



Geo-Environmental

GROUND APPRAISAL REPORT

for the land at

BOORLEY GREEN NURSERY SITE,

NAIRN ROAD,

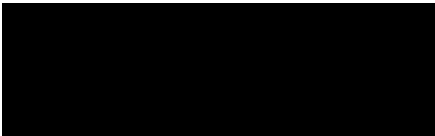
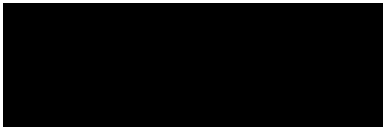
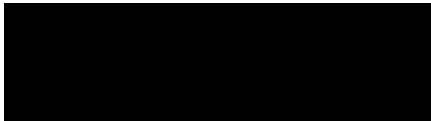
BOORLEY GREEN,

SO32 2SH

on behalf of

NH DEVELOPMENTS LIMITED



Report:	GROUND APPRAISAL REPORT
Site:	BOORLEY GREEN NURSERY SITE, NAIRN ROAD, BOORLEY GREEN, SO32 2SH
Client:	NH DEVELOPMENTS LIMITED
Date:	10/10/2024
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**CONTENTS**

EXECUTIVE SUMMARY	v
1.0 INTRODUCTION	1
1.1 General	1
1.2 Form of Development	1
1.3 Objectives	1
1.4 Standards and References	1
1.5 Conditions	2
2.0 SITE CONTEXT	3
2.1 Previous Reports	3
2.2 Site Description	3
2.3 Geology	3
2.4 Desk Study and Ground Investigation Summary	4
3.0 GROUND INVESTIGATION	7
3.1 Scope of Works	7
3.2 Investigation Strategy	7
4.0 ENCOUNTERED CONDITIONS	8
4.1 Ground Conditions	8
4.2 Groundwater	9
4.3 Obstructions and Access Issues	9
4.4 Geochemical Analysis	9
4.5 Geotechnical and Geochemical Results	10
5.0 ENGINEERING CONSIDERATIONS	11
5.1 Foundations	11
5.2 Excavations	12
5.3 Floor Slabs	12
5.4 Pavements	12
5.5 Sulphates	13
5.6 Falling Head Testing	13
6.0 ENVIRONMENTAL CONSIDERATIONS	14
6.1 Environmental Assessment	14
6.2 Ground Gases	14
6.3 Waste Disposal	16
7.0 DISCOVERY STRATEGY	18

FIGURES

FIGURE 1	Site Location Plan
FIGURE 2	Exploratory Hole Location Plan
FIGURE 3	Preliminary Site and Location Plan (Proposed Development Plan)

APPENDICES

APPENDIX A	Exploratory Hole Logs, In-Situ Testing
APPENDIX B	Geotechnical Laboratory Results
APPENDIX C	Geochemical Laboratory Results
APPENDIX D	Soakage Test Results
APPENDIX E	Gas and Groundwater Monitoring Results
APPENDIX F	Site Photographs



EXECUTIVE SUMMARY		
Site Details	Site Address	Boorley Green Nursery Site, Nairn Road, Boorley Green, SO32 2SH
	National Grid Reference	451081, 114689
	Site Area	0.25ha (approx.)
	Form of Development	The construction of a nursery/school use together with external play areas, landscaping and associated infrastructure.
Encountered Conditions	Scope of works	The assessment comprised an intrusive investigation to confirm the ground and groundwater conditions and support the development of geotechnical and geo-environmental assessments of the site in relation to the proposed development of a nursery school.
	Ground Conditions	The encountered ground conditions comprised a mantle of Topsoil overlying clay and sand-based soils of the Wittering Formation overlying soils tentatively identified as the London Clay Formation within one location (WS104).
	Groundwater	Groundwater strikes were encountered within four of the exploratory holes at depths of between 1.99m bgl [23.123mAOD] and 2.97m bgl [21.768mAOD]. Monitoring wells were installed in WS102, WS103 and WS105 to facilitate return monitoring on four occasions over a 1-2 month period. Groundwater was encountered at depths of between 2.12m bgl [21.993mAOD] and 2.98m bgl [21.758mAOD] within the monitoring wells to date with two of the boreholes recorded as dry on two occasions each.
Geotechnical Considerations	Foundations	It is considered that conventional foundations would be suitable for the ground and groundwater conditions encountered at the site, with foundations passing through any disturbed ground, Made Ground, soft ground, desiccated clay soils and live root zones and terminating wholly in the sand soils or firm to stiff clay soils of the Wittering Formation. The clay soils at the site should be classified 'en-masse' as medium volume change potential based on laboratory Atterberg Limit testing. A minimum founding depth of 0.90m bgl is applicable. A net allowable bearing capacity of 90kPa for the sand and firm to stiff clay soils of the Wittering Formation is recommended.
	Floor Slabs	It is recommended that suspended floor slabs are used with an adequate void designed according to NHBC Standards.
	Excavations	The boreholes were noted to be unstable with collapse/spalling observed during drilling and within the boreholes shortly after completion of drilling. Excavations within the firm and stiff clay soils encountered may be stable in the short to medium term. Where shallow excavations extend into granular or sandier soils (including pockets and lenses) the excavations may remain stable in the short term although spalling and some running strata may be encountered if/where exposed to surface water runoff or groundwater. Large scale excavations and those left unsupported for long time periods are likely to be less stable. The stability of excavations will also be reduced where exposed to surface water, perched water or groundwater.
	Pavements	Laboratory or in-situ CBR testing did not comprise part of the scope of works for this phase of intrusive investigation. With reference to Table C1 of TRRL LR1132, based on the results of the Atterberg testing undertaken within the Wittering Formation, a CBR value of between 3.0% to 6.0% would be recommended depending on construction conditions. As such, a CBR value of 3.0% is recommended for design purposes. On the basis of the plasticity testing undertaken, the shallow cohesive soils at the site should be considered non-frost susceptible throughout.



EXECUTIVE SUMMARY		
	Buried Concrete	Buried concrete should be designed in accordance with Class DS-1 of BRE Special Digest 1, with an ACEC class of AC-1.
Environmental Considerations	Human Health	Geochemical analysis for contamination analysis was outside of the scope of this stage of intrusive investigation.
	Ground gas	No plausible source of ground gas has been identified on or near to the site from a previous desk study or the intrusive investigation works therefore no contaminant linkages are considered to exist. Despite this, ground gas was monitored as part of the agreed scope of works and to address Planning Consent ref. F/23/96256 Condition 6. Four monitoring rounds have been completed (in line with best practice for the proposed end use). Monitoring to date has detected the presence of methane on two occasions at 0.3% and 1.1% in WS102. Carbon dioxide was detected in the range of 0.0% to 6.3% and oxygen in the range 9.3% to 20.6%. Flow rates were recorded between 0.7l/hr and 1.5l/hr within the wells during the monitoring undertaken to date. VOCs have been detected ranging from 0.1ppm to 55.8ppm and atmospheric pressure was recorded as between 999mb and 1025mb during the visits undertaken. Atmospheric pressures for the days leading up to the site visits are presented in Table 6.1. While spot monitoring undertaken in August and September 2024 has identified very low concentrations of ground gases within monitoring wells, the gassing regime is considered representative of Characteristic Situation 1, such that no gas or vapour protection measures are necessary for the proposed development.
	Radon Gas	Publicly available online radon risk maps indicate that the site lies within an area where some parts of the 1km grid square are in bands of elevated radon potential. Maximum radon potential is 3-5%. As such, a site-specific radon report should be undertaken in order to assess whether the site would require radon protection.
	Built Environment	In the absence of Made Ground, or organoleptic evidence of impacted soils, it is considered that standard pipe might be suitable for potable water supply. This must be verified with the water company.
	Waste Disposal	Geochemical testing for waste disposal was outside of the scope of this phase of site investigation. Once soils for disposal have been identified it is recommended that testing of these specific soils be undertaken.
Further Action: - A discovery strategy must be maintained during development such that if any abnormal conditions (geotechnical or potential contamination) are identified an appropriate course of action can be followed and their potential impact on the proposed development assessed prior to determining any potential mitigation measures. - Undertake a site-specific Radon Risk Assessment for the site. - If abnormal conditions are encountered, Geotechnical/Geo-Environmental advice must be sought (at the earliest practicable opportunity) to determine a suitable source of action.		
<i>This Executive Summary is intended to provide a brief summary of the main findings and conclusions of the investigation. For detailed information, the reader is referred to the main report ref. GE22665/GARv2/OCT24.</i>		



1.0 INTRODUCTION

1.1 General

Geo-Environmental Services Limited (Geo-Environmental) was instructed by NH Developments Limited (the Client) to undertake an investigation of geotechnical and geo-environmental factors pertaining to the proposed development of land at Boorley Green Nursery Site, Nairn Road, Boorley Green, SO32 2SH (herein referred to as 'the site'). The site's location is presented in Figure 1.

1.2 Form of Development

The proposed development is understood to comprise a nursery/school use together with external play areas, landscaping and associated infrastructure. A Preliminary Site and Location Plan (Drawing no: 2406-BR01) is presented in Figure 3.

1.3 Objectives

The data from the geotechnical investigation was to form the basis of an interpretation with respect to foundation design, pavement construction, concrete specification, excavation stability and other pertinent construction issues. The data from the geo-environmental investigation was acquired to inform the buried concrete design.

The objective of the review of the existing desk study and subsequent intrusive investigations was to evaluate the risks posed to the proposed redevelopment, adjacent land uses and the wider environment, in the context of likely planning requirements, immediate liabilities under the Environmental Protection Act 1990 and risks posed to Controlled Waters under the Water Resources Act from the current status of the site and in line with the current redevelopment.

1.4 Standards and References

Where practicable, the ground investigation and subsequent geotechnical and environmental assessments were undertaken in accordance with the following documents and guidance.

- British Standards Institute - Code of Practice for Site Investigations (BS5930:2015).
- British Standards Institute - Eurocode 7 – Geotechnical Design - Parts 1 & 2 (BS EN1997-1:2004 & BS EN1997-2:2007).
- British Standards Institute - Guidance on investigations for ground gas. Permanent gases and Volatile Organic Compounds (VOCs) (BS8576:2013).
- British Standards Institute - Investigation of Potentially Contaminated Sites - Code of Practice (BS10175:2011+A2:2017).
- British Standards Institute - Soils for Civil Engineering Purposes (BS1377:1990).
- Construction Industry Research and Information Association - Assessing risks posed by hazardous ground gases to buildings (C665) (2007).
- Department for Environment Food and Rural Affairs and CL:AIRE - Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination (SP1010) (2014).
- Environment Agency - Guidance on Requirements for Land Contamination Reports (2005).
- Environment Agency - Land Contamination Risk Management (LCRM) (2023).
- Ministry of Housing, Communities and Local Government - National Planning Policy Framework (2023).
- NHBC N94 - Hazardous Ground Gas - An essential guide for housebuilders.
- National House Building Council – Standards, Chapter 4.1 Land Quality - Managing Ground Conditions (2022).
- National House Building Council – Standards, Chapter 4.2 Building Near Trees (2022).



1.5 Conditions

This report does not purport to be a “Geotechnical Design Report” as defined in Clause 2.8 of Eurocode 7 (Geotechnical Design BS EN 1997-1:2004) and some of the data used to support this preliminary geotechnical assessment may not be fully compliant with that design code. It is considered possible that further detailed ground investigations could be required to facilitate the detailed geotechnical design process and should be carried out on a structure specific basis if necessary.

The data collected from the investigations have been used to provide an interpretation of the geotechnical and/or environmental conditions pertaining to the site. The recommendations and opinions expressed in this report are based on the data obtained. Geo-Environmental takes no responsibility for conditions that either have not been revealed in the available records, or that occur between or under points of physical investigation, or that result from updates to desk based data utilised subsequent to that presented herein and at the time of writing which may in turn alter the presented assessment. Whilst every effort has been made to interpret the conditions, such information is only indicative and liability cannot be accepted for its accuracy.

It should be noted that in particular the concentrations and levels of mobile liquid and gaseous materials are likely to vary with time. The results obtained may therefore only be representative of the conditions at the time of sampling. The absence of asbestos within soil samples analysed does not guarantee the absence of asbestos within buildings, within or bonded to concrete, as discrete burials, or within the soils mass elsewhere within a site. This report must not be taken as any guarantee that a site is free of hazardous or potentially contaminative materials.

Information contained in this report is intended for the use of the Client and Geo-Environmental can take no responsibility for the use of this information by any party for uses other than that described in this report. Geo-Environmental makes no warranty or representation whatsoever express or implied with respect to the use of this information by any third party. Geo-Environmental does not indemnify the Client or any third parties against any dispute or claim arising from any finding or other result of this investigation report or any consequential losses.

Assessment criteria or other parameters developed for the evaluation of contamination on this site are based on a number of assumptions regarding exposure and toxicology. Exposure to contaminants and levels of adverse effects may therefore vary. Whilst reasonable care and expertise has been employed in the development of such criteria, no liability is accepted in this respect. Other criteria or guidance on the development of assessment criteria may be published in the future and no liability is accepted in this respect.

The absence of asbestos noted during the site walkover or within any soil samples analysed does not guarantee the absence of asbestos within buildings, within or bonded to concrete, as discrete burials, or within the soil mass elsewhere within a site. This report must not be taken as, or assumed to imply, any guarantee that a site is free of hazardous or potentially contaminative materials.

This report remains the property of Geo-Environmental and the Client has no rights to, or reliance upon this document or supporting documents until such time as payment has been received in full for all invoices for works undertaken in connection with this report.



2.0 SITE CONTEXT

2.1 Previous Reports

A number of previous reports have been undertaken on site as part of the wider Boorley Green development site. The reports undertaken are detailed below:

- Combined Phase 1 Desk Study and Preliminary Phase 2 Site Investigation Report, Reference: J10856, undertaken by Southern Testing on behalf of Ashill Developments, Dated: 24 February 2012.
- Desk Study & Ground Investigation Report, reference: GE9523/GIR/JT/OCT13, undertaken by Geo-Environmental on behalf of Ashill Developments, Macdonald Hotels, MA Botley and Southern & Regional Developments, Dated October 2013.

The October 2013 report by Geo-Environmental included a summary of the February 2012 Southern Testing report. A brief summary of the salient findings of this report is provided below, however for further details reference should be made to the October 2013 Desk Study & Ground Investigation Report.

2.2 Site Description

At the time of the site walkover for this phase of intrusive investigation (August 2024), the site comprised an open field with no building infrastructure. The site was roughly rectangular in shape and extended to approximately 0.25Ha. The site was located to the north of Wallace Avenue, off Nairn Road in Boorley Green at NGR 451081, 114689.

The site sloped gently to the east and was overgrown with grass and vegetation. Several young to semi-mature trees were present on site, mainly spread across the central and southern portions of the site. The main coverage of ground comprised grass, brambles and weeds.

Man-made features on site consisted of an electricity substation box and a tap and connected pipework located at the site entrance in the south-eastern corner of the site, both of which were yet to be connected to services at the time of the site walkover.

A small stockpile was noted in the developer's plans, and evidence of the stockpile was identified during the site walkover. The stockpile was located in the centre of site and was overgrown with grass and vegetation.

The site was bounded by residential infrastructure to the south and west. The land immediately to the east and north comprised a school and associated school grounds. The site boundary comprised trees to the south and west, and wooden panelled fencing to the north and east

The access to site comprised a padlocked gate off Nairn Road, a small cul-de-sac located adjacent to the school to the east of the site.

2.3 Geology

With reference to British Geological Survey (BGS) mapping, the geology of the site was anticipated to comprise the sand, silt and clay of the Wittering Formation. In addition, given the previous land use as a golf course and nearby development, there remains the possibility that there may be areas of reworked, disturbed or Made Ground across the site.

BS5930:2015 defines **Made Ground** as anthropogenic ground in which the material has been placed without engineering control and/or manufactured by man in some way, such as through crushing or washing, or arising from an industrial process. Great variations in material type, thickness and degree of compaction invariably occur and



there can be deleterious or harmful matter, as well as potentially methanogenic organic material. In addition, where identified it is not uncommon for asbestos to be present within Made Ground soils.

The **Wittering Formation** is the lowest unit of the Bracklesham Group and was deposited by intertidal sedimentation during the Eocene. It comprises mainly brown grey laminated sandy clays and clayey sands with beds of green to brown glauconitic sands. Lignite beds may be encountered towards the base of the formation.

2.4 Desk Study and Ground Investigation Summary

The findings of the existing desk study and ground investigation reports are presented in the following section. At the time of the 2013 investigation, the site comprised part of the Macdonald Botley Park Golf Course.

Comments made in the following sections regarding possible ground conditions on the site are based on the findings of the Southern Testing desk study and site investigation (February 2012) and Geo-Environmental site investigation (October 2013).

As mentioned, the previous site investigations extended across the wider Boorley Green development site. One exploratory hole (TP112) from the October 2013 Geo-Environmental site investigation was recorded as being within the boundary of the current Boorley Green Nursery site. As such, the information in the following sections refers specifically to information regarding the Boorley Green Nursery site and excludes information from the wider site that is considered less relevant to the current phase of site works. For further details of the wider site, reference should be made directly to the original reports.

Encountered Conditions

The only previously reported exploratory hole undertaken within the Boorley Green Nursery site, TP112, encountered:

- **Topsoil** up to 0.40m bgl comprising grey/brown slightly silty sand with frequent rootlets;
- Cohesive **Wittering Formation** to 1.50m bgl comprising very high strength light grey and orange/brown mottled fine sandy CLAY
- Granular **Wittering Formation** from 1.50m bgl to the base of the hole at 3.0m bgl comprising orange/brown and light grey mottled silty fine to medium SAND.

No groundwater was encountered within TP112 and no signs of instability were recorded. Soakage testing was undertaken within TP112 with the results indicating an infiltration rate of 2.66×10^{-06} m/s.

Hydrogeology

The Wittering Formation was reported as being a Secondary A aquifer.

The site is indicated to be located outside of any Source Protection Zone (SPZ).

No discharge consents to land/groundwater identified within 250m of the Boorley Green Nursery site boundary.

No pollution incidents to controlled waters were recorded within a radius of 250m of the Boorley Green Nursery site boundary.

No licensed groundwater abstractions were identified within a 1000m radius of the site boundary.



Hydrology

With reference to the desk study, the closest surface water feature was a ditch containing water c.115m to the east of the site boundary adjacent to the Boorley Park Primary School.

No discharge consents to surface waters were identified within 250m of the site boundary.

Flood Risk

The Desk Study identified Zone 2 and Zone 3 flood zones c. 500m east of the site boundary on the northern and eastern boundaries of the wider Boorley Green Development site.

Waste

The desk study data did not identify any landfills, historical landfills, historical waste sites, infilled ground or licences waste sites within 500m of the site.

Sensitive Land Uses

With reference to the third party desk study data, no Sites of Special Scientific Interest (SSSI), Ramsar sites, Special Areas of Conservation (SAC), Special Protection Areas (SPA), National Nature Reserves (NNR), Forest Parks or National Parks, were identified within 500m of the site boundary.

Site History

The historical land use was outlined in the desk study report as follows:

On site

The site comprised agricultural fields on the earliest available historical map (1868) until the 2002 map where it was mapped as part of the Boorley Park Hotel and Golf Course.

Surrounding area

The surrounding land (wider Boorley Green development site) comprised primarily agricultural fields with two farms Braxells Farm and Little Braxells Farm located to the north of the wider site. Little Braxells Farm was no longer mapped on the 1895 map with some development of the farm buildings on the Braxells Farm noted over the course of the mapping period. Gradual residential development was noted to the south of the site on the 1908-1910, 1957, 1967-1968, 1985-1989 and 2002 maps. The wider site was developed to comprise part of the Boorley Park Hotel and Golf Course on the 2002 map with Braxells Farm reduced in size. The wider Boorley Green site has gradually become developed for residential, education and sports pitch use since the 2013 investigation.

Potential Geological Hazards

Description	Risk Designation (Groundsure)
Collapsible Ground Stability	Very Low
Compressible Ground Stability	Moderate
Ground Dissolution Stability	Negligible
Landslide Ground Stability	Very Low
Running Sand	Low
Shrinking or Swelling Clay	Moderate

Table 2.1 Potential Geological Hazards



Asbestos

Given the former use of the site as a golf course, it was considered possible that asbestos could be present within the near surface soils across the site should any areas of disturbed ground or Made Ground be present.

Radon

With reference to the 2012 desk study report, the site was mapped in an area where no radon protection measures were deemed necessary. However, at the time of writing, updated freely available online radon risk maps indicate that the site lies within an area where some parts of the 1km grid square are in bands of elevated radon potential. Maximum radon potential is 3-5%. As such, a site-specific radon report should be undertaken in order to assess whether the site would require radon protection.

Potential Contamination

With reference to the desk study report, no significant potentially contaminative land uses (beyond agricultural) were identified in the immediate surrounding area. However, due to the site's use as a golf course, the potential for Made Ground or disturbed ground was noted with potential for possible elevated concentrations of metals, organic and inorganic contaminants.

Notwithstanding the above, the 2013 investigation did not identify any contamination on, or proximal to the site.



3.0 GROUND INVESTIGATION

3.1 Scope of Works

The following scope of works for the intrusive investigation was agreed with the Client:

- Attendance of a specialist surveyor to undertake a buried utilities clearance survey using radiodetection and ground penetrating radar techniques. The survey included capture of co-ordinates and levels of exploratory holes using GPS surveying.
- Attendance of a Geo-Environmental Engineer to set out and supervise the intrusive investigation, undertake sampling, in-situ testing and logging of recovered soils from exploratory holes;
- Construction of 5No. dynamic sampler boreholes to depths of between 3.00m and 5.00m bgl (WS101-WS105), using a self-propelled track mounted rig.
- Standard Penetration Tests (SPTs) at 1.00m depth increments within each borehole to inform the geotechnical assessment.
- Installation of groundwater monitoring wells within boreholes WS102, WS103 and WS105 to facilitate groundwater monitoring on 4No. occasions over a 1-2 month period from the completion of the intrusive investigation.
- Construction of 2No. hand excavated pits (HP101-HP102) to depths of between 0.86m and 0.95m bgl.
- Undertake soakage testing within the two hand excavated pits (HP101-HP102) to inform the drainage strategy.
- Environmental and geotechnical sample collection from investigation positions with samples submitted to the laboratory for analysis of selected samples.
- Provision of a Ground Appraisal Report.

3.2 Investigation Strategy

The positioning of exploratory holes was determined on site to provide general coverage and to target specific areas. Table 3.1 sets out the investigation strategy adopted.

Area of Concern	Investigation	Positions
General ground conditions	Exploratory holes located across the site, coupled with in-situ testing, sampling and laboratory analysis.	All
Areas of proposed nursery development		WS101-W105
Small scale soakage test	Preliminary assessment of drainage conditions	HP101, HP102
Ground gas and groundwater	Monitoring well installed within exploratory hole to assess ground gas and groundwater conditions	WS102, WS103, WS105

Table 3.1 Summary of the 2024 Investigation Strategy

Soil samples were collected and placed into suitable containers on site for transit to the office, where they were stored under chilled conditions (<4°C) prior to final transportation in cool boxes to the laboratory by their in-house courier. Both the geotechnical and geochemical testing were undertaken by UKAS accredited laboratories. Geochemical testing of soil samples was also undertaken in accordance with accredited MCERTS protocols. Samples were stored in temperature controlled conditions from sampling until receipt at the laboratory from which time sample preparation and storage was determined by testing requirements and in line with laboratory's protocols.



4.0 ENCOUNTERED CONDITIONS

A factual record of the conditions encountered during the physical investigation of the site is presented in the following section.

For further details of the encountered ground conditions, reference should be made to the exploratory hole logs presented in Appendix A, the geotechnical testing results in Appendix B and the geochemical testing results in Appendix C.

The physical ground investigation works were undertaken on 9th August 2024. A Geo-Environmental Engineer attended site on 9th August 2024 to oversee the intrusive investigation works. The Client attended site on the 9th August 2024 to facilitate access to the site and to agree on the locations of the exploratory holes. The Client's Ecologist also attended site on the morning of the 9th August 2024 to clear the exploratory hole locations and access tracks prior to commencement. Due to dense vegetation on site, the Client cut back the vegetation using a strimmer and hedge cutters to create pathways through the site to allow access for the site team and dynamic sampler rig.

The locations of the exploratory holes are shown on Figure 2.

Unless stated otherwise, all depths are reported as metres below ground level (m bgl).

4.1 Ground Conditions

The ground conditions encountered within the exploratory holes were broadly consistent with the anticipated sequence of strata. In summary, ground conditions typically comprised a mantle of Topsoil overlying superficial clay, sand and interbedded clay and sand of the Wittering Formation with clay soils of the London Clay Formation tentatively identified at one location (WS104) due to a change noted in the characteristics of the soils compared with the overlying soils. A summary of the encountered soil conditions is presented in Table 4.1.

Top (m bgl)	Base (m bgl)	Geology	Locations
0	0.25 - 0.40	TOPSOIL: Dark brown/brown fine to SAND with varying proportions of clay, gravel, roots (1-5mm) and rootlets and semi decomposed roots 1mm; Dark brown sandy CLAY with abundant rootlets and roots 1-2mm.	All
0.25 – 0.40	0.86+ - 5.00+	WITTERING FORMATION: Greenish grey/pale brown/pale grey/reddish brown/orangish brown fine to medium SAND with varying proportions of clay, gravel, reddish brown/orange/dark brown staining, roots (1-3mm) and rootlets; Orange/pale grey/brown/reddish brown interbedded fine clayey SAND and sandy CLAY with varying proportions of reddish brown/orange staining, rootlets and roots (1-3mm); Stiff orange/pale grey/grey/orangish brown CLAY with varying proportions of sand, reddish orange staining, sand lenses (1-5mm) and rootlets.	All
4.90	5.00+	LONDON CLAY FORMATION: Dark grey silty CLAY with sand lenses 1mm.	WS104

Table 4.1 Summary of Ground Conditions

In-situ hand penetrometer testing was undertaken within cohesive soils of the Wittering Formation within the windowless sampler boreholes. These results generally ranged from 1.30kg/cm² to 2.8kg/cm² (firm to stiff).

With the exception of roots and rootlets observed within the Topsoil, roots and rootlets were observed within the investigation positions on the site as summarised in Table 4.2.

Location	Maximum observed depth (m bgl)	Root Description
HP101	0.50	Some rootlets and roost 1-3mm
HP102	0.40	Some rootlets
WS101	0.60	Frequent rootlets



Location	Maximum observed depth (m bgl)	Root Description
WS102	0.50	Rare rootlets
WS103	0.60	Occasional rootlets
WS104	0.70	Some rootlets

Table 4.2 Summary of roots observed in recovered soils

It is not considered that foundations would require deepening due to the presence of dead or decomposed root zones (if encountered) subject to NHBC or other warranty provider approval.

For more detailed descriptions of the ground conditions at specific locations, reference should be made to the exploratory hole logs presented in Appendix A.

4.2 Groundwater

Groundwater was encountered within four of the exploratory holes undertaken the details of which are presented in Table 4.3.

Location	Ground level [mAOD]	Water strike (m bgl)	Time elapsed (mins)	Water rose to (m bgl)
WS101	25.203	1.99 [23.213]	20	1.99 [23.213]
WS103	24.738	2.97 [21.768]	20	2.97 [21.768]
WS104	24.113	2.91 [21.203]	20	2.91 [21.203]
WS105	25.372	2.15 [23.222]	20	2.15 [23.222]

Table 4.3 Summary of Groundwater Encountered During Intrusive Investigation

Combined ground gas and groundwater monitoring wells were installed within three of the dynamic sampler boreholes (WS102, WS103, and WS105) in order to facilitate return spot monitoring of groundwater depths on 4No. further occasions over a 1-2 month period. At the time of writing, three of the return groundwater monitoring visits have been undertaken, the details of which are presented in Table 4.4.

Location	Ground level [mAOD]	Depth to water (m bgl) [mAOD]		
		15/08/24	02/09/24	16/09/24
WS102	24.627	Dry	Dry	2.97 [21.657]
WS103	24.738	Dry	Dry	2.98 [21.758]
WS105	24.113	2.14 [21.973]	2.20 [21.913]	2.12 [21.993]

Table 4.4 Summary of Groundwater Encountered During Return Monitoring

It should be noted that changes in groundwater levels do occur for a number of reasons including seasonal effects and variations in drainage. Such fluctuations may only be recorded by the measurement of the groundwater level within a series of standpipes or piezometers installed within appropriate response zones.

4.3 Obstructions and Access Issues

No natural or man-made obstructions were encountered within the exploratory holes undertaken. The presence of obstructions elsewhere on site cannot be completely discounted.

A number of exploratory holes were relocated due to dense vegetation in the central-southwestern portion of the site.

4.4 Geochemical Analysis

Geochemical analysis undertaken comprised BRE Suite D testing for buried concrete design.



Soil samples were placed into plastic containers for general inorganic analysis. Samples were stored in temperature-controlled conditions from sampling until receipt at the laboratory from which time sample preparation and storage was determined by testing requirements and in line with the laboratory's protocols.

4.5 Geotechnical and Geochemical Results

The results of geotechnical testing undertaken on the soils of the Wittering Formation are summarised in Table 4.5, with test results presented in Appendix B (geotechnical) and Appendix C (geochemical).

Parameter		Wittering Formation
Moisture Content (%)		13 – 29
Liquid Limit (%)		30 – 53
Plastic Limit (%)		12 – 21
Plasticity Index (%)		16 – 36
Modified Plasticity Index (%)		16 – 36
Volume Change Potential [NHBC]		Low to Medium
Grading		Sandy silty CLAY; Sandy very silty CLAY with rare gravel; Clayey SAND; Silty clayey SAND;
Particle Size Distribution (%)	Very coarse	0.0
	Gravel	0.0 – 1.0
	Sand	57.0 – 73.0
	Fines (<0.063mm)	26.0 – 43.0
Hand penetrometer (kg/cm ²)		1.30 to 2.80 (soft to stiff).
pH		5.5 – 8.3
Water soluble sulphate (mg/l)		3.31 – 40.90
Acid Soluble Sulphate (%)		0.007 – 0.133
Total Sulphur (%)		<0.005 – 0.045
Total Potential Sulphate (%)*		<0.015 – 0.135
Oxidisable Sulphides (%)*		-0.009 – 0.014

NOTE: * - calculated as detailed in BRE Special Digest 1

Table 4.5 Summary of Geotechnical and Geochemical Laboratory Test Results



5.0 ENGINEERING CONSIDERATIONS

Subsequent to intrusive investigation of the site and receipt of the laboratory results, the following interpretative assessments have been made with respect to engineering considerations.

5.1 Foundations

Based on the ground and groundwater conditions encountered in the exploratory holes it is considered that conventional foundations may be suitable across the site. Foundations should pass through any disturbed ground, Made Ground, soft ground, desiccated clay soils and live root zones to terminate wholly in the sand soils or firm to stiff clay soils of the Wittering Formation.

Where conventional foundations are proposed, a net allowable bearing capacity of 90kPa is recommended for the sand and firm to stiff clay soils of the Wittering Formation. Under this loading, total settlement should remain within tolerable limits for the proposed construction.

Wherever possible, foundations should terminate within a single stratum to mitigate the risk of differential settlement. Where foundations span differing strata (i.e. clay and sand soils) it is recommended that mesh reinforcement is incorporated into conventional foundations during construction. The specification and detailing of any such reinforcement should be confirmed by the Structural Engineer or Foundation Designer. Should foundation depth be increased such that the foundations extend beyond the depth of investigation and testing to date, further geotechnical testing should be undertaken.

On the basis of the results of the Atterberg Limit tests in conjunction with the field observations it is considered that the cohesive elements of the Lambeth Group, which are present at likely foundation depth across the site, should be classified '*en-masse*' as medium volume change potential, as defined by NHBC Standards, Chapter 4.2. Therefore, a minimum founding depth of 0.90m bgl is recommended within natural soils. This assumes that strata at 0.9m bgl are competent in terms of bearing capacity, settlement limitations, not desiccated and not within the zone of influence of trees (existing, recently felled, or proposed).

Where foundations are proposed to be constructed within the zone of influence of trees, it is possible that foundations would need to be deepened to account for the presence and influence of trees. It is possible that foundation bases would require to be stepped and as such, it is recommended that steps do not exceed 0.50m in height at any point and are at least 1.0m (lateral distance) away from any corner or node point on the foundations. Where this cannot be accommodated, the foundation should be formed at the greater depth.

Foundations which are proposed in cohesive soils in proximity to trees and hedgerows (remaining, removed or proposed) should be designed in accordance with NHBC Standards Chapter 4.2, and design approaches 4.2B and 4.2C, which incorporate the water demand of trees and the distance of the tree from the nearest portion of foundation.

Heave protection measures in accordance with NHBC Standards will be required where foundation depths exceed 1.50m and where foundations pass through any desiccated ground. Sizing of any compressible media should be determined in accordance with NHBC guidance and accounting for volume change potential, foundation depth, tree influence and other pertinent factors.

Foundations should be a minimum 450mm in width.

Where minimum founding depths of greater than 2.50m bgl could be required these would require structure-specific design by a Structural Engineer and technical approval from the NHBC, or alternative Building Control Organisation.

It is recommended that foundation excavations be concreted or blinded as soon after excavation as possible. Where



concreting could take place the following day it is recommended that excavations are not taken to full depth overnight and that the final 0.50m of cover is only removed immediately prior to concreting.

5.2 Excavations

The boreholes were noted to be unstable with collapse/spalling noted during drilling and within the boreholes shortly after completion of drilling. Excavations within the firm and stiff clay soils encountered may be stable in the short to medium term. Where shallow excavations extend into granular or sandier soils (including pockets and lenses) the excavations may remain stable in the short term although spalling and some running strata may be encountered if/where exposed to surface water runoff or groundwater.

The stability of all excavations will also be further reduced where groundwater is encountered and where exposed to surface water or where left open for long or prolonged periods. It should be noted that groundwater varies seasonally and in response to precipitation events such that even shallow excavations may encounter groundwater perched within the superficial deposits depending on the season and preceding weather conditions.

Long and/or deep excavations across sloping ground should be avoided due to their potential to initiate instability of the ground upslope of the excavation and possible catastrophic collapse.

Ground works must be designed in such a manner to avoid any requirement for construction or maintenance personnel to enter into or work within excavations. If such work cannot be avoided, then it should only be permitted once a safe system of work, supported by a robust risk assessment, has been determined and implemented.

5.3 Floor Slabs

Given the presence of shrinkable near surface soils, it is recommended that suspended ground floor slabs are used with an adequate void designed according to NHBC Standards. If a ground bearing slab is required, this must be designed and constructed to account for the presence of shrinkable strata.

5.4 Pavements

Laboratory or in-situ CBR testing did not comprise part of the scope of works for this phase of intrusive investigation.

However, with reference to Table C1 of TRRL LR1132, based on the results of the Atterberg testing undertaken within the Wittering Formation, a CBR value of between 3.0% to 6.0% would be recommended depending on construction conditions. A CBR of 3.0% is recommended for the design of roads and parking on this site.

On the basis of the plasticity testing undertaken, the shallow cohesive soils at the site should be considered non-frost susceptible throughout.

Made Ground soils were not encountered on site within the exploratory holes undertaken. The engineering characteristics of Made Ground are variable and unpredictable and the CBR value of these materials does not predict the overall settlements that may occur. Should Made Ground be encountered on site, it would be prudent to assume the Made Ground on site to be deemed frost susceptible throughout thus a minimum pavement thickness of 450mm would be appropriate.

Any hard or soft spots in the formation level may induce reflective cracking in the pavement and allowance should be made for removing any slabs or other hard spots etc. that may be present. Furthermore, the subgrade should be carefully proof rolled and any soft or loose zones replaced with compacted granular engineered fill.



5.5 Sulphates

The results of the water soluble sulphate and pH analyses indicate that shallow buried concrete should be designed in accordance with Class DS-1 of BRE Special Digest 1, with an ACEC class of AC-1. The advice of this publication should be taken for the design and specification of all sub surface concrete.

For buried concrete at depth e.g. piled foundations, further testing would be required within soils at depth.

5.6 Falling Head Testing

Small scale soakage tests were conducted in the two hand excavated pits (HP101 and HP102). The soakage pits were logged by a Geo-Environmental Engineer and soakage testing was commenced within the pits.

Soakage testing was undertaken in accordance with BRE Digest 365 Soakaway Design. During the course of the testing within HP101 and HP102, it became apparent that due to the ground conditions encountered, three complete test cycles could not be achieved in the timescale for testing agreed with the Client (one day). HP101 and HP102 were charged with water in the morning of the 9th August 2024. A fall in water of c. 0.29m in HP101 and 0.14m in HP102 was recorded over the course of the test period which was considered insufficient for an infiltration rate to be calculated.

Based on the testing undertaken, conventional soakaways are not considered feasible for the disposal of storm water on this site.



6.0 ENVIRONMENTAL CONSIDERATIONS

6.1 Environmental Assessment

Made Ground was not encountered within the exploratory holes undertaken. No organoleptic evidence of possible contamination was recorded in the exploratory holes. Made Ground or evidence of contamination may be present elsewhere on site.

Geochemical testing for contamination analysis was outside the scope of the current phase of investigation works on site.

6.2 Ground Gases

The Desk Study report undertaken for the site has not identified any potential sources of ground gases on the site or in proximity to the site with the exception of the potential for Made Ground or reworked soils due to the site's former use as a golf course. Made Ground soils are only considered likely to comprise a source of potential ground gases if a significant thickness of highly organic material is present. The ground investigations to date did not identify any Made Ground within the exploratory holes undertaken. Despite this, ground gas was monitored as part of the agreed scope of works and to address Planning Consent ref. F/23/96256 Condition 6.

Ground gas monitoring standpipes were installed within WS102, WS103 and WS105 on site by Geo-Environmental. The locations were selected to provide broad central coverage of the site. Return 'spot' ground gas monitoring has been undertaken on four occasions to date, on the 15th August and the 9th, 16th and 30th September 2024 in line with best practice for the proposed end use.

The spot monitoring undertaken to date has detected the presence of methane on two occasions within WS102 at 0.3% and 1.1%. These two occasions (from a total of 96 data points) were part way through monitoring sessions with all other results from this and other wells being zero (0.0%). A steady state methane concentration of <1% is considered characteristic based on the full dataset. Carbon dioxide was detected in the range of 0.0% to 6.3% and oxygen in the range 9.3% to 20.6%. Flow rates were recorded up to 1.5l/hr within the wells during the monitoring undertaken. VOCs were detected up to 55.8ppm during the monitoring undertaken to date. Atmospheric pressure was recorded as between 999mb and 1025mb during the visits undertaken. Trends in atmospheric pressure in the lead up to site visits can have an impact on the results of the ground gas monitoring. As such, atmospheric pressures for the area for the days leading up to the monitoring visits (obtained from the Southampton Airport weather station data available from WeatherOnline) have been presented in Table 6.1.

	Atmospheric Pressures leading up to monitoring visits (mb)			
	15/08/24*	02/09/24*	16/09/24*	30/09/24*
2 days before visit	1010	1021	1031	1025
1 day before visit	1014	1012	1027	1015
Day of site visit	1013	1005/1006	1023	999
Comment	Steady	Falling	Falling	Rapidly falling to low

*Date of monitoring visit

Table 6.1 Atmospheric Pressures leading up to monitoring visits (mb)

A Tier 1 Ground Gas Risk Assessment (GGRA) incorporating the results of the desk study and ground investigation was undertaken.

Recommendations on acceptable gas concentrations recorded in the ground beneath or adjacent to buildings are given in a variety of publications. For the purpose of this assessment, the results have been evaluated in terms of



British Standard BS8485, 'Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings' (2019); and CIRIA C665, 'Assessing risks posed by hazardous ground gases to buildings' (2007).

Assessment of the construction of the wells and the underlying ground conditions has shown that all of the response zones of the installed wells were solely within the natural soils beneath the site. Description of these natural materials has not noted the presence of organic materials or other materials that may give rise to the generation of ground gas. Assessment of likely sources of ground gas has not identified any on-site sources for the significant generation of bulk gases.

It can be seen that marginal volumes of carbon dioxide were recorded in all standpipes, with monitoring location WS02, and WS03 marginally exceeding the 5% 'limiting concentration' for Characteristic Situation 1, on a total of 3 separate visits (and across 10 of the 96 datapoints). In addition, whilst two marginal carbon dioxide exceedances at 5.1% in WS102 and 5.7% in WS103 were recorded after 180 seconds of monitoring, the steady state carbon dioxide concentration was below 5% for the remainder of monitoring rounds in all wells. No plausible significant on-site source of carbon dioxide as a bulk gas has been established, therefore it is considered that carbon dioxide is being produced mainly via biological respiration within the soils immediately surrounding the monitoring wells and as such is from a low to negligible generation potential source.

Groundwater levels did fluctuate over the monitoring period with depth ranging from 1.7m to 3.0m bgl during the monitoring period. However, the response zones were not noted to be saturated during the monitoring undertaken. In addition, low flow rates were recorded (up to 1.5l/hr) during the monitoring period, which might be associated with changes in groundwater level albeit that this is not conclusive.

Gas primarily either migrates via pressure driven (advective) flow or concentrations varying within the ground due to a diffusive regime. The flow rates detected are considered representative of a diffusive regime within the ground where concentrations reduce from a point/peak to a zero value at a boundary such as ground level, i.e. the gas is not flowing or migrating through the ground. The majority of any carbon dioxide would remain trapped in the soil pores. As only low rates of flow have been recorded during the monitoring period this suggests that any carbon dioxide is generally residual gas trapped within the soil pores, which is only being recorded and monitored due to the drilling and construction of the monitoring wells within these soil pores, and as such is not representative of the risks posed to proposed buildings on site.

Looking at atmospheric pressure conditions over the monitoring period, atmospheric pressure appears to have been both falling preceding and during the monitoring rounds undertaken. There does not appear to be any correlation between the recorded carbon dioxide concentrations and atmospheric pressure. It is considered that atmospheric pressure has not impacted the recorded concentrations of carbon dioxide, but that representative worst case scenario data has been obtained.

Gas screening values (GSV) have been calculated for carbon dioxide in accordance with the recommendations contained within C665 and NHBC guidance. To calculate a GSV for the site, the worst case, i.e. the highest concentration value, of recorded carbon dioxide has been used. A value of 6.3% v/v has been used for carbon dioxide. With the maximum borehole flow rate record of 1.5l/hr.

Using these worst case values a GSV of 0.0945l/hr for Carbon Dioxide and 0.017 l/hr for Methane has been calculated for carbon dioxide for the site. While the guidance states that consideration should be given for increasing to CS2 where GSV are greater than 0.07l/hr or where limiting concentrations have been identified it is not mandatory to increase the rating to Characteristic Situation 2 and this should still be undertaken on a risk based approach with consideration and assessment of the conceptual site model. As such it is considered that the elevated concentrations of carbon dioxide recorded are being produced via biological respiration within the soils beneath the site and as such are from low risk sources.

It is not mandatory to automatically increase the classification of a site based on detected gas concentrations. The



above assessment of the on-site gas regime has only identified low risk sources of bulk gases on site. It is considered that the source of the monitored carbon dioxide is most likely to be attributable to biological respiration within the soils surrounding monitoring wells.

It is considered that carbon dioxide is primarily trapped within the soil pore spaces beneath the site. The construction of the monitoring wells could have led to the creation of anaerobic conditions within the monitoring wells leading to an increase in carbon dioxide on a very small scale, within the monitoring well not the soil mass, producing the elevated concentrations recorded. The lack of any significant recorded flow rates suggests a diffusive gassing regime. The majority of gas is likely to remain trapped in the soil pores, and is therefore considered a low risk to buildings or occupants on the site. Therefore, it is not considered necessary to increase the classification of the site's gassing regime based on the marginal exceedances of the 5% concentration for carbon dioxide. In addition, as stated previously, a characteristic steady state methane concentration of <1% is considered plausible based on the monitoring dataset.

As such, it is considered, based on the above assessment, the low risk sources of bulk permanent gases, diffusive conditions, the frequency of the exceedances and the marginality of the exceedances of the limiting concentrations for carbon dioxide, that the entire site is classified as CS1.

Therefore, no gas or vapour protection measures are deemed necessary within the proposed development. In addition, soil sampling on site has not identified the presence of any specific potential gas or vapour sources on site and this is supported by the VOC data captured as part of the ground gas monitoring exercise.

6.3 Waste Disposal

Geochemical testing for waste disposal was outside of the scope of this phase of site investigation. Once soils for disposal have been identified it is recommended that testing of these specific soils be undertaken.

In accordance with the CL:AIRE Definition of Waste Code of Practice (2011) materials are only considered waste if 'they are discarded, intended to be discarded or required to be discarded by the holder'.

The Code of Practice therefore allows soils to be reused on site where the following criteria are met:

- The re-use of the soils will not present an unacceptable or increased risk to controlled waters, the environment and human health;
- The soils are suitable both in terms of chemical and geotechnical properties for the intended use without prior treatment;
- Only the required volume is used (and no more);
- There is a required use and a certainty of use not just a possibility.

In order to comply with the Code of Practice, a Material Management Plan that confirms the above criteria are met has to be prepared. The Material Management Plan must be reviewed by a 'Qualified Person' who then issues a declaration to the Environment Agency. Geo-Environmental can provide this service should it be required.

Where materials do not meet the required criteria, it may be possible to treat them under an environmental permit so that they may be re-used on site. In addition, where material is discarded as waste, it may still be possible to re-use the waste on site under a standard rules environmental permit or a U1 waste exemption. However, strict limits on the volumes that can be reused apply in these cases.

Under current legislation, where wastes are to be disposed of to landfill they may, depending on their classification, require pre-treatment. Pre-treatment shall comprise a chemical, physical (including sorting), thermal or biological process. The pre-treatment is required to change the characteristics of the waste, reduce its volume, reduce its hazardous nature, and facilitate its handling and enhance its recovery.



Other materials disposed of from site as part of the demolition or remediation process may require disposal separately. All materials containing dangerous substances e.g. tar or bitumen, asbestos, mercury, hydrocarbons and PCBs are likely to be classified as Hazardous Waste and therefore susceptible to the relevant legislative controls.



7.0 DISCOVERY STRATEGY

Whilst an intrusive investigation has been undertaken on the site, it remains possible that unexpected soil ground and/or groundwater conditions may be encountered during the process of construction.

Should previously undiscovered contamination or unforeseen ground conditions be encountered during construction, this must be reported to the site manager immediately in order that the consultant is notified. Where deemed necessary, the consultant shall attend the site to inspect the discovery and provide recommendations on the further actions required, if any. Where necessary the regulatory authority shall be informed. Post any additional investigation or laboratory testing the results and any proposed remedial measures shall be reported to the regulatory authority or other appropriate organisation for consent, before proceeding or implementing the remedial measures.

A copy of the discovery strategy must be lodged on site, and provisions made to ensure that all workers are made aware of their responsibility to observe, report, and act on any potentially suspicious, abnormal unforeseen or contaminated soils ground and/or groundwater conditions they may encounter.

Depending on the type, nature and extent of any such 'discovery', it may be necessary to halt works in that location until such time as the assessment has been completed. This shall be reviewed on a 'discovery' specific basis and in conjunction with regulatory consultation with the client, other technical personnel and/or regulatory/appraisal organisations.

As a general guide, where such unexpected conditions are encountered the following approach is required as a minimum:

- All discoveries are to be reported to the Site Manager immediately and works at that location are to halt until further notice;
- The Site Manager is to report any such discoveries to the Client and the Consultant;
- Following notification from the Site Manager, the Consultant shall discuss the discovery with the Local Authority and/or other relevant parties and if considered necessary, arrange to meet an Officer on site to view the discovery;
- The Consultant shall attend the site to record the location, extent and nature of the discovery and implement an appropriate sampling and analysis regime, taking due account of the type and nature of the discovery, known and probable land uses in that area of the site;
- Where remedial action is required, regulatory consultation and approval will be sought;
- A record will be produced by the Consultant and held on site (with copies held by the Consultant, Client and Local Authority/other relevant organisation), detailing the discovery, assessment works undertaken, findings thereof, confirmation either of no action required or detailing the remedial action taken and validation thereof.

The process is shown overleaf.

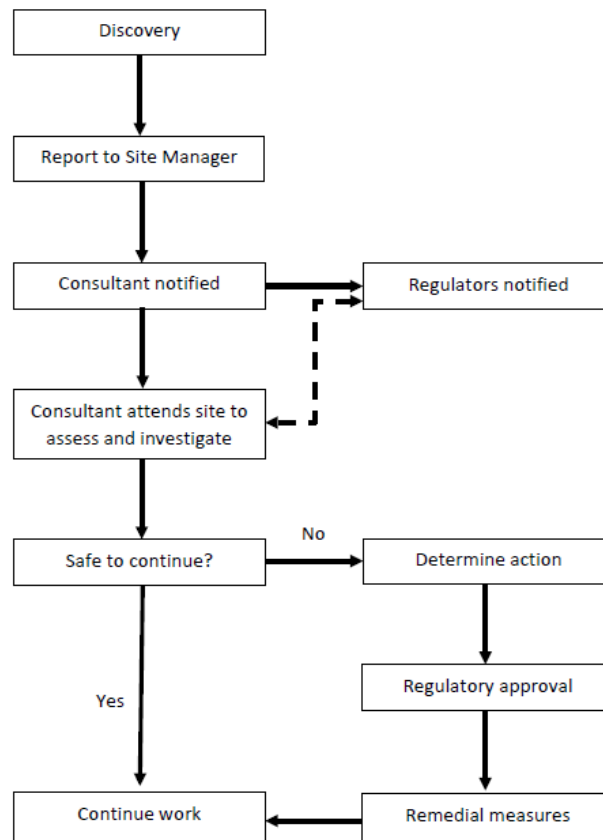


Chart 1 Discovery Strategy Process

A copy of this strategy will be lodged on site, and provisions made to ensure that all workers are made aware of their responsibility to observe, report, and act on any potentially suspicious or contaminated materials they may encounter.



FIGURES



Project Title: HDN Primary School Site – Boorley Green
Location : Nairn Road, Southampton, Hampshire,
SO32 2SH
Project No. : GE22665
Client : NH Developments Limited

Title : Figure 1 - Site Location Plan
Scale: 1:2000
Engineer: TU



Legend Key
Project Bounds - Project
Bounds



Project Title: HDN Primary School Site – Boorley Green
Location : Nairn Road, Southampton, Hampshire,
SO32 2SH
Project No. : GE22665
Client : NH Developments Limited

Title : Figure 2 - Exploratory Hole Location Plan
Scale: 1:500
Engineer: TU

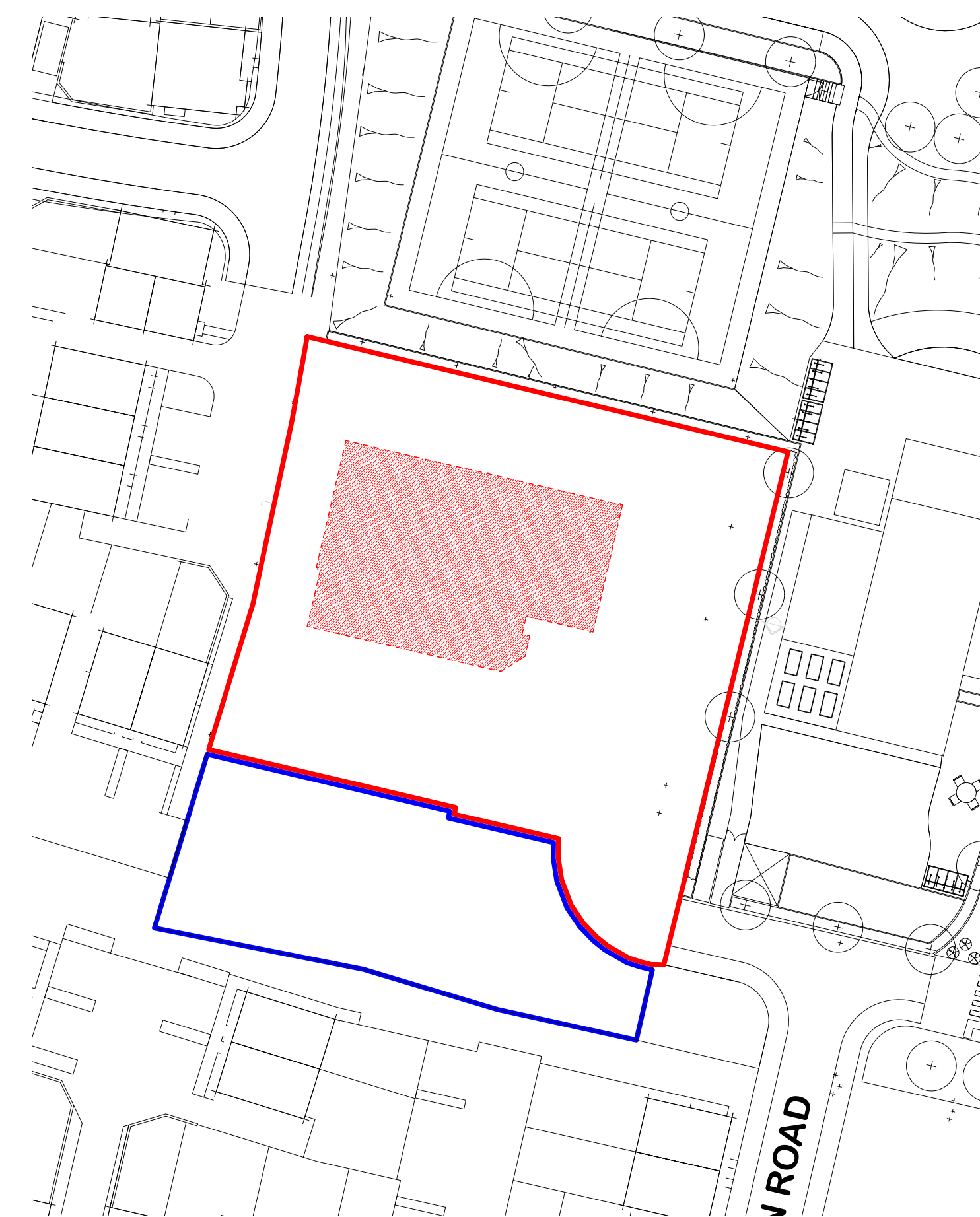
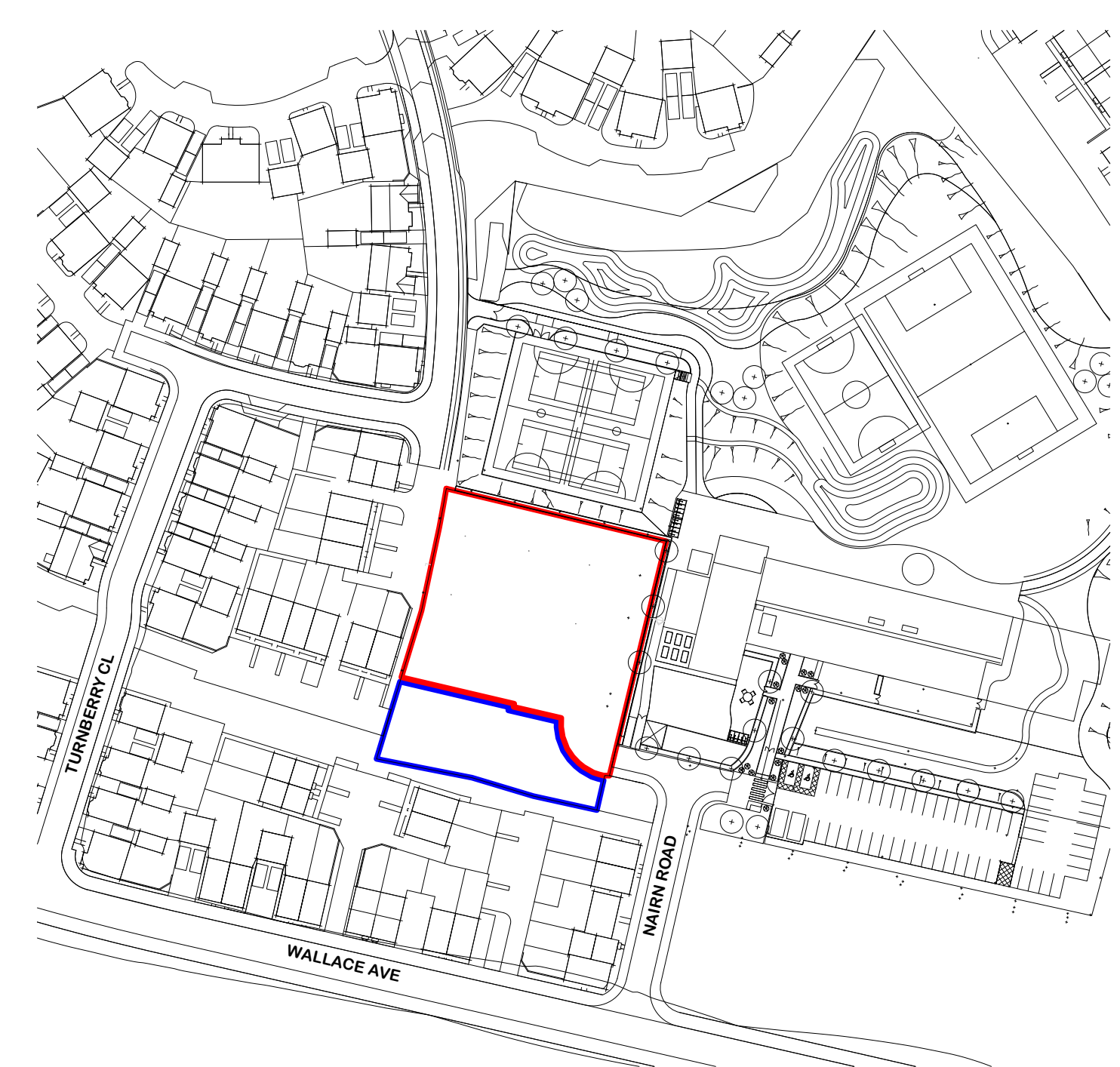
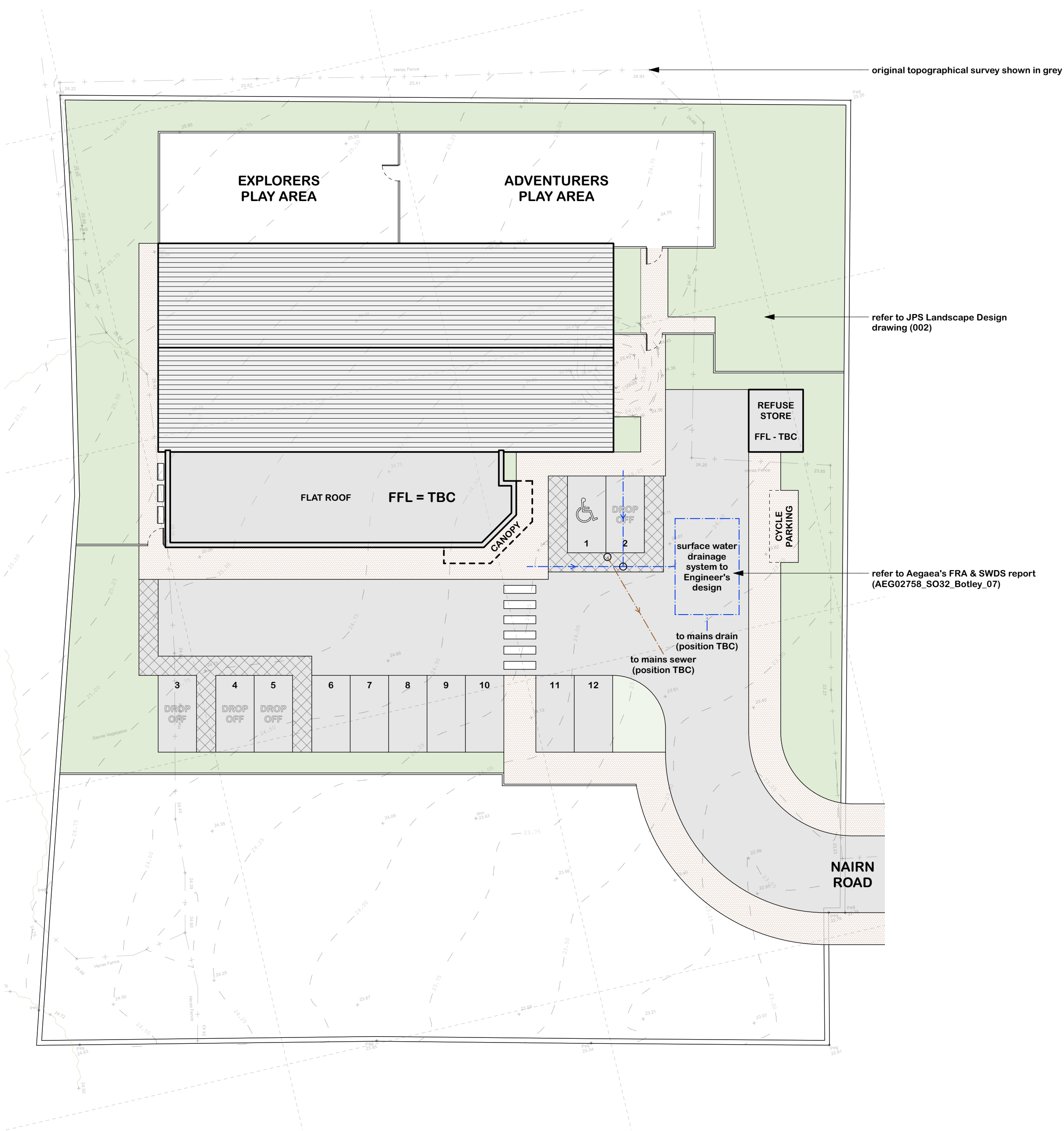
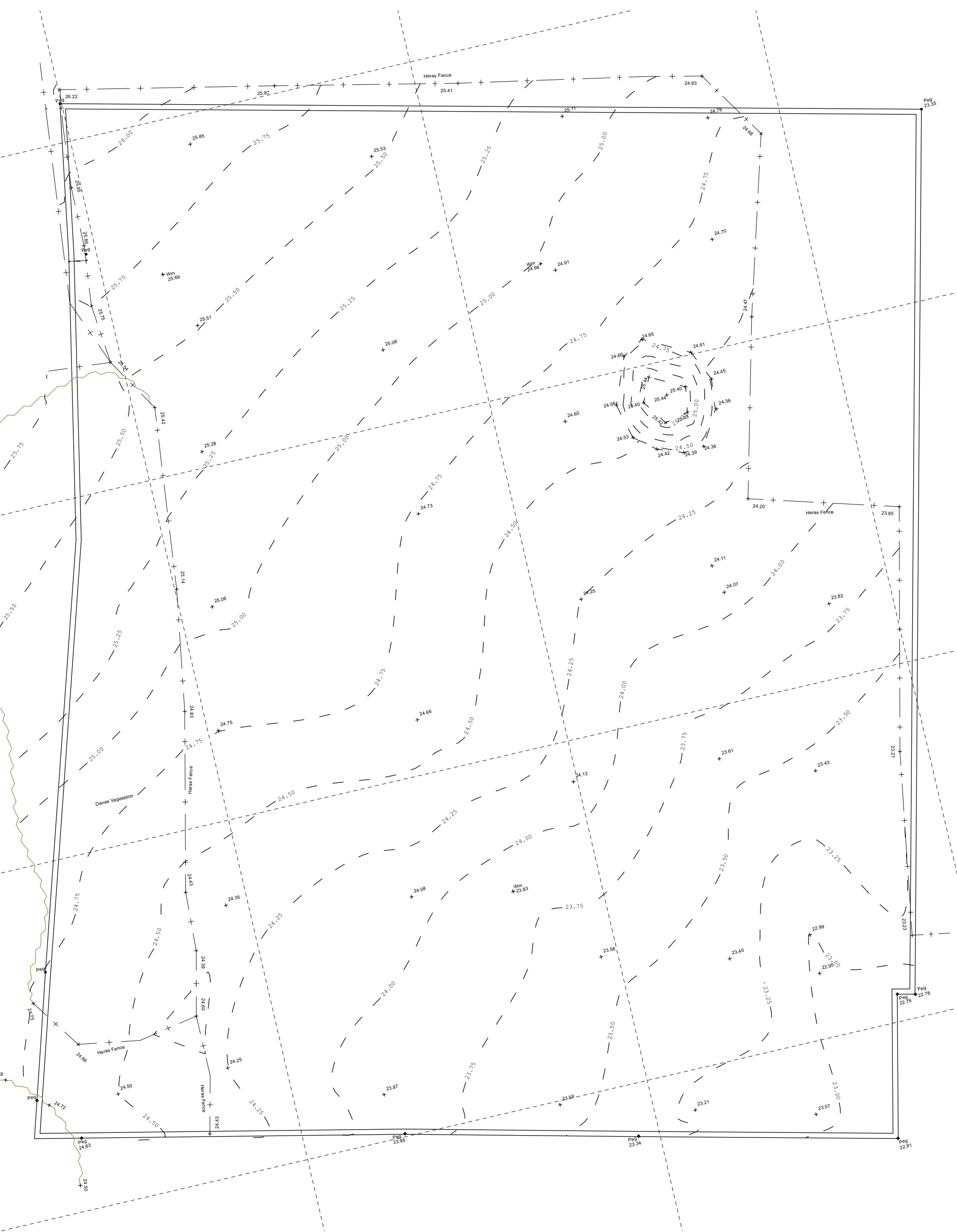


Geo-Environmental

Legend Key

- Locations By Type - Empty
- Locations By Type - IP
- ⊕ Locations By Type - WLS





PRELIMINARY

REV	DATE	NOTES	SCALE		BY
PROJECT Proposed Children's Nursery			1"	1'	100'
ADDRESS Land adj. to Boortley Park Primary School, Nairn Road, SO32 2SH			1"	1'	100'
CLIENT NH Developments			1"	1'	100'
PURPOSE Building Regulations			1"	1'	100'
DRAWING Site and Location Plans			1"	1'	100'
DRAWING NO. 2406-BR01			1"	1'	100'

On no scale from this drawing for construction purposes. Use figure dimensions only. This drawing has been used only for the purpose described above and is not valid for any other purpose. It is not to be used for any other purpose without the written consent of the author. The author is not responsible for any errors or omissions in this drawing. The user of this drawing is responsible for its accuracy and for its use in accordance with the relevant building regulations and standards.

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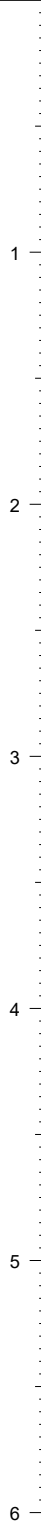
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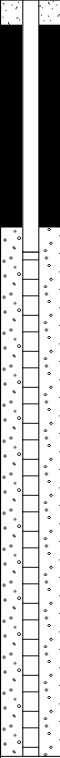
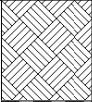
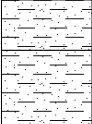
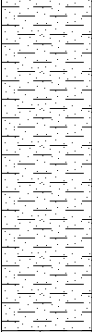


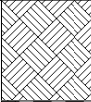
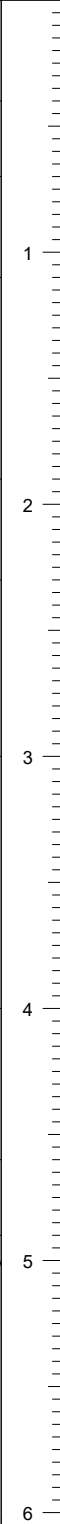
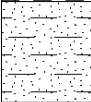
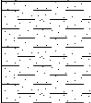
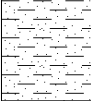
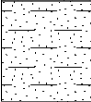
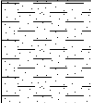
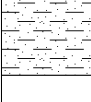
APPENDIX A

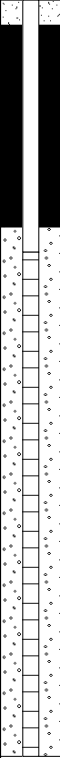
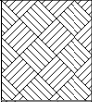
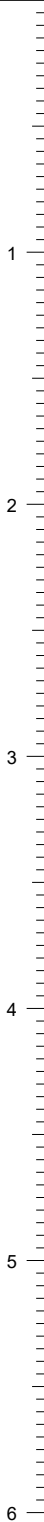
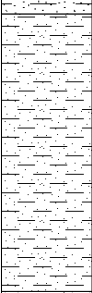
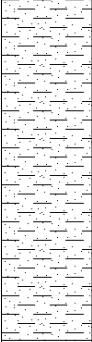
Exploratory Hole Logs

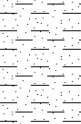


 Unit 7, Danworth Farm Hurstpierpoint BN6 9GL www.gesl.net			Borehole Log				Borehole No. WS101 Sheet 1 of 1		
Project Name:		HDN Primary School Site – Boorley Green		Project No. GE22665		Co-ords: 451065E - 114701N		Hole Type WLS	
Location: Nairn Road, Southampton, Hampshire, SO32 2SH				Level: 25.20		Scale 1:30			
Client: NH Developments Limited				Dates: 09/08/2024		Logged By DG/KOD			
Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.30	24.90		Grass overlying dark brown clayey gravelly fine SAND with abundant rootlets and roots 1-3mm. TOPSOIL	
		0.40	ES	2.4kg/cm2	0.60	24.60		Stiff orange and grey slightly sandy CLAY with frequent rootlets. Sand is fine. WITTERING FORMATION	
		0.50	D						
		0.50	PP						
		1.00	D	N=12 (2,2/3,3,3,3)	1.40	23.80		Orange, pale grey and brown interbedded fine SAND and sandy CLAY with some reddish brown staining. WITTERING FORMATION	
		1.00	SPT						
		1.50	D	N=11 (2,2/3,2,3,3)	1.90	23.30		Firm pale grey and orange interbedded sandy CLAY and clayey SAND with reddish brown staining. WITTERING FORMATION	
		1.50	ES						
		2.00	D	N=11 (2,2/3,2,3,3)	2.20	23.00		Greenish grey fine to medium SAND with reddish brown and orange staining. WITTERING FORMATION	
		2.00	SPT						
		2.50	D	N=12 (3,3/3,3,3,3)	4.10	21.10		Pale grey and orange interbedded sandy CLAY and clayey fine to medium SAND with reddish brown staining. WITTERING FORMATION	
3.00	D	N=12 (3,3/3,3,3,3)	5.00	20.20		Poor recovery. Wet sand infilling hole.			
3.00	SPT								
4.00	D	N=15 (3,3/4,3,4,4)	4.10	21.10		Pale brown and pale grey slightly clayey fine SAND. WITTERING FORMATION			
4.00	ES								
4.00	SPT								
4.50	D	N=14 (3,4/3,4,3,4)	5.00	20.20		End of Borehole at 5.00m			
5.00	D	N=14 (3,4/3,4,3,4)	5.00	20.20					
5.00	SPT								
Dynamic Sampling Run Details		Water Strike Details (mbgl)		Remarks					
Depth Top	Depth Base	Diameter	Depth Strike	Rose To	Collapse to 2.6m bgl.				
			1.99	1.99					
									

 Unit 7, Danworth Farm Hurstpierpoint BN6 9GL www.gesl.net		Borehole Log				Borehole No. WS103 Sheet 1 of 1					
Project Name: HDN Primary School Site – Boorley Green		Project No. GE22665		Co-ords: 451062E - 114686N		Hole Type WLS					
Location: Nairn Road, Southampton, Hampshire, SO32 2SH				Level: 24.74		Scale 1:30					
Client: NH Developments Limited				Dates: 09/08/2024		Logged By DG/KOD					
Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description			
		Depth (m)	Type	Results							
		0.20	ES	1.4kg/cm2	0.40	24.34		Dark brown sandy CLAY with abundant rootlets and roots 1-2mm. TOPSOIL	1		
		0.50	D		0.60	24.14		Firm orangish brown sandy CLAY with occasional rootlets. Sand is fine. WITTERING FORMATION			
		0.50	PP					Orangish brown and pale grey interbedded fine SAND and sandy CLAY. WITTERING FORMATION			
		0.90	ES	N=13 (2,2/3,3,3,4)					2		
		1.00	D								
		1.00	SPT								
				1.50	D	N=14 (3,3/3,4,3,4)	2.20	22.54		Pale grey sandy CLAY with sand lenses 1-2mm and some reddish orange stained sand lenses. Sand is fine. WITTERING FORMATION	3
				2.00	D						
				2.00	SPT						
				2.50	D	N=10 (2,2/3,2,2,3)	3.00	21.74		End of Borehole at 3.00m	4
		2.60	ES								
		3.00	D								
		3.00	SPT						5		
									6		
Dynamic Sampling Run Details		Water Strike Details (mbgl)		Remarks							
Depth Top	Depth Base	Diameter	Depth Strike	Rose To	Standpipe depth 3.03						
			2.97	2.97							

 Unit 7, Danworth Farm Hurstpierpoint BN6 9GL www.gesl.net			Borehole Log				Borehole No. WS104 Sheet 1 of 1		
Project Name:		HDN Primary School Site – Boorley Green		Project No. GE22665		Co-ords: 451090E - 114687N		Hole Type WLS	
Location: Nairn Road, Southampton, Hampshire, SO32 2SH				Level: 24.11		Scale 1:30			
Client: NH Developments Limited				Dates: 09/08/2024		Logged By DG/KOD			
Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
	▼				0.40	23.71		Grass overlying dark brown gravelly fine SAND with abundant rootlets. TOPSOIL	
		0.50	D	2.8kg/cm2	0.70	23.41		Stiff brown and pale orange sandy CLAY with some rootlets. Sand is fine. WITTERING FORMATION	
		0.50	PP						
		0.60	ES						
		1.00	D	N=14 (2,2/4,3,3,4)	1.10	23.01		Reddish brown and pale grey interbedded fine SAND and sandy CLAY with dark reddish brown staining. WITTERING FORMATION	
		1.00	SPT						
		1.40	ES	N=15 (2,3/4,4,3,4)	1.90	22.21		Orangish brown and pale grey interbedded sandy CLAY and fine SAND with dark reddish brown staining. WITTERING FORMATION	
		1.50	D						
		2.00	D	N=15 (2,3/4,4,3,4)	2.30	21.81		Orangish brown fine SAND with some pale grey clay lenses and reddish brown staining. WITTERING FORMATION	
		2.00	SPT						
		2.50	D	1.3kg/cm2	3.00	21.11		Firm pale purplish grey and orange sandy CLAY with sand lenses 1-5mm. Sand is fine. WITTERING FORMATION	
		2.50	PP						
		2.70	ES						
		3.00	D	N=15 (3,4/4,3,4,4)	4.00	20.11		No recovery WITTERING FORMATION	
		3.00	SPT						
3.50	D	N=19 (4,4/5,5,4,5)	4.60	19.51		Pale brown fine SAND. WITTERING FORMATION			
4.00	D								
4.00	SPT								
4.50	D	N=15 (4,3/3,4,4,4)	4.90	19.21		Pale grey and pale orangish brown interbedded CLAY and fine SAND. WITTERING FORMATION			
4.80	D								
5.00	D								
5.00	SPT		5.00	19.11		Dark grey silty CLAY with sand lenses 1mm. Sand is fine. LONDON CLAY			
End of Borehole at 5.00m									
Dynamic Sampling Run Details		Water Strike Details (mbgl)		Remarks					
Depth Top	Depth Base	Diameter	Depth Strike	Rose To	Hold collapse to 3.0m bgl				
			2.91	2.91					
									

 Unit 7, Danworth Farm Hurstpierpoint BN6 9GL www.gesl.net			Borehole Log				Borehole No. WS105 Sheet 1 of 1			
Project Name:		HDN Primary School Site – Boorley Green		Project No. GE22665		Co-ords: 451077E - 114711N		Hole Type WLS		
Location: Nairn Road, Southampton, Hampshire, SO32 2SH				Level: 25.37		Scale 1:30				
Client: NH Developments Limited				Dates: 09/08/2024		Logged By DG/KOD				
Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description		
		Depth (m)	Type	Results						
		0.20	ES		0.40 0.50	24.97 24.87		Brown gravelly fine SAND with occasional rootlets. Rare fine to coarse sized gravel. TOPSOIL		
		0.45	D							
		0.60	ES							
		1.00 1.00	D SPT	N=12 (3,3/3,3,3,3)	1.60	23.77		Orangish brown and grey clayey fine SAND. Sand is fine with grey clay lenses. WITTERING FORMATION Orangish brown and grey interbedded CLAY and SAND. Sand is fine. WITTERING FORMATION		
		1.50	D							
		2.00 2.00	D SPT	N=8 (2,2/2,2,2,2)						
		2.50 2.50	D ES							
		3.00 3.00	D SPT	N=11 (3,3/3,2,3,3)	3.00	22.37		Light brown and light grey fine interbedded SAND and CLAY. Occasional red lenses of sand. WITTERING FORMATION		
		End of Borehole at 3.00m								
		Dynamic Sampling Run Details		Water Strike Details (mbgl)		Remarks				
Depth Top	Depth Base	Diameter	Depth Strike	Rose To	Clay unsuitable for hand pen testing. Standpipe depth: 2.48m bgl.					
			2.15	2.15						
										

 Unit 7, Danworth Farm Hurstpierpoint BN6 9GL Geo-Environmentalwww.gesl.net				Trial Pit Log				TrialPit No HP101 Sheet 1 of 1	
Project Name: HDN Primary School Site – Boorley Green				Project No. GE22665		Co-ords: 451078.00 - 114685.26 Level: 24.26		Date 09/08/2024	
Location: Nairn Road, Southampton, Hampshire, SO32 2SH						Dimensions (m):		Scale 1:25	
Client: NH Developments Limited						Depth 0.95		Logged DG/KOD	
Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description		
	Depth	Type	Results						
	0.40	D		0.30	23.96		Grass overlying dark brown gravelly fine SAND with frequent rootlets and roots 1-3mm. Sand is fine. TOPSOIL		
				0.50	23.76		Pale orangish brown gravelly fine SAND with some rootlets and roots 1-3mm. Sand is fine. WITTERING FORMATION		
	0.80	D		0.95	23.31		Orangish brown and pale grey fine SAND with CLAY lenses. WITTERING FORMATION		
				End of Pit at 0.95m					
12345									
Water Strike Details (mbgl)									
Depth	Rose To								
Remarks									
Stability		Sides stable							
									

 Unit 7, Danworth Farm Hurstpierpoint BN6 9GL Geo-Environmentalwww.gesl.net				Trial Pit Log				TrialPit No HP102 Sheet 1 of 1	
Project Name: HDN Primary School Site – Boorley Green				Project No. GE22665		Co-ords: 451088.32 - 114682.34 Level: 23.91		Date 09/08/2024	
Location: Nairn Road, Southampton, Hampshire, SO32 2SH						Dimensions (m): Depth 0.86		Scale 1:25	
Client: NH Developments Limited								Logged DG/KOD	
Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description		
	Depth	Type	Results						
	0.30	D		0.25	23.66		Grass overlying dark brown gravelly fine SAND with abundant rootlets and roots 1-5mm. TOPSOIL		
				0.40	23.51		Pale orangish brown and some pale grey fine SAND with clay lenses and some rootlets. WITTERING FORMATION		
	0.80	D		0.86	23.05		Orangish brown gravelly fine SAND. Gravel is fine to coarse sub angular ironstone. WITTERING FORMATION		
End of Pit at 0.86m							1		
							2		
							3		
							4		
							5		
Water Strike Details (mbgl)				Soakage pit					
Depth	Rose To	Remarks							
		Stability		Sides unstable					
									



APPENDIX B

Geotechnical Laboratory Results





LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX

Job No.

35864

Borehole/Pit No.

WS101

Site Name

HDN Primary School - Boorley Green

Sample No.

1

Project No.

GE22665

Client

GESL

Depth Top

0.50

m

Depth Base

-

m

Sample Type

D

Soil Description

Orangish brown, brown and grey sandy silty CLAY with rare fine gravel

Samples received

13/08/2024

Schedules received

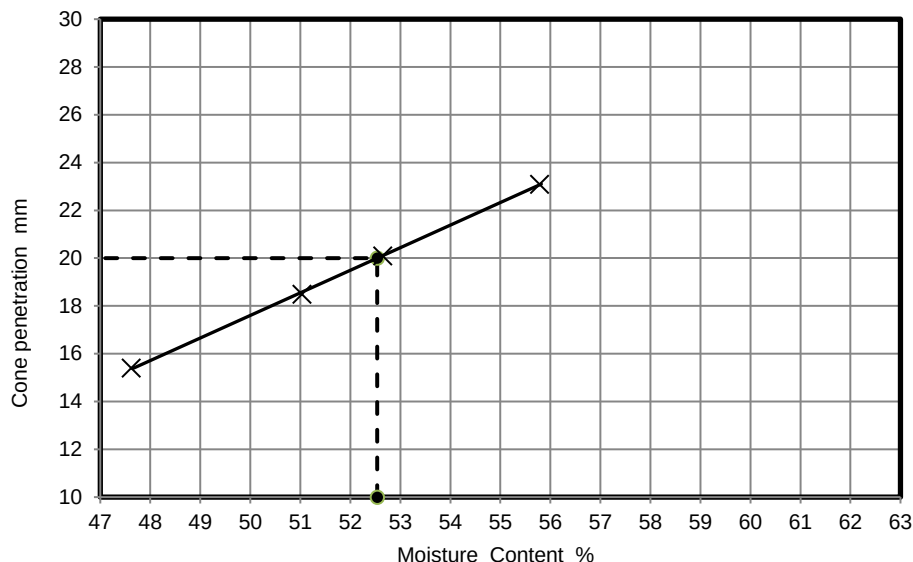
16/08/2024

Project Started

19/08/2024

Date Tested

27/08/2024



NATURAL MOISTURE CONTENT

21

%

% PASSING 425µm SIEVE

99

%

LIQUID LIMIT

53

%

PLASTIC LIMIT

17

%

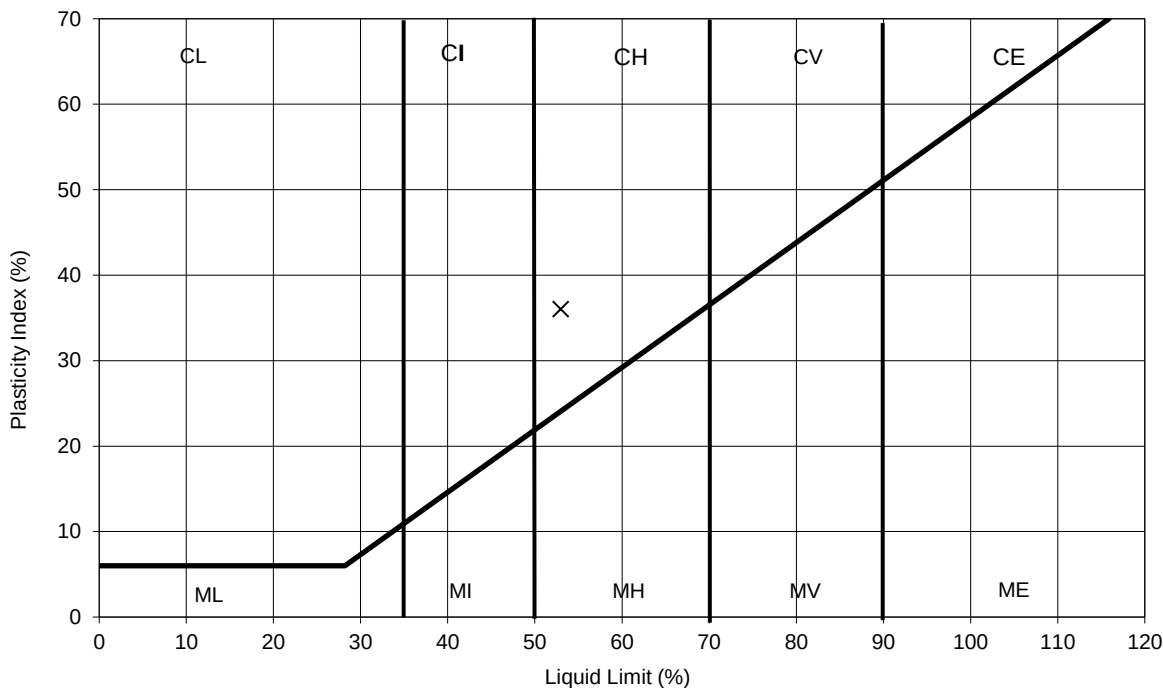
PLASTICITY INDEX

36

%

Remarks

PLASTICITY INDEX



These results only apply to the items tested. The report shall not be reproduced except in full without authority of the laboratory

TEST METHOD

BS1377: Part 2 :Clause 4.3 : 1990 Determination of the liquid limit by the cone penetrometer method

BS1377: Part 2 :Clause 5.0 : 1990: Determination of the plastic limit and plasticity index

BS1377: Part 2 :Clause 3.2 : 1990:Determination of the moisture content by the oven drying

Test Report by K4 SOILS LABORATORY Unit 8 Olds Close Olds Approach Watford Herts WD18 9RU

Tel: 01923 711 288 Email: James@k4soils.com

Checked and Approved

Initials: J.P

Date: 02/09/2024

2519

Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)

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LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX

Job No.

35864

Borehole/Pit No.

WS101

Site Name

HDN Primary School - Boorley Green

Sample No.

2

Project No.

GE22665

Client

GESL

Depth Top

1.00

m

Depth Base

-

m

Sample Type

D

Soil Description

Orangish brown and grey mottled sandy silty CLAY

Samples received

13/08/2024

Schedules received

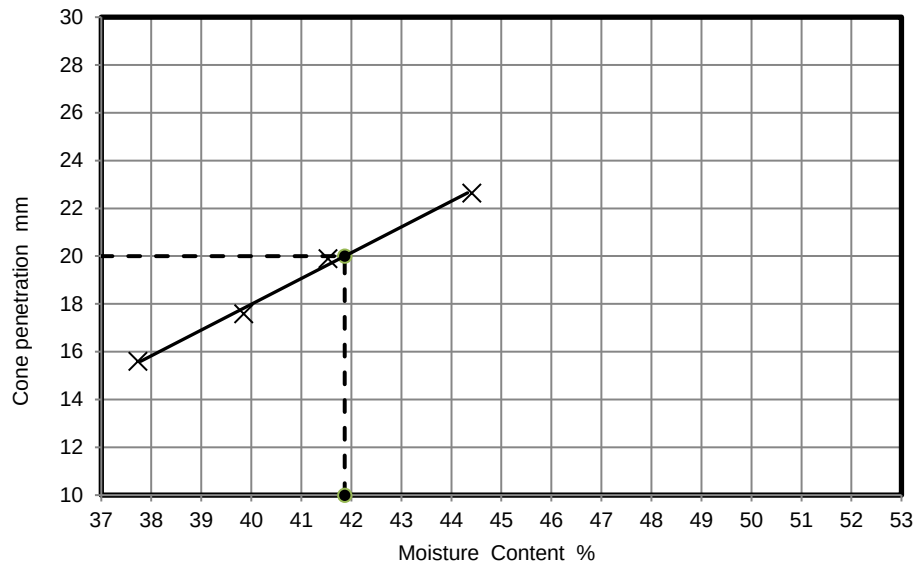
16/08/2024

Project Started

19/08/2024

Date Tested

27/08/2024

**NATURAL MOISTURE CONTENT**

15

%

% PASSING 425µm SIEVE

100

%

LIQUID LIMIT

42

%

PLASTIC LIMIT

18

%

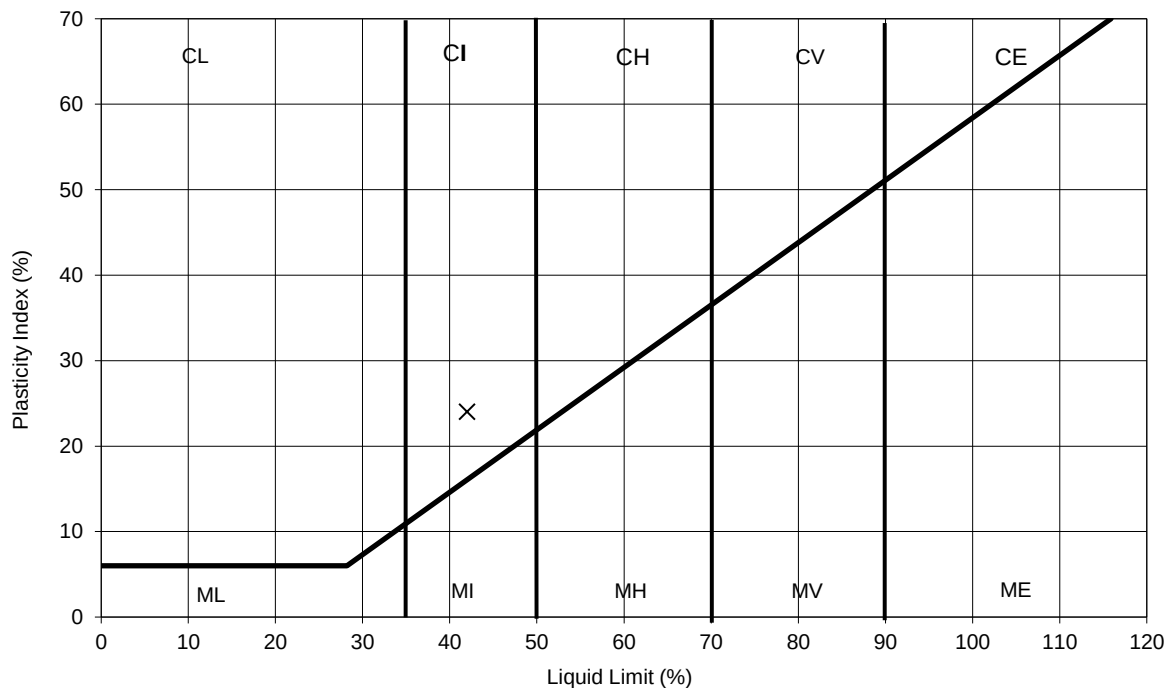
PLASTICITY INDEX

24

%

Remarks

PLASTICITY INDEX



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TEST METHOD

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BS1377: Part 2 :Clause 5.0 : 1990: Determination of the plastic limit and plasticity index

BS1377: Part 2 :Clause 3.2 : 1990:Determination of the moisture content by the oven drying

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LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX

Job No.

35864

Borehole/Pit No.

WS102

Site Name

HDN Primary School - Boorley Green

Sample No.

1

Project No.

GE22665

Client

GESL

Depth Top

0.60

m

Depth Base

-

m

Sample Type

D

Soil Description

Orangish brown, brown and occasional grey sandy silty CLAY with occasional fine roots and rootlets

Samples received

13/08/2024

Schedules received

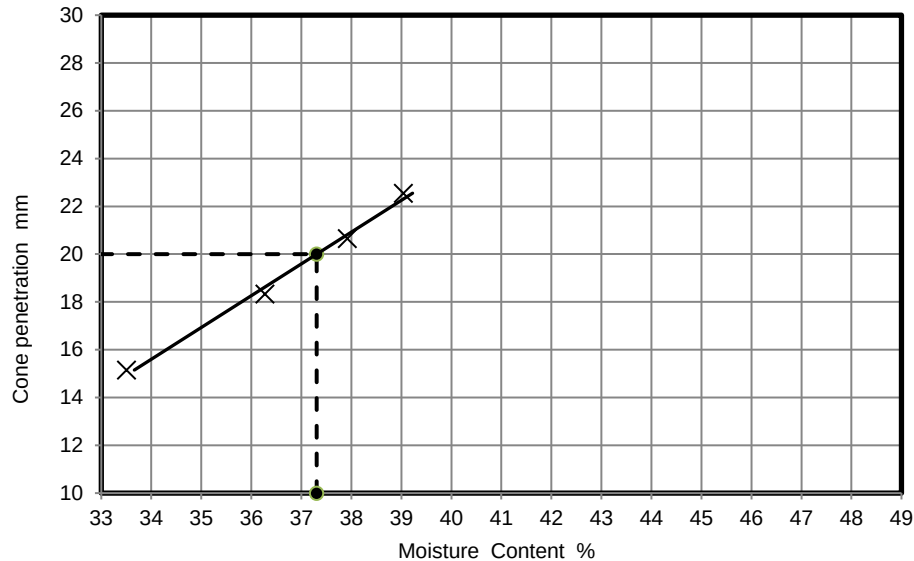
16/08/2024

Project Started

19/08/2024

Date Tested

28/08/2024

**NATURAL MOISTURE CONTENT**

19

%

% PASSING 425µm SIEVE

100

%

LIQUID LIMIT

37

%

PLASTIC LIMIT

18

%

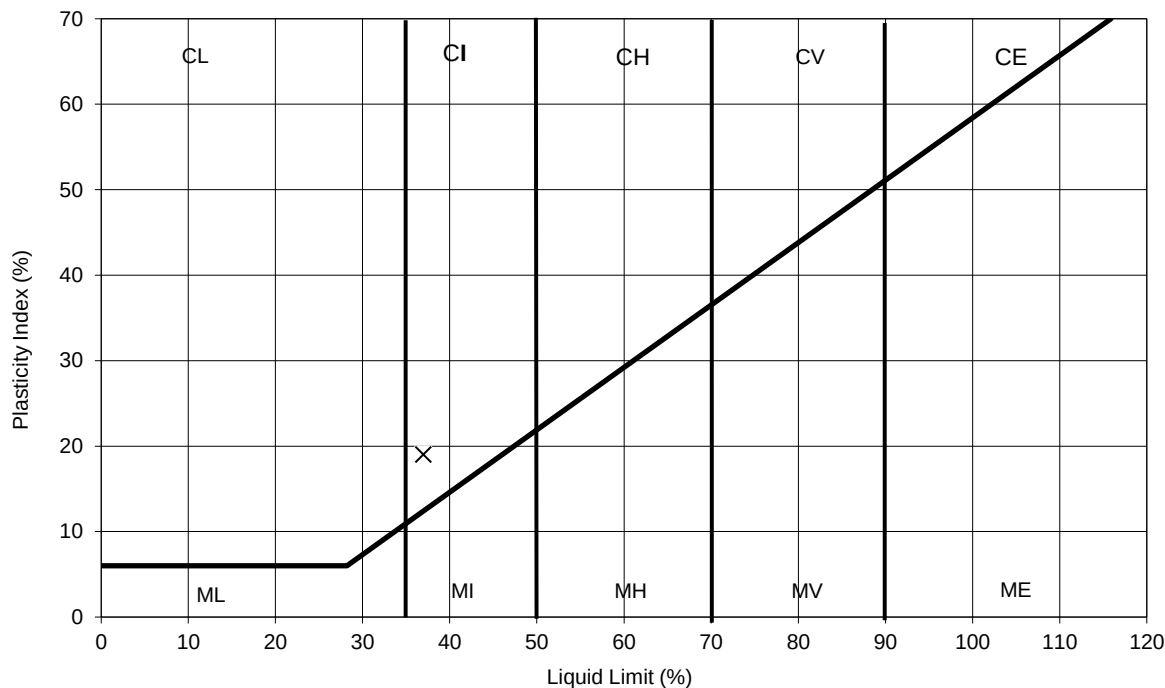
PLASTICITY INDEX

19

%

Remarks

PLASTICITY INDEX



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TEST METHOD

BS1377: Part 2 :Clause 4.3 : 1990 Determination of the liquid limit by the cone penetrometer method

BS1377: Part 2 :Clause 5.0 : 1990: Determination of the plastic limit and plasticity index

BS1377: Part 2 :Clause 3.2 : 1990:Determination of the moisture content by the oven drying

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Date: 02/09/2024

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LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX

Job No.

35864

Borehole/Pit No.

WS102

Site Name

HDN Primary School - Boorley Green

Sample No.

2

Project No.

GE22665

Client

GESL

Depth Top

1.00

m

Depth Base

-

m

Sample Type

D

Soil Description

Grey mottled orangish brown sandy silty CLAY

Samples received

13/08/2024

Schedules received

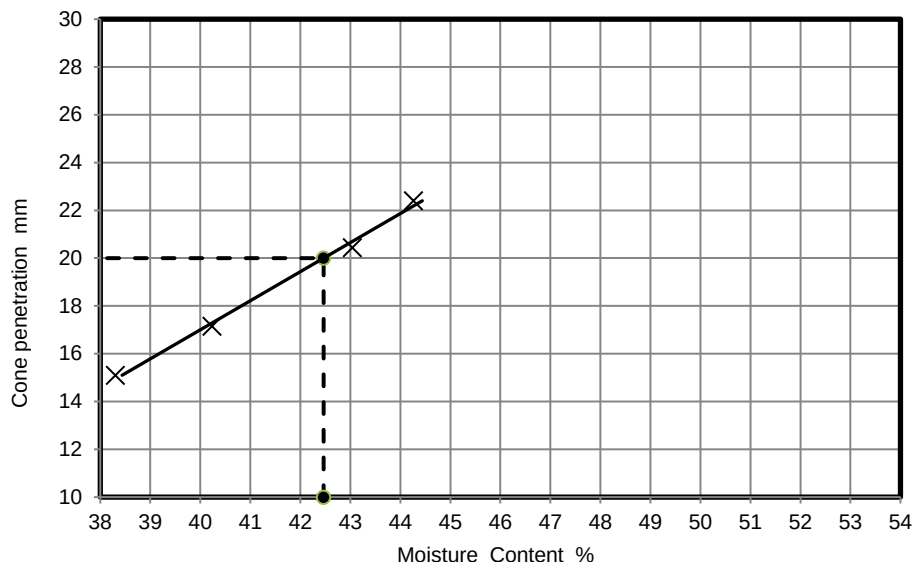
16/08/2024

Project Started

19/08/2024

Date Tested

28/08/2024



NATURAL MOISTURE CONTENT

21

%

% PASSING 425µm SIEVE

100

%

LIQUID LIMIT

42

%

PLASTIC LIMIT

19

%

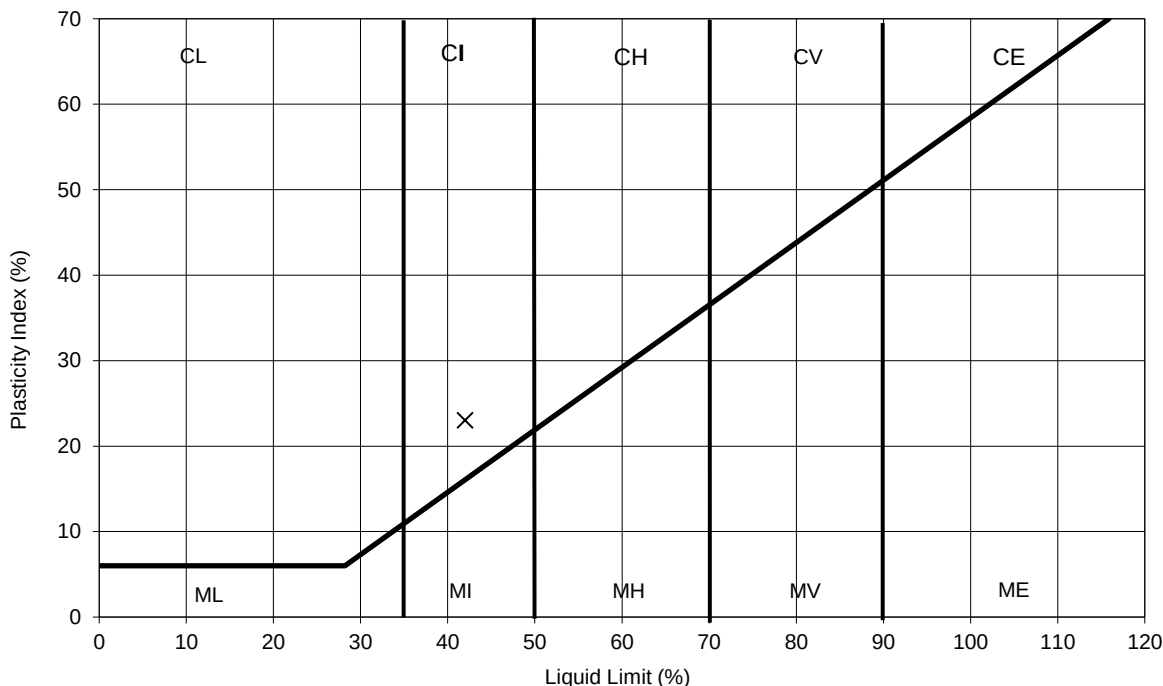
PLASTICITY INDEX

23

%

Remarks

PLASTICITY INDEX



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TEST METHOD

BS1377: Part 2 :Clause 4.3 : 1990 Determination of the liquid limit by the cone penetrometer method

BS1377: Part 2 :Clause 5.0 : 1990: Determination of the plastic limit and plasticity index

BS1377: Part 2 :Clause 3.2 : 1990:Determination of the moisture content by the oven drying

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Date: 02/09/2024

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MSF-5 R2



LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX

Job No.

35864

Borehole/Pit No.

WS102

Site Name

HDN Primary School - Boorley Green

Sample No.

4

Project No.

GE22665

Client

GESL

Depth Top

2.00

m

Depth Base

-

m

Sample Type

D

Soil Description

Brown and grey fine sandy silty CLAY with traces of fine rootlets

Samples received

13/08/2024

Schedules received

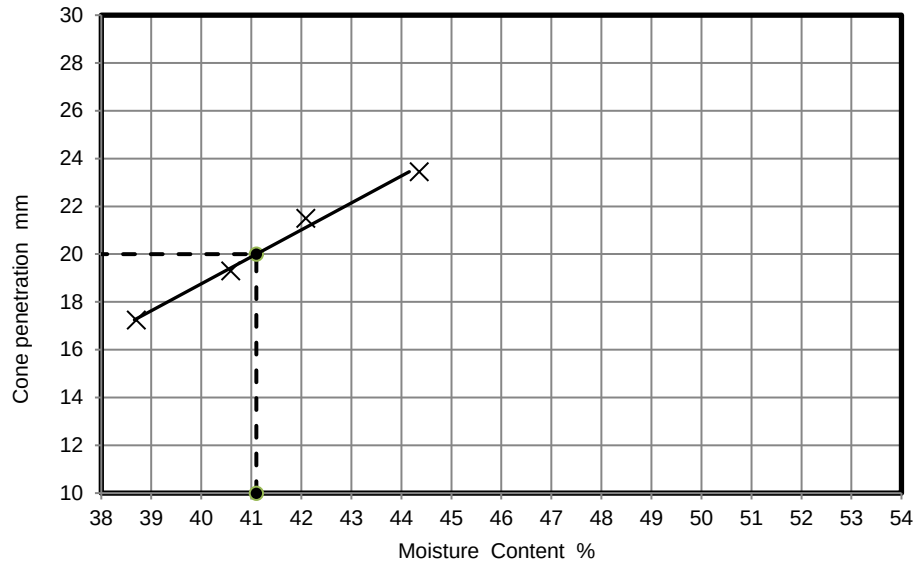
16/08/2024

Project Started

19/08/2024

Date Tested

29/08/2024

**NATURAL MOISTURE CONTENT**

29

%

% PASSING 425µm SIEVE

100

%

LIQUID LIMIT

41

%

PLASTIC LIMIT

12

%

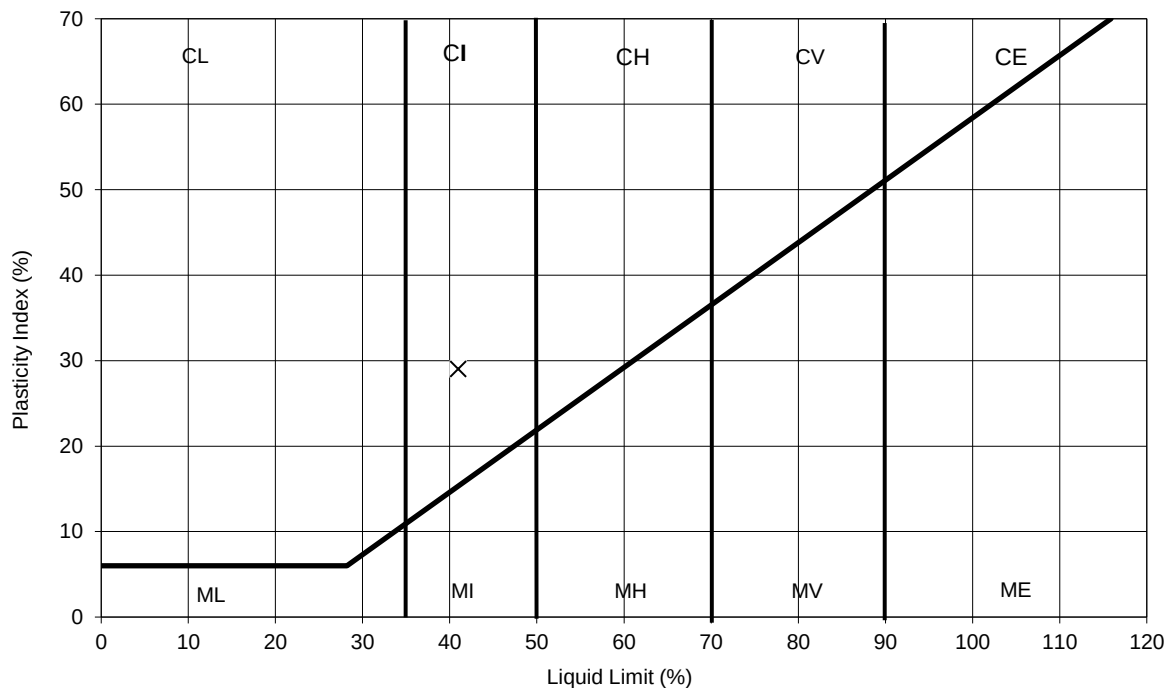
PLASTICITY INDEX

29

%

Remarks

PLASTICITY INDEX



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TEST METHOD

BS1377: Part 2 :Clause 4.3 : 1990 Determination of the liquid limit by the cone penetrometer method

BS1377: Part 2 :Clause 5.0 : 1990: Determination of the plastic limit and plasticity index

BS1377: Part 2 :Clause 3.2 : 1990:Determination of the moisture content by the oven drying

Test Report by K4 SOILS LABORATORY Unit 8 Olds Close Olds Approach Watford Herts WD18 9RU

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Checked and Approved

Initials: J.P

Date: 02/09/2024

MSF-5 R2

2519

Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)



LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX

Job No.

35864

Borehole/Pit No.

WS103

Site Name

HDN Primary School - Boorley Green

Sample No.

1

Project No.

GE22665

Client

GESL

Depth Top

0.50

m

Depth Base

-

m

Sample Type

D

Soil Description

Brown mottled orangish brown slightly sandy/sandy silty CLAY with rare roots and rootlets

Samples received

13/08/2024

Schedules received

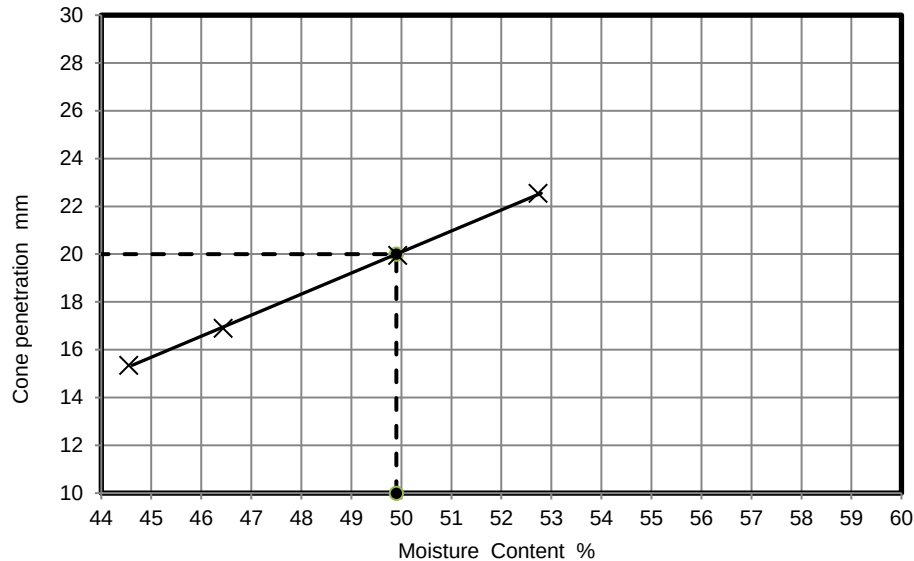
16/08/2024

Project Started

19/08/2024

Date Tested

27/08/2024



NATURAL MOISTURE CONTENT

22

%

% PASSING 425µm SIEVE

100

%

LIQUID LIMIT

50

%

PLASTIC LIMIT

21

%

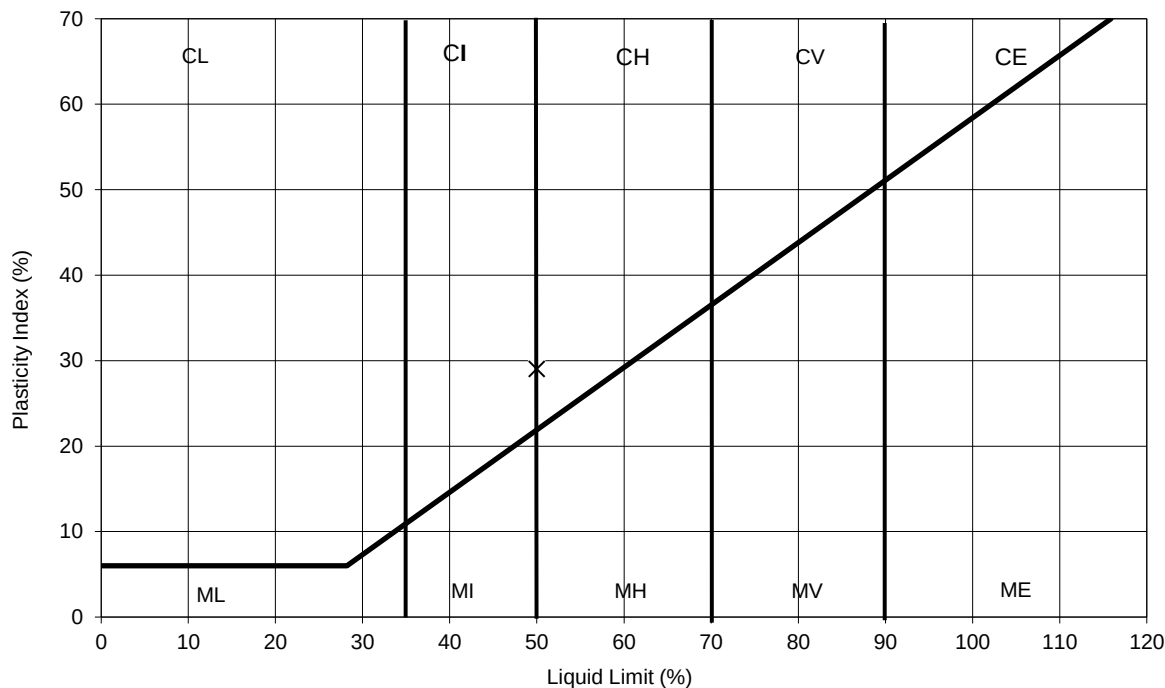
PLASTICITY INDEX

29

%

Remarks

PLASTICITY INDEX



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TEST METHOD

BS1377: Part 2 :Clause 4.3 : 1990 Determination of the liquid limit by the cone penetrometer method

BS1377: Part 2 :Clause 5.0 : 1990: Determination of the plastic limit and plasticity index

BS1377: Part 2 :Clause 3.2 : 1990:Determination of the moisture content by the oven drying

Test Report by K4 SOILS LABORATORY Unit 8 Olds Close Olds Approach Watford Herts WD18 9RU

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Checked and Approved

Initials: J.P

Date: 02/09/2024

2519

Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)

MSF-5 R2



LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX

Job No.

35864

Borehole/Pit No.

WS103

Site Name

HDN Primary School - Boorley Green

Sample No.

2

Project No.

GE22665

Client

GESL

Depth Top

1.00

m

Depth Base

-

m

Sample Type

D

Soil Description

Orangish brown and grey silty clayey SAND

Samples received

13/08/2024

Schedules received

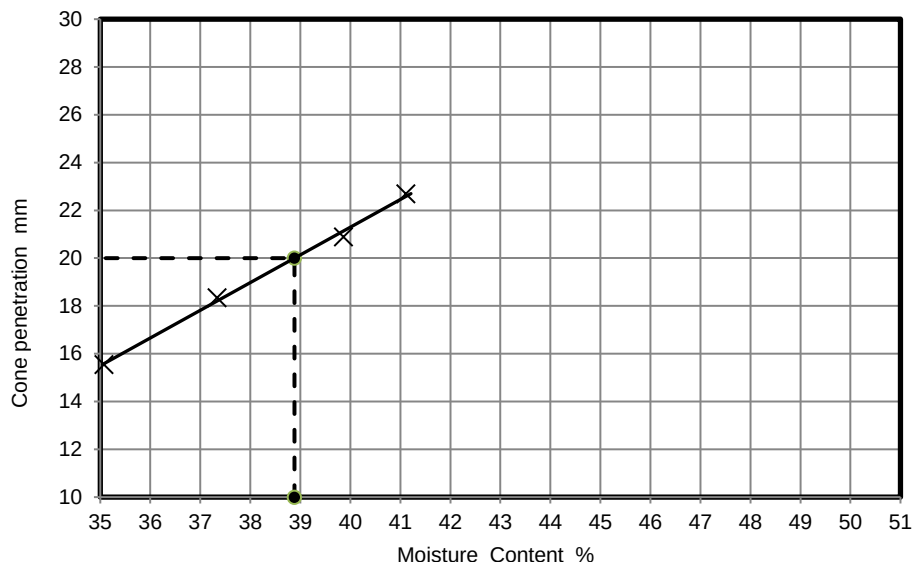
16/08/2024

Project Started

19/08/2024

Date Tested

28/08/2024



NATURAL MOISTURE CONTENT

15

%

% PASSING 425µm SIEVE

100

%

LIQUID LIMIT

39

%

PLASTIC LIMIT

19

%

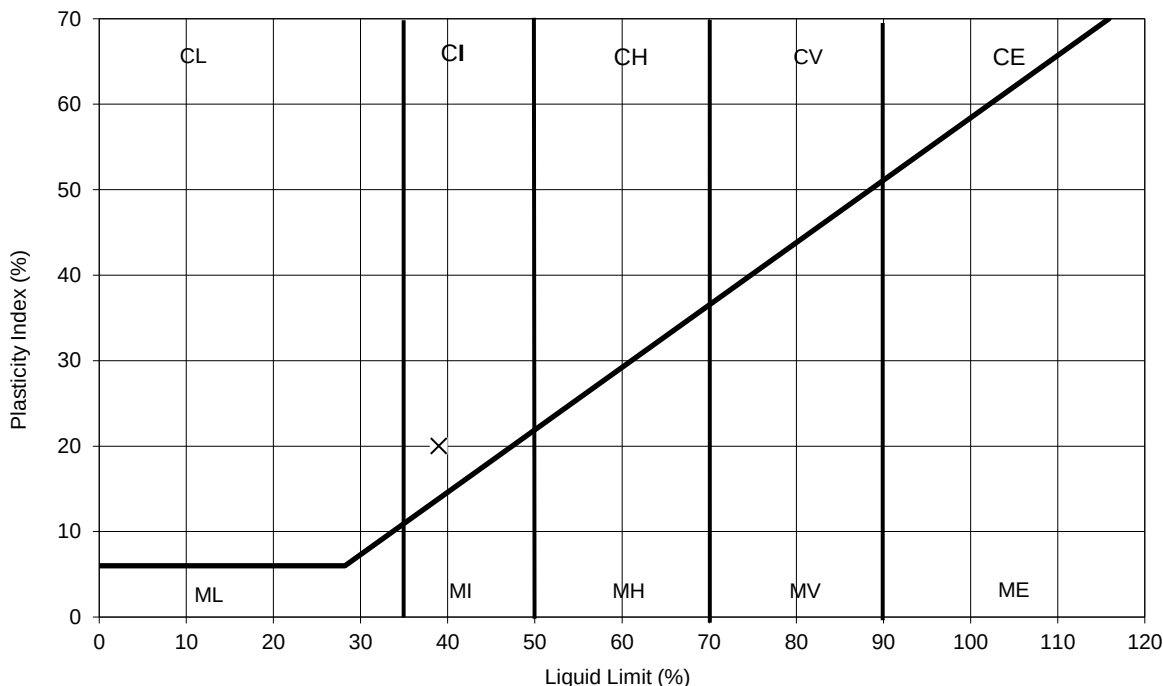
PLASTICITY INDEX

20

%

Remarks

PLASTICITY INDEX



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TEST METHOD

BS1377: Part 2 :Clause 4.3 : 1990 Determination of the liquid limit by the cone penetrometer method

BS1377: Part 2 :Clause 5.0 : 1990: Determination of the plastic limit and plasticity index

BS1377: Part 2 :Clause 3.2 : 1990:Determination of the moisture content by the oven drying

Test Report by K4 SOILS LABORATORY Unit 8 Olds Close Olds Approach Watford Herts WD18 9RU

Tel: 01923 711 288 Email: James@k4soils.com

Checked and Approved

Initials: J.P

Date: 02/09/2024

2519

Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)

MSF-5 R2



LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX

Job No. 35864

Borehole/Pit No. WS104

Site Name HDN Primary School - Boorley Green

Sample No. 1

Project No. GE22665

Client

GESL

Depth Top 0.50 m

Depth Base - m

Sample Type D

Soil Description

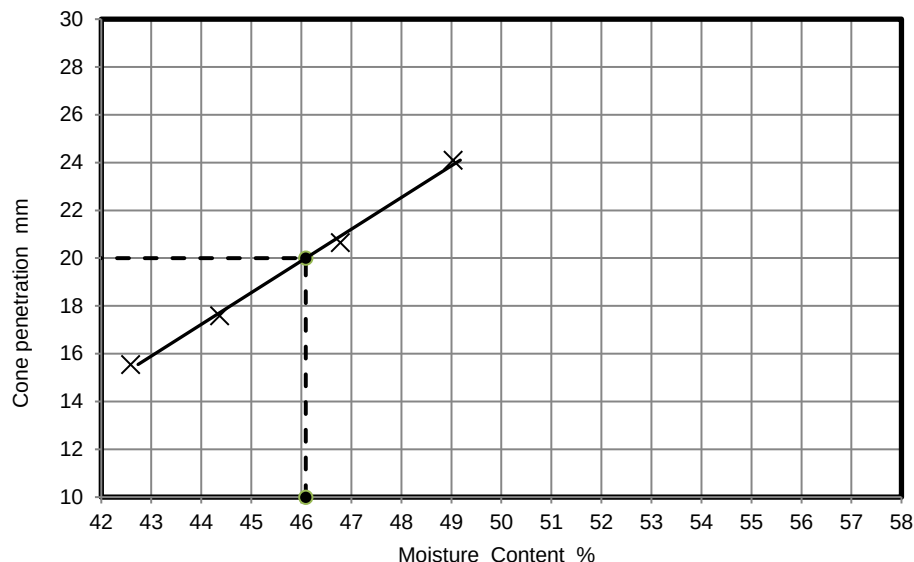
Orangish brown and brown fine sandy very silty CLAY with rare fine gravel

Samples received 13/08/2024

Schedules received 16/08/2024

Project Started 19/08/2024

Date Tested 28/08/2024



NATURAL MOISTURE CONTENT

13

%

% PASSING 425µm SIEVE

99

%

LIQUID LIMIT

46

%

PLASTIC LIMIT

18

%

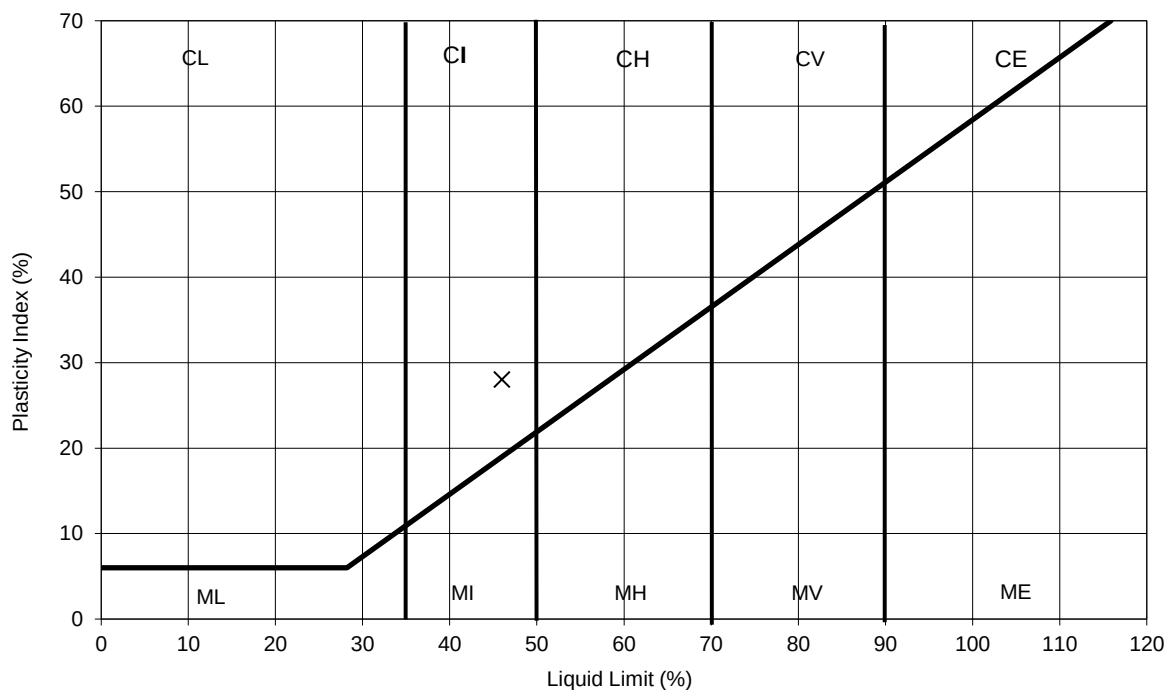
PLASTICITY INDEX

28

%

Remarks

PLASTICITY INDEX



These results only apply to the items tested. The report shall not be reproduced except in full without authority of the laboratory

TEST METHOD

BS1377: Part 2 :Clause 4.3 : 1990 Determination of the liquid limit by the cone penetrometer method

BS1377: Part 2 :Clause 5.0 : 1990: Determination of the plastic limit and plasticity index

BS1377: Part 2 :Clause 3.2 : 1990:Determination of the moisture content by the oven drying

Test Report by K4 SOILS LABORATORY Unit 8 Olds Close Olds Approach Watford Herts WD18 9RU

Tel: 01923 711 288 Email: James@k4soils.com

Checked and Approved

Initials: J.P

Date: 02/09/2024

2519

Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)

MSF-5 R2



LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX

Job No.

35864

Borehole/Pit No.

WS104

Site Name

HDN Primary School - Boorley Green

Sample No.

5

Project No.

GE22665

Client

GESL

Depth Top

2.50

m

Depth Base

-

m

Sample Type

D

Soil Description

Orangish brown sandy silty CLAY with grey slightly sandy silty clay laminations

Samples received

13/08/2024

Schedules received

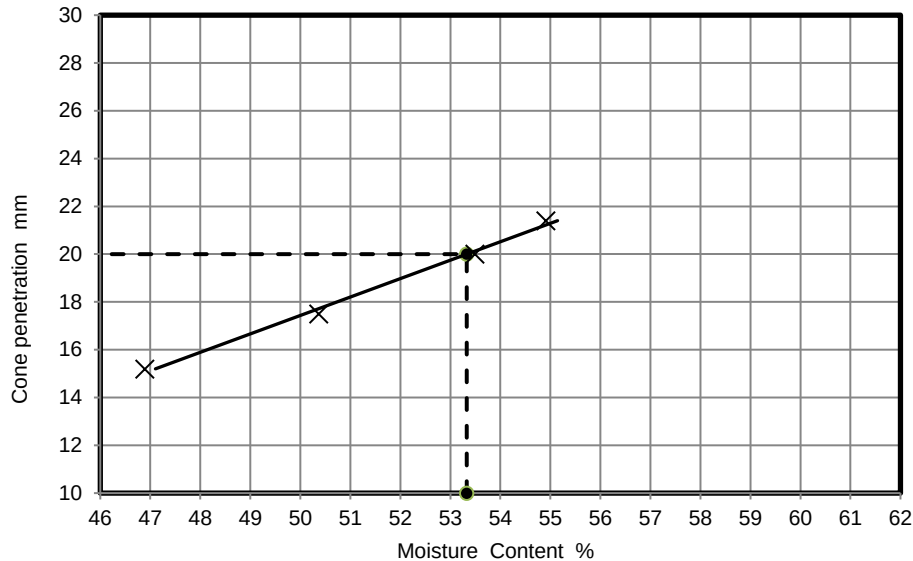
16/08/2024

Project Started

19/08/2024

Date Tested

28/08/2024



NATURAL MOISTURE CONTENT

25

%

% PASSING 425µm SIEVE

100

%

LIQUID LIMIT

53

%

PLASTIC LIMIT

21

%

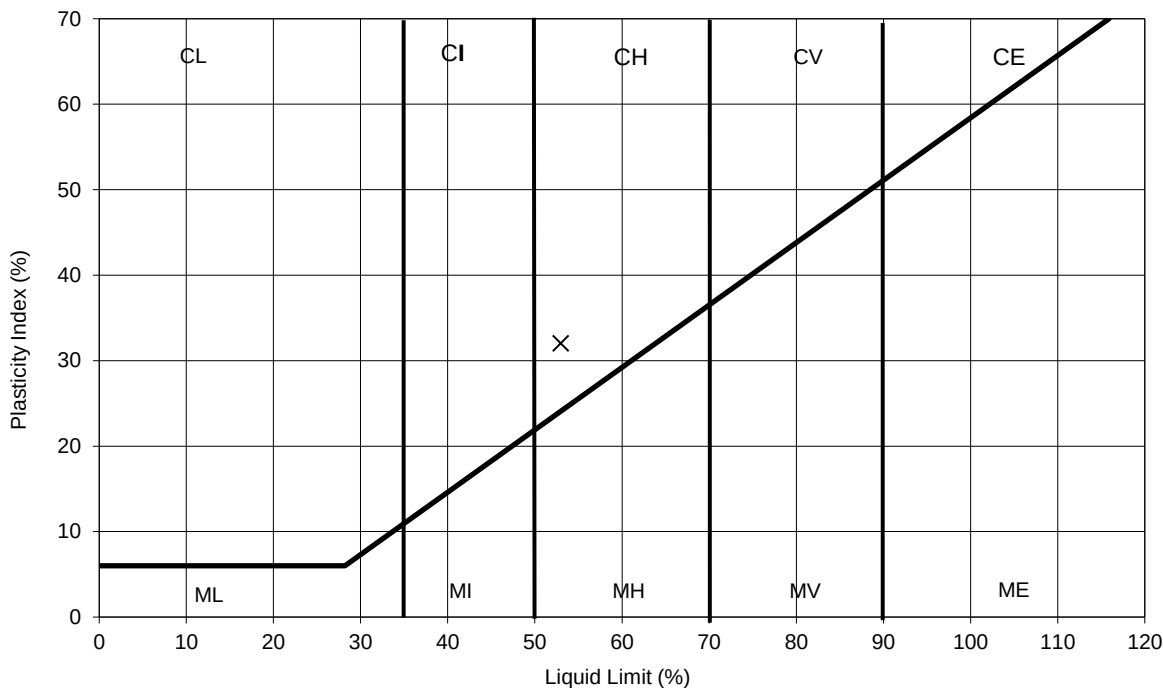
PLASTICITY INDEX

32

%

Remarks

PLASTICITY INDEX



These results only apply to the items tested. The report shall not be reproduced except in full without authority of the laboratory

TEST METHOD

BS1377: Part 2 :Clause 4.3 : 1990 Determination of the liquid limit by the cone penetrometer method

BS1377: Part 2 :Clause 5.0 : 1990: Determination of the plastic limit and plasticity index

BS1377: Part 2 :Clause 3.2 : 1990:Determination of the moisture content by the oven drying

Test Report by K4 SOILS LABORATORY Unit 8 Olds Close Olds Approach Watford Herts WD18 9RU

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2519

Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)

MSF-5 R2



LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX

Job No. 35864

Borehole/Pit No. WS105

Site Name HDN Primary School - Boorley Green

Sample No. 2

Project No. GE22665

Client

GESL

Depth Top 1.00 m

Depth Base - m

Sample Type D

Soil Description

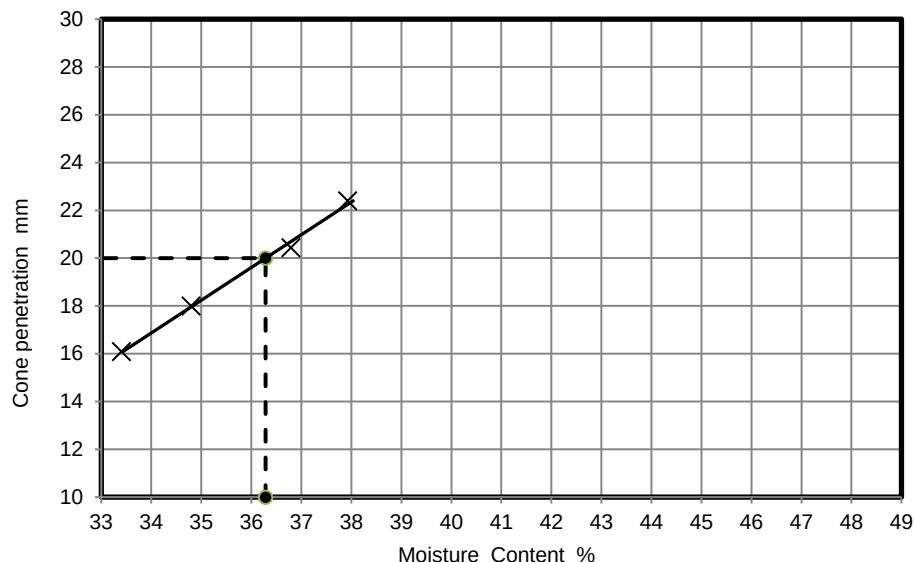
Orangish brown silty clayey SAND with grey slightly sandy silty clay pockets

Samples received 13/08/2024

Schedules received 16/08/2024

Project Started 19/08/2024

Date Tested 28/08/2024



NATURAL MOISTURE CONTENT

16

%

% PASSING 425µm SIEVE

100

%

LIQUID LIMIT

36

%

PLASTIC LIMIT

16

%

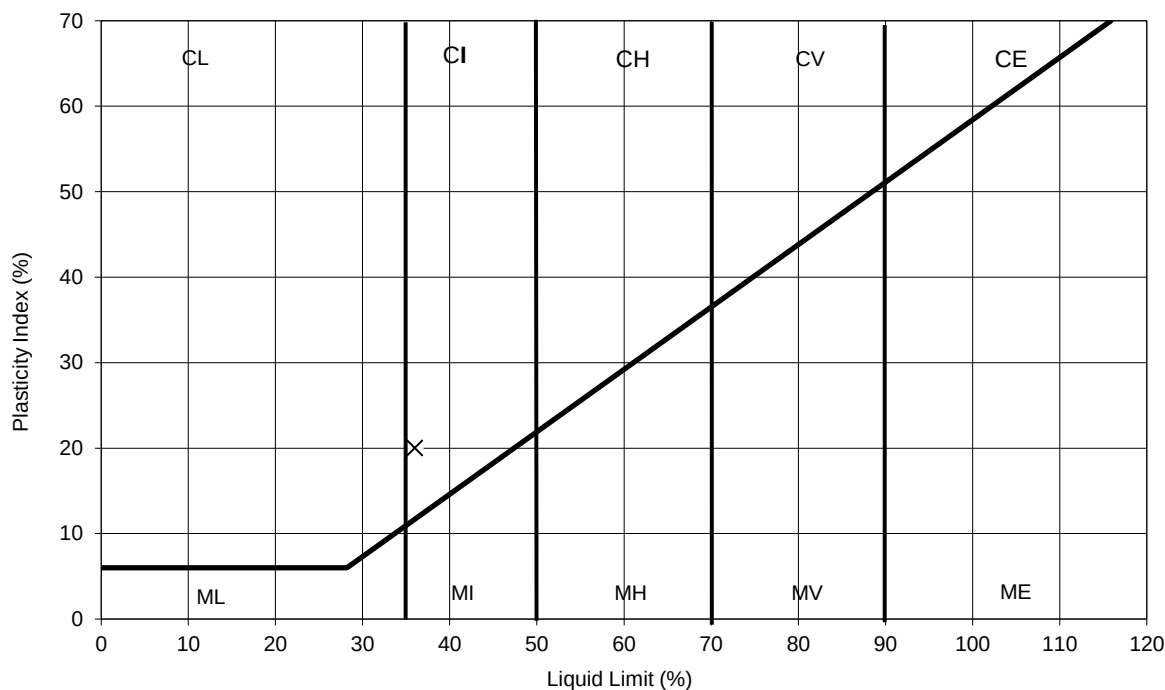
PLASTICITY INDEX

20

%

Remarks

PLASTICITY INDEX



These results only apply to the items tested. The report shall not be reproduced except in full without authority of the laboratory

TEST METHOD

BS1377: Part 2 :Clause 4.3 : 1990 Determination of the liquid limit by the cone penetrometer method

BS1377: Part 2 :Clause 5.0 : 1990: Determination of the plastic limit and plasticity index

BS1377: Part 2 :Clause 3.2 : 1990:Determination of the moisture content by the oven drying

Test Report by K4 SOILS LABORATORY Unit 8 Olds Close Olds Approach Watford Herts WD18 9RU

Tel: 01923 711 288 Email: James@k4soils.com

Checked and Approved

Initials: J.P

Date: 02/09/2024

2519

Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)

MSF-5 R2



LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX

Job No.

35864

Borehole/Pit No.

WS105

Site Name

HDN Primary School - Boorley Green

Sample No.

3

Project No.

GE22665

Client

GESL

Depth Top

1.50

m

Depth Base

-

m

Sample Type

D

Soil Description

Brown fine sandy silty CLAY

Samples received

13/08/2024

Schedules received

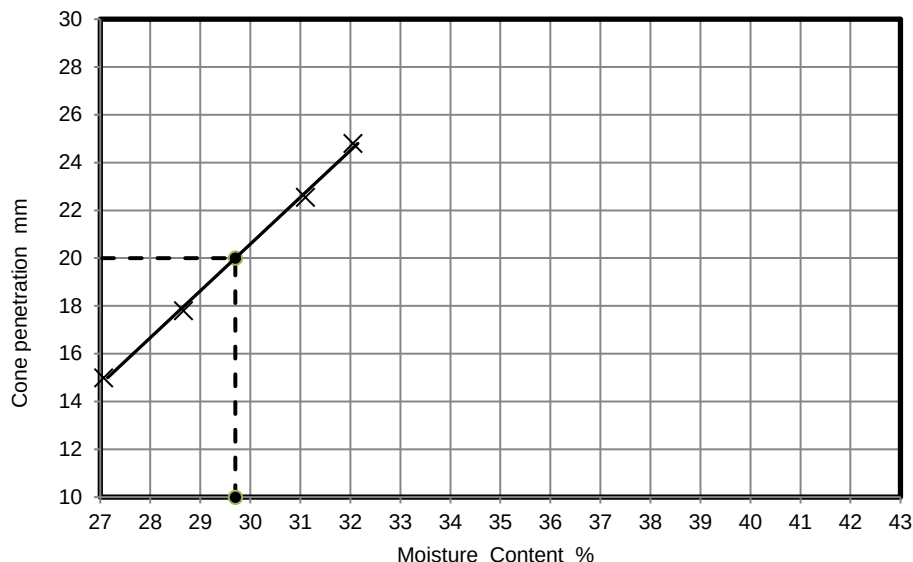
16/08/2024

Project Started

19/08/2024

Date Tested

29/08/2024



NATURAL MOISTURE CONTENT

23

%

% PASSING 425µm SIEVE

100

%

LIQUID LIMIT

30

%

PLASTIC LIMIT

14

%

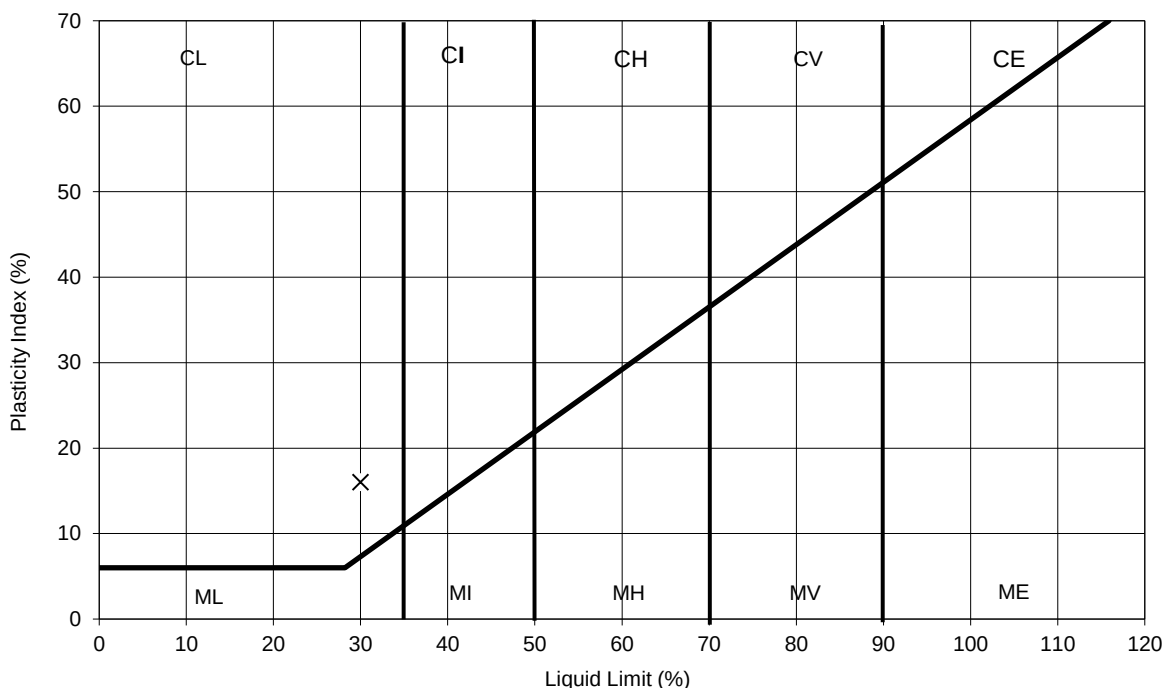
PLASTICITY INDEX

16

%

Remarks

PLASTICITY INDEX



These results only apply to the items tested. The report shall not be reproduced except in full without authority of the laboratory

TEST METHOD

BS1377: Part 2 :Clause 4.3 : 1990 Determination of the liquid limit by the cone penetrometer method

BS1377: Part 2 :Clause 5.0 : 1990: Determination of the plastic limit and plasticity index

BS1377: Part 2 :Clause 3.2 : 1990:Determination of the moisture content by the oven drying

Test Report by K4 SOILS LABORATORY Unit 8 Olds Close Olds Approach Watford Herts WD18 9RU

Tel: 01923 711 288 Email: James@k4soils.com

Checked and Approved

Initials: J.P

Date: 02/09/2024

2519

Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)

MSF-5 R2



Summary of Natural Moisture Content, Liquid Limit and Plastic Limit Results

Job No.	Project Name	Programme	
35864	HDN Primary School - Boorley Green	Samples received	13/08/2024
		Schedule received	16/08/2024
Project No.	Client	Project started	19/08/2024
GE22665	GESL	Testing Started	27/08/2024

[illegible]

Test Methods: BS1377: Part 2: 1990:
 Natural Moisture Content : clause 3.2
 Atterberg Limits: clause 4.3, 4.4 and 5.0
These results only apply to the items tested

NOTE: The report shall not be reproduced except in full without authority of the laboratory

Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)

Test Report by K4 SOILS LABORATORY
Unit 8 Olds Close Olds Approach
Watford Herts WD18 9RU

Tel: 01923 711 288
Email: James@k4soils.com

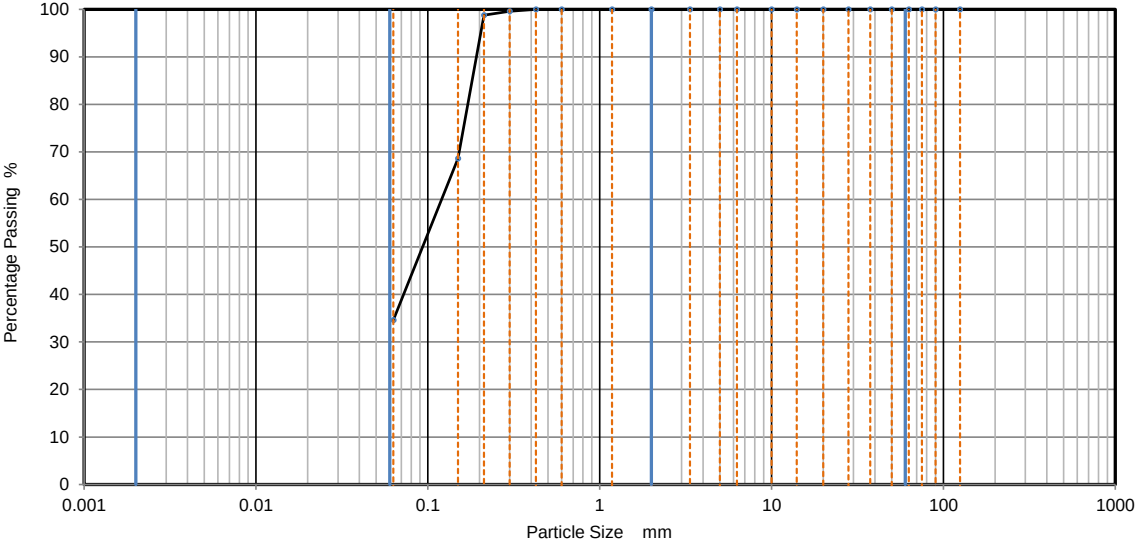
Checked and
Approved

Initials J.P

Date: 02/09/2024

	PARTICLE SIZE DISTRIBUTION			Job Ref	35864
				Borehole/Pit No.	WS101
Site Name	HDN Primary School - Boorley Green			Sample No.	4
Project No.	GE22665	Client	GESL	Depth Top	2.00 m
Soil Description	Orangish brown clayey SAND and bluish grey fine sandy silty clay pockets			Depth Base	- m
				Sample Type	D
				Samples received	13/08/2024
				Schedules received	16/08/2024
Test Method	BS1377:Part 2: 1990, clause 9.0			Project started	19/08/2024
These results only apply to the items tested				Date tested	28/08/2024

CLAY	SILT			SAND			GRAVEL			COBBLES	BOULDERS
	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse		



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	100		
14	100		
10	100		
6.3	100		
5	100		
3.35	100		
2	100		
1.18	100		
0.6	100		
0.425	100		
0.3	100		
0.212	99		
0.15	69		
0.063	35		

Sample Proportions		% dry mass
Very coarse		0
Gravel		0
Sand		65
Fines <0.063mm		35

Grading Analysis		
D100	mm	
D60	mm	0.121
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

Preparation and testing in accordance with BS1377 unless noted below

NOTE: The report shall not be reproduced except in full without approval of the laboratory

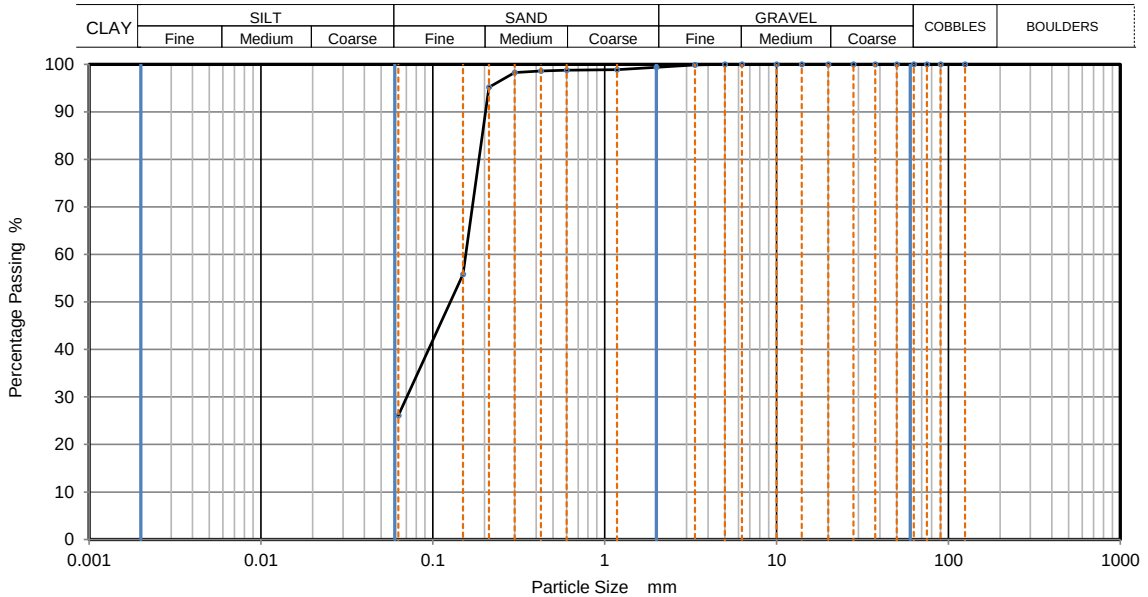
	K4 Soils Laboratory Unit 8, Olds Close, Watford, Herts, WD18 9RU Email: james@k4soils.com Tel: 01923 711288		Checked and Approved Initials: J.P Date: 02/09/2024
	2519 Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)		MSF-5-R3



PARTICLE SIZE DISTRIBUTION

Job Ref			35864		
			WS104		
Borehole/Pit No.			WS104		
Sample No.			2		
Depth Top			1.00 m		
Depth Base			- m		
Sample Type			D		
Samples received			13/08/2024		
Schedules received			16/08/2024		
Project started			19/08/2024		
Date tested			28/08/2024		

These results only apply to the items tested



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	100		
14	100		
10	100		
6.3	100		
5	100		
3.35	100		
2	99		
1.18	99		
0.6	99		
0.425	99		
0.3	98		
0.212	95		
0.15	56		
0.063	26		

Sample Proportions	% dry mass
Very coarse	0
Gravel	1
Sand	73
Fines <0.063mm	26

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

Remarks
Preparation and testing in accordance with BS1377 unless noted below

NOTE: The report shall not be reproduced except in full without approval of the laboratory

K4 Soils Laboratory			Checked and Approved	
Unit 8, Olds Close, Watford, Herts, WD18 9RU			Initials:	J.P
Email: james@k4soils.com			Date:	02/09/2024
Tel: 01923 711288			MSF-5-R3	
Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)				

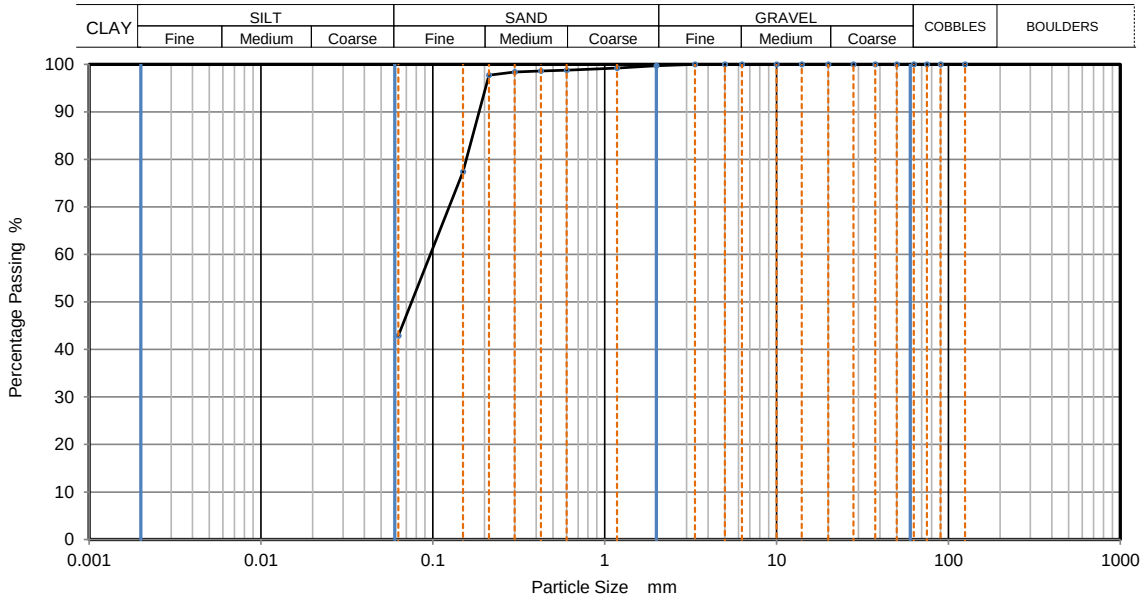




PARTICLE SIZE DISTRIBUTION

	PARTICLE SIZE DISTRIBUTION			Job Ref	35864	
				Borehole/Pit No.	WS105	
Site Name	HDN Primary School - Boorley Green			Sample No.	1	
Project No.	GE22665	Client	GESL	Depth Top	0.45	m
Soil Description	Orangish brown sandy silty CLAY with rare fine shaley deposits			Depth Base	-	m
				Sample Type	D	
				Samples received	13/08/2024	
				Schedules received	16/08/2024	
Test Method	BS1377:Part 2: 1990, clause 9.0			Project started	19/08/2024	
These results only apply to the items tested				Date tested	28/08/2024	

These results only apply to the items tested



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	100		
14	100		
10	100		
6.3	100		
5	100		
3.35	100		
2	100		
1.18	99		
0.6	99		
0.425	99		
0.3	98		
0.212	98		
0.15	77		
0.063	43		

Sample Proportions	% dry mass
Very coarse	0
Gravel	0
Sand	57
Fines <0.063mm	43

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

Remarks

Preparation and testing in accordance with BS1377 unless noted below

NOTE: The report shall not be reproduced except in full without approval of the laboratory



K4 Soils Laboratory

Unit 8, Olds Close, Watford, Herts, WD18 9RU

Email: james@k4soils.com

Tel: 01923 711288

Checked and Approved

Initials: J.P

Date: 02/09/2024

2519

Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)

MSF-5-R3



APPENDIX C

Geochemical Laboratory Results



Geo-Environmental Services Ltd
Unit 7, Danworth Farm
Cuckfield Road
Hurstpierpoint
West Sussex
BN6 9GL

t: 01273 832972

e: katie.odea@gesl.net
gavin.roberts@gesl.net
results@aesl.net

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

t: 01923 225404
f: 01923 237404
e: reception@i2analytical.com

Analytical Report Number : 24-036647

Project / Site name:	HDN Primary School Site - Boorley Green	Samples received on:	13/08/2024
Your job number:	GE22665	Samples instructed on/ Analysis started on:	15/08/2024
Your order number:	PO 7667	Analysis completed by:	21/08/2024
Report Issue Number:	1	Report issued on:	21/08/2024
Samples Analysed:	10 soil samples		

Sign

Rafał Szczepańczyk
Technical Reviewer
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

Excel copies of reports are only valid when accompanied by this PDF certificate.

Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement.
Application of uncertainty of measurement would provide a range within which the true result lies.
An estimate of measurement uncertainty can be provided on request.

Analytical Report Number: 24-036647

Project / Site name: HDN Primary School Site - Boorley Green

Your Order No: PO 7667

Lab Sample Number				288053	288054	288055	288056	288057
Sample Reference				WS101	WS101	WS102	WS102	WS103
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.50	4.00	1.20	3.00	0.90
Date Sampled				09/08/2024	09/08/2024	09/08/2024	09/08/2024	09/08/2024
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)				Units	Test Limit of detection	Test Accreditation Status		

Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	20	16	15	15	15
Total mass of sample received	kg	0.1	NONE	0.9	0.9	0.9	0.9	0.9

General Inorganics

pH (L099)	pH Units	N/A	MCERTS	7.5	5.5	6.7	5.5	7.7
Total Sulphate as SO ₄	mg/kg	50	MCERTS	170	1300	300	1100	130
Total Sulphate as SO ₄	%	0.005	MCERTS	0.017	0.133	0.03	0.112	0.013
Water Soluble Sulphate as SO ₄ 16hr extraction (2:1)	mg/kg	2.5	MCERTS	30	27	6.6	18	15
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.015	0.0135	0.00331	0.00899	0.00767
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	15	13.5	3.31	8.99	7.67
Total Sulphur	mg/kg	50	MCERTS	69	450	130	420	59
Total Sulphur	%	0.005	MCERTS	0.007	0.045	0.013	0.042	0.006

U/S = Unsuitable Sample I/S = Insufficient Sample ND = Not detected

Analytical Report Number: 24-036647

Project / Site name: HDN Primary School Site - Boorley Green

Your Order No: PO 7667

Lab Sample Number	288058	288059	288060	288061	288062
Sample Reference	WS103	WS104	WS104	WS105	WS105
Sample Number	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)	2.60	1.40	2.70	0.60	2.50
Date Sampled	09/08/2024	09/08/2024	09/08/2024	09/08/2024	09/08/2024
Time Taken	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Test Limit of detection	Test Accreditation Status		

Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	17	12	18	15	16
Total mass of sample received	kg	0.1	NONE	0.9	0.9	0.9	0.9	0.9

General Inorganics

pH (L099)	pH Units	N/A	MCERTS	7.7	8.3	6.4	6.1	5.5
Total Sulphate as SO ₄	mg/kg	50	MCERTS	1200	66	150	240	250
Total Sulphate as SO ₄	%	0.005	MCERTS	0.12	0.007	0.015	0.024	0.025
Water Soluble Sulphate as SO ₄ 16hr extraction (2:1)	mg/kg	2.5	MCERTS	82	7.2	15	19	35
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.0409	0.00359	0.00751	0.00937	0.0174
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	40.9	3.59	7.51	9.37	17.4
Total Sulphur	mg/kg	50	MCERTS	370	< 50	52	90	110
Total Sulphur	%	0.005	MCERTS	0.037	< 0.005	0.005	0.009	0.011

U/S = Unsuitable Sample I/S = Insufficient Sample ND = Not detected

Analytical Report Number : 24-036647
Project / Site name: HDN Primary School Site - Boorley Green

* 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 *
288053	WS101	None Supplied	1.5	Brown clay and sand with gravel
288054	WS101	None Supplied	4	Brown clay and sand with gravel
288055	WS102	None Supplied	1.2	Brown clay and sand with gravel
288056	WS102	None Supplied	3	Brown clay and sand with gravel
288057	WS103	None Supplied	0.9	Brown clay and sand with gravel
288058	WS103	None Supplied	2.6	Brown clay and sand with gravel
288059	WS104	None Supplied	1.4	Brown clay and sand with gravel
288060	WS104	None Supplied	2.7	Brown clay and sand with gravel
288061	WS105	None Supplied	0.6	Brown clay and sand with gravel
288062	WS105	None Supplied	2.5	Brown clay and sand with gravel

Analytical Report Number : 24-036647

Project / Site name: HDN Primary School Site - Boorley Green

Water matrix abbreviations:

Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Moisture Content	Moisture content, determined gravimetrically (up to 30°C)	In-house method	L019B	W	NONE
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.	L019B	D	NONE
Total sulphate (as SO ₄ in soil)	Determination of total sulphate in soil by extraction with 10% HCl followed by ICP-OES	In-house method	L038B	D	MCERTS
Sulphate, water soluble, in soil (16hr extraction)	Sulphate, water soluble, in soil (16hr extraction)	In-house method	L038B	D	MCERTS
Total Sulphur in soil	Determination of total sulphur in soil by extraction with aqua-regia, potassium bromide/bromate followed by ICP-OES	In-house method	L038B	D	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement	In-house method	L099	D	MCERTS

For method numbers ending in 'UK' or 'A' analysis have been carried out in our laboratory in the United Kingdom (Watford).

For method numbers ending in 'F' analysis have been carried out in our laboratory in the United Kingdom (East Kilbride).

For method numbers ending in 'PL' or 'B' 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 30°C.

Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.

Quality control parameter failure associated with individual result applies to calculated sum of individuals.

The result for sum should be interpreted with caution



APPENDIX D

Soakage Testing Results



 Geo-Environmental	Soakaway Test Results (after BRE Digest 365)	Geo-Environmental Services Limited Unit 7 Danworth Farm, Cuckfield Road, Hurstpierpoint, West Sussex BN6 9GL +44(0)1273 832972 www.gesl.net
Project Name : HDN Primary School Site - Boorley Green		Job No. : GE22665
Client : NH Developments Limited		Date : 09/08/2024

Pit reference	HP101
Pit depth (m)	0.95
Pit width (m)	0.30
Pit length (m)	0.30
Depth to standing water (m)	

Test 1

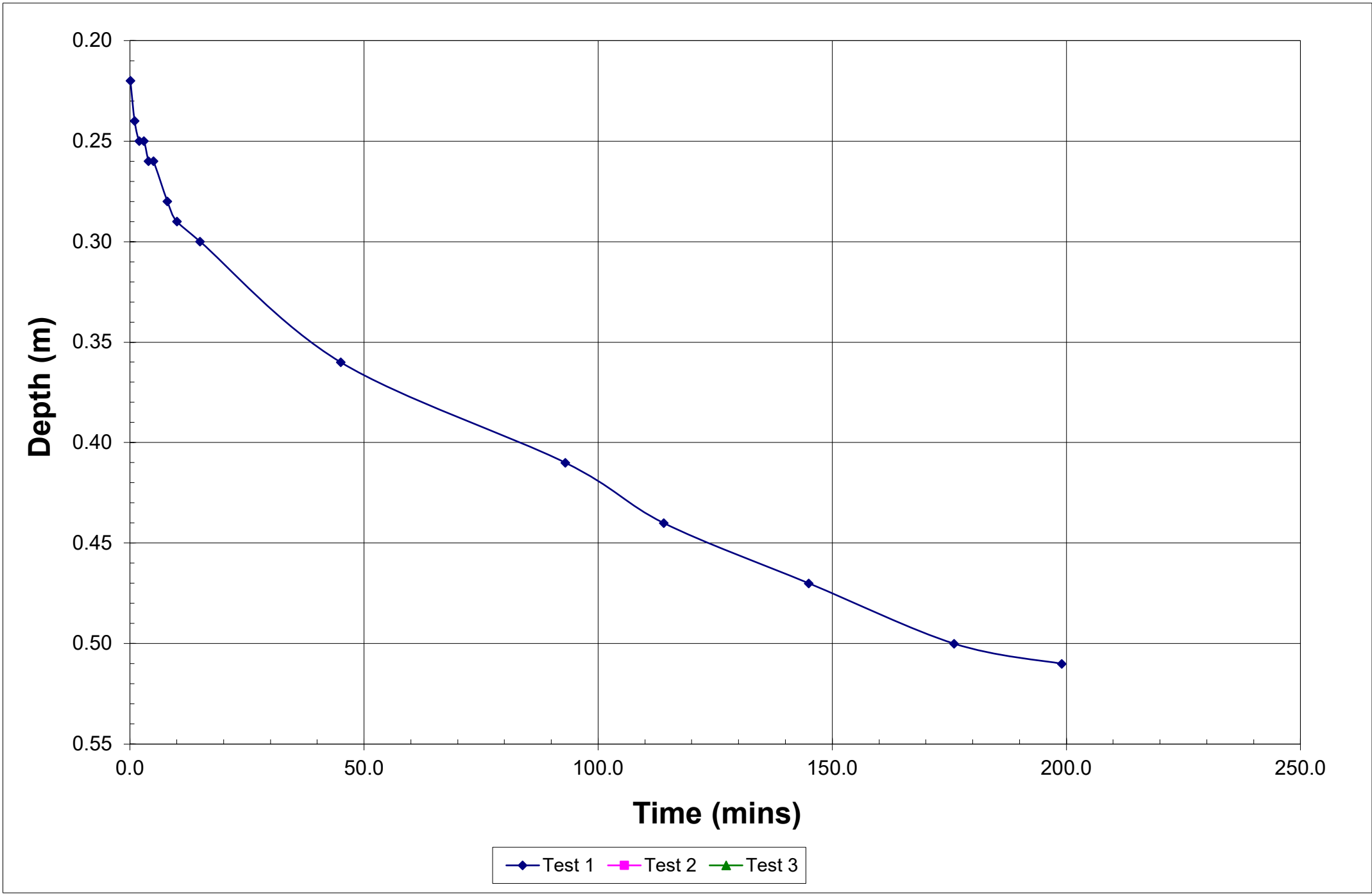
Time (min)	Depth (m)
0.1	0.22
1.0	0.24
2.0	0.25
3.0	0.25
4.0	0.26
5.0	0.26
8.0	0.28
10.0	0.29
15.0	0.30
45.0	0.36
93.0	0.41
114.0	0.44
145.0	0.47
176.0	0.50
199.0	0.51

Test 2

Time (min)	Depth (m)

Test 3

Time (min)	Depth (m)



Max. depth (m)	0.95	0.95	0.95
Effective depth (m)	0.73	0.95	0.95
75% effective depth (m)	0.40	0.24	0.24
50% effective depth (m)	0.59	0.48	0.48
25% effective depth (m)	0.77	0.71	0.71
t75 (min)			
t50 (min)			
t25 (min)			
Vp 75-25	0.03	0.04	0.04
ap 50	0.528	0.66	0.66
tp 75-25	0.00	0.00	0.00

Soil infiltration rate (m/s)	Insufficient fall in water to complete test	
Soil infiltration rate (mm/hr)	Insufficient fall in water to complete test	

 Geo-Environmental	Soakaway Test Results (after BRE Digest 365)	Geo-Environmental Services Limited Unit 7 Danworth Farm, Cuckfield Road, Hurstpierpoint, West Sussex BN6 9GL +44(0)1273 832972 www.gesl.net
Project Name : HDN Primary School Site - Boorley Green		Job No. : GE22665
Client : NH Developments Limited		Date : 09/08/2024

Pit reference	HP102
Pit depth (m)	0.86
Pit width (m)	0.30
Pit length (m)	0.30
Depth to standing water (m)	

Test 1

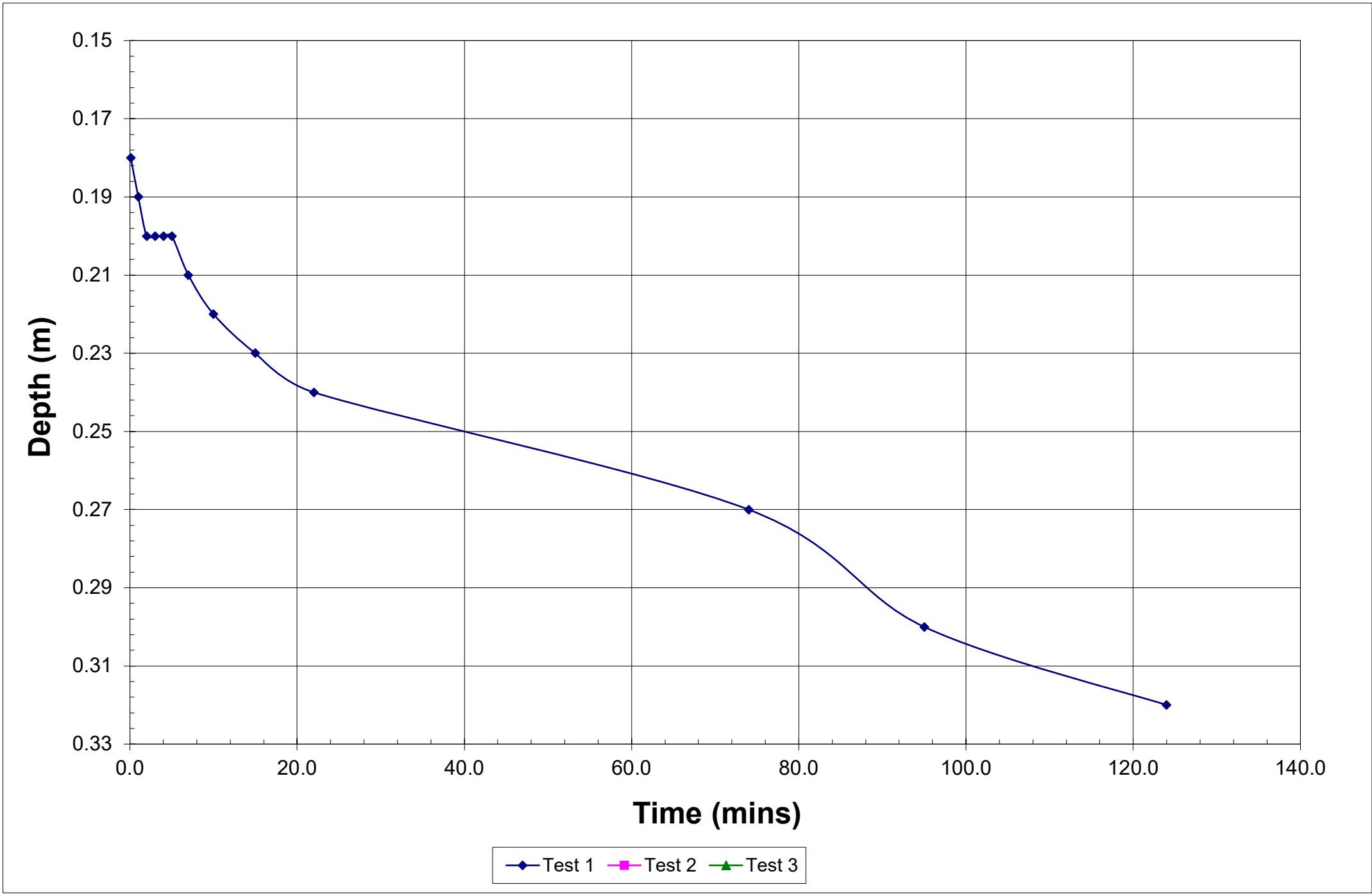
Time (min)	Depth (m)
0.1	0.18
1.0	0.19
2.0	0.20
3.0	0.20
4.0	0.20
5.0	0.20
7.0	0.21
10.0	0.22
15.0	0.23
22.0	0.24
74.0	0.27
95.0	0.30
124.0	0.32

Test 2

Time (min)	Depth (m)

Test 3

Time (min)	Depth (m)



Max. depth (m)	0.86	0.86	0.86
Effective depth (m)	0.68	0.86	0.86
75% effective depth (m)	0.35	0.22	0.22
50% effective depth (m)	0.52	0.43	0.43
25% effective depth (m)	0.69	0.65	0.65
t75 (min)			
t50 (min)			
t25 (min)			
Vp 75-25	0.03	0.04	0.04
ap 50	0.498	0.606	0.606
tp 75-25	0.00	0.00	0.00

Soil infiltration rate (m/s)	Insufficient fall in water to complete test	
Soil infiltration rate (mm/hr)	Insufficient fall in water to complete test	



APPENDIX E

Gas and Groundwater Monitoring Results (to date)



Project: HDN Primary school site, Boorley Green
Ref: GE22665
Client: NH Developments Limited



Location	Date	Time (sec)	CH ₄ (%)	CO ₂ (%)	O ₂ (%)	Flow (l/hr)	VOC (ppm)	Pressure (mb)	GWL (m bgl)	GSV/Qhgs		Characteristic Situation		CS1 Limiting Value Check		
										CH ₄	CO ₂	BS8485 & C665		Flow	CH ₄	CO ₂
												CH ₄	CO ₂			
WS102	15/08/24	0	0.0	0	20.2	0.9	0.4	1013	Dry	0.000	0.000	CS1	CS1	NO	NO	NO
WS102	15/08/24	10	0.0	3.4	17.4	0.9	0.4	1013	Dry	0.000	0.031	CS1	CS1	NO	NO	NO
WS102	15/08/24	20	0.0	3.7	16.9	0.9	0.4	1013	Dry	0.000	0.033	CS1	CS1	NO	NO	NO
WS102	15/08/24	30	0.0	3.7	16.7	0.9	0.4	1013	Dry	0.000	0.033	CS1	CS1	NO	NO	NO
WS102	15/08/24	60	0.0	3.8	16.7	0.9	0.4	1013	Dry	0.000	0.034	CS1	CS1	NO	NO	NO
WS102	15/08/24	90	0.0	3.7	16.7	0.9	0.4	1013	Dry	0.000	0.033	CS1	CS1	NO	NO	NO
WS102	15/08/24	120	0.0	3.6	16.9	0.9	0.4	1013	Dry	0.000	0.032	CS1	CS1	NO	NO	NO
WS102	15/08/24	180	0.0	3.1	17.3	0.9	0.4	1013	Dry	0.000	0.028	CS1	CS1	NO	NO	NO
WS103	15/08/24	0	0.0	1.1	20.5	0.7	0.6	1013	Dry	0.000	0.008	CS1	CS1	NO	NO	NO
WS103	15/08/24	10	0.0	3.7	18.5	0.7	0.6	1013	Dry	0.000	0.026	CS1	CS1	NO	NO	NO
WS103	15/08/24	20	0.0	3.9	18	0.7	0.6	1013	Dry	0.000	0.027	CS1	CS1	NO	NO	NO
WS103	15/08/24	30	0.0	4.3	17.5	0.7	0.6	1013	Dry	0.000	0.030	CS1	CS1	NO	NO	NO
WS103	15/08/24	60	0.0	4.5	17.2	0.7	0.6	1013	Dry	0.000	0.032	CS1	CS1	NO	NO	NO
WS103	15/08/24	90	0.0	4.5	17.2	0.7	0.6	1013	Dry	0.000	0.032	CS1	CS1	NO	NO	NO
WS103	15/08/24	120	0.0	4.2	17.4	0.7	0.6	1013	Dry	0.000	0.029	CS1	CS1	NO	NO	NO
WS103	15/08/24	180	0.0	4.1	17.6	0.7	0.6	1013	Dry	0.000	0.029	CS1	CS1	NO	NO	NO
WS105	15/08/24	0	0.0	3.1	18.3	0.9	0.7	1013	2.14	0.000	0.028	CS1	CS1	NO	NO	NO
WS105	15/08/24	10	0.0	4.2	18.3	0.9	0.7	1013	2.14	0.000	0.038	CS1	CS1	NO	NO	NO
WS105	15/08/24	20	0.0	4.8	18.2	0.9	0.7	1013	2.14	0.000	0.043	CS1	CS1	NO	NO	NO
WS105	15/08/24	30	0.0	4.8	18.5	0.9	0.7	1013	2.14	0.000	0.043	CS1	CS1	NO	NO	NO
WS105	15/08/24	60	0.0	4.8	18.2	0.9	0.7	1013	2.14	0.000	0.043	CS1	CS1	NO	NO	NO
WS105	15/08/24	90	0.0	4.8	18.2	0.9	0.7	1013	2.14	0.000	0.043	CS1	CS1	NO	NO	NO
WS105	15/08/24	120	0.0	4.7	18.2	0.9	0.7	1013	2.14	0.000	0.042	CS1	CS1	NO	NO	NO
WS105	15/08/24	180	0.0	4.6	18.3	0.9	0.7	1013	2.14	0.000	0.041	CS1	CS1	NO	NO	NO
WS102	02/09/24	0	0.0	0.0	20.5	1.2	0.3	1006	Dry	0.000	0.000	CS1	CS1	NO	NO	NO
WS102	02/09/24	10	0.0	2.5	18.7	1.2	0.3	1006	Dry	0.000	0.030	CS1	CS1	NO	NO	NO
WS102	02/09/24	20	0.0	3.7	17.5	1.2	0.3	1006	Dry	0.000	0.044	CS1	CS1	NO	NO	NO
WS102	02/09/24	30	0.0	3.9	17.1	1.2	0.3	1006	Dry	0.000	0.047	CS1	CS1	NO	NO	NO
WS102	02/09/24	60	0.0	3.9	16.6	1.2	0.3	1006	Dry	0.000	0.047	CS1	CS1	NO	NO	NO
WS102	02/09/24	90	0.0	3.8	17.0	1.2	0.3	1006	Dry	0.000	0.046	CS1	CS1	NO	NO	NO
WS102	02/09/24	120	0.0	3.6	17.2	1.2	0.3	1006	Dry	0.000	0.043	CS1	CS1	NO	NO	NO
WS102	02/09/24	180	0.0	3.2	17.8	1.2	0.3	1006	Dry	0.000	0.038	CS1	CS1	NO	NO	NO
WS103	02/09/24	0	0.0	0.1	20.0	1.5	0.4	1005	Dry	0.000	0.002	CS1	CS1	NO	NO	NO
WS103	02/09/24	10	0.0	2.2	19.3	1.5	0.4	1005	Dry	0.000	0.033	CS1	CS1	NO	NO	NO
WS103	02/09/24	20	0.0	3.9	17.9	1.5	0.4	1005	Dry	0.000	0.059	CS1	CS1	NO	NO	NO

Project: HDN Primary school site, Boorley Green
Ref: GE22665
Client: NH Developments Limited



Location	Date	Time (sec)	CH ₄ (%)	CO ₂ (%)	O ₂ (%)	Flow (l/hr)	VOC (ppm)	Pressure (mb)	GWL (m bgl)	GSV/Qhgs		Characteristic Situation		CS1 Limiting Value Check		
										CH ₄	CO ₂	BS8485 & C665		Flow	CH ₄	CO ₂
												CH ₄	CO ₂			
WS103	02/09/24	30	0.0	4.1	17.5	1.5	0.4	1005	Dry	0.000	0.062	CS1	CS1	NO	NO	NO
WS103	02/09/24	60	0.0	4.2	17.4	1.5	0.4	1005	Dry	0.000	0.063	CS1	CS1	NO	NO	NO
WS103	02/09/24	90	0.0	4.0	17.5	1.5	0.4	1005	Dry	0.000	0.060	CS1	CS1	NO	NO	NO
WS103	02/09/24	120	0.0	4.0	17.6	1.5	0.4	1005	Dry	0.000	0.060	CS1	CS1	NO	NO	NO
WS103	02/09/24	180	0.0	3.5	18.1	1.5	0.4	1005	Dry	0.000	0.053	CS1	CS1	NO	NO	NO
WS105	02/09/24	0	0.0	0.2	20.6	1.3	55.8	1005	2.20	0.000	0.003	CS1	CS1	NO	NO	NO
WS105	02/09/24	10	0.0	2.1	20.1	1.3	55.8	1005	2.20	0.000	0.027	CS1	CS1	NO	NO	NO
WS105	02/09/24	20	0.0	3.9	19.1	1.3	55.8	1005	2.20	0.000	0.051	CS1	CS1	NO	NO	NO
WS105	02/09/24	30	0.0	4.4	19.0	1.3	55.8	1005	2.20	0.000	0.057	CS1	CS1	NO	NO	NO
WS105	02/09/24	60	0.0	4.2	18.5	1.3	55.8	1005	2.20	0.000	0.055	CS1	CS1	NO	NO	NO
WS105	02/09/24	90	0.0	3.9	20.1	1.3	55.8	1005	2.20	0.000	0.051	CS1	CS1	NO	NO	NO
WS105	02/09/24	120	0.0	3.9	18.7	1.3	55.8	1005	2.20	0.000	0.051	CS1	CS1	NO	NO	NO
WS105	02/09/24	180	0.0	3.5	18.8	1.3	55.8	1005	2.20	0.000	0.046	CS1	CS1	NO	NO	NO
WS102	16/09/24	0	0.0	0.0	20.3	1.1	0.3	1023	2.97	0.000	0.000	CS1	CS1	NO	NO	NO
WS102	16/09/24	10	0.0	3.8	12.2	1.1	0.3	1023	2.97	0.000	0.042	CS1	CS1	NO	NO	NO
WS102	16/09/24	20	0.3	4.7	15.3	1.1	0.3	1023	2.97	0.003	0.052	CS1	CS1	NO	NO	NO
WS102	16/09/24	30	0.0	4.7	17.4	1.1	0.3	1023	2.97	0.000	0.052	CS1	CS1	NO	NO	NO
WS102	16/09/24	60	0.0	4.3	15.1	1.1	0.3	1023	2.97	0.000	0.047	CS1	CS1	NO	NO	NO
WS102	16/09/24	90	0.0	5.6	15.6	1.1	0.3	1023	2.97	0.000	0.062	CS1	CS1	NO	NO	CO2>CS1 limit
WS102	16/09/24	120	0.0	4.5	15.1	1.1	0.3	1023	2.97	0.000	0.050	CS1	CS1	NO	NO	NO
WS102	16/09/24	180	0.0	4.4	16.3	1.1	0.3	1023	2.97	0.000	0.048	CS1	CS1	NO	NO	NO
WS103	16/09/24	0	0.0	0.6	19.2	1.0	0.5	1025	2.98	0.000	0.006	CS1	CS1	NO	NO	NO
WS103	16/09/24	10	0.0	5.1	16.6	1.0	0.5	1025	2.98	0.000	0.051	CS1	CS1	NO	NO	CO2>CS1 limit
WS103	16/09/24	20	0.0	4.5	16.0	1.0	0.5	1025	2.98	0.000	0.045	CS1	CS1	NO	NO	NO
WS103	16/09/24	30	0.0	4.4	15.3	1.0	0.5	1025	2.98	0.000	0.044	CS1	CS1	NO	NO	NO
WS103	16/09/24	60	0.0	4.2	16.9	1.0	0.5	1025	2.98	0.000	0.042	CS1	CS1	NO	NO	NO
WS103	16/09/24	90	0.0	4.5	15.9	1.0	0.5	1025	2.98	0.000	0.045	CS1	CS1	NO	NO	NO
WS103	16/09/24	120	0.0	4.4	15.9	1.0	0.5	1025	2.98	0.000	0.044	CS1	CS1	NO	NO	NO
WS103	16/09/24	180	0.0	4.3	16.0	1.0	0.5	1025	2.98	0.000	0.043	CS1	CS1	NO	NO	NO
WS105	16/09/24	0	0.0	0.1	20.4	1.0	0.3	1024	2.12	0.000	0.001	CS1	CS1	NO	NO	NO
WS105	16/09/24	10	0.0	2.0	18.0	1.0	0.3	1024	2.12	0.000	0.020	CS1	CS1	NO	NO	NO
WS105	16/09/24	20	0.0	4.0	17.8	1.0	0.3	1024	2.12	0.000	0.040	CS1	CS1	NO	NO	NO
WS105	16/09/24	30	0.0	4.1	17.7	1.0	0.3	1024	2.12	0.000	0.041	CS1	CS1	NO	NO	NO
WS105	16/09/24	60	0.0	4.1	17.7	1.0	0.3	1024	2.12	0.000	0.041	CS1	CS1	NO	NO	NO
WS105	16/09/24	90	0.0	4.3	17.7	1.0	0.3	1024	2.12	0.000	0.043	CS1	CS1	NO	NO	NO

Project: HDN Primary school site, Boorley Green
Ref: GE22665
Client: NH Developments Limited



Location	Date	Time (sec)	CH ₄ (%)	CO ₂ (%)	O ₂ (%)	Flow (l/hr)	VOC (ppm)	Pressure (mb)	GWL (m bgl)	GSV/Qhgs		Characteristic Situation		CS1 Limiting Value Check		
										CH ₄	CO ₂	BS8485 & C665		Flow	CH ₄	CO ₂
												CH ₄	CO ₂			
WS105	16/09/24	120	0.0	3.7	16.5	1.0	0.3	1024	2.12	0.000	0.037	CS1	CS1	NO	NO	NO
WS105	16/09/24	180	0.0	3.9	18.0	1.0	0.3	1024	2.12	0.000	0.039	CS1	CS1	NO	NO	NO
WS102	30/09/24	0	0.0	0.0	19.7	0.9	0.1	1001	2.69	0.000	0.000	CS1	CS1	NO	NO	NO
WS102	30/09/24	10	0.0	0.2	20.1	0.9	0.1	1001	2.69	0.000	0.002	CS1	CS1	NO	NO	NO
WS102	30/09/24	20	0.0	6.3	13.5	0.9	0.1	1001	2.69	0.000	0.057	CS1	CS1	NO	NO	CO2>CS1 limit
WS102	30/09/24	30	0.0	5.2	12.5	0.9	0.1	1001	2.69	0.000	0.047	CS1	CS1	NO	NO	CO2>CS1 limit
WS102	30/09/24	60	0.0	5.9	11.9	0.9	0.1	1001	2.69	0.000	0.053	CS1	CS1	NO	NO	CO2>CS1 limit
WS102	30/09/24	90	0.0	5.2	11.8	0.9	0.1	1001	2.69	0.000	0.047	CS1	CS1	NO	NO	CO2>CS1 limit
WS102	30/09/24	120	1.1	4.5	11.7	0.9	0.1	1001	2.69	0.010	0.041	CS1	CS1	NO	CH4>CS1 limit	NO
WS102	30/09/24	180	0.0	5.1	11.3	0.9	0.1	1001	2.69	0.000	0.046	CS1	CS1	NO	NO	CO2>CS1 limit
WS103	30/09/24	0	0.0	0.2	19.8	1.2	0.3	999	2.05	0.000	0.002	CS1	CS1	NO	NO	NO
WS103	30/09/24	10	0.0	2.6	14.9	1.2	0.3	999	2.05	0.000	0.031	CS1	CS1	NO	NO	NO
WS103	30/09/24	20	0.0	4.5	12.4	1.2	0.3	999	2.05	0.000	0.054	CS1	CS1	NO	NO	NO
WS103	30/09/24	30	0.0	5.7	10.0	1.2	0.3	999	2.05	0.000	0.068	CS1	CS1	NO	NO	CO2>CS1 limit
WS103	30/09/24	60	0.0	4.9	10.0	1.2	0.3	999	2.05	0.000	0.059	CS1	CS1	NO	NO	NO
WS103	30/09/24	90	0.0	4.8	10.2	1.2	0.3	999	2.05	0.000	0.058	CS1	CS1	NO	NO	NO
WS103	30/09/24	120	0.0	5.1	9.9	1.2	0.3	999	2.05	0.000	0.061	CS1	CS1	NO	NO	CO2>CS1 limit
WS103	30/09/24	180	0.0	5.7	9.3	1.2	0.3	999	2.05	0.000	0.068	CS1	CS1	NO	NO	CO2>CS1 limit
WS105	30/09/24	0	0.0	0.1	19.7	0.9	0.2	999	1.69	0.000	0.001	CS1	CS1	NO	NO	NO
WS105	30/09/24	10	0.0	3.3	16.4	0.9	0.2	999	1.69	0.000	0.030	CS1	CS1	NO	NO	NO
WS105	30/09/24	20	0.0	4.1	16.1	0.9	0.2	999	1.69	0.000	0.037	CS1	CS1	NO	NO	NO
WS105	30/09/24	30	0.0	4.3	16.1	0.9	0.2	999	1.69	0.000	0.039	CS1	CS1	NO	NO	NO
WS105	30/09/24	60	0.0	4.3	15.9	0.9	0.2	999	1.69	0.000	0.039	CS1	CS1	NO	NO	NO
WS105	30/09/24	90	0.0	4.3	15.8	0.9	0.2	999	1.69	0.000	0.039	CS1	CS1	NO	NO	NO
WS105	30/09/24	120	0.0	4.3	15.8	0.9	0.2	999	1.69	0.000	0.039	CS1	CS1	NO	NO	NO
WS105	30/09/24	180	0.0	4.3	15.8	0.9	0.2	999	1.69	0.000	0.039	CS1	CS1	NO	NO	NO

Project: HDN Primary school site, Boorley Green
Ref: GE22665
Client: NH Developments Limited



Max & Min value check	CH ₄ (%)	CO ₂ (%)	O ₂ (%)	Flow (l/hr)	VOC (ppm)	Pressure (mb)	GWL (m bgl)	GSV/Qhgs		Characteristic Situation		CS1 Limiting Value Check		
								CH ₄	CO ₂	BS8485 & C665		Flow	CH ₄	CO ₂
										CH ₄	CO ₂			
Max values	1.1	6.3	20.6	1.5	55.8	1025.0	3.0	0.017	0.095	CS1	CS2	NO	CH4>CS1 limit	NO
Min Vaues	0.0	0.0	9.3	0.7	0.1	999.0	1.7	0.000	0.000	CS1	CS1	NO	NO	NO
BH Flow LoD check	1.1	6.3	20.6	0.1	-	-	-	0.001	0.006	CS1	CS1	NO	CH4>CS1 limit	CO2>CS1 limit



APPENDIX F

Site Photographs





Plate 1 – View from North facing South



Plate 2 – View from South facing North



Plate 3 – View from East facing West



Plate 4 – View from the West facing East



Plate 5 – Site heavily vegetated. Pathway was trimmed back for access. Looking NW.



Plate 6 – View of the gated entrance in the south-eastern corner of the site. Looking west.



Plate 7 – Young small tree located in the centre of site



Plate 8 – Two young small trees together in the centre of site.



Plate 9 – A small young tree southeast of site.



Plate 10 – A small overgrown stockpile east of site with school visible in background.



Plate 11 – A power substation at site entrance. Visible power lines going underground.



Plate 12 – A tap and pipework being installed on the day of site visit located at the site entrance.