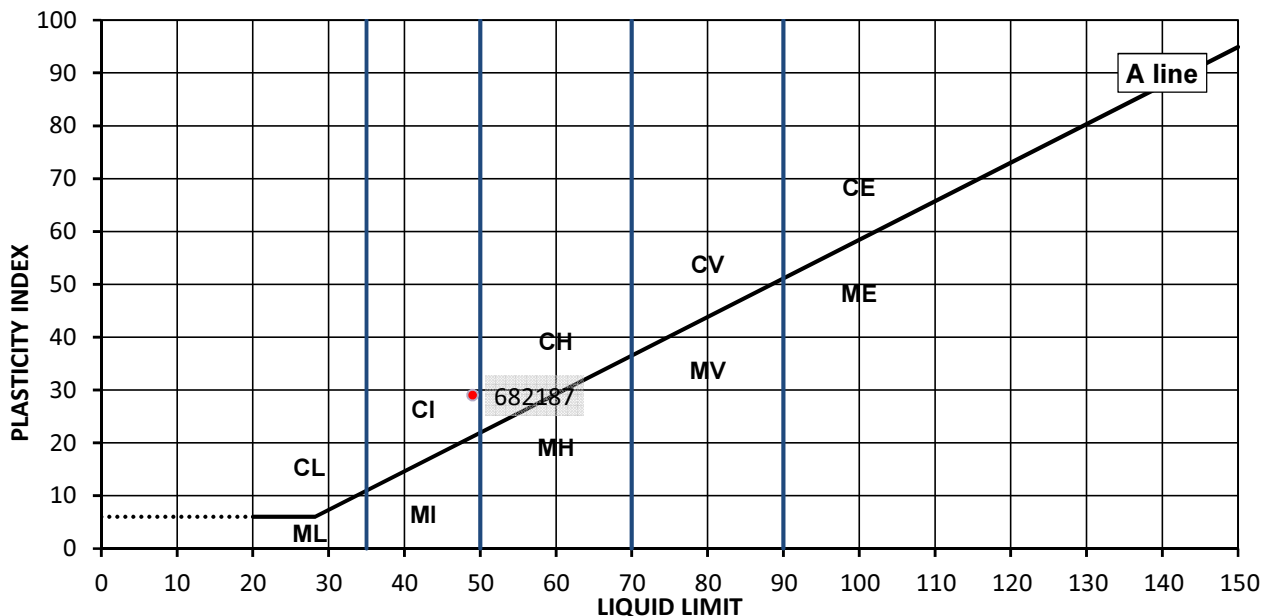
TEST RESULTS

Laboratory Reference: 682187
Sample Reference: Not Given

Description: Orangish brown slightly gravelly slightly sandy CLAY
Location: BH04
Sample Preparation: Tested after >425um removed by hand

Sample Type: B
Depth Top [m]: 0.7
Depth Base [m]: 1.1

As Received Moisture Content [%]	Liquid Limit [%]	Plastic Limit [%]	Plasticity Index [%]	% Passing 425µm BS Test Sieve
23	49	20	29	96



Legend, based on BS 5930:2015 Code of practice for site investigations

	Plasticity	Liquid Limit
C	Clay	below 35
M	Silt	35 to 50
	L Low	50 to 70
	I Medium	70 to 90
	H High	exceeding 90
	V Very high	
	E Extremely high	
	Organic	O append to classification for organic material (eg CHO)

Remarks

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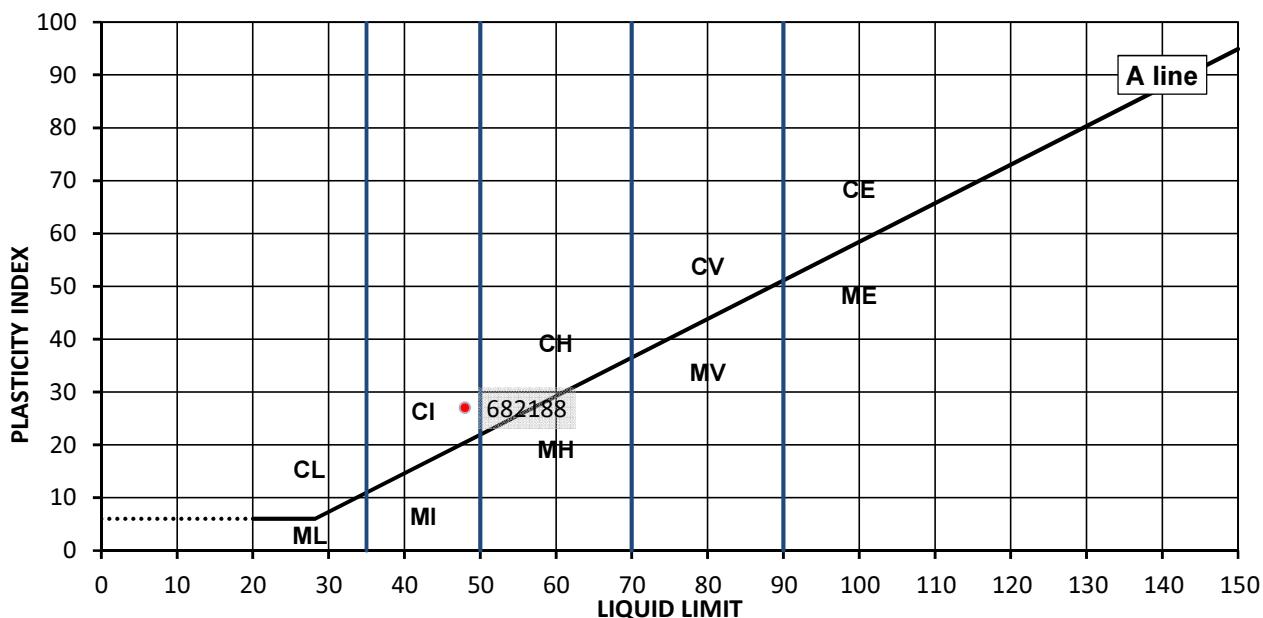
TEST RESULTS

Laboratory Reference: 682188
Sample Reference: Not Given

Description: Brown gravelly slightly sandy CLAY
Location: BH04
Sample Preparation: Tested after washing to remove >425um

Sample Type: B
Depth Top [m]: 1.3
Depth Base [m]: 1.7

As Received Moisture Content [%]	Liquid Limit [%]	Plastic Limit [%]	Plasticity Index [%]	% Passing 425µm BS Test Sieve
16	48	21	27	54



Legend, based on BS 5930:2015 Code of practice for site investigations

	Plasticity	Liquid Limit
C	Clay	below 35
M	Silt	35 to 50
	L	Low
	I	Medium
	H	High
	V	Very high
	E	Extremely high
		exceeding 90
	Organic	O
		append to classification for organic material (eg CHO)

Remarks

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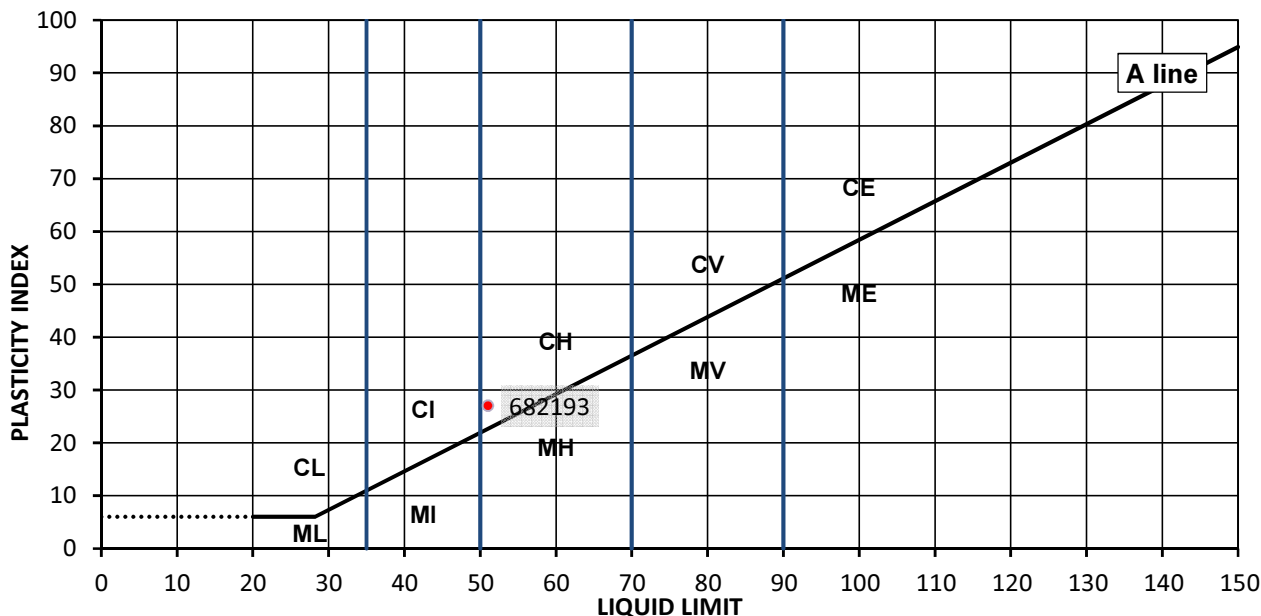
TEST RESULTS

Laboratory Reference: 682193
Sample Reference: Not Given

Description: Mottled brown slightly gravelly slightly sandy CLAY
Location: WS01
Sample Preparation: Tested after >425um removed by hand

Sample Type: B
Depth Top [m]: 0.7
Depth Base [m]: 1.1

As Received Moisture Content [%]	Liquid Limit [%]	Plastic Limit [%]	Plasticity Index [%]	% Passing 425µm BS Test Sieve
20	51	24	27	98



Legend, based on BS 5930:2015 Code of practice for site investigations

	Plasticity	Liquid Limit
C	Clay	below 35
M	Silt	35 to 50
	L	Low
	I	Medium
	H	High
	V	Very high
	E	Extremely high
		exceeding 90
	Organic	O
		append to classification for organic material (eg CHO)

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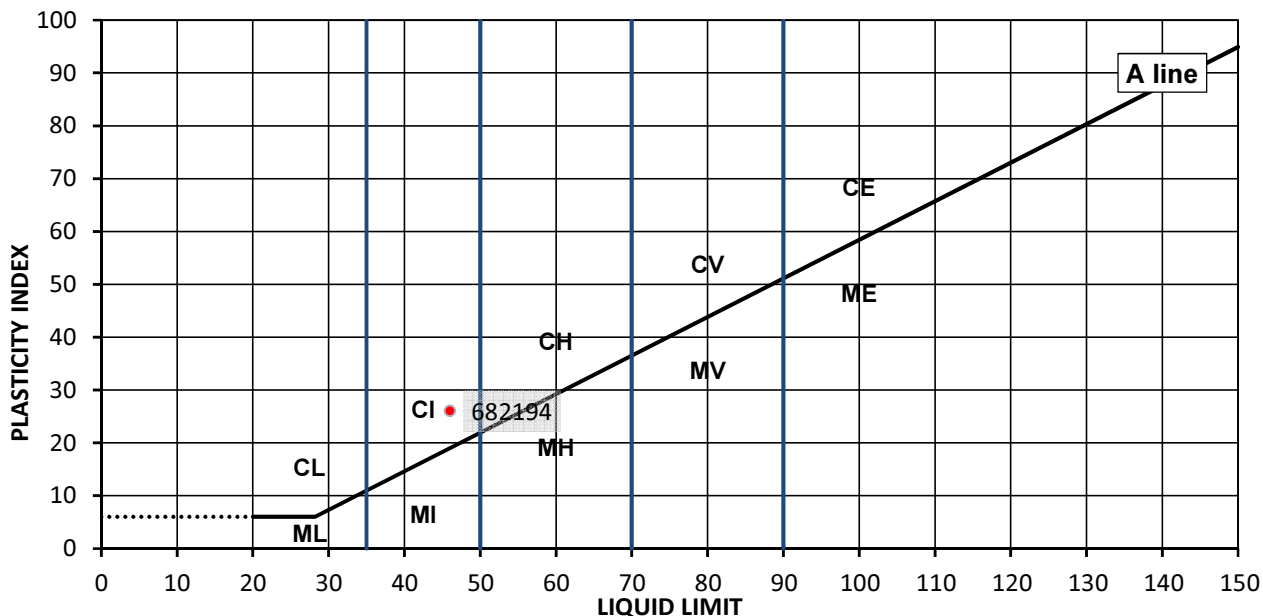
TEST RESULTS

Laboratory Reference: 682194
Sample Reference: Not Given

Description: Orangish brown sandy CLAY
Location: WS01
Sample Preparation: Tested in natural condition

Sample Type: D
Depth Top [m]: 1.4
Depth Base [m]: Not Given

As Received Moisture Content [%]	Liquid Limit [%]	Plastic Limit [%]	Plasticity Index [%]	% Passing 425µm BS Test Sieve
24	46	20	26	100



Legend, based on BS 5930:2015 Code of practice for site investigations

	Plasticity	Liquid Limit
C Clay	L Low	below 35
M Silt	I Medium	35 to 50
	H High	50 to 70
	V Very high	70 to 90
	E Extremely high	exceeding 90
Organic	O append to classification for organic material (eg CHO)	

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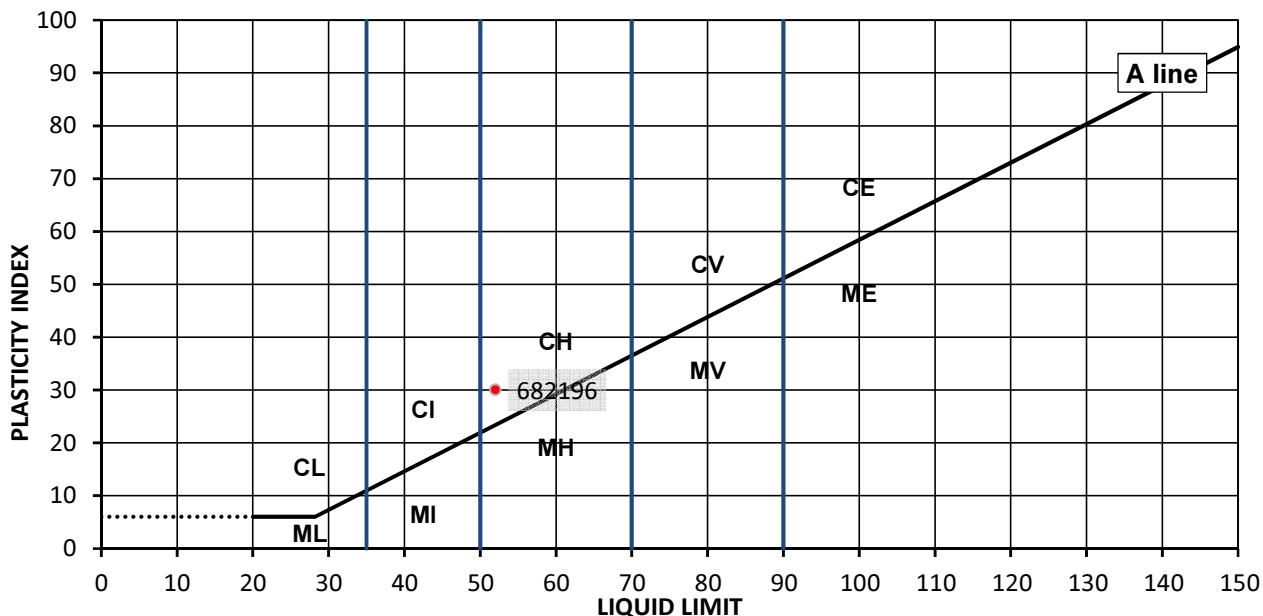
TEST RESULTS

Laboratory Reference: 682196
Sample Reference: Not Given

Description: Yellowish brown to grey slightly gravelly CLAY
Location: WS02
Sample Preparation: Tested after >425um removed by hand

Sample Type: B
Depth Top [m]: 0.6
Depth Base [m]: 0.9

As Received Moisture Content [%]	Liquid Limit [%]	Plastic Limit [%]	Plasticity Index [%]	% Passing 425µm BS Test Sieve
25	52	22	30	95



Legend, based on BS 5930:2015 Code of practice for site investigations

Plasticity		Liquid Limit
C	Clay	below 35
M	Silt	35 to 50
		50 to 70
		70 to 90
		exceeding 90
	Organic	
	O	append to classification for organic material (eg CHO)

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TEST RESULTS

Laboratory Reference: 682197
Sample Reference: Not Given

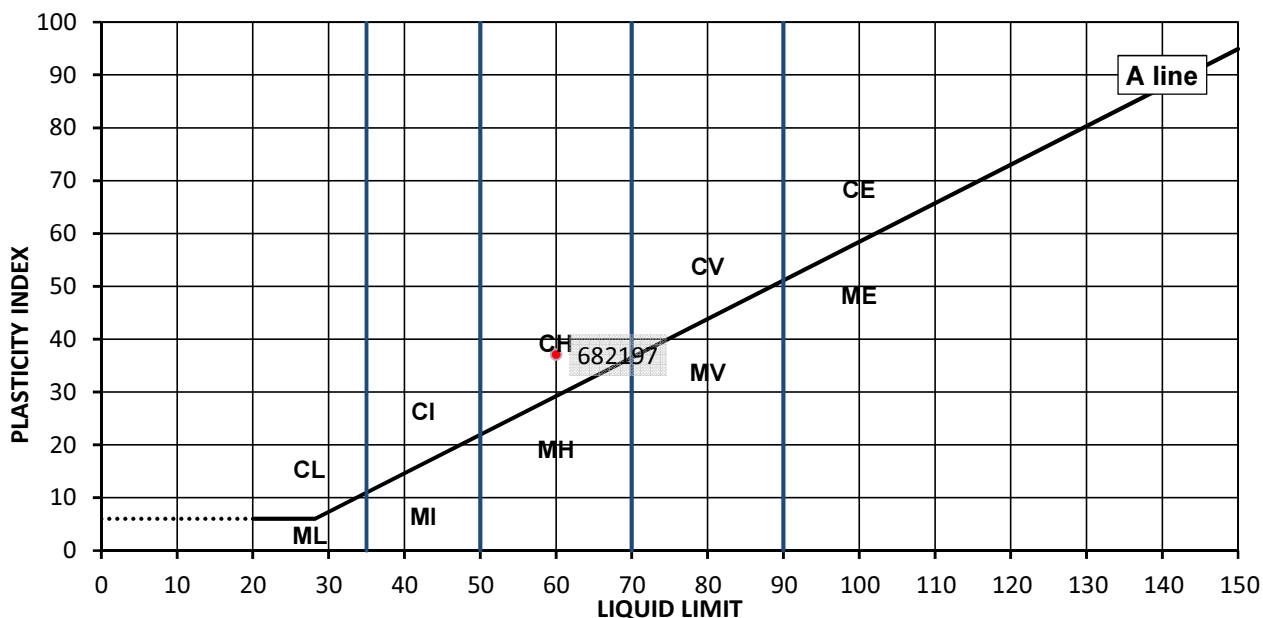
Description: Orangish brown to grey slightly gravelly CLAY

Location: WS02

Sample Preparation: Tested after >425um removed by hand

Sample Type: D
Depth Top [m]: 1
Depth Base [m]: Not Given

As Received Moisture Content [%]	Liquid Limit [%]	Plastic Limit [%]	Plasticity Index [%]	% Passing 425µm BS Test Sieve
23	60	23	37	98



Legend, based on BS 5930:2015 Code of practice for site investigations

		Plasticity	Liquid Limit
C	Clay	L Low	below 35
M	Silt	I Medium	35 to 50
		H High	50 to 70
		V Very high	70 to 90
		E Extremely high	exceeding 90
	Organic	O append to classification for organic material (eg CHO)	

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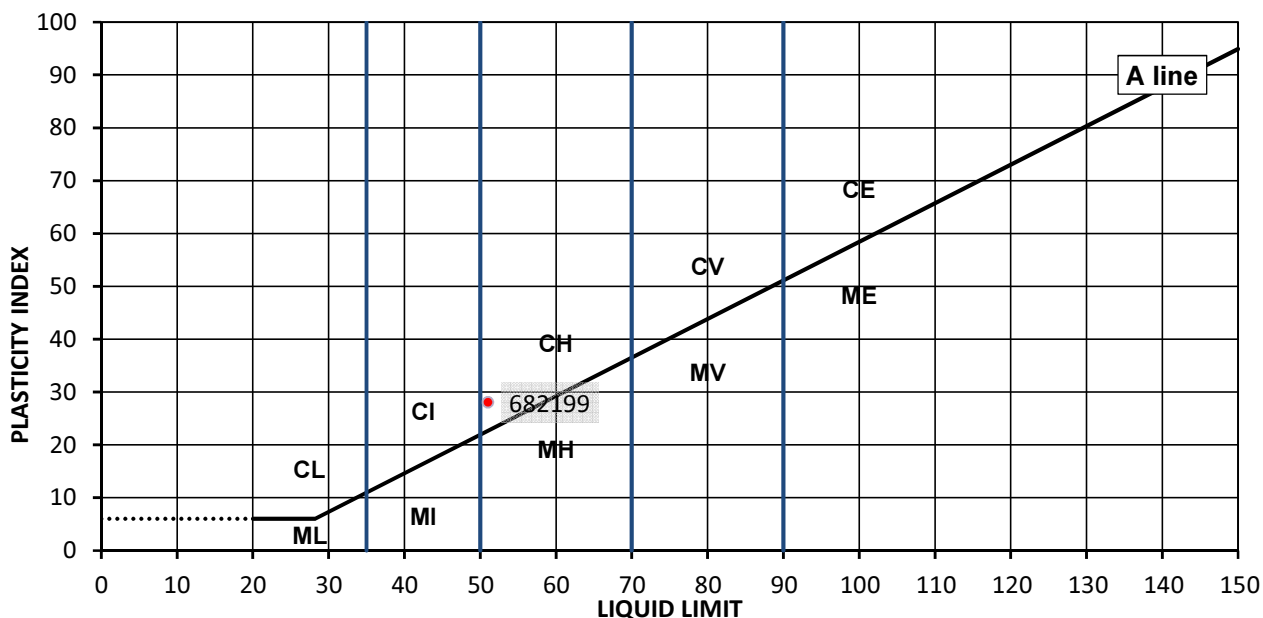
TEST RESULTS

Laboratory Reference: 682199
Sample Reference: Not Given

Description: Brown slightly sandy CLAY
Location: WS03
Sample Preparation: Tested in natural condition

Sample Type: D
Depth Top [m]: 1.1
Depth Base [m]: Not Given

As Received Moisture Content [%]	Liquid Limit [%]	Plastic Limit [%]	Plasticity Index [%]	% Passing 425µm BS Test Sieve
26	51	23	28	100



Legend, based on BS 5930:2015 Code of practice for site investigations

		Plasticity	Liquid Limit
C	Clay	L Low	below 35
M	Silt	I Medium	35 to 50
		H High	50 to 70
		V Very high	70 to 90
		E Extremely high	exceeding 90
	Organic	O append to classification for organic material (eg CHO)	

Remarks

Approved:

Mirosława Pytlík
PL Head of
Geotechnical Section

Signed:

Sushil Sharda
Technical Manager
(Geotechnical Division)

Date Reported: 18/01/2017

for and on behalf of i2 Analytical Ltd

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The analysis was carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland."

TEST CERTIFICATE**Summary of Classification Test Results**

i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS



Client: Opus International Consultants (UK) Ltd
Client Address: 1 South House
Bond Avenue
Milton Keynes
MK1 1SW
Emma Small
Contact:
Site Name: Meadow School
Site Address: Not Given

Client Reference: J-M3932.12
Job Number: 17-36655
Date Sampled: 16/12 - 21/12/2016
Date Received: 04/01/2017
Date Tested: 13/01 - 13/11/2017
Sampled By: ES/EDH

Test results

Laboratory Reference	Hole No.	Sample				Soil Description	Density		M/C	Atterberg				PD
		Reference	Top depth [m]	Base depth [m]	Type		bulk	dry		% Passing 425um	LL	PL	PI	
							Mg/m3	Mg/m3						
682149	BH01	Not Given	4.60	Not Given	B	Brown slightly gravelly CLAY			25	96	61	28	33	
682150	BH01	Not Given	7.10	Not Given	B	Brown CLAY			26	100	59	22	37	
682152	BH01	Not Given	9.60	10.00	U	Greyish brown CLAY			26	100	61	27	34	
682159	BH01	Not Given	4.00	4.40	B	Brown gravelly slightly sandy CLAY			22	52	51	19	32	
682160	BH02	Not Given	3.80	Not Given	B	Brown slightly gravelly CLAY			27	76	63	23	40	
682161	BH02	Not Given	4.40	Not Given	B	Brown CLAY			27	100	61	25	36	
682162	BH02	Not Given	7.00	Not Given	B	Brown CLAY			27	100	64	28	36	
682171	BH03	Not Given	5.40	Not Given	B	Brown CLAY			27	100	63	28	35	
682172	BH03	Not Given	8.50	Not Given	B	Brown CLAY			28	100	68	31	37	
682181	BH03	Not Given	4.10	4.40	B	Brown very gravelly CLAY			19	41	59	28	31	

Comments:

Approved:

Mirosława Pytlík
PL Head of Geotechnical Section

Signed:

Sushil Sharda
Technical Manager (Geotechnical Division)

Date Reported: 18/01/2017

for and on behalf of i2 Analytical Ltd

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TEST CERTIFICATE

Summary of Classification Test Results

i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS



Client: Opus International Consultants (UK) Ltd
Client Address: 1 South House
Bond Avenue
Milton Keynes
MK1 1SW
Contact: Emma Small
Site Name: Meadow School
Site Address: Not Given

Client Reference: J-M3932.12
Job Number: 17-36655
Date Sampled: 19/12/2016
Date Received: 04/01/2017
Date Tested: 16/01/2017
Sampled By: ES/EDH

Test results

Laboratory Reference	Hole No.	Sample				Soil Description	Density		M/C	Atterberg				PD
		Reference	Top depth [m]	Base depth [m]	Type		bulk	dry		% Passing 425um	LL	PL	PI	
							Mg/m3	Mg/m3						
682182	BH04	Not Given	4.40	Not Given	B	Orangish brown slightly gravelly CLAY			27	80	64	28	36	
682183	BH04	Not Given	7.00	Not Given	B	Brown CLAY			26	100	63	26	37	
682187	BH04	Not Given	0.70	1.10	B	Orangish brown slightly gravelly slightly sandy CLAY			23	96	49	20	29	
682188	BH04	Not Given	1.30	1.70	B	Brown gravelly slightly sandy CLAY			16	54	48	21	27	
682193	WS01	Not Given	0.70	1.10	B	Mottled brown slightly gravelly slightly sandy CLAY			20	98	51	24	27	
682194	WS01	Not Given	1.40	Not Given	D	Orangish brown sandy CLAY			24	100	46	20	26	
682196	WS02	Not Given	0.60	0.90	B	Yellowish brown to grey slightly gravelly CLAY			25	95	52	22	30	
682197	WS02	Not Given	1.00	Not Given	D	Orangish brown to grey slightly gravelly CLAY			23	98	60	23	37	
682199	WS03	Not Given	1.10	Not Given	D	Brown slightly sandy CLAY			26	100	51	23	28	

Comments:

Approved:

Mirosława Pytlík
PL Head of Geotechnical Section

Signed:

Sushil Sharda
Technical Manager (Geotechnical Division)

Date Reported: 18/01/2017

for and on behalf of i2 Analytical Ltd

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4041

TEST CERTIFICATE**Determination of Particle Size Distribution**

Tested in Accordance with BS1377:Part 2:1990, clause 9.2

i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS



Client: Opus International Consultants (UK) Ltd
Client Address: 1 South House
Bond Avenue
Milton Keynes
MK1 1SW
Contact: Emma Small
Site Name: Meadow School
Site Address: Not Given

Client Reference: J-M3932.12
Job Number: 17-36655
Date Sampled: 20/12/2016
Date Received: 04/01/2017
Date Tested: 16/01/2017
Sampled By: ES/EDH

TEST RESULTS

Laboratory Reference: 682156

Sample Reference: Not Given

Sample description: Brown sandy clayey GRAVEL

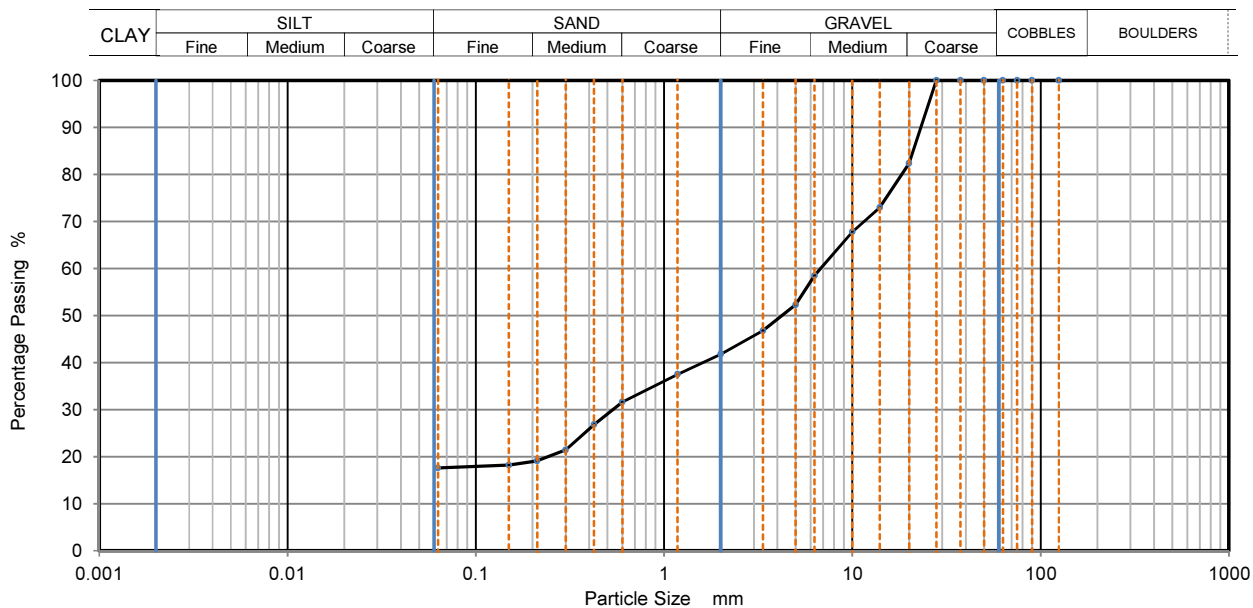
Sample Type: B

Location: BH01

Depth Top [m]: 1.2

Supplier: Not Given

Depth Base [m]: 1.6



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	82		
14	73		
10	68		
6.3	59		
5	52		
3.35	47		
2	42		
1.18	38		
0.6	32		
0.425	27		
0.3	21		
0.212	19		
0.15	18		
0.063	18		

Dry Mass of sample [g]: 638

Sample Proportions		% dry mass
Very coarse		0.00
Gravel		58.20
Sand		24.20
Fines <0.063mm		17.60

Grading Analysis		
D100	mm	28
D60	mm	6.79
D30	mm	0.534
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

Preparation and testing in accordance with BS1377 unless noted below

Approved:

Mirosława Pytlík
PL Head of
Geotechnical Section

Date Reported: 18/01/2017

Signed:

Sushil Sharda
Technical Manager
(Geotechnical Division)

for and on behalf of i2 Analytical Ltd

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TEST CERTIFICATE**Determination of Particle Size Distribution**

Tested in Accordance with BS1377:Part 2:1990, clause 9.2

i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS

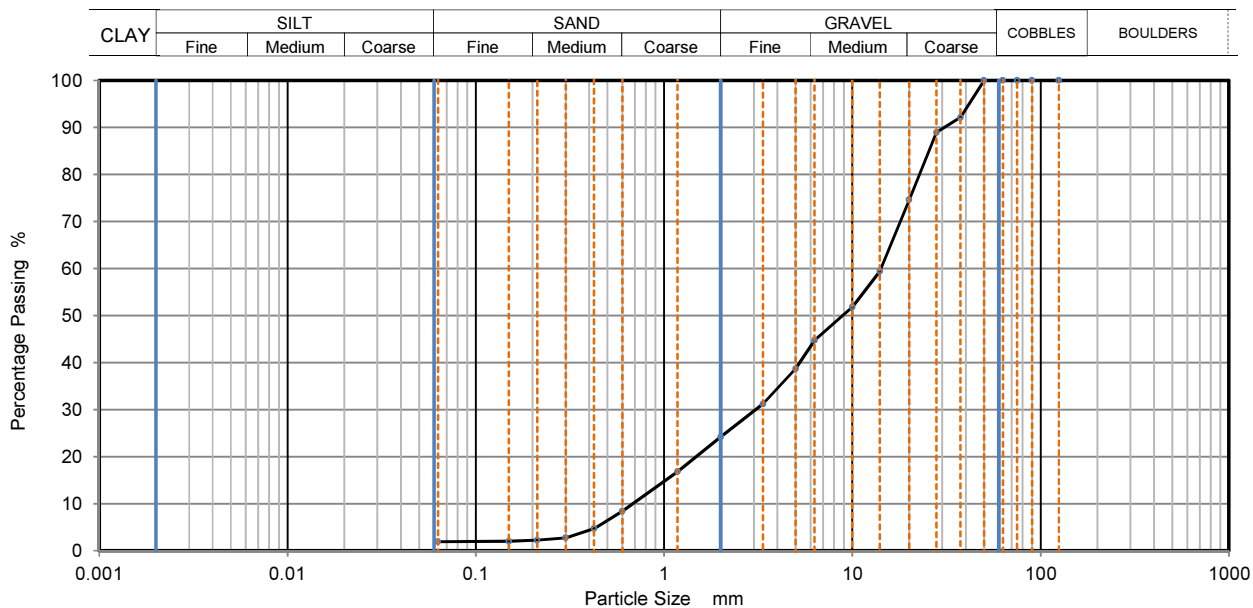


Client: Opus International Consultants (UK) Ltd
Client Address: 1 South House
Bond Avenue
Milton Keynes
MK1 1SW
Contact: Emma Small
Site Name: Meadow School
Site Address: Not Given

Client Reference: J-M3932.12
Job Number: 17-36655
Date Sampled: 20/12/2016
Date Received: 04/01/2017
Date Tested: 16/01/2017
Sampled By: ES/EDH

TEST RESULTS Laboratory Reference: 682157
Sample description: Brown slightly clayey sandy GRAVEL
Location: BH01
Supplier: Not Given

Sample Reference: Not Given
Sample Type: B
Depth Top [m]: 2
Depth Base [m]: 2.5



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	92		
28	89		
20	75		
14	59		
10	52		
6.3	45		
5	39		
3.35	31		
2	24		
1.18	17		
0.6	8		
0.425	5		
0.3	3		
0.212	2		
0.15	2		
0.063	2		

Dry Mass of sample [g]: 2191

Sample Proportions	% dry mass
Very coarse	0.00
Gravel	75.80
Sand	22.20
Fines <0.063mm	1.90

Grading Analysis	
D100	mm 50
D60	mm 14.2
D30	mm 3.07
D10	mm 0.681
Uniformity Coefficient	21
Curvature Coefficient	0.98

Remarks
Preparation and testing in accordance with BS1377 unless noted below

Approved:

Mirosława Pytlík
PL Head of
Geotechnical Section

Date Reported: 18/01/2017

Signed:

Sushil Sharda
Technical Manager
(Geotechnical Division)

for and on behalf of i2 Analytical Ltd

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4041

TEST CERTIFICATE**Determination of Particle Size Distribution**

Tested in Accordance with BS1377:Part 2:1990, clause 9.2

i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS

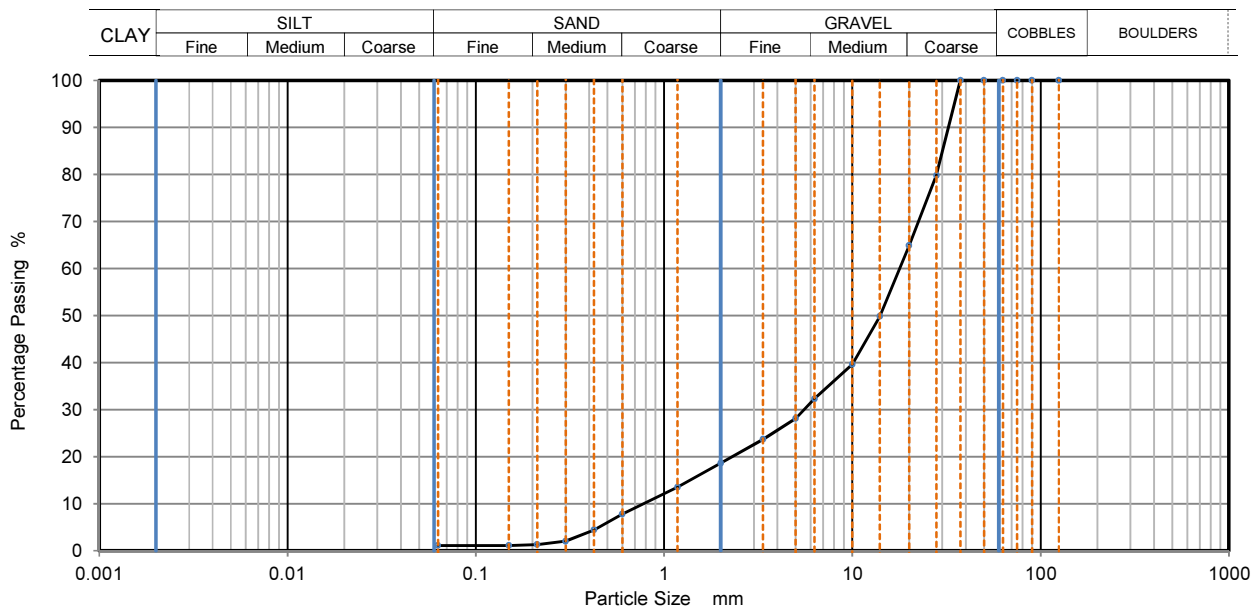


Client: Opus International Consultants (UK) Ltd
Client Address: 1 South House
Bond Avenue
Milton Keynes
MK1 1SW
Contact: Emma Small
Site Name: Meadow School
Site Address: Not Given

Client Reference: J-M3932.12
Job Number: 17-36655
Date Sampled: 20/12/2016
Date Received: 04/01/2017
Date Tested: 16/01/2017
Sampled By: ES/EDH

TEST RESULTS Laboratory Reference: 682158
Sample description: Brown slightly clayey sandy GRAVEL
Location: BH01
Supplier: Not Given

Sample Reference: Not Given
Sample Type: B
Depth Top [m]: 3.1
Depth Base [m]: 3.5



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	80		
20	65		
14	50		
10	40		
6.3	32		
5	28		
3.35	24		
2	19		
1.18	14		
0.6	8		
0.425	4		
0.3	2		
0.212	1		
0.15	1		
0.063	1		

Dry Mass of sample [g]: 2024

Sample Proportions		% dry mass
Very coarse		0.00
Gravel		81.40
Sand		17.50
Fines <0.063mm		1.10

Grading Analysis		
D100	mm	37.5
D60	mm	17.8
D30	mm	5.55
D10	mm	0.779
Uniformity Coefficient		23
Curvature Coefficient		2.2

Remarks

Preparation and testing in accordance with BS1377 unless noted below

Approved:

Mirosława Pytlík
PL Head of
Geotechnical Section

Date Reported: 18/01/2017

Signed:

Sushil Sharda
Technical Manager
(Geotechnical Division)

for and on behalf of i2 Analytical Ltd

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4041

TEST CERTIFICATE**Determination of Particle Size Distribution**

Tested in Accordance with BS1377:Part 2:1990, clause 9.2

i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS



Client: Opus International Consultants (UK) Ltd
Client Address: 1 South House
Bond Avenue
Milton Keynes
MK1 1SW
Contact: Emma Small
Site Name: Meadow School
Site Address: Not Given

Client Reference: J-M3932.12
Job Number: 17-36655
Date Sampled: 20/12/2016
Date Received: 04/01/2017
Date Tested: 16/01/2017
Sampled By: ES/EDH

TEST RESULTS

Laboratory Reference: 682168

Sample Reference: Not Given

Sample description: Greyish brown clayey sandy GRAVEL

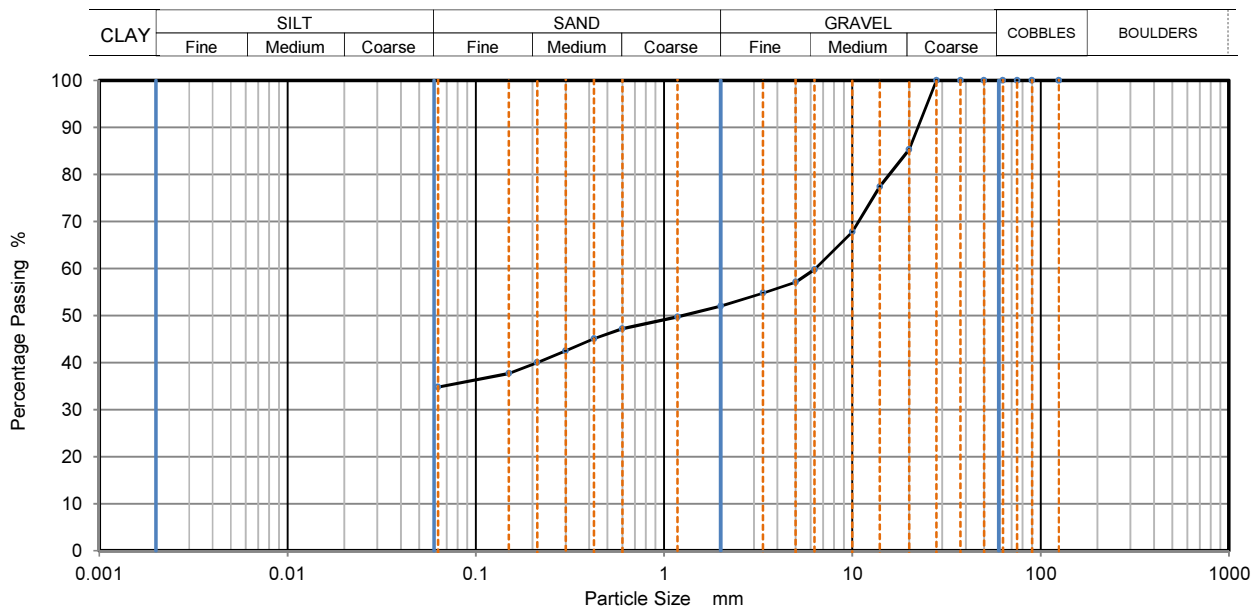
Sample Type: B

Location: BH02

Depth Top [m]: 1.3

Supplier: Not Given

Depth Base [m]: 1.7



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	85		
14	77		
10	68		
6.3	60		
5	57		
3.35	55		
2	52		
1.18	50		
0.6	47		
0.425	45		
0.3	43		
0.212	40		
0.15	38		
0.063	35		

Dry Mass of sample [g]: 452

Sample Proportions		% dry mass
Very coarse		0.00
Gravel		48.00
Sand		17.20
Fines <0.063mm		34.80

Grading Analysis		
D100	mm	28
D60	mm	6.36
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

Preparation and testing in accordance with BS1377 unless noted below

Approved:

Mirosława Pytlík
PL Head of
Geotechnical Section

Date Reported: 18/01/2017

Signed:

Sushil Sharda
Technical Manager
(Geotechnical Division)

for and on behalf of i2 Analytical Ltd

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4041

TEST CERTIFICATE**Determination of Particle Size Distribution**

Tested in Accordance with BS1377:Part 2:1990, clause 9.2

i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS



Environmental Science

Client: Opus International Consultants (UK) Ltd
Client Address: 1 South House
Bond Avenue
Milton Keynes
MK1 1SW
Contact: Emma Small
Site Name: Meadow School
Site Address: Not Given

Client Reference: J-M3932.12
Job Number: 17-36655
Date Sampled: 20/12/2016
Date Received: 04/01/2017
Date Tested: 16/01/2017
Sampled By: ES/EDH

TEST RESULTS

Laboratory Reference: 682169

Sample Reference: Not Given

Sample description: Multicolour slightly clayey sandy GRAVEL

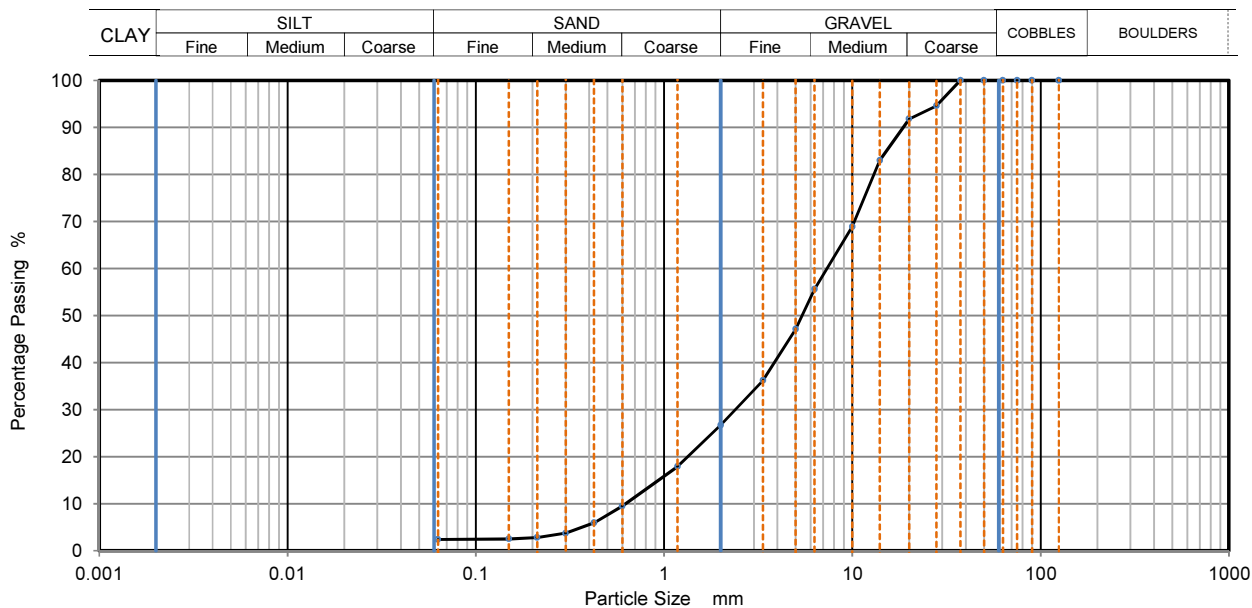
Sample Type: B

Location: BH02

Depth Top [m]: 2.1

Supplier: Not Given

Depth Base [m]: 2.5



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	95		
20	92		
14	83		
10	69		
6.3	56		
5	47		
3.35	36		
2	27		
1.18	18		
0.6	10		
0.425	6		
0.3	4		
0.212	3		
0.15	3		
0.063	2		

Dry Mass of sample [g]: 754

Sample Proportions	% dry mass
Very coarse	0.00
Gravel	73.30
Sand	24.30
Fines <0.063mm	2.40

Grading Analysis	
D100	mm 37.5
D60	mm 7.34
D30	mm 2.39
D10	mm 0.625
Uniformity Coefficient	12
Curvature Coefficient	1.2

Remarks

Preparation and testing in accordance with BS1377 unless noted below

Approved:

Mirosława Pytlík
PL Head of
Geotechnical Section

Date Reported: 18/01/2017

Signed:

Sushil Sharda
Technical Manager
(Geotechnical Division)

for and on behalf of i2 Analytical Ltd

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4041

TEST CERTIFICATE**Determination of Particle Size Distribution**

Tested in Accordance with BS1377:Part 2:1990, clauses 9.2 and 9.5

i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS

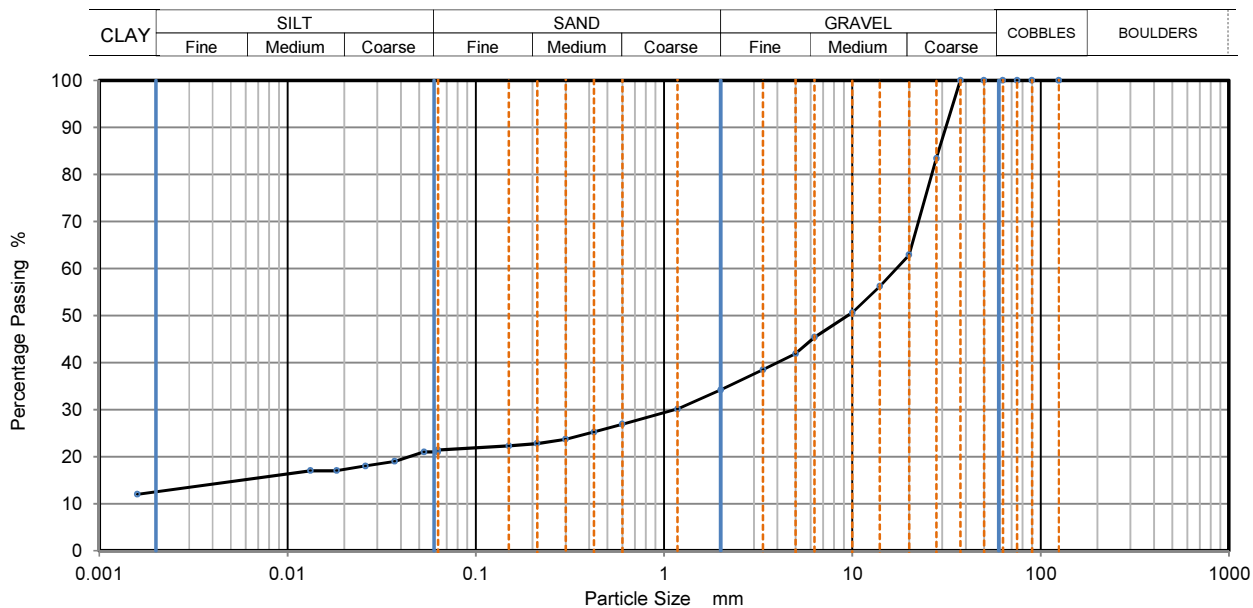


Client: Opus International Consultants (UK) Ltd
Client Address: 1 South House
Bond Avenue
Milton Keynes
MK1 1SW
Contact: Emma Small
Site Name: Meadow School
Site Address: Not Given

Client Reference: J-M3932.12
Job Number: 17-36655
Date Sampled: 20/12/2016
Date Received: 04/01/2017
Date Tested: 16/01/2017
Sampled By: ES/EDH

TEST RESULTS Laboratory Reference: 682170
Sample description: Brown silty clayey sandy GRAVEL
Location: BH02
Supplier: Not Given

Sample Reference: Not Given
Sample Type: B
Depth Top [m]: 3.2
Depth Base [m]: 3.6



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	21
90	100	0.0531	21
75	100	0.0371	19
63	100	0.0260	18
50	100	0.0182	17
37.5	100	0.0132	17
28	83	0.0016	12
20	63		
14	56		
10	51		
6.3	45		
5	42		
3.35	39		
2	34		
1.18	30		
0.6	27	Particle density (assumed) 2.65 Mg/m ³	
0.425	25		
0.3	24		
0.212	23		
0.15	22		
0.063	21		

Dry Mass of sample [g]: 719

Sample Proportions		% dry mass
Very coarse		0.00
Gravel		65.80
Sand		12.80
Silt		8.50
Clay		12.90

Grading Analysis		
D100	mm	37.5
D60	mm	17.1
D30	mm	1.16
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks
Preparation and testing in accordance with BS1377 unless noted below

Approved:

Mirosława Pytlík
PL Head of
Geotechnical Section

Date Reported: 18/01/2017

Signed:

Sushil Sharda
Technical Manager
(Geotechnical Division)

for and on behalf of i2 Analytical Ltd

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Determination of Particle Size Distribution



Tested in Accordance with BS1377:Part 2:1990, clauses 9.2 and 9.5

Client: Opus International Consultants (UK) Ltd
Client Address: 1 South House
Bond Avenue
Milton Keynes
MK1 1SW
Contact: Emma Small
Site Name: Meadow School
Site Address: Not Given

Client Reference: J-M3932.12
Job Number: 17-36655
Date Sampled: 16/12/2016
Date Received: 04/01/2017
Date Tested: 16/01/2017
Sampled By: ES/EDH

TEST RESULTS

Laboratory Reference: 682178

Sample Reference: Not Given

Sample description: Brown silty clayey sandy GRAVEL

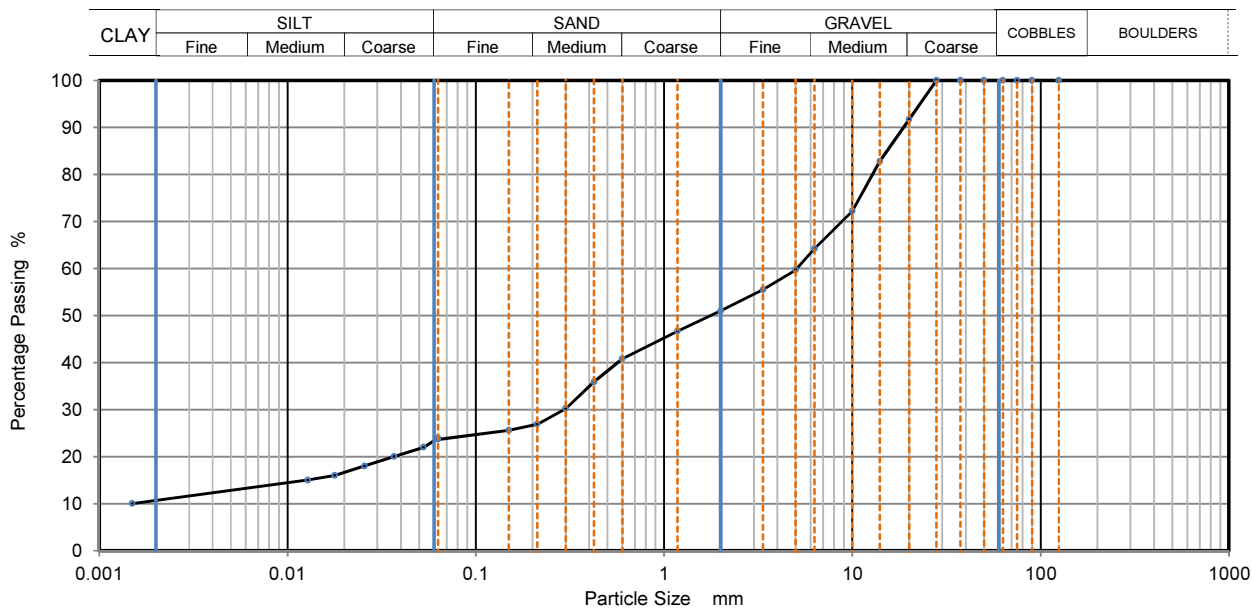
Sample Type: B

Location: BH03

Depth Top [m]: 1.3

Supplier: Not Given

Depth Base [m]: 1.6



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	24
90	100	0.0528	22
75	100	0.0367	20
63	100	0.0257	18
50	100	0.0178	16
37.5	100	0.0128	15
28	100	0.0015	10
20	92		
14	83		
10	72		
6.3	64		
5	60		
3.35	56		
2	51		
1.18	47		
0.6	41	Particle density 2.65 (assumed) Mg/m3	
0.425	36		
0.3	30		
0.212	27		
0.15	26		
0.063	24		

Dry Mass of sample [g]: 684

Sample Proportions	% dry mass
Very coarse	0.00
Gravel	49.00
Sand	27.30
Silt	13.10
Clay	10.60

Grading Analysis		
D100	mm	28
D60	mm	5.09
D30	mm	0.294
D10	mm	0.00154
Uniformity Coefficient		3300
Curvature Coefficient		11

Remarks

Preparation and testing in accordance with BS1377 unless noted below

Approved:

Mirosława Pytlik
PL Head of
Geotechnical Section

Date Reported: 18/01/2017

Signed:

Sushil Sharda
Technical Manager
(Geotechnical Division)

for and on behalf of i2 Analytical Ltd

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4041

TEST CERTIFICATE**Determination of Particle Size Distribution**

Tested in Accordance with BS1377:Part 2:1990, clause 9.2

i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS

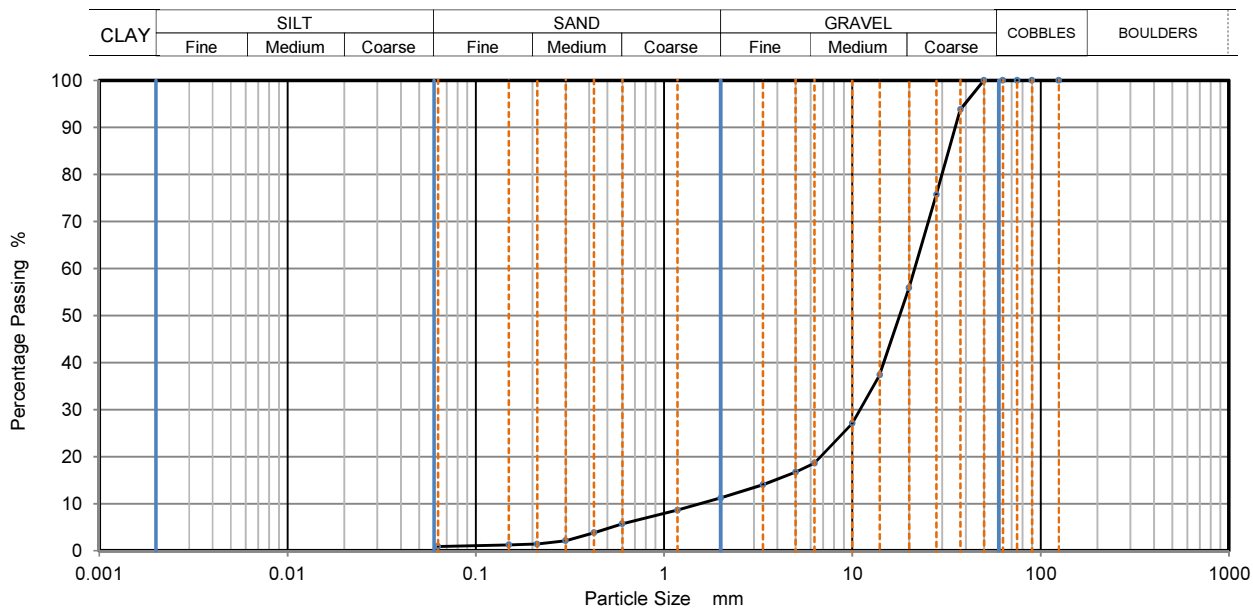


Client: Opus International Consultants (UK) Ltd
Client Address: 1 South House
Bond Avenue
Milton Keynes
MK1 1SW
Contact: Emma Small
Site Name: Meadow School
Site Address: Not Given

Client Reference: J-M3932.12
Job Number: 17-36655
Date Sampled: 16/12/2016
Date Received: 04/01/2017
Date Tested: 13/01/2017
Sampled By: ES/EDH

TEST RESULTS Laboratory Reference: 682179
Sample description: Yellowish brown sandy GRAVEL
Location: BH03
Supplier: Not Given

Sample Reference: Not Given
Sample Type: B
Depth Top [m]: 2.1
Depth Base [m]: 2.5



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	94		
28	76		
20	56		
14	37		
10	27		
6.3	19		
5	17		
3.35	14		
2	11		
1.18	9		
0.6	6		
0.425	4		
0.3	2		
0.212	1		
0.15	1		
0.063	1		

Dry Mass of sample [g]: 6203

Sample Proportions	% dry mass
Very coarse	0.00
Gravel	88.80
Sand	10.30
Fines <0.063mm	0.90

Grading Analysis	
D100	mm 50
D60	mm 21.4
D30	mm 11
D10	mm 1.56
Uniformity Coefficient	14
Curvature Coefficient	3.6

Remarks

Preparation and testing in accordance with BS1377 unless noted below

Approved:

Mirosława Pytlík
PL Head of
Geotechnical Section

Date Reported: 18/01/2017

Signed:

Sushil Sharda
Technical Manager
(Geotechnical Division)

for and on behalf of i2 Analytical Ltd

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4041

TEST CERTIFICATE**Determination of Particle Size Distribution**

Tested in Accordance with BS1377:Part 2:1990, clause 9.2

i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS

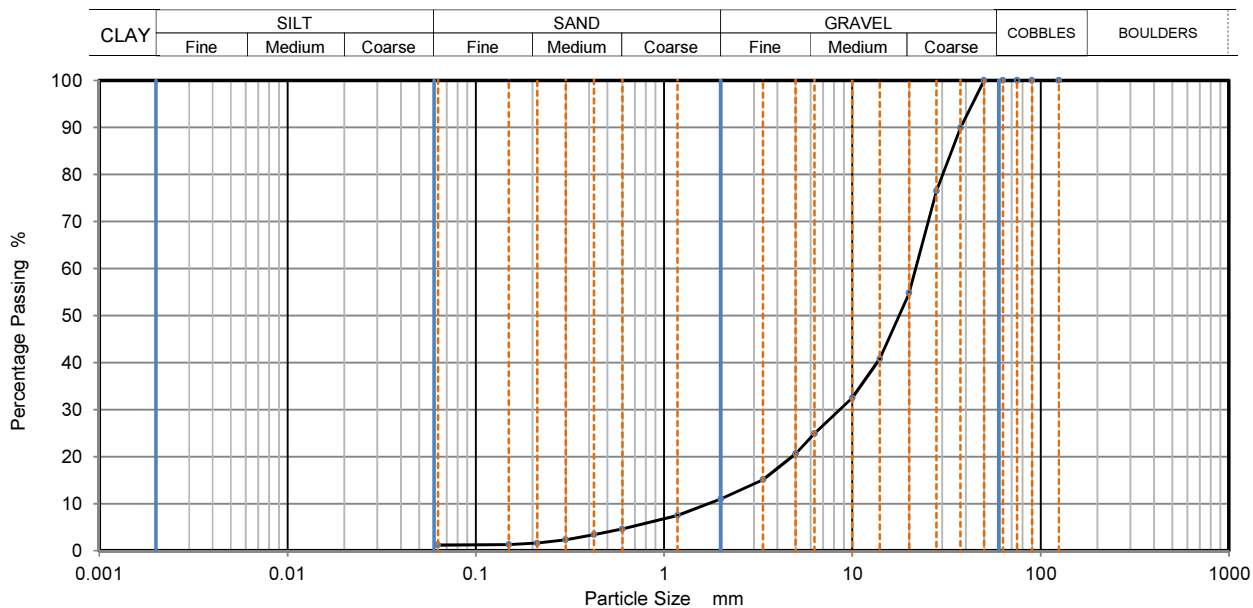


Client: Opus International Consultants (UK) Ltd
Client Address: 1 South House
Bond Avenue
Milton Keynes
MK1 1SW
Contact: Emma Small
Site Name: Meadow School
Site Address: Not Given

Client Reference: J-M3932.12
Job Number: 17-36655
Date Sampled: 16/12/2016
Date Received: 04/01/2017
Date Tested: 16/01/2007
Sampled By: ES/EDH

TEST RESULTS
Laboratory Reference: 682180
Sample description: Brown slightly clayey sandy GRAVEL
Location: BH03
Supplier: Not Given

Sample Reference: Not Given
Sample Type: B
Depth Top [m]: 3.1
Depth Base [m]: 3.5



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	90		
28	77		
20	55		
14	41		
10	33		
6.3	25		
5	21		
3.35	15		
2	11		
1.18	8		
0.6	5		
0.425	3		
0.3	2		
0.212	2		
0.15	1		
0.063	1		

Dry Mass of sample [g]: 5769

Sample Proportions	% dry mass
Very coarse	0.00
Gravel	89.00
Sand	9.80
Fines <0.063mm	1.20

Grading Analysis	
D100	mm 50
D60	mm 21.7
D30	mm 8.57
D10	mm 1.72
Uniformity Coefficient	13
Curvature Coefficient	2

Remarks

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Approved:

Mirosława Pytlík
PL Head of
Geotechnical Section

Date Reported: 18/01/2017

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Tested in Accordance with BS1377:Part 2:1990, clause 9.2

i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS

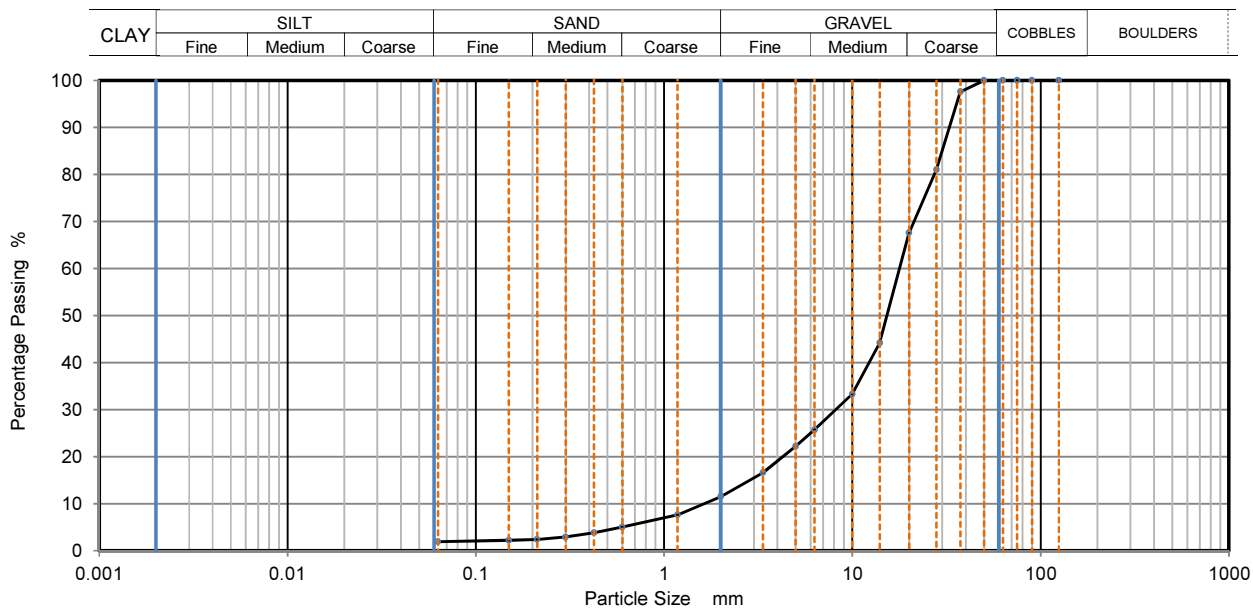


Client: Opus International Consultants (UK) Ltd
Client Address: 1 South House
Bond Avenue
Milton Keynes
MK1 1SW
Contact: Emma Small
Site Name: Meadow School
Site Address: Not Given

Client Reference: J-M3932.12
Job Number: 17-36655
Date Sampled: 19/12/2016
Date Received: 04/01/2017
Date Tested: 16/01/2017
Sampled By: ES/EDH

TEST RESULTS Laboratory Reference: 682189
Sample description: Brown slightly clayey sandy GRAVEL
Location: BH04
Supplier: Not Given

Sample Reference: Not Given
Sample Type: B
Depth Top [m]: 2
Depth Base [m]: 2.4



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	98		
28	81		
20	68		
14	44		
10	33		
6.3	26		
5	22		
3.35	17		
2	12		
1.18	8		
0.6	5		
0.425	4		
0.3	3		
0.212	2		
0.15	2		
0.063	2		

Dry Mass of sample [g]: 4671

Sample Proportions		% dry mass
Very coarse		0.00
Gravel		88.50
Sand		9.70
Fines <0.063mm		1.90

Grading Analysis		
D100	mm	50
D60	mm	17.8
D30	mm	8.18
D10	mm	1.62
Uniformity Coefficient		11
Curvature Coefficient		2.3

Remarks
Preparation and testing in accordance with BS1377 unless noted below

Approved:

Mirosława Pytlík
PL Head of
Geotechnical Section

Date Reported: 18/01/2017

Signed:

Sushil Sharda
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TEST CERTIFICATE**Determination of Particle Size Distribution**

Tested in Accordance with BS1377:Part 2:1990, clause 9.2

i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS



Client: Opus International Consultants (UK) Ltd
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Milton Keynes
MK1 1SW
Contact: Emma Small
Site Name: Meadow School
Site Address: Not Given

Client Reference: J-M3932.12
Job Number: 17-36655
Date Sampled: 19/12/2016
Date Received: 04/01/2017
Date Tested: 16/01/2017
Sampled By: ES/EDH

TEST RESULTS

Laboratory Reference: 682190

Sample Reference: Not Given

Sample description: Brown slightly sandy GRAVEL

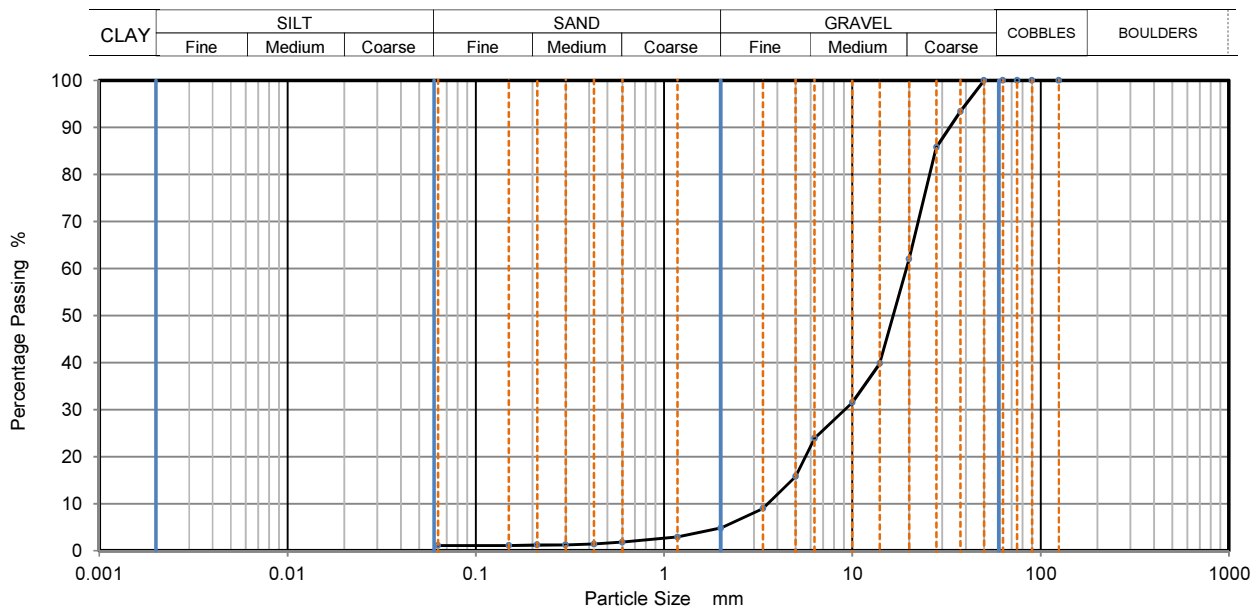
Sample Type: B

Location: BH04

Depth Top [m]: 3.1

Supplier: Not Given

Depth Base [m]: 3.5



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	93		
28	86		
20	62		
14	40		
10	32		
6.3	24		
5	16		
3.35	9		
2	5		
1.18	3		
0.6	2		
0.425	1		
0.3	1		
0.212	1		
0.15	1		
0.063	1		

Dry Mass of sample [g]: 2424

Sample Proportions		% dry mass
Very coarse		0.00
Gravel		95.20
Sand		3.60
Fines <0.063mm		1.10

Grading Analysis		
D100	mm	50
D60	mm	19.4
D30	mm	9.14
D10	mm	3.56
Uniformity Coefficient		5.4
Curvature Coefficient		1.2

Remarks

Preparation and testing in accordance with BS1377 unless noted below

Approved:

Mirosława Pytlík
PL Head of
Geotechnical Section

Date Reported: 18/01/2017

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Sushil Sharda
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TEST CERTIFICATE**Determination of Particle Size Distribution**

Tested in Accordance with BS1377:Part 2:1990, clauses 9.2 and 9.5

i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS

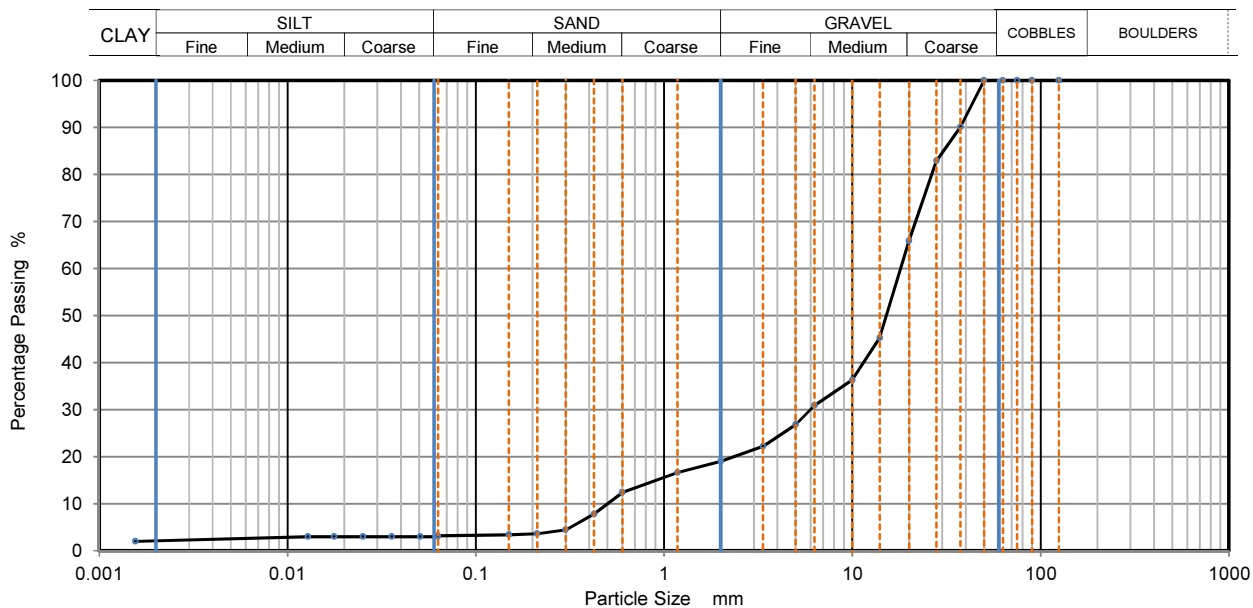


Client: Opus International Consultants (UK) Ltd
Client Address: 1 South House
Bond Avenue
Milton Keynes
MK1 1SW
Contact: Emma Small
Site Name: Meadow School
Site Address: Not Given

Client Reference: J-M3932.12
Job Number: 17-36655
Date Sampled: 19/12/2016
Date Received: 04/01/2017
Date Tested: 16/01/2017
Sampled By: ES/EDH

TEST RESULTS Laboratory Reference: 682191
Sample description: Brown sandy GRAVEL
Location: BH04
Supplier: Not Given

Sample Reference: Not Given
Sample Type: B
Depth Top [m]: 4
Depth Base [m]: 4.3



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	3
90	100	0.0507	3
75	100	0.0358	3
63	100	0.0252	3
50	100	0.0177	3
37.5	90	0.0128	3
28	83	0.0016	2
20	66		
14	45		
10	36		
6.3	31		
5	27		
3.35	22		
2	19		
1.18	17		
0.6	12	Particle density (assumed) 2.65 Mg/m ³	
0.425	8		
0.3	4		
0.212	4		
0.15	3		
0.063	3		

Dry Mass of sample [g]: 3832

Sample Proportions		% dry mass
Very coarse		0.00
Gravel		81.00
Sand		15.80
Silt		1.20
Clay		2.00

Grading Analysis		
D100	mm	50
D60	mm	18.1
D30	mm	5.97
D10	mm	0.502
Uniformity Coefficient		36
Curvature Coefficient		3.9

Remarks
Preparation and testing in accordance with BS1377 unless noted below

Approved:

Mirosława Pytlík
PL Head of
Geotechnical Section

Date Reported: 18/01/2017

Signed:

Sushil Sharda
Technical Manager
(Geotechnical Division)

for and on behalf of i2 Analytical Ltd

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TEST CERTIFICATE

Determination of California Bearing Ratio

Tested in Accordance with BS 1377-4: 1990: Clause 7

i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS



Client: Opus International Consultants (UK) Ltd
Client Address: 1 South House
Bond Avenue
Milton Keynes
MK1 1SW
Contact: Emma Small
Site Name: Meadow School
Site Address: Not Given

Client Reference: J-M3932.12
Job Number: 17-36655
Date Sampled: 20/12/2016
Date Received: 04/01/2017
Date Tested: 16/01/2017
Sampled By: ES/EDH

Test Results:

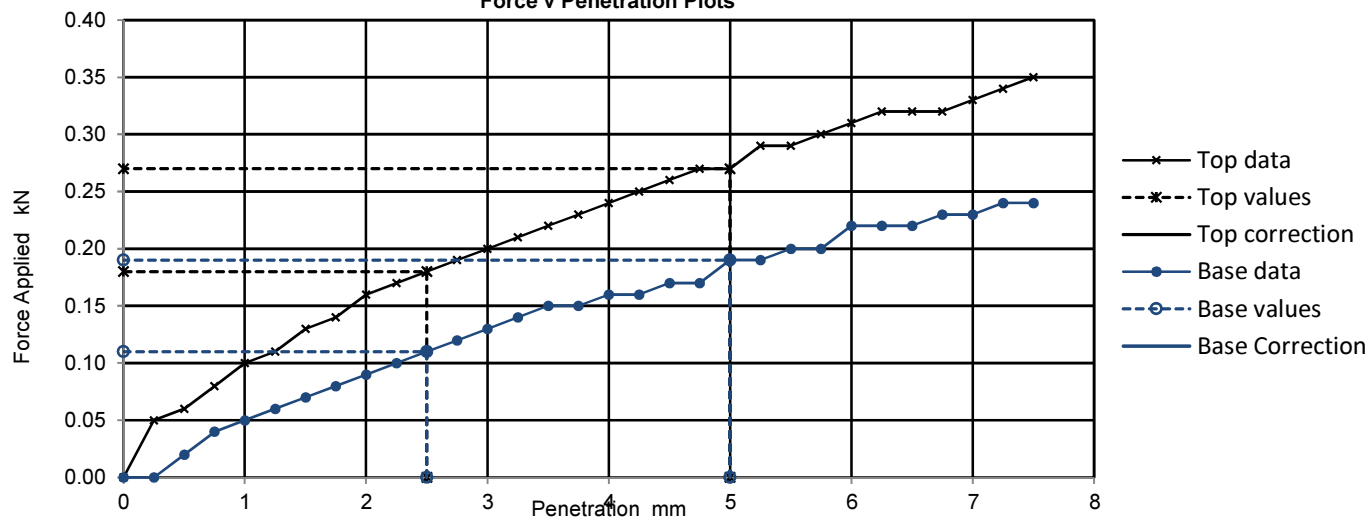
Laboratory Reference: 682154
Hole No.: BH01
Sample Reference: Not Given

Depth Top [m]: 0.4
Depth Base [m]: 0.8
Sample Type: B

Specimen Preparation:

Condition	Remoulded			Soaking details		Not soaked	
Details	Recompacted with specified standard effort using 2.5kg rammer			Period of soaking		days	
				Time to surface		days	
Sample Description:	Yellowish brown slightly gravelly CLAY			Amount of swell recorded		mm	
Material retained on 20mm sieve removed	0	%		Dry density after soaking		Mg/m3	
Initial Specimen details	Bulk density	1.98	Mg/m3	Surcharge applied		8	kg
	Dry density	1.58	Mg/m3			4.9	kPa
	Moisture content	25	%				

Force v Penetration Plots



Results

TOP
BASE

Curve correction applied	CBR Values, %			
	2.5mm	5mm	Highest	Average
No	1.4	1.4	1.4	
No	0.8	1.0	1.0	

Moisture Content %
25
25

Remarks:

Test/ Specimen
specific remarks:

Approved:

Signed:

Mirosława Pytlik
PL Head of Geotechnical
Section

Sushil Sharda
Technical Manager
(Geotechnical Division)

Date Reported: 18/01/2017

for and on behalf of i2 Analytical Ltd

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TEST CERTIFICATE**Determination of California Bearing Ratio**

Tested in Accordance with BS 1377-4: 1990: Clause 7

i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS



Client: Opus International Consultants (UK) Ltd
Client Address: 1 South House
Bond Avenue
Milton Keynes
MK1 1SW
Contact: Emma Small
Site Name: Meadow School
Site Address: Not Given

Client Reference: J-M3932.12
Job Number: 17-36655
Date Sampled: 20/12/2016
Date Received: 04/01/2017
Date Tested: 16/01/2017
Sampled By: ES/EDH

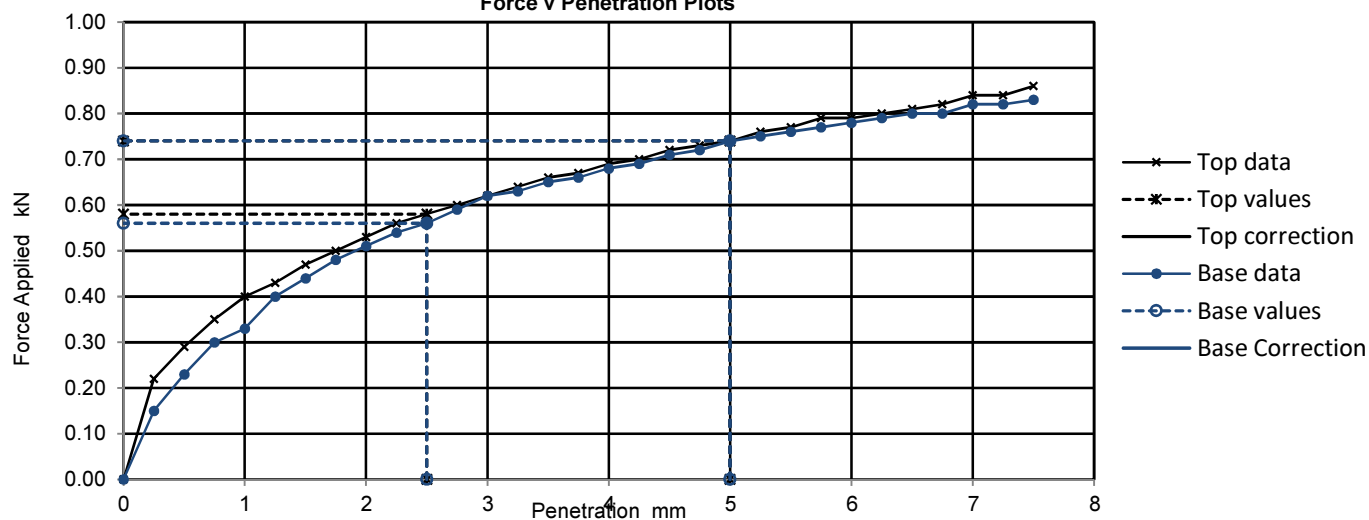
Test Results:

Laboratory Reference: 682167
Hole No.: BH02
Sample Reference: Not Given

Depth Top [m]: 0.7
Depth Base [m]: 1
Sample Type: B

Specimen Preparation:

Condition	Remoulded			Soaking details		Not soaked	
Details	Recompacted with specified standard effort using 2.5kg rammer			Period of soaking		days	
				Time to surface		days	
Sample Description:	Brown slightly gravelly slightly sandy CLAY			Amount of swell recorded		mm	
Material retained on 20mm sieve removed		0	%	Dry density after soaking		Mg/m3	
Initial Specimen details	Bulk density	1.98	Mg/m3	Surcharge applied		8	kg
	Dry density	1.58	Mg/m3			4.9	kPa
	Moisture content	25	%				

Force v Penetration Plots

Results

TOP
BASE

Curve correction applied	CBR Values, %			
	2.5mm	5mm	Highest	Average
No	4.4	3.7	4.4	4.3
No	4.2	3.7	4.2	

Moisture Content %
24
24

Remarks:

Test/ Specimen
specific remarks:

Approved:

Signed:

Mirosława Pytlik
PL Head of Geotechnical
Section

Sushil Sharda
Technical Manager
(Geotechnical Division)

Date Reported: 18/01/2017

for and on behalf of i2 Analytical Ltd

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TEST CERTIFICATE

Determination of California Bearing Ratio

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i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS



Client: Opus International Consultants (UK) Ltd
Client Address: 1 South House
Bond Avenue
Milton Keynes
MK1 1SW
Contact: Emma Small
Site Name: Meadow School
Site Address: Not Given

Client Reference: J-M3932.12
Job Number: 17-36655
Date Sampled: 16/12/2016
Date Received: 04/01/2017
Date Tested: 16/01/2017
Sampled By: ES/EDH

Test Results:

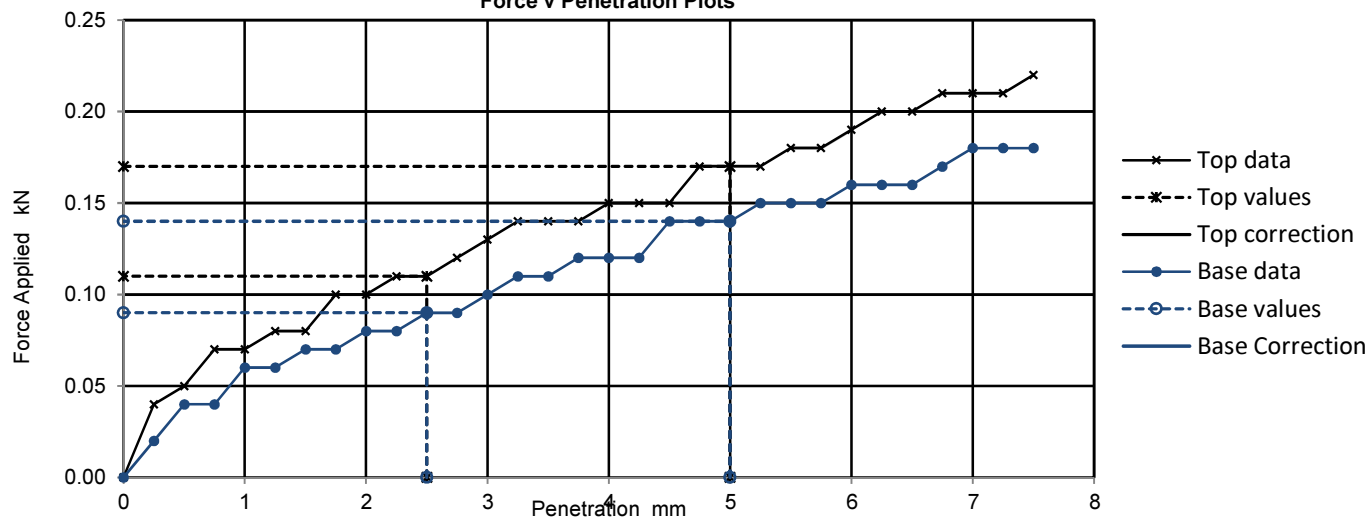
Laboratory Reference: 682176
Hole No.: BH03
Sample Reference: Not Given

Depth Top [m]: 0.4
Depth Base [m]: 0.7
Sample Type: B

Specimen Preparation:

Condition	Remoulded	Soaking details	Not soaked
Details	Recompacted with specified standard effort using 2.5kg rammer	Period of soaking	days
		Time to surface	days
Sample Description:	Yellowish brown slightly gravelly slightly sandy CLAY	Amount of swell recorded	mm
Material retained on 20mm sieve removed	0 %	Dry density after soaking	Mg/m3
Initial Specimen details	Bulk density	1.96	Mg/m3
	Dry density	1.58	Mg/m3
	Moisture content	24	%
	Surcharge applied	8	kg
		4.8	kPa

Force v Penetration Plots



Results

TOP
BASE

Curve correction applied	CBR Values, %			
	2.5mm	5mm	Highest	Average
No	0.8	0.9	0.9	0.8
No	0.7	0.7	0.7	

Moisture Content %
24
24

Remarks:

Test/ Specimen
specific remarks:

Approved:

Signed:

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PL Head of Geotechnical
Section

Sushil Sharda
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Croxley Green Business Park
Watford Herts WD18 8YS



Client: Opus International Consultants (UK) Ltd
Client Address: 1 South House
Bond Avenue
Milton Keynes
MK1 1SW
Contact: Emma Small
Site Name: Meadow School
Site Address: Not Given

Client Reference: J-M3932.12
Job Number: 17-36655
Date Sampled: 19/12/2016
Date Received: 04/01/2017
Date Tested: 16/01/2017
Sampled By: ES/EDH

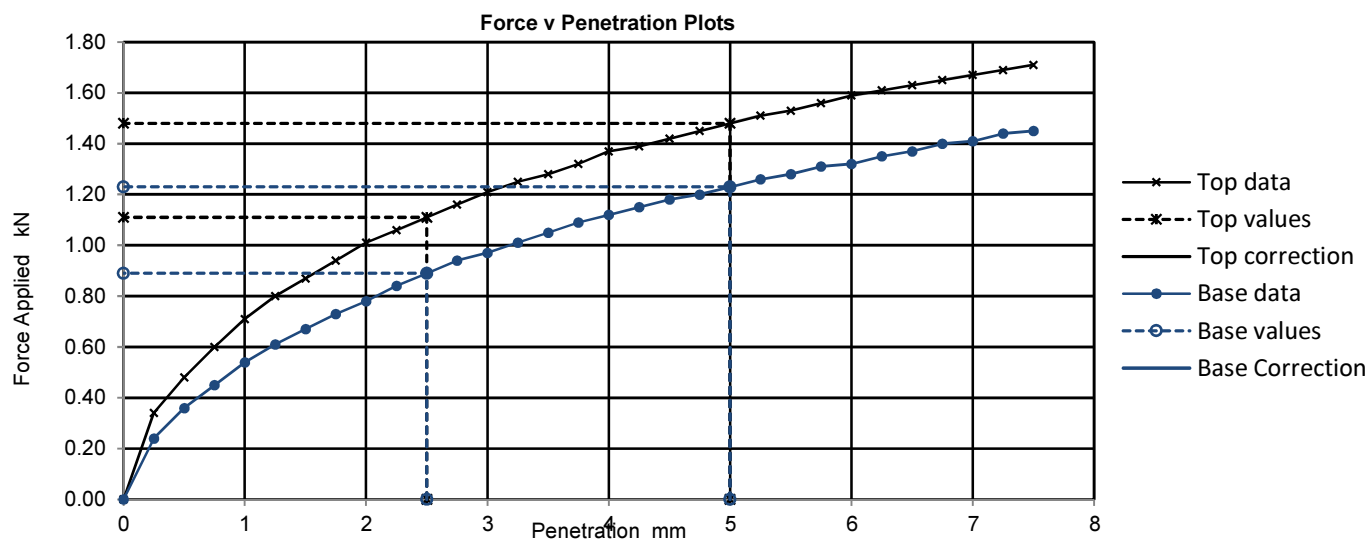
Test Results:

Laboratory Reference: 682187
Hole No.: BH04
Sample Reference: Not Given

Depth Top [m]: 0.7
Depth Base [m]: 1.1
Sample Type: B

Specimen Preparation:

Condition	Remoulded	Soaking details	Not soaked
Details	Recompacted with specified standard effort using 2.5kg rammer	Period of soaking	days
		Time to surface	days
Sample Description:	Orangish brown slightly gravelly slightly sandy CLAY	Amount of swell recorded	mm
Material retained on 20mm sieve removed	1 %	Dry density after soaking	Mg/m3
Initial Specimen details	Bulk density 1.98 Mg/m3	Surcharge applied	8 kg
	Dry density 1.64 Mg/m3		4.8 kPa
	Moisture content 21 %		



Results

TOP
BASE

Curve correction applied	CBR Values, %			
	2.5mm	5mm	Highest	Average
No	8.4	7.4	8.4	
No	6.7	6.2	6.7	

Moisture Content %
20
21

Remarks:

Test/ Specimen
specific remarks:

Approved:

Signed:

Mirosława Pytlik
PL Head of Geotechnical
Section

Sushil Sharda
Technical Manager
(Geotechnical Division)

Date Reported: 18/01/2017

for and on behalf of i2 Analytical Ltd

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MK1 1SW
Contact: Emma Small
Site Name: Meadow School
Site Address: Not Given

Client Reference: J-M3932.12
Job Number: 17-36655
Date Sampled: 19/12/2016
Date Received: 04/01/2017
Date Tested: 17/01/2017
Sampled By: ES/EDH

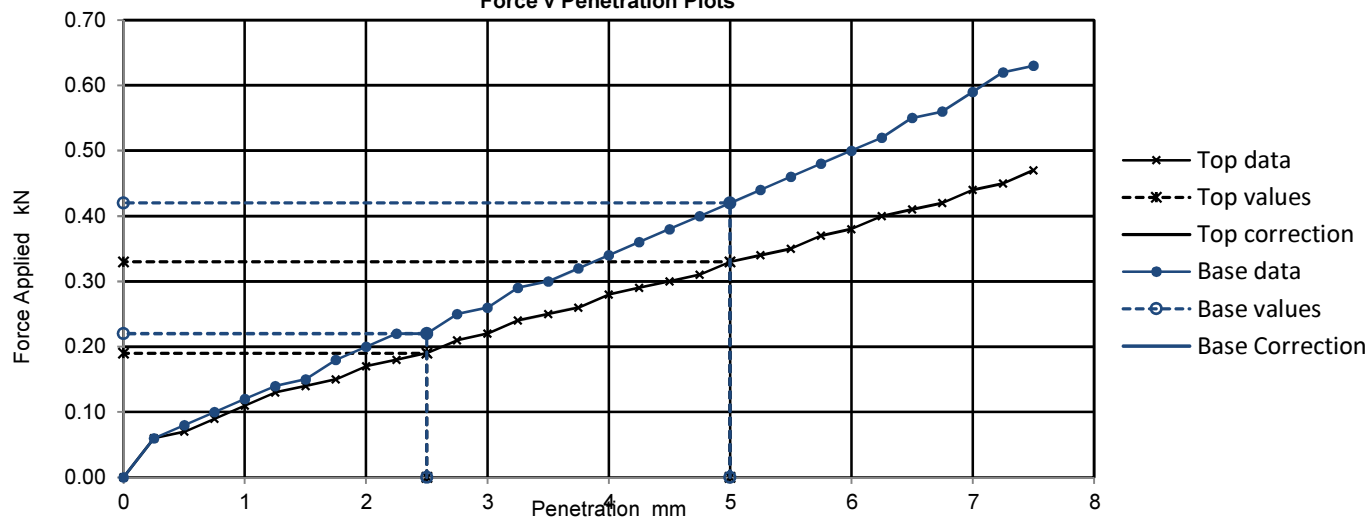
Test Results:

Laboratory Reference: 682192
Hole No.: WS01
Sample Reference: Not Given

Depth Top [m]: 0.45
Depth Base [m]: 0.7
Sample Type: B

Specimen Preparation:

Condition	Remoulded	Soaking details	Not soaked
Details	Recompacted with specified standard effort using 2.5kg rammer	Period of soaking	days
		Time to surface	days
Sample Description:	Brown gravelly clayey SAND	Amount of swell recorded	mm
Material retained on 20mm sieve removed	44 %	Dry density after soaking	Mg/m3
Initial Specimen details	Bulk density 1.74 Mg/m3	Surcharge applied	8 kg
	Dry density 1.29 Mg/m3		4.9 kPa
	Moisture content 35 %		

Force v Penetration Plots

Results

TOP
BASE

Curve correction applied	CBR Values, %			
	2.5mm	5mm	Highest	Average
No	1.4	1.7	1.7	
No	1.7	2.1	2.1	

Moisture Content %
35
30

Remarks:

Test/ Specimen
specific remarks:

Approved:

Signed:

Mirosława Pytlik
PL Head of Geotechnical
Section

Sushil Sharda
Technical Manager
(Geotechnical Division)

Date Reported: 18/01/2017

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Watford Herts WD18 8YS



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Milton Keynes
MK1 1SW
Contact: Emma Small
Site Name: Meadow School
Site Address: Not Given

Client Reference: J-M3932.12
Job Number: 17-36655
Date Sampled: 19/12/2016
Date Received: 04/01/2017
Date Tested: 16/01/2017
Sampled By: ES/EDH

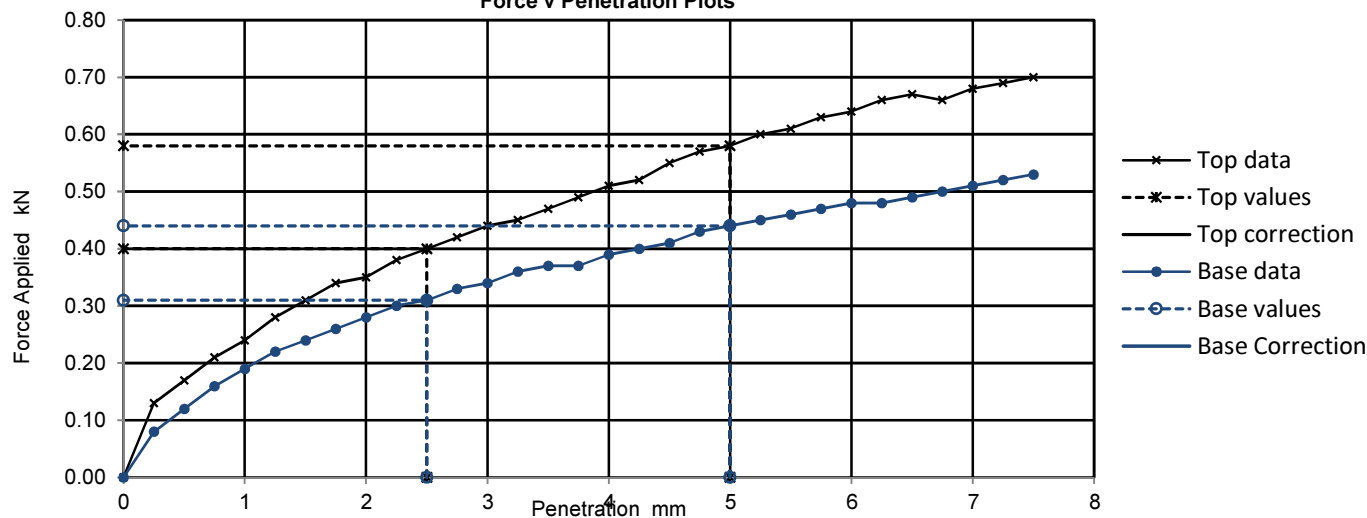
Test Results:

Laboratory Reference: 682196
Hole No.: WS02
Sample Reference: Not Given

Depth Top [m]: 0.6
Depth Base [m]: 0.9
Sample Type: B

Specimen Preparation:

Condition	Remoulded	Soaking details	Not soaked
Details	Recompacted with specified standard effort using 2.5kg rammer	Period of soaking	days
		Time to surface	days
Sample Description:	Yellowish brown to grey slightly gravelly CLAY	Amount of swell recorded	mm
Material retained on 20mm sieve removed	1 %	Dry density after soaking	Mg/m3
Initial Specimen details	Bulk density 1.57 Mg/m3	Surcharge applied	8 kg
	Dry density 1.26 Mg/m3		4.9 kPa
	Moisture content 25 %		

Force v Penetration Plots

Results

TOP
BASE

Curve correction applied	CBR Values, %			
	2.5mm	5mm	Highest	Average
No	3.0	2.9	3.0	
No	2.3	2.2	2.3	

Moisture Content %
23
24

Remarks:

Test/ Specimen
specific remarks:

Approved:

Signed:

Mirosława Pytlik
PL Head of Geotechnical
Section

Sushil Sharda
Technical Manager
(Geotechnical Division)

Date Reported: 18/01/2017

for and on behalf of i2 Analytical Ltd

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The analysis was carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland."



4041

TEST CERTIFICATE**Determination of California Bearing Ratio**

Tested in Accordance with BS 1377-4: 1990: Clause 7

i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS



Client: Opus International Consultants (UK) Ltd
Client Address: 1 South House
Bond Avenue
Milton Keynes
MK1 1SW
Contact: Emma Small
Site Name: Meadow School
Site Address: Not Given

Client Reference: J-M3932.12
Job Number: 17-36655
Date Sampled: 19/12/2016
Date Received: 04/01/2017
Date Tested: 16/01/2017
Sampled By: ES/EDH

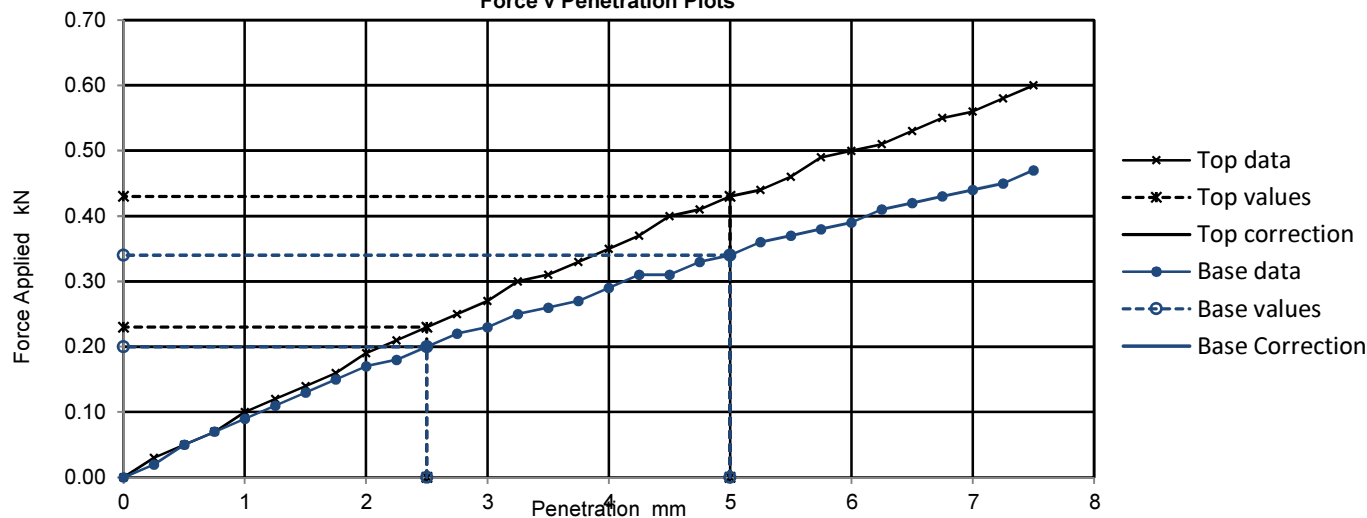
Test Results:

Laboratory Reference: 682198
Hole No.: WS03
Sample Reference: Not Given

Depth Top [m]: 0.5
Depth Base [m]: 0.7
Sample Type: B

Specimen Preparation:

Condition	Remoulded	Soaking details	Not soaked
Details	Recompacted with specified standard effort using 2.5kg rammer	Period of soaking	days
		Time to surface	days
Sample Description:	Brown slightly gravelly clayey SAND	Amount of swell recorded	mm
Material retained on 20mm sieve removed	2 %	Dry density after soaking	Mg/m3
Initial Specimen details	Bulk density	1.90	Mg/m3
	Dry density	1.52	Mg/m3
	Moisture content	25	%
	Surcharge applied	8	kg
		4.9	kPa

Force v Penetration Plots

Results

TOP
BASE

Curve correction applied	CBR Values, %			
	2.5mm	5mm	Highest	Average
No	1.7	2.2	2.2	
No	1.5	1.7	1.7	

Moisture Content %
24
25

Remarks:

Test/ Specimen
specific remarks:

Approved:

Signed:

Mirosława Pytlik
PL Head of Geotechnical
Section

Sushil Sharda
Technical Manager
(Geotechnical Division)

Date Reported: 18/01/2017

for and on behalf of i2 Analytical Ltd

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4041

TEST CERTIFICATE

Determination of California Bearing Ratio

Tested in Accordance with BS 1377-4: 1990: Clause 7

i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS



Client: Opus International Consultants (UK) Ltd
Client Address: 1 South House
Bond Avenue
Milton Keynes
MK1 1SW
Contact: Emma Small
Site Name: Meadow School
Site Address: Not Given

Client Reference: J-M3932.12
Job Number: 17-36655
Date Sampled: 19/12/2016
Date Received: 04/01/2017
Date Tested: 16/01/2017
Sampled By: ES/EDH

Test Results:

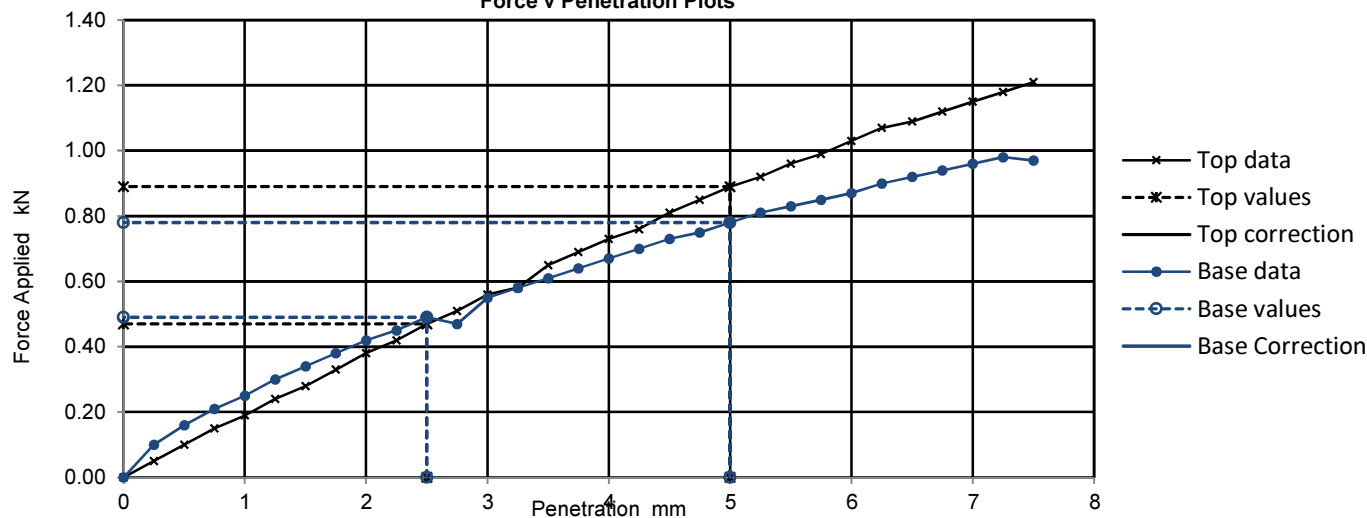
Laboratory Reference: 682200
Hole No.: WS04
Sample Reference: Not Given

Depth Top [m]: 0.4
Depth Base [m]: 0.7
Sample Type: B

Specimen Preparation:

Condition	Remoulded			Soaking details		Not soaked	
Details	Recompacted with specified standard effort using 2.5kg rammer			Period of soaking		days	
				Time to surface		days	
Sample Description:	Brown slightly gravelly slightly sandy CLAY			Amount of swell recorded		mm	
Material retained on 20mm sieve removed	3	%		Dry density after soaking		Mg/m3	
Initial Specimen details	Bulk density	2.07	Mg/m3	Surcharge applied		8	kg
	Dry density	1.73	Mg/m3			4.9	kPa
	Moisture content	20	%				

Force v Penetration Plots



Results

TOP
BASE

Curve correction applied	CBR Values, %			
	2.5mm	5mm	Highest	Average
TOP	3.6	4.5	4.5	4.2
BASE	3.7	3.9	3.9	

Moisture Content %
17
18

Remarks:

Test/ Specimen
specific remarks:

Approved:

Signed:

Mirosława Pytlik
PL Head of Geotechnical
Section

Sushil Sharda
Technical Manager
(Geotechnical Division)

Date Reported: 18/01/2017

for and on behalf of i2 Analytical Ltd

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TEST CERTIFICATE

Dry Density / Moisture Content Relationship Light Compaction

i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS



Tested in accordance with BS 1377-4:1990: Clause 3.3 using 2.5kg[light] Rammer

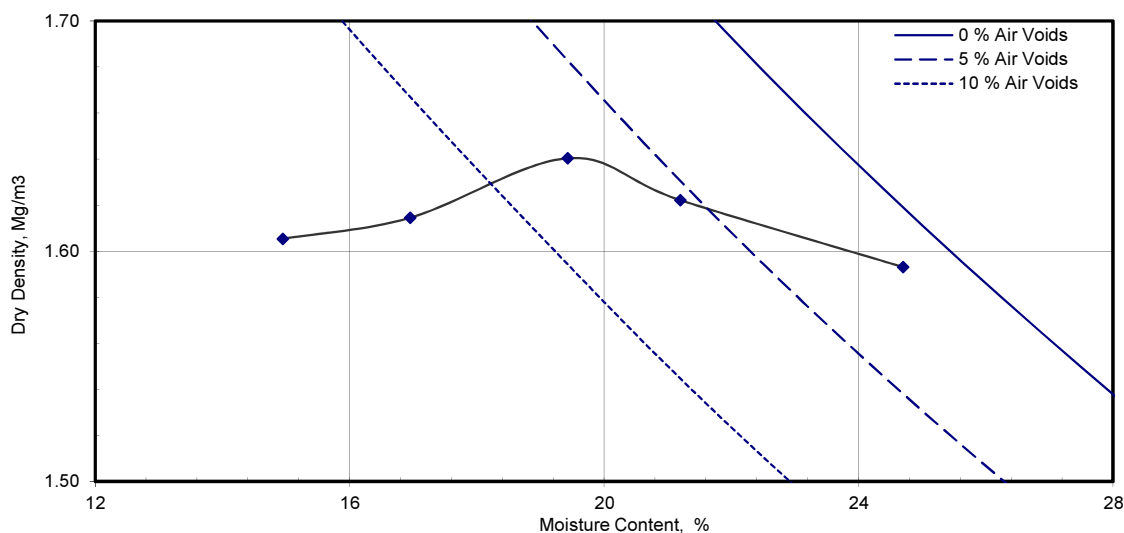
Client: Opus International Consultants (UK) Ltd
Client Address: 1 South House
Bond Avenue
Milton Keynes
MK1 1SW
Contact: Emma Small
Site Name: Meadow School
Site Address: Not Given

Client Reference: J-M3932.12
Job Number: 17-36655
Date Sampled: 20/12/2016
Date Received: 04/01/2017
Sampled By: ES/EDH

TEST RESULTS

Laboratory Reference: 682155
Hole No.: BH01
Sample Reference: Not Given
Sample Description: Yellowish brown slightly gravelly sandy CLAY

Depth Top [m]: 0.8
Depth Base [m]: 1.1
Sample Type: B



Preparation	Material used was natural	
Mould Type	1 Litre	
Samples Used	Composite specimens tested	
Material Retained on 37.5 mm Sieve	%	0
Material Retained on 20.0 mm Sieve	%	0
Particle Density - Assumed	Mg/m³	2.70
As received Moisture Content	%	25
Maximum Dry Density	Mg/m³	1.64
Optimum Moisture Content	%	19

Remarks

Approved:

Mirosława Pytlik
PL Head of
Geotechnical Section

Date Reported: 18/01/2017

Signed:

Sushil Sharda
Technical Manager
(Geotechnical Division)

for and on behalf of i2 Analytical Ltd

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4041

TEST CERTIFICATE**Dry Density / Moisture Content Relationship****Light Compaction**

i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS



Environmental Science

Tested in accordance with BS 1377-4:1990: Clause 3.3 using 2.5kg[light] Rammer

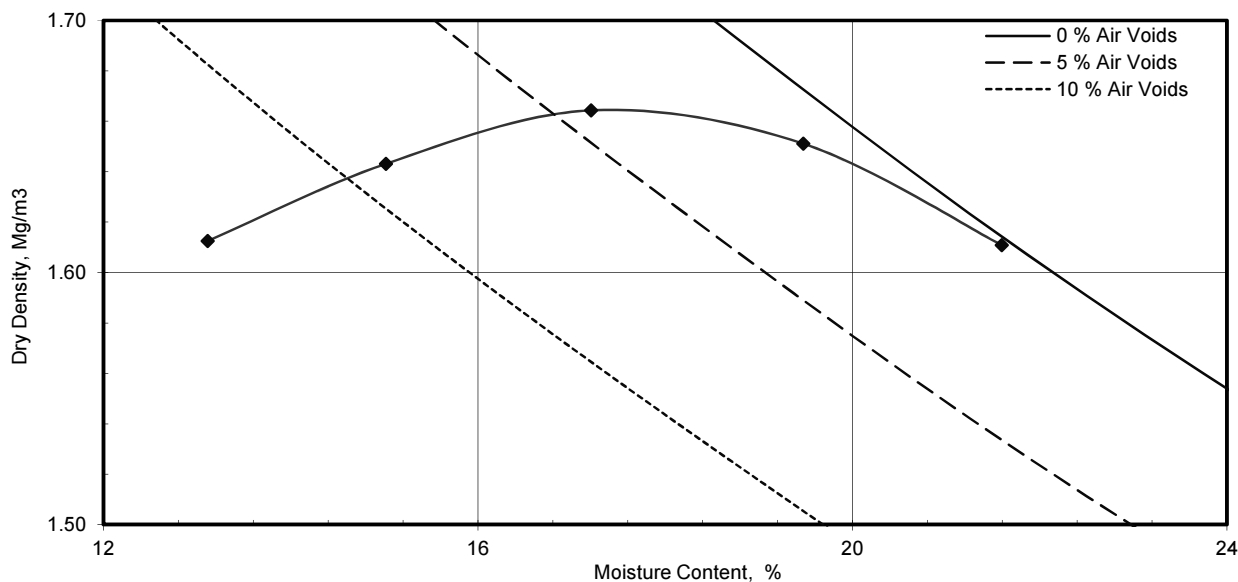
Client: Opus International Consultants (UK) Ltd
Client Address: 1 South House
Bond Avenue
Milton Keynes
MK1 1SW
Contact: Emma Small
Site Name: Meadow School
Site Address: Not Given

Client Reference: J-M3932.12
Job Number: 17-36655
Date Sampled: 20/12/2016
Date Received: 04/01/2017
Date Tested: 16/01/2017
Sampled By: ES/EDH

TEST RESULTS

Laboratory Reference: 682166
Hole No.: BH02
Sample Reference: Not Given
Sample Description: Brown gravelly clayey SAND

Depth Top [m]: 0.2
Depth Base [m]: 0.5
Sample Type: B



Preparation	Material used was natural	
Mould Type	1 Litre	
Samples Used	Composite specimens tested	
Material Retained on 37.5 mm Sieve	%	0
Material Retained on 20.0 mm Sieve	%	4
Particle Density - Assumed	Mg/m ³	2.48
As received Moisture Content	%	19
Maximum Dry Density	Mg/m³	1.66
Optimum Moisture Content	%	17

Remarks

Approved:

Mirosława Pytlik
PL Head of
Geotechnical Section

Signed:

Sushil Sharda
Technical Manager
(Geotechnical Division)

Date Reported: 18/01/2017

for and on behalf of i2 Analytical Ltd

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4041

TEST CERTIFICATE**Dry Density / Moisture Content Relationship****Light Compaction**

i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS



Tested in accordance with BS 1377-4:1990: Clause 3.3 using 2.5kg[light] Rammer

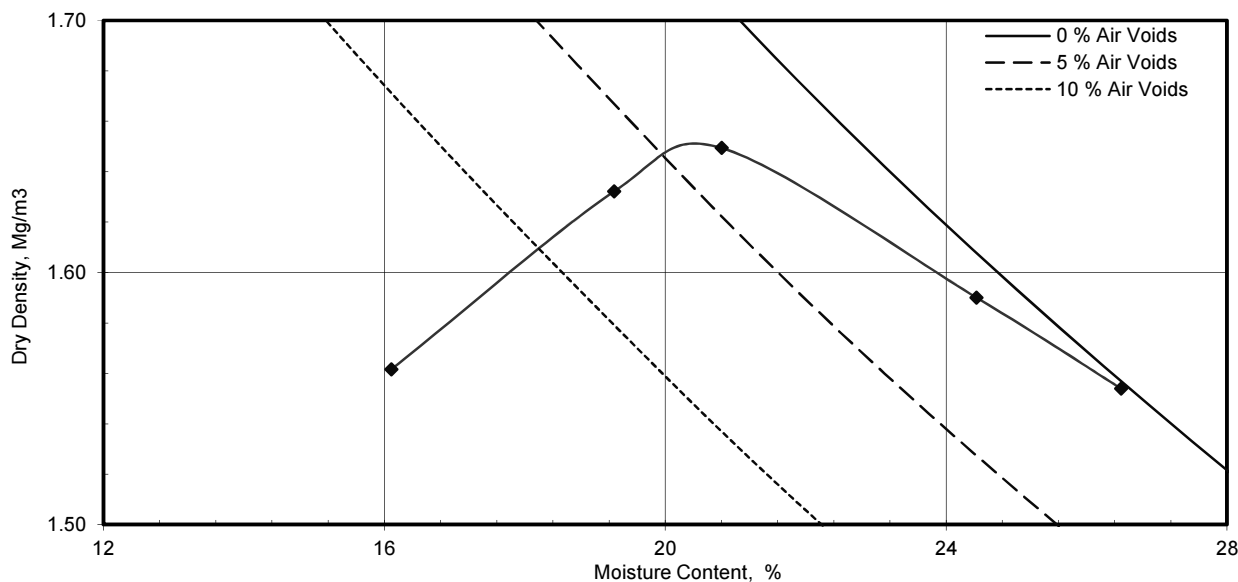
Client: Opus International Consultants (UK) Ltd
Client Address: 1 South House
Bond Avenue
Milton Keynes
MK1 1SW
Contact: Emma Small
Site Name: Meadow School
Site Address: Not Given

Client Reference: J-M3932.12
Job Number: 17-36655
Date Sampled: 16/12/2016
Date Received: 04/01/2017
Date Tested: 16/01/2017
Sampled By: ES/EDH

TEST RESULTS

Laboratory Reference: 682177
Hole No.: BH03
Sample Reference: Not Given
Sample Description: Yellowish brown slightly gravelly slightly sandy CLAY

Depth Top [m]: 0.7
Depth Base [m]: 1
Sample Type: B



Preparation	Material used was natural	
Mould Type	1 Litre	
Samples Used	Composite specimens tested	
Material Retained on 37.5 mm Sieve	%	0
Material Retained on 20.0 mm Sieve	%	0
Particle Density - Assumed	Mg/m³	2.65
As received Moisture Content	%	26
Maximum Dry Density	Mg/m³	1.65
Optimum Moisture Content	%	21

Remarks

Approved:

Mirosława Pytlik
PL Head of
Geotechnical Section

Signed:

Sushil Sharda
Technical Manager
(Geotechnical Division)

Date Reported: 18/01/2017

for and on behalf of i2 Analytical Ltd

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4041

TEST CERTIFICATE**Dry Density / Moisture Content Relationship****Light Compaction**

i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS



Environmental Science

Tested in accordance with BS 1377-4:1990: Clause 3.3 using 2.5kg[light] Rammer

Client: Opus International Consultants (UK) Ltd
Client Address: 1 South House
Bond Avenue
Milton Keynes
MK1 1SW
Contact: Emma Small
Site Name: Meadow School
Site Address: Not Given

Client Reference: J-M3932.12
Job Number: 17-36655
Date Sampled: 19/12/2016
Date Received: 04/01/2017
Date Tested: 16/01/2017
Sampled By: ES/EDH

TEST RESULTS

Laboratory Reference: 682193

Hole No.: WS01

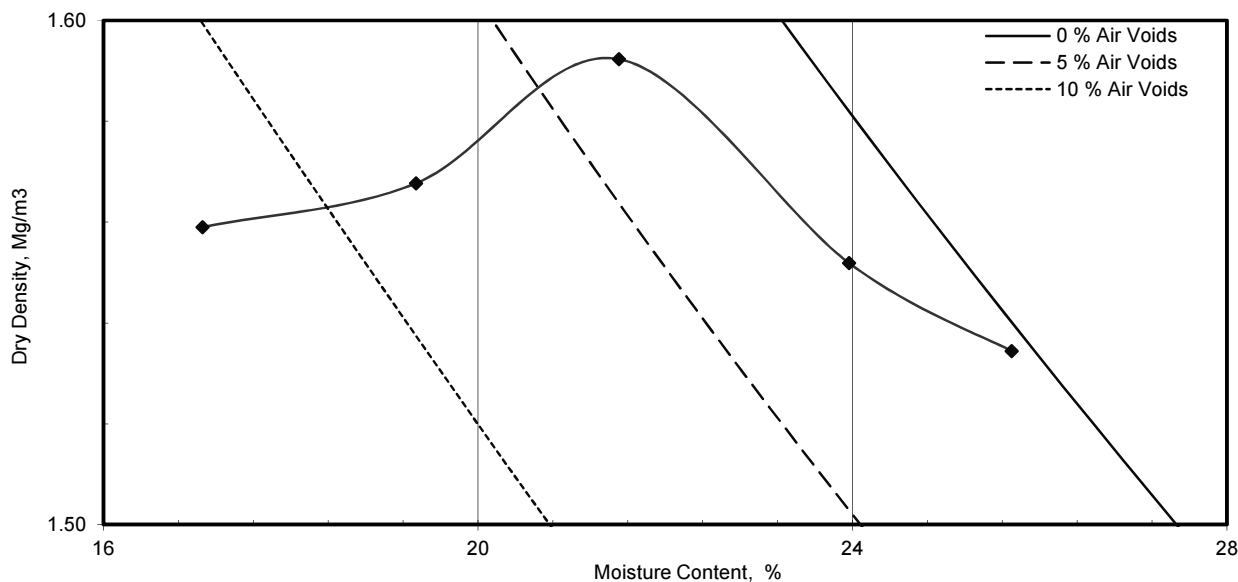
Sample Reference: Not Given

Sample Description: Mottled brown slightly gravelly slightly sandy CLAY

Depth Top [m]: 0.7

Depth Base [m]: 1.1

Sample Type: B



Preparation		Material used was natural
Mould Type		1 Litre
Samples Used		Composite specimens tested
Material Retained on 37.5 mm Sieve	%	0
Material Retained on 20.0 mm Sieve	%	4
Particle Density - Assumed	Mg/m³	2.55
As received Moisture Content	%	26
Maximum Dry Density	Mg/m³	1.59
Optimum Moisture Content	%	22

Remarks

Approved:

Mirosława Pytlik
PL Head of
Geotechnical Section

Signed:

Sushil Sharda
Technical Manager
(Geotechnical Division)

Date Reported: 18/01/2017

for and on behalf of i2 Analytical Ltd

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4041

TEST CERTIFICATE**Dry Density / Moisture Content Relationship****Light Compaction**

i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS



Environmental Science

Tested in accordance with BS 1377-4:1990: Clause 3.3 using 2.5kg[light] Rammer

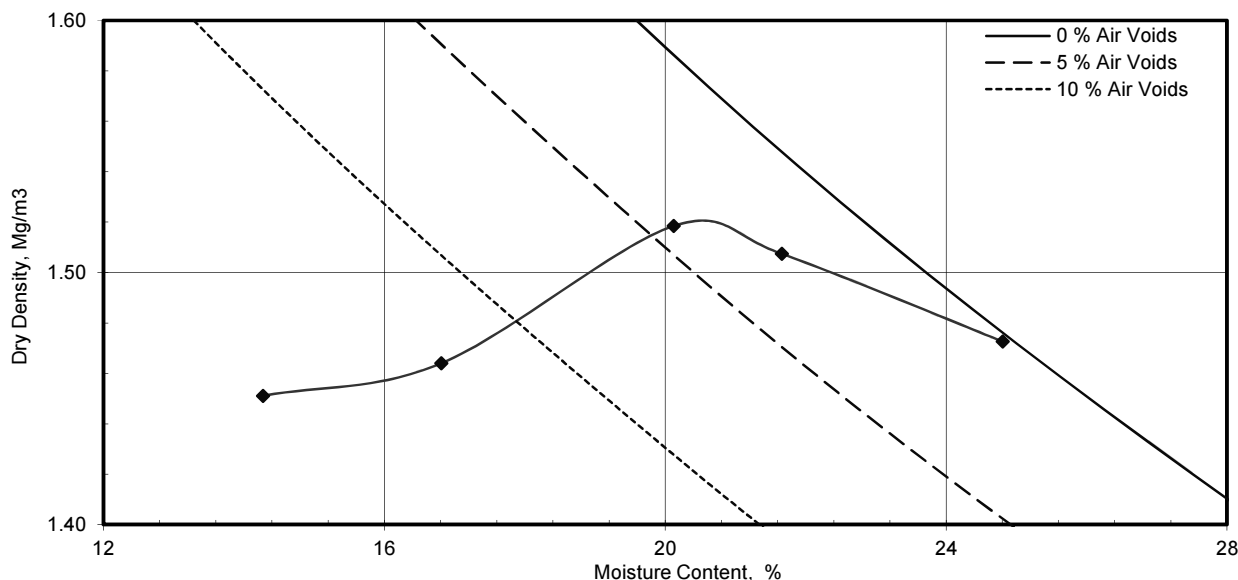
Client: Opus International Consultants (UK) Ltd
Client Address: 1 South House
Bond Avenue
Milton Keynes
MK1 1SW
Contact: Emma Small
Site Name: Meadow School
Site Address: Not Given

Client Reference: J-M3932.12
Job Number: 17-36655
Date Sampled: 19/12/2016
Date Received: 04/01/2017
Date Tested: 16/01/2017
Sampled By: ES/EDH

TEST RESULTS

Laboratory Reference: 682195
Hole No.: WS02
Sample Reference: Not Given
Sample Description: Yellowish brown gravelly sandy CLAY

Depth Top [m]: 0.3
Depth Base [m]: 0.6
Sample Type: B



Preparation	Material used was natural	
Mould Type	1 Litre	
Samples Used	Composite specimens tested	
Material Retained on 37.5 mm Sieve	%	15
Material Retained on 20.0 mm Sieve	%	5
Particle Density - Assumed	Mg/m³	2.33
As received Moisture Content	%	25
Maximum Dry Density	Mg/m³	1.52
Optimum Moisture Content	%	20

Remarks: Grading Zone X. Test carried out as per client request. Insufficient material for CBR mould, compacted in 1litre mould

Approved:

Signed:

Mirosława Pytlik
PL Head of
Geotechnical Section

Sushil Sharda
Technical Manager
(Geotechnical Division)

Date Reported: 18/01/2017

for and on behalf of i2 Analytical Ltd

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4041

TEST CERTIFICATE**Dry Density / Moisture Content Relationship****Light Compaction**

i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS



Environmental Science

Tested in accordance with BS 1377-4:1990: Clause 3.3 using 2.5kg[light] Rammer

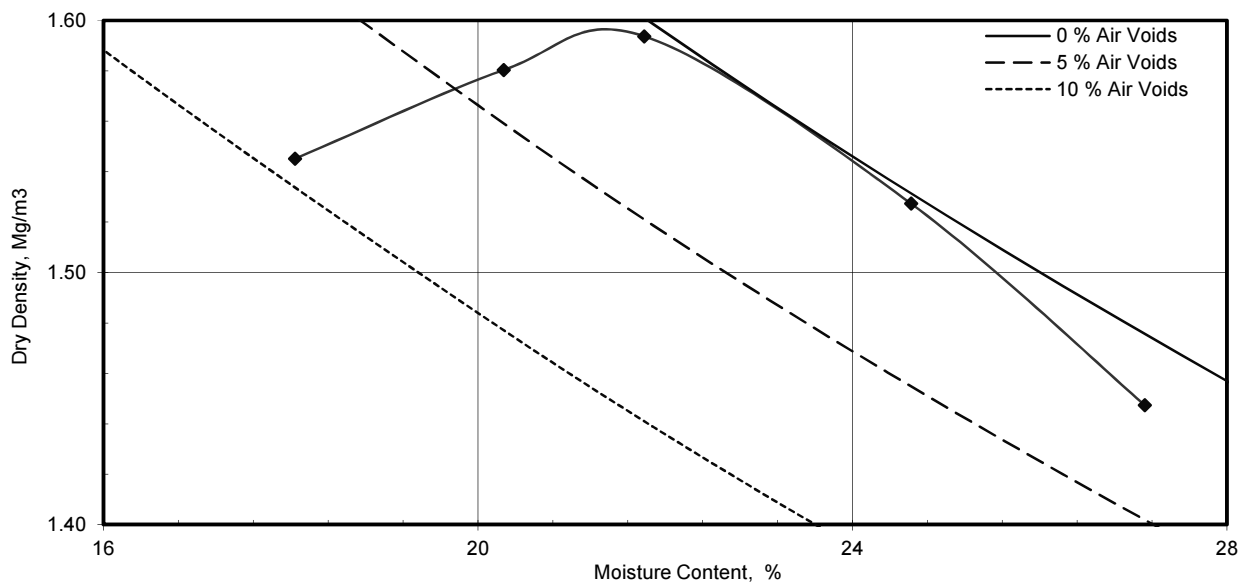
Client: Opus International Consultants (UK) Ltd
Client Address: 1 South House
Bond Avenue
Milton Keynes
MK1 1SW
Contact: Emma Small
Site Name: Meadow School
Site Address: Not Given

Client Reference: J-M3932.12
Job Number: 17-36655
Date Sampled: 19/12/2016
Date Received: 04/01/2017
Date Tested: 16/01/2017
Sampled By: ES/EDH

TEST RESULTS

Laboratory Reference: 682198
Hole No.: WS03
Sample Reference: Not Given
Sample Description: brown slightly gravelly clayey SAND

Depth Top [m]: 0.5
Depth Base [m]: 0.7
Sample Type: B



Preparation	Material used was natural	
Mould Type	1 Litre	
Samples Used	Composite specimens tested	
Material Retained on 37.5 mm Sieve	%	0
Material Retained on 20.0 mm Sieve	%	2
Particle Density - Assumed	Mg/m³	2.46
As received Moisture Content	%	25
Maximum Dry Density	Mg/m³	1.59
Optimum Moisture Content	%	22

Remarks

Approved:

Signed:

Mirosława Pytlik
PL Head of
Geotechnical Section

Sushil Sharda
Technical Manager
(Geotechnical Division)

Date Reported: 18/01/2017

for and on behalf of i2 Analytical Ltd

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TEST CERTIFICATE

Dry Density / Moisture Content Relationship Light Compaction

i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS



Tested in accordance with BS 1377-4:1990: Clause 3.3 using 2.5kg[light] Rammer

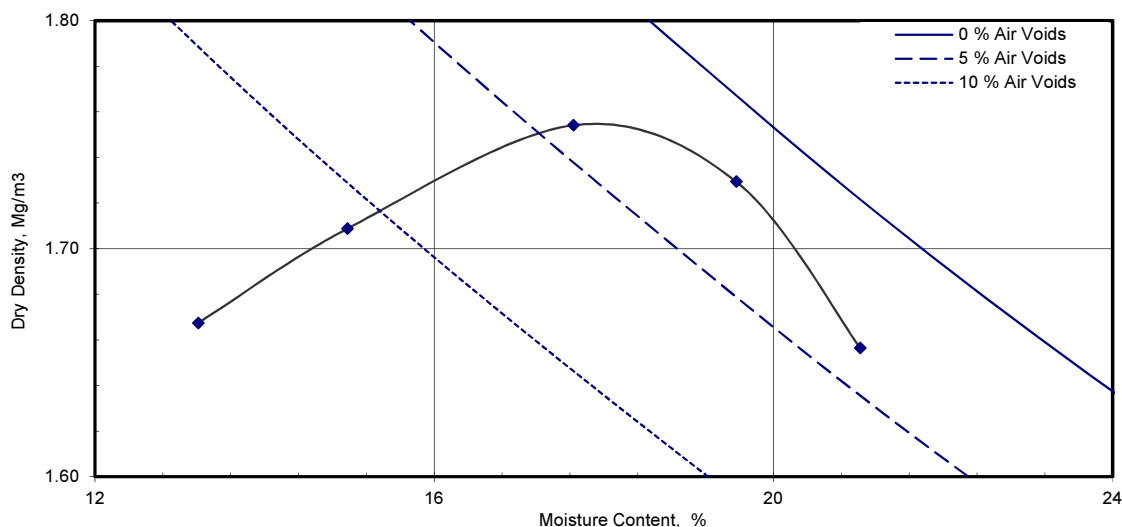
Client: Opus International Consultants (UK) Ltd
Client Address: 1 South House
Bond Avenue
Milton Keynes
MK1 1SW
Contact: Emma Small
Site Name: Meadow School
Site Address: Not Given

Client Reference: J-M3932.12
Job Number: 17-36655
Date Sampled: 19/12/2016
Date Received: 04/01/2017
Date Tested: 16/117
Sampled By: ES/EDH

TEST RESULTS

Laboratory Reference: 682200
Hole No.: WS04
Sample Reference: Not Given
Sample Description: brown slightly gravelly slightly sandy CLAY

Depth Top [m]: 0.4
Depth Base [m]: 0.7
Sample Type: B



Preparation	Material used was natural	
Mould Type	1 Litre	
Samples Used	Composite specimens tested	
Material Retained on 37.5 mm Sieve	%	0
Material Retained on 20.0 mm Sieve	%	3
Particle Density - Assumed	Mg/m³	2.70
As received Moisture Content	%	20
Maximum Dry Density	Mg/m³	1.75
Optimum Moisture Content	%	18

Remarks

Approved:

Mirosława Pytlik
PL Head of
Geotechnical Section

Date Reported: 18/01/2017

Signed:

Sushil Sharda
Technical Manager
(Geotechnical Division)

for and on behalf of i2 Analytical Ltd

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TEST CERTIFICATE

Dry Density / Moisture Content Relationship Light Compaction

i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS



Tested in accordance with BS 1377-4:1990: Clause 3.3 using 2.5kg[light] Rammer

Client: Opus International Consultants (UK) Ltd
Client Address: 1 South House
Bond Avenue
Milton Keynes
MK1 1SW
Contact: Emma Small
Site Name: Meadow School
Site Address: Not Given

Client Reference: J-M3932.12
Job Number: 17-36655
Date Sampled: 19/12/2016
Date Received: 04/01/2017
Date Tested: 25/01/2017
Sampled By: ES/EDH

TEST RESULTS

Laboratory Reference: 682186

Hole No.: BH04

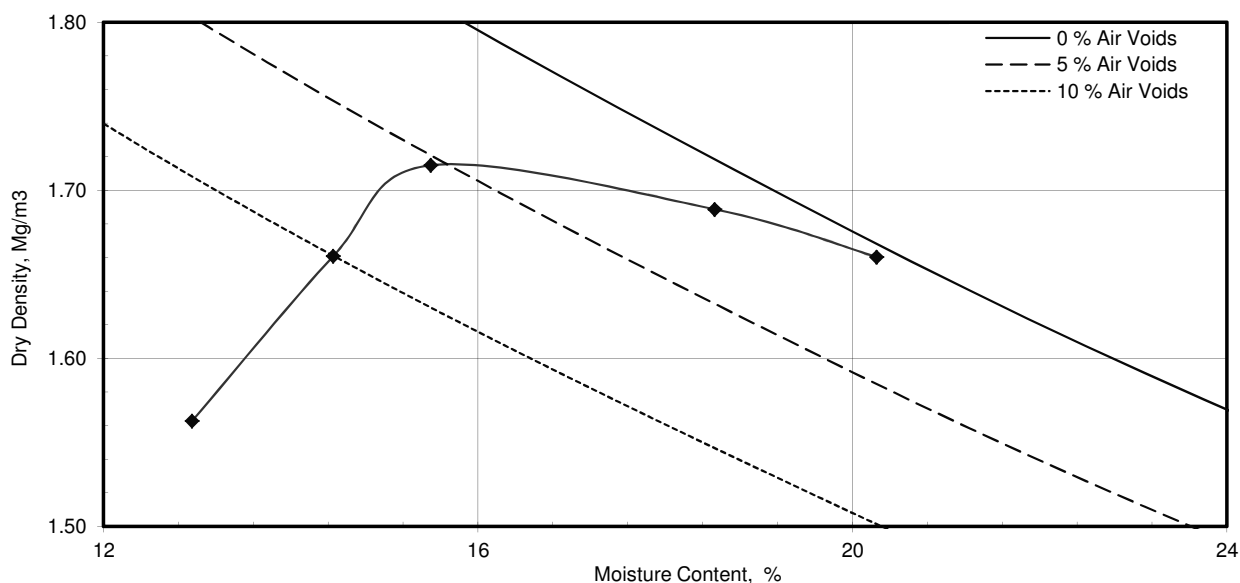
Sample Reference: Not Given

Sample Description: Yellowish brown slightly sandy slightly gravelly CLAY

Depth Top [m]: 0.4

Depth Base [m]: 0.7

Sample Type: B



Preparation	Material used was natural	
Mould Type	1 Litre	
Samples Used	Composite specimens tested	
Material Retained on 37.5 mm Sieve	%	0
Material Retained on 20.0 mm Sieve	%	4
Particle Density - Assumed	Mg/m³	2.52
As received Moisture Content	%	19
Maximum Dry Density	Mg/m³	1.71
Optimum Moisture Content	%	15

Remarks

Approved:

Mirosława Pytlik
PL Head of
Geotechnical Section

Date Reported: 18/01/2017

Signed:

Sushil Sharda
Technical Manager
(Geotechnical Division)

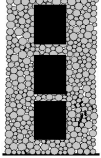
for and on behalf of i2 Analytical Ltd

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Total Stress Triaxial Compression

Unconsolidated Undrained (Multiple Specimen)

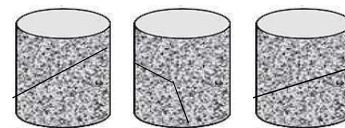
Summary Report

Sample Details		Depth	6.60 - 7.00			
 sketch showing specimen location in original sample	Description	Brown CLAY				
	Type	U				
				Spm. 1	2	3
	Initial Sample Length	L ₀	(mm)	77.4	76.5	77.2
	Initial Sample Diameter	D ₀	(mm)	37.4	36.6	37.3
	Initial Sample Weight	W ₀	(gr)	161.1	152.9	165.9
	Bulk Density	ρ ₀	(Mg/m ³)	1.89	1.90	1.97
	Particle Density	ρ _s	(Mg/m ³)	2.65	2.65	2.65

Initial Conditions				Spm. 1	2	3
Specimen						
Initial Cell Pressure	σ ₃	(kPa)		66	132	264
Strain Rate	m _s	(mm/min)		1.54700	1.53020	1.54340
Membrane Thickness	m _b	(mm)		0.18	0.18	0.20
Displacement Input				CH 2	CH 2	CH 2
Load Input				CH 1	CH 1	CH 1
Initial Moisture						
	ω _i %	(%)		27	27	27
Initial Dry Density	ρ _{d0}	(Mg/m ³)		1.49	1.50	1.55
Initial Voids Ratio	e ₀	.		0.77	0.77	0.71
Initial Degree of Saturation	S _o	(%)		92	93	100

Final Conditions				Spm. 1	2	3
Max Deviator Stress						
	(σ ₁ - σ ₃) _f	(kPa)		208.67	313.22	340.25
Membrane Correction						
	m _c	(kPa)		1.307	1.405	0.867
Strain At Max Stress						
	ε _f %	(%)		8.60	10.13	4.73
Shear Strength						
	c _u	(kPa)		104.34	156.61	170.12
Final Moisture						
	ω _f %	(%)		27	27	27
Final Dry Density	ρ _{df}	(Mg/m ³)		1.49	1.50	1.55
Final Voids Ratio	e _f	.		0.77	0.77	0.71
Final Degree of Saturation	S _f	(%)		91.9	92.5	100.0

Notes



Failure Sketch

(surface inclination)

	Test Method	BS1377-7 : 1990 Clause 8	Test Name	682151
	Database:	.\SQLEXPRESS \ 6171-I2 Analytical	Test Date	18/01/2017
	Site Reference	Meadow School	Borehole	BH01
	Jobfile	17-36655	Sample	682151
	Client	Opus International Consultants Ltd	Depth	6.60 - 7.00
	Operator	palmowska	Checked	pytlikm
			Approved	pytlikm

i2 Analytical Limited, 7 Woodshots Meadow, Croxley Green Business Park, Herts WD18 8YS

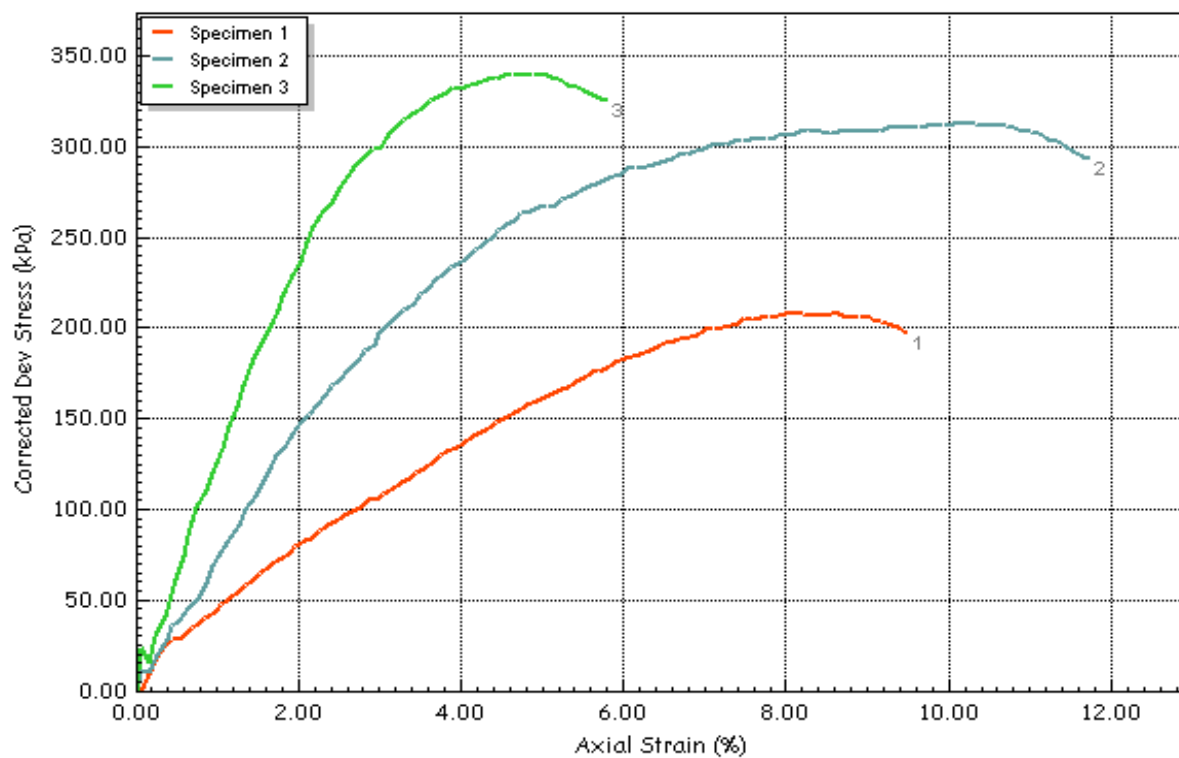
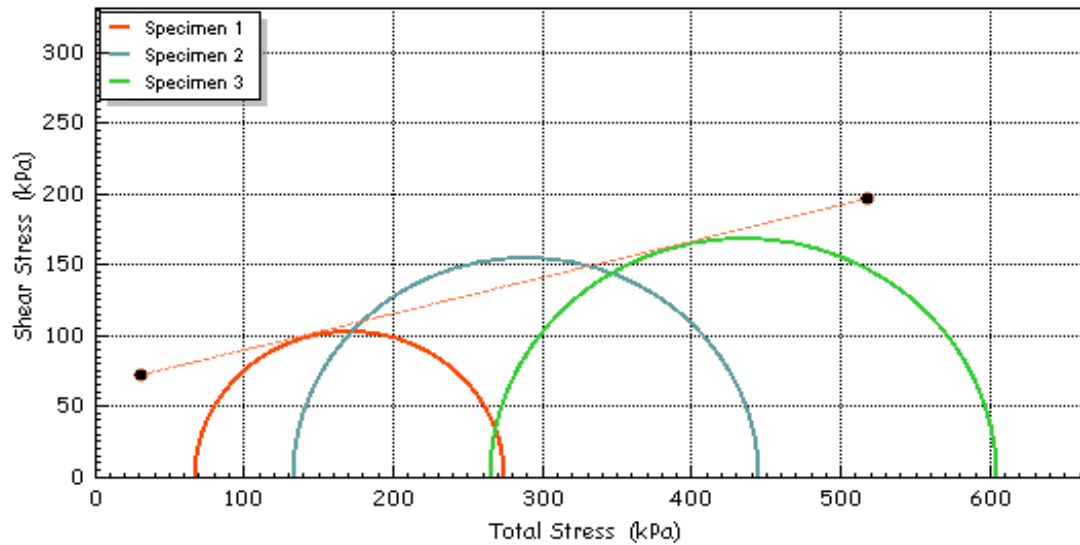
i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Total Stress Triaxial Compression

Unconsolidated Undrained (Multiple Specimen)

Test Results Plots

Cohesion Level	c	(kPa)	63.8
Friction Angle	ϕ	(deg)	14.4



 Environmental Science	Test Method BS1377-7 : 1990 Clause 8		Test Name 682151	
	Database: .SQLEXPRESS \ 6171-I2 Analytical		Test Date 18/01/2017	
	Site Reference Meadow School		Borehole BH01	
	Jobfile 17-36655		Sample 682151	
	Client Opus International Consultants Ltd		Depth 6.60 - 7.00	
Operator	palmowska	Checked	pytlikm	Approved
				pytlikm

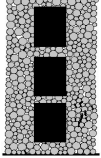
i2 Analytical Limited, 7 Woodshots Meadow, Croxley Green Business Park, Herts WD18 8YS

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Total Stress Triaxial Compression

Unconsolidated Undrained (Multiple Specimen)

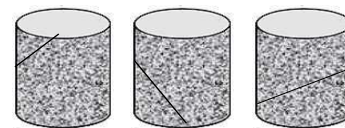
Summary Report

Sample Details		Depth	4.00 - 4.40			
 sketch showing specimen location in original sample	Description	Brown CLAY				
	Type	U				
				Spm. 1	2	3
	Initial Sample Length	L ₀	(mm)	76.5	76.6	76.9
	Initial Sample Diameter	D ₀	(mm)	36.5	36.6	36.7
	Initial Sample Weight	W ₀	(gr)	162.2	162.5	161.0
	Bulk Density	ρ ₀	(Mg/m3)	2.03	2.02	1.98
	Particle Density	ρ _s	(Mg/m3)	2.65	2.65	2.65

Initial Conditions				Spm. 1	2	3
Specimen						
Initial Cell Pressure	σ ₃	(kPa)		40	80	160
Strain Rate	m _s	(mm/min)		1.52980	1.53160	1.53860
Membrane Thickness	m _b	(mm)		0.23	0.22	0.20
Displacement Input	L _{IP}	(mm)		CH 2	CH 2	CH 2
Load Input	N _{IP}	(N)		CH 1	CH 1	CH 1
Initial Moisture	ω _i %	(%)		27	27	27
Initial Dry Density	ρ _{d0}	(Mg/m3)		1.59	1.59	1.56
Initial Voids Ratio	e ₀	.		0.66	0.67	0.70
Initial Degree of Saturation	S _o	(%)		100	100	100

Final Conditions				Spm. 1	2	3
Max Deviator Stress	(σ ₁ - σ ₃) _f	(kPa)		211.98	224.81	246.43
Membrane Correction	m _c	(kPa)		2.048	1.308	1.394
Strain At Max Stress	ε _f %	(%)		14.90	8.88	8.14
Shear Strength	c _u	(kPa)		105.99	112.40	123.21
Final Moisture	ω _f %	(%)		27	27	27
Final Dry Density	ρ _{df}	(Mg/m3)		1.59	1.59	1.56
Final Voids Ratio	e _f	.		0.66	0.67	0.70
Final Degree of Saturation	S _f	(%)		100.0	100.0	100.0

Notes



Failure Sketch

(surface inclination)

	Test Method	BS1377-7 : 1990 Clause 8	Test Name	682163
	Database:	.\SQLEXPRESS \ 6171-I2 Analytical	Test Date	18/01/2017
	Site Reference	Meadow School	Borehole	BH02
	Jobfile	17-36655	Sample	682163
	Client	Opus International Consultants Ltd	Depth	4.00 - 4.40
Operator		palmowska	Checked	pytlikm
			Approved	pytlikm

i2 Analytical Limited, 7 Woodshots Meadow, Croxley Green Business Park, Herts WD18 8YS

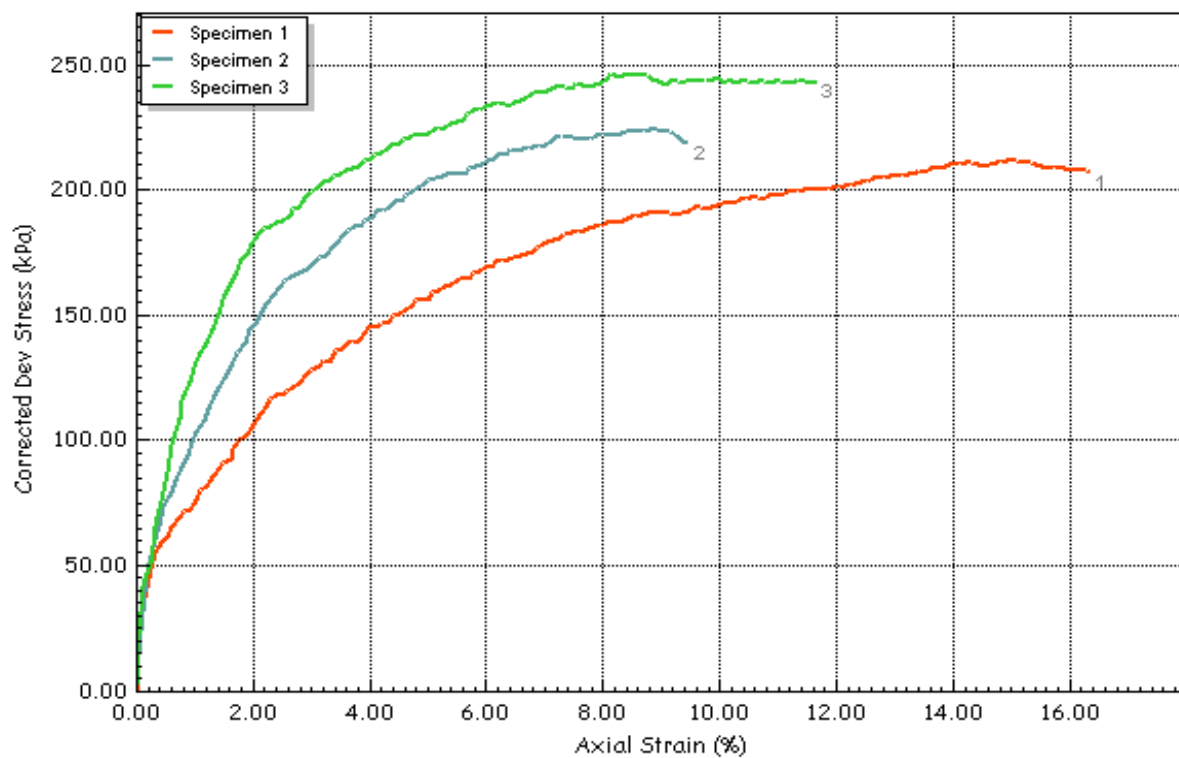
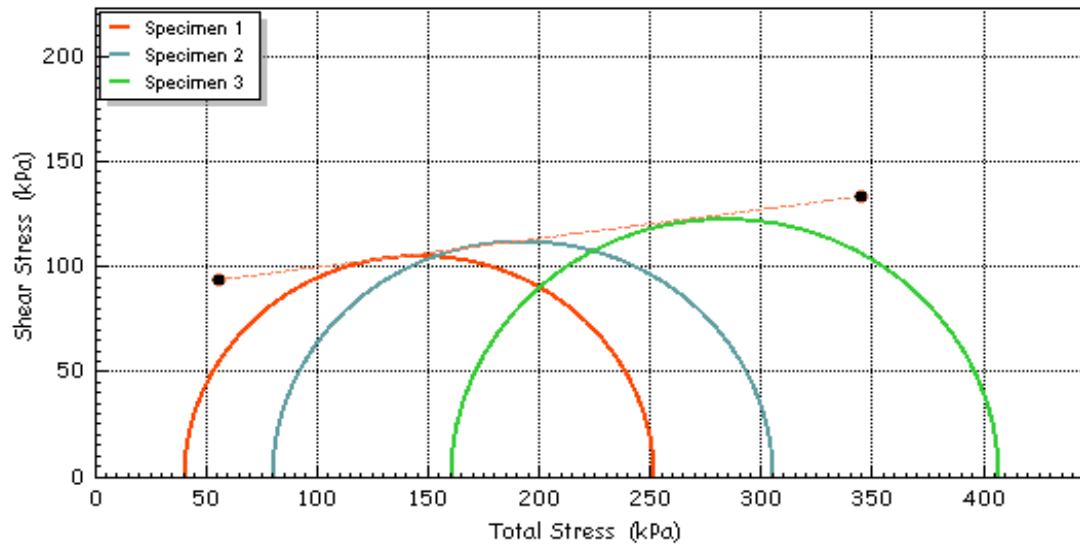
i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Total Stress Triaxial Compression

Unconsolidated Undrained (Multiple Specimen)

Test Results Plots

Cohesion Level	c	(kPa)	86.4
Friction Angle	ϕ	(deg)	7.7



	Test Method BS1377-7 : 1990 Clause 8		Test Name 682163	
	Database: .SQLEXPRESS \ 6171-I2 Analytical		Test Date 18/01/2017	
	Site Reference Meadow School		Borehole BH02	
	Jobfile 17-36655		Sample 682163	
	Client Opus International Consultants Ltd		Depth 4.00 - 4.40	
Operator	palmowska	Checked	pytlikm	Approved
				pytlikm

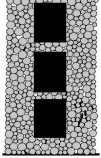
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i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Total Stress Triaxial Compression

Unconsolidated Undrained (Multiple Specimen)

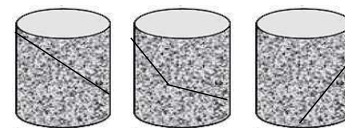
Summary Report

Sample Details		Depth	8.00 - 8.40		
 sketch showing specimen location in original sample	Description	Brown CLAY			
	Type	U			
			Spm. 1	2	3
	Initial Sample Length	L_0 (mm)	75.5	75.1	77.3
	Initial Sample Diameter	D_0 (mm)	36.7	36.5	36.5
	Initial Sample Weight	W_0 (gr)	156.5	164.3	160.2
	Bulk Density	ρ_0 (Mg/m3)	1.96	2.09	1.98
	Particle Density	ρ_s (Mg/m3)	2.65	2.65	2.65

Initial Conditions			Spm. 1	2	3
Specimen					
Initial Cell Pressure	σ_3 (kPa)		80	160	320
Strain Rate	$\dot{\epsilon}_s$ (mm/min)		1.51060	1.50260	1.54580
Membrane Thickness	m_b (mm)		0.23	0.24	0.28
Displacement Input	L_{IP} (mm)		CH 2	CH 2	CH 2
Load Input	N_{IP} (N)		CH 1	CH 1	CH 1
Initial Moisture	ω_i (%)		27	27	27
Initial Dry Density	ρ_{d0} (Mg/m3)		1.54	1.64	1.55
Initial Voids Ratio	e_0		0.72	0.61	0.71
Initial Degree of Saturation	S_o (%)		100	100	100

Final Conditions			Spm. 1	2	3
Max Deviator Stress	$(\sigma_1 - \sigma_3)_f$ (kPa)		217.28	296.78	406.53
Membrane Correction	m_c (kPa)		0.765	0.972	1.485
Strain At Max Stress	ϵ_f (%)		3.56	5.33	7.22
Shear Strength	c_u (kPa)		108.64	148.39	203.27
Final Moisture	ω_f (%)		27	27	27
Final Dry Density	ρ_{df} (Mg/m3)		1.54	1.64	1.55
Final Voids Ratio	e_f		0.72	0.61	0.71
Final Degree of Saturation	S_f (%)		100.0	100.0	100.0

Notes



Failure Sketch

(surface inclination)

	Test Method	BS1377-7 : 1990 Clause 8	Test Name	682174
	Database:	.\SQLEXPRESS \ 6171-I2 Analytical	Test Date	18/01/2017
	Site Reference	Meadow School	Borehole	BH03
	Jobfile	17-36655	Sample	682174
	Client	Opus International Consultants Ltd	Depth	8.00 - 8.40
	Operator	palmowska	Checked	pytlikm
			Approved	pytlikm

i2 Analytical Limited, 7 Woodshots Meadow, Croxley Green Business Park, Herts WD18 8YS

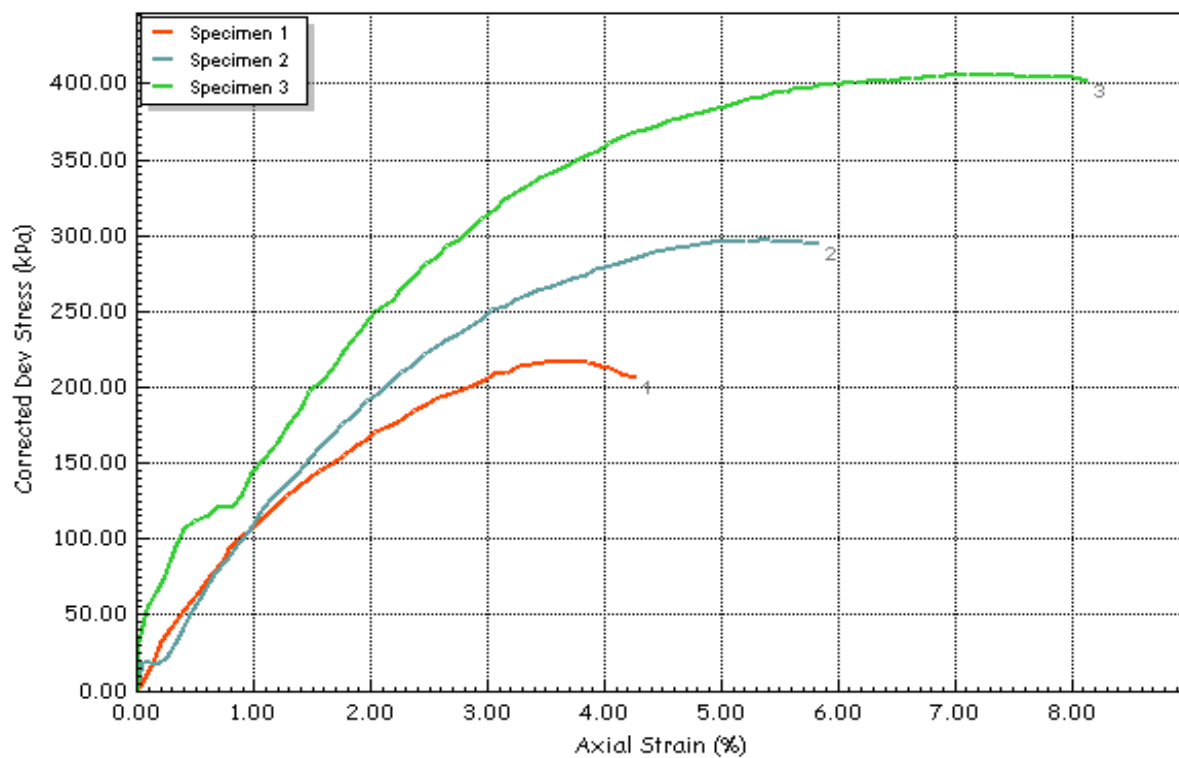
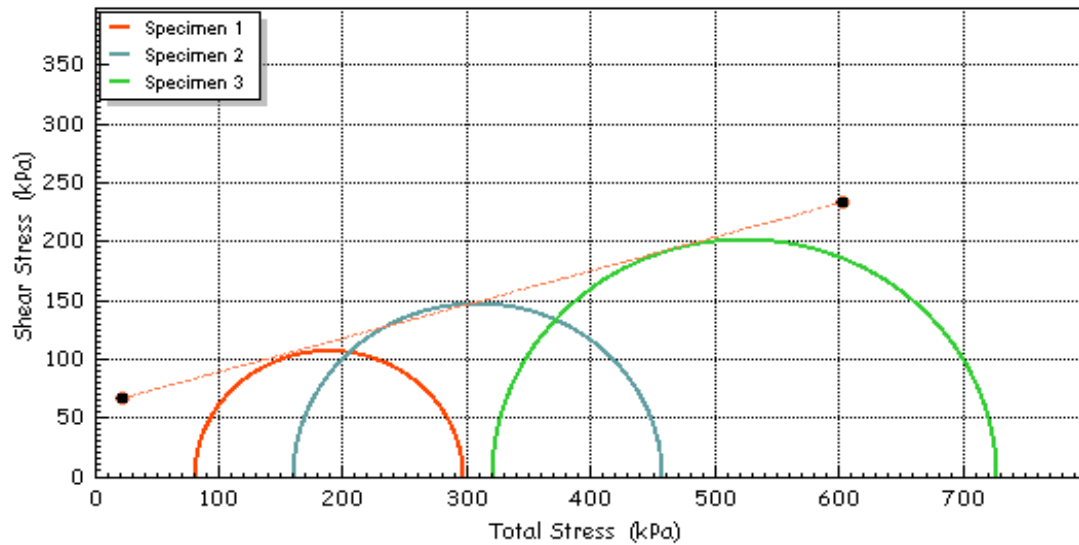
i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Total Stress Triaxial Compression

Unconsolidated Undrained (Multiple Specimen)

Test Results Plots

Cohesion Level	c	(kPa)	59.9
Friction Angle	ϕ	(deg)	16.1



 Environmental Science	Test Method BS1377-7 : 1990 Clause 8		Test Name 682174	
	Database: .SQLEXPRESS \ 6171-I2 Analytical		Test Date 18/01/2017	
	Site Reference Meadow School		Borehole BH03	
	Jobfile 17-36655		Sample 682174	
	Client Opus International Consultants Ltd		Depth 8.00 - 8.40	
	Operator palmowska	Checked pytlkm	Approved	pytlkm

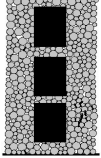
i2 Analytical Limited, 7 Woodshots Meadow, Croxley Green Business Park, Herts WD18 8YS

i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Total Stress Triaxial Compression

Unconsolidated Undrained (Multiple Specimen)

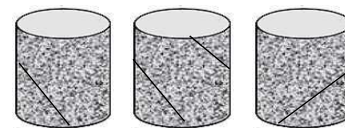
Summary Report

Sample Details		Depth	6.50 - 6.90			
 sketch showing specimen location in original sample	Description	Brown CLAY				
	Type	U				
				Spm. 1	2	3
	Initial Sample Length	L ₀	(mm)	76.1	76.9	77.1
	Initial Sample Diameter	D ₀	(mm)	37.0	36.9	36.8
	Initial Sample Weight	W ₀	(gr)	163.9	157.2	162.9
	Bulk Density	ρ ₀	(Mg/m3)	2.00	1.91	1.99
	Particle Density	ρ _s	(Mg/m3)	2.65	2.65	2.65

Initial Conditions				Spm. 1	2	3
Specimen						
Initial Cell Pressure	σ ₃	(kPa)		65	130	260
Strain Rate	m _s	(mm/min)		1.52120	1.53720	1.54220
Membrane Thickness	m _b	(mm)		0.20	0.20	0.19
Displacement Input	L _{IP}	(mm)		CH 2	CH 2	CH 2
Load Input	N _{IP}	(N)		CH 1	CH 1	CH 1
Initial Moisture	ω _i %	(%)		29	29	29
Initial Dry Density	ρ _{d0}	(Mg/m3)		1.55	1.48	1.54
Initial Voids Ratio	e ₀	.		0.70	0.79	0.72
Initial Degree of Saturation	S _a	(%)		100	97	100

Final Conditions				Spm. 1	2	3
Max Deviator Stress	(σ ₁ - σ ₃) _f	(kPa)		259.78	297.00	323.95
Membrane Correction	m _c	(kPa)		1.159	0.973	0.943
Strain At Max Stress	ε _f %	(%)		8.06	6.58	7.12
Shear Strength	c _u	(kPa)		129.89	148.50	161.97
Final Moisture	ω _f %	(%)		29	29	29
Final Dry Density	ρ _{df}	(Mg/m3)		1.55	1.48	1.54
Final Voids Ratio	e _f	.		0.70	0.79	0.72
Final Degree of Saturation	S _f	(%)		100.0	97.2	100.0

Notes



Failure Sketch

(surface inclination)

	Test Method	BS1377-7 : 1990 Clause 8	Test Name	682184
	Database:	.\SQLEXPRESS \ 6171-I2 Analytical	Test Date	18/01/2017
	Site Reference	Meadow School	Borehole	BH04
	Jobfile	17-36655	Sample	682184
	Client	Opus International Consultants Ltd	Depth	6.50 - 6.90
	Operator	palmowska	Checked	pytlikm
			Approved	pytlikm

i2 Analytical Limited, 7 Woodshots Meadow, Croxley Green Business Park, Herts WD18 8YS

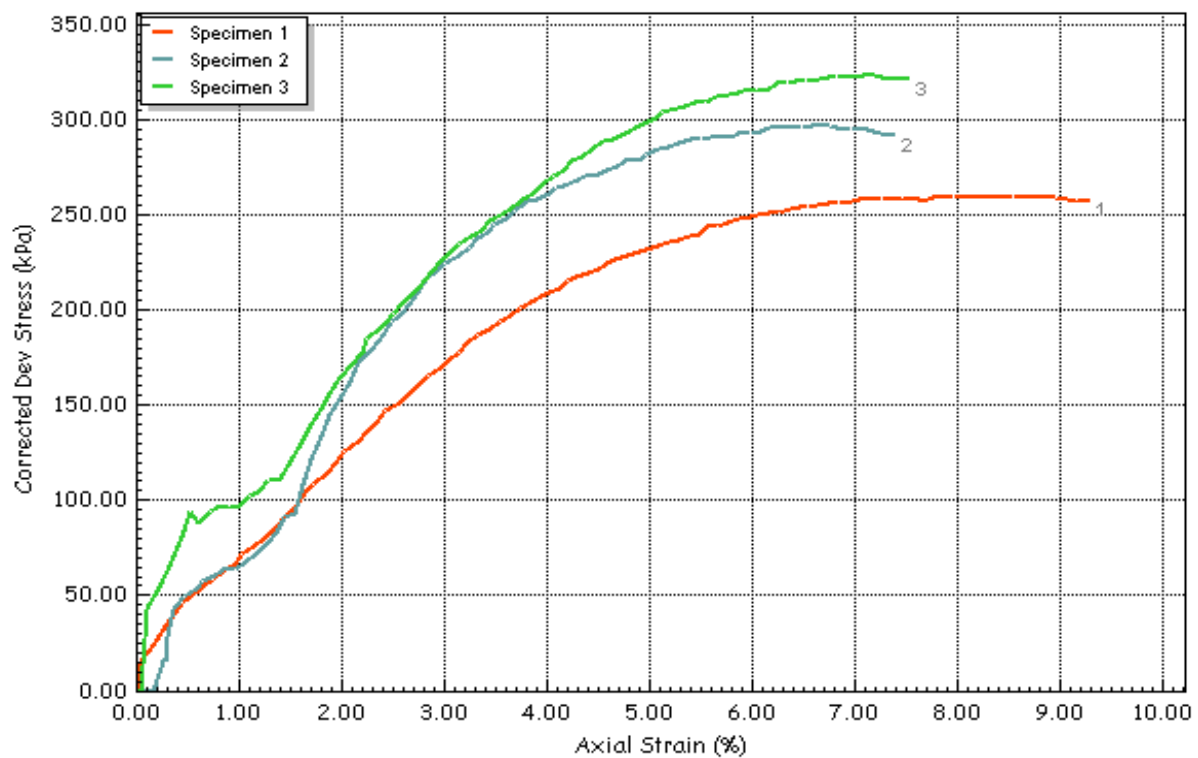
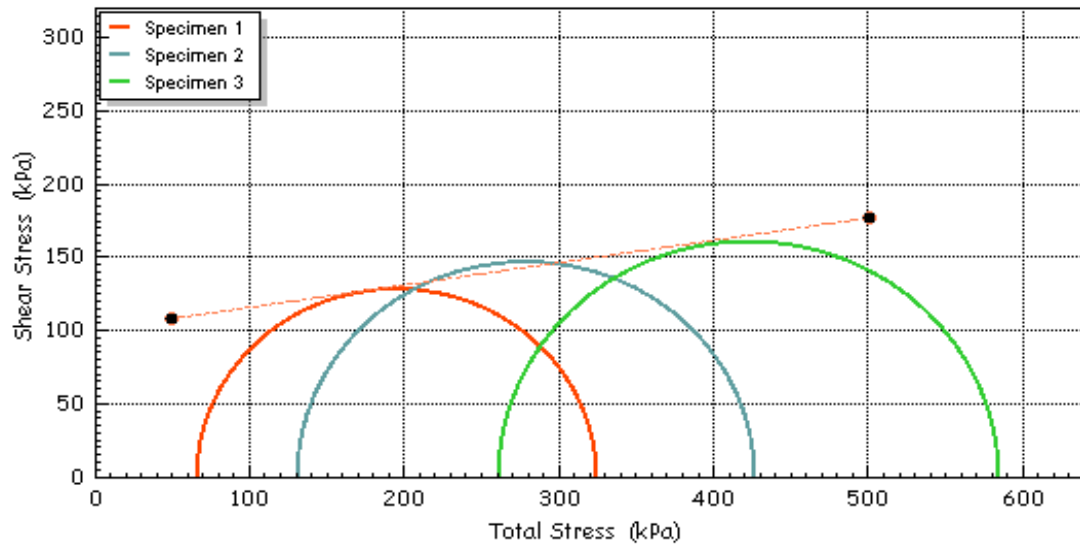
i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Total Stress Triaxial Compression

Unconsolidated Undrained (Multiple Specimen)

Test Results Plots

Cohesion Level	c	(kPa)	101.2
Friction Angle	ϕ	(deg)	8.6



	Test Method BS1377-7 : 1990 Clause 8		Test Name 682184	
	Database: .SQLEXPRESS \ 6171-I2 Analytical		Test Date 18/01/2017	
	Site Reference Meadow School		Borehole BH04	
	Jobfile 17-36655		Sample 682184	
	Client Opus International Consultants Ltd		Depth 6.50 - 6.90	
Operator	palmowska	Checked	pytlikm	Approved
				pytlikm

i2 Analytical Limited, 7 Woodshots Meadow, Croxley Green Business Park, Herts WD18 8YS

i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

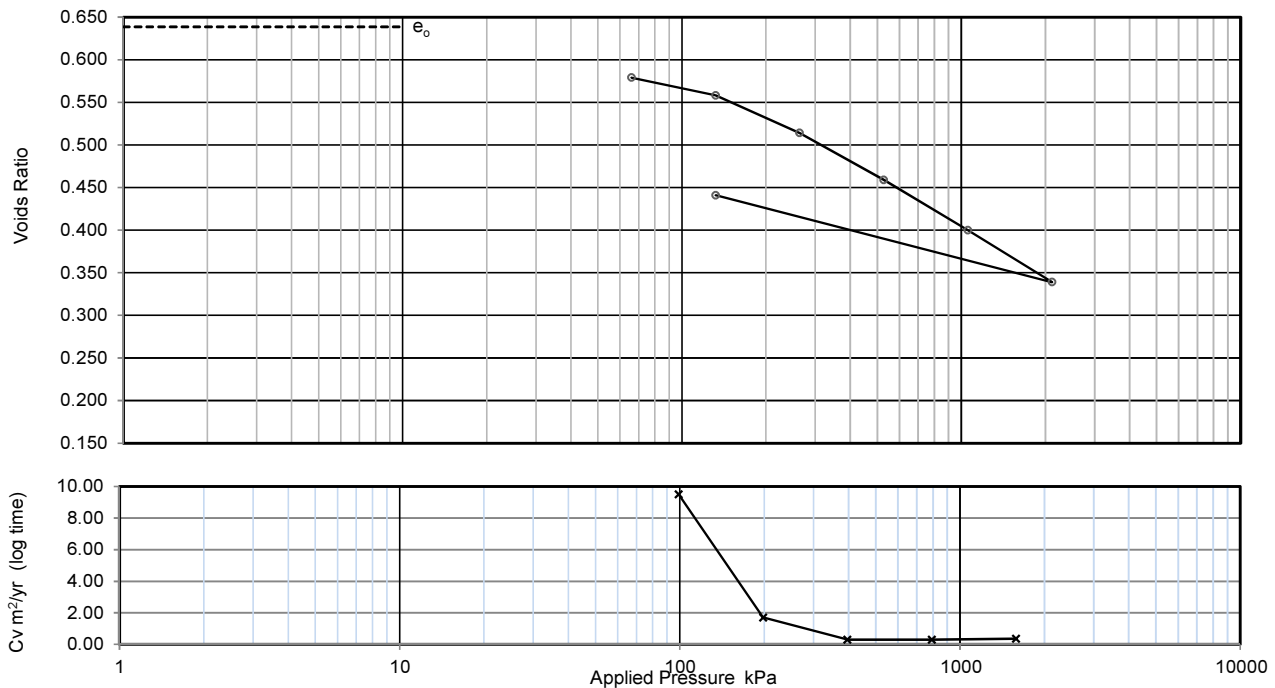
One Dimensional Consolidation Test

i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS



Client Reference: J-M3932.12
Job Number: 17-36655
Date Sampled: 20/12/2016
Date Received: 04/01/2017
Date Tested: 23/01/2017
Sampled By: Not Given

Depth Top [m]: 6.6
Depth Base [m]: 7
Sample Type: U

[illegible]

Index tests	Liquid limit:	N/A	%	Plastic limit:	N/A	%
Orientation of the sample				Vertical		
Particle density		assumed		2.65	Mg/m3	

Specimen details	Initial	Final	
Diameter	50.00	-	mm
Height	19.94	17.54	mm
Moisture Content	24.0	23.0	%
Bulk density	2.01	2.26	Mg/m ³
Dry density	1.62	1.84	Mg/m ³
Voids Ratio	0.639	0.441	
Saturation	101	136	%
Average temperature for test	20.0		°C
Swelling Pressure	Not measured		kPa
Settlement on saturation			%
Remarks			

Comments:

Signed:

Sushil Sharda
Technical Manager
(Geotechnical Division)

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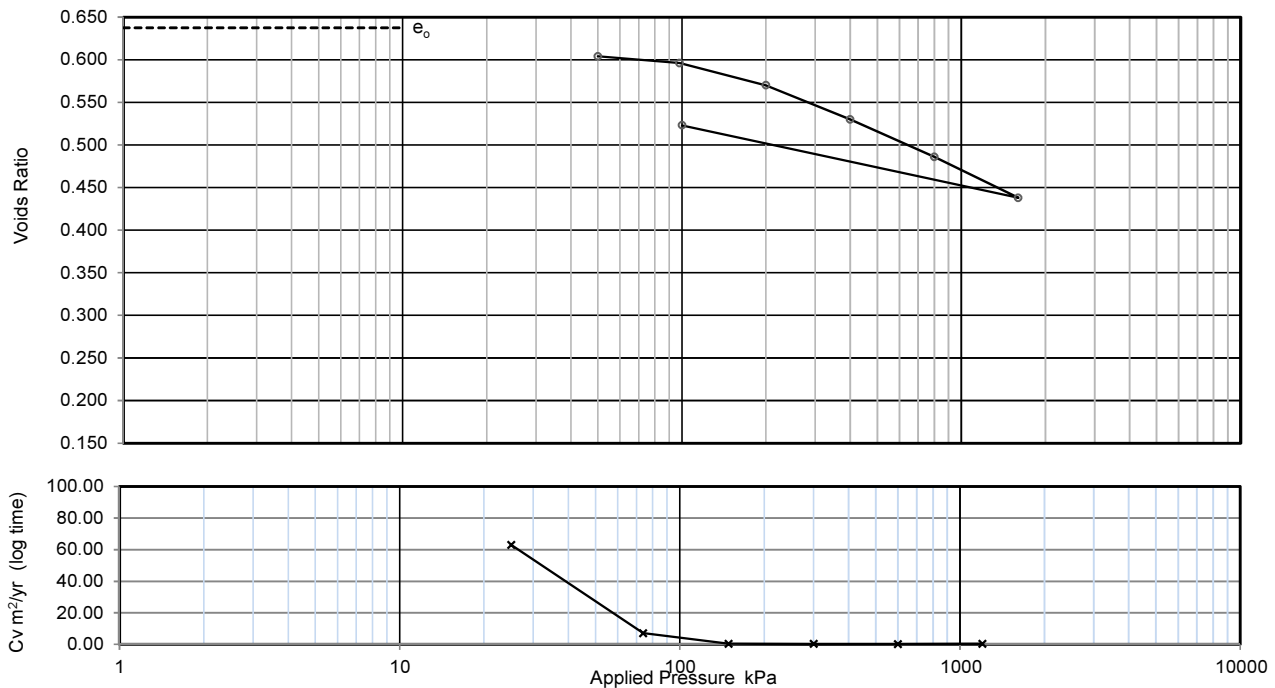
One Dimensional Consolidation Test

i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS



Client Reference: J-M3932.12
Job Number: 17-36655
Date Sampled: 16/12/2016
Date Received: 04/01/2017
Date Tested: 23/01/2017
Sampled By: Not Given

Depth Top [m]: 5
Depth Base [m]: 5.4
Sample Type: U

[illegible]

Index tests	Liquid limit:	N/A	%	Plastic limit:	N/A	%
Orientation of the sample				Vertical		
Particle density		assumed		2.65		Mg/m3

Diameter
Height
Moisture Content
Bulk density
Dry density
Voids Ratio
Saturation
Average temperature for test
Swelling Pressure
Settlement on saturation
Remarks

Initial	Final	
50.00	-	mm
20.14	18.74	mm
25.0	26.0	%
2.02	2.18	Mg/m3
1.62	1.74	Mg/m3
0.637	0.523	
104	129	%
20.0		°C
Not measured		kPa
		%

Comments:

Minnawa PythG

Signed:

Sushil Sharda
Technical Manager
(Geotechnical Division)

S. Gordon

for and on behalf of i2 Analytical Ltd

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One Dimensional Consolidation Test

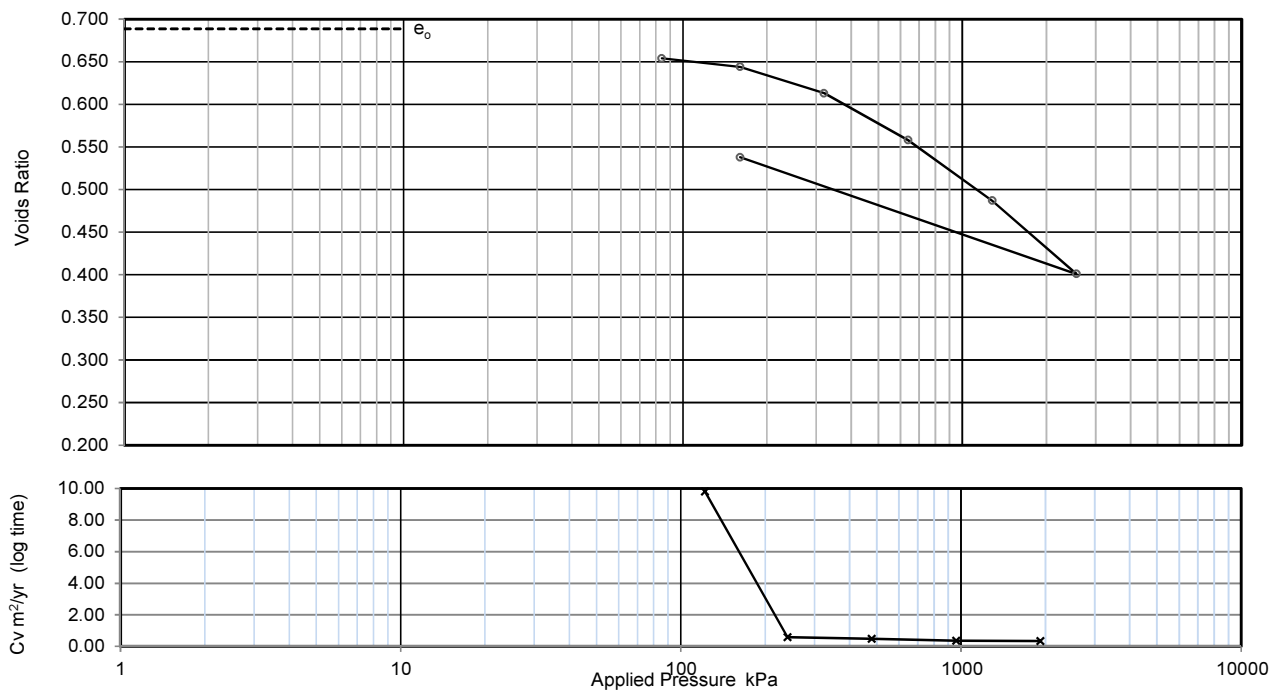
i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS



Client Reference: J-M3932.12
Job Number: 17-36655
Date Sampled: 16/12/2016
Date Received: 04/01/2017
Date Tested: 23/01/2017
Sampled By: Not Given

Laboratory Reference:	682174
Hole No.:	BH03
Sample Reference:	Not Given
Sample Description:	Brown CLAY

Depth Top [m]: 8
Depth Base [m]: 8.4
Sample Type: U

[illegible]

Index tests	Liquid limit:	N/A	%	Plastic limit:	N/A	%
Orientation of the sample				Vertical		
Particle density		assumed		2.65		Mg/m3

Specimen details	Initial	Final	
Diameter	50.00	-	mm
Height	20.11	18.31	mm
Moisture Content	26.0	27.0	%
Bulk density	1.98	2.19	Mg/m3
Dry density	1.57	1.72	Mg/m3
Voids Ratio	0.689	0.538	
Saturation	101	134	%
Average temperature for test	20.0		°C
Swelling Pressure	Not measured		kPa
Settlement on saturation			%
Remarks			

Note: Final values should be used with caution, C_v plotted at mid point of load increments, C_v corrected to 20°C

Approved: *Mina*
Mirosława Pytlik
PL Head of
Geotechnical Section
Date Reported: 30/01/2017

Signed:

Sushil Sharda
Technical Manager
(Geotechnical Division)

for and on behalf of i2 Analytical Ltd

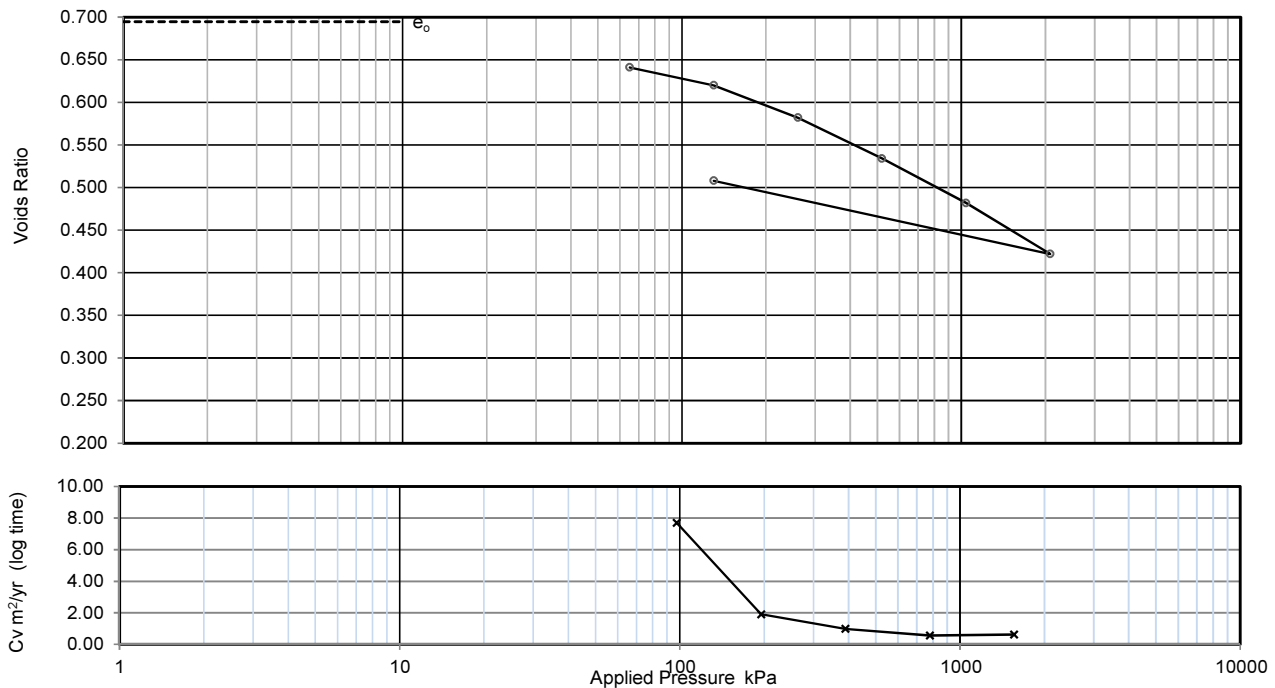
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Tested in Accordance with BS1377: Part 5: 1990 Clause 3



Client Reference: J-M3932.12
Job Number: 17-36655
Date Sampled: 19/12/2016
Date Received: 04/01/2017
Date Tested: 23/01/2017
Sampled By: Not Given

Depth Top [m]: 6.5
Depth Base [m]: 6.9
Sample Type: U

[illegible]

Index tests	Liquid limit:	N/A	%	Plastic limit:	N/A	%
Orientation of the sample				Vertical		
Particle density		assumed		2.65		Mg/m3

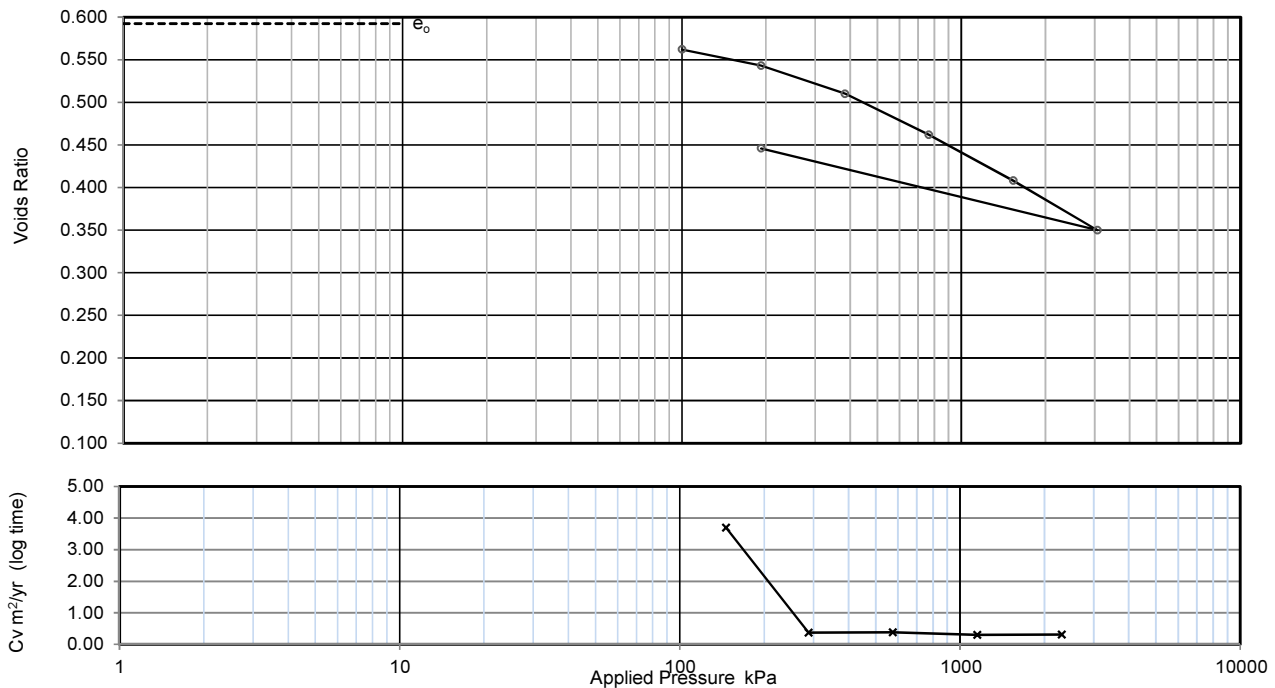
Initial	Final	
50.09	-	mm
19.91	17.72	mm
27.0	25.0	%
1.99	2.20	Mg/m3
1.56	1.76	Mg/m3
0.695	0.508	
104	130	%
20.0		°C
Not measured		kPa
		%

Tested in Accordance with BS1377: Part 5: 1990 Clause 3



Client Reference: J-M3932.12
Job Number: 17-36655
Date Sampled: 19/12/2016
Date Received: 04/01/2017
Date Tested: 23/01/2017
Sampled By: Not Given

Depth Top [m]: 9.6
Depth Base [m]: 10
Sample Type: U

[illegible]

Index tests	Liquid limit:	N/A	%	Plastic limit:	N/A	%
Orientation of the sample				Vertical		
Particle density		assumed		2.65		Mg/m3

Specimen details	Initial	Final	
Diameter	50.05	-	mm
Height	19.92	18.08	mm
Moisture Content	25.0	22.0	%
Bulk density	2.08	2.23	Mg/m ³
Dry density	1.66	1.83	Mg/m ³
Voids Ratio	0.593	0.446	
Saturation	111	130	%
Average temperature for test	20.0		°C
Swelling Pressure	Not measured		kPa
Settlement on saturation			%
Remarks			

for and on behalf of i2 Analytical Ltd

GF 172.5

APPENDIX F

Human Health Generic Assessment Criteria

Human Health Generic Screening Assessment

Client	Mace Group Limited
Project Ref	J-M3932.12
Site Name	Meadow High School, Hillingdon
Contaminants	Metals/PAH/TPH/BTEX
End Use Scenario	Residential Without Homegrown Produce
Date	16.01.17
Assessed	LJE
Checked/Approved	RP/NM



Project Name:	Meadow High School, Hillingdon
Project Reference:	J-M3932.12

Metals Screening Suite - Human Health Residential Without Homegrown Produce			TP / BH No	BH03	WS01	WS01	WS02	WS02	WS03	WS03	WS04	WS04	BH01	BH01	BH04	BH04
			Additional Refs	ES2	ES3	ES1	ES2	ES2	ES3	ES1	ES2	ES1	ES2	ES1	ES2	ES1
			Depth (m)	0.10	0.50	1.00	0.30	0.90	0.50	1.20	0.20	0.6	0.1	0.5	0.2	0.5
Determinand	Screening Value	Source	Units													
Antimony	550	ATRISKsoil (EIC/AGS/CL:AIRE*)	mg/kg	< 1.0	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Arsenic	40	C4SL	mg/kg	15	11	10	7.9	11	12	13	5	9.3	12	15	9.6	14
Barium	1300	ATRISKsoil (EIC/AGS/CL:AIRE*)	mg/kg	67	120	90	83	77	58	85	89	76	84	100	88	66
Beryllium	1.7	S4UL	mg/kg	0.58	0.84	0.91	1.1	0.7	0.51	0.96	< 0.06	0.66	0.72	1.3	0.63	0.79
Boron	11000	S4UL	mg/kg	1.3	1.2	7.2	0.6	0.4	0.7	0.5	0.6	1.2	1.4	1.4	3.8	0.6
Cadmium	150	C4SL	mg/kg	< 0.2	0.2	< 0.2	< 0.2	0.4	11	< 0.2	0.3	< 0.2	0.2	< 0.2	0.3	< 0.2
Chromium (hexavalent)	21	C4SL	mg/kg	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
Chromium (III)	910	S4UL	mg/kg	21	22	26	21	29	23	36	11	25	24	34	27	37
Copper	7100	S4UL	mg/kg	22	69	44	100	13	19	18	13	19	25	22	30	18
Iron*		Opus IHSV	mg/kg	20000	21000	20000	17000	27000	17000	35000	10000	23000	22000	34000	23000	37000
Lead	310	C4SL	mg/kg	52	320	87	38	14	45	15	9	40	72	27	68	17
Mercury	56	S4UL	mg/kg	0.6	< 0.3	0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Molybdenum	670	ATRISKsoil (EIC/AGS/CL:AIRE*)	mg/kg	0.95	2.1	1.3	4.3	0.79	0.89	0.91	0.54	0.74	0.95	0.85	0.95	0.52
Nickel	180	S4UL	mg/kg	13	30	21	41	14	15	22	6	15	15	26	16	19
Selenium	430	S4UL	mg/kg	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Vanadium	1200	S4UL	mg/kg	31	48	42	45	53	37	53	18	40	40	57	37	52
Zinc	40000	S4UL	mg/kg	48	90	67	32	32	57	48	39	45	65	60	86	74
Cyanide (free)	34	ATRISKsoil	mg/kg	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1

Highlighted concentrations have exceeded their generic screening value

*no GAC

Project Name:	Meadow High School, Hillingdon
Project Reference:	J-M3932.12

PAH Screening Suite - Human Health Residential Without Homegrown Produce 1% SOM	TP / BH No	BH03	WS01	WS01	WS02	WS02	WS03	WS03	WS04	WS04	BH01	BH01	BH04	BH04
	Additional Refs	ES2	ES3	ES1	ES2	ES2	ES3	ES1	ES2	ES2	ES1	ES2	ES1	ES2
	Depth (m)	0.1	0.5	1	0.3	0.9	0.5	1.2	0.2	0.6	0.1	0.5	0.2	0.5

Determinand	Screening Value	Source	Units											
Naphthalene	2.3	S4UL	mg/kg	0.31	0.23	3.9	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthylene	170	S4UL	mg/kg	0.2	< 0.10	0.37	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthene	210	S4UL	mg/kg	< 0.10	< 0.10	0.36	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluorene	170	S4UL	mg/kg	< 0.10	< 0.10	0.65	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Phenanthrene	95	S4UL	mg/kg	1.8	0.5	4.1	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.3	< 0.10	< 0.10
Anthracene	2400	S4UL	mg/kg	0.47	< 0.10	0.82	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluoranthene	280	S4UL	mg/kg	4.1	0.95	6.3	< 0.10	0.54	< 0.10	< 0.10	< 0.10	0.76	< 0.10	< 0.10
Pyrene	620	S4UL	mg/kg	4.7	0.94	7.3	< 0.10	0.55	< 0.10	< 0.10	< 0.10	0.65	< 0.10	< 0.10
Benzo(a)anthracene	7.2	S4UL	mg/kg	2.1	0.42	2	< 0.10	0.4	< 0.10	< 0.10	< 0.10	0.41	< 0.10	< 0.10
Chrysene	15	S4UL	mg/kg	2	0.37	2.3	< 0.05	0.4	< 0.05	< 0.05	< 0.05	0.35	< 0.05	< 0.05
Benzo(b)fluoranthene	2.6	S4UL	mg/kg	4.1	0.61	3.2	< 0.10	0.48	< 0.10	< 0.10	< 0.10	0.4	< 0.10	< 0.10
Benzo(k)fluoranthene	77	S4UL	mg/kg	2.5	0.31	2.2	< 0.10	0.44	< 0.10	< 0.10	< 0.10	0.22	< 0.10	< 0.10
Benzo(a)pyrene	5.0	S4UL	mg/kg	5	0.58	3.8	< 0.10	0.51	< 0.10	< 0.10	< 0.10	0.36	< 0.10	< 0.10
Indeno(1,2,3-cd)pyrene	27	S4UL	mg/kg	3.9	0.54	3.2	< 0.10	0.45	< 0.10	< 0.10	< 0.10	0.27	< 0.10	< 0.10
Dibenz(a,h)anthracene	0.24	S4UL	mg/kg	0.43	< 0.10	0.34	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo(ghi)perylene	320	S4UL	mg/kg	4.9	0.68	4.5	< 0.05	0.48	< 0.05	< 0.05	< 0.05	0.32	< 0.05	< 0.05
Total Phenols (monohydric)	120	S4UL	mg/kg	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

Highlighted concentrations have exceeded their generic screening value

Project Name:	Meadow High School, Hillingdon
Project Reference:	J-M3932.12

TPH Screening Suite - Human Health Residential Without Homegrown Produce 1% SOM			TP / BH No	BH03	WS01	WS01	WS02	WS02	WS03	WS03	WS04	WS04	BH01	BH01	BH04	BH04
			Additional Refs	ES2	ES3	ES1	ES2	ES2	ES3	ES1	ES2	ES1	ES2	ES1	ES2	ES2
			Depth (m)	0.1	0.5	1	0.3	0.9	0.5	1.2	0.2	0.6	0.1	0.5	0.2	0.5
Determinand	Screening Value	Source	Units													
Aliphatic >C5 - C6	42	S4UL	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aliphatic >C6 - C8	100	S4UL	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aliphatic >C8 - C10	27	S4UL	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aliphatic >C10 - C12	130	S4UL	mg/kg	< 1.0	1.3	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	1.1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic >C12 - C16	1100	S4UL	mg/kg	< 2.0	8.5	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	5.3	< 2.0	< 2.0	< 2.0	2	< 2.0
Aliphatic >C16 - C21	65000	S4UL	mg/kg	< 8.0	26	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0	17	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0
Aliphatic >C21 - C34	65000	S4UL	mg/kg	< 8.0	130	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0	90	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0
Aromatic >C5 - C7	0.2	C4SL Benzene	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aromatic >C7 - C8	130	C4SL Toluene	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aromatic >C8 - C10	34	S4UL	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aromatic >C10 - C12	74	S4UL	mg/kg	< 1.0	< 1.0	< 1.0	4	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	1.7
Aromatic >C12 - C16	140	S4UL	mg/kg	< 2.0	7.3	< 2.0	6.4	< 2.0	3.3	< 2.0	7.1	< 2.0	< 2.0	< 2.0	3.3	5.9
Aromatic >C16 - C21	260	S4UL	mg/kg	< 10	41	< 10	19	< 10	< 10	< 10	26	< 10	< 10	< 10	15	< 10
Aromatic >C21 - C35	1100	S4UL	mg/kg	< 10	240	17	24	< 10	15	< 10	190	< 10	< 10	< 10	17	< 10

Highlighted concentrations have exceeded their generic screening value

Project Name:	Meadow High School, Hillingdon
Project Reference:	J-M3932.12

BTEX Screening Suite - Human Health Residential Without Homegrown Produce 1% SOM				TP / BH No	BH03	WS01	WS01	WS02	WS02	WS03	WS03	WS04	WS04	BH01	BH01	BH04	BH04
				Additional Refs		ES2	ES3	ES1	ES2	ES2	ES3	ES1	ES2	ES1	ES2	ES1	ES2
				Depth (m)	0.1	0.5	1	0.3	0.9	0.5	1.2	0.2	0.6	0.1	0.5	0.2	0.5
Determinand	Screening Value	Source	Units														
Benzene	0.2	C4SL	mg/kg	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	130	S4UL	mg/kg	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	47	S4UL	mg/kg	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
p & m-xylene	59	S4UL	mg/kg	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
o-xylene	60	S4UL	mg/kg	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
MTBE	49	EIC/AGX/CL:AIRE	mg/kg	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

Highlighted concentrations have exceeded their generic screening value

APPENDIX G

Human Health Statistical Analysis Results

Client/client ref	Mace
Project ref	J-M3932.12
Site ref	Meadow High School
Data description	Made Ground
Contaminant(s)	Lead
Test scenario	Planning: is true mean lower than critical concentration ($\mu < C_c$)? ▼
Date	16.01.17
User details	Opus International Consultants (UK) Ltd

Statistics calculator (version 1)



Input data

This spreadsheet has been produced based on the document 'Guidance on Comparing Soil Contamination Data with a Critical Concentration (CIEH/CL:AIRE, 2008)'. Users of this spreadsheet should always refer to this guidance, the User Manual and to relevant guidance on UK legislation and policy, in order to understand how the procedure should be applied in an appropriate context.

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[Go to summary](#)

Data sheet

Project details

[illegible]

Client/client ref: Mace
Project ref: J-M3932.12
Site ref: Meadow High School
Data description: Made Ground
Contaminant(s): Lead
Test scenario: Planning
Date: 16.01.17
User details: Opus International Consultants

[illegible]

Client/client ref	Mace
Project ref	J-M3932.12
Site ref	Meadow High School
Data description	Made Ground
Contaminant(s)	PAHs
Test scenario	Planning: is true mean lower than critical concentration ($\mu < C_c$)? ▼
Date	17.01.17
User details	Opus International Consultants (UK) Ltd

Statistics calculator (version 1)



Input data

This spreadsheet has been produced based on the document 'Guidance on Comparing Soil Contamination Data with a Critical Concentration (CIEH/CL:AIRE, 2008)'. Users of this spreadsheet should always refer to this guidance, the User Manual and to relevant guidance on UK legislation and policy, in order to understand how the procedure should be applied in an appropriate context.

ESI Ltd (ESI) do not promise that the spreadsheet will provide any particular facilities or functions. The user must ensure that the spreadsheet meets their needs and they remain solely responsible for the competent use of the spreadsheet. Users are entirely responsible for the consequences of any use of the spreadsheet, ESI do not provide any warranty about the fitness for purpose or performance of any part of the spreadsheet. We do not promise that the media will always be free from defects, computer viruses, software locks or other similar code or that the operation of the spreadsheet will be uninterrupted or error free. The user should carry out all necessary virus checks prior to installing on their computing system.

[Go to summary](#)

Data sheet

Project details

[illegible]

Client/client ref: Mace Project ref: J-M3932.05 Site ref: Claverham School Data description: Made Ground Contaminant(s): PAHs Test scenario: Planning Date: 11.01.17 User details: Opus International Consultants Auto: Cheb		Naphthalene	Acenaphthylene	Acenaphthene	Fluorene	Phenanthrene	Anthracene	Fluoranthene	Pyrene	Benzo(a)anthracene	Chrysene	Benzo(b)fluoranthene	Benzo(k)fluoranthene	Benzo(a)pyrene	Indeno(1,2,3-cd)pyrene	Dibenz(a,h)anthracene	Benzo(ghi)perylene
Critical concentration, C _c		2.3	2900	3000	2800	1300	3100	1500	3700	11	30	3.9	110	5.3	45	0.31	360
Notes																	
Sample size, n		7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
Sample mean, $\bar{x}$		0.66285714	0.15285714	0.13714286	0.17857143	0.97142857	0.25571429	1.74142857	1.97	0.74571429	0.74571429	1.24142857	0.82142857	1.45571429	1.19857143	0.18142857	1.53
Standard deviation, s		1.43139459	0.10274796	0.09827076	0.20788046	1.51295989	0.28447947	2.46630918	2.87024389	0.90219837	0.97483088	1.67801896	1.05565822	2.05072229	1.62880763	0.14147185	2.1822771
Number of non-detects		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Set non-detect values to:		Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit
Outliers?		Yes	Yes	Yes	Yes	Yes	Yes	No	No	No	No	No	No	No	No	No	No
Distribution		Non-normal	Non-normal	Non-normal	Non-normal	Non-normal	Non-normal	Non-normal	Non-normal	Non-normal	Non-normal	Non-normal	Non-normal	Non-normal	Non-normal	Non-normal	Non-normal
Statistical approach		Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev

Test scenario:	Planning: is true mean lower than critical concentration (μ < C _c)? ▾ Evidence level required: 95% Use Normal distribution to test for outliers ▾																
t statistic, t ₀ (or k ₀)	-3.026050879	-74670.82106	-80765.53846	-35634.09091	-2271.644196	-28828.62646	-1607.267904	-3408.793151	-30.07131322	-79.39794136	-4.191799392	-273.6296104	-4.959727617	-71.14878709	-2.404492583	-434.6022204	
Upper confidence limit (on true mean concentration, μ)	3.02109253	0.32213532	0.29904482	0.52105635	3.46404351	0.72439676	5.80469499	6.69875248	2.23209417	2.35175687	4.00597981	2.56063494	4.83429759	3.88204656	0.41450472	5.12532103	
Evidence level	90%	100%	100%	100%	100%	100%	100%	100%	100%	100%	95%	100%	96%	100%	85%	100%	
Base decision on:	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	
Result	μ ≥ C _c	μ < C _c	μ < C _c	μ < C _c	μ < C _c	μ < C _c	μ < C _c	μ < C _c	μ < C _c	μ < C _c	μ < C _c	μ ≥ C _c	μ < C _c	μ < C _c	μ < C _c	μ < C _c	

APPENDIX H

Gas Monitoring Results

Client	Mace Group Ltd							
Site	Meadow Special School							
Our Ref	J-M3932.12							
Gas Probe Ref	HDG5-GA5059							
Date	04/01/2017							
Weather	Cloudy							
Atmospheric Pressure (mb)							Drawn: ES Checked: RP Approved: NM	
Gas Monitoring Point	Methane Peak/Steady (% by volume)	Carbon Dioxide Peak/Steady (% by volume)	Oxygen Minimum/Steady (% by volume)	Hydrogen Sulphide Peak/Steady (ppm)	Carbon Monoxide Peak/Steady (ppm)	Flow Peak/Steady (l/h)	Depth to Groundwater (m)	Comments
Start	<0.1	<0.1	20.0	<1	<1	*	*	
BH02	<0.1 (<0.1)	0.4 (0.4)	19.7 (19.7)	<1 (<1)	<1 (<1)	<0.1 (<0.1)	1.43	
BH04	<0.1 (<0.1)	1.6 (1.5)	17.2 (17.2)	<1 (<1)	<1 (<1)	<0.1 (<0.1)	1.64	
WS01	<0.1 (<0.1)	0.3 (0.3)	18.4 (18.4)	<1 (<1)	<1 (<1)	10.2 (<0.1)	0.55	
WS04	<0.1 (<0.1)	1.7 (1.7)	5.7 (5.7)	<1 (<1)	<1 (<1)	<0.1 (<0.1)	NGW	
End	<0.1	<0.1	20.1	0	0	*	*	

KEY

Text shown in Bold and Italic indicates either:

a) Carbon Dioxide equal to or above 5.00% by volume or

b) Methane equal to or above 1.00% by volume

Notes

UW	indicates that monitoring point was under water
*	indicates that no measurement was taken
NA	indicates that data was unavailable
NGW	indicates no groundwater was present in standpipe
()	steady reading taken approximately 1 minute after initial peak reading

Client	Mace Group Ltd							
Site	Meadow Special School							
Our Ref	J-M3932.12							
Gas Probe Ref	HDG5-GA5059							
Date	23/01/2017							
Weather	Cloudy							
Atmospheric Pressure (mb)							Drawn: EDH Checked: RP Approved: NM	
	Start 1020	End 1019						
Gas Monitoring Point	Methane Peak/Steady (% by volume)	Carbon Dioxide Peak/Steady (% by volume)	Oxygen Minimum/Steady (% by volume)	Hydrogen Sulphide Peak/Steady (ppm)	Carbon Monoxide Peak/Steady (ppm)	Flow Peak/Steady (l/h)	Depth to Groundwater (m)	Comments
Start	<0.1	<0.1	20.0	<1	<1	*	*	
BH02	<0.1 (<0.1)	<0.1 (<0.1)	18.9 (19.5)	<1 (<1)	<1 (<1)	-5.0 (<0.1)	1.53	
BH04	<0.1 (<0.1)	2.3 (2.3)	14.7 (14.7)	<1 (<1)	<1 (<1)	<0.1 (<0.1)	1.63	
WS01	<0.1 (<0.1)	0.7 (0.7)	18.1 (18.1)	<1 (<1)	<1 (<1)	<0.1 (<0.1)	0.82	
WS04	<0.1 (<0.1)	1.7 (1.7)	0.6 (0.6)	<1 (<1)	<1 (<1)	<0.1 (<0.1)	1.06	
End	<0.1	<0.1	19.8	0	0	*	*	

KEY

Text shown in Bold and Italic indicates either:

a) Carbon Dioxide equal to or above 5.00% by volume or

b) Methane equal to or above 1.00% by volume

Notes

UW	indicates that monitoring point was under water
*	indicates that no measurement was taken
NA	indicates that data was unavailable
NGW	indicates no groundwater was present in standpipe
()	steady reading taken approximately 1 minute after initial peak reading

Client	Mace Group Ltd							
Site	Meadow Special School							
Our Ref	J-M3932.12							
Gas Probe Ref	HDG5-GA5059							
Date	27/01/2017							
Weather	Cloudy with sunny spells							
Atmospheric Pressure (mb)								Drawn: EDH Checked: RP Approved: NM
Gas Monitoring Point	Methane Peak/Steady (% by volume)	Carbon Dioxide Peak/Steady (% by volume)	Oxygen Minimum/Steady (% by volume)	Hydrogen Sulphide Peak/Steady (ppm)	Carbon Monoxide Peak/Steady (ppm)	Flow Peak/Steady (l/h)	Depth to Groundwater (m)	Comments
Start	<0.1	<0.1	20.1	<1	<1	*	*	
BH02	<0.1 (<0.1)	1.7 (0.2)	18.3 (19.8)	<1 (<1)	<1 (<1)	-5.0 (<0.1)	1.61	
BH04	<0.1 (<0.1)	2.2 (2.2)	14.8 (14.8)	<1 (<1)	<1 (<1)	<0.1 (<0.1)	1.69	
WS01	<0.1 (<0.1)	0.8 (0.8)	17.4 (17.5)	<1 (<1)	<1 (<1)	<0.1 (<0.1)	0.91	
WS04	<0.1 (<0.1)	2.2 (2.2)	<0.1 (<0.1)	<1 (<1)	<1 (<1)	<0.1 (<0.1)	1.18	
End	<0.1	<0.1	19.8	0	0	*	*	

KEY

Text shown in Bold and Italic indicates either:

- a) Carbon Dioxide equal to or above 5.00% by volume or
b) Methane equal to or above 1.00% by volume**

Notes

UW	indicates that monitoring point was under water
*	indicates that no measurement was taken
NA	indicates that data was unavailable
NGW	indicates no groundwater was present in standpipe
()	steady reading taken approximately 1 minute after initial peak reading

APPENDIX I

Conditions and Limitations

OPUS INTERNATIONAL CONSULTANTS (UK) LTD

SITE INVESTIGATIONS

CONDITIONS AND LIMITATIONS

1. The report is confidential to the clients stated in the report and has been prepared to their instructions for their own purposes and it is not permitted to disclose this report to other parties (except NHBC, Local Authority, the Client's own Solicitors and Professional Advisers) without the prior consent of Opus International Consultants (UK) Ltd.
2. The copyright of this report remains the property of Opus International Consultants (UK) Ltd.
3. No liability for the contents of this report is accepted to any parties other than the client stated in the report. No parties other than the client stated in the report should rely upon this report.
4. Attention is drawn to the fact that, whilst every effort is made to ensure the accuracy of the data and any conclusions derived from it, the possibility exists of variations in ground conditions around and between trial pits. No liability can be accepted for such variations or for agreed sampling rates/trial hole frequency.
5. Unless specifically stated otherwise in the report, any recommendations for works given in the report are outline only and are to be confirmed or modified as appropriate at detailed design stage.
6. No liability can be accepted for any services or other below ground items unless clearly shown on a plan to us in advance of any site works.
7. In accepting instructions to carry out site investigations it is assumed by us that our clients have all necessary permissions from existing owners and/or other authorities for such works to proceed. No liability is accepted for any claims arising as a result of anything contrary to this.
8. It is also assumed that a suitable clear access to the site is available for the required equipment and plant.
9. All holes are normally back-filled with excavated material compacted by its own weight only. Any excess spoil will be spread evenly around the direct area of excavation.
10. No chemical analysis of samples will be carried out unless specifically stated otherwise in the text of this report. Where fill, disturbed soil or an unfavourable earlier land usage is identified by the investigation the client is advised to have chemical analysis carried out subsequently. In any event no liability is accepted in respect of pollution. Similarly for radon and naturally occurring chemicals and gases.
11. Unless stated otherwise any desk study into the site history will be limited to information readily available at the Local Reference Library.
12. Under the Construction (Design & Management) Regulations latest edition, the Client has obligations for ensuring Health and Safety arising from any construction work. If it is proposed to proceed with construction work based upon information or recommendations contained in this report, these regulations probably apply. Further details of any issues arising from our report or the Clients obligations generally are available on request.
13. Unless dealt with more specifically above the Association of Consulting Engineers Conditions of Engagement, Short Form Agreement 2002 applies.
14. Laboratory testing where carried out is usually undertaken by sub-contract laboratories. No liability is accepted arising from any errors or omissions on the part of such laboratories.



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