



Report
Title:

Geo-Environmental Site Investigation

Project
Name:

Winchester Road, Hedge End



Report Reference:

BRD2924-OR1-C

Date:

September 2017

REPORT CONTROL SHEET

REPORT TITLE	GEO-ENVIRONMENTAL SITE INVESTIGATION
PROJECT	WINCHESTER ROAD, HEDGE END
CLIENT	GLEESON STRATEGIC LAND AND MILLER HOMES

REPORT REFERENCE	ISSUE DETAIL	DATE	PREPARED BY	CHECKED BY
BRD2924-OR1-A	Interim Issue - Gas monitoring visits still ongoing	01/09/2017	A Leon	B Devonshire
BRD2924-OR1-B	Final Issue - Incorporating additional gas monitoring visits	21/09/2017	M Wood	J Brockwell
BRD2924-OR1-C	Revision including appendices missed from revision B.	21/09/2017	M Wood	J Brockwell

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REPORT LAYOUT

This report is divided into the following four sections: Summary Report, Technical Report, Supporting Information and Appendices.

SUMMARY REPORT

This expanded executive summary provides the main findings of the work undertaken in brief non-technical language. This section provides an overview of the key outcomes for the benefit of non-specialists and concludes with the main recommendations. This section should only be relied upon in the context of the whole report and the Technical Report should be referred to with respect to any design decisions.

TECHNICAL REPORT

The main report section is intended to provide the technical detail of the investigation and is intended to provide the level of information required by current guidance documents and practice. The Technical Report is written in a language that, in part, assumes knowledge of subject matter so that it can be written in as concise a form as possible. Its intended audience is peers, regulators and other professionals in related disciplines.

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SUPPORTING INFORMATION

This section of the report provides background details of a generic nature together with specific technical approaches adopted by BRD and details of the guidance documents that are commonly referenced in the report. The section also includes explanations of technical terms to assist non-specialist readers in understanding the Technical Report. It should be noted that not all the information within this section is necessarily applicable to this specific report.

APPENDICES

The final section of the report presents the factual data collected and employed as part of the investigation.

APPENDIX 1 SITE PLANS & PHOTOGRAPHS

Site Location Plan	Ref. BRD2924-OP3-A
Walkover Photographs	Ref. BRD2924-OP4-A
Revised Conceptual Site Model	Ref. BRD2924-OP5-B
Proposed Development Layout	'Boorley Gardens Land use Plan', Terence O'Rourke, ref. 143405/LUB/003 Rev. F & date: December 2014
Exploratory Hole Location Plan	Ref. BRD2924-OD1-A

APPENDIX 2 EXPLORATORY HOLE & MONITORING RECORDS

Logs of trial pits	Ref. TP01-TP25 & SA01-SA06
Photographic records of trial pits and soakage tests	Ref. BRD2924-OP2-A
Logs of boreholes	Ref. WS01 - WS15
BRE365 soakage test records.	10 x A4 pages
TRL Dynamic Cone Penetrometer	Ref. CBR01 - CBR06
Gas and Groundwater monitoring records	6 x A4 pages

APPENDIX 3 LABORATORY TEST RESULTS

QTS report 17-62273, 1762339 & 17-63665	35 x A4 pages
SPT report 31515	21 x A4 pages

SUMMARY REPORT - GENERAL INFORMATION

SUBJECT	COMMENTS
CURRENT USE & DESCRIPTION	The site currently comprises several agricultural fields together with a cattle farm named as 'Park Farm'.
PROPOSED USE	It is proposed that the site will be developed with residential properties a primary school and open space leisure areas.
HISTORICAL SUMMARY	The site has remained undeveloped and recorded as agricultural lands since first available historical map of 1868. It is not until 1962-1963 when the first buildings of 'Park Farm' are shown. The railway line recorded along the eastern and southern boundaries of the site is shown since the first available historical map of 1868.
PUBLISHED GEOLOGY	The site is shown to be devoid of superficial deposits but Alluvium deposits along the northern boundary of the site are identified. The shallowest bedrock unit is shown to be both the Wittering Formation and the Earnley Sand Formation which in turns are underlain by the London Clay Formation.
ACTUAL GROUND CONDITIONS	The investigation has proved a site wide cover of Topsoil. In addition, localised shallow Made Ground was encountered in the farm yard of the 'Park Farm' area. The bedrock deposits of Wittering Formation were proved beneath the whole of the site generally as a firm. The deepest London Clay Formation was only recorded in the northern area of the site and generally over 3.00m depth.
HYDROGEOLOGY	The underlying bedrock geology is designated a Secondary A Aquifer. The site is not located within a groundwater Source Protection Zone.
HYDROLOGY	The closest water feature to the site is a tertiary river, Mooregreen stream, which runs along the northern site's boundary in a west to east direction and ends into the Ford Lake river which in turns is a right-bank tributary of the Humble River. The site is not in an area indicated to be at risk of flooding.
PREVIOUS GROUND REPORTS	BRD is not aware of any previous ground investigations having been conducted at the site.

SUMMARY REPORT - GEOTECHNICAL

SUBJECT	COMMENTS
EXCAVATIONS	It should be possible to forward excavations employing normal equipment. The use of hydraulic breaking equipment will be required for forwarding some excavations at the site. Limited groundwater control in the form of pumping from sumps is likely to be required. However, for deeper trench fill foundations and in areas where shallow groundwater is encountered specialist groundwater control, such as well pointing, will likely be required. It is unlikely that requirements of the Party Wall Act will apply to the development.
SLOPE STABILITY	The slopes across the site are relatively shallow and show no obvious signs of instability. Any change in levels required by the development should be cut to a shallow slope or should be supported by appropriately designed and constructed retaining walls.
SUB-SURFACE CONCRETE	<u>Wittering Formation above 2.50m depth:</u> Design Sulphate Class of DS-1 and Aggressive Chemical Environment for Concrete class of AC-2z applies. <u>Wittering Formation below 2.50m depth and London Clay Formation:</u> Design Sulphate Class of DS-4 and Aggressive Chemical Environment for Concrete class of AC-3s applies.
SOAKAWAYS	Site is not suitable for surface water disposal to soakaways.
PAVEMENT DESIGN	A preliminary design California Bearing Ratio (CBR) of 3% has been recommended.
FOUNDATIONS	
LIKELY FOUNDATION TYPE	Generally shallow strip or deeper trench fill footings bearing upon the clay deposits of the Wittering Formation. Some plots may require a 'dig and pour' approach. Piled foundations may be required within influence of existing boundary trees, where groundwater proves too problematical and for the primary school (if very high column loads).
VOLUME CHANGE POTENTIAL	High i.e. significant swelling or shrinking with moisture content changes.
ESTIMATED FOUNDATION DEPTHS	The minimum footing depth required is 1.00m, but 1.50m where required to allow for restricted new tree planting. Pile lengths to be determined by specialist piling contractor.
HEAVE PROTECTION	Will be required for a limited number of plots located close to existing trees.

SUMMARY REPORT - CONTAMINATION ISSUES

SUBJECT	COMMENTS
SOIL RISKS TO HUMAN HEALTH	A hotspot of contamination likely related to the presence of tarmac fragments in the soil has been identified in the farm yard of the 'Park Farm' area located to the eastern boundary of the site.
LANDFILL GAS	Elevated concentrations of carbon dioxide have been recorded in the 'Park Farm' area of the site, albeit that these are considered to be associated with natural soils with low organic content. Elevated concentrations of landfill gases were not recorded in the boreholes across the rest of the site. This area of the site falls into the NHBC Amber 1 requirements and accordingly gas protection measures will be required. The extent of which plots requiring gas protection measures will need to be determined following further investigation and monitoring in the 'Park Farm' area of the site.
RADON GAS	In an area where no radon protection measure in new dwellings.
RISKS TO THE WATER ENVIRONMENT	No unacceptable contamination risks to water resources have been identified by this investigation.
RISKS TO BUILDING MATERIALS AND SERVICES	No unacceptable contamination risks to building materials and services have been identified by this investigation.
REMEDIATION	It is considered that the identified asbestos and hydrocarbon contamination in the farm yard at eastern boundary of the site, identified as 'Park Farm' will require remediation. This will involve re-location of the soils or removal from site. It is possible that further contamination may be found in this area as a result of the recommended additional investigation. The vast majority of the site is free from any contamination issues and will not require remedial works.
ASBESTOS	Asbestos containing materials have been observed in the near surface Made Ground soils in WS05 and WS06. The soils pose a risk to future residents as well as workers during the development of the site.

WASTE SOIL DISPOSAL	It is considered that the Topsoil at the site is unlikely to constitute 'inert waste' due to its high organic matter content. It is considered that the natural sub-soils disposed of from the site would be classified as 'inert waste'. It is considered that the hydrocarbon contaminated soils containing tarmac disposed of from the hotspot present at the eastern boundary of the site would be classified as 'hazardous waste'. The Made Ground deposits containing asbestos and also only encountered in the eastern boundary of the site, 'Park Farm' area, would be classed as 'non-hazardous waste'.
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SUMMARY REPORT - KEY RECOMMENDATIONS

RECOMMENDATIONS

Geotechnical:

A tree survey should be undertaken as this information will be required for detailed foundation design. This survey with topographic survey data should be undertaken prior to any site clearance to accurately record the location of any previously felled trees and existing trees both within the site and close to the site boundaries. The survey should record the trunk location, height and species of the trees.

The influence of trees on required foundation depth should be considered within the design of the development layout. Ideally structures should be moved further away from existing trees so as to minimise the impact on required foundation depth/type.

It is considered that viability of strip or trench fill foundations will be dependent upon actual groundwater levels present at the time of construction. As a consequence of this, it is recommended that foundation construction generally occurs in the summer months when groundwater is likely to be at its deepest.

The density of exploratory points is relatively low in some areas due to the access available at the time of this investigation. Whilst no significant variation in ground conditions is anticipated, it would be prudent to undertake additional ground investigation to increase the density of exploratory points. This would best be undertaken once the development layout has become more detailed.

In order to confirm deeper ground conditions for pile design further ground investigation comprising deep cable percussive boreholes is recommended. It is suggested that 4No. boreholes are drilled to depths of 18m. Monitoring wells should be included in the boreholes and at least one post work monitoring visit should be undertaken to record groundwater levels. In-situ Standard Penetration Tests should be conducted during forwarding of the boreholes and collected soil samples submitted for appropriate geotechnical laboratory testing.

It is recommended that longer term groundwater monitoring is undertaken to assess the variation in the water table with seasonal or short term weather effects.

Contamination:

It is considered that further exploratory points are required in the 'Park Farm' area in order to delineate the extent of the identified hydrocarbon and asbestos contamination.

As no exploratory holes were undertaken beneath the buildings footprint in the 'Park Farm' area, attendance by a Geo-Environmental consultant during the removal of existing foundations as part of the demolition should be considered. Inspection of the subsequent excavations and the undertaking of a couple of trial pits would address the limitations in the exploratory point layout.

Further investigation and gas monitoring is recommended in the 'Park Farm' area of the site to determine the extent of the elevated concentrations of CO₂.

1. INTRODUCTION TO TECHNICAL REPORT

1.1. CONTRACT DETAILS

CLIENT	'Gleeson Strategic Land Ltd' and 'Miller Homes Ltd', trading as Gleeson Strategic Land and Miller Homes.
SITE	Land situated to the northern outskirts of the village of Hedge End.
CLIENT'S ADVISORS	BRD Environmental Limited (BRD) has been commissioned directly by the Client.
REPORT CONTEXT	It is understood that the Client intends to market the site and develop it mainly for residential housing.
REPORT TYPE	Geo-environmental site investigation (i.e. combined geotechnical ground investigation and Phase 2 contamination assessment).
REPORT OBJECTIVES	The primary purpose of the report is to present the findings of a ground investigation and present both a geotechnical and contamination risk assessment of the conditions revealed. The site has been the subject of a desk study referenced as follows: • "Land West of Boorley Green, Hedge End, Hampshire - Desk Study Report", Opus International Consultants (UK) Ltd, ref. E-E1589/LJE/CDS, dated November 2014.

1.2. SCOPE OF WORKS

The agreed scope of works was:

- Review of existing Opus desk study report for the site.
- Mobilisation to site and production of health and safety documentation.
- Three days of windowless sampling using a percussive drilling rig to provide approximately 15No. boreholes to a nominal depth of 3m-5m, ground conditions permitting. Undertake Standard Penetration Tests (SPT) at 1m intervals.
- Installation of a 4m depth combined gas and groundwater monitoring well (nominal 50mm diameter) into 10No. boreholes. Installations will be finished with a flush fitting metal stopcock cover.
- Three days of trial pitting using a mechanical excavator to provide approximately 26-27No. trial pits to a nominal depth of 3m, ground conditions permitting.
- Undertake 6No. in-situ TRL dynamic cone penetrometer tests across the site to a depth of 1.0m bgl, ground conditions permitting, to assist in determining equivalent CBR values for the surface soils.
- All exploratory points will be logged and sampled in general accordance with BS5930:2015 by supervising Geo-Environmental Consultant.

- In-situ geotechnical testing of any fine soils using a Hand Shear Vane and/or Pocket Penetrometer.
- Determination of the location of exploratory points by tape measurements or the use of a handheld recreational GPS unit.
- Geo-Environmental Technician to undertake a total of 6No. combined gas, vapour and groundwater monitoring visits. For gas, the determination of oxygen, carbon dioxide, methane, hydrogen sulphide and carbon monoxide concentrations, together with atmospheric pressure and flow rates, using portable equipment. For vapours, determination of the concentration of volatile organic compounds by photo ionisation detector. For groundwater, the determination of groundwater levels.
- Chemical testing of soil samples with the budget based on the following testing schedule:
 - 40No. Metals Suite - As, Cd, Cr, CrVI, Hg, Pb, Se, Cu, Ni and Zn.
 - 40No. Inorganics Suite - water soluble sulphate, pH, organic matter.
 - 40No. Speciated Polycyclic Aromatic Hydrocarbons (PAH).
 - 10No. Banded aliphatic/aromatic Total Petroleum Hydrocarbons (TPH).
 - 10No. Benzene, Toluene, Ethylbenzene, Xylene (BTEX) and Methyl Tertiary Butyl Ether (MTBE) compounds.
 - 10No. Asbestos screen and quantification (if present).
 - 5No. Semi-Volatile Organic Compounds (SVOC) suite.
 - 5No. Pesticide screen.
- Chemical testing of 2No. soil samples for Waste Acceptance Criteria (WAC) to assist in establishing the waste classification of the soil for disposal purposes.
- Geotechnical testing as appropriate to the nature of the ground conditions encountered, but the budget is based on the following testing schedule:
 - 12No. Moisture content.
 - 12No. Plasticity indices.
 - 4No. Particle size distribution by wet sieve and follow on hydrometer.
 - 10No. pH and water soluble sulphate analysis.
 - 10No. Total sulphate and sulphur analysis.
- Provision of a combined factual and interpretative investigation report. Factual findings to include all exploratory point records, monitoring and test results. Interpretative reporting to include a summary of information from desk study research, a Generic Quantitative Contamination Risk Assessment (GQRA), waste classification and a Geotechnical Assessment providing comments on pavement design, concrete classification, soakaway feasibility, foundation design recommendations. Report to be supplied in an electronic Adobe pdf format and forwarded on CD-ROM.

Once the main phase of investigation has confirmed the most viable areas for soakaways, then the following scope of works for undertaking BRE365 compliant soakage tests would be undertaken as a follow-on investigation:

- Delivery of 20mm granular material to site for backfilling the pits and supply of 75-100mm diameter perforated pipes for the inspection well in each pit.
- Performance of soakage tests based upon BRE Digest 365 at 6No. mechanically excavated trial pit locations. Price includes for mechanical excavator for an additional day.

- All exploratory points will be logged and sampled in general accordance with BS5930:2015 by supervising Geo-Environmental Consultant.
- Supply of water to site via a water tanker/bowser unit on three consecutive days for the repeat filling of each trial pit. A Geo-Environmental Technician will attend site in order to monitor the soakage tests. The first gas/groundwater monitoring visit will be undertaken at the same time as the soakage works.
- Removal of pipework at the end of the third day and reinstatement of trial pit surfacing. The surplus soil from excavating the pits will be neatly stockpiled on site. We have not allowed for any disposal of this soil.
- Incorporate all additional exploratory point records and test results in to existing investigation report together with the interpretation of the soakage tests and the potential infiltration rates attainable for the site.

1.3. REPORT LIMITATIONS

Any site boundary lines depicted on plans included within this report are approximate only and do not imply legal ownership of land. Any observations of tree species, asbestos containing materials within structures or invasive weeds, such as Japanese Knotweed, does not constitute a formal survey of such features. The identification of such features is therefore tentative only. The report does not consider whether sensitive ecology or archaeology is present as these require consideration by professionals specialising in these matters. It should be recognised that the collection of desk study information may not be exhaustive and that other information pertinent to the site may be available.

The recommendations, interpretations and conclusions of this report are based solely on the ground conditions found at the exploratory holes. Due to the variability in the nature of ground, conditions between exploratory holes can only be interpreted and not defined. The description of the site and the ground conditions is accurate only for the dates of the field works. In particular, groundwater levels can vary due to seasonal and other effects.

The assessment and interpretation of contamination risks is based on the scope of works agreed with the Client together with the budgetary and programme constraints imposed. Further investigation, analysis and assessment of contamination may be required by regulators or other third parties with an interest in the site. An ecological risk assessment of contaminated soils is beyond the scope of this report. This report is concerned with assessing those contamination risks which apply to the future use of the site through the proposed development as part of the planning regime. The assessment does not consider the risk to current site users or continued future use of the site in its current state. If development of the site should occur that differs from that proposed, then the findings of the contamination assessment would need to be re-evaluated.

At the time of writing, detailed information on the proposed structure, such as detailed layout, loadings and serviceability limits, was not available. Accordingly, where geotechnical design advice is provided it is on the prescriptive basis allowed for by Eurocode 7: employing conventional and conservative design rules. The scope of this investigation excludes a formal slope stability study and any observations made regarding slopes are for information only.

2. SITE CHARACTERISTICS

2.1. SITE SETTING

SITE ADDRESS AND POST CODE	Winchester Road, Botley, Southampton, Hampshire, SO32 2BX.
NATIONAL GRID REFERENCE	Approximately centred at: 450266E, 114818N.

2.2. SITE SUMMARY

SUBJECT	COMMENTS
CURRENT SITE DESCRIPTION	The site currently comprises several agricultural fields whose boundaries are defined by a mixed of hedges, wooden post and barbed wire and ditches. Considering the whole site, then it has an elongated triangular shape and occupies about 46Ha in size. Its eastern boundary is defined by the site access road Winchester road, the western boundary is defined by the railway line and the northern boundary is defined by a ditch. There is a main water drainage ditch which divides the whole site approximately in two halves, the north and southern fields. The northern area comprises mainly cattle fields and a paddock from the 'Park Farm' which is located to the eastern boundary and a triangular in shape field located to the western corner of the site. In general, the northern fields gently slope down to the south eastern boundary. The southern area comprises the land located next to the railway line which is roughly flat and agricultural fields which some of them had maize crops at the time of the ground investigation. This area has recorded with a strip of stockpiled manure. The southern end of this area is formed by a ridge whose flanks gently slope down to the north and south. The hedges delineating boundaries of the site fields generally comprise high water demand trees such as Oaks and Hawthorn. Another type of species such as Ash or Silver Birch trees were also recorded. Park Farm which is an active cow farm, is located to the eastern boundary of the northern fields and comprises several farm buildings most of them used as shelters for the cows and to store hale bales but also to accommodate the different agricultural tools, trailers and tractors. Most of the buildings have been recorded with asbestos cement roof. The farmer house is located to the entrance of the site and a mixed of tarmac and concrete road give access to the site. Concrete surface has also been recorded across the farm yard.
SURROUNDING LAND USE	The surrounding land use is predominantly agricultural and residential together with a hotel opposite to the access road which also includes a golf course.
PROPOSED DEVELOPMENT	It is proposed that the site will be developed with residential properties, a primary school and open space leisure areas.

HISTORICAL SUMMARY	From the previous desk study report undertaken by Opus, the following summary of the site's history is presented. The site has remained undeveloped and recorded as agricultural lands since first available historical map of 1868. It is not until 1962-1963 when the first buildings of 'Park Farm' are shown. From then, building distribution has been changing to show the current site farm distribution. The railway line recorded along the eastern and southern boundaries of the site is shown since the first available historical map of 1868.
PUBLISHED GEOLOGY	The site is shown to be underlain directly by bedrock of either the Wittering Formation and the Earnley Sands Formation. The latter is only present in the southern fields.
RADON	Radon protection measures are not required in new dwellings.
HYDROGEOLOGY	The underlying bedrock geology is designated a Secondary A Aquifer. The site is not located within a groundwater Source Protection Zone.
HYDROLOGY	The closest water feature to the site is a tertiary river, Mooregreen stream, which runs along the northern site's boundary in a west to east direction and ends into the Ford Lake river which in turns is a right-bank tributary of the Humble River. The site is not in an area indicated to be at risk of flooding. However, the northern boundary is designated as a risk of flooding area.

2.3. PREVIOUS INVESTIGATIONS

BRD is unaware of any previous ground investigations having been conducted at the site. However, the site has been the subject of geo-environmental desk study research by Opus which has been facilitated and referenced as follows:

- "Land West of Boorley Green, Hedge End, Hampshire - Desk Study Report", Opus International Consultants (UK) Ltd, ref. E-E1589/LJE/CDS, dated November 2014.

This current report should be read in conjunction with the previous desk study report.

2.4. PRELIMINARY ASSESSMENTS

The following information has been recorded from the previous Desk Study report undertaken by Opus in November 2014.

PRELIMINARY CONTAMINATION RISK ASSESSMENT

Based upon the data collected to date the primary potential for contamination at this site arises from the storage of fuel on site and the potential storage and use of agrochemicals on site. Primary receptors are considered to be construction workers, future site residents and potentially local controlled waters including groundwater and surface water.

3. GROUND INVESTIGATION

3.1. INVESTIGATION DESIGN

METHODOLOGY	A combination of trial pits and windowless sampling boreholes were considered to be the most appropriate methods of investigation at the site. The trial pits expose more soils which provides a more reliable record of the ground conditions and allowed soakage tests to be undertaken. The windowless sampling boreholes provided in-situ density tests of the soils and allowed the installation of groundwater monitoring standpipes. Both the trial pits and windowless samples boreholes provided a sufficient number of soil samples to be tested for contamination and geotechnical assessment purposes.	
DATES OF SITE WORKS	The main field works were undertaken between 24th and 26th July 2017. Monitoring visits were undertaken on 8th, 17th and 23rd August, 1st, 7th and 14th September 2017.	
CONSTRAINTS TO EXPLORATORY HOLE LAYOUT	As an occupied site, the site works were distributed in those fields where animals were no present and also accommodated in to those areas devoid of crops. Site works in the area of the railway line, western corner of the site, were prevented by a protecting fence and then works were accommodated at the base of the railway embankment. It is considered sufficient number of exploratory points have still been completed for the current investigation purpose.	
EXPLORATORY HOLE SPACING	Approximately 100m grid.	
LAYOUT RATIONALE	SOURCE / FEATURE	EXPLORATORY HOLE
CONTAMINATION SOURCES TARGETED	General site coverage targeting the near surface soils.	TP01 to TP25 and WS01 to WS15.
GROUND FEATURES TARGETED	General site coverage.	All exploratory points.
	Soakage tests.	SA01 to SA06.
	Pavement design.	CBR01 to CBR06.
CONTAMINATION SAMPLING PLAN	Based on the proposed end use, the sampling and analysis plan is more positively biased towards near surface samples as these represent the soils most likely to be available to future site users. The analysis is more biased towards the Made Ground samples as this stratum represents the soils most likely to be contaminated.	
ANALYSIS PLAN	Given the site's history as agricultural fields and farming use BRD has scheduled a suite of typically occurring contaminants.	

3.2. BRD FIELDWORK

TRIAL PITS	
REFERENCES	TP01 to TP25.
DEPTH RANGE	From 2.20m to 3.00m.
EXCAVATOR	JCB 3CX style wheeled backactor.
BACKFILL	All the trial pits were backfilled with arisings upon completion and compacted with rams of the excavator bucket.

SOAKAGE TESTS	
REFERENCES	SA01 to SA06.
DEPTH RANGE	From 1.90m to 3.90m.
EXCAVATOR	JCB 3CX style wheeled backactor.
BACKFILL	Soakage tests were filled with 20mm gravel surrounding a monitoring well to allow for soakage testing. The remaining pit was backfilled with arisings following completion of the soakage tests and as much of the monitoring pipe was removed as possible. Soakage test SA03 was located as the client requested in the area where the future water treatment plant will be placed. This pit was excavated to a depth of 3.90m due to both the maximum reach of the excavator and presence of groundwater.

WINDOWLESS SAMPLING BOREHOLES	
REFERENCES	WS01 to WS15.
DEPTH RANGE	From 4.45m to 5.45m.
RIG TYPE	Premier Drilling Rig.
INSTALLATION / BACKFILL	Boreholes WS02, WS04, WS10, WS13 and WS14 were backfilled with arisings only. Boreholes WS01, WS03, WS05, WS06, WS07 to WS09, WS11, WS12 and WS15 had monitoring wells installed. These comprised 50mm nominal diameter standpipes fitted with a gas tap finished with a raised metal cover. The slotted response length of the well is shown on the individual logs. Bentonite seals are also indicated on the logs. The filter medium used was pea gravel.

TRL DYNAMIC CONE PENETROMETER	
REFERENCES	CBR01 to CBR06.
DEPTH RANGE	From 0.97m to 0.99m.
METHODOLOGY	TRL DCP

MONITORING	
TYPE	Ground gases. Vapour. Groundwater monitoring.
DATES	8 th August, 17 th August, 23 rd August, 1 st September, 7 th September and 14 th September 2017.

3.3. LABORATORY TESTING

GEOTECHNICAL TESTING	
The soil samples for geotechnical testing were forwarded to the laboratory of Soil Property Testing Ltd with pH and sulphate analysis undertaken at the laboratory of QTS Environmental Ltd. The geotechnical testing suite is detailed below. The UKAS accreditation of the individual test methods is shown on the laboratory test report included in the Appendices.	
TEST	NUMBER OF SAMPLES TESTED
Moisture content	12
Liquid and plastic limits	12
Particle size distribution by wet sieve and hydrometer	1
Particle size distribution by hydrometer including pre-sieve	3
pH and Water soluble Sulphate	39
Total Sulphur and Sulphate	10

SOIL CHEMICAL TESTING	
The soil samples for contamination and/or chemical geotechnical testing were forwarded to the laboratory of QTS Environmental Ltd and the testing suite is detailed below. The UKAS or MCERTS accreditation of the individual test methods is shown on the laboratory test report included in the Appendices.	
SOIL TESTS	NUMBER OF SAMPLES TESTED
Arsenic, Cadmium, Chromium, Chromium VI, Copper, Lead, Mercury, Nickel, Selenium, Zinc	39
Speciated Polycyclic Aromatic Hydrocarbons (PAH)	39
Total Petroleum Hydrocarbons (TPH) with full carbon banding and aliphatic/aromatic split	9
Benzene, Toluene, Ethylbenzene and Xylenes (BTEX) plus Methyl Tert Butyl Ether (MTBE)	9
Organic Matter	39
Fibrous Material Screen (for Asbestos)	2
Asbestos Identification	10
Semi-Volatile Organic Compounds (SVOCs)	4
Organochlorine Pesticides	5
Waste Acceptance Criteria (WAC) testing	2

4. GROUND CONDITIONS

4.1. OVERVIEW

The ground conditions encountered are the same as suggested by the published geology maps. The site is shown devoid of superficial deposits and directly recorded with the bedrock deposits of the Wittering Formation and the Earnley Sand Formation.

Underneath a consistent superficial Topsoil layer the Wittering Formation has been recorded as firm to stiff clay-rich deposits with variable content in sandy partings and/or thin sandy intercalated beds which form sequences of thin beds of clay and sand deposits. In the southern fields the presence of sand and silt beds with metric thickness is more frequent. This distribution was also observed to the northern most field.

Variable gravel content has been recorded to the top of the Wittering Formation being interpreted as a weathered layer recorded up to 1.20m to 2.40m depth.

Variable colours have been identified in these sediments, from orangey brown mottled grey and/or green to orangey brown. Pink colours have been recorded in few holes in the centre area of the site. At depth, the Wittering Formation has been recorded with purple and bluish grey colours and recovered with gravel sized lithorelicts or excavated as gravel sized fragments.

Soft consistency has been recorded in WS08 and due to its location near a ditch it is considered that the sediments in that area are influenced by the adjacent water course.

In the southern fields it is likely that the Earnley Sand Formation is present, this is supported by the presence of more sandy-rich deposits and the published geology map. However, it has been recorded with the same geotechnical characteristics as the Wittering Formation and so both units have been treated as a single stratum due to their similarity in hand sample and the difficulty to make any distinction by hand sample.

London Clay was only recorded in the northern fields at depth and was recorded as stiff grey clay.

Seepages and groundwater levels were recorded across the site at variable depths but not in every exploratory hole and generally recorded in the Wittering Formation. For those tests recorded nearby the drains which define site fields boundaries shallow groundwater levels were recorded (i.e. soakage tests).

Details of the various stratigraphic units are given in the following sections.

4.2. ARTIFICIAL GROUND

SURFACE HARDSTANDING	Not encountered in exploratory points.
BURIED STRUCTURES	Not encountered in exploratory points.
BURIED SERVICES	Not encountered in exploratory points.

MADE GROUND			
LOCATION	WS05 and WS06. Farm yard of the 'Park Farm'.		
DEPTH TO BASE	0.20m - 0.25m bgl (below ground level).	THICKNESS	0.20m - 0.25m.
DESCRIPTION	These deposits were recorded as 'soft, dark brown and some orangey brown, sandy, slightly gravelly clay. Gravel is fine to coarse, subangular to subrounded chert, quartzite with occasional brick, tarmac and charcoal fragments'.		
COMMENTS	GEOTECHNICAL	Nothing significant noted.	
	CONTAMINATION	Tarmac fragments were recorded in WS06.	
	GROUNDWATER	Groundwater was not observed in this stratum.	

4.3. TOPSOIL AND MADE GROUND TOPSOIL

TOPSOIL AND MADE GROUND TOPSOIL			
LOCATION	Entire site except farm yard of 'Park Farm'.		
DEPTH TO BASE	0.20m - 0.90m bgl.	THICKNESS	0.20m - 0.90m.
DESCRIPTION	The shallow soil was generally recovered as 'grass over light to dark brown, occasionally mottled orange, slightly to gravelly, sandy, silty clay with roots and rootlets. Gravel of fine to coarse, angular to subrounded chert'. Made Ground Topsoil deposits were recorded in TP04, TP07, SA02, WS08, WS10 and WS15. These deposits were recorded containing rare brick fragments and occasional charcoal fragments. They are considered as reworked Topsoil due to the agricultural use of the site.		
COMMENTS	GEOTECHNICAL	Nothing significant noted.	
	CONTAMINATION	No visual or olfactory evidence of contamination.	
	GROUNDWATER	Groundwater was not observed in this stratum.	

4.4. SUPERFICIAL DEPOSITS

No superficial deposits were encountered.

4.5. BEDROCK

WITTERING FORMATION			
LOCATION	Entire site.		
DEPTH TO BASE	3.20m - >5.45m bgl.	THICKNESS	2.85m - >5.15m.
DESCRIPTION	In general, initially the Wittering Formation has been recorded as orangey brown mottled grey and green sandy clay-rich soils with variable gravel content up to depths between 1.20m to 2.40m. Then, the clay soils of the Wittering Formation have been recorded as firm to stiff soils with sandy partings and/or thin sandy intercalated beds which form sequences of thin beds of clay and sand deposits. At depth these deposits have been generally recovered with mudstone gravel lithorelicts and turning into grey, purple and bluish grey colours. To the southern fields the sandy content is become more frequent.		
COMMENTS	GEOTECHNICAL	Nothing significant noted.	
	CONTAMINATION	No visual or olfactory evidence of contamination.	
	GROUNDWATER	Groundwater was observed in this stratum in trial pits TP02, TP06, TP11, TP13, TP14, SA01 to SA03, SA05, WS02, WS03, WS09, WS10, WS11 and WS14 at variable depths.	

LONDON CLAY FORMATION			
LOCATION	WS01 to WS05. Northern fields located in the 'Park Farm'.		
DEPTH TO BASE	>5.45m bgl.	THICKNESS	>2.25m.
DESCRIPTION	Encountered at the base of the boreholes the London Clay Formation was generally recorded as 'stiff, grey, slightly sandy, silty CLAY'.		
COMMENTS	GEOTECHNICAL	Nothing significant noted.	
	CONTAMINATION	No visual or olfactory evidence of contamination.	
	GROUNDWATER	Seepage were recorded in this stratum in WS03 at 4.00m depth.	

4.6. GROUNDWATER MONITORING

DATE	RESTING GROUNDWATER RANGE	COMMENTS
08/08/2017	From 0.98m to 2.36m bgl.	Variable standing groundwater levels were recorded across the site. The shallowest values were recorded in WS06 located in the farm yard of 'Park Farm' and the deepest values were recorded to the north of the site in WS01 and in WS05 located in the northern area of the 'Park Farm'. Borehole WS15 was recorded dry.
17/08/2017	From 0.78m to 2.15m bgl.	Slightly variations in the standing groundwater level were recorded in the second monitoring visit. Generally, standing groundwater levels rose in the northern fields whereas levels decrease to the south. The shallowest values were recorded in the centre area of the site but to the north (WS01) and southern fields (WS09, WS11, WS12) the recorded values were slightly deeper. Borehole WS15 was again recorded dry.
23/08/2017	From 0.75m to 2.41m bgl.	Similar trend was recorded in this monitoring visit. The lowest value was recorded in WS03 located in the middle of the site and the deepest values was recorded in WS12 located in the southern fields area. Borehole WS15 was again recorded dry.
01/09/2017	From 0.82m to 2.68m bgl.	Generally, slightly deeper values were recorded in most of the holes and borehole WS15 was recorded as dry.
07/09/2017	From 0.98m to 2.63m bgl.	The groundwater levels were similar to the previous visit. WS15 remained dry.
14/09/2017	From 0.97m to 2.76m bgl.	The groundwater levels were consistent with the previous monitoring visits. The deepest groundwater level was recorded in WS12, the shallowest in WS03 and WS15 remained dry, which is consistent with previous trends.

5. GEOTECHNICAL PROPERTIES

5.1. DYNAMIC CONE PENETROMETER

Six TRL dynamic cone penetrometer tests have been undertaken on site, their results are included in Appendix 2 (Ref. CBR01 to CBR06) and their location is included in the exploratory plan layout in Appendix 1.

None of the tests show values above 200mm or 300mm due to the soft shallow ground conditions of the superficial Topsoil.

The CBR01 and CBR02 located to the southern fields have a similar distribution pattern with depth. The recorded values below 200mm and 400mm depth are about 5%. Underneath, a decreasing trend is recorded and an average values of 2% is considered representative of the soils between 400m and base of the test.

The CBR03 located in the southern fields shows values between 2.5% and 5% between 200mm to 700mm, then CBR values increase with depth and records between 6% to 17% are recorded to the base of the test.

The CBR04, located to the western corner of the site near the train embankment, recorded values at depths below 300mm between approximately 3% and 5% up to 550mm, where soft conditions still acting. Increasing values are recorded below 650mm ranging from 8.0% to 13%.

The CBR05 shows a similar distribution pattern to CBR01 and CBR02. Values above 5% are recorded up to approximately between 200mm and 400mm depth. Then values decrease below 4% and records show a constant trend below 500mm depth with an average CBR value of 3.5%.

Finally, CBR06 shows an approximately constant pattern from 200mm to 600mm depth with an average 5% value, then the CBR values increase to 13%.

5.2. COARSE SOIL PARAMETERS

5.2.1. Particle Size Distribution

The grading curves of the four samples of Wittering formation subject to PSD determination revealed variable soil distribution.

One sample recorded in TP12 at 0.90m depth was recorded as silty clayey SAND, however the other three tested samples were recorded as very sandy, silty CLAY and very clayey SILT.

5.3. FINE SOIL PARAMETERS

5.3.1. Index Property Testing

SOIL TYPE	Wittering Formation.
PLASTICITY INDEX (PI)	19% - 56%
MODIFIED PI	29%
NHBC CLASS	Low volume change potential (One sample: 19%). Medium volume change potential (Five samples: 21% - 29%). High volume change potential (Five samples: 43% - 56%).
COMMENTS	The variable plasticity indices are a result of the variable sand content recorded across the site which has been noted with a no distribution pattern.

SOIL TYPE	London Clay Formation.
PLASTICITY INDEX (PI)	43%
MODIFIED PI	Not applicable - no oversize particles.
NHBC CLASS	High volume change potential.

5.3.2. Undrained Shear Strength

This section discusses all of the laboratory and in-situ tests that produce either direct or indirect measures of undrained shear strength.

5.3.2.1. *Hand Shear Vane*

SOIL TYPE	Wittering Formation.
CORRECTION FACTOR μ	$\mu=1.0$
JUSTIFICATION	Professional judgement.
DISCUSSION OF CORRECTED RESULTS	The recorded undrained shear strength was generally low to medium at depths about 1.00m with values ranging from 30kPa to 54kPa. At depths over 1.50m values ranging from 50kPa to 86kPa indicative of medium to high strength soil type were recorded. Where greater sand content was recorded in these soils undrained shear strength values were unable to be recorded particularly in the southern fields.

5.3.2.2. Hand Penetrometer

SOIL TYPE	Wittering Formation.
DISCUSSION OF CORRECTED RESULTS	The recorded undrained shear strength was in the range between 57kPa to over 163kPa which is indicative of Medium to High strength soils type. High values identified as shallow depths are elevated due to the gravel content recorded in the near surface soils.

SOIL TYPE	London Clay Formation.
DISCUSSION OF CORRECTED RESULTS	The recorded undrained shear strength was in the range between 78kPa to 139kPa which is indicative of High strength soils type.

5.3.2.3. Standard Penetration Test Correlations

The SPT N-values have been converted using industry standard correlations, such as Stroud's method, to equivalent undrained shear strengths of a 100mm-diameter triaxial compression test.

The SPT values recorded above 2.00m depth in the Wittering Formation ranging from N=2 to N=22 and an average N-value representative of these deposits of N= 8 could be considered. Based on the Stroud's conversion this mean value is indicative of Low strength soil type.

At depth these soils become more competent an N-values between N=7 and N=20 have been recorded which are indicative of Medium strength soils type.

The London Clay Formation has been recorded with an average N-value of N=11 which is indicative of Medium strength soils type.

5.4. WATER SOLUBLE SULPHATE AND PH

WITTERING FORMATION ABOVE 2.50m DEPTH				
	Sulphate		pH	
Characteristic Value	100 mg/l		5.3 units	
Justification	Mean of highest 20% results rounded to nearest 100mg/l.		Mean of lowest 20% results.	
	No. of tests	Results Range	No. of tests	Results Range
Soil	45	<10 - 94 mg/l	45	4.9 - 8.4 units
Groundwater	-	Not tested	-	Not tested
Total Potential Sulphate	6	Not applicable as pyrite unlikely in the samples tested.		

WITTERING FORMATION BELOW 2.50m DEPTH / LONDON CLAY FORMATION				
	Sulphate		pH	
Characteristic Value	3.72%		4.4 units	
Justification	Based on Highest Total Potential Sulphate.		Lowest measured value.	
	No. of tests	Results Range	No. of tests	Results Range
Soil	4	40 - 316 mg/l	4	4.4 - 6.5 units
Groundwater	-	Not tested	-	Not tested
Total Potential Sulphate	4	0.18% - 3.72% Three out of four samples tested are potentially pyritic		

6. GEOTECHNICAL ASSESSMENT

6.1. INTRODUCTION

The following advice and recommendations are based on the construction of a residential state comprising about 680 new dwellings, a primary school and open space leisure areas. The preliminary proposed development layout plan is included in Appendix 1. From assessment of the nature of the ground conditions and the type of proposed structures, it is considered that the situation falls within EC7 Geotechnical Category 1.

Should the nature of the development be changed then the results of this investigation would need to be reviewed and reassessed.

6.2. EXCAVATIONS

STABILITY	Any excavation requiring man entry should be battered back to a safe angle, supported by an appropriate proprietary trench support system or adequately shored to provide safe working conditions. Shoring to any excavation requiring man entry must be designed by a suitably qualified and experienced engineer. Any support system will require regular inspection as detailed in published guidelines to ensure the excavation support is adequate and appropriate for the ground conditions present. It is anticipated that narrow trench excavations will remain relatively stable and open for short periods, but minor spalling of side walls could still occur. Trench excavations encountering the groundwater are likely to suffer side wall collapse. However, the shallow soils along the north western boundary of the site was recorded soft and water logged so the are likely to suffer side wall collapse. Excavations below the water table at this site are likely to result in excavation difficulties due to 'running sands' and appropriate groundwater control will therefore be required.
EQUIPMENT	It should be possible to progress excavations with conventional equipment. The removal of sub-surface structures following demolition will require the use of hydraulic breaking equipment.
GROUNDWATER CONTROL	Variable groundwater levels have been recorded across the site and therefore it is considered that groundwater levels at the time of construction will have a critical impact on the ease of which the structures can be built for some plots, particularly those recorded in the northern fields. It is therefore recommended that excavations, particularly any deep excavations, are planned for the late summer or early autumn when seasonally groundwater will be expected to be at its lowest. Limited groundwater control in the form of pumping from sumps is likely to be required as perched water can be recorded across the site. Where deep trench excavations are required then it is considered that construction without adequate groundwater control will be problematical and that pumping from sumps alone may not be sufficient. Consultation with groundwater control contractors is recommended as specialist measures such as 'well pointing' may be required for groundwater exclusion and reducing running sands in any deep excavations. Any groundwater control system should be designed and operated to minimise

	the loss of fines from the soil matrix as this could adversely affect settlement. Groundwater levels at the time of construction will have a critical impact on the ease of which the structure can be built. It is therefore recommended that groundwater monitoring is undertaken to assess the variation in the water table with seasonal or short term weather effects.
PARTY WALL ISSUES	As there are no nearby third party structures, the Party Wall Act is unlikely to apply to the development.

6.3. SLOPE STABILITY

The slopes across the site are relatively shallow and show no obvious signs of instability. No significant changes in level as part of the development are anticipated. Any change in levels required should be cut to a slope no greater than one in three (vertical : horizontal) which should provide reasonable long term stability. Alternatively, changes in level should be supported by appropriately designed and constructed retaining walls.

The embankments flanking the railway line were observed generally stable based only on a simple visual inspection. Inspection was limited by vegetation together with mature trees observed along most of the line.

6.4. SUBSURFACE CONCRETE

WITTING FORMATION ABOVE 2.50m DEPTH	
SITE / SOIL CATEGORY	Natural ground.
DESIGN SULPHATE CLASS	DS-1
GROUNDWATER REGIME	Mobile.
AGGRESSIVE CHEMICAL ENVIRONMENT FOR CONCRETE (ACEC) CLASS	AC-2z
COMMENTS	Due to weathering effects and leaching, it is common for clay soils to have lower sulphate concentrations at shallow depth.

WITTERING FORMATION BELOW 2.50m DEPTH / LONDON CLAY FORMATION	
SITE / SOIL CATEGORY	Natural ground containing pyrite.
DESIGN SULPHATE CLASS	DS-4
GROUNDWATER REGIME	Static.
AGGRESSIVE CHEMICAL ENVIRONMENT FOR CONCRETE (ACEC) CLASS	AC-3s
COMMENTS	Concrete in pyritic ground that is initially low in soluble sulphate does not have to be designed to withstand a high potential sulphate class unless ground disturbance is such that pyrite may be oxidised. This may prompt a change in construction e.g. employing piled foundations instead of trench fill footings. The restriction to DS-4 has been applied. Static conditions assumed to be more representative of deeper soil conditions.

6.5. SOAKAWAYS

6.5.1. Soil Infiltration Rate

The records of the soakage tests are presented in the Appendices that includes the calculation of the soil infiltration rate. Due to the presence of groundwater in the test pit, sometimes very shallow, that depth of the test was altered in the calculation to take this into account. A summary of results are presented in the table below:

TRIAL PIT	SOIL INFILTRATION RATE		STRATUM TESTED
SA01	Test 1	Permeability too low to calculate soil infiltration rate.	Firm to stiff, grey and orange staining at the surfaces, silty CLAY with mudstone lithorelicts and relict rootlets.
SA02	Test 1	9.48×10^{-6} m/s	Firm, grey mottled orange, silty CLAY recovered as gravel sized fragments.
SA03	Test 1	1.06×10^{-5} m/s	Medium dense, orange mottled grey, slightly silty, fine SAND with occasional thin interbedded silt and clay layers.
	Test 2	9.39×10^{-6} m/s	
	Test 3	1.09×10^{-5} m/s	
SA04	Test 1	Permeability too low to calculate soil infiltration rate.	Firm to stiff, grey, brown and orange, sequences of thinly bedded silty CLAY and fine SAND.

TRIAL PIT	SOIL INFILTRATION RATE		STRATUM TESTED
SA05	Test 1	2.07×10^{-6} m/s	Firm, grey and purple, sequences of thinly bedded silty CLAY and fine SAND.
SA06	Test 1	2.58×10^{-6} m/s	Firm, orange mottled grey, sequences of thinly bedded silty CLAY and fine SAND.
	Test 2	2.47×10^{-6} m/s	
	Test 3	5.66×10^{-6} m/s Result extrapolated and so guide only.	

6.5.2. Soakaway Design Advice

The soakage tests undertaken across the site have revealed variable infiltration rates. Where able to be calculated, the infiltration rates recorded were generally indicative of poor drainage conditions. The presence of sand fraction in the form of interbedded thin layers have slightly favoured the percolation of water but the significant clay fraction in the soils prevents better infiltration rates.

This situation has been also aggravated by the presence of generally relatively shallow standing groundwater recorded prior to the tests in most of the soakage pits. Shallow groundwater has also been recorded in the monitoring visits. Bearing in mind the monitoring was undertaken when groundwater would be expected to be at its seasonal deepest, during periods of elevated groundwater the ability of the soils underlying the site to receive additional water will be further limited. In addition, the Environment Agency will object to the use of infiltration devices that lead to the direct input to groundwater and seek that in excess of a 1m thick unsaturated zone is present between the base of the infiltration device and the seasonal high maximum groundwater level.

Therefore, it is considered that the disposal of collected surface water to soakaways will not be feasible at this site due to the clay content of the soils limiting infiltration rates coupled with the existing shallow groundwater levels.

The use of swales at the development is recommended as part of the drainage design. Whilst these should be designed for storage / attenuating flows, they will also allow limited infiltration to occur.

Where deeper attenuation basins are required, care should be taken to ensure that the base of such basins are not designed to be below the local groundwater level. Further targeted ground investigation may be required. Longer term groundwater monitoring is recommended to assess the variation in the water table with seasonal or short term weather effects.

6.6. PAVEMENT CONSTRUCTION

From consideration of the observed ground conditions and the plasticity of the clay, it is recommended that a preliminary design California Bearing Ratio (CBR) of 3% is assumed. The cohesive deposits will be prone to rapid degradation during wet weather working and this should be avoided where possible.

Increased road pavement construction thickness should be anticipated where paved areas cross over ground disturbed by the removal of the existing structures in the small farm yard part of the site.

All unsuitable soils, such as topsoil or desiccated soils, should be removed from beneath proposed paved areas. The exposed sub-grade formation should then be proof rolled to reveal any excessively soft or compressible zones and any such features identified also removed by excavation. Where unsuitable materials are removed, the resultant voids should be filled in layers with appropriately compacted suitable granular fill. To reduce the loss of granular construction materials into the sub-grade, consideration should be given to utilising a geotextile starter layer across the formation level.

6.7. PRELIMINARY FOUNDATION RECOMMENDATIONS

6.7.1. Introduction

Outside of the zones of influence of the trees and hedges it is considered that shallow spread foundations may be adopted for the proposed residential properties emplaced within the underlying clay deposits of the Wittering Formation. Locally there may be a requirement to deepen foundations (trench fill) where soft soils are recorded in the areas near the ditches which defining the site fields.

Within the zones of influence of the trees deepened trench fill foundations are considered appropriate. However, where plots are located adjacent to the trees and hedges piled foundations may need to be considered if trench fill foundations are too deep to be economic or practical to construct.

For the proposed school building, potential loads may be too high to support on conventional shallow spread/deepened trench fill foundations. At this stage it may be necessary to assume a piled foundation design until details of structural loadings and settlement tolerances are available. Once such detailed design information is available the foundation design will need to be reassessed to determine whether or not shallow spread/trench fill foundations are suitable for the proposed structure.

6.7.2. Floor Slabs

In consideration of the near surface clay soils, fully suspended floor slabs designed and constructed in accordance with NHBC Standards are recommended at this development.

6.7.3. Traditional Footings

The site is suitable for the adoption of shallow strip/trench fill footings. Foundations should be taken through made ground/topsoil and any soft near surface layers to bear upon the firm clay soils of the Wittering Formation.

Due to the variability of the soils in both nature and consistency recorded across the site a restrictive presumed bearing value of 100kN/m² is considered appropriate for foundations up to 1.5m wide bearing upon the firm clay soils of the Wittering Formation. Immediate and long term settlement should be within tolerable limits and take place over several years.

The clay deposits of the Wittering Formation have been shown to have a variably low to high volume change potential when assessed against NHBC standards. As it will not be possible to visually differentiate between medium and high volume change potential soils it will be necessary to assume high volume change potential deposits to be present beneath the whole site.

Therefore, the minimum foundation depth required is 1.00m, but 1.50m where required to allow for restricted new tree planting. Under the NHBC Standards, foundation depths have to be increased if they are within the influence zone of felled trees, existing trees or proposed tree planting. It should be noted that where trees are in groups the resulting competition for

resources can lead to deeper root systems than allowed for in the NHBC Standards. In any event, foundations should be taken below any roots encountered in foundation trench excavation. Where the required foundation depth varies around a structure, this can be accommodated by forming steps in the foundation as per NHBC Standards.

Where foundation depths exceed 1.50m in clay soils and are within the zone of influence of existing or felled trees or where foundations cut through tree roots, a compressible void former will be required against the internal faces of new foundations in order to accommodate potential long term soil heave. Such precautions against heave should be designed and constructed in accordance with NHBC Standards.

The influence of trees on required foundation depth should be considered within the design of the development layout. Ideally structures should be moved further away from existing trees so as to minimise the impact on required foundation depth/type.

The excavator must be set up with care and operated correctly to ensure trench walls are vertical and base horizontal as any slight inclination will result in eccentric loading on deep trench fill footings.

A number of trees and tree stumps comprise the hedges of the site fields. It will be necessary to remove all unwanted trees, stumps and root structures prior to commencing with the development. Any resultant void should be backfilled accordingly with respect to the preferred foundation design.

Groundwater at the site is relatively shallow and likely subject to seasonal variation. It is considered that for some plots any excavations encountering the groundwater could become unstable and this will make construction of the footings problematical or impossible, especially deep trench footings. It is considered that viability of strip or trench fill foundations will be dependent upon actual groundwater levels present at the time of construction. As a consequence of this, it is recommended that foundation construction generally occurs in the summer months when groundwater is likely to be at its deepest.

If groundwater proves problematic then, localised temporary lowering of the groundwater table may prove beneficial. In addition, a 'dig and pour' approach could be adopted. A variation on this approach is to construct footing in two phases employing an initial semi-dry concrete mix to form a 'dig and pour' trench fill footing, but left at a lower level. A reinforced strip footing can then be constructed upon this trench fill footing. It is an inherent risk of any 'dig and pour' that spoil disposal and concrete volumes could increase.

The ground located along the western boundary, area of exploratory holes WS10, TP20, SA04 and TP21, were recorded saturate after periods of rain. These saturated shallow soils may make trench sides unstable and so allowance for over digging and increased concrete volumes should be allowed for.

During construction, any soft spots found at foundation formation level should be excavated and replaced with lean mix concrete. Foundation excavations should be kept dry and left open for the minimum amount of time possible. Where foundations cannot be completed immediately, a blinding layer of concrete should be placed.

6.7.4. Piling

Dependent on the position of proposed plots relative to the zones of influence of the existing trees and hedges, specific plots may result in uneconomically deep trench fill foundations. Consequently, consideration may need to be given to adopting piled foundations for a limited number of house plots due to tree influence. It may also be necessary to pile some plots if groundwater causes too great a difficulty with constructing trench fill footings.

As a consequence of the potential significant structural loads of the proposed school building, it may be necessary to assume a piled foundation design at this stage. Following provision of detailed structural loadings and settlement tolerances foundation design may be reconsidered to determine whether or not shallow spread/deepened trench fill foundations may be utilised for the structure.

In order to confirm deeper ground conditions for pile design further ground investigation comprising deep cable percussive boreholes is recommended.

6.8. RECOMMENDATIONS FOR FURTHER GEOTECHNICAL WORK

A tree survey should be undertaken as this information will be required for detailed foundation design. This survey with topographic survey data should be undertaken prior to any site clearance to accurately record the location of any previously felled trees and existing trees both within the site and close to the site boundaries. The survey should record the trunk location, height and species of the trees.

The density of exploratory points is relatively low in some areas due to the access available at the time of this investigation. Whilst no significant variation in ground conditions is anticipated, it would be prudent to undertake additional ground investigation to increase the density of exploratory points. This would best be undertaken once the development layout has become more detailed.

In order to confirm deeper ground conditions for pile design further ground investigation comprising deep cable percussive boreholes is recommended. It is suggested that 4No. boreholes are drilled to depths of 18m. Monitoring wells should be included in the boreholes and at least one post work monitoring visit should be undertaken to record groundwater levels. In-situ Standard Penetration Tests should be conducted during forwarding of the boreholes and collected soil samples submitted for appropriate geotechnical laboratory testing.

It is recommended that longer term groundwater monitoring is undertaken to assess the variation in the water table with seasonal or short term weather effects.

7. RISK ESTIMATION - SOILS

7.1. HUMAN HEALTH

The Generic Assessment Criteria (GAC) employed below are for residential land use as this is appropriate to the proposed form of development.

CONTAMINANT	UNITS	NUMBER OF TESTS	MAXIMUM CONCENTRATION	GAC	NUMBER EXCEEDING GAC
Arsenic	mg/kg	34	19	37	0
Cadmium	mg/kg	34	<0.2	22	0
Chromium (hexavalent)	mg/kg	34	<2	21	0
Chromium (total)	mg/kg	34	23	910	0
Copper	mg/kg	34	15	2,400	0
Lead	mg/kg	34	53	200	0
Mercury	mg/kg	34	<1	11	0
Nickel	mg/kg	34	32	180	0
Selenium	mg/kg	34	10.5	250	0
Zinc	mg/kg	34	116	3,700	0
pH	Units	49	4.9	<5-10>	1
Naphthalene	mg/kg	34	0.27	2.3	0
Acenaphthylene	mg/kg	34	<0.1	170	0
Acenaphthene	mg/kg	34	0.63	210	0
Fluorene	mg/kg	34	0.43	170	0
Phenanthrene	mg/kg	34	9.36	95	0
Anthracene	mg/kg	34	3.82	2,400	0
Fluoranthene	mg/kg	34	37.80	280	0
Pyrene	mg/kg	34	36.80	620	0
Benzo(a)anthracene	mg/kg	34	20.90	7.2	1
Chrysene	mg/kg	34	20.20	15	1
Benzo(b)fluoranthene	mg/kg	34	27	2.6	1
Benzo(k)fluoranthene	mg/kg	34	6.94	77	0
Benzo(a)pyrene	mg/kg	34	21.80	2.2	1
Indeno(1,2,3-cd)pyrene	mg/kg	34	9.93	27	0
Dibenzo(a,h)anthracene	mg/kg	34	1.94	0.24	1
Benzo(ghi)perylene	mg/kg	34	8.35	320	0
TPH Aliphatic C5-C6	mg/kg	9	<0.01	42	0
TPH Aliphatic C6-C8	mg/kg	9	<0.05	100	0
TPH Aliphatic C8-C10	mg/kg	9	<2	27	0
TPH Aliphatic C10-C12	mg/kg	9	<2	130	0
TPH Aliphatic C12-C16	mg/kg	9	<3	1,100	0
TPH Aliphatic C16-C35	mg/kg	9	<10	65,000	0
TPH Aliphatic C35-C44	mg/kg	9	<10	65,000	0

CONTAMINANT	UNITS	NUMBER OF TESTS	MAXIMUM CONCENTRATION	GAC	NUMBER EXCEEDING GAC
TPH Aromatic C5-C7	mg/kg	9	<0.01	70	0
TPH Aromatic C7-C8	mg/kg	9	<0.05	130	0
TPH Aromatic C8-C10	mg/kg	9	<2	34	0
TPH Aromatic C10-C12	mg/kg	9	<2	74	0
TPH Aromatic C12-C16	mg/kg	9	<2	140	0
TPH Aromatic C16-C21	mg/kg	9	<3	260	0
TPH Aromatic C21-C35	mg/kg	9	<10	1,100	0
TPH Aromatic C35-C44	mg/kg	9	<10	1,100	0
Benzene	mg/kg	9	<2	0.87	0
Toluene	mg/kg	9	<5	130	0
Ethylbenzene	mg/kg	9	<2	47	0
Xylene (total of all types)	mg/kg	9	<2	56	0
Methyl Tert Butyl Ether (MTBE)	mg/kg	9	<2	49	0
Semi-Volatile Organic Compounds (SVOCs)	mg/kg	4	<0.15	LOD*	0
Organochlorine Pesticides	mg/kg	5	<0.02	LOD*	0
Asbestos	Presence	10	0.002	Fibres Present	2

Notes: *Limit of detection: Given the large amount of compounds in this group, coupled with the lack of GAC for certain compounds, any concentrations above the limit of detection will be highlighted in the first instance.

RESULTS EXCEEDING HUMAN HEALTH ASSESSMENT CRITERIA

PAH	One sample from WS06 at 0.20m from shallow Made Ground - Containing loose tarmac in the 'Park Farm' area of the site recorded five PAH bands above their respective generic assessment criteria. WS06 was located in the farm yard adjacent to the surface hardstanding areas existing on site. This soil contained fragments of tarmac and this is the most likely source of the PAHs recorded. As such WS06 is considered to represent a hotspot and is considered further in subsequent sections.
ASBESTOS	Asbestos quantification was undertaken on ten samples of near surface soils including Topsoil and Made Ground and two of the results were over the detection limit of 0.001%. The two samples containing fibres of Chrysotile were recorded in WS05 and WS06 in the 'Park Farm' area. Most of the existing buildings in the farm have been identified with asbestos cement roofs and so these loose fibres probably relate to these.
pH	The acidic pH values recorded reflect the natural geochemistry of the soils and do not represent a contamination issue. Accordingly no further comment is made on these results within this contamination assessment.

7.2. WATER ENVIRONMENT

It is not appropriate to consider human health assessment criteria for human health in relation to the risk to the water environment, but currently there are no generic soil assessment criteria in respect of the water environment. In the absence of any groundwater sampling data, the soil results are assessed on the basis of professional judgement.

The contaminant concentrations recorded in the soils at the site are not considered to be at such levels that they would present any significant risk to the underlying water environment. The elevated PAHs recorded in a single sample are likely related to the presence of tarmac fragments in the Made Ground and so will not be in a mobile form.

7.3. BUILDING MATERIALS

Contaminant	Units	Number of tests	Maximum Concentration	GAC	Number exceeding GAC
pH	units	49	4.9	<5.5	5
Sulphate (w/s)	mg/l	45	316	500	0
Sum of SVOC + Aliphatic TPH >C5-C10 + Aromatic TPH >C5-C10 above detection limits	mg/kg	9	<0.1	2	0
Sum of Aliphatic TPH >C10-C21 + Aromatic TPH >C10-C21 above detection limits	mg/kg	9	<0.1	10	0
Sum of Aliphatic TPH >C21-C34 + Aromatic TPH >C10-C35 above detection limits	mg/kg	9	<0.1	500	0
Sum of BTEX + MTBE above detection limits	mg/kg	9	<0.005	0.1	0
Phenols	mg/kg	9	<0.1	2	0
Cresols and chlorinated phenols	mg/kg	9	<0.1	2	0
Naphthalene	mg/kg	34	0.27	0.5	0
Benzo(a)pyrene	mg/kg	34	21.8	0.5	1

RESULTS EXCEEDING BUILDING MATERIALS ASSESSMENT CRITERIA

BENZO(A)PYRENE	The concentrations of the Polycyclic Aromatic Hydrocarbon (PAH) benzo(a)pyrene recorded are above the limits for the use of conventional polyethylene (PE) water supply pipes. However, the sample tested has been recorded at shallow depths (0.20m) in the superficial Made Ground deposits recorded in WS06 in the farm yard area related to loose tarmac fragments recorded within the Made Ground soils. These deposits have been recorded up to maximum depths of 0.25m. Therefore it is considered that the low contamination level recorded in the samples tested together with the depth which has been recorded at is not considered to be a cause for concern for the deeper water supplies pips and are not considered further.
pH	The acidic pH values recorded are such that they could detrimentally impact sub-surface concrete. The impact on concrete mix design is a geotechnical issue that is considered separately and so no further comment is made on these results within this contamination assessment.

8. RISK ESTIMATION - GROUND GAS

RESULTS SUMMARY			
Parameter	Minimum	Maximum	Comments
Methane	0.0%	0.2%	No significant concentrations recorded.
Carbon Dioxide	0.5%	13.1%	The highest concentration was recorded in WS05 during the fifth monitoring visit and had fallen to 11.6% during the sixth visit. Values of 11.8% and 10.9% were also recorded during the first and second monitoring visits. Elevated concentrations of CO₂ of 8.6% and 9.3% were also recorded in WS03 and WS06 during the fourth monitoring visit. Concentrations of 8.3% and 7.8% were also recorded in WS06 during the fifth and sixth visit respectively. Boreholes WS05 and WS06 are located in the 'Park Farm' area of the site and WS03 is located in a field approximately 100m south east of the farm buildings. In essence, all those boreholes recording elevated CO₂ are located in and around 'Park Farm'.
Oxygen	5.2%	20.3%	The oxygen levels were typically depleted as carbon dioxide concentrations increased.
Hydrogen Sulphide	0ppm	1ppm	Trace background levels.
Carbon Monoxide	0ppm	3ppm	Trace background levels.
Hydrocarbon Vapour (PID)	2.7ppm	42.9ppm	No significant concentrations recorded.
Atmospheric pressure	1006mB	1021mB	One of the six monitoring visits was undertaken during a falling atmospheric pressure trend.
Groundwater levels	0.75m	Dry	Variable standing groundwater levels have been recorded across the site. Windowless sampling WS15 is the only borehole which was recorded dry. Apart from this borehole the deepest standing ground water level has been recorded in WS12 at 2.76m depth bgl.

Flow rate	<0.0 l/hr	0.5l/hr	Very low flow rates recorded. Negative flows are indicative of 'draw down' in the boreholes. These can be a factor of the effect of drilling on the immediate ground conditions, the creation of a partial vacuum as a result of monitoring, groundwater behaviour or due to certain geologic conditions. In terms of the contamination risk assessment, this does not present a cause for concern as the net effect is to reduce the emission of gas at surface.
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GAS GENERATION POTENTIAL OF SOURCE

GAS SOURCE	GENERATION POTENTIAL	COMMENTS
Natural soils with low organic content	Negligible	Whilst the gas generation potential is low, it is common for natural soils to record low concentrations of Carbon Dioxide due to limited organic or carbonate content.

Sensitivity of development	High (Residential with gardens)	
	Idealised	Actual
Monitoring period	3 months	2 months
Total number of visits	6	6
Number of visits during falling pressure trends	At least two visits	One
Comment	The number of gas monitoring visits completed broadly complies with the guidance within CIRIA C665 although only one of the visits was undertaken during a period of falling atmospheric pressure.	

GAS REGIME CHARACTERISATION

Radon protection measures required?	No.	Vapour protection measures required?	No.
	Characteristic Gas Concentration (fraction)	Characteristic Gas Flow Rate (l/hr)	Gas Screening Value (l/hr)
Methane	0.002 (0.2%)	0.5	0.001
Carbon Dioxide	0.131 (13.1%)	0.5	0.0655

Methodology	Situation B - Low rise housing with gardens - NHBC 'Traffic Lights'.
Gas Regime	Amber 1 on account of the maximum concentrations of carbon dioxide recorded. However, the elevated concentrations of carbon dioxide were identified in WS03, WS05 and WS06, which are all located in the 'Park Farm' area of the site. Elevated CO₂ was not recorded in any of the boreholes across the rest of the site and therefore it is considered that the majority of the site should be considered as a Green gas regime.
Gas Protection Measures	Amber 1 dictates a low to intermediate gas regime identified, which requires low level gas protection measures, comprising a membrane and ventilated sub-floor void to create a permeability contrast to limit ingress of gas into buildings. Gas protection measures should be as prescribed in BRE Report 414. Ventilation of the sub-floor void should facilitate a minimum of one complete volume change per 24 hours. Away from the Park Farm area of the site it is considered that gas protection measures will not be required. Further investigation and monitoring is recommended in this area of the site to accurately delineate the area requiring Amber 1 gas protection measures.

9. RISK EVALUATION

9.1. REVISED CONCEPTUAL MODEL

The revised conceptual site model plan is presented in the Appendices.

ADDITIONAL POLLUTANT LINKAGES	Asbestos fibres were detected in the farm yard area and elevated concentrations of carbon dioxide were also recorded in the boreholes in and around this area.
INVALID POLLUTANT LINKAGES	No hydrocarbon contamination was identified in the farm yard area. Likewise, contamination regarding historical use of the site such as agrochemicals was not identified under this investigation.
LIMITATIONS AND UNCERTAINTIES	Due to access restrictions, it was not possible to undertake any exploratory holes under the buildings floor slab existing in the 'Park Farm' area. However, all of the potential contamination sources have been targeted by the exploratory holes. Further ground investigation in the area of the farm yard would be prudent to increase in the density of exploratory points in order to determine the need and extent for remediation. For the vast majority of the site it is considered that a sufficient number of exploratory points have been completed for contamination assessment purposes.

9.2. UPDATED CONTAMINATION RISK ASSESSMENT

The pollutant linkages identified in the revised conceptual site model will now be evaluated as to their severity.

SOURCES AND CONTAMINANTS	PATHWAYS (REFERENCE FROM MODEL)	RECEPTORS	POTENTIAL RISK
'Park Farm' farm yard. - PAH. - Asbestos fibres.	Ingestion & inhalation (1) Consumption of home grown produce (1)	Future residents	Low to moderate risk (localised in the Park Farm area)
	Inhalation of fibres (2)		
	Direct contact	Water supply pipes	Negligible risk
	Horizontal & vertical migration	Underlying Secondary A Aquifer.	Negligible risk
Natural soils with low organic content. - Landfill gases (CO ₂)	Inhalation of gases (3)	Future residents	Low to moderate (localised to the Park Farm area)

The contamination risks that are presented to the various receptor groups are discussed further in the following sections:

RISK TO HUMAN HEALTH

Low to moderate risks to future residents have been identified from a hotspot of elevated PAH recorded in WS05 in the shallow Made Ground deposits. This borehole is located in the 'Park Farm' adjacent to the hardstanding access road and the contamination is likely related to the presence of tarmac fragments within the near surface Made Ground. Elevated concentrations of carbon dioxide were recorded in WS03, WS05 and WS06 also located in the 'Park Farm' area of the site at concentrations which require gas protection measures.

Loose asbestos fibres have been detected in the soils near the farm buildings. Employing the Joint Industry Working Group 'Receptor Ranking' spreadsheet for a residential setting, the risk ranking is low.

RISK TO WATER ENVIRONMENT

No unacceptable risks to the water environment have been identified by this investigation.

RISK TO BUILDING MATERIALS AND SERVICES

Slightly elevated concentrations of PAH have been recorded in the near surface Made Ground recorded in the farm yard in only one exploratory hole located in close proximity to the tarmac access road. It is considered that the identified hydrocarbon contaminants suppose a negligible contamination risk and BRD considered that the use of hydrocarbon resistant pipes is not required based on the undertaken ground investigation due to the low concentrations recorded and its location at shallow depths. However, it should be noted that the water pipe specification should always be confirmed with the local water supply company as they may insist on such protective pipes regardless of the level of contamination or remediation.

The vast majority of the site is greenfield in nature and so should be suitable for the use of conventional plastic water supply pipes.

9.3. RISK MANAGEMENT

GENERAL	A hotspot of slightly elevated PAH has been identified in the farm yard of the 'Park Farm' area. It is recommended that this report is submitted to the planning department of the Local Authority, the organisation undertaking the Building Control function, warranty providers to confirm that the investigation completed to date is satisfactory.
FURTHER INVESTIGATION	In order to provide further confidence in the risk assessment and to address the limitations and uncertainties identified within the existing conceptual model it is recommended that the following additional investigation elements are completed for contamination assessment purposes: • It is considered that further exploratory points are required in the 'Park Farm' area in order to delineate the extent of the identified PAH and asbestos contamination. • As no exploratory holes were undertaken beneath the buildings footprint in the 'Park Farm' area, attendance by a Geo-Environmental consultant during the removal of existing foundations as part of the demolition should be considered. Inspection of the subsequent excavations and the undertaking of a couple of trial pits would address the limitations in the exploratory point layout. • Further investigation and gas monitoring is recommended around the 'Park Farm' area of the site to fully delineate the extent of the elevated concentrations of CO₂. This will help determine which plots will require gas protection measures.
OUTLINE REMEDIATION SOLUTION	The aim of any remediation undertaken as part of site development will be to remove or break all of the viable pollutant linkages identified in the previous section. A formal remediation strategy should therefore be developed by an experienced Geo-Environmental Consultant. A hotspot of elevated PAH has been identified in the farm yard of the 'Park Farm' located to the eastern boundary of the northern fields. It is considered that this hotspot should be removed in its entirety from the site or the affected soil used in an area where there is no viable pathway e.g. under hard standing. Asbestos fibres within the near surface Made Ground in WS05 and WS06 have been identified. Such contamination which could impact future residents where they have direct contact with the soils. Further testing is recommended in this area to confirm the lateral extent of the contaminated soils. Following delineation of the area it is considered stripping and removal of these soils would be the most appropriate remedial technique. The soil could be removed from site or the affected soil used in an area where there is no viable pathway e.g. under hard standing. Given the use of the 'Park Farm', there is the possibility of further hotspots of contamination being present. Based on the current gas monitoring results the 'Park Farm' area of the site falls into the NHBC Amber 1. Accordingly gas protection measures will be required in as described within CIRIA 665 and summarised at the end of Section 8. The extent of those plots requiring gas protection measures

	will need to be determined following further investigation and monitoring in the 'Park Farm' area of the site.
WASTE SOILS CLASSIFICATION	Topsoil should be viewed as a resource rather than a waste and as it is suitable for residential garden use, the topsoil at the site should be stripped and the surplus reused on other developments. It should be noted that topsoil, even if uncontaminated, is unlikely to constitute 'inert waste' due to its high organic matter content. It is considered that the natural sub-soils disposed of from the site would be classified as 'inert waste'. However, the chemical results should be forwarded to the proposed landfill site and the waste classification confirmed prior to disposing of any surplus soils. Waste Acceptance Criteria (WAC) testing of the soils will also be required where the soil is to be disposed of at an landfill permitted to accept inert waste. Such WAC has been completed and the results confirm compliance with the inert waste limits. The waste code from the European Waste Catalogue (EWC) 2002 for the soils would be 17 05 04 'Soil and Stones, not containing dangerous substances'. It is considered that the soils disposed of from the identified hotspot of PAH contamination present in the 'Park Farm' area would be classified as 'hazardous waste'. Such waste will require pre-treatment prior to off-site treatment or disposal. Waste Acceptance Criteria (WAC) testing of the soils for disposal will also be required if the soil is to be disposed of to landfill. The waste code from the European Waste Catalogue (EWC) 2002 for the soils would be 17 05 03 'Soil and Stones, containing dangerous substances'. The Made Ground deposits containing asbestos fibres would be classified as 'non-hazardous waste'. Such waste will require pre-treatment prior to off-site treatment or disposal. The waste code from the European Waste Catalogue (EWC) 2002 for the soils would be 17 05 03 'Soil and Stones, containing dangerous substances'.

10. HEALTH AND SAFETY FILE INFORMATION

10.1. INTRODUCTION

The aim of the following sections is to present pertinent Health and Safety information that has arisen from the current investigation/survey works discussed in this report. The aim is to identify health and safety controls that may be necessary during any subsequent maintenance, refurbishment, demolition or construction works.

Where BRD has been appointed as a Principal Contractor, then this information shall form the Health and Safety Files as required by the Construction Design and Management (CDM) Regulations 2015.

Reports are always forwarded to the Client and they shall be responsible for ensuring this safety information is disseminated to those who need it.

10.2. WORK UNDERTAKEN

Detail on the works undertaken and the information gained about the site are discussed in previous sections of this report.

In summary, BRD's work comprised 15No. Windowless sampling boreholes, 25No. Trial pits, 6No. Soakage Tests and 6No. Dynamic Cone Penetrometer tests.

10.3. HAZARDS

The investigation has revealed the following hazards:

10.3.1. Contamination

Contaminated soils are present at the site. Construction workers will be at risk where they are exposed to these soils and groundwater, for example during demolition, utility services work and foundation construction. During the redevelopment of the site, the presence of contaminated soils should be considered within health and safety plans. Measures to protect the health and safety of site workers should be implemented including use of appropriate personal protective equipment, education and good hygiene procedures. If during the redevelopment any anomalous material is encountered that is different to that conditions revealed by this investigation, then expert environmental advice should be sought.

10.3.2. Asbestos

Asbestos fibres were recorded within the Made Ground soils recorded in the 'Park Farm' area, in the eastern boundary of the northern fields of the site. The presence of these asbestos fragments should be considered within health and safety plans.

In accordance with Health and Safety Executive (HSE) guidance, a 'Refurbishment Demolition Survey' (RDS) should be undertaken to identify whether or not asbestos containing materials are present in the existing structure(s) prior to demolition or refurbishment. The results of the survey should then be used to plan for the safe management, removal and disposal of asbestos containing materials from the existing buildings and infrastructure should such materials be present.

10.3.3. Other Issues

During the BRD works the following safety hazards were identified:

- There is evidence that the site is subject to trespass due to the existence of public footpaths. Measures to secure the site should be taken so that trespassers are not at risk during construction.
- There are open water hazards at the site.

10.4. STRUCTURES

BRD recommend that advice on existing structures is gained from a qualified and experienced Building Surveyor or Structural Engineer.

10.5. HAZARDOUS MATERIALS USED

BRD did not construct anything with hazardous materials.

Any soils to be imported to the site, in particular topsoil, should be tested to confirm their suitability in the development.

10.6. UTILITY SERVICES

No previously unidentified utility services were encountered during the BRD works.

The utility services plans held by the Client should be referred to.

The utility service companies should be contacted for records of their own equipment.

REPORT SPECIFIC REFERENCES

- British Geological Survey sheet 315 "Southampton" Solid and Drift edition (1:50,000) published 1987.
- "Land West of Boorley Green, Hedge End, Hampshire - Desk Study Report", Opus International Consultants (UK) Ltd, ref. E-E1589/LJE/CDS, dated November 2014.

SUPPORTING INFORMATION

GROUND INVESTIGATION

Exploratory holes are logged by an experienced Geo-Environmental Consultant in general accordance with 'Code of practice for site investigations' BS5930:1999 +A2:2010, BSi, August 2010. Soil samples for chemical and geotechnical analysis are taken from the exploratory holes at intervals dictated by the nature of the soils and the objectives of the investigation.

Where stated on the logs of inspection pits, trial pits or boreholes (where insitu testing has not been undertaken), the relative density of coarse (sand and gravel) soils is tentative only. Such assessments of density are on the basis of visual inspection only taking into consideration such factors as drilling rates, stability of pit side walls, appearance and behaviour under excavation.

Where Chalk strata is encountered it is logged and graded in general accordance with CIRIA guidance 'C574 - Engineering in Chalk'. It should be recognised that where percussive drilling methods are employed, the structure of the Chalk is destroyed and therefore the grading stated on such logs is either tentative or absent where it is not possible to assess the grade.

Hand Dug Inspection Pits

Hand tools are used to forward shallow inspection pits as a cost effective method of describing and sampling near surface soils. The technique is also used where exposure of existing footings is required. The depth reached by such techniques is a function of the nature of the ground and generally does not exceed 1.5m

Trial Pits

Mechanically excavated trial pits allow detailed inspection of near surface ground due to the large volume of soil exposed. A wheeled backhoe loader is the usual machine for digging trial pits that are typically 3 to 4.5m deep, 0.5m wide and 3m long.

Windowless Sampling Boreholes

This type of borehole is formed by a small tracked dynamic percussion drilling rig with samples retrieved in thin plastic liners within the narrow diameter steel sampling tubes. Borehole depths of up to 5m are typical, but in exceptional circumstances up to 15m depth can be achieved. This is the smallest type of rig that is capable of undertaking Standard Penetration Tests (SPTs).

Hand Held Window Sampling

Hand held window sampling is a useful method of drilling narrow diameter boreholes particularly where access is difficult. Hand held mechanical percussive hammers are used to drive the sampling tube into the ground. The soil samples are collected within the hollow metal sampling tubes and inspected via the open window along one side. Window sampling boreholes can be forwarded to depths of 3m to 6m depending upon ground conditions.

Cable Percussive Boreholes

This form of drilling involves repetitive dropping of a tube into the soil under its own weight from a tripod support. The sample is obtained from the clay cutter head in fine soils or a bailer for wet granular soils. As the borehole progresses SPTs can be undertaken and relatively undisturbed samples can be obtained. Typically these boreholes are 15 to 25m

deep, but depths of double that can be achieved in soils, but only thin weak rock layers can be penetrated.

Rotary Boreholes

Where competent rock is required to be drilled then rotary drilling techniques are required. The drilling rigs can vary in size from small tracked units to larger units mounted on four wheel drive trucks. Rotary open hole drilling techniques break the rock into small fragments and so recovery of any samples is limited. In contrast, rotary coring retrieves excellent samples. Some rigs also allow windowless sampling to be undertaken through soil layers. There are no practical limits to the depths that this drilling method can achieve.

Dynamic Probing

Dynamic probing comprises a sectional rod with a sacrificial cone at the base of slightly larger diameter than the rod. The rod is driven into the ground by a constant mass falling through a set distance. The number of blows required to forward the rod per 100mm is then recorded and presented in a graph of N_{10} values. The standard applicable to dynamic probing is "BS EN ISO 22476-2:2005 Incorporating corrigendum no. 1, Geotechnical investigation and testing – Field testing – Part 2: Dynamic probing" BSi, February 2007.

Dynamic Penetrometer

The Transport Research Laboratory Dynamic Cone Penetrometer (TRL DCP) uses an 8 kg hammer dropping through a height of 575mm to drive a 60° cone of 20mm maximum diameter into the ground. The depth driven either per blow or per several blows is recorded. The strength of each of the soil layer encountered is then calculated by converting the penetration rate (mm per blow) into an approximate California Bearing Ratio (CBR) value employing the correlation proposed by TRL.

Gas Monitoring

Gas monitoring is undertaken with a portable gas monitor for oxygen, Methane, Carbon Dioxide, Hydrogen Sulphide and Carbon Monoxide together with recording of atmospheric pressure and any flow rate.

Vapour Monitoring

Headspace tests and monitoring for Volatile Organic Compounds (VOC) or Semi Volatile Organic Compounds (SVOC) is undertaken using a Photo Ionisation Detector (PID). The MiniRAE models used have a 10.6 eV lamp calibrated for isobutylene. The PID is useful tool to indicate the presence of a wide range of volatile compounds, but only provides semi-quantitative data as different compounds provide a different response and thus the reading is not a true reflection of the actual concentration present.

Low PID readings can be recorded in natural uncontaminated organic soils or even as a result of atmospheric pollution. It is generally accepted by consultants and regulators that recorded values in excess 50 parts per million (ppm) represents the presence of organic compound pollutants and in excess of 100 ppm such contamination may be significant.

The headspace test procedure involves the collection of a sample of suspected contaminated soils and placing within a sample bag. A tight seal to the bag is formed with a similar volume of air trapped to that of the soil and the sample is left for fifteen minutes to allow volatilisation of any contaminants. The bag is then pierced by, and sealed around, the sample probe of the PID and a reading taken.

Borehole well monitoring is undertaken by connecting the PID directly to the gas tap on the monitoring well installation.

Groundwater Level Monitoring

Groundwater levels are recorded with an electronic dip meter that has a detector end that is lowered into the borehole well. An audible signal is made when water is reached and the depth recorded from the graduated tape used to lower the detector. Where there is potential for a separate Light Non Aqueous Phase Liquid (LNAPL) to be present floating on the groundwater an oil/water interface meter is used in preference to a conventional dip meter so that any such floating product can be detected.

Geotechnical Sampling

BRD schedule a range of geotechnical testing as appropriate to the identified ground conditions, available budget and the proposed development. Different types of soil samples are obtained as appropriate to the ground conditions and planned testing.

SAMPLE TYPE	SYMBOL USED ON LOGS	DESCRIPTION
Disturbed	D	Small disturbed soil samples of about 1 to 2 kg are collected in plastic bags.
Bulk	B	Large disturbed bulk samples up to about 30 kg are collected in plastic bags
Undisturbed	U	'Undisturbed' samples generally collected in plastic or metal tubes within cable percussive boreholes of 100mm diameter for samples of fine soils of firm to stiff consistency. Can also be representative of samples taken by cutting plastic sample liners from windowless sampling drilling methods. It is recognised that such samples do not generally meet Eurocode sample quality requirements for the tests commonly employed. However, given the wealth of experience with these sampling methods this continues to be common in United Kingdom practice particularly for less sensitive developments where more expensive sampling techniques are not economically justifiable.
Undisturbed	UT	A thin walled steel sampler developed by Archway Engineering called a UT100 in an attempt to gain better quality samples of soft to firm fine soils when using cable percussive drilling methods.

Contamination Sampling

BRD schedule contamination testing as appropriate to the ground conditions, available budget, potential contaminants and the proposed development. Samples are collected in single use laboratory supplied containers.

Soil samples are retrieved in plastic containers and/or amber glass jars with a lined plastic cap. Contamination samples are indicated by a 'J' on exploratory hole logs.

Water samples are collected in plastic bottles and/or amber glass jars with a lined plastic cap then placed in cool boxes together with freezer packs. Water samples are indicated by a 'W' on exploratory hole records, but generally such samples are not tested as testing from dedicated monitoring wells is preferred for sample quality reasons.

Samples retrieved from the exploratory holes are dispatched to the laboratory by overnight courier. Where samples cannot be transported directly from site they are temporarily stored in the BRD dedicated sample storage facility which includes refrigeration where necessary. The individual accreditation of the test methods is detailed in the laboratory test report.

GEOTECHNICAL ASSESSMENT

Under Eurocode 7 (EC7) the following risk ranking is applied to geotechnical projects:

GEOTECHNICAL CATEGORY	DESCRIPTION
1	Small and relatively simple structures for which it is possible to ensure that the fundamental requirements will be satisfied on the basis of experience and qualitative geotechnical investigations with negligible risk. For example, straightforward ground conditions, local experience, no excavation below the water table unless this will be straight forward.
2	Conventional types of structures and foundations. No difficult soil or loading conditions. Quantitative geotechnical data and laboratory testing. Routine procedures for field and laboratory testing. Conventional structures and no exceptional geotechnical risk. For example, spread, raft and piled foundations, retaining walls, bridge piers and abutments, embankments, ground anchors, tunnels and excavations.
3	Those structures not in Categories 1 and 2 such as very large or unusual structures, structures involving abnormal risks, or unusual or exceptionally difficult ground or loading conditions. Structures in highly seismic areas. Structures in areas of probable site instability or persistent ground movements that require separate investigation or special measures.

GEOTECHNICAL PARAMETERS

Soakage Tests

Soakage tests comprise the filling of a test pit with water and recording the time taken for the water to drain away. The test are undertaken in general accordance with 'BRE Digest 365: Soakaway design', Building Research Establishment, 1991. Water is generally supplied by a tanker to allow fast filling of the pits with water. Repeat tests are undertaken where possible within the time available on site with the investigation budget.

Standard Penetration Tests

The standard penetration test (SPT) determines the resistance of soils at the base of a borehole to the dynamic penetration of a split barrel sampler and the recovering of disturbed samples for identification purposes. In gravelly soils and some soft rocks a solid cone is used in preference to the sampler.

The basis of the test consists in driving a sampler by dropping a hammer of 63.5 kg mass on from a height of 760 mm. The number of blows (N value) necessary to achieve a penetration of the sampler of 300 mm is recorded. The test is described in 'Geotechnical investigation and testing – Field testing – Part 3: Standard penetration test - BS EN ISO 22476-3:2005 Incorporating corrigendum no. 1', BSi, 2007.

The uncorrected N values of the SPT tests are recorded upon the borehole logs together with a record of blows for each 75mm test portion including the seating blows. Where the full test depth cannot be achieved due to refusal on hard stratum, the number of blows and the distance achieved is recorded and the N value given as >50. The abbreviation SPT(c) is used upon the logs indicates that the test was performed with a solid cone rather than a split spoon sampler.

It is necessary to apply a correction to the N values to account for the effects of energy delivery using the equation: $N_{60} = \frac{E_r}{60} N$ where E_r is the energy ratio of the specific test equipment.

In the case of tests in sand, for the effects of overburden and rod length the equation is modified to $N_{60} = \frac{E_r}{60} \times \lambda \times C_N \times N$ where λ is the correction factor for energy losses due to the rod length and C_N is the correction factor for vertical stress due to overburden of the soil.

Sulphate

In order to compare the laboratory soil test results with 'Concrete in aggressive ground. BRE Special Digest 1: 2005' (BRE, 2005) laboratory results are converted to SO_4 mg/l. QTS Environmental Ltd results are expressed as SO_4 g/l and so are multiplied by a factor of 1000 to convert to mg/l. Soil Property Testing Ltd laboratory results are expressed as SO_3 g/l and are multiplied by a factor of 1200 to express the results as SO_4 mg/l.

Index Property Tests

In accordance with National House Building Council (NHBC) Standards Chapter 4.2 - Building near trees, the laboratory plasticity indexes are assessed against their volume change potential. The Modified Plasticity Index is defined as the Plasticity Index of the soil multiplied by the percentage of particles with a nominal diameter of less than 425µm. Whilst the NHBC Standards were developed for residential buildings, the advice is equally applicable to a large number of other types of low rise structures.

Hand Shear Vane

The undrained shear strength of the fine (i.e. clay) soils at the site can be established using hand shear vane apparatus. Usually three readings are taken at every depth tested and the uncorrected results recorded on the exploratory point log. Shear vane readings from depths below 1.2m depth in trial pits are from tests performed on excavated soil. In accordance with Eurocode 7 – Geotechnical design – Part 2: Ground investigation and testing EN 1997-2:2007 the results should be corrected. BRD employ only simple correction methods as the more complex correction methodologies imply undue accuracy to a test that has distinct disadvantages and limitations.

Pocket Penetrometers

The Pocket Penetrometer is a lightweight instrument for use by field personnel to check visual classification of soils. It is a simple test and there is inherent uncertainty related to the small volume of soil being tested and so the results should be used with appropriate caution. Pocket penetrometers are calibrated in terms of unconfined compressive strength and once converted to undrained shear strength (divide by two) the results are further reduced by a factor of 1.5 - 2.0 as the device tends to overestimate strengths.

Instrument Reading (uncompressive strength in kg/cm ²)	Indicative Undrained Shear Strength (kN/m ²)	Indicative Consistency	Indicative strength
1.0	25 - 33	Soft	Low
1.5	38 - 50	Soft to firm	Low to medium
2.0	50 - 67	Firm	Medium
2.5	63 - 83	Firm to stiff	Medium to high
3.5	88 - 116	Stiff	High
4.5	113 - 150	Stiff to very stiff	High to very high

CONTAMINATION ASSESSMENT METHODOLOGY

UK Policy

The UK Government's policy in relation to land affected by historic contamination is based on a 'suitable for use' approach. The approach recognises that the risks presented by any given level of contamination will vary greatly according to the use of the land and a wide range of other factors, such as the underlying geology of the site. Contamination risks therefore need to be assessed on a site-by-site basis. The 'suitable for use' approach limits requirements for remediation to the work necessary to prevent unacceptable risks to human health or the environment in relation to either the current use or future use of the land.

The three main drivers for contamination assessment and remediation are:

- *Voluntary action.*
- *Development as part of the planning regime.*
- *Regulatory action to mitigate unacceptable risks e.g. Part 2A of the Environmental Protection Act 1990.*

Pollutant Linkages

For a contamination risk to exist there must be a 'pollutant linkage' from the contaminant (source) via a pathway (the route from contaminant to receptor) to a receptor (the entity that could be harmed). The absence of a contaminant, pathway or receptor breaks the pollutant linkage and therefore no contamination risk exists.

Contamination is typically present at a site (in the ground and/or in the underlying groundwater) as a result of a historic or current industrial use, usually as a result of leaks, spills or disposal of residues, wastes and excess raw materials from the industrial processes. Contamination may also be present due to:

- *The deliberate application of chemicals e.g. the spraying of herbicide/pesticide.*
- *Migration of pollutants from adjacent land.*

Naturally occurring processes e.g. elevated concentrations of particular heavy metals associated with specific geological strata.

Conceptual Site Model

The conceptual site model can be defined as a textual or graphical representation of the identified pollutant linkages for a given site. The model forms the basis for designing the investigation as the aim will be to target all of the potential pollutant linkages to determine, through the subsequent phases of risk assessment, whether or not they pose an actual risk.

It is important that the conceptual site model is updated with new information as the various investigation, risk assessment and remediation works are completed.

Technical Guidance

The technical and legal framework for contamination assessment is complex. The process adopted through this report for assessing contamination risks is in general accordance with the following guidance, as listed below:

- 'Investigation of Potentially Contaminated Sites - Code of Practice - BS 10175: 2011', BSi, 2011.
- 'Model Procedures for the management of Land Contamination - CLR Document No. 11', Environment Agency, 2004.
- 'Guidance for the safe development of housing on land affected by contamination - R&D66: 2008', NHBC/Environment Agency, 2008.

Risk Assessment Methodology

In line with the technical guidance, the contamination risk assessment follows a series of phased stages for each particular site:

PHASE	DESCRIPTION	RISK ASSESSMENT STAGE
PHASE 1	Generally limited to desk based research and a site walkover survey to develop an initial conceptual site model and identify what risks, if any, are likely to be presented by the site.	Hazard Identification and Assessment A preliminary stage of risk assessment concerned with identifying and characterising the hazards that may be associated with a particular site and identifying potential pollutant linkages.
PHASE 2	This phase is concerned with establishing whether contamination is present, usually through intrusive ground investigation, and then evaluating the degree and magnitude of the associated risks.	Risk Estimation A stage concerned with estimating the likelihood that receptors will suffer adverse effects if they come into contact with, or are otherwise affected by, a hazardous substance or agent under defined conditions. Risk Evaluation A stage of risk assessment concerned with evaluating the acceptability of estimated risks, taking into account the nature and scale of the risk estimates, any uncertainties associated with the assessment and the broad costs and benefits of taking action to mitigate risks.
PHASE 3	The appraisal and selection of remediation techniques, their implementation and verification.	Risk Management The process whereby decisions are made to accept a known or assessed risk and/or the implementation of action to reduce the consequences or probabilities of occurrence.

Risk Classification

The objective of risk assessment is to identify the nature and magnitude of the potential risks and should be based on a consideration of both:

- The likelihood/probability of an event [taking into account both the presence of the hazard and receptor and the integrity of the pathway].
- The severity of the potential consequence [taking into account both the potential severity of the hazard and the sensitivity of the receptor].

There is a need for a logical, transparent and repeatable system in defining the categories of severity of consequence and likelihood as well as for the risk itself and therefore the following risk rating matrix is employed:

		SEVERITY OF CONSEQUENCE			
		SEVERE	MEDIUM	MILD	MINOR
PROBABILITY	HIGH LIKELIHOOD	Very High Risk	High Risk	Moderate Risk	Moderate/Low Risk
	LIKELY	High Risk	Moderate Risk	Moderate/Low Risk	Low Risk
	LOW LIKELIHOOD	Moderate Risk	Moderate/Low Risk	Low Risk	Negligible Risk
	UNLIKELY	Moderate/Low Risk	Low Risk	Negligible Risk	Negligible Risk

These risk classifications are defined as follows:

- **Very High Risk** - There is a high probability that severe harm could arise to a designated receptor from an identified hazard at the site without appropriate remediation action.
- **High Risk** - Harm is likely to arise to a designated receptor from an identified hazard at the site without appropriate remediation action.
- **Moderate Risk** - It is possible that without appropriate remediation action harm could arise to a designated receptor. It is relatively unlikely that any such harm would be severe, and if any harm were to occur it is more likely that such harm would be relatively mild.
- **Low Risk** - It is possible that harm could arise to a designated receptor from an identified hazard. It is likely that, at worst if any harm was realised any effects would be mild.
- **Negligible Risk** - The presence of an identified hazard does not give rise to the potential to cause harm to a designated receptor.

This risk assessment matrix and classification system is based on guidance produced by Department for Environment, Food and Rural Affairs (Defra) and the Environment Agency in connection with contaminated land assessment.

RISK ESTIMATION - SOILS

Introduction to Soil Human Health Generic Assessment Criteria (GAC)

The Environment Agency (EA) and Department of Environment Food and Rural Affairs (DEFRA) had previously issued revised guidance following the consultation about the DEFRA publication "Assessing risks from land contamination - a proportionate approach. Soil Guideline Values: the Way Forward". This resulted in a revised version of the Contaminated Land Exposure Model (CLEA) model (version 1.06) and a few of the previously published Soil Guideline Values (SGVs) were revised.

The main legislative driver for dealing with historical land affected by contamination is Part 2A of the Environmental Protection Act 1990. Revised Statutory Guidance to support Part 2A was published in April 2012. This Guidance introduced a new four-category system for classifying land under Part 2A for cases of a Significant Possibility of Significant Harm to human health,¹ where Category 1 includes land where the level of risk is clearly unacceptable and Category 4 includes land where the level of risk posed is acceptably low. The impact assessment for the new Statutory Guidance stated "The new statutory guidance will bring about a situation where the current SGVs/GACs are replaced with more pragmatic (but still strongly precautionary) Category 4 screening levels (C4SLs) which will provide a higher simple test for deciding that land is suitable for use and definitely not contaminated land". The C4SLs are still derived using the CLEA model, but adopt a slightly different approach to toxicological assessment and exposure modelling.

In March 2014, the outcome of "SP1010 - Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination - Final Project Report" (CL:AIRE) was published. Due to slightly ambiguous wording within this report, Lord de Mauley, Parliamentary Under Secretary, DEFRA wrote to all local authorities on 3 September 2014 to confirm that the published C4SLs were final and that they can be used in risk assessment undertaken under the planning regime.

Whilst there are proposals for the industry to develop C4SLs for other contaminants, these have yet to produce any new values. BRD do not believe that C4SLs could be developed by a single organisation with sufficient confidence. BRD has therefore employed other, more conservative guidance based on the CLEA model (detailed below) within this assessment for compounds where C4SLs are not available. However, it should be noted that the results of this investigation may need to be reinterpreted as new C4SLs become available.

Due to the limited number of published C4SL values at this time, the Chartered Institute of Environmental health (CIEH) and Land Quality Management Ltd (LQM) have produced Generic Assessment Criteria (GAC) known as Suitable for Use Levels (S4ULs), for use in contaminated land human health risk assessment. These S4ULs (2014) have been derived for a large number of substances using the current CLEA model and are therefore consistent with current guidance. They also incorporate the revised exposure parameters as adopted by the C4SL programme, but have not adopted the revised toxicological approach adopted by the C4SLs and so remain a more conservative assessment criteria. The substances for which SGVs were previously published have also been revised as new S4ULs in light of the new exposure parameters proposed by the C4SL programme, and therefore effectively replace the existing SGVs.

In addition, in December 2009, other GAC for less common substances were produced by the Environmental Industries Commission (EIC), The Association of Geotechnical and Geoenvironmental Specialists (AGS) and Contaminated Land: Applications in Real Environments (CL:AIRE) using the CLEA model. These are referred to as the EIC/AGS/CLAIRE GAC.

In summary, C4SLs have been used where these are available. For those substances where C4SLs have yet to be issued, then the S4ULs have been adopted or in some cases, the EIC/AGS/CLAIRE GAC. All of the previously produced SGVs have now either been withdrawn, or superseded by the respective C4SLs or S4ULs.

The only exception to this approach is the PAH compound benzo(a)pyrene (BaP) where a C4SL guideline value has been produced, whereas BRD has adopted the S4UL value. The C4SL for BaP relates to its use as a surrogate marker compound representing all of the genotoxic PAH compounds as a mixture, rather than this individual compound. BRD has therefore adopted the compound specific S4UL value as the initial screening value, for consistency with the other PAH compounds before then employing the C4SL is necessary.

It should be noted that unless otherwise stated, all the assessment criteria adopted within this report have been derived based on a sandy loam soil at pH 7 and the values quoted are for a conservative soil organic matter content of 1% where applicable (i.e. organic contaminants).

Human Health - Soil Generic Assessment Criteria

The results of the soils analysis have been compared to generic assessment criteria for the default exposure scenarios comprising either residential land with plant uptake, residential land without plant uptake, or commercial/industrial land use. The criteria values selected are listed in the table below and full details on the source are referred to above. Where applicable, the results have also been assessed with reference to the required statistical tests presented within CLAIRE document "Guidance on comparing soil contamination data with a critical concentration".

ANALYSIS	GENERIC ASSESSMENT CRITERIA (mg/kg unless stated)			SOURCE
	RESIDENTIAL WITH PLANT UPTAKE	RESIDENTIAL WITHOUT PLANT UPTAKE	COMMERCIAL / INDUSTRIAL	
Arsenic	37	40	640	C4SL
Cadmium	22	150	410	
Chromium (total) ⁵	910	910	8,600	S4UL
Chromium VI	21	21	49	C4SL
Lead	200	310	2,330	
Mercury*	11	15	320	S4UL
Selenium	250	430	12,000	
Nickel	180	180	980	
Copper	2400	7,100	68,000	
Zinc	3,700	40,000	730,000	
pH	<5 - 10> units			Professional judgement
Naphthalene	2.3	2.3	190	S4UL
Acenaphthylene	170	2,900	83,000	
Acenaphthene	210	3,000	84,000	
Fluorene	170	2,800	63,000	
Phenanthrene	95	1,300	22,000	
Anthracene	2,400	31,000	520,000	
Fluoranthene	280	1,500	23,000	
Pyrene	620	3,700	54,000	
Benzo(a)anthracene	7.2	11	170	
Chrysene	15	30	350	
Benzo(b)fluoranthene	2.6	3.9	44	
Benzo(k)fluoranthene	77	110	1,200	
Benzo(a)pyrene	2.2	3.2	35	
Indeno(1,2,3-cd)pyrene	27	45	500	

ANALYSIS	GENERIC ASSESSMENT CRITERIA (mg/kg unless stated)			SOURCE
	RESIDENTIAL WITH PLANT UPTAKE	RESIDENTIAL WITHOUT PLANT UPTAKE	COMMERCIAL / INDUSTRIAL	
Dibenzo(a,h)anthracene	0.24	0.31	3.5	S4UL
Benzo(ghi)perylene	320	360	3,900	
TPH Aliphatic C5-C6	42	42	3,200	
TPH Aliphatic C6-C8	100	100	7,800	
TPH Aliphatic C8-C10	27	27	2,000	
TPH Aliphatic C10-C12	130	130	9,700	
TPH Aliphatic C12-C16	1,100	1,100	59,000	
TPH Aliphatic C16-C35	65,000	65,000	1,600,000	
TPH Aliphatic C35-C44	65,000	65,000	1,600,000	
TPH Aromatic C5-C7	70	370	26,000	
TPH Aromatic C7-C8	130	860	56,000	
TPH Aromatic C8-C10	34	47	3,500	
TPH Aromatic C10-C12	74	250	16,000	
TPH Aromatic C12-C16	140	1,800	36,000	
TPH Aromatic C16-C21	260	1,900	28,000	
TPH Aromatic C21-C35	1,100	1,900	28,000	
TPH Aromatic C35-C44	1,100	1,900	28,000	
Benzene	0.87	3.3	98	C4SL
Toluene	130	880	56,000	S4UL
Ethylbenzene	47	83	5,700	
Xylene [^]	56	79	5,900	EIC/AGS/CL:AIRE GAC
MTBE	49	73	7,900	

Notes:

* The S4UL for methyl mercury has been adopted as the worst case mercury compound as generally there is no desk study evidence to suggest the potential for elemental mercury on the majority of sites.

[^] The lowest S4UL of either p-xylene, o-xylene or m-xylene has been adopted for each land use as a conservative measure.

⁵ S4UL for Chromium III adopted, as in the absence of Chromium VI it is likely that all of the chromium will be in this form as these are the two most common and stable forms of chromium in the soil environment.

Where no GAC is available, any concentrations exceeding the laboratory limit of detection are identified and discussed in more detail.

Water Environment - Soil Generic Assessment Criteria

There are no UK published Generic Assessment Criteria for soil test results in respect of the risk to the water environment and therefore risk estimation is on the basis of the professional judgement and experience of BRD to employ values that are a reasonable concentration above which concern for water resources is valid.

The Total PAH GAC employed is the sum of the 16No. priority PAH compounds regularly tested for in contaminated land analysis (i.e. US EPA 16PAHs). BRD employ a soil screening based upon the total PAH limit for 'inert waste' of 100mg/kg. The rationale is based on PAHs are recognised to be generally of low solubility and the risk to the water environment is correspondingly low.

In respect of Total Petroleum Hydrocarbons, BRD employ a value of 500 mg/kg as a screening value in comparison to the sum of the component aliphatic and aromatic TPH carbon bands. The employed soil screening value is based upon:

- In common with some other consultants, the professional judgement and experience of BRD suggests that this value is a reasonable concentration above which concern for water resources is valid. The rationale is based on the fact that lower concentrations of fuel based contaminants are more likely to naturally degrade than migrate any great distance.*
- BRD is aware of regional Environment Agency groundwater and contaminated land teams that employ 500 mg/kg as a screening value for considering whether or not TPH could represent a risk to water resources.*
- The value mirrors the mineral oil Waste Acceptance Criteria limits for what is considered 'inert waste'.*

Should elevated contaminants that pose a potential risk to the water environment be identified then site specific assessment criteria should be developed.

Building Materials and Services - Soil Generic Assessment Criteria

Some hydrocarbon compounds are known to both attack and permeate through certain plastic pipe materials, with the primary concern being the degradation and tainting of water supplies. The UK Water Industry Research (UKWIR) has therefore produced a document 'Guidance for the Selection of Water Supply Pipes to be used in Brownfield Sites' (ref. 10/WM/03/21) that specifies threshold criteria for the adoption of 'standard' polythene (PE) or PVC pipes, protective barrier pipe and ductile iron/steel/copper pipes.

The UKWIR threshold assessment criteria from Table 3.1 of this document for standard PE pipes have been employed. It should be noted that the approach taken by UKWIR is very conservative, and both the document and research are flawed. However, it is these values that are being using to specify water pipe materials and therefore it is appropriate to consider them.

The UKWIR guidance is particularly flawed in respect of the chemical analysis it expects as it seeks a limit of detection that is generally below limits that are reasonable or commonly employed in contaminated land assessment. The UKWIR seeks that where a substance is below the limit of detection it should be taken as being present at half this concentration. For the larger suite of chemicals where the limit is against a sum of compounds, this approach would mean that a sample of virgin sub-soil from a greenfield site with absolutely no contamination would actually fail the criteria for using standard PE pipes. To avoid this situation, BRD have adopted the approach of summing only those compounds detected above their respective limits of detection.

In terms of building materials, the primary concern is in respect of concrete as certain commonly occurring natural ground conditions can adversely impact on buried concrete as discussed in 'Special digest 1:2005 Concrete in aggressive ground', BRE, 2005.

ANALYSIS	GENERIC ASSESSMENT CRITERIA	SOURCE
pH	<5.5	BRE Special Digest 1:2005
Sulphate (w/s)	500 mg/l	BRE Special Digest 1:2005
Sum of any VOC above detection limits	0.5 mg/kg	Relevant compounds adapted from UKWIR Table 3.1
Sum of SVOC + Aliphatic TPH >C5-C10 + Aromatic TPH >C5-C10 above detection limits	2 mg/kg	
Sum of Aliphatic TPH >C10-C21 + Aromatic TPH >C10-C21 above detection limits	10 mg/kg	
Sum of Aliphatic TPH >C21-C34 + Aromatic TPH >C10-C35 above detection limits	500 mg/kg	
Sum of BTEX + MTBE above detection limits	0.1 mg/kg	
Phenols	2 mg/kg	
Cresols and chlorinated phenols	2 mg/kg	
Naphthalene	0.5 mg/kg	
Benzo(a)pyrene	0.5 mg/kg	

RISK ESTIMATION - GROUNDWATER

The initial assessment of the contamination risk to groundwater is by comparing dissolved groundwater concentrations with screening values that are protective of groundwater resources.

The reference source for the target concentrations is generally the EA's Environmental Quality Standards (EQS), the Water Supply (Water Quality) Regulations (WSR) 1989 / 2000 and the DW1/DW2 criteria from the Surface Water (Abstraction for drinking water)(classification) Regulations 1996. The target concentrations are outlined in the table overleaf.

ANALYSIS	GENERIC ASSESSMENT CRITERIA	SOURCE
Arsenic	50 µg/l	EQS
Cadmium	5 µg/l	EQS
Chromium (total)	50 µg/l	DW2
Copper	50 µg/l	DW2
Nickel	20 µg/l	WSR
Lead	50 µg/l	DW2
Mercury	1 µg/l	EQS
Selenium	10 µg/l	WSR
Zinc	5 mg/l	DW2
Cyanide	50 µg/l	WSR
pH	6 to 9 units	EQS
Benzene	30 µg/l	EQS
Toluene	50 µg/l	EQS
Ethylbenzene	30 µg/l	EQS for benzene as a guide
Xylene	30 µg/l	EQS for benzene as a guide
Naphthalene	2.4 µg/l	EQS
Benzo(a)pyrene	0.05 µg/l	EQS
Total PAH	0.2 µg/l	DW1
TPH (dissolved or emulsified hydrocarbons)	50 µg/l	DW1

There are no available generic assessment criteria for some of the analytical parameters which have been scheduled, for example hexavalent chromium, and individual TPH and PAH and some VOC compounds. These parameters will be assessed based on professional judgement should they exceed the limit of detection.

RISK ESTIMATION - GROUND GAS

Introduction

A variety of potentially hazardous gases occur in naturally in the ground environment. Microbial decay of organic matter under anaerobic conditions and geological processes can lead to the generation of Methane and Carbon Dioxide, but can also include traces gases such as Hydrogen sulphide and Carbon monoxide.

Methane is a colourless and odourless gas that has the hazardous properties of being flammable and, at certain air/Methane mixtures, explosive. Methane has a low toxicity, but can be a simple asphyxiant due to the displacement of oxygen.

Carbon Dioxide is a colourless, odourless and non-combustible gas that has the hazardous property of being a highly toxic chemical. At concentrations of 3% by volume, shortness of breath and headaches will occur becoming acute by 6%. At levels of above 10% by volume headache, visual distortion, tremors and rapid loss of consciousness occur. Concentrations of Carbon Dioxide above 22% by volume are likely to be fatal. The effects of Carbon Dioxide poisoning are made more severe if there is accompanying reduction in oxygen concentrations.

Hydrogen sulphide is a colourless and flammable gas that has an odour of rotten eggs. It is important to that the sense of smell is over powered at higher concentrations. The gas is toxic and can be an asphyxiant.

Carbon monoxide is a colourless, odourless and explosive gas in air mixtures that has the hazardous property of being a highly toxic chemical.

Radon is a naturally occurring colourless and odourless gas that is radioactive. It is formed by the radioactive decay of radium which in turn is derived from the radioactive decay of uranium, both of which are minerals that can be found in many soil types. Whilst it is recognised that the air inside every house contains radon, some houses built in certain defined areas of the country might have unacceptably high concentrations and require special precautions to be taken. The maps contained within BRE211:2007 'Radon: guidance on protective measures for new buildings' identify areas where no radon protection measures are necessary or where higher concentrations are present that either basic or full radon protection measures are required to be fitted to all new dwellings.

Basis of Gas Assessment

In order to classify the level of risk and need, if any, for gas protection measures at a site with the potential for a gas problem, consideration of each of the following is necessary:

- The source of the gas.*
- The generation potential of the gas.*
- The location of the source and the geological setting.*
- Boreholes flow rate and estimated surface emission rate.*

- The nature of the proposed development.
- Confidence in the knowledge of the gas regime.

The gas assessment is made with reference to 'C665 - Assessing risks posed by hazardous ground gases to buildings', Construction Industry Research and Information Association (CIRIA), 2007.

Gas Screening Value

The method within CIRIA C665 uses both the gas concentrations and borehole flow rates to define a characteristic situation for a site based on the limiting borehole gas volume flow for Methane and Carbon Dioxide. This limiting borehole gas volume flow is called the Gas Screening Value (GSV) and is expressed below:

$$\text{Gas Screening Value (l / hr)} = \text{borehole flow rate (l/hr)} \times \text{gas concentration (fraction)}$$

The calculation of GSV is completed for both Methane and Carbon Dioxide and then the 'worse case' maximum values are used in the assessment. The assessment is to determine the gas regime at the site is dependent upon the nature of the development.

Situation A - All development types except low rise housing with gardens.

The characteristic situation for many sites is determined from evaluation of the Gas Screening Value derived against the criteria in the following table.

Characteristic situation	Risk classification	Gas Screening Value (CH ₄ or CO ₂ l/hr)	Additional factors	Typical sources of generation
1	Very low risk	<0.07	Typically Methane ≤1% and/or Carbon Dioxide ≤5%. Otherwise consider an increase to characteristic situation 2.	Natural soils with low organic matter content and 'typical' made ground.
2	Low risk	<0.7	Borehole air flow rate not to exceed 70 l/hr. Otherwise consider an increase to characteristic situation 3.	Natural soil with high organic peat/organic content and 'typical' made ground.
3	Moderate risk	<3.5		Old landfill, inert waste and flooded mine working.
4	Moderate to high risk	<15	Quantitative risk assessment required to evaluate scope of protection measures.	Mine working susceptible to flooding and landfill completed to WMP 26B criteria.
5	High risk	<70		Mine working unflooded inactive with shallow workings near surface.
6	Very high risk	>70		Recent landfill site.

Situation B - Low rise housing with gardens - NHBC 'Traffic Lights'

The NHBC model for low rise housing development considered a typical residential house with a ground floor area of 64m², suspended floor and ventilated sub-floor void of height 150mm. Where the proposed development of a site is consistent with this model, the NHBC traffic light situation of the site is determined from evaluation of the Gas Screening Value against the criteria in the following table.

Traffic Lights	Methane		Carbon Dioxide	
	Typical maximum concentrations (%)	Gas Screening Value (l/hr)	Typical maximum concentrations (%)	Gas Screening Value (l/hr)
Green	≤1	≤0.16	≤5	≤0.78
Amber 1	1 > to ≤5	>0.16 to ≤0.63	>5 to ≤10	>0.78 to ≤1.56
Amber 2	5 > to ≤20	>0.63 to ≤1.56	>10 to ≤30	>1.56 to ≤3.13
Red	>20	>1.56	>30	>3.13

APPENDIX 1

Site Location Plan



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Not to scale.

Project Title: Winchester Road, Hedge End
Client: Gleeson Strategic Land and Miller Homes
BRD Reference: BRD2924-OP3-A
Date Issued: August 2017



Site Walkover Photographs



Plate 1: Northern fields area view.



Plate 2: Northern fields area view.

Project Title: Winchester Road, Hedge End
Client: Gleeson Strategic Land and Miller Homes
BRD Reference: BRD2924-OP4-A
Date Issued: September 2017

Site Walkover Photographs



Plate 3: Northern fields area view. Park Farm to the bottom.



Plate 4: Park Farm general view.

Project Title: Winchester Road, Hedge End
Client: Gleeson Strategic Land and Miller Homes
BRD Reference: BRD2924-OP4-A
Date Issued: September 2017

Site Walkover Photographs



Plate 5: Park Farm entrance.



Plate 6: Park Farm store buildings.

Project Title: Winchester Road, Hedge End
Client: Gleeson Strategic Land and Miller Homes
BRD Reference: BRD2924-OP4-A
Date Issued: September 2017

Site Walkover Photographs



Plate 7: Southern fields. View from western corner to the south.



Plate 8: Southern fields. Ridge view from west to south.

Project Title: Winchester Road, Hedge End
Client: Gleeson Strategic Land and Miller Homes
BRD Reference: BRD2924-OP4-A
Date Issued: September 2017



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Site Walkover Photographs



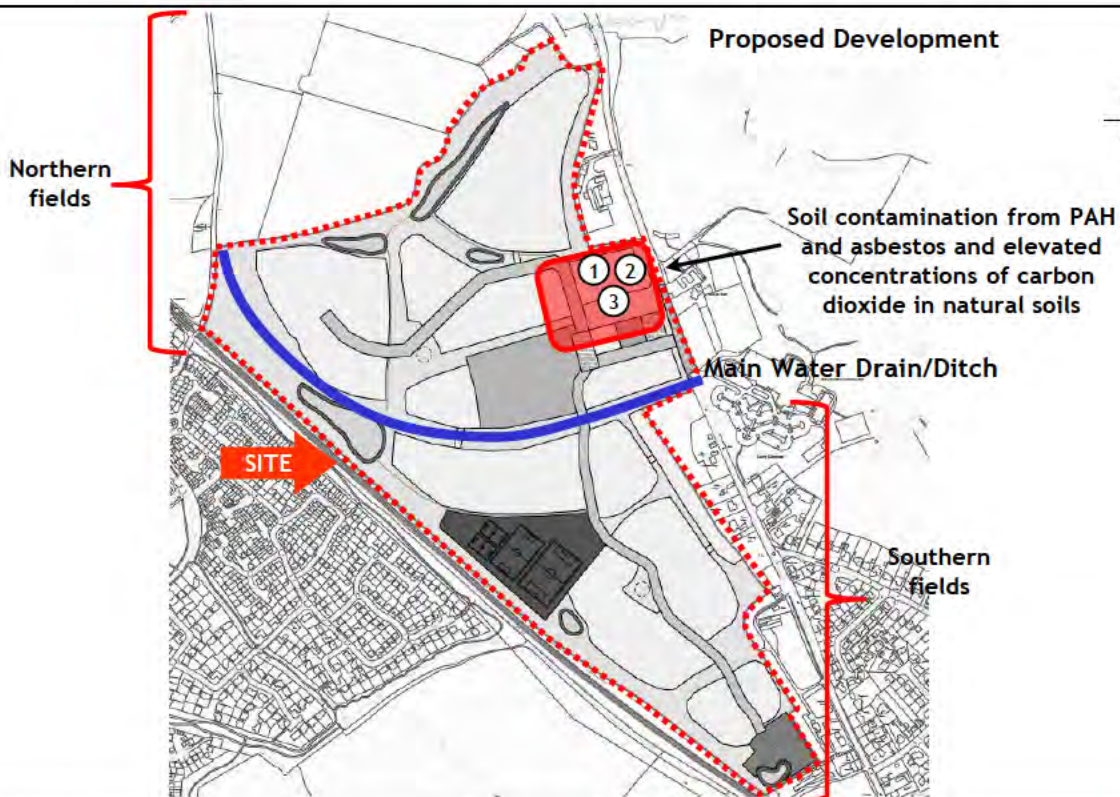
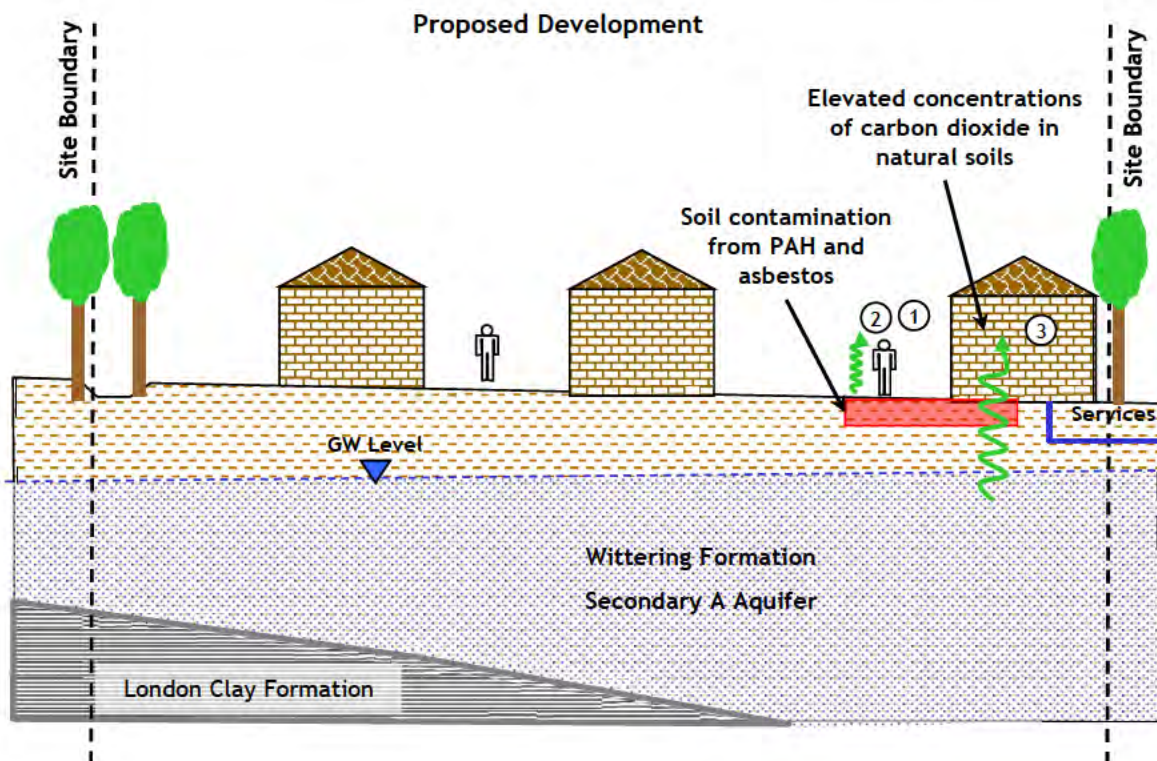
Plate 9: Southern fields. Manure stockpile.



Plate 10: Southern fields. Maize crops.

Project Title: Winchester Road, Hedge End
Client: Gleeson Strategic Land and Miller Homes
BRD Reference: BRD2924-OP4-A
Date Issued: September 2017

Revised Conceptual Model



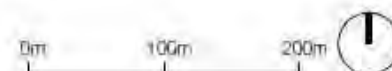
Project Title: Winchester Road, Hedge End
 Client: Gleeson Strategic Land and Miller Homes
 BRD Reference: BRD2924-OP5-B
 Date Issued: September 2017



01295 272244
 info@brduk.com

- Red line - 45.41 ha
- Residential development areas
- Mixed use
- Land for primary school
- Primary and secondary movement corridor
- Road crossing open space
- Public square
- Formal open space
- Informal open space
- Attenuation basin
- Proposed swale locations
- Allotments
- Highway improvement works
- Play areas for children
(Areas to include play equipment or natural play. Minimum total area across the two locations to be 0.062ha)

Not to scale



Hedge End
Hedge End Consortium

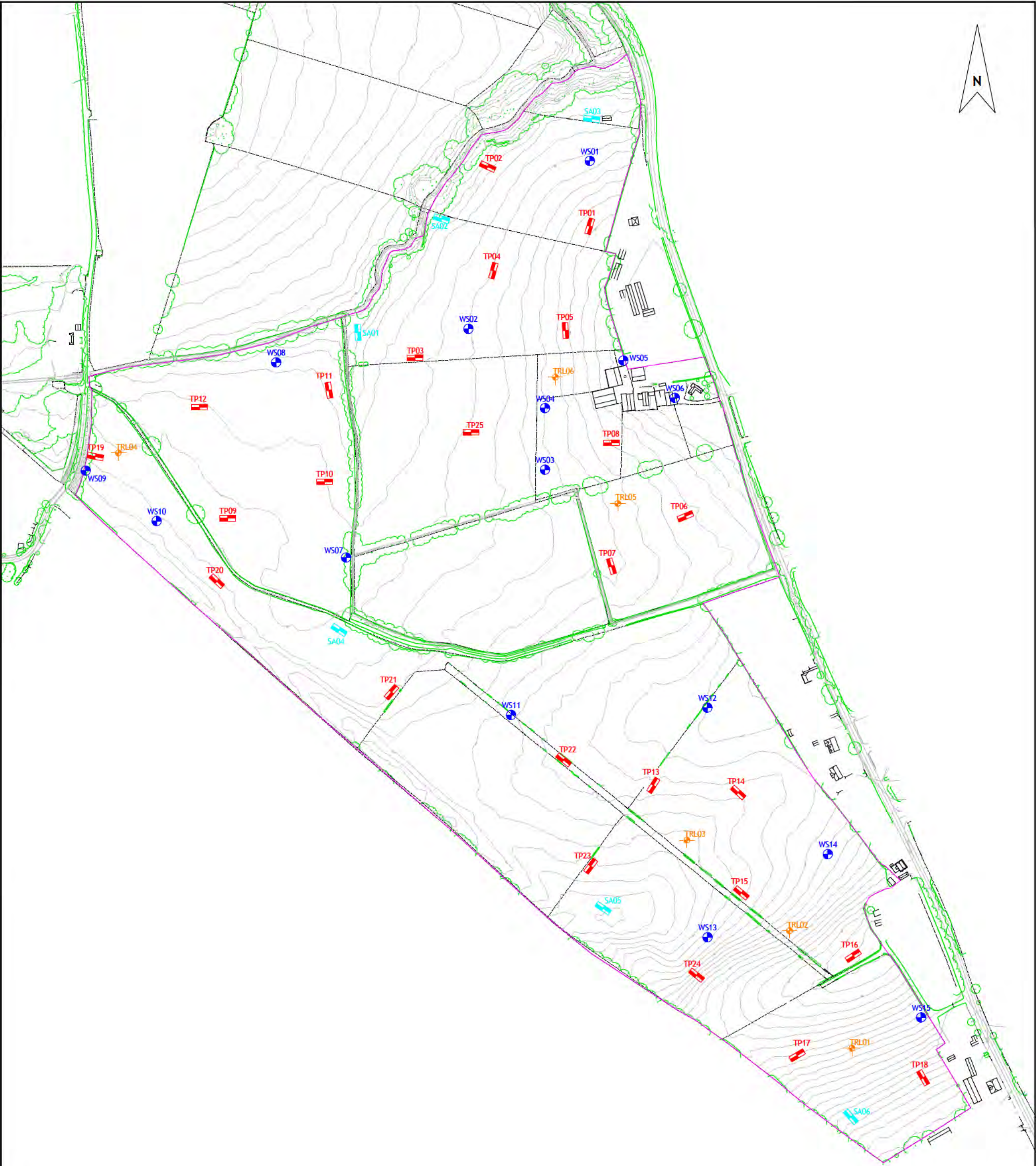
Boorley Gardens
Land use plan

143405/LU3/003	Revision F
Final	Drawn and Dec 2014
150000/A3	Drawn by KD Checked by JM

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- Key:
- BRD Windowless Sample Borehole Location
 - BRD Trial Pit Locations
 - BRD Soakage Pit Locations
 - BRD TRL Test Locations
 - Site Boundary Location (Approximate Location)

Notes:

All exploratory point are located using an recreational handheld GPS unless otherwise stated.

Drawing reproduced from: Antony Brooks Surveys Ltd
Title: Topographical Survey. Site: Hedge End, Eastleigh
Drawing No: A258/7838/1D,1F,1G,1H,2E and 2J. Dated: June 2014

Rev.	Date	Description	Drawn	Approved
Drawing Title				
EXPLORATORY POINT PLAN				
Project title				
WINCHESTER ROAD, HEDGE END				
Client				
GLEESON STRATEGIC LAND AND MILLER HOMES				
Scale	Original dtp. size/colour	Date		
1:2000	A1 / C	01/08/2017		
Drawn	Checked	Approved	Rev.	
DB	AL	BD	A	
Drawing Number				
BRD2924-OD1				
BRD Environmental Ltd				
01295 272244				
info@brduk.com				
www.brduk.com				

APPENDIX 2

TRIAL PIT RECORD

Client: Gleeson Strategic Land and Miller Homes Project Title: Winchester Road, Hedge End Project No: BRD2924 Logged By: A Leon Date Completed: 24/07/2017 Method Used: 180° Backhoe excavator (JCB 3CX type)				Trial Pit No. TP01		
				Sheet 1 of 1		
Samples & Tests			Description of Strata	Depth / (Level)	Geology	Legend
Depth	Type & No	Value				
0.20	J1		TOPSOIL: Grass over: Dark brown, slightly gravelly, slightly sandy, silty clay with roots. Gravel of fine to medium, angular to subrounded chert. Firm to stiff, grey mottled orange, slightly sandy, silty CLAY with rootlets, occasional fine to medium, angular chert gravel and occasional white, sandy partings.	0.25 ()	TS WITTERING FORMATION	
0.80	J2					
0.90	B1			1		
1.10	SV	55/72/52 kPa				
1.40	SV B2	58/70/62 kPa	1.50 m: Becoming brown mottled orange with crumbly texture.			
2.00	SV B3	80/86/80 kPa	2.00 m: Becoming very silty CLAY with gravel sized mudstone lithorelicts.	2		
2.60	B4			2.70 ()		
				3		
				4		
Pit Stability: Generally stable throughout Groundwater: Not encountered					Surface Elevation Level:	
Plan of Trial Pit: 			General Remarks: Trial pit terminated at 2.70m bgl.			
All dimensions in metres Log Scale 1:25					 Telephone: 01295 272244 Email: info@brduk.com	

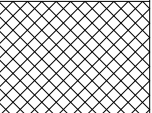
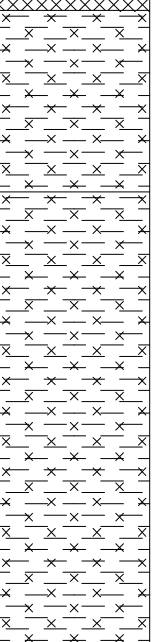
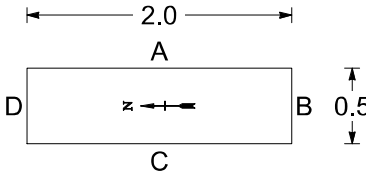
TRIAL PIT RECORD

Client: Gleeson Strategic Land and Miller Homes Project Title: Winchester Road, Hedge End Project No: BRD2924 Logged By: A Leon Date Completed: 24/07/2017 Method Used: 180° Backhoe excavator (JCB 3CX type)				Trial Pit No. TP02		
				Sheet 1 of 1		
Samples & Tests			Description of Strata	Depth / (Level)	Geology	Legend
Depth	Type & No	Value				
0.10	J1		TOPSOIL: Grass over: Dark brown, slightly gravelly, slightly sandy, silty clay with roots. Gravel of fine to medium, angular to subrounded chert.	0.25 ()	TS	
0.60	J2		Firm, orange mottled grey, slightly sandy, silty CLAY with rootlets and rare, subangular chert gravel. Greenish grey mottled reddish orange sandy partings. 0.40 m: Active root of 3cm diameter.			
0.80	B1					
1.60	D1		1.00 m: Becoming sandy, very silty CLAY.	1		
			Medium dense, orange brown, silty SAND.	2.10 ()	WITTERING FORMATION	
2.40	D2		Medium dense, wet, bluish grey, silty SAND with occasional thin, intercalated clay beds. Occasional medium to coarse, rounded sandstone gravel.	2.40 ()		
				2.90 ()		
				3		
				4		
Pit Stability: Pit sides collapsed on encountering groundwater Groundwater: Ingress at 2.60m bgl.				Surface Elevation Level:		
Plan of Trial Pit: 			General Remarks: Trial pit terminated at 2.90m bgl.			
			All dimensions in metres Log Scale 1:25			
			Telephone: 01295 272244 Email: info@brduk.com			

TRIAL PIT RECORD

Client: Gleeson Strategic Land and Miller Homes Project Title: Winchester Road, Hedge End Project No: BRD2924 Logged By: A Leon Date Completed: 24/07/2017 Method Used: 180° Backhoe excavator (JCB 3CX type)				Trial Pit No. TP03		
				Sheet 1 of 1		
Samples & Tests			Description of Strata	Depth / (Level)	Geology	Legend
Depth	Type & No	Value				
0.30	J1		TOPSOIL: Grass over: Dark brown, slightly gravelly, slightly sandy, silty clay with roots and occasional charcoal fragments. Gravel of fine to medium, angular to subrounded chert.	0.40 ()	TS	
0.80 0.90	SV J2 B1	30/40/36 kPa	Firm, green mottled orange, very sandy, silty CLAY with occasional fine to medium chert gravel.			
1.10	B2		1.10 m: Becoming gravelly, sandy, silty CLAY.	1	WITTERING FORMATION	
1.30	J3					
1.70	SV	60/60/52 kPa	Firm, light grey mottled orange with natural black staining, CLAY with greenish and orange sandy partings, subhorizontal polished surfaces and orange, gravelly pockets. Gravel of fine to medium, subangular to rounded chert.	1.60 ()		
1.90	SV B3	70/62/70 kPa		2		
				2.70 ()		
				3		
				4		
Pit Stability: Generally stable throughout Groundwater: Not encountered					Surface Elevation Level:	
Plan of Trial Pit: 			General Remarks: Trial pit terminated at 2.90m bgl.			
All dimensions in metres Log Scale 1:25						
Telephone: 01295 272244 Email: info@brduk.com						

TRIAL PIT RECORD

Client: Gleeson Strategic Land and Miller Homes Project Title: Winchester Road, Hedge End Project No: BRD2924 Logged By: A Leon Date Completed: 24/07/2017 Method Used: 180° Backhoe excavator (JCB 3CX type)				Trial Pit No. TP04		
Sheet 1 of 1						
Samples & Tests			Description of Strata	Depth / (Level)	Geology	Legend
Depth	Type & No	Value				
0.90	SV B1	52/52/54 kPa	MADE GROUND/TOPSOIL: Grass over: Dark brown, slightly gravelly, slightly sandy, silty clay topsoil with roots and occasional charcoal and clinker fragments. Gravel of fine to medium, angular to subrounded chert.	0.40 ()	MG/TS	
			Firm, crumbly texture, grey mottled orange, very silty CLAY with relict rootlets.			
1.20	SV	58/54/56 kPa	Firm to stiff, light grey and occasionally mottled orange, silty CLAY.	1.00 ()	WITTERING FORMATION	
2.20	SV D1	60/58/60				
				3		
				4		
Pit Stability: Generally stable throughout Groundwater: Slight seepage at 2.20m bgl.					Surface Elevation Level:	
Plan of Trial Pit: 			General Remarks: Trial pit terminated at 2.50m bgl.			
All dimensions in metres Log Scale 1:25						
						
Telephone: 01295 272244 Email: info@brduk.com						

TRIAL PIT RECORD

Client: Gleeson Strategic Land and Miller Homes Project Title: Winchester Road, Hedge End Project No: BRD2924 Logged By: A Leon Date Completed: 24/07/2017 Method Used: 180° Backhoe excavator (JCB 3CX type)						Trial Pit No. TP05 Sheet 1 of 1	
Samples & Tests			Description of Strata	Depth / (Level)	Geology	Legend	
Depth	Type & No	Value					
0.30	J1		TOPSOIL: Grass over: Dark brown, slightly gravelly, slightly sandy, silty clay with roots. Gravel of fine to medium, angular to subrounded chert.	0.40 () 1 1.70 () 2 2.90 () 3 4	TS		
0.80	J2		Firm, light grey mottled orange, silty CLAY with orange, silty partings and rare, fine to medium, angular chert gravel.				
1.50	D1		1.00 m: Becoming firm to stiff, light grey, occasionally mottled orange and yellow stained with a crumbly texture with no gravel.				
1.70	SV	80/74/76 kPa	Firm to stiff, light grey, silty CLAY with grey and brown mudstone gravel lithorelicts.				
2.00	D2		2.50 m: Becoming wet, grey with brown stained surfaces and recovered mudstone gravel lithorelicts.				
2.80	D3						
Pit Stability: Generally stable throughout Groundwater: Not encountered						Surface Elevation Level:	
Plan of Trial Pit: 				General Remarks: Trial pit terminated at 2.90m bgl.			
				All dimensions in metres Log Scale 1:25 Telephone: 01295 272244 Email: info@brduk.com			

TRIAL PIT RECORD

Client: Gleeson Strategic Land and Miller Homes Project Title: Winchester Road, Hedge End Project No: BRD2924 Logged By: A Leon Date Completed: 24/07/2017 Method Used: 180° Backhoe excavator (JCB 3CX type)				Trial Pit No. TP06		
				Sheet 1 of 1		
Samples & Tests			Description of Strata	Depth / (Level)	Geology	Legend
Depth	Type & No	Value				
0.15	J1		TOPSOIL: Grass over: Dark brown, slightly gravelly, slightly sandy, silty clay with roots. Gravel of fine to medium, angular to subrounded chert.	0.30 ()	TS	
0.70	J2		Firm, light grey mottled orange, silty CLAY with occasional fine to medium, subangular chert gravel and green, sandy partings.			
0.80	SV B1	48/50/48 kPa	0.70 m: Intercalated bed of brown, mottled orange, gravelly, sandy clay. Gravel of fine to medium, angular chert.	1.00 ()	WITTERING FORMATION	
1.30	B2		Firm, brown mottled orange, silty CLAY with orange, sandy partings.			
1.40	SV	52/54/50 kPa	1.00 m: Becoming firm, brown mottled orange, silty CLAY with orange, sandy partings.	2.50 ()		
1.90	SV	50/54/52 kPa	2.00 m: Becoming wet and with brown mudstone gravel lithorelicts.			
2.40	B3			3		
				4		
Pit Stability: Generally stable throughout Groundwater: Ingress at 2.40m bgl.					Surface Elevation Level:	
Plan of Trial Pit: 			General Remarks: Trial pit terminated at 2.50m bgl.			
All dimensions in metres Log Scale 1:25						
Telephone: 01295 272244 Email: info@brduk.com						

TRIAL PIT RECORD

Client: Gleeson Strategic Land and Miller Homes Project Title: Winchester Road, Hedge End Project No: BRD2924 Logged By: A Leon Date Completed: 24/07/2017 Method Used: 180° Backhoe excavator (JCB 3CX type)				Trial Pit No. TP07		
Sheet 1 of 1						
Samples & Tests			Description of Strata	Depth / (Level)	Geology	Legend
Depth	Type & No	Value				
0.30	J1		MADE GROUND/TOPSOIL: Grass over: Dark brown, slightly gravelly, slightly sandy, silty clay topsoil with roots. Gravel of fine to medium, angular to subrounded chert.	0.30 ()	MG/TS	
0.60	J2		MADE GROUND/TOPSOIL: Brown and grey, slightly gravelly clay with abundant clinker fragments. Soft to firm, orange mottled grey, sandy, silty CLAY with green and orange sandy partings. 0.40 - 0.90 m: Face D: Natural black staining.	0.40 ()		
1.20	SV B1	40/30/42 kPa	Soft, orange, brown and grey, very sandy, very silty CLAY with rare, fine chert gravel.	0.90 ()	WITTERING FORMATION	
1.80	SV B2	28/30/40 kPa	Soft, brown with reddish grey oxidized staining, very silty CLAY.	1.60 ()		
			Medium dense, bluish grey and yellow stained, very silty, fine SAND.	2.00 ()		
			Firm, bluish grey and orange stained, sandy, silty CLAY with grey, silty fine sand partings.	2.20 ()		
2.50	B3			2.60 ()		
				3		
				4		
Pit Stability: Generally stable throughout Groundwater: Slight seepage at 1.10m bgl.					Surface Elevation Level:	
Plan of Trial Pit: 			General Remarks: Trial pit terminated at 2.60m bgl. Density description based on visual observation only.			
All dimensions in metres Log Scale 1:25					 Telephone: 01295 272244 Email: info@brduk.com	

TRIAL PIT RECORD

Client: Gleeson Strategic Land and Miller Homes Project Title: Winchester Road, Hedge End Project No: BRD2924 Logged By: A Leon Date Completed: 24/07/2017 Method Used: 180° Backhoe excavator (JCB 3CX type)				Trial Pit No. TP08		
				Sheet 1 of 1		
Samples & Tests			Description of Strata	Depth / (Level)	Geology	Legend
Depth	Type & No	Value				
0.20	J1	80/90/70 kPa	TOPSOIL: Grass over: Dark brown, slightly gravelly, slightly sandy, silty clay with roots. Gravel of fine to medium, angular to subrounded chert.	0.35 ()	TS	
0.70	J2		Firm, orange and greenish grey, sandy, silty CLAY with occasional fine to medium, subangular chert gravel.	0.80 ()		
0.90	B1		Firm to stiff, pink CLAY with greenish, silty, slightly gravelly, fine sand partings. Gravel of fine to medium, subrounded flint.	1		
1.30	SV B2		Firm to stiff, dark pink and brown, silty CLAY with orange, sandy silt partings and pockets.	1.50 ()		
1.90	B3		2.30 m: Becoming wet recovered as mudstone gravel lithorelicts.	2		
				2.50 ()	WITTERING FORMATION	
				3		
				4		
Pit Stability: Generally stable throughout Groundwater: Slight seepage at 2.40m bgl.				Surface Elevation Level:		
Plan of Trial Pit: 			General Remarks: Trial pit terminated at 2.50m bgl.			
			All dimensions in metres Log Scale 1:25			
			Telephone: 01295 272244 Email: info@brduk.com			

TRIAL PIT RECORD

Client: Gleeson Strategic Land and Miller Homes Project Title: Winchester Road, Hedge End Project No: BRD2924 Logged By: A Leon Date Completed: 25/07/2017 Method Used: 180° Backhoe excavator (JCB 3CX type)				Trial Pit No. TP09		
				Sheet 1 of 1		
Samples & Tests			Description of Strata	Depth / (Level)	Geology	Legend
Depth	Type & No	Value				
0.20	J1		TOPSOIL: Grass over: Dark brown with some orange mottling, slightly gravelly, slightly silty clay. Gravel of fine to medium, subangular chert.		TS	
0.50	SV	48/50/48 kPa	Soft to firm, grey and brown mottled orange, silty CLAY with rare, subrounded chert gravel.	0.40 ()		
0.60	J2					
0.80	SV	42/50/50 kPa	Firm, grey mottled orange, very silty CLAY with relict rootlets (1cm diameter).	0.70 ()		
	B1					
1.50	B2		1.50 m: Reddish stains (oxidized).	1	WITTERING FORMATION	
2.00	D1		Firm, thinly laminated, grey CLAY with silty partings.	2 2.00 ()		
2.50	D2			2.60 ()		
				3		
				4		
Pit Stability: Generally stable throughout Groundwater: Not encountered					Surface Elevation Level:	
Plan of Trial Pit: 			General Remarks: Trial pit terminated at 2.60m bgl.			
All dimensions in metres Log Scale 1:25						
Telephone: 01295 272244 Email: info@brduk.com						

TRIAL PIT RECORD

Client: Gleeson Strategic Land and Miller Homes Project Title: Winchester Road, Hedge End Project No: BRD2924 Logged By: A Leon Date Completed: 25/07/2017 Method Used: 180° Backhoe excavator (JCB 3CX type)				Trial Pit No. TP10		
				Sheet 1 of 1		
Samples & Tests			Description of Strata	Depth / (Level)	Geology	Legend
Depth	Type & No	Value				
0.15	J1		TOPSOIL: Grass over: Dark brown, slightly gravelly, slightly sandy, silty clay with roots. Gravel of fine to medium, angular to subrounded chert.	0.40 ()	TS	
0.80 0.90	SV J2 B1	50/50/52 kPa	Firm, green mottled orange, slightly gravelly, very sandy, silty CLAY. Gravel of fine to medium, angular chert.			
1.40	SV B2	48/40/34 kPa	Soft to firm, light grey mottled orange, sandy, very silty CLAY / very clayey SILT.	1.00 ()	WITTERING FORMATION	
2.00	B3		1.90 m: Becoming thinly laminated, grey mottled orange, very silty CLAY / very clayey SILT. Excavated as angular, mudstone/siltstone gravel.			
2.60	B4		Firm, thinly laminated, grey with orange brown stained surfaces, silty CLAY.			
			2.50 m: Becoming thinly laminated, bluish grey, silty CLAY with mudstone gravel lithorelicts. Orange stained surfaces.	2.20 ()		
				2.70 ()		
				3		
				4		
Pit Stability: Generally stable throughout Groundwater: Not encountered					Surface Elevation Level:	
Plan of Trial Pit: 			General Remarks: Trial pit terminated at 2.70m bgl.			
All dimensions in metres Log Scale 1:25						
Telephone: 01295 272244 Email: info@brduk.com						

TRIAL PIT RECORD

Client: Gleeson Strategic Land and Miller Homes Project Title: Winchester Road, Hedge End Project No: BRD2924 Logged By: A Leon Date Completed: 25/07/2017 Method Used: 180° Backhoe excavator (JCB 3CX type)			Trial Pit No. TP11			
			Sheet 1 of 1			
Samples & Tests			Description of Strata	Depth / (Level)	Geology	Legend
Depth	Type & No	Value				
0.90	B1		TOPSOIL: Grass over: Dark brown, slightly gravelly, slightly sandy, silty clay with roots. Gravel of fine to medium, angular to subrounded chert.	0.35 ()	TS	
			Firm, green mottled orange, slightly gravelly, very sandy, silty CLAY. Gravel of fine to medium, angular chert.			
1.50	B2		Firm, desiccated, light grey mottled orange, silty CLAY with abundant, orange, silty partings and fine, active rootlets.	0.80 ()	WITTERING FORMATION	
			1.30 m: No longer desiccated.			
2.40	D1		Firm, light grey mottled yellow, thinly laminated, silty CLAY recovered as sand to fine angular CLAY gravel.	2.00 ()		
				2.60 ()		
				3		
				4		
Pit Stability: Generally stable throughout Groundwater: Ingress at 2.50m bgl.					Surface Elevation Level:	
Plan of Trial Pit: 			General Remarks: Trial pit terminated at 2.60m bgl.			
			All dimensions in metres Log Scale 1:25			
			Telephone: 01295 272244 Email: info@brduk.com			

TRIAL PIT RECORD

Client: Gleeson Strategic Land and Miller Homes Project Title: Winchester Road, Hedge End Project No: BRD2924 Logged By: A Leon Date Completed: 25/07/2017 Method Used: 180° Backhoe excavator (JCB 3CX type)				Trial Pit No. TP12		
				Sheet 1 of 1		
Samples & Tests			Description of Strata	Depth / (Level)	Geology	Legend
Depth	Type & No	Value				
0.30	J1	58/60/58 kPa	TOPSOIL: Grass over: Dark brown, slightly gravelly, slightly sandy, silty clay with roots. Gravel of fine to medium, angular to subrounded chert.	0.40 ()	TS	
0.70	J2		Firm, desiccated, light grey mottled orange, sandy, silty clay with fine, active roots.			
0.90	B1		Firm, desiccated, light grey mottled orange, very gravelly, sandy, silty clay with fine, active roots. Gravel of fine to medium, angular chert.			
			Firm, wet, light grey mottled orange, very silty CLAY with light grey, orange and yellow silty partings			
1.50	B2			WITTERING FORMATION		
1.60	SV					
2.10	D1	Firm, very thinly laminated, grey and brown CLAY, recovered as sand to angular gravel with orange stained surfaces.	2.00 ()			
			2.50 ()			
				3		
				4		
Pit Stability: Generally stable throughout Groundwater: Slight seepage at 2.10m bgl.				Surface Elevation Level:		
Plan of Trial Pit: 			General Remarks: Trial pit terminated at 2.50m bgl.		All dimensions in metres Log Scale 1:25	
					Telephone: 01295 272244 Email: info@brduk.com	

TRIAL PIT RECORD

Client: Project Title: Project No: Logged By: Date Completed: Method Used: Gleeson Strategic Land and Miller Homes Winchester Road, Hedge End BRD2924 A Leon 25/07/2017 180° Backhoe excavator (JCB 3CX type)						Trial Pit No. TP13		
						Sheet 1 of 1		
Samples & Tests			Description of Strata	Depth / (Level)	Geology	Legend		
Depth	Type & No	Value						
0.20	J1		TOPSOIL: Grass over: Dark brown, slightly gravelly, slightly sandy, silty clay topsoil. Gravel of fine to medium, subangular to rounded chert.	0.40) 1 1.30) 2 2.00) 2.70) 3 4	TS			
0.90	B1		Firm, light grey mottled orange, sandy, very silty CLAY / very clayey SILT. (Possible Earnley Sand Formation)				WITTERING FORMATION	
1.60	D1		Firm, light grey mottled orange, slightly sandy, slightly clayey SILT.					
2.10	D2		Medium dense, light grey and brown with some orange, slightly clayey, very sandy SILT / very silty, fine SAND with occasionally intercalated fine clay beds.					
2.60	D3							
Pit Stability: Generally stable throughout Groundwater: Ingress at 2.60m bgl.					Surface Elevation Level:			
Plan of Trial Pit:			General Remarks: Trial pit terminated at 2.70m bgl. Density description based on visual observation only.			All dimensions in metres Log Scale 1:25 Telephone: 01295 272244 Email: info@brduk.com		

TRIAL PIT RECORD

Client: Gleeson Strategic Land and Miller Homes			Trial Pit No.				
Project Title: Winchester Road, Hedge End			TP14				
Project No: BRD2924							
Logged By: A Leon			Sheet 1 of 1				
Date Completed: 25/07/2017							
Method Used: 180° Backhoe excavator (JCB 3CX type)							
Samples & Tests							
Depth	Type & No	Value	Description of Strata	Depth / (Level)	Geology	Legend	
1.20	D1		TOPSOIL: Grass over: Dark brown, slightly gravelly, slightly sandy, silty clay topsoil. Gravel of fine to medium, subangular to rounded chert.	0.40 ()	TS		
		Firm, greenish grey mottled orange, gravelly, slightly sandy, silty CLAY. Gravel of fine to medium, angular chert. (Possible Earnley Sand Formation) 0.40 - 1.00 m: MADE GROUND: dark brown silty clay.	1.00 ()				
		Firm, light grey mottled orange, very silty CLAY with orange, silty partings. 1.00 m: Face C: Land drain.					1.80 ()
2.00	D2	Medium dense, thinly bedded, multi-colored (light grey, greenish grey and orange) very silty, fine SAND.		2.10 ()	WITTERING FORMATION		
		Firm, wet, very thinly laminated, light grey, brown and orange, sandy, silty CLAY recovered as fine, angular, tabular clay gravel with orange, sandy partings.	2.40 ()				
2.30	D3			3.00 ()			
			4.00 ()				
Pit Stability: Slight spalling of sides Groundwater: Ingress at 2.20m bgl.					Surface Elevation Level:		
Plan of Trial Pit: 			General Remarks: Trial pit terminated at 2.40m bgl. Density description based on visual observation only.			All dimensions in metres Log Scale 1:25	
						Telephone: 01295 272244 Email: info@brduk.com	

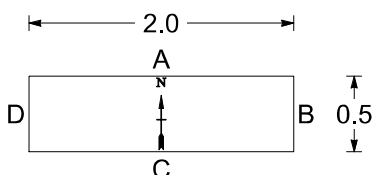
TRIAL PIT RECORD

Client: Gleeson Strategic Land and Miller Homes Project Title: Winchester Road, Hedge End Project No: BRD2924 Logged By: A Leon Date Completed: 25/07/2017 Method Used: 180° Backhoe excavator (JCB 3CX type)				Trial Pit No. TP15		
				Sheet 1 of 1		
Samples & Tests			Description of Strata	Depth / (Level)	Geology	Legend
Depth	Type & No	Value				
0.10	J1		TOPSOIL: Grass over: Dark brown, slightly gravelly, slightly sandy, silty clay topsoil. Gravel of fine to medium, subangular to rounded chert.	0.30 ()	TS	
0.60	J2		Firm, greenish grey mottled orange, clayey, sandy SILT with rare, fine to medium, subrounded chert gravel at the top and occasional interbedded thin, light brown clay bands. (Possible Earnley Sand Formation)			
1.10	D1					
1.90	D2		1.70 m: Abundant thin brown sandy beds interbedded. 2.20 m: Becoming thinly laminated sandy SILT recovered as gravel.			
				2.50 ()	WITTERING FORMATION	
Pit Stability: Generally stable throughout Groundwater: Not encountered				Surface Elevation Level:		
Plan of Trial Pit: 			General Remarks: Trial pit terminated at 2.50m bgl.			
			All dimensions in metres Log Scale 1:25			
			Telephone: 01295 272244 Email: info@brduk.com			

TRIAL PIT RECORD

Client: Gleeson Strategic Land and Miller Homes Project Title: Winchester Road, Hedge End Project No: BRD2924 Logged By: A Leon Date Completed: 25/07/2017 Method Used: 180° Backhoe excavator (JCB 3CX type)				Trial Pit No. TP16		
				Sheet 1 of 1		
Samples & Tests			Description of Strata	Depth / (Level)	Geology	Legend
Depth	Type & No	Value				
0.10	J1		TOPSOIL: Grass over: Dark brown, slightly gravelly, slightly sandy, silty clay topsoil. Gravel of fine to medium, subangular to rounded flint.	0.30 (1 1.20 (2 2.50 (2.60 (3 4	TS	
0.80	D1 J2		Firm, orange mottled green, very sandy, very clayey SILT. (Possible Earnley Sand Formation)			
1.50	B1		Medium dense, orange and light grey, silty, fine SAND.		WITTERING FORMATION	
2.50	D2		Firm, orange brown mottled grey, very sandy, silty CLAY.			
Pit Stability: Generally stable throughout Groundwater: Not encountered				Surface Elevation Level:		
Plan of Trial Pit: 			General Remarks: Trial pit terminated at 2.60m bgl. Density description based on visual observation only.			
				All dimensions in metres Log Scale 1:25		
				Telephone: 01295 272244 Email: info@brduk.com		

TRIAL PIT RECORD

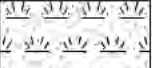
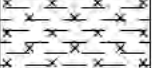
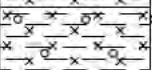
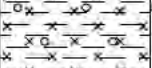
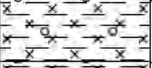
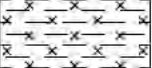
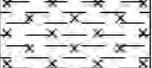
Client: Project Title: Project No: Logged By: Date Completed: Method Used: Gleeson Strategic Land and Miller Homes Winchester Road, Hedge End BRD2924 A Leon 25/07/2017 180° Backhoe excavator (JCB 3CX type)						Trial Pit No. TP17		Sheet 1 of 1	
Samples & Tests			Description of Strata	Depth / (Level)	Geology	Legend			
Depth	Type & No	Value							
0.10	J1		TOPSOIL: Grass over: Dark brown, slightly gravelly, slightly sandy, silty clay topsoil. Gravel of fine to medium, subangular to rounded chert.	0.30 ()	TS				
			Firm, orange mottled greenish, sandy, very silty CLAY / very clayey SILT. (Possible Earnley Sand Formation)						
0.70	J2								
			1.00 m: Becoming orange mottled grey in colour.						
1.50	B1		1.60 m: Becoming light grey mottled orange in colour.	1	WITTERING FORMATION				
			1.90 m: Firm, thinly laminated, orange brown and light grey banded, sandy, clayey SILT.						
2.10	D1		2.20 m: Reddish brown and orange banded in colour and thin, light grey bands of clay interbedded.						
				2.60 ()					
				3					
				4					
Pit Stability: Generally stable throughout Groundwater: Not encountered					Surface Elevation Level:				
Plan of Trial Pit: 			General Remarks: Trial pit terminated at 2.60m bgl.			All dimensions in metres Log Scale 1:25			
			 Telephone: 01295 272244 Email: info@brduk.com						

TRIAL PIT RECORD

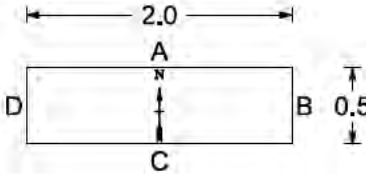
Client: Project Title: Project No: Logged By: Date Completed: Method Used: Gleeson Strategic Land and Miller Homes Winchester Road, Hedge End BRD2924 A Leon 25/07/2017 180° Backhoe excavator (JCB 3CX type)						Trial Pit No. TP18	
						Sheet 1 of 1	
Samples & Tests			Description of Strata	Depth / (Level)	Geology	Legend	
Depth	Type & No	Value					
0.20	J1		TOPSOIL: Grass over: Dark brown, slightly gravelly, slightly sandy, silty clay topsoil. Gravel of fine to medium, subangular to rounded chert.	0.30 ()	TS		
0.80	J2		Firm, desiccated, orange brown with some greenish mottling, sandy, silty CLAY with occasional fine, active roots and occasional, fine to medium, subangular to rounded chert gravel.				
1.10	D1		Firm, orange brown mottled grey, sandy, clayey SILT.				
1.70	D2		Medium dense, light grey mottled orange, very silty, fine SAND / very sandy SILT.				
			2.30 m: Becoming thinly laminated, sandy SILT with intercalated thin bands of brown clay excavated as fine gravel.	1.60 ()	WITTERING FORATION		
				2			
				2.50 ()			
				3			
				4			
Pit Stability: Generally stable throughout Groundwater: Not encountered					Surface Elevation Level:		
Plan of Trial Pit:			General Remarks: Trial pit terminated at 2.50m bgl. Density description based on visual observation only.			All dimensions in metres Log Scale 1:25 Telephone: 01295 272244 Email: info@brduk.com	

TRIAL PIT RECORD

Client: Gleeson Strategic Land and Miller Homes Project Title: Winchester Road, Hedge End Project No: BRD2924 Logged By: A Leon Date Completed: 26/07/2017 Method Used: 180° Backhoe excavator (JCB 3CX type)				Trial Pit No. TP19	
				Sheet 1 of 1	

Samples & Tests			Description of Strata	Depth / (Level)	Geology	Legend
Depth	Type & No	Value				
0.20	J1		TOPSOIL: Grass over: dark brown, slightly gravelly, silty clay with roots. Gravel of fine to medium, rounded chert.	0.30 ()	TS	
			Firm, brown, slightly sandy, silty CLAY / clayey SILT with roots.			
			Firm, desiccated, grey mottled orange with occasional natural black stains, silty CLAY with occasional fine to coarse, angular chert gravel and orange, sandy partings. Tree roots up to 1.00m bgl.	0.80 ()	WITTERING FORMATION	
			Stiff, dark grey, silty CLAY with fine, decayed roots and white, sandy partings.	1.50 ()		
2.10	B1		Stiff, thinly laminated, bluish grey, silty CLAY with mudstone gravel lithorelicts.	2.10 () 2.20 ()		
				2		
				3		
				4		

Pit Stability: Generally stable throughout Groundwater: Not encountered		Surface Elevation Level:
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Plan of Trial Pit: 	General Remarks: Trial pit terminated at 2.20m bgl.	All dimensions in metres Log Scale 1:25  Telephone: 01295 272244 Email: info@brduk.com
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TRIAL PIT RECORD

Client: Gleeson Strategic Land and Miller Homes Project Title: Winchester Road, Hedge End Project No: BRD2924 Logged By: A Leon Date Completed: 26/07/2017 Method Used: 180° Backhoe excavator (JCB 3CX type)				Trial Pit No. TP20		
				Sheet 1 of 1		
Samples & Tests			Description of Strata	Depth / (Level)	Geology	Legend
Depth	Type & No	Value				
0.20	J1		TOPSOIL: Grass over: Dark brown, slightly gravelly, silty clay with roots. Gravel of fine to medium, rounded chert.	0.30 ()	TS	
0.70	J2		Firm, green mottled light brown, sandy, clayey SILT / silty CLAY with occasional fine, angular chert gravel. 0.50 m: Land drain.			
0.90	D1		1.10 m: Land drain.	1	WITTERING FORMATION	
1.60	SV D2	54/58/48 kPa	Firm, purple grey, silty CLAY with relict rootlets and light grey and orange, fine sandy partings.	1.30 ()		
			Medium dense, multicolored (green, grey, purple, orange), silty SAND.	1.70 ()		
2.00	SV	45/50/42 kPa	Soft to firm, light grey and grey, thinly banded in colour, light grey and grey, silty CLAY with light grey silty partings. 2.10 m: Becoming thinly laminated, dark grey, silty CLAY with mudstone gravel lithorelicts and light grey sandy partings.	1.90 ()		
2.60	B3			2		
2.70	SV	52/52/58 kPa		2.70 ()		
				3		
				4		
Pit Stability: Generally stable throughout Groundwater: Not encountered					Surface Elevation Level:	
Plan of Trial Pit: 			General Remarks: Trial pit terminated at 2.70m bgl. Density description based on visual observation only.			
All dimensions in metres Log Scale 1:25						
Telephone: 01295 272244 Email: info@brduk.com						

TRIAL PIT RECORD

Client: Gleeson Strategic Land and Miller Homes Project Title: Winchester Road, Hedge End Project No: BRD2924 Logged By: A Leon Date Completed: 26/07/2017 Method Used: 180° Backhoe excavator (JCB 3CX type)				Trial Pit No. TP21		
				Sheet 1 of 1		
Samples & Tests			Description of Strata	Depth / (Level)	Geology	Legend
Depth	Type & No	Value				
0.10	J1		TOPSOIL: Grass over: Dark brown with some orange mottling, slightly gravelly, silty clay with roots. Gravel of fine to medium, rounded chert. Firm, light grey mottled orange, very thinly laminated, silty CLAY with orange brown, thin silty sand beds intercalated.	0.30 ()	TS	
0.80	J2					
1.00	D1			1		
1.50	D2			2		
2.50	D3		Firm, grey with orange stained at surfaces, thinly laminated, closely spaced silty CLAY recovered as mudstone gravel lithorelicts. 2.10 m: Running sands. Medium dense, bluish grey, thinly laminated, silty CLAY with interbedded bluish grey sandy partings. Recovered as angular gravel sized fragments.	2.10 () 2.20 () 2.60 ()	WITTERING FORMATION	
				3		
				4		

Pit Stability: Generally stable throughout Groundwater: Seepage at 2.10m bgl.		Surface Elevation Level:
Plan of Trial Pit: 	General Remarks: Trial pit terminated at 2.60m bgl. Density description based on visual observation only.	
All dimensions in metres Log Scale 1:25		
Telephone: 01295 272244 Email: info@brduk.com		

TRIAL PIT RECORD

Client: Gleeson Strategic Land and Miller Homes Project Title: Winchester Road, Hedge End Project No: BRD2924 Logged By: A Leon Date Completed: 26/07/2017 Method Used: 180° Backhoe excavator (JCB 3CX type)				Trial Pit No. TP22				
				Sheet 1 of 1				
Samples & Tests			Description of Strata	Depth / (Level)	Geology	Legend		
Depth	Type & No	Value						
0.90	D1		TOPSOIL: Grass over: dark brown, slightly gravelly, silty clay with roots. Gravel of fine to medium, rounded chert.	0.20 ()	TS			
			Firm, brown, slightly sandy, clayey SILT / silty CLAY with roots and rare, fine to medium, angular chert gravel.					
			Firm, orange mottled light grey, slightly sandy, very silty CLAY.	0.70 ()				
			Firm, thinly laminated, light grey mottled orange, slightly sandy, very silty CLAY / very clayey SILT with fine, orange, sandy partings and occasional active roots.	0.90 ()				
2.00	D2		Medium dense, thinly laminated, light grey mottled orange, fine, silty SAND with intercalated, thin, light brown clay bands intercalated.	1.50 ()			WITTERING FORMATION	
			Firm, brown and pink mottled orange, silty CLAY with orange, sandy partings.	2.00 ()				
			2.20 m: Recovered as fine, angular gravel sized fragment.					
			Firm to stiff, thinly laminated, reddish, dark brown, silty CLAY with mudstone gravel lithorelicts.	2.80 ()				
				3.00 ()				
				4				

Pit Stability: Generally stable throughout Groundwater: Not encountered		Surface Elevation Level:
Plan of Trial Pit: 	General Remarks: Trial pit terminated at 3.00m bgl. Density description based on visual observation only.	
All dimensions in metres Log Scale 1:25		
		Telephone: 01295 272244 Email: info@brduk.com

TRIAL PIT RECORD

Client: Gleeson Strategic Land and Miller Homes Project Title: Winchester Road, Hedge End Project No: BRD2924 Logged By: A Leon Date Completed: 26/07/2017 Method Used: 180° Backhoe excavator (JCB 3CX type)				Trial Pit No. TP23				
Sheet 1 of 1								
Samples & Tests			Description of Strata	Depth / (Level)	Geology	Legend		
Depth	Type & No	Value						
0.20	J1		TOPSOIL: Grass over: dark brown, slightly gravelly, silty clay with roots. Gravel of fine to medium, rounded chert.	0.30 ()	TS			
0.60	J2		Firm, very thinly laminated, greenish light grey mottled orange, sandy, silty CLAY / clayey SILT with rootlets and light grey and orange sandy partings. (Possible Earnley Sand Formation)					
2.30	D1		Firm, brown and pink mottled orange, silty CLAY with orange, sandy partings.				1.80 ()	
			Medium dense, orange and brown, silty, fine SAND.					2.40 ()
			Medium dense, bluish grey, slightly silty, fine SAND with occasional thin, purplish grey clay beds intercalated.					
				3				
				4				
Pit Stability: Generally stable throughout Groundwater: Not encountered					Surface Elevation Level:			
Plan of Trial Pit: 			General Remarks: Trial pit terminated at 2.70m bgl.					
All dimensions in metres Log Scale 1:25					 Telephone: 01295 272244 Email: info@brduk.com			

TRIAL PIT RECORD

Client: Gleeson Strategic Land and Miller Homes				Trial Pit No.		
Project Title: Winchester Road, Hedge End				TP24		
Project No: BRD2924						
Logged By: A Leon				Sheet 1 of 1		
Date Completed: 26/07/2017						
Method Used: 180° Backhoe excavator (JCB 3CX type)						
Samples & Tests			Description of Strata	Depth / (Level)	Geology	Legend
Depth	Type & No	Value				
0.30	J1		TOPSOIL: Grass over: dark brown, slightly gravelly, silty clay with roots. Gravel of fine to medium, rounded chert.	0.35 ()	TS	
			Firm, green mottled orange, very sandy, clayey SILT / very silty SAND with rare, fine to medium, angular flint gravel near the top. (Possible Earnley Sand Formation)			
1.00	D1		Medium dense, orange brown mottled greenish grey, clayey, silty, fine SAND. 1.10 m: Face C & D: Land drain.	1 1.10 ()	WITTERING FORMATION	
1.80	D2			2 2.00 ()	WITTERING FORMATION	
2.90	D3		Firm, very thinly laminated, light grey, light brown and orange, silty CLAY with fine, intercalated sand beds.	3 3.00 ()	WITTERING FORMATION	
			2.80 m: Clay beds becoming pinkish brown in colour.			
				4 4.00 ()		
Pit Stability: Generally stable throughout Groundwater: Not encountered					Surface Elevation Level:	
Plan of Trial Pit: 				General Remarks: Trial pit terminated at 3.00m bgl. Density description based on visual observation only.		
				All dimensions in metres Log Scale 1:25		
				 Telephone: 01295 272244 Email: info@brduk.com		

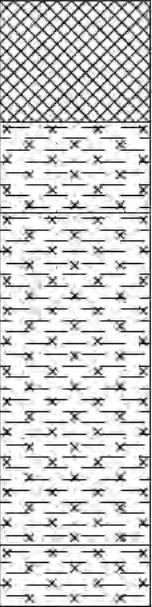
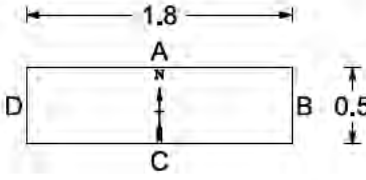
TRIAL PIT RECORD

Client: Gleeson Strategic Land and Miller Homes Project Title: Winchester Road, Hedge End Project No: BRD2924 Logged By: A Leon Date Completed: 04/08/2017 Method Used: 180° Backhoe excavator (JCB 3CX type)				Trial Pit No. TP25		
				Sheet 1 of 1		
Samples & Tests			Description of Strata	Depth / (Level)	Geology	Legend
Depth	Type & No	Value				
			TOPSOIL: Grass over: Dark brown, slightly sandy, silty clay with roots and rare, fine to medium, subangular chert gravel.	0.25 ()	TS	
			Firm, orange brown mottled greenish grey, sandy, silty CLAY with occasional medium to coarse, subangular to rounded chert gravel.	1	WITTERING FORMATION	
			1.50 m: Becoming grey.	2		
			Firm to stiff, thinly laminated, closely spaced, orange, light grey and brownish pink banded in colour, silty CLAY recovered as angular gravel sized fragments.	2.00 ()		
				2.80 ()		
				3		
				4		
Pit Stability: Slight spalling of sides Groundwater: See General Remarks					Surface Elevation Level:	
Plan of Trial Pit: 			General Remarks: Trial pit terminated at 2.80m bgl. Slight seepage at 1.10m bgl. Seepage at 2.00m bgl.			
All dimensions in metres Log Scale 1:25					 Telephone: 01295 272244 Email: info@brduk.com	

TRIAL PIT RECORD

Client: Gleeson Strategic Land and Miller Homes Project Title: Winchester Road, Hedge End Project No: BRD2924 Logged By: A Leon Date Completed: 04/08/2017 Method Used: 180° Backhoe excavator (JCB 3CX type)				Trial Pit No. SA01		
				Sheet 1 of 1		
Samples & Tests			Description of Strata	Depth / (Level)	Geology	Legend
Depth	Type & No	Value				
			TOPSOIL: Grass over: Wet, dark brown mottled grey, slightly gravelly, slightly sandy, silty clay. Gravel of fine to medium, angular to subrounded chert.	0.35 ()	TS WITTERING FORMATION	
			Soft to firm, wet, thinly laminated, grey mottled orange, silty CLAY with fine rootlets.	1 ()		
			Firm to stiff, thinly laminated, grey with orange staining at the surfaces, silty CLAY with mudstone gravel lithorelicts and relict rootlets. 1.10 m: Face A, C & D: Pocket of dark grey to brown, very clayey GRAVEL of fine to medium, angular flint. Organic odour.	1.10 ()		
			1.70 m: Recovered as mudstone gravel lithorelicts.	1.90 ()		
				2 ()		
				3 ()		
				4 ()		
Pit Stability: Generally stable throughout Groundwater: See General Remarks					Surface Elevation Level:	
Plan of Trial Pit: 			General Remarks: Trial pit terminated at 1.90m bgl. for soakage testing. Slight groundwater seepage at 1.60 bgl. Slight groundwater seepage at 1.90m bgl. Groundwater level at 1.75m bgl.			
			All dimensions in metres Log Scale 1:25 Telephone: 01295 272244 Email: info@brduk.com			

TRIAL PIT RECORD

Client: Gleeson Strategic Land and Miller Homes Project Title: Winchester Road, Hedge End Project No: BRD2924 Logged By: A Leon Date Completed: 04/08/2017 Method Used: 180° Backhoe excavator (JCB 3CX type)				Trial Pit No. SA02		
				Sheet 1 of 1		
Samples & Tests			Description of Strata	Depth / (Level)	Geology	Legend
Depth	Type & No	Value				
			MADE GROUND/TOPSOIL: Grass over: Wet, dark brown, slightly sandy, silty clay topsoil with active roots of 0.5cm diameter and occasional brick gravel fragments.	0.40 ()	MG/TS WITTERING FORMATION	
			Firm, orange, sandy, silty CLAY,	0.70 ()		
			Soft to firm, wet, orange mottled grey, slightly sandy, silty CLAY with rare, coarse chert gravel.	1 ()		
			Firm, grey mottled orange, silty CLAY recovered as mudstone gravel lithorelicts.	1.80 ()		
			1.80 - 2.00 m: Faces A, B & C: Strata as above across half of the pit.	2 2.00 ()		
				3 ()		
				4 ()		
Pit Stability: Slight spalling of sides Groundwater: See General Remarks					Surface Elevation Level:	
Plan of Trial Pit: 			General Remarks: Trial pit terminated at 2.00m bgl. for soakage testing. Groundwater seepage at 1.30m bgl. Groundwater level at 1.50m bgl.			
					All dimensions in metres Log Scale 1:25	
					 Telephone: 01295 272244 Email: info@brduk.com	

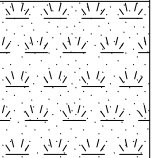
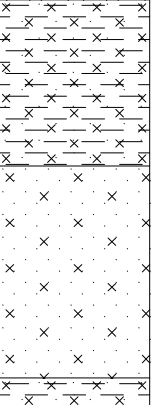
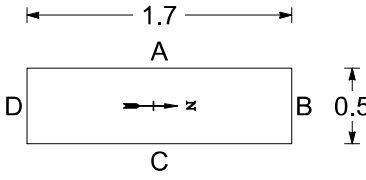
TRIAL PIT RECORD

Client: Gleeson Strategic Land and Miller Homes Project Title: Winchester Road, Hedge End Project No: BRD2924 Logged By: A Leon Date Completed: 04/08/2017 Method Used: 180° Backhoe excavator (JCB 3CX type)			Trial Pit No. SA03	
			Sheet 1 of 1	
Samples & Tests			Description of Strata	
Depth	Type & No	Value	Depth / (Level)	Geology
				TS
			0.35 ()	
			1	
			1.20 ()	
			1.30 ()	
			1.70 ()	
			2	
			3	
			3.90 ()	
			4	
Pit Stability: Generally stable throughout Groundwater: Ingress at 3.70m bgl.			Surface Elevation Level:	
Plan of Trial Pit: 			General Remarks: Trial pit terminated at 3.90m bgl. for soakage testing.	
			All dimensions in metres Log Scale 1:25	
			Telephone: 01295 272244 Email: info@brduk.com	

TRIAL PIT RECORD

Client: Gleeson Strategic Land and Miller Homes Project Title: Winchester Road, Hedge End Project No: BRD2924 Logged By: A Leon Date Completed: 04/08/2017 Method Used: 180° Backhoe excavator (JCB 3CX type)				Trial Pit No. SA04		
				Sheet 1 of 1		
Samples & Tests			Description of Strata	Depth / (Level)	Geology	Legend
Depth	Type & No	Value				
			TOPSOIL: Grass over: Dark brown with some grey mottling, slightly sandy, silty clay with roots and rare, fine to medium, subangular chert gravel. Firm, wet, brown and grey, very gravelly, sandy CLAY. Firm to stiff, grey mottled orange, silty CLAY with active roots and interbedded, thin, white and grey sand beds. Firm to stiff, grey, brown and orange, thingly banded sequences of silty CLAY and fine SAND.	0.35 () 0.65 () 1 1.70 () 1.90 () 2 3 4	TS WITTERING FORMATION	
Pit Stability: Generally stable throughout Groundwater: Not encountered				Surface Elevation Level:		
Plan of Trial Pit: 			General Remarks: Trial pit terminated at 1.90m bgl. for soakage testing.		All dimensions in metres Log Scale 1:25 Telephone: 01295 272244 Email: info@brduk.com	

TRIAL PIT RECORD

Client: Gleeson Strategic Land and Miller Homes Project Title: Winchester Road, Hedge End Project No: BRD2924 Logged By: A Leon Date Completed: 04/08/2017 Method Used: 180° Backhoe excavator (JCB 3CX type)				Trial Pit No. SA05		
				Sheet 1 of 1		
Samples & Tests			Description of Strata	Depth / (Level)	Geology	Legend
Depth	Type & No	Value				
			TOPSOIL: Grass over: Dark brown with some grey mottling, slightly gravelly, slightly sandy, silty clay. Gravel of fine to medium, subangular to rounded chert.	0.55 ()	TOPSOIL WITTERING FM	 
			Firm, wet, orange mottled grey, sandy, silty CLAY with fine, active roots.	1 ()		
			Medium dense, greenish grey with some orange and light grey, silty, fine SAND.	1.10 ()		
			Firm, grey and purple, thinly banded, interbedded thin sequences of silty CLAY and fine SAND.	1.80 () 1.90 () 2 ()		
				3 () 4 ()		
Pit Stability: Generally stable throughout Groundwater: See General Remarks					Surface Elevation Level:	
Plan of Trial Pit: 			General Remarks: Trial pit terminated at 1.90m bgl. for soakage testing. Groundwater seepage with running sands at 1.90m bgl. Groundwater level at 1.30m bgl after 3 hours.			
			All dimensions in metres Log Scale 1:25  Telephone: 01295 272244 Email: info@brduk.com			

TRIAL PIT RECORD

Client: Gleeson Strategic Land and Miller Homes Project Title: Winchester Road, Hedge End Project No: BRD2924 Logged By: A Leon Date Completed: 04/08/2017 Method Used: 180° Backhoe excavator (JCB 3CX type)				Trial Pit No. SA06		
				Sheet 1 of 1		
Samples & Tests			Description of Strata	Depth / (Level)	Geology	Legend
Depth	Type & No	Value				
			TOPSOIL: Grass over: Dark brown, slightly gravelly, slightly sandy, silty clay. Gravel of fine to medium, subangular to rounded chert.	0.30 ()	TS	
			Firm, greenish grey mottled orange, slightly gravelly, sandy, sequences of silty CLAY. Gravel of fine to medium, angular chert. (Possible Earnley Sand Formation)	0.60 ()		
			Firm, orange mottled grey, thinly interbedded sequences of silty CLAY and fine SAND. (Possible Earnley)	1 ()		
			1.40 m: Becoming more orange and brown in colour, increasing sand content.	2 2.00 ()	WITTERING FM	
				3 ()		
				4 ()		
Pit Stability: Generally stable throughout Groundwater: Not encountered					Surface Elevation Level:	
Plan of Trial Pit: 			General Remarks: Trial pit terminated at 2.00m bgl. for soakage testing.		All dimensions in metres Log Scale 1:25	
					Telephone: 01295 272244 Email: info@brduk.com	

Trial Pit Photographs

TP01



Project Title: Gleeson Strategic Land and Miller Homes
Client: Winchester Road, Hedge End
BRD Reference: BRD2924-OP2-A
Date Issued: August 2017

Trial Pit Photographs

TP02



Project Title: Gleeson Strategic Land and Miller Homes
Client: Winchester Road, Hedge End
BRD Reference: BRD2924-OP2-A
Date Issued: August 2017



01295 272244
info@brduk.com

Trial Pit Photographs

TP03



Project Title: Gleeson Strategic Land and Miller Homes
Client: Winchester Road, Hedge End
BRD Reference: BRD2924-OP2-A
Date Issued: August 2017

Trial Pit Photographs

TP04



Project Title: Gleeson Strategic Land and Miller Homes
Client: Winchester Road, Hedge End
BRD Reference: BRD2924-OP2-A
Date Issued: August 2017

Trial Pit Photographs

TP05



Project Title: Gleeson Strategic Land and Miller Homes
Client: Winchester Road, Hedge End
BRD Reference: BRD2924-OP2-A
Date Issued: August 2017

Trial Pit Photographs

TP06



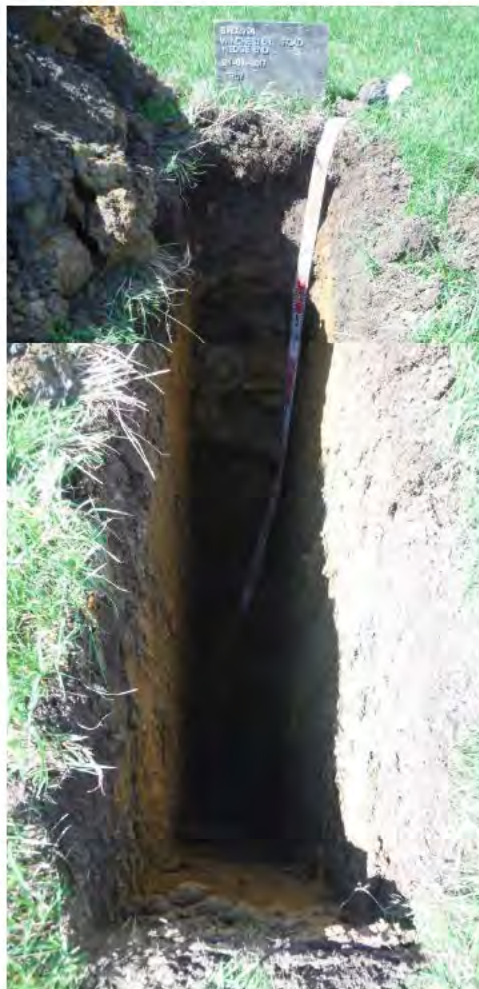
Project Title: Gleeson Strategic Land and Miller Homes
Client: Winchester Road, Hedge End
BRD Reference: BRD2924-OP2-A
Date Issued: August 2017



01295 272244
info@brduk.com

Trial Pit Photographs

TP07



Project Title: Gleeson Strategic Land and Miller Homes
Client: Winchester Road, Hedge End
BRD Reference: BRD2924-OP2-A
Date Issued: August 2017



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Trial Pit Photographs

TP08



Project Title: Gleeson Strategic Land and Miller Homes
Client: Winchester Road, Hedge End
BRD Reference: BRD2924-OP2-A
Date Issued: August 2017

Trial Pit Photographs

TP09



Project Title: Gleeson Strategic Land and Miller Homes
Client: Winchester Road, Hedge End
BRD Reference: BRD2924-OP2-A
Date Issued: August 2017

Trial Pit Photographs

TP10



Project Title: Gleeson Strategic Land and Miller Homes
Client: Winchester Road, Hedge End
BRD Reference: BRD2924-OP2-A
Date Issued: August 2017

Trial Pit Photographs

TP11



Project Title: Gleeson Strategic Land and Miller Homes
Client: Winchester Road, Hedge End
BRD Reference: BRD2924-OP2-A
Date Issued: August 2017

Trial Pit Photographs

TP12



Project Title: Gleeson Strategic Land and Miller Homes
Client: Winchester Road, Hedge End
BRD Reference: BRD2924-OP2-A
Date Issued: August 2017

Trial Pit Photographs

TP13



Project Title: Gleeson Strategic Land and Miller Homes
Client: Winchester Road, Hedge End
BRD Reference: BRD2924-OP2-A
Date Issued: August 2017

Trial Pit Photographs

TP14



Project Title: Gleeson Strategic Land and Miller Homes
Client: Winchester Road, Hedge End
BRD Reference: BRD2924-OP2-A
Date Issued: August 2017

Trial Pit Photographs

TP15



Project Title: Gleeson Strategic Land and Miller Homes
Client: Winchester Road, Hedge End
BRD Reference: BRD2924-OP2-A
Date Issued: August 2017

Trial Pit Photographs

TP16



Project Title: Gleeson Strategic Land and Miller Homes
Client: Winchester Road, Hedge End
BRD Reference: BRD2924-OP2-A
Date Issued: August 2017

Trial Pit Photographs

TP17



Project Title: Gleeson Strategic Land and Miller Homes
Client: Winchester Road, Hedge End
BRD Reference: BRD2924-OP2-A
Date Issued: August 2017



01295 272244
info@brduk.com

Trial Pit Photographs

TP18



Project Title: Gleeson Strategic Land and Miller Homes
Client: Winchester Road, Hedge End
BRD Reference: BRD2924-OP2-A
Date Issued: August 2017



01295 272244
info@brduk.com

Trial Pit Photographs

TP19



Project Title: Gleeson Strategic Land and Miller Homes
Client: Winchester Road, Hedge End
BRD Reference: BRD2924-OP2-A
Date Issued: August 2017

Trial Pit Photographs

TP20



Project Title: Gleeson Strategic Land and Miller Homes
Client: Winchester Road, Hedge End
BRD Reference: BRD2924-OP2-A
Date Issued: August 2017



01295 272244
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Trial Pit Photographs

TP21



Project Title: Gleeson Strategic Land and Miller Homes
Client: Winchester Road, Hedge End
BRD Reference: BRD2924-OP2-A
Date Issued: August 2017

Trial Pit Photographs

TP22



Project Title: Gleeson Strategic Land and Miller Homes
Client: Winchester Road, Hedge End
BRD Reference: BRD2924-OP2-A
Date Issued: August 2017

Trial Pit Photographs

TP23



Project Title: Gleeson Strategic Land and Miller Homes
Client: Winchester Road, Hedge End
BRD Reference: BRD2924-OP2-A
Date Issued: August 2017



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info@brduk.com

Trial Pit Photographs

TP24



Project Title: Gleeson Strategic Land and Miller Homes
Client: Winchester Road, Hedge End
BRD Reference: BRD2924-OP2-A
Date Issued: August 2017

TP25



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Trial Pit Photographs

SA01



Project Title: Gleeson Strategic Land and Miller Homes
Client: Winchester Road, Hedge End
BRD Reference: BRD2924-OP2-A
Date Issued: August 2017

Trial Pit Photographs

SA02



Project Title: Gleeson Strategic Land and Miller Homes
Client: Winchester Road, Hedge End
BRD Reference: BRD2924-OP2-A
Date Issued: August 2017

Trial Pit Photographs

SA03



Project Title: Gleeson Strategic Land and Miller Homes
Client: Winchester Road, Hedge End
BRD Reference: BRD2924-OP2-A
Date Issued: August 2017

Trial Pit Photographs

SA04



Project Title: Gleeson Strategic Land and Miller Homes
Client: Winchester Road, Hedge End
BRD Reference: BRD2924-OP2-A
Date Issued: August 2017



01295 272244
info@brduk.com

Trial Pit Photographs

SA05



Project Title: Gleeson Strategic Land and Miller Homes
Client: Winchester Road, Hedge End
BRD Reference: BRD2924-OP2-A
Date Issued: August 2017



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info@brduk.com

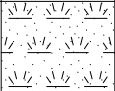
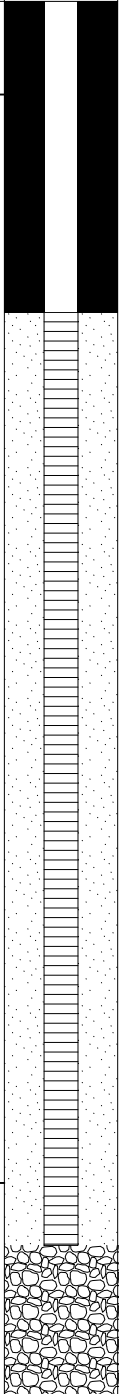
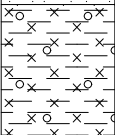
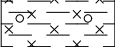
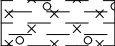
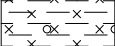
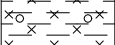
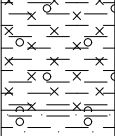
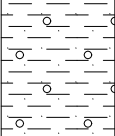
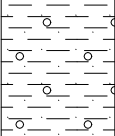
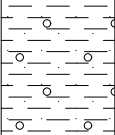
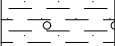
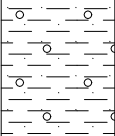
Trial Pit Photographs

SA06



Project Title: Gleeson Strategic Land and Miller Homes
Client: Winchester Road, Hedge End
BRD Reference: BRD2924-OP2-A
Date Issued: August 2017

PROBEHOLE RECORD

Client: Gleeson Strategic Land and Miller Homes Project Title: Winchester Road, Hedge End Project No: BRD2924 Logged By: M Wood Date Commenced: 24/07/2017 Date Completed: 24/07/2017 Method Used: Windowless Percussive Sampling Rig						Borehole No. WS01		
						Sheet 1 of 2		
Samples & Tests			Water	Description of Strata	Depth / (Level)	Legend	Geology	Installation /Backfill
Depth	Type & No	Value						
0.20	J1			TOPSOIL: Grass over: Soft, light brown mottled orange brown, sandy, slightly gravelly, silty clay with frequent rootlets. Gravel is fine to medium, subrounded quartzite and subangular chert.	0.30		TS	
0.60	PEN	1.75/2.0/1.75 kg/cm²		Firm to stiff, light grey and orangey brown, slightly gravelly, slightly sandy, silty CLAY. Gravel is fine to medium, subrounded quartzite.				
0.75	J2							
0.90	D1							
1.00	SPT	10 N		1.00 - 1.45 m: SPT: 2 for 150mm/2,2,3,3	1.0			
1.60	D2				1.65			
1.80	PEN	2.0/2.25/2.0 kg/cm²		Firm, becoming stiff, orange brown, reddish brown and light brown, slightly sandy, silty CLAY with gravel lithorelicts.				
2.00	SPT	6 N		2.00 - 2.45 m: SPT: 2 for 150mm/1,2,1,2	2.0			
2.70	PEN D3	3.0/3.0/3.0 kg/cm²						
3.00	SPT	15 N		3.00 - 3.45 m: SPT: 5 for 150mm/3,4,4,4	3.0			
3.90	PEN D4	2.5/2.5/3.0 kg/cm²		Firm to stiff, light grey, slightly sandy, silty CLAY.	3.80			
4.00	SPT	8 N		4.00 - 4.45 m: SPT: 3 for 150mm/1,2,2,3	4.0		LCF	
					4.50			
General Remarks: Borehole terminated at 5.45m bgl.					Surface Elevation Level:		 Telephone: 01295 272244 Email: info@brduk.com	
					All dimensions in metres Log Scale 1:25			

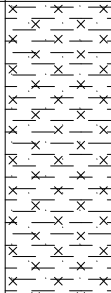
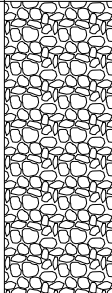
PROBEHOLE RECORD

Client: Gleeson Strategic Land and Miller Homes Project Title: Winchester Road, Hedge End Project No: BRD2924 Logged By: M Wood Date Commenced: 24/07/2017 Date Completed: 24/07/2017 Method Used: Windowless Percussive Sampling Rig						Borehole No. WS01		
						Sheet 2 of 2		
Samples & Tests			Water	Description of Strata	Depth / (Level)	Legend	Geology	Installation /Backfill
Depth	Type & No	Value						
4.60	D5			Continued from 3.80m bgl: Firm to stiff, light grey, slightly sandy, silty CLAY.			LONDON CLAY FM	
4.70	PEN	2.5/2.25/3.0 kg/cm ²						
5.00	SPT	14 N						
				5.00 - 5.45 m: SPT: 3 for 150mm/2,4,4,4	5.0			
					5.45			
					6.0			
					7.0			
					8.0			
					9.0			
General Remarks: Borehole terminated at 5.45m bgl.					Surface Elevation Level:		 Telephone: 01295 272244 Email: info@brduk.com	
					All dimensions in metres Log Scale 1:25			

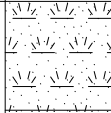
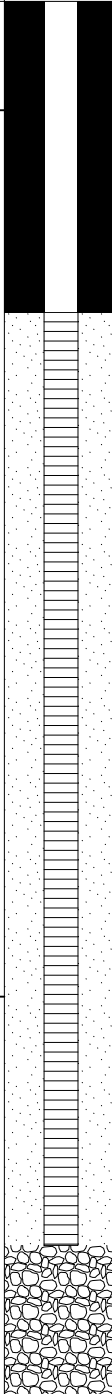
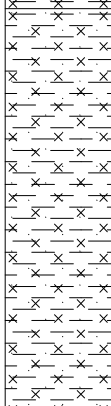
PROBEHOLE RECORD

Client: Gleeson Strategic Land and Miller Homes Project Title: Winchester Road, Hedge End Project No: BRD2924 Logged By: M Wood Date Commenced: 24/07/2017 Date Completed: 24/07/2017 Method Used: Windowless Percussive Sampling Rig						Borehole No. WS02		
						Sheet 1 of 2		
Samples & Tests			Water	Description of Strata	Depth / (Level)	Legend	Geology	Installation /Backfill
Depth	Type & No	Value						
0.30	J1			TOPSOIL: Grass over: Soft, light brown mottled orange brown, sandy, slightly gravelly, silty clay with frequent rootlets. Gravel is fine to medium, subrounded quartzite and subangular chert.	0.40		TS	
0.70	D1			Firm, orange brown and light grey, slightly sandy, slightly gravelly CLAY. Gravel is fine to coarse, subangular chert and subrounded gravel.			WITTERING FORMATION	
0.90	PEN	2.0/1.75/2.25			1.0			
1.00	SPT	kg/cm ² 5 N		1.00 - 1.45 m: SPT: 2 for 150mm/1,1,1,2				
1.60	D2							
1.80	PEN	3.0/3.0/3.0	1		2.0			
2.00	SPT	7 N		2.00 - 2.45 m: SPT: 2 for 150mm/1,2,2,2				
2.60	D3			Stiff, orange brown, slightly sandy, silty CLAY with mudstone gravel lithorelicts.	2.40			
2.80	PEN	2.5/2.5/2.5			3.0			
3.00	SPT	9 N		3.00 - 3.45 m: SPT: 3 for 150mm/2,2,3,2				
3.60	PEN D4	3.0/2.5/2.5			3.70		LCF	
4.00	SPT	12 N		Stiff, grey, slightly sandy, silty CLAY. 4.00 - 4.45 m: SPT: 3 for 150mm/3,3,3,3	4.0			
					4.50			
General Remarks: Borehole terminated at 5.45m bgl.					Surface Elevation Level:		 Telephone: 01295 272244 Email: info@brduk.com	
					All dimensions in metres Log Scale 1:25			

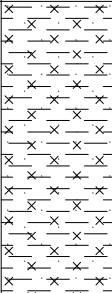
PROBEHOLE RECORD

Client: Gleeson Strategic Land and Miller Homes Project Title: Winchester Road, Hedge End Project No: BRD2924 Logged By: M Wood Date Commenced: 24/07/2017 Date Completed: 24/07/2017 Method Used: Windowless Percussive Sampling Rig						Borehole No. WS02		
						Sheet 2 of 2		
Samples & Tests			Water	Description of Strata	Depth / (Level)	Legend	Geology	Installation /Backfill
Depth	Type & No	Value						
4.60	D5			Continued from 3.70m bgl: Stiff, grey, slightly sandy, silty CLAY.			LONDON CLAY FM	
4.90 5.00	PEN SPT	3.0/3.25/3.0 kg/cm ² 19 N		5.00 - 5.45 m: SPT: 5 for 150mm/4,5,5,5	5.0 5.45			
					6.0 7.0 8.0 9.0			
General Remarks: Borehole terminated at 5.45m bgl.					Surface Elevation Level:		 Telephone: 01295 272244 Email: info@brduk.com	
					All dimensions in metres Log Scale 1:25			

PROBEHOLE RECORD

Client: Gleeson Strategic Land and Miller Homes Project Title: Winchester Road, Hedge End Project No: BRD2924 Logged By: M Wood Date Commenced: 24/07/2017 Date Completed: 24/07/2017 Method Used: Windowless Percussive Sampling Rig						Borehole No. WS03		
						Sheet 1 of 2		
Samples & Tests			Water	Description of Strata	Depth / (Level)	Legend	Geology	Installation /Backfill
Depth	Type & No	Value						
0.15	J1			TOPSOIL: Grass over: Soft, brown mottled orange brown, sandy, slightly gravelly clay with frequent rootlets. Gravel is fine to medium, subangular chert and subrounded quartzite.	0.35		TS	
0.70 0.75 0.80	D1 PEN J2	1.75/1.75/1.75 kg/cm²		Firm, orange brown and light grey, slightly sandy, slightly gravelly CLAY. Gravel is fine to coarse, subangular chert and subrounded gravel.				
1.00	SPT	8 N		1.00 - 1.45 m: SPT: 2 for 150mm/2,2,2,2	1.0			
1.60	PEN	3.0/2.5/3.0 kg/cm²		Firm to stiff, orange brown and pinkish brown, slightly sandy, silty CLAY with mudstone gravel lithorelicts.	1.70			
1.80	D2							
2.00	SPT	5 N			2.00 - 2.45 m: SPT: 1 for 150mm/1,1,1,2	2.0		
2.60	PEN	2.5/2.5/2.75 kg/cm²		Stiff, light grey, slightly sandy, silty CLAY.	3.0			
2.90	D3							
3.00	SPT	12 N			3.00 - 3.45 m: SPT: 3 for 150mm/2,4,3,3	3.20		
3.60	D4				4.0			
3.90	PEN	2.75/3.0/3.0 kg/cm²	4.00 - 4.45 m: SPT: 2 for 150mm/1,2,2,2					
4.00	SPT	7 N						
General Remarks: Borehole terminated at 5.45m bgl.				Surface Elevation Level:				
				All dimensions in metres Log Scale 1:25		Telephone: 01295 272244 Email: info@brduk.com		

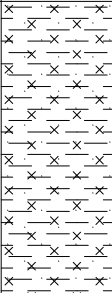
PROBEHOLE RECORD

Client: Gleeson Strategic Land and Miller Homes Project Title: Winchester Road, Hedge End Project No: BRD2924 Logged By: M Wood Date Commenced: 24/07/2017 Date Completed: 24/07/2017 Method Used: Windowless Percussive Sampling Rig						Borehole No. WS03		
						Sheet 2 of 2		
Samples & Tests			Water	Description of Strata	Depth / (Level)	Legend	Geology	Installation /Backfill
Depth	Type & No	Value						
4.70	D5			Continued from 3.20m bgl: Stiff, light grey, slightly sandy, silty CLAY.			LONDON CLAY FM	
4.90	PEN	2.0/2.25/3.0			5.0			
5.00	SPT	kg/cm ² 9 N		5.00 - 5.45 m: SPT: 3 for 150mm/2,2,2,3	5.45			
					6.0			
					7.0			
					8.0			
					9.0			
General Remarks: Borehole terminated at 5.45m bgl.					Surface Elevation Level:		 Telephone: 01295 272244 Email: info@brduk.com	
					All dimensions in metres Log Scale 1:25			

PROBEHOLE RECORD

Client: Gleeson Strategic Land and Miller Homes Project Title: Winchester Road, Hedge End Project No: BRD2924 Logged By: M Wood Date Commenced: 24/07/2017 Date Completed: 24/07/2017 Method Used: Windowless Percussive Sampling Rig						Borehole No. WS04		
						Sheet 1 of 2		
Samples & Tests			Water	Description of Strata	Depth / (Level)	Legend	Geology	Installation /Backfill
Depth	Type & No	Value						
0.15	J1			TOPSOIL: Grass over: Soft, brown mottled orange brown, sandy, slightly gravelly clay with frequent rootlets. Gravel is fine to medium, subangular chert and subrounded quartzite.	0.35		TS	
0.75 0.80	D1 PEN	>4.5/>4.5/>4.5 kg/cm²		Stiff, orange brown and light grey, slightly sandy, slightly gravelly CLAY. Gravel is fine to coarse, angular to subangular chert and subrounded quartzite.				
1.00	SPT	10 N		1.00 - 1.45 m: SPT: 2 for 150mm/2,2,3,3	1.0		WITTERING FORMATION	
1.80	PEN D2	>4.5/>4.5/>4.5 kg/cm²		Stiff, orange brown, pinkish brown and reddish brown, slightly sandy, silty CLAY with mudstone gravel lithorelicts.	1.70			
2.00	SPT	8 N		2.00 - 2.45 m: SPT: 2 for 150mm/2,2,2,2	2.0			
2.60 2.70	D3 PEN	3.0/2.0/2.25 kg/cm²						
3.00	SPT	12 N		3.00 - 3.45 m: SPT: 3 for 150mm/3,2,3,4	3.0			
3.50 3.60	PEN D4	4.0/4.0/3.5 kg/cm²					LCF	
4.00	SPT	9 N		4.00 - 4.45 m: SPT: 3 for 150mm/2,2,2,3 Stiff, light grey, slightly sandy, silty CLAY.	4.0 4.10			
General Remarks: Borehole terminated at 5.45m bgl.					Surface Elevation Level:		 Telephone: 01295 272244 Email: info@brduk.com	
					All dimensions in metres Log Scale 1:25			

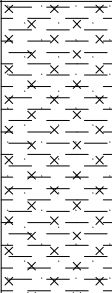
PROBEHOLE RECORD

Client: Gleeson Strategic Land and Miller Homes Project Title: Winchester Road, Hedge End Project No: BRD2924 Logged By: M Wood Date Commenced: 24/07/2017 Date Completed: 24/07/2017 Method Used: Windowless Percussive Sampling Rig						Borehole No. WS04		
						Sheet 2 of 2		
Samples & Tests			Water	Description of Strata	Depth / (Level)	Legend	Geology	Installation /Backfill
Depth	Type & No	Value						
4.60	D5			Continued from 4.10m bgl: Stiff, light grey, slightly sandy, silty CLAY. 5.00 - 5.45 m: SPT: 2 for 150mm/1,2,2,3	5.0	 LONDON CLAY FM		
4.80	PEN	3.0/2.0/2.75 kg/cm ²						
5.00	SPT	8 N			5.45			
					6.0			
					7.0			
					8.0			
					9.0			
General Remarks: Borehole terminated at 5.45m bgl.					Surface Elevation Level:			
					All dimensions in metres Log Scale 1:25			
					 Telephone: 01295 272244 Email: info@brduk.com			

PROBEHOLE RECORD

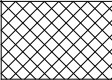
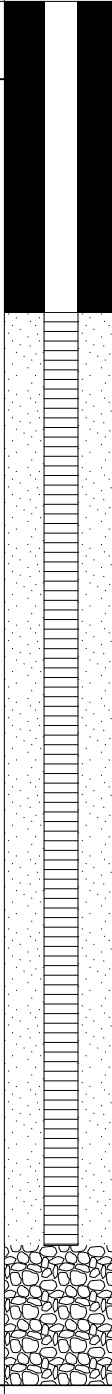
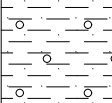
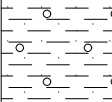
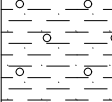
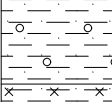
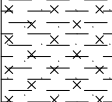
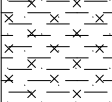
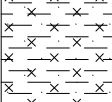
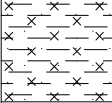
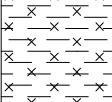
Client: Gleeson Strategic Land and Miller Homes Project Title: Winchester Road, Hedge End Project No: BRD2924 Logged By: M Wood Date Commenced: 24/07/2017 Date Completed: 24/07/2017 Method Used: Windowless Percussive Sampling Rig						Borehole No. WS05		
						Sheet 1 of 2		
Samples & Tests			Water	Description of Strata	Depth / (Level)	Legend	Geology	Installation /Backfill
Depth	Type & No	Value						
0.10	J1			MADE GROUND: Soft, dark brown, sandy, slightly gravelly clay. Gravel is fine to coarse, subangular to subrounded chert with occasional brick and charcoal fragments.	0.20		MG	
0.75	J2			Firm, orange brown and light grey, slightly sandy, slightly gravelly CLAY. Gravel is fine to coarse, subangular chert and subrounded quartzite.				
0.80	D1			0.80 m: Becoming firm to stiff.				
1.00	SPT	7 N		1.00 - 1.45 m: SPT: 1 for 150mm/1,2,2,2	1.0			
				Stiff, light pinkish brown, slightly sandy, silty CLAY.	1.20			
1.60	D2							
1.80	PEN	3.5/3.5/3.5 kg/cm²						
2.00	SPT	7 N		2.00 - 2.45 m: SPT: 3 for 150mm/1,2,2,2	2.0			
				Stiff, orange brown, pinkish brown and reddish brown, slightly sandy, silty CLAY with mudstone gravel lithorelicts.	2.10			
2.60	PEN	2.5/2.75/3.0 kg/cm²						
2.70	D3							
3.00	SPT	9 N		3.00 - 3.45 m: SPT: 3 for 150mm/2,2,2,3	3.0			
3.75	PEN	4.0/4.5/>4.5 kg/cm²		Stiff, grey, slightly sandy, silty CLAY.	3.70			
3.80	D4							
4.00	SPT	12 N		4.00 - 4.45 m: SPT: 4 for 150mm/2,3,3,4	4.0		LCF	
					4.50			
General Remarks: Borehole terminated at 5.45m bgl. Borehole hand dug to 1.20m bgl.					Surface Elevation Level:			
					All dimensions in metres Log Scale 1:25		Telephone: 01295 272244 Email: info@brduk.com	

PROBEHOLE RECORD

Client: Gleeson Strategic Land and Miller Homes Project Title: Winchester Road, Hedge End Project No: BRD2924 Logged By: M Wood Date Commenced: 24/07/2017 Date Completed: 24/07/2017 Method Used: Windowless Percussive Sampling Rig						Borehole No. WS05		
						Sheet 2 of 2		
Samples & Tests			Water	Description of Strata	Depth / (Level)	Legend	Geology	Installation /Backfill
Depth	Type & No	Value						
4.60	PEN	4.5/4.0/4.25 kg/cm ²		Continued from 3.70m bgl: Stiff, grey, slightly sandy, silty CLAY.			LONDON CLAY FM	
4.80	D5							
5.00	SPT	7 N		5.00 - 5.45 m: SPT: 2 for 150mm/1,2,2,2	5.0			
					5.45			
					6.0			
					7.0			
					8.0			
					9.0			
General Remarks: Borehole terminated at 5.45m bgl. Borehole hand dug to 1.20m bgl.					Surface Elevation Level:		 Telephone: 01295 272244 Email: info@brduk.com	
					All dimensions in metres Log Scale 1:25			

PROBEHOLE RECORD

Client: Gleeson Strategic Land and Miller Homes Project Title: Winchester Road, Hedge End Project No: BRD2924 Logged By: M Wood Date Commenced: 24/07/2017 Date Completed: 24/07/2017 Method Used: Windowless Percussive Sampling Rig						Borehole No. WS06	
						Sheet 1 of 1	

Samples & Tests			Water	Description of Strata	Depth / (Level)	Legend	Geology	Installation /Backfill
Depth	Type & No	Value						
0.20	J1			MADE GROUND: Soft, dark brown and orange brown, sandy, slightly gravelly clay with occasional rootlets. Gravel is fine to coarse, subangular to subrounded chert and quartzite with occasional brick and tarmac fragments.	0.25		MG	
0.80	J2			Soft, orange brown and brown, slightly sandy, slightly gravelly CLAY. Gravel is fine to coarse, subangular chert and subrounded quartzite.				
0.90	D1			0.60 m: Becoming orange brown and light grey in colour.				
1.00	SPT	5 N		1.00 - 1.45 m: SPT: 1 for 150mm/1,1,1,2	1.0			
1.70	PEN D2	2.0/2.0/2.0 kg/cm²						
2.00	SPT	8 N			2.0 2.00			
2.70	D3			Stiff, pinkish brown, slightly sandy, silty CLAY. 2.00 - 2.45 m: SPT: 2 for 150mm/1,2,2,3			WITTERING FORMATION	
3.00	SPT	9 N		3.00 - 3.45 m: SPT: 2 for 150mm/2,1,3,3 3.00 - 4.00 m: Poor recovery, approximately 30%.	3.0			
3.80	D4			Stiff, brownish purple, silty CLAY.	3.50			
4.00	SPT	11 N		4.00 - 4.45 m: SPT: 4 for 150mm/2,3,3,3	4.0			
				4.40 m: Becoming grey.	4.45			

General Remarks: Borehole terminated at 4.45m bgl. Borehole hand dug to 1.50m bgl using hand auger. Slight groundwater seepage at 1.50m bgl.	Surface Elevation Level:	 Telephone: 01295 272244 Email: info@brduk.com
	All dimensions in metres Log Scale 1:25	

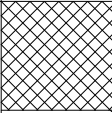
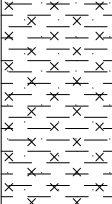
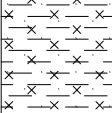
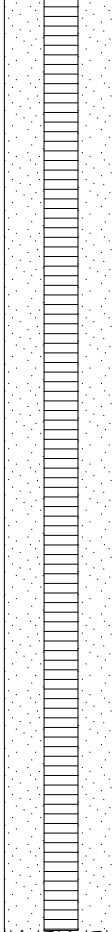
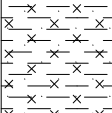
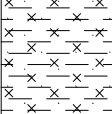
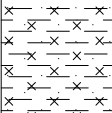
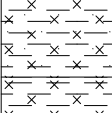
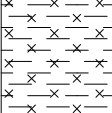
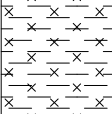
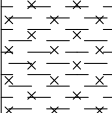
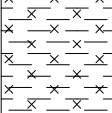
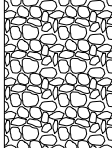
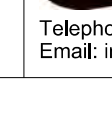
PROBEHOLE RECORD

Client: Gleeson Strategic Land and Miller Homes Project Title: Winchester Road, Hedge End Project No: BRD2924 Logged By: M Wood Date Commenced: 25/07/2017 Date Completed: 25/07/2017 Method Used: Windowless Percussive Sampling Rig						Borehole No. WS07		
						Sheet 1 of 2		
Samples & Tests			Water	Description of Strata	Depth / (Level)	Legend	Geology	Installation /Backfill
Depth	Type & No	Value						
0.15	J1			TOPSOIL: Grass over: Soft to firm, desiccated, light brown to brown, sandy, slightly gravelly clay with frequent rootlets. Gravel is fine to coarse, subangular chert.	0.30		TS	
0.60 0.70	PEN D1	2.5/2.5/2.5 kg/cm²		Firm, orange brown and light grey, slightly sandy, gravelly, silty CLAY with occasional roots and rootlets. Gravel is fine to coarse, subangular chert.				
0.90 1.00	J2 SPT	7 N		1.00 - 1.45 m: SPT: 2 for 150mm/2,2,2,1	1.0		WITTERING FORMATION	
1.60 1.70	PEN D2	2.0/1.5/2.0 kg/cm²		Firm, light grey, orange brown and greyish green, sandy, clayey SILT with occasional roots.	1.30			
2.00	SPT	10 N		2.00 - 2.45 m: SPT: 2 for 150mm/2,3,2,3 2.10 m: No more roots.	2.0			
2.70	D3			Firm to stiff, greenish grey, sandy, silty CLAY with occasional partings of sandy silt.	2.50			
2.90 3.00	PEN SPT	2.5/2.5/2.5 kg/cm² 9 N		3.00 - 3.45 m: SPT: 3 for 150mm/1,2,3,3	3.0		WITTERING FORMATION	
3.60	PEN	3.25/4.0/3.5 kg/cm²						
4.00	SPT	10 N		4.00 - 4.45 m: SPT: 3 for 150mm/2,2,3,3 4.00 - 5.00 m: Poor recovery, approximately 40%.	4.0			
					4.50			
General Remarks: Borehole terminated at 5.45m bgl. Ground water struck between 1.00 and 2.00m bgl.					Surface Elevation Level:		 Telephone: 01295 272244 Email: info@brduk.com	
					All dimensions in metres Log Scale 1:25			

PROBEHOLE RECORD

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PROBEHOLE RECORD

Client: Gleeson Strategic Land and Miller Homes Project Title: Winchester Road, Hedge End Project No: BRD2924 Logged By: M Wood Date Commenced: 25/07/2017 Date Completed: 25/07/2017 Method Used: Windowless Percussive Sampling Rig						Borehole No. WS08		
						Sheet 1 of 2		
Samples & Tests			Water	Description of Strata	Depth / (Level)	Legend	Geology	Installation /Backfill
Depth	Type & No	Value						
0.20	J1			MADE GROUND/TOPSOIL: Grass over: Soft, light brown, slightly sandy, gravelly clay topsoil with frequent rootlets. Gravel is fine to coarse, angular to subangular chert with rare brick and charcoal fragments.	0.35		MGTS	
				Soft, orange brown, reddish brown and light grey, slightly sandy, silty CLAY.				
0.70 0.80	PEN D1	3.5/2.0/2.75 kg/cm²					WITTERING FORMATION	
1.00	SPT	2 N		1.00 - 1.45 m: SPT: 1 for 150mm/0,1,0,1	1.0			
1.60	D2							
1.80	PEN	2.0/1.5/2.0 kg/cm²		1.70 m: Becoming firm.				
2.00	SPT	5 N		2.00 - 2.45 m: SPT: 1 for 150mm/1,1,1,2	2.0			
								
2.70	PEN	2.0/2.25/2.25 kg/cm²		Firm to stiff, grey, silty CLAY.	2.70			
2.80	D3							
3.00	SPT	7 N		3.00 m: Becoming stiff. 3.00 - 3.45 m: SPT: 3 for 150mm/1,2,2,2	3.0			
								
3.70 3.80	D4 PEN	2.25/2.75/2.0 kg/cm²						
4.00	SPT	5 N		4.00 m: Becoming firm. 4.00 - 4.45 m: SPT: 1 for 150mm/1,1,1,2	4.0			
					4.50			
General Remarks: Borehole terminated at 5.45m bgl.					Surface Elevation Level:		 Telephone: 01295 272244 Email: info@brduk.com	
					All dimensions in metres Log Scale 1:25			

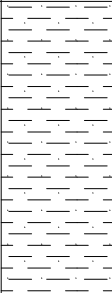
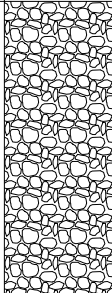
PROBEHOLE RECORD

Client: Project Title: Project No: Logged By: Date Commenced: Date Completed: Method Used: Gleeson Strategic Land and Miller Homes Winchester Road, Hedge End BRD2924 M Wood 25/07/2017 25/07/2017 Windowless Percussive Sampling Rig							Borehole No. WS08 Sheet 2 of 2													
Samples & Tests <table><tr><th>Depth</th><th>Type & No</th><th>Value</th></tr><tr><td>4.50</td><td>D5</td><td></td></tr><tr><td>4.80</td><td>PEN</td><td>3.5/4.0/3.0 kg/cm²</td></tr><tr><td>5.00</td><td>SPT</td><td>10 N</td></tr></table>			Depth	Type & No	Value	4.50	D5		4.80	PEN	3.5/4.0/3.0 kg/cm²	5.00	SPT	10 N	Water	Description of Strata Continued from 2.70m bgl: Firm to stiff, grey, silty CLAY. 5.00 - 5.45 m: SPT: 3 for 150mm/2,2,3,3	Depth / (Level) 5.0 5.45 6.0 7.0 8.0 9.0	Legend WITTERING FM	Geology	Installation /Backfill
Depth	Type & No	Value																		
4.50	D5																			
4.80	PEN	3.5/4.0/3.0 kg/cm²																		
5.00	SPT	10 N																		
General Remarks: Borehole terminated at 5.45m bgl.					Surface Elevation Level: All dimensions in metres Log Scale 1:25		 Telephone: 01295 272244 Email: info@brduk.com													

PROBEHOLE RECORD

Client: Gleeson Strategic Land and Miller Homes Project Title: Winchester Road, Hedge End Project No: BRD2924 Logged By: M Wood Date Commenced: 25/07/2017 Date Completed: 25/07/2017 Method Used: Windowless Percussive Sampling Rig						Borehole No. WS09		
						Sheet 1 of 2		
Samples & Tests			Water	Description of Strata	Depth / (Level)	Legend	Geology	Installation /Backfill
Depth	Type & No	Value						
0.15	J1			TOPSOIL: Grass over: Soft, brown, slightly sandy, slightly gravelly clay with frequent roots and rootlets. Gravel is fine to coarse, subangular to subrounded chert.	0.30		TS	
				Firm, desiccated, orange brown and light grey, slightly sandy, slightly gravelly CLAY with frequent roots and rootlets. Gravel is fine to coarse, subangular to subrounded flint.				
0.70	D1							
0.80	J1							
0.95	PEN	4.0/4.5/4.5			1.0			
1.00	SPT	kg/cm ² 7 N		1.00 - 1.45 m: SPT: 4 for 150mm/2,1,2,2				
1.50	PEN	2.5/2.0/2.25		1.40 - 1.45 m: Small pocket of orange brown and light grey, fine SAND.	1.60			
				Loose to medium dense, orange brown and light grey, fine SAND.				
1.80	D2			1.70 - 1.75 m: Thin band of firm, grey, very sandy CLAY.	1.90			
2.00	SPT	5 N		2.00 - 2.45 m: SPT: 1 for 150mm/1,2,1,1	2.0			
2.75	D3							
2.80	PEN	2.75/2.75/2.75						
3.00	SPT	10 N		Loose, grey, saturated, very silty, fine SAND.	3.0			
				3.00 - 3.45 m: SPT: 2 for 150mm/2,2,3,3				
				3.00 - 4.00 m: Approximately 70% recovery.				
3.40	D4			Stiff, grey, slightly sandy, silty CLAY with occasional partings of silty sand.	3.50			
4.00	SPT	11 N		4.00 - 4.45 m: SPT: 2 for 150mm/2,3,3,3	4.0			
					4.50			
General Remarks: Borehole terminated at 5.45m bgl.						Surface Elevation Level:		 Telephone: 01295 272244 Email: info@brduk.com
						All dimensions in metres Log Scale 1:25		

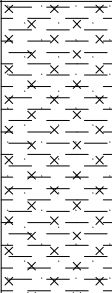
PROBEHOLE RECORD

Client: Gleeson Strategic Land and Miller Homes Project Title: Winchester Road, Hedge End Project No: BRD2924 Logged By: M Wood Date Commenced: 25/07/2017 Date Completed: 25/07/2017 Method Used: Windowless Percussive Sampling Rig						Borehole No. WS09		
						Sheet 2 of 2		
Samples & Tests			Water	Description of Strata	Depth / (Level)	Legend	Geology	Installation /Backfill
Depth	Type & No	Value						
4.90	PEN	3.0/3.0/3.0		Continued from 3.50m bgl: Stiff, grey, slightly sandy, silty CLAY with occasional partings of silty sand.	5.0		WITTERING FM	
5.00	SPT	kg/cm ² 15 N		5.00 - 5.45 m: SPT: 5 for 150mm/3,3,4,5	5.45			
					6.0			
					7.0			
					8.0			
					9.0			
General Remarks: Borehole terminated at 5.45m bgl.					Surface Elevation Level:		 Telephone: 01295 272244 Email: info@brduk.com	
					All dimensions in metres Log Scale 1:25			

PROBEHOLE RECORD

Client: Gleeson Strategic Land and Miller Homes Project Title: Winchester Road, Hedge End Project No: BRD2924 Logged By: M Wood Date Commenced: 25/07/2017 Date Completed: 25/07/2017 Method Used: Windowless Percussive Sampling Rig						Borehole No. WS10		
						Sheet 1 of 2		
Samples & Tests			Water	Description of Strata	Depth / (Level)	Legend	Geology	Installation /Backfill
Depth	Type & No	Value						
0.10	J1			MADE GROUND/TOPSOIL: Grass over: Soft to firm, light brown and orange brown, sandy, silty clay topsoil with frequent rootlets and rare brick and charcoal fragments.	0.35		MADE GROUND/TOPSOIL	
0.80	J2			MADE GROUND/TOPSOIL: Firm, orange brown and light grey, slightly sandy, slightly gravelly clay with occasional rootlets. Gravel is fine to coarse, subangular chert with occasional charcoal fragments.	0.90			
0.95	D1			Soft to firm, orange brown and light grey, slightly sandy, slightly gravelly CLAY with occasional rootlets. Gravel is fine to medium, subangular chert. 1.00 - 1.45 m: SPT: 1 for 150mm/1,1,2,1	1.0			
1.00	SPT	5 N			1.75			
1.50	PEN D2	2.0/1.75/2.0 kg/cm²		Firm, grey, with natural black staining, slightly sandy, silty CLAY with occasional sandy partings. 2.00 - 2.45 m: SPT: 1 for 150mm/1,1,2,3	2.0		WITTERING FORMATION	
2.00	SPT	7 N			3.00			
2.50	D3			Loose to medium dense, saturated, grey, silty, fine SAND. 3.00 - 3.45 m: SPT: 3 for 150mm/3,3,5,5 3.00 - 4.00 m: Approximately 80% recovery. Stiff, grey, slightly sandy, silty CLAY with occasional partings and thin bands of fine sand.	3.20			
2.90	PEN	2.0/2.0/3.25 kg/cm²			4.0			
3.00	SPT	16 N		4.00 - 4.45 m: SPT: 5 for 150mm/3,5,5,5 4.00 - 5.00 m: Approximately 50% recovery.	4.50			
3.70	D4							
4.00	SPT	18 N						
General Remarks: Borehole terminated at 5.45m bgl.					Surface Elevation Level:		 Telephone: 01295 272244 Email: info@brduk.com	
					All dimensions in metres Log Scale 1:25			

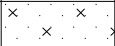
PROBEHOLE RECORD

Client: Gleeson Strategic Land and Miller Homes Project Title: Winchester Road, Hedge End Project No: BRD2924 Logged By: M Wood Date Commenced: 25/07/2017 Date Completed: 25/07/2017 Method Used: Windowless Percussive Sampling Rig						Borehole No. WS10		
						Sheet 2 of 2		
Samples & Tests			Water	Description of Strata	Depth / (Level)	Legend	Geology	Installation /Backfill
Depth	Type & No	Value						
4.70	D5			Continued from 3.20m bgl: Stiff, grey, slightly sandy, silty CLAY with occasional partings and thin bands of fine sand.			WITTERING FM	
5.00	SPT	14 N		5.00 - 5.45 m: SPT: 4 for 150mm/3,3,4,4	5.0			
					5.45			
					6.0			
					7.0			
					8.0			
					9.0			
General Remarks: Borehole terminated at 5.45m bgl.					Surface Elevation Level:		 Telephone: 01295 272244 Email: info@brduk.com	
					All dimensions in metres Log Scale 1:25			

PROBEHOLE RECORD

Client: Gleeson Strategic Land and Miller Homes Project Title: Winchester Road, Hedge End Project No: BRD2924 Logged By: M Wood Date Commenced: 25/07/2017 Date Completed: 25/07/2017 Method Used: Windowless Percussive Sampling Rig						Borehole No. WS11			
						Sheet 1 of 2			
Samples & Tests			Water	Description of Strata	Depth / (Level)	Legend	Geology	Installation /Backfill	
Depth	Type & No	Value							
0.10	J1			TOPSOIL: Grass over: Soft, brown to light brown, sandy, slightly gravelly clay with frequent rootlets. Gravel is fine to medium, subangular chert.	0.45		TS		
0.75	J2			Firm, orange brown and light grey, slightly sandy, slightly gravelly, silty CLAY with occasional rootlets. Gravel is fine to medium, angular to subangular chert.					
1.00	SPT	8 N		1.00 - 1.45 m: SPT: 2 for 150mm/2,1,2,3 1.20 m: Ceramic land drain.	1.0				
1.70	PEN	3.0/2.5/2.5 kg/cm²							
1.90	D1								
2.00	SPT	22 N		2.00 - 2.45 m: SPT: 3 for 150mm/4,6,6,6	2.0				
2.40	D2			Loose to medium dense, orange brown and light grey, slightly clayey, silty, fine SAND with frequent thin bands of light grey clay throughout. 2.20 - 2.50 m: Saturated.	2.20				
3.00	SPT	14 N		3.00 - 3.45 m: SPT: 4 for 150mm/3,4,4,3	3.0				
3.70	D3			Stiff, greyish green, slightly sandy, silty CLAY with frequent partings of fine sand throughout.	3.25				
4.00	SPT	13 N		4.00 - 4.45 m: SPT: 4 for 150mm/2,3,4,4 4.00 - 5.00 m: Approximately 65% recovery.	4.0				
				4.50		WITTERING FORMATION			
General Remarks: Borehole terminated at 5.45m bgl. Ground water at 2.20m bgl after drilling.					Surface Elevation Level:				
					All dimensions in metres Log Scale 1:25				
					Telephone: 01295 272244 Email: info@brduk.com				

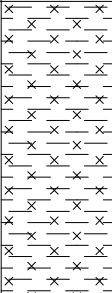
PROBEHOLE RECORD

Client: Gleeson Strategic Land and Miller Homes Project Title: Winchester Road, Hedge End Project No: BRD2924 Logged By: M Wood Date Commenced: 25/07/2017 Date Completed: 25/07/2017 Method Used: Windowless Percussive Sampling Rig						Borehole No. WS11		
						Sheet 2 of 2		
Samples & Tests			Water	Description of Strata	Depth / (Level)	Legend	Geology	Installation /Backfill
Depth	Type & No	Value						
5.00	SPT	18 N		Loose to medium dense, greyish green and brown, silty, fine SAND.	4.65		WITTERING FM	
			Stiff, greyish green, slightly sandy, silty CLAY with frequent partings of fine sand throughout. 5.00 - 5.45 m: SPT: 5 for 150mm/4,4,4,6	5.0				
					5.45			
					6.0			
					7.0			
					8.0			
					9.0			
General Remarks: Borehole terminated at 5.45m bgl. Ground water at 2.20m bgl after drilling.					Surface Elevation Level:		 Telephone: 01295 272244 Email: info@brduk.com	
					All dimensions in metres Log Scale 1:25			

PROBEHOLE RECORD

Client: Gleeson Strategic Land and Miller Homes Project Title: Winchester Road, Hedge End Project No: BRD2924 Logged By: M Wood Date Commenced: 25/07/2017 Date Completed: 25/07/2017 Method Used: Windowless Percussive Sampling Rig						Borehole No. WS12		
						Sheet 1 of 2		
Samples & Tests			Water	Description of Strata	Depth / (Level)	Legend	Geology	Installation /Backfill
Depth	Type & No	Value						
0.15	J1			TOPSOIL: Grass over: Soft, desiccated, light brown, sandy, slightly gravelly clay with frequent rootlets. Gravel is fine to coarse, subangular to subrounded chert and quartzite.	0.30		TS	
0.65	D1			Firm, orange brown and light grey, slightly sandy, slightly gravelly CLAY with occasional roots and rootlets. Gravel is fine to medium, subangular chert.				
0.90	PEN	2.5/2.0/2.5		1.00 - 1.45 m: SPT: 2 for 150mm/1,2,2,2	1.0		WITTERING FORMATION	
1.00	SPT	7 N						
1.60	D2			Firm to stiff, orange brown, reddish brown and light grey, slightly sandy, silty CLAY with occasional sand partings.	1.50			
1.85	PEN	3.5/3.5/3.5		2.00 - 2.45 m: SPT: 2 for 150mm/2,1,2,3	2.0			
2.00	SPT	8 N						
2.60	PEN	2.0/2.0/2.25		3.00 - 3.45 m: SPT: 3 for 150mm/3,3,3,4	3.0			
2.70	D3	kg/cm²						
3.00	SPT	13 N		Stiff, greenish grey, slightly sandy, silty CLAY with frequent sand partings.	3.30			
3.70	D4			4.00 - 4.45 m: SPT: 4 for 150mm/3,3,5,5	4.0			
3.90	PEN	4.25/4.0/4.5						
4.00	SPT	16 N			4.50			
General Remarks: Borehole terminated at 5.45m bgl. Ground water rose to 3.00m bgl after drilling.					Surface Elevation Level:		 Telephone: 01295 272244 Email: info@brduk.com	
					All dimensions in metres Log Scale 1:25			

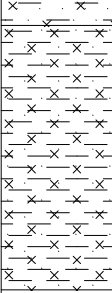
PROBEHOLE RECORD

Client: Gleeson Strategic Land and Miller Homes Project Title: Winchester Road, Hedge End Project No: BRD2924 Logged By: M Wood Date Commenced: 25/07/2017 Date Completed: 25/07/2017 Method Used: Windowless Percussive Sampling Rig						Borehole No. WS12		
						Sheet 2 of 2		
Samples & Tests			Water	Description of Strata	Depth / (Level)	Legend	Geology	Installation /Backfill
Depth	Type & No	Value						
4.80	D5	4.0/4.0/4.0 kg/cm ² 20 N		Continued from 3.30m bgl: Stiff, greenish grey, slightly sandy, silty CLAY with frequent sand partings.	5.0		WITTERING FM	
4.90	PEN							
5.00	SPT				5.00 - 5.45 m: SPT: 6 for 150mm/4,5,5,6	5.45		
					6.0			
					7.0			
					8.0			
					9.0			
General Remarks: Borehole terminated at 5.45m bgl. Ground water rose to 3.00m bgl after drilling.					Surface Elevation Level:		 Telephone: 01295 272244 Email: info@brduk.com	
					All dimensions in metres Log Scale 1:25			

PROBEHOLE RECORD

Client: Gleeson Strategic Land and Miller Homes Project Title: Winchester Road, Hedge End Project No: BRD2924 Logged By: M Wood Date Commenced: 26/07/2017 Date Completed: 26/07/2017 Method Used: Windowless Percussive Sampling Rig						Borehole No. WS13		
						Sheet 1 of 2		
Samples & Tests			Water	Description of Strata	Depth / (Level)	Legend	Geology	Installation /Backfill
Depth	Type & No	Value						
0.15	J1			TOPSOIL: Grass over: Soft, light brown, sandy, gravelly clay with frequent rootlets. Gravel is fine to coarse, subangular to subrounded chert.	0.30		TS	
0.60	D1			Firm, orange brown and light grey, gravelly, slightly sandy CLAY. Gravel is fine to medium, subangular chert.				
0.80	J2						WITTERING FORMATION	
0.90	PEN	2.5/2.5/2.25			1.0			
1.00	SPT	9 N		Firm, orange brown and light grey, slightly sandy, silty CLAY with occasional partings of silty sand. 1.00 - 1.45 m: SPT: 3 for 150mm/2,2,2,3	1.00			
1.60	D2							
1.70	PEN	2.75/2.0/2.5						
2.00	SPT	8 N		2.00 - 2.45 m: SPT: 2 for 150mm/1,2,2,3	2.0			
2.60	D3							
2.80	PEN	2.75/2.5/2.0						
3.00	SPT	16 N		3.00 - 3.45 m: SPT: 4 for 150mm/4,4,4,4	3.0			
3.60	D4			Medium dense, greyish green, clayey, slightly silty, fine SAND with frequent bands of firm clay.	3.55			
4.00	SPT	10 N		4.00 - 4.45 m: SPT: 3 for 150mm/2,2,3,3	4.0			
					4.50			
General Remarks: Borehole terminated at 5.45m bgl.					Surface Elevation Level:		 Telephone: 01295 272244 Email: info@brduk.com	
					All dimensions in metres Log Scale 1:25			

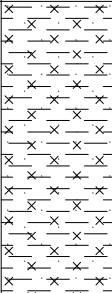
PROBEHOLE RECORD

Client: Gleeson Strategic Land and Miller Homes Project Title: Winchester Road, Hedge End Project No: BRD2924 Logged By: M Wood Date Commenced: 26/07/2017 Date Completed: 26/07/2017 Method Used: Windowless Percussive Sampling Rig						Borehole No. WS13		
						Sheet 2 of 2		
Samples & Tests			Water	Description of Strata	Depth / (Level)	Legend	Geology	Installation /Backfill
Depth	Type & No	Value						
4.70	D5			Continued from 3.55m bgl: Medium dense, greyish green, clayey, slightly silty, fine SAND with frequent bands of firm clay.	4.60		WITTERING FM	
5.00	SPT	20 N		Firm to stiff, greyish green, sandy, silty CLAY with frequent bands of slightly silty, fine sand.	5.0			
				5.00 - 5.45 m: SPT: 3 for 150mm/4,6,5,5	5.45			
					6.0			
					7.0			
					8.0			
					9.0			
General Remarks: Borehole terminated at 5.45m bgl.					Surface Elevation Level:			
					All dimensions in metres Log Scale 1:25			
					Telephone: 01295 272244 Email: info@brduk.com			

PROBEHOLE RECORD

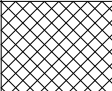
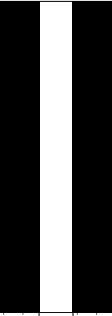
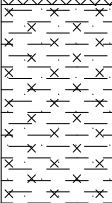
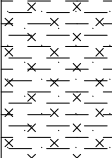
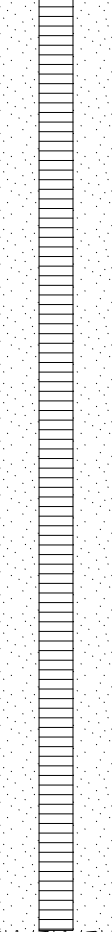
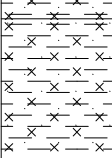
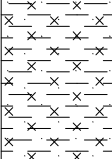
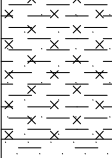
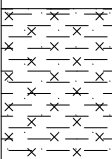
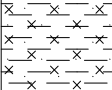
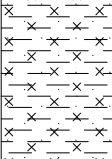
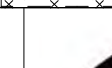
Client: Gleeson Strategic Land and Miller Homes Project Title: Winchester Road, Hedge End Project No: BRD2924 Logged By: M Wood Date Commenced: 26/07/2017 Date Completed: 26/07/2017 Method Used: Windowless Percussive Sampling Rig						Borehole No. WS14		
						Sheet 1 of 2		
Samples & Tests			Water	Description of Strata	Depth / (Level)	Legend	Geology	Installation /Backfill
Depth	Type & No	Value						
0.10	J1			TOPSOIL: Grass over: Soft, light brown, sandy, gravelly clay with frequent rootlets. Gravel is fine to coarse, subangular to subrounded chert.	0.30		TS	
0.70	PEN J2	2.25/2.0/1.75 kg/cm²		Firm to stiff, orange brown and light grey, slightly sandy, silty CLAY with frequent partings and occasional thin bands of silty sand.				
0.90	D1						WITTERING FORMATION	
1.00	SPT	8 N		1.00 - 1.45 m: SPT: 3 for 150mm/1,2,2,3	1.0			
1.60	PEN	2.0/1.75/1.75 kg/cm²			1.70			
1.80	D2			Medium dense, orange brown with occasional light grey, slightly clayey, slightly silty, fine SAND with frequent bands of firm, grey clay throughout.				
2.00	SPT	10 N		2.00 - 2.45 m: SPT: 3 for 150mm/2,3,2,3	2.0			
2.40	D3			Firm to stiff, orange brown and light grey, slightly sandy, silty CLAY with frequent partings and occasional thin bands of silty sand.	2.35			
				Medium dense, orange brown with occasional light grey, slightly clayey, slightly silty, fine SAND with frequent bands of firm, grey clay throughout.	2.65			
3.00	SPT	9 N	↓	3.00 - 3.45 m: SPT: 2 for 150mm/1,2,3,3	3.0			
3.60	PEN	1.75/1.75/1.75 kg/cm²		Firm to stiff, orange brown and light grey, slightly sandy, silty CLAY with frequent partings and occasional thin bands of silty sand.	3.25			
3.80	D4			Stiff, greenish grey, slightly sandy, silty CLAY with partings and thin bands of sand.	3.50			
4.00	SPT	12 N		4.00 - 4.45 m: SPT: 3 for 150mm/2,3,3,4 4.00 - 5.00 m: Poor recovery, approximately 30%.	4.0			
					4.50			
General Remarks: Borehole terminated at 5.45m bgl.					Surface Elevation Level:		 Telephone: 01295 272244 Email: info@brduk.com	
					All dimensions in metres Log Scale 1:25			

PROBEHOLE RECORD

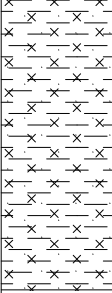
Client: Gleeson Strategic Land and Miller Homes Project Title: Winchester Road, Hedge End Project No: BRD2924 Logged By: M Wood Date Commenced: 26/07/2017 Date Completed: 26/07/2017 Method Used: Windowless Percussive Sampling Rig						Borehole No. WS14		
						Sheet 2 of 2		
Samples & Tests			Water	Description of Strata	Depth / (Level)	Legend	Geology	Installation /Backfill
Depth	Type & No	Value						
4.90	D5			Continued from 3.50m bgl:Stiff, greenish grey, slightly sandy, silty CLAY with partings and thin bands of sand.		 WITTERING FM		
5.00	SPT	19 N		5.00 - 5.45 m: SPT: 5 for 150mm/4,5,5,5	5.0			
					5.45			
					6.0			
					7.0			
					8.0			
					9.0			
General Remarks: Borehole terminated at 5.45m bgl.					Surface Elevation Level:			
					All dimensions in metres Log Scale 1:25			
					 Telephone: 01295 272244 Email: info@brduk.com			

PROBEHOLE RECORD

Client: Gleeson Strategic Land and Miller Homes Project Title: Winchester Road, Hedge End Project No: BRD2924 Logged By: M Wood Date Commenced: 26/07/2017 Date Completed: 26/07/2017 Method Used: Windowless Percussive Sampling Rig						Borehole No. WS15	
						Sheet 1 of 2	

Samples & Tests			Water	Description of Strata	Depth / (Level)	Legend	Geology	Installation /Backfill
Depth	Type & No	Value						
0.15	J1			MADE GROUND/TOPSOIL: Grass over: Soft, light brown and orange brown, sandy, slightly gravelly clay topsoil with frequent rootlets. Gravel is fine to coarse, subangular to subrounded chert and quartzite with rare brick and charcoal fragments. Firm, orange brown and light grey, slightly sandy, silty CLAY.	0.30		MG/TS	
0.70 0.80	PEN D1	1.0/2.0/1.5 kg/cm²						
1.00	SPT	8 N		1.00 - 1.45 m: SPT: 2 for 150mm/2,2,2,2	1.0		WITTERING FORMATION	
1.60	D2			Firm, orange brown, light grey and reddish brown, sandy, silty CLAY with frequent partings and thin bands of fine sand throughout.	1.50			
1.90 2.00	PEN SPT	1.5/2.0/1.75 kg/cm² 5 N		2.00 - 2.45 m: SPT: 2 for 150mm/1,1,2,1	2.0			
2.70	D3							
3.00	SPT	14 N		Medium dense, orange and yellowish brown, slightly clayey, fine SAND. 3.00 - 3.45 m: SPT: 3 for 150mm/2,3,4,5	3.0			
				Stiff, orange brown, light grey and reddish brown, sandy, silty CLAY with frequent partings and thin bands of fine sand throughout.	3.20			
3.85	D4			3.65 - 3.80 m: Interbedded sand and clay layers of approximately 1-2cm thickness.				
4.00	SPT	16 N		4.00 - 4.45 m: SPT: 6 for 150mm/3,4,4,5	4.0			
				4.40 m: Occasional partings of fine sand.	4.50			
General Remarks: Borehole terminated at 5.45m bgl.				Surface Elevation Level:		 Telephone: 01295 272244 Email: info@brduk.com		
				All dimensions in metres Log Scale 1:25				

PROBEHOLE RECORD

Client: Gleeson Strategic Land and Miller Homes Project Title: Winchester Road, Hedge End Project No: BRD2924 Logged By: M Wood Date Commenced: 26/07/2017 Date Completed: 26/07/2017 Method Used: Windowless Percussive Sampling Rig						Borehole No. WS15		
						Sheet 2 of 2		
Samples & Tests			Water	Description of Strata	Depth / (Level)	Legend	Geology	Installation /Backfill
Depth	Type & No	Value						
4.70	D5			Continued from 3.20m bgl: Stiff, orange brown, light grey and reddish brown, sandy, silty CLAY with frequent partings and thin bands of fine sand throughout.			WITTERING FM	
5.00	SPT	17 N		5.00 - 5.45 m: SPT: 5 for 150mm/3,4,5,5	5.0			
					5.45			
					6.0			
					7.0			
					8.0			
					9.0			
General Remarks: Borehole terminated at 5.45m bgl.					Surface Elevation Level:		 Telephone: 01295 272244 Email: info@brduk.com	
					All dimensions in metres Log Scale 1:25			

SOAKAGE TEST RECORD

SOIL INFILTRATION RATE

(BRE Digest 365 : Soakaway Test)



Client: Gleeson Strategic Land and Miller Homes
Project Title Winchester Road, Hedge End.
Project No. BRD2924

Test Details

Trial Pit Number	SA01	
Test Number	1	
Pit Depth	0.97	m
Pit Length	1.70	m
Pit Width	0.50	m
Depth to groundwater prior to test	0.97	m
Date of Test	07/08/2017	
Logged by	D Brown	
Description of Soil under Test	Firm to stiff, grey and orange staining at the surfaces, silty CLAY with mudstone lithorelicts and relict rootlets.	

Test Record

Elapsed Time min	Depth to Water m	Plot of water level against elapsed time	
0	0.33		Full
1	0.33		
2	0.33		
3	0.33		
4	0.33		
5	0.33		
6	0.33		
7	0.33		
8	0.33		
9	0.33		
10	0.33		
99	0.36		
182	0.37		
250	0.38		
329	0.39		
1444	0.41		
2214	0.42		

Summary of Calculations and Result

RESULT COULD NOT BE CALCULATED AS TEST PIT WOULD NOT REACH HALF EMPTY WITHIN 24 HOURS

Comments Shallow groundwater recorded. Test pit depth was 1.90m. but level of groundwater taken as base of pit for calculation.

SOAKAGE TEST RECORD

SOIL INFILTRATION RATE

(BRE Digest 365 : Soakaway Test)



Client: Gleeson Strategic Land and Miller Homes
Project Title Winchester Road, Hedge End.
Project No. BRD2924

Test Details

Trial Pit Number	SA02	
Test Number	1	
Pit Depth	0.95	m
Pit Length	1.80	m
Pit Width	0.50	m
Depth to groundwater prior to test	0.95	m
Date of Test	07/08/2017	
Logged by	D Brown	
Description of Soil under Test	Firm, grey mottled orange, silty CLAY recovered at mudstone gravel.	

Test Record

Elapsed Time min	Depth to Water m	Plot of water level against elapsed time	
0	0.39		Full
0.2	0.49		
0.4	0.49		
1	0.50		
2	0.51		
3	0.51		
4	0.52		
5	0.54		
6	0.56		
7	0.57		
8	0.57		
9	0.57		
10	0.57		
15	0.60		
20	0.62		
35	0.67		
120	0.76		
207	0.81		25%
274	0.83		
352	0.85		
1462	0.91		Empty

Summary of Calculations and Result

Soil infiltration rate, f , is calculated from the time taken for the water to fall from 75% to 25% effective storage depth in the pit.

$$f = (V_{75} - V_{25}) / A_{50}(T_{75} - T_{25})$$

where, T_{75} (4.5 mins) is the time for the water level to fall to 75% effective depth (0.53m bgl)

and T_{25} (207 mins) is the time for the water level to fall to 25% effective depth (0.81m bgl)

thus, $T_{75} - T_{25}$ is the time for the water level to fall from 75% to 25% effective depth:

$$T_{75} - T_{25} = 203 \text{ mins}$$

$V_{75} - V_{25}$ is the effective storage volume in the trial pit between 75% and 25% effective depth:

$$V_{75} - V_{25} = 0.25 \text{ m}^3$$

and A_{50} is the internal surface area of the trial pit up to 50% effective depth and including the base area:

$$A_{50} = 2.19 \text{ m}^2$$

$$\text{Soil Infiltration Rate } f = \underline{9.48 \times 10^{-6}} \text{ m/s}$$

Comments Test pit actual depth 2.0m. but base taken as standing groundwater level prior to start of the test.

SOAKAGE TEST RECORD

SOIL INFILTRATION RATE

(BRE Digest 365 : Soakaway Test)



Client: Gleeson Strategic Land and Miller Homes
Project Title: Winchester Road, Hedge End.
Project No.: BRD2924

Test Details

Trial Pit Number	SA03	
Test Number	1	
Pit Depth	3.68	m
Pit Length	2.40	m
Pit Width	0.50	m
Depth to groundwater prior to test	3.68	m
Date of Test	07/08/2017	
Logged by	D Brown	
Description of Soil under Test	Medium dense, orange mottled grey, slightly silty, fine SAND with occasional thin interbedded silt and clay layers.	

Test Record

Elapsed Time min	Depth to Water m	Plot of water level against elapsed time
0	2.80	
1	2.89	
2	2.92	
3	2.93	
4	2.94	
5	2.94	
6	2.95	
7	2.96	
8	2.96	
9	2.97	
10	2.98	
15	3.00	
20	3.03	
25	3.05	
30	3.07	
77	3.21	
155	3.37	
250	3.47	
317	3.52	
396	3.57	
1437	3.68	

Summary of Calculations and Result

Soil infiltration rate, f , is calculated from the time taken for the water to fall from 75% to 25% effective storage depth in the pit.

$$f = (V_{75}-V_{25})/A_{50}(T_{75}-T_{25})$$

where, T_{75} (18 mins) is the time for the water level to fall to 75% effective depth (3.02m bgl)

and T_{25} (241 mins) is the time for the water level to fall to 25% effective depth (3.46m bgl)

thus, $T_{75}-T_{25}$ is the time for the water level to fall from 75% to 25% effective depth:

$$T_{75}-T_{25} = 222 \text{ mins}$$

$V_{75}-V_{25}$ is the effective storage volume in the trial pit between 75% and 25% effective depth:

$$V_{75}-V_{25} = 0.53 \text{ m}^3$$

and A_{50} is the internal surface area of the trial pit up to 50% effective depth and including the base area:

$$A_{50} = 3.75 \text{ m}^2$$

$$\text{Soil Infiltration Rate } f = \underline{1.06 \times 10^{-5}} \text{ m/s}$$

Comments: Soakage pit dug to 3.90m depth. Gravel filled to 2.50m bgl and backfilled with soil to ground level. Water added to gravel. Test pit depth was 3.90m, but level of groundwater taken as base of pit for calculation.

SOAKAGE TEST RECORD

SOIL INFILTRATION RATE

(BRE Digest 365 : Soakaway Test)



Client: Gleeson Strategic Land and Miller Homes
Project Title: Winchester Road, Hedge End.
Project No.: BRD2924

Test Details

Trial Pit Number	SA03	
Test Number	2	
Pit Depth	3.68	m
Pit Length	2.40	m
Pit Width	0.50	m
Depth to groundwater prior to test	3.68	m
Date of Test	08/08/2017	
Logged by	D Brown	
Description of Soil under Test	Medium dense, orange mottled grey, slightly silty, fine SAND with occasional thin interbedded silt and clay layers.	

Test Record

Elapsed Time min	Depth to Water m	Plot of water level against elapsed time
0	2.70	Full
1	2.72	
2	2.75	75%
3	2.76	
4	2.77	50%
5	2.78	
6	2.79	25%
7	2.80	
8	2.81	Empty
9	2.81	
10	2.82	
15	2.85	
20	2.88	
25	2.92	
30	2.94	
100	3.20	
203	3.37	
323	3.46	
443	3.54	
1476	3.67	

Summary of Calculations and Result

Soil infiltration rate, f , is calculated from the time taken for the water to fall from 75% to 25% effective storage depth in the pit.

$$f = (V_{75} - V_{25}) / A_{50}(T_{75} - T_{25})$$

where, T_{75} (31 mins) is the time for the water level to fall to 75% effective depth (2.95m bgl)

and T_{25} (290 mins) is the time for the water level to fall to 25% effective depth (3.44m bgl)

thus, $T_{75} - T_{25}$ is the time for the water level to fall from 75% to 25% effective depth:

$$T_{75} - T_{25} = 258 \text{ mins}$$

$V_{75} - V_{25}$ is the effective storage volume in the trial pit between 75% and 25% effective depth:

$$V_{75} - V_{25} = 0.59 \text{ m}^3$$

and A_{50} is the internal surface area of the trial pit up to 50% effective depth and including the base area:

$$A_{50} = 4.04 \text{ m}^2$$

$$\text{Soil Infiltration Rate } f = \underline{9.39 \times 10^{-6}} \text{ m/s}$$

Comments Soakage pit dug to 3.90m depth. Gravel filled to 2.50m bgl and backfilled with soil to ground level. Water added to gravel. Test pit depth was 3.90m, but level of groundwater taken as base of pit for calculation.

SOAKAGE TEST RECORD

SOIL INFILTRATION RATE

(BRE Digest 365 : Soakaway Test)



Client: Gleeson Strategic Land and Miller Homes
Project Title: Winchester Road, Hedge End.
Project No.: BRD2924

Test Details

Trial Pit Number	SA03	
Test Number	3	
Pit Depth	3.67	m
Pit Length	2.40	m
Pit Width	0.50	m
Depth to groundwater prior to test	3.67	m
Date of Test	09/08/2017	
Logged by	D Brown	
Description of Soil under Test	Medium dense, orange mottled grey, slightly silty, fine SAND with occasional thin interbedded silt and clay layers.	

Test Record

Elapsed Time min	Depth to Water m	Plot of water level against elapsed time
0	2.78	
1	2.78	
2	2.78	
3	2.78	
4	2.78	
5	2.79	
6	2.79	
7	2.80	
8	2.80	
9	2.81	
10	2.82	
30	2.95	
108	3.21	
207	3.35	
263	3.45	

Summary of Calculations and Result

Soil infiltration rate, f , is calculated from the time taken for the water to fall from 75% to 25% effective storage depth in the pit.

$$f = (V_{75}-V_{25})/A_{50}(T_{75}-T_{25})$$

where, T_{75} (46 mins) is the time for the water level to fall to 75% effective depth (3.00m bgl)

and T_{25} (262 mins) is the time for the water level to fall to 25% effective depth (3.45m bgl)

thus, $T_{75}-T_{25}$ is the time for the water level to fall from 75% to 25% effective depth:

$$T_{75}-T_{25} = 216 \text{ mins}$$

$V_{75}-V_{25}$ is the effective storage volume in the trial pit between 75% and 25% effective depth:

$$V_{75}-V_{25} = 0.53 \text{ m}^3$$

and A_{50} is the internal surface area of the trial pit up to 50% effective depth and including the base area:

$$A_{50} = 3.78 \text{ m}^2$$

$$\text{Soil Infiltration Rate } f = \underline{1.09 \times 10^{-5}} \text{ m/s}$$

Comments Soakage pit dug to 3.90m depth. Gravel filled to 2.50m bgl and backfilled with soil to ground level. Water added to gravel. Test pit depth was 3.90m, but level of groundwater taken as base of pit for calculation.

SOAKAGE TEST RECORD

SOIL INFILTRATION RATE

(BRE Digest 365 : Soakaway Test)

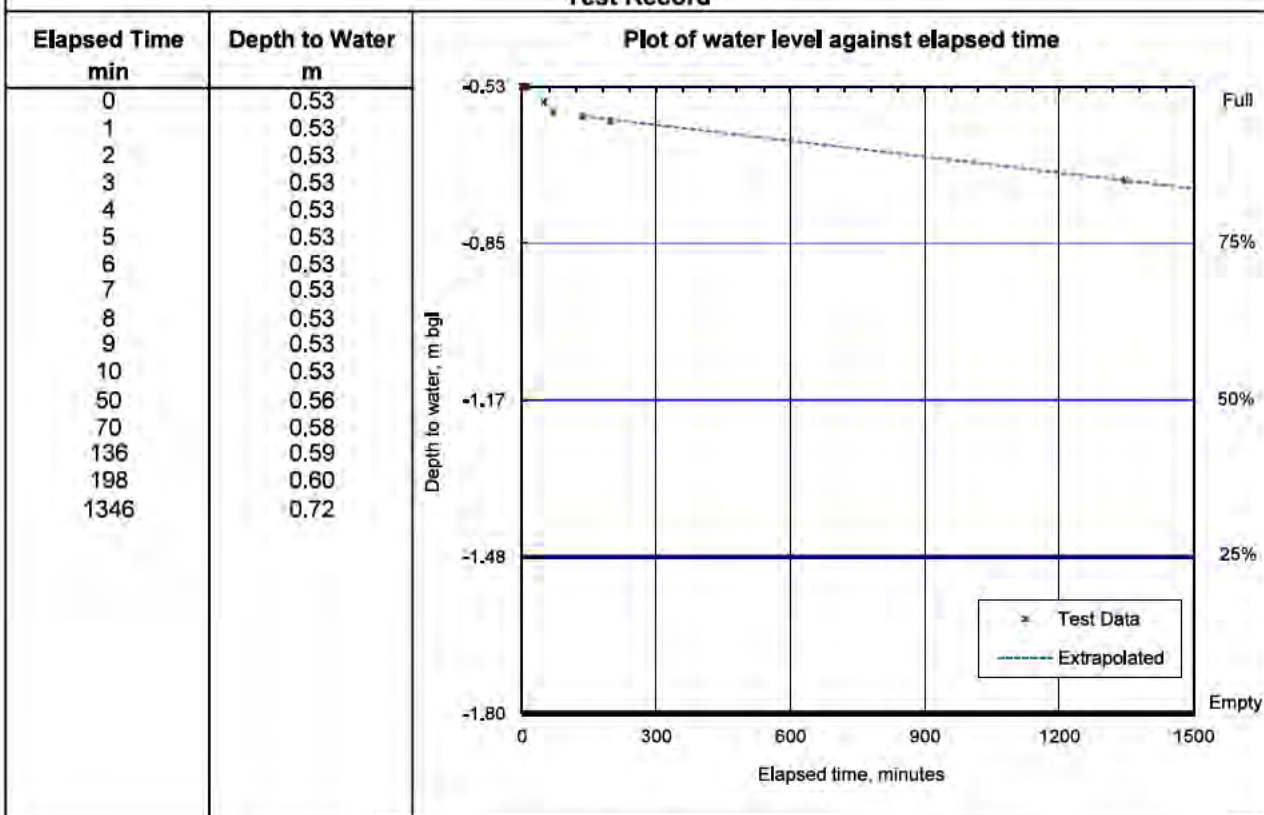


Client: Gleeson Strategic Land and Miller Homes
Project Title Winchester Road, Hedge End.
Project No. BRD2924

Test Details

Trial Pit Number	SA04	
Test Number	1	
Pit Depth	1.80	m
Pit Length	1.90	m
Pit Width	0.50	m
Depth to groundwater prior to test	1.80	m
Date of Test	07/08/2017	
Logged by	D Brown	
Description of Soil under Test	Firm to stiff, grey, brown and orange, sequences of thinly bedded silty CLAY and fine SAND.	

Test Record



Summary of Calculations and Result

RESULT COULD NOT BE CALCULATED AS TEST PIT WOULD NOT REACH HALF EMPTY WITHIN 24 HOURS

Comments Groundwater recorded. Test pit depth was 1.90m. but level of groundwater taken as base of pit for calculation.

SOAKAGE TEST RECORD

SOIL INFILTRATION RATE

(BRE Digest 365 : Soakaway Test)



Client: Gleeson Strategic Land and Miller Homes
Project Title: Winchester Road, Hedge End.
Project No.: BRD2924

Test Details

Trial Pit Number	SA05	
Test Number	1	
Pit Depth	0.90	m
Pit Length	1.70	m
Pit Width	0.50	m
Depth to groundwater prior to test	0.90	m
Date of Test	07/08/2017	
Logged by	D Brown	
Description of Soil under Test	Firm, grey and purple, sequences of thinly bedded silty CLAY and fine SAND.	

Test Record

Elapsed Time min	Depth to Water m	Plot of water level against elapsed time	
0	0.31		Full
1	0.33		
2	0.34		
3	0.35		
4	0.36		
5	0.37		
6	0.37		
7	0.38		
8	0.38		
9	0.38		
10	0.38		
15	0.40		
77	0.52		
159	0.59		
229	0.63		
293	0.67		
1383	0.80		Empty

Summary of Calculations and Result

Soil infiltration rate, f , is calculated from the time taken for the water to fall from 75% to 25% effective storage depth in the pit.

$$f = (V_{75}-V_{25})/A_{50}(T_{75}-T_{25})$$

where, T_{75} (45 mins) is the time for the water level to fall to 75% effective depth (0.46m bgl)

and T_{25} (985 mins) is the time for the water level to fall to 25% effective depth (0.75m bgl)

thus, $T_{75}-T_{25}$ is the time for the water level to fall from 75% to 25% effective depth:

$$T_{75}-T_{25} = 940 \text{ mins}$$

$V_{75}-V_{25}$ is the effective storage volume in the trial pit between 75% and 25% effective depth:

$$V_{75}-V_{25} = 0.25 \text{ m}^3$$

and A_{50} is the internal surface area of the trial pit up to 50% effective depth and including the base area:

$$A_{50} = 2.15 \text{ m}^2$$

$$\text{Soil Infiltration Rate } f = \underline{2.07 \times 10^{-6}} \text{ m/s}$$

Comments Shallow groundwater recorded. Test pit depth was 1.90m. but level of groundwater taken as base of pit for calculation.

SOAKAGE TEST RECORD

SOIL INFILTRATION RATE

(BRE Digest 365 : Soakaway Test)

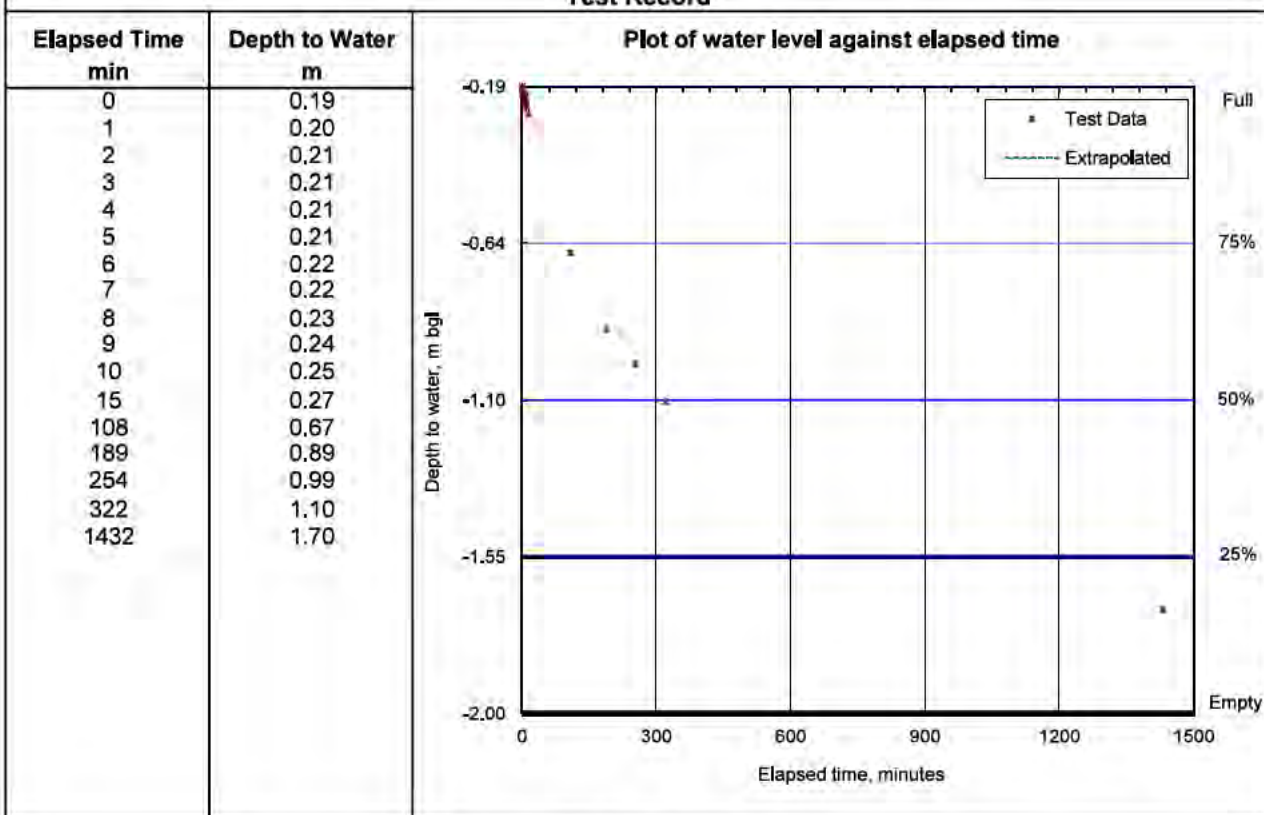


Client: Gleeson Strategic Land and Miller Homes
Project Title: Winchester Road, Hedge End.
Project No. BRD2924

Test Details

Trial Pit Number	SA06	
Test Number	1	
Pit Depth	2.00	m
Pit Length	1.90	m
Pit Width	0.50	m
Depth to groundwater prior to test	Dry	m
Date of Test	07/08/2017	
Logged by	D Brown	
Description of Soil under Test	Firm, orange mottled grey, sequences of thinly bedded silty CLAY and fine SAND.	

Test Record



Summary of Calculations and Result

Soil infiltration rate, f , is calculated from the time taken for the water to fall from 75% to 25% effective storage depth in the pit.

$$f = (V_{75}-V_{25})/A_{50}(T_{75}-T_{25})$$

where, T_{75} (102 mins) is the time for the water level to fall to 75% effective depth (0.64m bgl)

and T_{25} (1150 mins) is the time for the water level to fall to 25% effective depth (1.55m bgl)

thus, $T_{75}-T_{25}$ is the time for the water level to fall from 75% to 25% effective depth:

$$T_{75}-T_{25} = 1048 \text{ mins}$$

$V_{75}-V_{25}$ is the effective storage volume in the trial pit between 75% and 25% effective depth:

$$V_{75}-V_{25} = 0.86 \text{ m}^3$$

and A_{50} is the internal surface area of the trial pit up to 50% effective depth and including the base area:

$$A_{50} = 5.29 \text{ m}^2$$

$$\text{Soil Infiltration Rate } f = \underline{2.58 \times 10^{-6}} \text{ m/s}$$

Comments

SOAKAGE TEST RECORD

SOIL INFILTRATION RATE

(BRE Digest 365 : Soakaway Test)

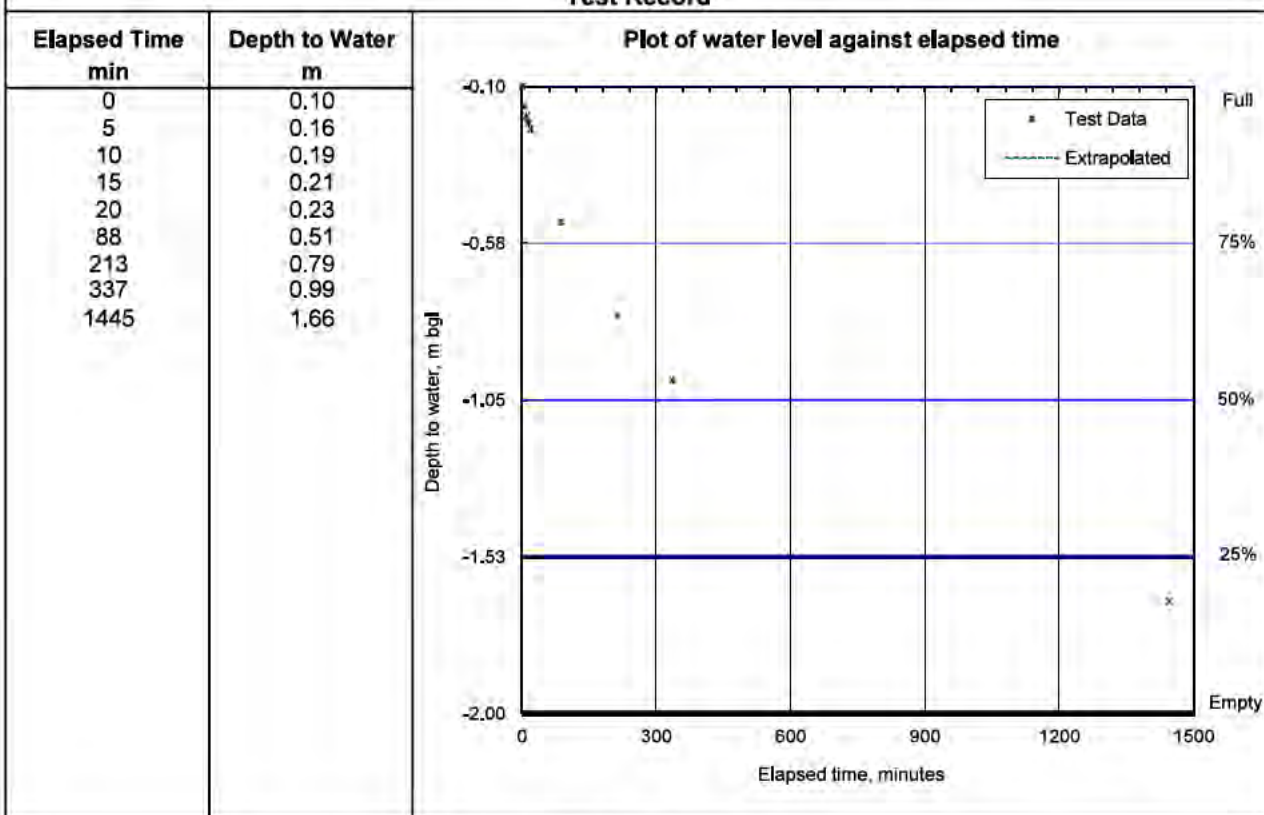


Client: Gleeson Strategic Land and Miller Homes
Project Title: Winchester Road, Hedge End.
Project No.: BRD2924

Test Details

Trial Pit Number	SA06	
Test Number	2	
Pit Depth	2.00	m
Pit Length	1.90	m
Pit Width	0.50	m
Depth to groundwater prior to test	1.70	m
Date of Test	08/08/2017	
Logged by	D Brown	
Description of Soil under Test	Firm, orange mottled grey, thinly interbedded silty CLAY and fine SAND,	

Test Record



Summary of Calculations and Result

Soil infiltration rate, f , is calculated from the time taken for the water to fall from 75% to 25% effective storage depth in the pit.

$$f = (V_{75}-V_{25})/A_{50}(T_{75}-T_{25})$$

where, T_{75} (117 mins) is the time for the water level to fall to 75% effective depth (0.58m bgl)

and T_{25} (1222 mins) is the time for the water level to fall to 25% effective depth (1.53m bgl)

thus, $T_{75}-T_{25}$ is the time for the water level to fall from 75% to 25% effective depth:

$$T_{75}-T_{25} = 1105 \text{ mins}$$

$V_{75}-V_{25}$ is the effective storage volume in the trial pit between 75% and 25% effective depth:

$$V_{75}-V_{25} = 0.90 \text{ m}^3$$

and A_{50} is the internal surface area of the trial pit up to 50% effective depth and including the base area:

$$A_{50} = 5.51 \text{ m}^2$$

$$\text{Soil Infiltration Rate } f = \underline{2.47 \times 10^{-6}} \text{ m/s}$$

Comments: Water remaining at 1.70m from previous test.

SOAKAGE TEST RECORD

SOIL INFILTRATION RATE

(BRE Digest 365 : Soakaway Test)



Client: Gleeson Strategic Land and Miller Homes
Project Title: Winchester Road, Hedge End.
Project No.: BRD2924

Test Details

Trial Pit Number	SA06	
Test Number	3	
Pit Depth	2.00	m
Pit Length	1.90	m
Pit Width	0.50	m
Depth to groundwater prior to test	1.66	m
Date of Test	08/08/2017	
Logged by	D Brown	
Description of Soil under Test	Firm, orange mottled grey, thinly interbedded silty CLAY and fine SAND,	

Test Record

Elapsed Time min	Depth to Water m	Plot of water level against elapsed time
0	0.64	
1	0.64	
2	0.65	
3	0.65	
4	0.65	
5	0.65	
10	0.66	
15	0.68	
20	0.70	
127	0.87	
237	1.01	
267	1.08	

Summary of Calculations and Result

Soil infiltration rate, f , is calculated from the time taken for the water to fall from 75% to 25% effective storage depth in the pit.

$$f = (V_{75}-V_{25})/A_{50}(T_{75}-T_{25})$$

where, T_{75} (213 mins) is the time for the water level to fall to 75% effective depth (0.98m bgl)

and T_{25} (665* mins) is the time for the water level to fall to 25% effective depth (1.66m bgl)

thus, $T_{75}-T_{25}$ is the time for the water level to fall from 75% to 25% effective depth:

$$T_{75}-T_{25} = 451 \text{ mins}$$

$V_{75}-V_{25}$ is the effective storage volume in the trial pit between 75% and 25% effective depth:

$$V_{75}-V_{25} = 0.65 \text{ m}^3$$

and A_{50} is the internal surface area of the trial pit up to 50% effective depth and including the base area:

$$A_{50} = 4.21 \text{ m}^2$$

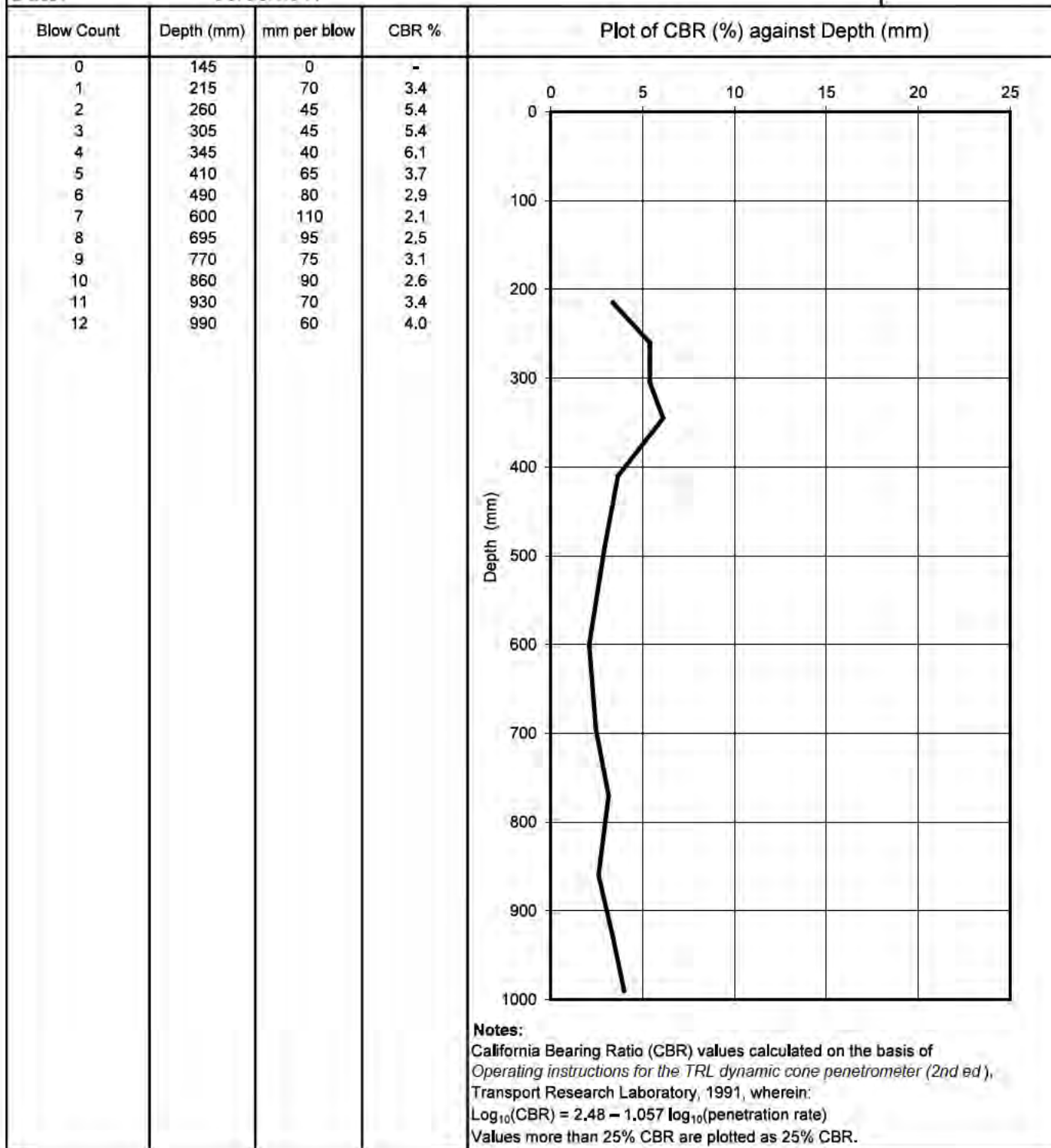
$$\text{Soil Infiltration Rate } f = \underline{5.66 \times 10^{-6}} \text{ m/s}$$

Comments Water remaining at 1.66m from previous test. Calculation based on extrapolated results. Use as a guide only.

TRL DYNAMIC CONE PENETROMETER TEST



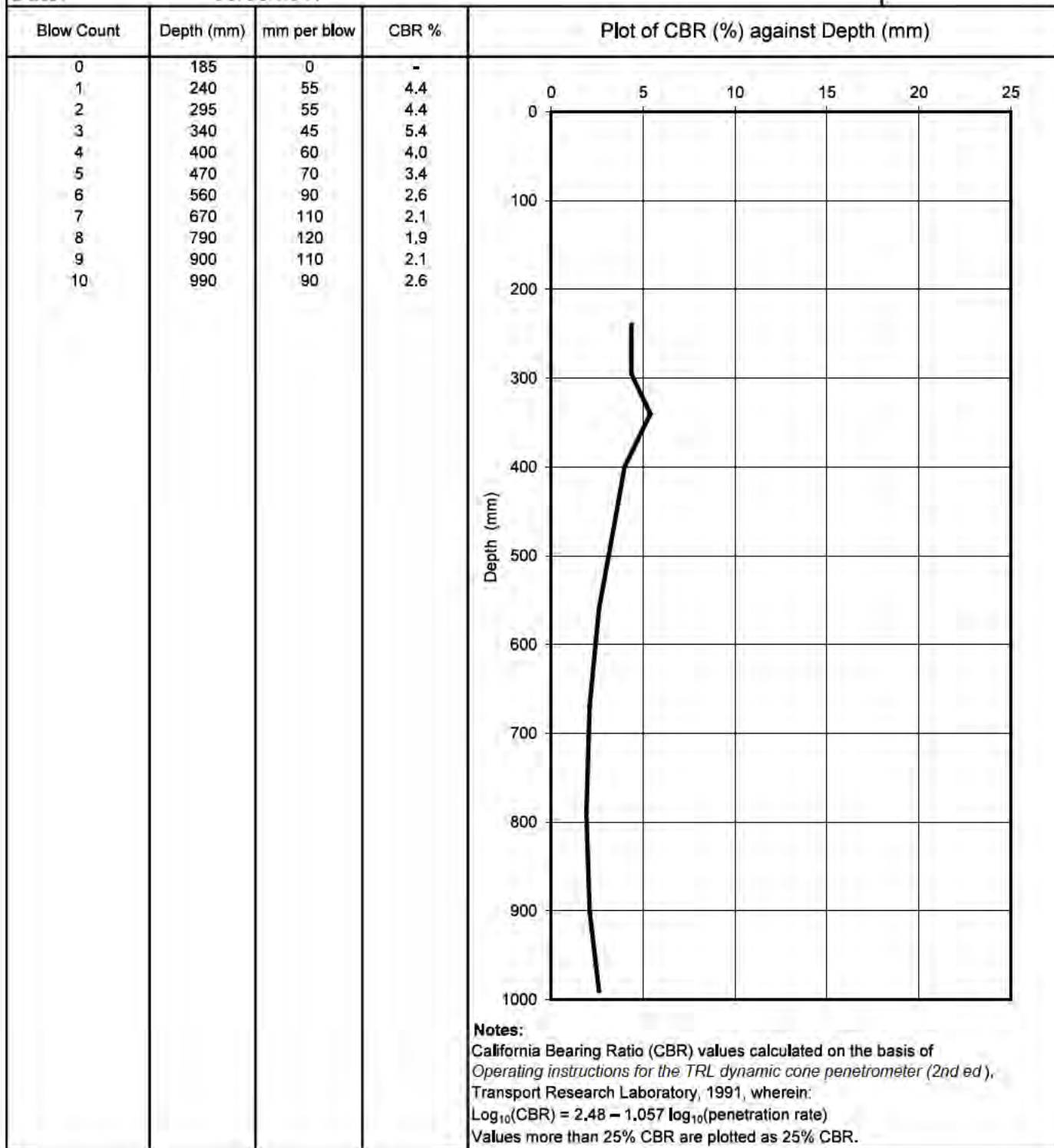
Client Name: Gleeson Statagic Land and Miller Homes. Project Name: Winchester Road, Hedge End. Project No: BRD2924 Tested By: D Brown Date: 08/08/2017	Test No: CBR01
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TRL DYNAMIC CONE PENETROMETER TEST



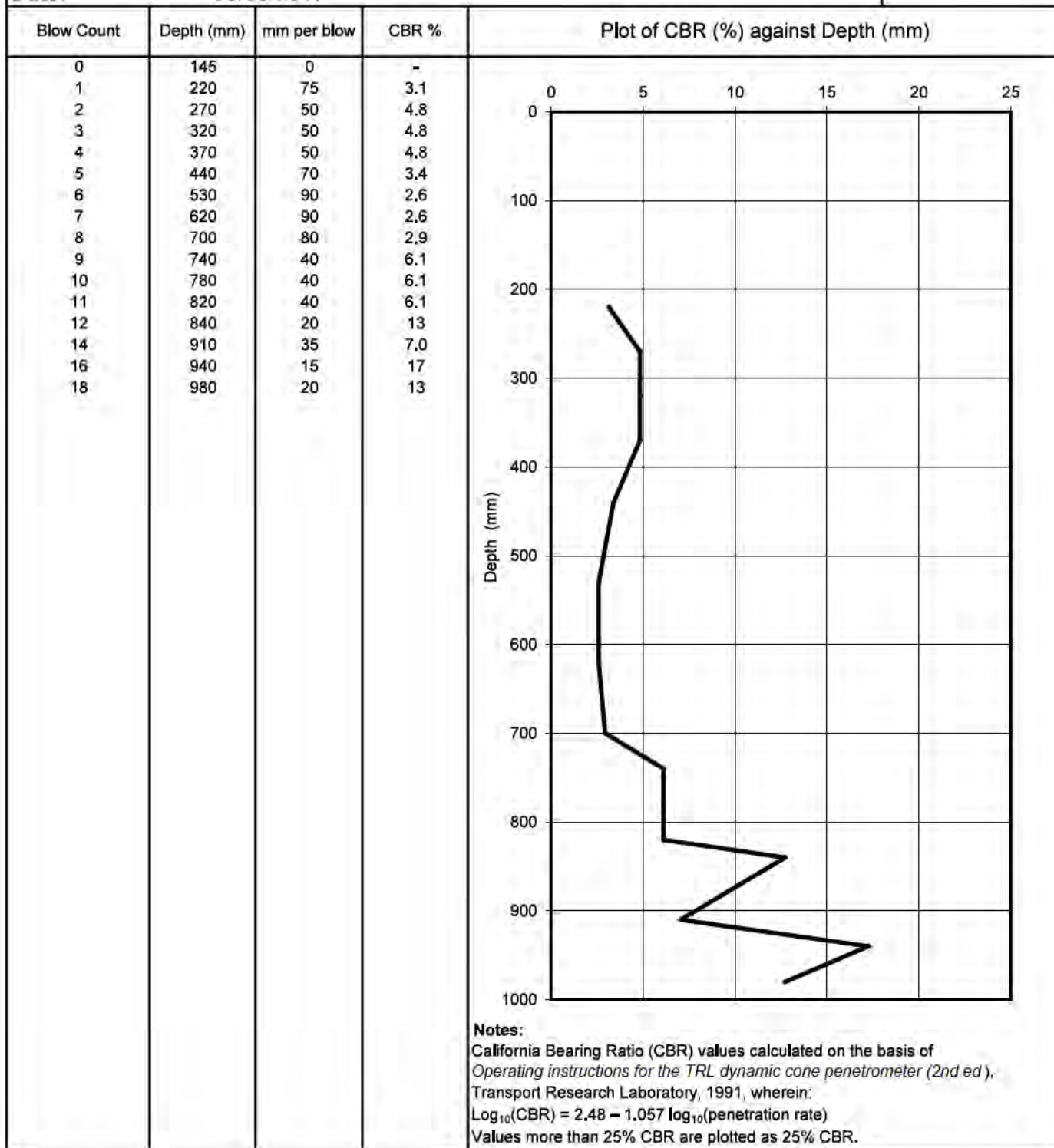
Client Name: Gleeson Statagic Land and Miller Homes. Project Name: Winchester Road, Hedge End. Project No: BRD2924 Tested By: D Brown Date: 08/08/2017	Test No: CBR02
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TRL DYNAMIC CONE PENETROMETER TEST



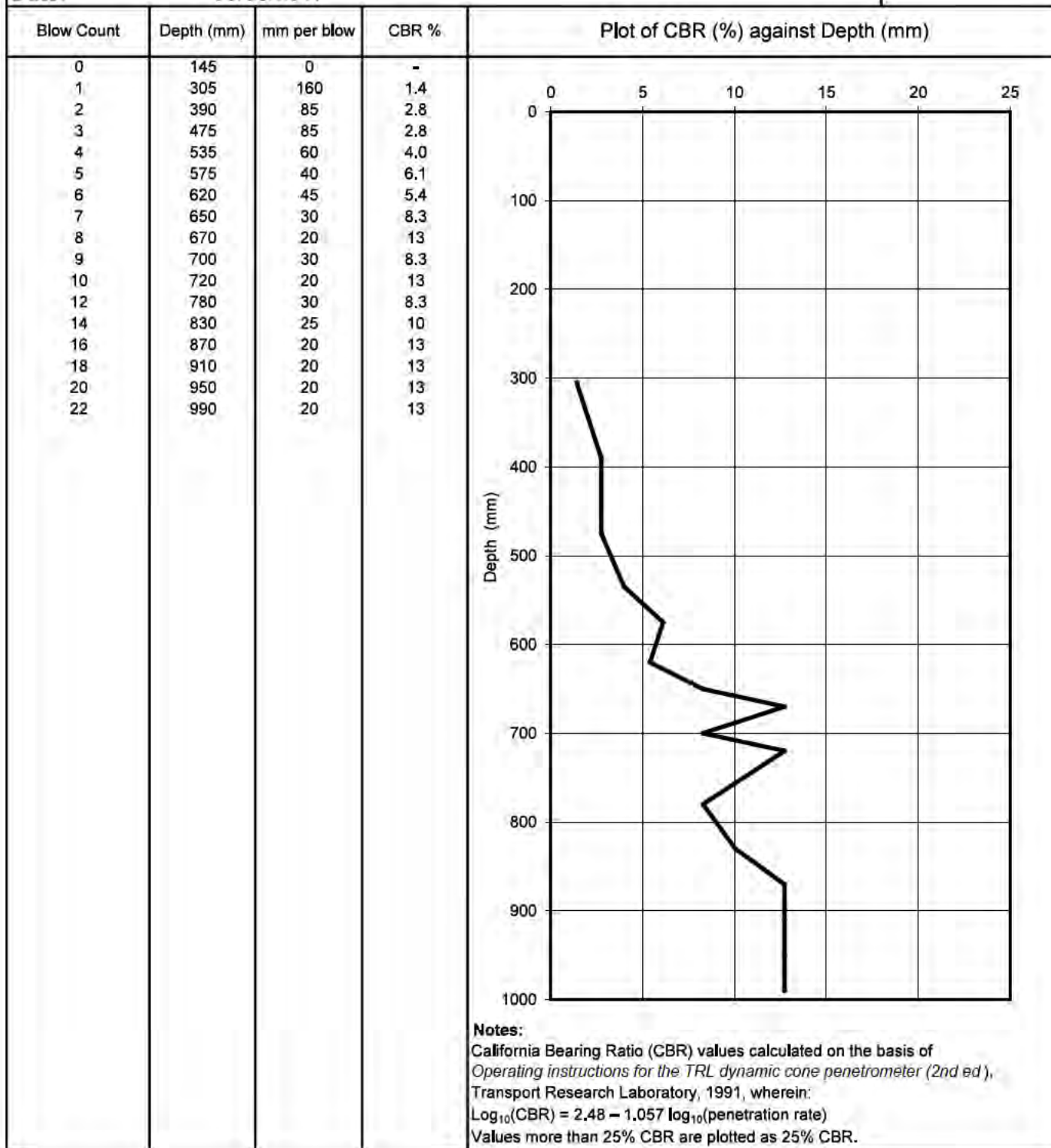
Client Name: Gleeson Statagic Land and Miller Homes. Project Name: Winchester Road, Hedge End. Project No: BRD2924 Tested By: D Brown Date: 08/08/2017	Test No: CBR03
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TRL DYNAMIC CONE PENETROMETER TEST



Client Name:	Gleeson Statagic Land and Miller Homes.	Test No:
Project Name:	Winchester Road, Hedge End.	CBR04
Project No:	BRD2924	
Tested By:	D Brown	
Date:	08/08/2017	



TRL DYNAMIC CONE PENETROMETER TEST



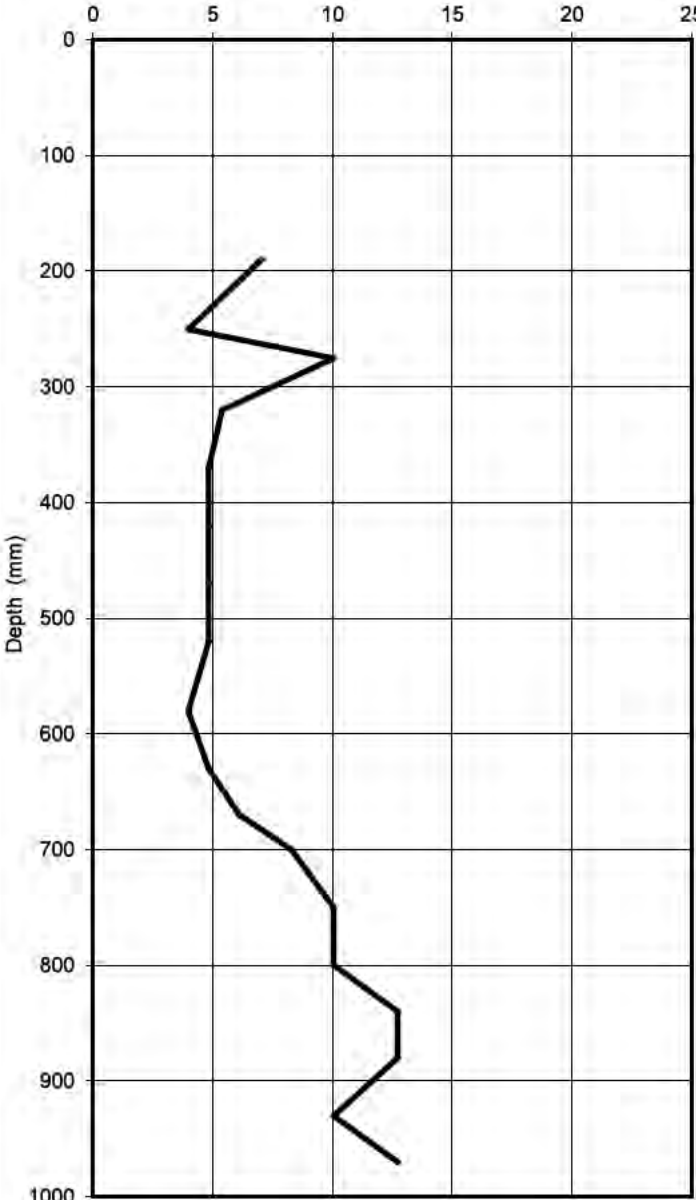
Client Name:	Gleeson Statagic Land and Miller Homes.	Test No:
Project Name:	Winchester Road, Hedge End.	CBR05
Project No:	BRD2924	
Tested By:	D Brown	
Date:	08/08/2017	

Blow Count	Depth (mm)	mm per blow	CBR %	Plot of CBR (%) against Depth (mm)
0	120	0	-	
1	180	60	4.0	
2	210	30	8.3	
3	230	20	13	
4	270	40	6.1	
5	300	30	8.3	
6	335	35	7.0	
7	380	45	5.4	
8	435	55	4.4	
9	500	65	3.7	
10	580	80	2.9	
11	640	60	4.0	
12	710	70	3.4	
13	770	60	4.0	
14	840	70	3.4	
15	910	70	3.4	
16	980	70	3.4	

Notes:

California Bearing Ratio (CBR) values calculated on the basis of
Operating instructions for the TRL dynamic cone penetrometer (2nd ed),
 Transport Research Laboratory, 1991, wherein:
 $\text{Log}_{10}(\text{CBR}) = 2.48 - 1.057 \log_{10}(\text{penetration rate})$
 Values more than 25% CBR are plotted as 25% CBR.

Test No:
CBR06

Blow Count	Depth (mm)	mm per blow	CBR %	Plot of CBR (%) against Depth (mm)
0	155	0	-	
1	190	35	7.0	
2	250	60	4.0	
3	275	25	10	
4	320	45	5.4	
5	370	50	4.8	
6	420	50	4.8	
7	470	50	4.8	
8	520	50	4.8	
9	580	60	4.0	
10	630	50	4.8	
11	670	40	6.1	
12	700	30	8.3	
14	750	25	10	
16	800	25	10	
18	840	20	13	
20	880	20	13	
22	930	25	10	
24	970	20	13	

Notes:
California Bearing Ratio (CBR) values calculated on the basis of
Operating instructions for the TRL dynamic cone penetrometer (2nd ed),
Transport Research Laboratory, 1991, wherein:
 $\text{Log}_{10}(\text{CBR}) = 2.48 - 1.057 \log_{10}(\text{penetration rate})$
Values more than 25% CBR are plotted as 25% CBR.



Gas Monitoring Record

Project Name: Gleeson Strategic Land and Miller Homes

Client: Winchester Road, Hedge End

Project No: BRD2924

Date: 08/08/2017 Ground conditions: Damp and soft Recorded by: D Brown
 Time at start: 09:00 Weather conditions: Overcast and raining Pressure trend: Steady
 Time at finish: 14:50 Air Temperature (°C): 12° Monitor serial no: G501315

The gas monitoring equipment is a Geotech GA5000 portable analyser. As per manufacturers recommendations this is factory calibrated every six months and in addition BRD undertake calibration checks against bottled standard gases on at least a monthly basis. Gas monitor pump is run for three minutes unless otherwise stated and the steady readings are an average reading taken over this pump run time. Vapour monitoring equipment is miniRAE lite PGM-7350 Photo Ionisation Detector (PID) with 10.6 eV lamp calibrated for isobutylene. PID calibration check is performed on site against ambient air and also against a 100ppm isobutylene standard gas. Barometric pressure trend and ambient air temperature is recorded from weather websites at the nearest reported weather station.

CH₄ = Methane CO₂ = Carbon Dioxide O₂ = Oxygen H₂S = Hydrogen Sulphide CO = Carbon Monoxide NR = Not Recorded PID = Photo Ionisation Detector

GWL = Groundwater level measured from ground surface and top of standpipe.

Base = Base of standpipe measured from ground surface.

Monitoring point				Gas Concentration								Pressure	Flow rate	Vapour	Comments
Borehole	GWL Ground (m)	GWL Pipe (m)	Base Ground (m)	Steady			Peak		Minimum	Peak		Baro - metric (mb)	Steady (l/hr)	PID (ppm)	
				CH ₄ (%)	CO ₂ (%)	O ₂ (%)	CH ₄ (%)	CO ₂ (%)	O ₂ (%)	CO (ppm)	H ₂ S (ppm)				
WS01	2.08	1.96	3.95	0.1	3.3	18.2	0.1	3.3	18.2	0	0	1013	0.1	12.7	Unable to locate borehole.
WS03	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
WS05	2.36	2.15	3.99	0.1	11.8	13.1	0.1	11.8	13.3	0	0	1012	0.3	6.4	
WS06	0.98	0.88	3.90	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	3.7	Gas monitor didn't save data.
WS07	1.26	1.11	3.60	0.0	6.4	10.3	0.1	6.4	10.3	0	0	1010	-0.1	7.8	
WS08	1.30	1.30	4.00	0.1	3.2	18.2	0.1	3.2	18.2	0	0	1009	0.0	9.9	
WS09	1.56	1.40	4.00	0.0	5.1	16.3	0.0	8.5	15.2	0	0	1009	0.1	3.0	
WS11	1.40	1.28	2.44	0.0	3.5	17.5	0.0	3.5	17.5	0	0	1009	-0.1	2.8	
WS12	1.76	2.16	4.70	0.1	3.2	19.0	0.1	3.2	19.0	0	0	1009	0.0	42.9	
WS15	Dry	Dry	4.80	0.1	6.6	12.9	0.1	6.6	12.9	0	0	1008	0.4	7.9	



Gas Monitoring Record

Project Name: Gleeson Strategic Land and Miller Homes

Client: Winchester Road, Hedge End

Project No: BRD2924

Date: 17/08/2017 Ground conditions: Wet and soft Recorded by: D Brown
Time at start: 10:10 AM Weather conditions: Overcast with light rain Pressure trend: Rising
Time at finish: 12:20 PM Air Temperature (°C): 18° Monitor serial no: G501315

The gas monitoring equipment is a Geotech GA5000 portable analyser. As per manufacturers recommendations this is factory calibrated every six months and in addition BRD undertake calibration checks against bottled standard gases on at least a monthly basis. Gas monitor pump is run for three minutes unless otherwise stated and the steady readings are an average reading taken over this pump run time. Vapour monitoring equipment is miniRAE lite PGM-7350 Photo Ionisation Detector (PID) with 10.6 eV lamp calibrated for isobutylene. PID calibration check is performed on site against ambient air and also against a 100ppm isobutylene standard gas. Barometric pressure trend and ambient air temperature is recorded from weather websites at the nearest reported weather station.

CH₄ = Methane CO₂ = Carbon Dioxide O₂ = Oxygen H₂S = Hydrogen Sulphide CO = Carbon Monoxide NR = Not Recorded PID = Photo Ionisation Detector

GWL = Groundwater level measured from ground surface and top of standpipe.

Base = Base of standpipe measured from ground surface.

Monitoring point				Gas Concentration								Pressure	Flow rate	Vapour	Comments
Borehole	GWL Ground (m)	GWL Pipe (m)	Base Ground (m)	Steady			Peak		Minimum	Peak		Baro - metric (mb)	Steady (l/hr)	PID (ppm)	
				CH ₄ (%)	CO ₂ (%)	O ₂ (%)	CH ₄ (%)	CO ₂ (%)	O ₂ (%)	CO (ppm)	H ₂ S (ppm)				
WS01	2.15	2.05	3.94	0.0	3.1	18.4	0.0	3.1	18.4	0	0	1011	-0.5	10.2	
WS03	0.78	0.60	3.15	0.1	2.7	18.2	0.1	2.7	18.2	2	0	1011	-0.1	6.5	
WS05	1.20	1.06	3.98	0.0	10.4	14.6	0.1	10.9	14.6	0	0	1010	-0.3	6.9	
WS06	0.92	0.78	3.80	0.0	0.3	19.7	0.1	0.5	18.6	3	0	1010	-0.3	4.9	
WS07	1.14	1.03	3.60	0.0	4.0	15.7	0.0	4.0	15.7	1	0	1011	-0.6	8.5	
WS08	1.27	1.12	4.00	0.0	2.5	18.8	0.0	2.5	18.8	0	0	1011	-0.5	10.7	
WS09	1.59	1.34	4.00	0.0	1.1	20.3	0.0	1.2	20.3	1	0	1010	0.0	2.7	
WS11	1.56	1.40	2.65	0.0	3.6	17.4	0.0	3.6	17.4	1	0	1011	0.0	8.0	
WS12	1.90	2.40	4.67	0.0	2.9	19.0	0.0	2.9	19.0	1	0	1010	-0.7	40.9	
WS15	Dry	Dry	4.80	0.0	5.8	14.4	0.0	5.8	14.4	1	0	1010	-0.5	20.5	



Gas Monitoring Record

Project Name: Gleeson Strategic Land And Miller Homes

Client: Winchester Road, Hedge End

Project No: BRD2924

Date: 23/08/2017 Ground conditions: Wet and soft on green area. Recorded by: D Brown
Time at start: 9:21 AM Weather conditions: Overcast and light rain. Pressure trend: Rising
Time at finish: 12:00 PM Air Temperature (°C): 18° Monitor serial no: G501315

The gas monitoring equipment is a Geotech GA5000 portable analyser. As per manufacturers recommendations this is factory calibrated every six months and in addition BRD undertake calibration checks against bottled standard gases on at least a monthly basis. Gas monitor pump is run for three minutes unless otherwise stated and the steady readings are an average reading taken over this pump run time. Vapour monitoring equipment is miniRAE lite PGM-7350 Photo Ionisation Detector (PID) with 10.6 eV lamp calibrated for isobutylene. PID calibration check is performed on site against ambient air and also against a 100ppm isobutylene standard gas. Barometric pressure trend and ambient air temperature is recorded from weather websites at the nearest reported weather station.

CH₄ = Methane CO₂ = Carbon Dioxide O₂ = Oxygen H₂S = Hydrogen Sulphide CO = Carbon Monoxide NR = Not Recorded PID = Photo Ionisation Detector

GWL = Groundwater level measured from ground surface and top of standpipe. Base = Base of standpipe measured from ground surface.

Monitoring point				Gas Concentration								Pressure	Flow rate	Vapour	Comments
Borehole	GWL Ground (m)	GWL Pipe (m)	Base Ground (m)	Steady			Peak		Minimum	Peak		Baro - metric (mb)	Steady (l/hr)	PID (ppm)	
				CH ₄ (%)	CO ₂ (%)	O ₂ (%)	CH ₄ (%)	CO ₂ (%)	O ₂ (%)	CO (ppm)	H ₂ S (ppm)				
WS01	2.22	2.15	3.94	0	3.1	18.3	0	3.1	18.3	0	0	1012	-0.4	11.4	Unable to locate borehole.
WS03	0.75	0.65	3.00	0.1	2.3	18.6	0.1	2.3	18.6	1	0	1012	0.0	5.6	
WS05	1.36	1.22	3.99	0.0	4.5	18.7	0.1	4.5	18.7	0	0	1012	-0.2	7.9	
WS06	0.90	0.78	3.88	0.0	0.7	18.8	0.0	0.7	18.8	3	0	1011	-0.4	6.1	
WS07	1.10	0.96	3.60	0.1	3.1	16.7	0.1	3.1	16.7	3	0	1012	-0.3	4.9	
WS08	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
WS09	1.58	1.33	2.68	0.0	1.1	20.1	0.0	2.1	19.5	0	0	1012	-0.5	2.9	
WS11	1.69	1.54	2.65	0.0	4.4	15.9	0.0	4.4	15.8	0	0	1013	0.0	9.1	
WS12	2.41	1.91	4.69	0.0	3.0	19.0	0.0	3.0	19.0	1	0	1013	-0.7	30.6	
WS15	Dry	Dry	5.00	0.0	5.9	14.1	0.1	5.9	14.1	1	0	1011	-0.4	10.9	



Gas Monitoring Record

Project Name: Gleeson Strategic Land And Miller Homes

Client: Winchester Road, Hedge End

Project No: BRD2924

Date: 01/09/2017 Ground conditions: Wet and soft in areas Recorded by: Dan Brown
Time at start: 10:30 Weather conditions: Overcast with light Rain Pressure trend: Steady
Time at finish: 1:00 PM Air Temperature (°C): 15 Monitor serial no: G501688

The gas monitoring equipment is a Geotech GA5000 portable analyser. As per manufacturers recommendations this is factory calibrated every six months and in addition BRD undertake calibration checks against bottled standard gases on at least a monthly basis. Gas monitor pump is run for three minutes unless otherwise stated and the steady readings are an average reading taken over this pump run time. Vapour monitoring equipment is miniRAE lite PGM-7350 Photo Ionisation Detector (PID) with 10.6 eV lamp calibrated for isobutylene. PID calibration check is performed on site against ambient air and also against a 100ppm isobutylene standard gas. Barometric pressure trend and ambient air temperature is recorded from weather websites at the nearest reported weather station.

CH₄ = Methane CO₂ = Carbon Dioxide O₂ = Oxygen H₂S = Hydrogen Sulphide CO = Carbon Monoxide NR = Not Recorded PID = Photo Ionisation Detector

GWL = Groundwater level measured from ground surface and top of standpipe. Base = Base of standpipe measured from ground surface.

Monitoring point				Gas Concentration								Pressure	Flow rate	Vapour	Comments
Borehole	GWL Ground (m)	GWL Pipe (m)	Base Ground (m)	Steady			Peak		Minimum	Peak		Baro - metric (mb)	Steady (l/hr)	PID (ppm)	
				CH ₄ (%)	CO ₂ (%)	O ₂ (%)	CH ₄ (%)	CO ₂ (%)	O ₂ (%)	CO (ppm)	H ₂ S (ppm)				
WS01	2.22	2.12	3.94	0.0	3.2	18.3	0.0	3.2	18.3	0	1	1019	0.0	4.7	
WS03	0.82	0.72	3.00	0.0	2.1	17.7	0.0	8.6	5.7	0	1	1018	0.0	3.9	
WS05	2.22	2.09	3.99	0.0	4.6	17.8	0.0	4.7	17.8	0	0	1019	0.3	6.7	
WS06	2.68	2.55	3.90	0.0	9.3	5.2	0.0	9.3	5.2	0	1	1019	0.0	10.4	
WS07	1.07	0.97	3.60	0.0	2.3	16.6	0.0	2.3	16.6	2	0	1021	-2.2	5.6	
WS08	2.37	2.10	4.00	0.0	2.4	18.5	0.0	2.4	18.5	1	0	1021	-0.3	3.9	
WS09	1.75	1.62	4.00	0.0	1.0	19.4	0.0	2.0	19.0	1	0	1020	-0.4	9.7	
WS11	1.88	1.70	2.65	0.0	1.7	18.9	0.0	1.7	18.9	1	0	1021	-0.6	8.7	
WS12	2.07	2.57	4.07	0.0	3.5	18.0	0.0	3.5	18.0	2	0	1021	-0.7	29.9	
WS15	Dry	Dry	4.80	0.0	2.4	18.6	0.0	2.4	18.6	1	0	1020	-0.3	10.7	



Gas Monitoring Record

Project Name: Gleeson Strategic Land And Miller Homes

Client: Winchester Road, Hedge End

Project No: BRD2924

Date: 07/09/2017 Ground conditions: Wet and soft in areas Recorded by: Dan Brown
Time at start: 10:31 Weather conditions: Overcast with light Rain Pressure trend: Falling
Time at finish: 12:30 PM Air Temperature (°C): 14 Monitor serial no: G501688

The gas monitoring equipment is a Geotech GA5000 portable analyser. As per manufacturers recommendations this is factory calibrated every six months and in addition BRD undertake calibration checks against bottled standard gases on at least a monthly basis. Gas monitor pump is run for three minutes unless otherwise stated and the steady readings are an average reading taken over this pump run time. Vapour monitoring equipment is miniRAE lite PGM-7350 Photo Ionisation Detector (PID) with 10.6 eV lamp calibrated for isobutylene. PID calibration check is performed on site against ambient air and also against a 100ppm isobutylene standard gas. Barometric pressure trend and ambient air temperature is recorded from weather websites at the nearest reported weather station.

CH₄ = Methane CO₂ = Carbon Dioxide O₂ = Oxygen H₂S = Hydrogen Sulphide CO = Carbon Monoxide NR = Not Recorded PID = Photo Ionisation Detector

GWL = Groundwater level measured from ground surface and top of standpipe. Base = Base of standpipe measured from ground surface.

Monitoring point				Gas Concentration								Pressure	Flow rate	Vapour	Comments
Borehole	GWL Ground (m)	GWL Pipe (m)	Base Ground (m)	Steady			Peak		Minimum	Peak		Baro - metric (mb)	Steady (l/hr)	PID (ppm)	
				CH ₄ (%)	CO ₂ (%)	O ₂ (%)	CH ₄ (%)	CO ₂ (%)	O ₂ (%)	CO (ppm)	H ₂ S (ppm)				
WS01	2.24	2.14	3.94	0.0	3.3	18.0	0.0	3.3	17.2	0	1	1013	0.3	4.9	
WS03	0.98	0.80	3.00	0.0	1.9	19.0	0.0	1.9	19.0	1	0	1014	0.5	4.9	
WS05	2.11	2.01	3.99	0.0	11.8	15.3	0.0	13.1	15.3	0	1	1014	0.0	7.1	
WS06	1.17	1.07	3.90	0.0	8.3	7.0	0.0	8.3	7.0	1	1	1014	-0.1	6.6	
WS07	1.15	1.05	3.61	0.0	2.6	17.6	0.1	2.6	17.6	1	0	1014	0.0	6.2	
WS08	1.40	1.24	4.00	0.2	2.3	18.9	0.2	2.3	18.9	0	0	1014	0.2	4.7	
WS09	1.70	1.57	4.00	0.0	2.7	18.6	0.0	3.8	18.4	0	0	1014	-0.1	9.9	
WS11	2.00	1.78	2.67	0.0	2.7	18.8	0.0	2.7	18.8	0	0	1013	-0.1	10.1	
WS12	2.63	2.16	4.08	0.0	4.1	18.4	0.0	4.1	18.4	0	0	1013	0.0	30.1	
WS15	Dry	Dry	5.00	0.0	4.5	16.5	0.1	4.5	16.5	0	0	1012	0.1	11.4	



Gas Monitoring Record

Project Name: Gleeson Strategic Land And Miller Homes

Client: Winchester Road, Hedge End

Project No: BRD2924

Date: 14/09/2017 Ground conditions: Wet Recorded by: Dan Brown
Time at start: 10:50 AM Weather conditions: Overcast Pressure trend: Rising
Time at finish: 12:40 PM Air Temperature (°C): 14 Monitor serial no: G501688

The gas monitoring equipment is a Geotech GA5000 portable analyser. As per manufacturers recommendations this is factory calibrated every six months and in addition BRD undertake calibration checks against bottled standard gases on at least a monthly basis. Gas monitor pump is run for three minutes unless otherwise stated and the steady readings are an average reading taken over this pump run time. Vapour monitoring equipment is miniRAE lite PGM-7350 Photo Ionisation Detector (PID) with 10.6 eV lamp calibrated for isobutylene. PID calibration check is performed on site against ambient air and also against a 100ppm isobutylene standard gas. Barometric pressure trend and ambient air temperature is recorded from weather websites at the nearest reported weather station.

CH₄ = Methane CO₂ = Carbon Dioxide O₂ = Oxygen H₂S = Hydrogen Sulphide CO = Carbon Monoxide NR = Not Recorded PID = Photo Ionisation Detector

GWL = Groundwater level measured from ground surface and top of standpipe. Base = Base of standpipe measured from ground surface.

Monitoring point				Gas Concentration								Pressure	Flow rate	Vapour	Comments
Borehole	GWL Ground (m)	GWL Pipe (m)	Base Ground (m)	Steady			Peak		Minimum	Peak		Baro - metric (mb)	Steady (l/hr)	PID (ppm)	
				CH ₄ (%)	CO ₂ (%)	O ₂ (%)	CH ₄ (%)	CO ₂ (%)	O ₂ (%)	CO (ppm)	H ₂ S (ppm)				
WS01	2.26	2.16	3.94	0.0	3.4	18.4	0.0	3.4	17.5	0	1	1008	0.4	9.4	
WS03	0.97	0.87	3.00	0.0	1.7	19.6	0.0	1.7	19.6	0	0	1006	-0.3	4.1	
WS05	1.57	1.47	3.99	0.0	11.5	16.3	0.0	11.6	16.3	0	1	1007	0.4	6.7	
WS06	1.14	1.00	3.90	0.0	7.8	8.1	0.0	7.8	8.1	0	1	1007	0.0	5.9	
WS07	1.15	1.00	3.60	0.0	2.5	17.8	0.0	2.5	17.8	1	0	1009	0.3	6.0	
WS08	2.40	2.25	4.00	0.0	2.2	19.3	0.0	2.2	19.3	0	0	1009	0.0	6.9	
WS09	1.75	1.60	4.00	0.0	1.0	19.9	0.0	2.3	19.5	0	0	1009	0.0	8.9	
WS11	2.10	1.84	2.66	0.0	1.9	19.2	0.0	1.9	19.2	0	0	1010	0.0	9.1	
WS12	2.76	2.26	4.09	0.0	4.0	18.6	0.0	4.0	18.6	1	0	1009	-0.3	28.5	
WS15	Dry	Dry	5.00	0.0	2.8	18.9	0.1	2.8	18.9	0	0	1008	0.0	5.9	

APPENDIX 3



Ana Leon
BRD Environmental Ltd
Hawthorne Villa
1 Old Parr Road
Banbury
Oxfordshire
OX16 5HT



QTS Environmental Ltd
Unit 1
Rose Lane Industrial Estate
Rose Lane
Lenham Heath
Kent
ME17 2JN
t: 01622 850410

QTS Environmental Report No: 17-62273

Site Reference: Hedge End

Project / Job Ref: BRD2924

Order No: None Supplied

Sample Receipt Date: 28/07/2017

Sample Scheduled Date: 28/07/2017

Report Issue Number: 2

Reporting Date: 04/08/2017

Authorised by:

Kevin Old
Associate Director of Laboratory

Authorised by:

Russell Jarvis
Associate Director of Client Services

QTSE is the trading name of DETS Ltd, company registration number 03705645



QTS Environmental Ltd
Unit 1, Rose Lane Industrial Estate
Rose Lane
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Soil Analysis Certificate						
QTS Environmental Report No: 17-62273	Date Sampled	24/07/17	24/07/17	24/07/17	24/07/17	24/07/17
BRD Environmental Ltd	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Hedge End	TP / BH No	WS01	TP01	TP02	WS02	TP03
Project / Job Ref: BRD2924	Additional Refs	J1	J1	J1	J1	J1
Order No: None Supplied	Depth (m)	0.20	0.20	0.10	0.30	0.30
Reporting Date: 04/08/2017	QTS Sample No	282375	282376	282377	282378	282379

Determinand	Unit	RL	Accreditation					
Asbestos Screen ^(S)	N/a	N/a	ISO17025					
Sample Matrix ^(S)	Material Type	N/a	NONE					
Asbestos Type ^(S)	PLM Result	N/a	ISO17025					
Asbestos Quantification ^(S)	%	< 0.001	ISO17025	< 0.001			< 0.001	
pH	pH Units	N/a	MCERTS	6.1	6.2	8.4	5.8	5.0
W/S Sulphate as SO ₄ (2:1)	mg/l	< 10	MCERTS	24	15	24	36	32
W/S Sulphate as SO ₄ (2:1)	g/l	< 0.01	MCERTS	0.02	0.01	0.02	0.04	0.03
Organic Matter	%	< 0.1	MCERTS	2.7	2.7	4.5	4.1	1.8
Arsenic (As)	mg/kg	< 2	MCERTS	5	6	5	6	7
Cadmium (Cd)	mg/kg	< 0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Chromium (Cr)	mg/kg	< 2	MCERTS	10	12	12	13	16
Chromium (hexavalent)	mg/kg	< 2	NONE	< 2	< 2	< 2	< 2	< 2
Copper (Cu)	mg/kg	< 4	MCERTS	6	6	7	9	7
Lead (Pb)	mg/kg	< 3	MCERTS	22	29	22	27	23
Mercury (Hg)	mg/kg	< 1	NONE	< 1	< 1	< 1	< 1	< 1
Nickel (Ni)	mg/kg	< 3	MCERTS	< 3	< 3	4	4	5
Selenium (Se)	mg/kg	< 3	NONE	< 3	< 3	< 3	< 3	< 3
Zinc (Zn)	mg/kg	< 3	MCERTS	27	21	34	31	24

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C

Analysis carried out on the dried sample is corrected for the stone content

The samples have been examined to identify the presence of asbestiform minerals by polarising light microscopy and dispersion staining technique to In-House Procedures QTSE600 Determination of Asbestos in Bulk Materials; Asbestos in Soils/Sediments (fibre screening and identification)

This report refers to samples as received, and QTS Environmental Ltd, takes no responsibility for the accuracy or competence of sampling by others.

The material description shall be regarded as tentative and is not included in our scope of UKAS Accreditation.

Opinions and interpretations expressed herein are outside the scope of UKAS Accreditation.

Asbestos Analyst: Javeed Malik

RL: Reporting Limit

Pinch Test: Where pinch test is positive it is reported "Loose Fibres - PT" with type(s).

Subcontracted analysis ^(S)



QTS Environmental Ltd
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Soil Analysis Certificate						
QTS Environmental Report No: 17-62273	Date Sampled	24/07/17	24/07/17	24/07/17	24/07/17	24/07/17
BRD Environmental Ltd	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Hedge End	TP / BH No	TP05	WS05	WS06	WS03	WS04
Project / Job Ref: BRD2924	Additional Refs	J1	J1	J1	J1	J1
Order No: None Supplied	Depth (m)	0.30	0.10	0.20	0.15	0.15
Reporting Date: 04/08/2017	QTS Sample No	282380	282381	282382	282383	282384

Determinand	Unit	RL	Accreditation		Detected	Detected		
Asbestos Screen ^(S)	N/a	N/a	ISO17025					
Sample Matrix ^(S)	Material Type	N/a	NONE		Fibre bundle in soil	Small fibre bundle in soil		
Asbestos Type ^(S)	PLM Result	N/a	ISO17025		Chrysotile	Chrysotile		
Asbestos Quantification ^(S)	%	< 0.001	ISO17025		0.002	0.001	< 0.001	
pH	pH Units	N/a	MCERTS	6.0	7.4	7.7	5.8	6.9
W/S Sulphate as SO ₄ (2:1)	mg/l	< 10	MCERTS	16	94	33	22	22
W/S Sulphate as SO ₄ (2:1)	g/l	< 0.01	MCERTS	0.02	0.09	0.03	0.02	0.02
Organic Matter	%	< 0.1	MCERTS	3.6	6.8	5.9	5.4	1.7
Arsenic (As)	mg/kg	< 2	MCERTS	6	4	8	5	6
Cadmium (Cd)	mg/kg	< 0.2	MCERTS	< 0.2	< 0.2	0.2	< 0.2	< 0.2
Chromium (Cr)	mg/kg	< 2	MCERTS	12	9	12	13	11
Chromium (hexavalent)	mg/kg	< 2	NONE	< 2	< 2	< 2	< 2	< 2
Copper (Cu)	mg/kg	< 4	MCERTS	8	14	17	8	5
Lead (Pb)	mg/kg	< 3	MCERTS	25	15	53	20	17
Mercury (Hg)	mg/kg	< 1	NONE	< 1	< 1	< 1	< 1	< 1
Nickel (Ni)	mg/kg	< 3	MCERTS	< 3	5	6	4	< 3
Selenium (Se)	mg/kg	< 3	NONE	< 3	< 3	< 3	< 3	< 3
Zinc (Zn)	mg/kg	< 3	MCERTS	32	103	110	34	21

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C

Analysis carried out on the dried sample is corrected for the stone content

The samples have been examined to identify the presence of asbestiform minerals by polarising light microscopy and dispersion staining technique to In-House Procedures QTSE600 Determination of Asbestos in Bulk Materials; Asbestos in Soils/Sediments (fibre screening and identification)

This report refers to samples as received, and QTS Environmental Ltd, takes no responsibility for the accuracy or competence of sampling by others.

The material description shall be regarded as tentative and is not included in our scope of UKAS Accreditation.

Opinions and interpretations expressed herein are outside the scope of UKAS Accreditation.

Asbestos Analyst: Javeed Malik

RL: Reporting Limit

Pinch Test: Where pinch test is positive it is reported "Loose Fibres - PT" with type(s).

Subcontracted analysis ^(S)



QTS Environmental Ltd
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Rose Lane
Lenham Heath
Maidstone
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Soil Analysis Certificate

QTS Environmental Report No: 17-62273	Date Sampled	24/07/17	24/07/17	25/07/17	25/07/17	25/07/17
BRD Environmental Ltd	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Hedge End	TP / BH No	TP06	TP07	WS08	TP09	TP10
Project / Job Ref: BRD2924	Additional Refs	J1	J1	J1	J1	J1
Order No: None Supplied	Depth (m)	0.15	0.30	0.20	0.20	0.15
Reporting Date: 04/08/2017	QTS Sample No	282385	282386	282387	282388	282389

Determinand	Unit	RL	Accreditation					
Asbestos Screen ^(S)	N/a	N/a	ISO17025					
Sample Matrix ^(S)	Material Type	N/a	NONE					
Asbestos Type ^(S)	PLM Result	N/a	ISO17025					
Asbestos Quantification ^(S)	%	< 0.001	ISO17025	< 0.001				< 0.001
pH	pH Units	N/a	MCERTS	6.1	6.7	6.3	6.1	5.8
W/S Sulphate as SO ₄ (2:1)	mg/l	< 10	MCERTS	26	23	15	14	20
W/S Sulphate as SO ₄ (2:1)	g/l	< 0.01	MCERTS	0.03	0.02	0.01	0.01	0.02
Organic Matter	%	< 0.1	MCERTS	7.4	1.3	2.6	2.4	2.9
Arsenic (As)	mg/kg	< 2	MCERTS	7	11	7	5	5
Cadmium (Cd)	mg/kg	< 0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Chromium (Cr)	mg/kg	< 2	MCERTS	19	23	16	13	13
Chromium (hexavalent)	mg/kg	< 2	NONE	< 2	< 2	< 2	< 2	< 2
Copper (Cu)	mg/kg	< 4	MCERTS	11	6	7	< 4	< 4
Lead (Pb)	mg/kg	< 3	MCERTS	28	28	19	13	14
Mercury (Hg)	mg/kg	< 1	NONE	< 1	< 1	< 1	< 1	< 1
Nickel (Ni)	mg/kg	< 3	MCERTS	3	32	4	< 3	< 3
Selenium (Se)	mg/kg	< 3	NONE	< 3	10.5	< 3	< 3	< 3
Zinc (Zn)	mg/kg	< 3	MCERTS	31	53	33	18	17

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C

Analysis carried out on the dried sample is corrected for the stone content

The samples have been examined to identify the presence of asbestiform minerals by polarising light microscopy and dispersion staining technique to In-House Procedures QTSE600 Determination of Asbestos in Bulk Materials; Asbestos in Soils/Sediments (fibre screening and identification)

This report refers to samples as received, and QTS Environmental Ltd, takes no responsibility for the accuracy or competence of sampling by others.

The material description shall be regarded as tentative and is not included in our scope of UKAS Accreditation.

Opinions and interpretations expressed herein are outside the scope of UKAS Accreditation.

Asbestos Analyst: Javeed Malik

RL: Reporting Limit

Pinch Test: Where pinch test is positive it is reported "Loose Fibres - PT" with type(s).

Subcontracted analysis ^(S)



QTS Environmental Ltd
Unit 1, Rose Lane Industrial Estate
Rose Lane
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Maidstone
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Tel : 01622 850410



Soil Analysis Certificate						
QTS Environmental Report No: 17-62273	Date Sampled	25/07/17	25/07/17	25/07/17	26/07/17	26/07/17
BRD Environmental Ltd	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Hedge End	TP / BH No	WS07	WS09	WS10	TP20	TP21
Project / Job Ref: BRD2924	Additional Refs	J1	J1	J1	J1	J1
Order No: None Supplied	Depth (m)	0.15	0.15	0.10	0.20	0.10
Reporting Date: 04/08/2017	QTS Sample No	282390	282391	282392	282393	282394

Determinand	Unit	RL	Accreditation					
Asbestos Screen ^(S)	N/a	N/a	ISO17025					
Sample Matrix ^(S)	Material Type	N/a	NONE					
Asbestos Type ^(S)	PLM Result	N/a	ISO17025					
Asbestos Quantification ^(S)	%	< 0.001	ISO17025					< 0.001
pH	pH Units	N/a	MCERTS	5.2	5.7	5.6	6.1	5.5
W/S Sulphate as SO ₄ (2:1)	mg/l	< 10	MCERTS	36	< 10	< 10	< 10	22
W/S Sulphate as SO ₄ (2:1)	g/l	< 0.01	MCERTS	0.04	< 0.01	< 0.01	< 0.01	0.02
Organic Matter	%	< 0.1	MCERTS	3.9	2.6	1.8	1.2	4.4
Arsenic (As)	mg/kg	< 2	MCERTS	5	6	8	9	4
Cadmium (Cd)	mg/kg	< 0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Chromium (Cr)	mg/kg	< 2	MCERTS	13	15	13	16	10
Chromium (hexavalent)	mg/kg	< 2	NONE	< 2	< 2	< 2	< 2	< 2
Copper (Cu)	mg/kg	< 4	MCERTS	< 4	9	10	5	5
Lead (Pb)	mg/kg	< 3	MCERTS	18	21	26	12	20
Mercury (Hg)	mg/kg	< 1	NONE	< 1	< 1	< 1	< 1	< 1
Nickel (Ni)	mg/kg	< 3	MCERTS	3	3	4	5	< 3
Selenium (Se)	mg/kg	< 3	NONE	< 3	< 3	< 3	< 3	< 3
Zinc (Zn)	mg/kg	< 3	MCERTS	25	37	21	21	24

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C

Analysis carried out on the dried sample is corrected for the stone content

The samples have been examined to identify the presence of asbestiform minerals by polarising light microscopy and dispersion staining technique to In-House Procedures QTSE600 Determination of Asbestos in Bulk Materials; Asbestos in Soils/Sediments (fibre screening and identification)

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Asbestos Analyst: Javeed Malik

RL: Reporting Limit

Pinch Test: Where pinch test is positive it is reported "Loose Fibres - PT" with type(s).

Subcontracted analysis ^(S)

Soil Analysis Certificate

QTS Environmental Report No: 17-62273	Date Sampled	25/07/17	25/07/17	25/07/17	26/07/17	26/07/17
BRD Environmental Ltd	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Hedge End	TP / BH No	WS11	WS12	TP13	TP23	TP24
Project / Job Ref: BRD2924	Additional Refs	J1	J1	J1	J1	J1
Order No: None Supplied	Depth (m)	0.10	0.15	0.20	0.20	0.30
Reporting Date: 04/08/2017	QTS Sample No	282395	282396	282397	282398	282399

Determinand	Unit	RL	Accreditation					
Asbestos Screen ^(S)	N/a	N/a	ISO17025					
Sample Matrix ^(S)	Material Type	N/a	NONE					
Asbestos Type ^(S)	PLM Result	N/a	ISO17025					
Asbestos Quantification ^(S)	%	< 0.001	ISO17025					
pH	pH Units	N/a	MCERTS	5.1	6.2	5.6	5.5	5.5
W/S Sulphate as SO ₄ (2:1)	mg/l	< 10	MCERTS	24	< 10	10	14	12
W/S Sulphate as SO ₄ (2:1)	g/l	< 0.01	MCERTS	0.02	< 0.01	0.01	0.01	0.01
Organic Matter	%	< 0.1	MCERTS	4.7	2.6	4.3	4.2	1.6
Arsenic (As)	mg/kg	< 2	MCERTS	5	6	6	5	6
Cadmium (Cd)	mg/kg	< 0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Chromium (Cr)	mg/kg	< 2	MCERTS	12	12	9	9	14
Chromium (hexavalent)	mg/kg	< 2	NONE	< 2	< 2	< 2	< 2	< 2
Copper (Cu)	mg/kg	< 4	MCERTS	10	8	8	8	7
Lead (Pb)	mg/kg	< 3	MCERTS	33	22	25	27	24
Mercury (Hg)	mg/kg	< 1	NONE	< 1	< 1	< 1	< 1	< 1
Nickel (Ni)	mg/kg	< 3	MCERTS	< 3	< 3	< 3	< 3	< 3
Selenium (Se)	mg/kg	< 3	NONE	< 3	< 3	< 3	< 3	< 3
Zinc (Zn)	mg/kg	< 3	MCERTS	116	22	20	20	21

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C

Analysis carried out on the dried sample is corrected for the stone content

The samples have been examined to identify the presence of asbestiform minerals by polarising light microscopy and dispersion staining technique to In-House Procedures QTSE600 Determination of Asbestos in Bulk Materials; Asbestos in Soils/Sediments (fibre screening and identification)

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Asbestos Analyst: Javeed Malik

RL: Reporting Limit

Pinch Test: Where pinch test is positive it is reported "Loose Fibres - PT" with type(s).

Subcontracted analysis ^(S)



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Soil Analysis Certificate

QTS Environmental Report No: 17-62273	Date Sampled	25/07/17	25/07/17	25/07/17	25/07/17	26/07/17
BRD Environmental Ltd	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Hedge End	TP / BH No	TP17	TP18	TP16	TP15	WS14
Project / Job Ref: BRD2924	Additional Refs	J1	J1	J1	J1	J1
Order No: None Supplied	Depth (m)	0.10	0.20	0.10	0.10	0.10
Reporting Date: 04/08/2017	QTSE Sample No	282400	282401	282402	282403	282404

Determinand	Unit	RL	Accreditation					
Asbestos Screen ^(S)	N/a	N/a	ISO17025					
Sample Matrix ^(S)	Material Type	N/a	NONE					
Asbestos Type ^(S)	PLM Result	N/a	ISO17025					
Asbestos Quantification ^(S)	%	< 0.001	ISO17025		< 0.001	< 0.001		
pH	pH Units	N/a	MCERTS	5.4	5.6	5.4	5.7	6.3
W/S Sulphate as SO ₄ (2:1)	mg/l	< 10	MCERTS	11	< 10	11	< 10	17
W/S Sulphate as SO ₄ (2:1)	g/l	< 0.01	MCERTS	0.01	< 0.01	0.01	< 0.01	0.02
Organic Matter	%	< 0.1	MCERTS	3	3.8	4.6	1.7	2.8
Arsenic (As)	mg/kg	< 2	MCERTS	5	6	8	7	8
Cadmium (Cd)	mg/kg	< 0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Chromium (Cr)	mg/kg	< 2	MCERTS	12	11	13	11	11
Chromium (hexavalent)	mg/kg	< 2	NONE	< 2	< 2	< 2	< 2	< 2
Copper (Cu)	mg/kg	< 4	MCERTS	15	7	8	13	8
Lead (Pb)	mg/kg	< 3	MCERTS	41	25	27	42	26
Mercury (Hg)	mg/kg	< 1	NONE	< 1	< 1	< 1	< 1	< 1
Nickel (Ni)	mg/kg	< 3	MCERTS	< 3	< 3	3	3	3
Selenium (Se)	mg/kg	< 3	NONE	< 3	< 3	< 3	< 3	< 3
Zinc (Zn)	mg/kg	< 3	MCERTS	22	28	38	30	41

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C

Analysis carried out on the dried sample is corrected for the stone content

The samples have been examined to identify the presence of asbestiform minerals by polarising light microscopy and dispersion staining technique to In-House Procedures QTSE600 Determination of Asbestos in Bulk Materials; Asbestos in Soils/Sediments (fibre screening and identification)

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Asbestos Analyst: Javeed Malik

RL: Reporting Limit

Pinch Test: Where pinch test is positive it is reported "Loose Fibres - PT" with type(s).

Subcontracted analysis ^(S)



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Soil Analysis Certificate						
QTS Environmental Report No: 17-62273	Date Sampled	24/07/17	24/07/17	25/07/17	25/07/17	24/07/17
BRD Environmental Ltd	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Hedge End	TP / BH No	WS05	WS06	TP10	WS09	TP02
Project / Job Ref: BRD2924	Additional Refs	J2	J2	J2	J2	J2
Order No: None Supplied	Depth (m)	0.75	0.80	0.80	0.80	0.60
Reporting Date: 04/08/2017	QTS Sample No	282405	282406	282407	282408	282409

Determinand	Unit	RL	Accreditation					
Asbestos Screen ^(S)	N/a	N/a	ISO17025					
Sample Matrix ^(S)	Material Type	N/a	NONE					
Asbestos Type ^(S)	PLM Result	N/a	ISO17025					
Asbestos Quantification ^(S)	%	< 0.001	ISO17025					
pH	pH Units	N/a	MCERTS	6.1	7.2	7.2	5.6	6.9
W/S Sulphate as SO ₄ (2:1)	mg/l	< 10	MCERTS	61	15	10	30	10
W/S Sulphate as SO ₄ (2:1)	g/l	< 0.01	MCERTS	0.06	0.01	0.01	0.03	0.01
Organic Matter	%	< 0.1	MCERTS	0.7	0.4	0.3	1.4	0.3
Arsenic (As)	mg/kg	< 2	MCERTS	8	3	10	10	3
Cadmium (Cd)	mg/kg	< 0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Chromium (Cr)	mg/kg	< 2	MCERTS	15	20	18	8	14
Chromium (hexavalent)	mg/kg	< 2	NONE	< 2	< 2	< 2	< 2	< 2
Copper (Cu)	mg/kg	< 4	MCERTS	7	4	5	< 4	< 4
Lead (Pb)	mg/kg	< 3	MCERTS	7	8	8	6	7
Mercury (Hg)	mg/kg	< 1	NONE	< 1	< 1	< 1	< 1	< 1
Nickel (Ni)	mg/kg	< 3	MCERTS	< 3	< 3	4	< 3	7
Selenium (Se)	mg/kg	< 3	NONE	< 3	< 3	< 3	< 3	< 3
Zinc (Zn)	mg/kg	< 3	MCERTS	18	22	21	12	32

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C

Analysis carried out on the dried sample is corrected for the stone content

The samples have been examined to identify the presence of asbestiform minerals by polarising light microscopy and dispersion staining technique to In-House Procedures QTSE600 Determination of Asbestos in Bulk Materials; Asbestos in Soils/Sediments (fibre screening and identification)

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Asbestos Analyst: Javeed Malik

RL: Reporting Limit

Pinch Test: Where pinch test is positive it is reported "Loose Fibres - PT" with type(s).

Subcontracted analysis ^(S)

Soil Analysis Certificate						
QTS Environmental Report No: 17-62273	Date Sampled	25/07/17	26/07/17	25/07/17	26/07/17	
BRD Environmental Ltd	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	
Site Reference: Hedge End	TP / BH No	TP05	TP20	TP13	WS13	
Project / Job Ref: BRD2924	Additional Refs	J2	J2	J2	J2	
Order No: None Supplied	Depth (m)	0.80	0.70	0.70	0.80	
Reporting Date: 04/08/2017	QTS Sample No	282410	282411	282412	282413	

Determinand	Unit	RL	Accreditation				
Asbestos Screen ^(S)	N/a	N/a	ISO17025				
Sample Matrix ^(S)	Material Type	N/a	NONE				
Asbestos Type ^(S)	PLM Result	N/a	ISO17025				
Asbestos Quantification ^(S)	%	< 0.001	ISO17025				
pH	pH Units	N/a	MCERTS	4.9	6.9	6.4	5.9
W/S Sulphate as SO ₄ (2:1)	mg/l	< 10	MCERTS	53	< 10	< 10	< 10
W/S Sulphate as SO ₄ (2:1)	g/l	< 0.01	MCERTS	0.05	< 0.01	0.01	< 0.01
Organic Matter	%	< 0.1	MCERTS	0.4	0.2	0.6	0.6
Arsenic (As)	mg/kg	< 2	MCERTS	19	9	7	8
Cadmium (Cd)	mg/kg	< 0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2
Chromium (Cr)	mg/kg	< 2	MCERTS	15	15	16	16
Chromium (hexavalent)	mg/kg	< 2	NONE	< 2	< 2	< 2	< 2
Copper (Cu)	mg/kg	< 4	MCERTS	7	< 4	5	4
Lead (Pb)	mg/kg	< 3	MCERTS	12	6	8	9
Mercury (Hg)	mg/kg	< 1	NONE	< 1	< 1	< 1	< 1
Nickel (Ni)	mg/kg	< 3	MCERTS	< 3	9	< 3	< 3
Selenium (Se)	mg/kg	< 3	NONE	< 3	< 3	< 3	< 3
Zinc (Zn)	mg/kg	< 3	MCERTS	17	20	15	17

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C

Analysis carried out on the dried sample is corrected for the stone content

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Asbestos Analyst: Javeed Malik

RL: Reporting Limit

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Subcontracted analysis ^(S)



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Soil Analysis Certificate - Speciated PAHs

QTS Environmental Report No: 17-62273	Date Sampled	24/07/17	24/07/17	24/07/17	24/07/17	24/07/17
BRD Environmental Ltd	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Hedge End	TP / BH No	WS01	TP01	TP02	WS02	TP03
Project / Job Ref: BRD2924	Additional Refs	J1	J1	J1	J1	J1
Order No: None Supplied	Depth (m)	0.20	0.20	0.10	0.30	0.30
Reporting Date: 04/08/2017	QTSE Sample No	282375	282376	282377	282378	282379

Determinand	Unit	RI	Accreditation					
Naphthalene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthylene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Fluorene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Phenanthrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Pyrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(a)anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Chrysene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(b)fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(k)fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(a)pyrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Dibenz(a,h)anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(ghi)perylene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Total EPA-16 PAHs	mg/kg	< 1.6	MCERTS	< 1.6	< 1.6	< 1.6	< 1.6	< 1.6

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C



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Soil Analysis Certificate - Speciated PAHs

QTS Environmental Report No: 17-62273	Date Sampled	24/07/17	24/07/17	24/07/17	24/07/17	24/07/17
BRD Environmental Ltd	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Hedge End	TP / BH No	TP05	WS05	WS06	WS03	WS04
Project / Job Ref: BRD2924	Additional Refs	J1	J1	J1	J1	J1
Order No: None Supplied	Depth (m)	0.30	0.10	0.20	0.15	0.15
Reporting Date: 04/08/2017	QTSE Sample No	282380	282381	282382	282383	282384

Determinand	Unit	RI	Accreditation					
Naphthalene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	0.27	< 0.1	< 0.1
Acenaphthylene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	0.63	< 0.1	< 0.1
Fluorene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	0.43	< 0.1	< 0.1
Phenanthrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	9.36	< 0.1	< 0.1
Anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	3.82	< 0.1	< 0.1
Fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	37.80	< 0.1	< 0.1
Pyrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	36.80	< 0.1	< 0.1
Benzo(a)anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	20.90	< 0.1	< 0.1
Chrysene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	20.20	< 0.1	< 0.1
Benzo(b)fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	27	< 0.1	< 0.1
Benzo(k)fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	6.94	< 0.1	< 0.1
Benzo(a)pyrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	21.80	< 0.1	< 0.1
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	9.93	< 0.1	< 0.1
Dibenz(a,h)anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	1.94	< 0.1	< 0.1
Benzo(ghi)perylene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	8.35	< 0.1	< 0.1
Total EPA-16 PAHs	mg/kg	< 1.6	MCERTS	< 1.6	< 1.6	206	< 1.6	< 1.6

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C



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Soil Analysis Certificate - Speciated PAHs

QTS Environmental Report No: 17-62273	Date Sampled	24/07/17	24/07/17	25/07/17	25/07/17	25/07/17
BRD Environmental Ltd	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Hedge End	TP / BH No	TP06	TP07	WS08	TP09	TP10
Project / Job Ref: BRD2924	Additional Refs	J1	J1	J1	J1	J1
Order No: None Supplied	Depth (m)	0.15	0.30	0.20	0.20	0.15
Reporting Date: 04/08/2017	QTSE Sample No	282385	282386	282387	282388	282389

Determinand	Unit	RI	Accreditation					
Naphthalene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthylene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Fluorene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Phenanthrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Pyrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(a)anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Chrysene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(b)fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(k)fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(a)pyrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Dibenz(a,h)anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(ghi)perylene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Total EPA-16 PAHs	mg/kg	< 1.6	MCERTS	< 1.6	< 1.6	< 1.6	< 1.6	< 1.6

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C



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Soil Analysis Certificate - Speciated PAHs

QTS Environmental Report No: 17-62273	Date Sampled	25/07/17	25/07/17	25/07/17	26/07/17	26/07/17
BRD Environmental Ltd	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Hedge End	TP / BH No	WS07	WS09	WS10	TP20	TP21
Project / Job Ref: BRD2924	Additional Refs	J1	J1	J1	J1	J1
Order No: None Supplied	Depth (m)	0.15	0.15	0.10	0.20	0.10
Reporting Date: 04/08/2017	QTSE Sample No	282390	282391	282392	282393	282394

Determinand	Unit	RI	Accreditation					
Naphthalene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthylene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Fluorene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Phenanthrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	0.23	< 0.1	< 0.1	< 0.1
Pyrene	mg/kg	< 0.1	MCERTS	< 0.1	0.19	< 0.1	< 0.1	< 0.1
Benzo(a)anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Chrysene	mg/kg	< 0.1	MCERTS	< 0.1	0.14	< 0.1	< 0.1	< 0.1
Benzo(b)fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(k)fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(a)pyrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Dibenz(a,h)anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(ghi)perylene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Total EPA-16 PAHs	mg/kg	< 1.6	MCERTS	< 1.6	< 1.6	< 1.6	< 1.6	< 1.6

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C



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Soil Analysis Certificate - Speciated PAHs

QTS Environmental Report No: 17-62273	Date Sampled	25/07/17	25/07/17	25/07/17	26/07/17	26/07/17
BRD Environmental Ltd	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Hedge End	TP / BH No	WS11	WS12	TP13	TP23	TP24
Project / Job Ref: BRD2924	Additional Refs	J1	J1	J1	J1	J1
Order No: None Supplied	Depth (m)	0.10	0.15	0.20	0.20	0.30
Reporting Date: 04/08/2017	QTSE Sample No	282395	282396	282397	282398	282399

Determinand	Unit	RI	Accreditation					
Naphthalene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthylene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Fluorene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Phenanthrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Pyrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(a)anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Chrysene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(b)fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(k)fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(a)pyrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Dibenz(a,h)anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(ghi)perylene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Total EPA-16 PAHs	mg/kg	< 1.6	MCERTS	< 1.6	< 1.6	< 1.6	< 1.6	< 1.6

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C



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Soil Analysis Certificate - Speciated PAHs

QTS Environmental Report No: 17-62273	Date Sampled	25/07/17	25/07/17	25/07/17	25/07/17	26/07/17
BRD Environmental Ltd	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Hedge End	TP / BH No	TP17	TP18	TP16	TP15	WS14
Project / Job Ref: BRD2924	Additional Refs	J1	J1	J1	J1	J1
Order No: None Supplied	Depth (m)	0.10	0.20	0.10	0.10	0.10
Reporting Date: 04/08/2017	QTSE Sample No	282400	282401	282402	282403	282404

Determinand	Unit	RI	Accreditation					
Naphthalene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthylene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Fluorene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Phenanthrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Pyrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(a)anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Chrysene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(b)fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(k)fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(a)pyrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Dibenz(a,h)anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(ghi)perylene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Total EPA-16 PAHs	mg/kg	< 1.6	MCERTS	< 1.6	< 1.6	< 1.6	< 1.6	< 1.6

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C



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Soil Analysis Certificate - Speciated PAHs

QTS Environmental Report No: 17-62273	Date Sampled	24/07/17	24/07/17	25/07/17	25/07/17	24/07/17
BRD Environmental Ltd	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Hedge End	TP / BH No	WS05	WS06	TP10	WS09	TP02
Project / Job Ref: BRD2924	Additional Refs	J2	J2	J2	J2	J2
Order No: None Supplied	Depth (m)	0.75	0.80	0.80	0.80	0.60
Reporting Date: 04/08/2017	QTSE Sample No	282405	282406	282407	282408	282409

Determinand	Unit	RI	Accreditation					
Naphthalene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthylene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Fluorene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Phenanthrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Pyrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(a)anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Chrysene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(b)fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(k)fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(a)pyrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Dibenz(a,h)anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(ghi)perylene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Total EPA-16 PAHs	mg/kg	< 1.6	MCERTS	< 1.6	< 1.6	< 1.6	< 1.6	< 1.6

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C



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Soil Analysis Certificate - Speciated PAHs

QTS Environmental Report No: 17-62273	Date Sampled	25/07/17	26/07/17	25/07/17	26/07/17
BRD Environmental Ltd	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Hedge End	TP / BH No	TP05	TP20	TP13	WS13
Project / Job Ref: BRD2924	Additional Refs	J2	J2	J2	J2
Order No: None Supplied	Depth (m)	0.80	0.70	0.70	0.80
Reporting Date: 04/08/2017	QTSE Sample No	282410	282411	282412	282413

Determinand	Unit	RI	Accreditation					
Naphthalene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	
Acenaphthylene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	
Acenaphthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	
Fluorene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	
Phenanthrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	
Anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	
Fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	
Pyrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	
Benzo(a)anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	
Chrysene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	
Benzo(b)fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	
Benzo(k)fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	
Benzo(a)pyrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	
Dibenz(a,h)anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	
Benzo(ghi)perylene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	
Total EPA-16 PAHs	mg/kg	< 1.6	MCERTS	< 1.6	< 1.6	< 1.6	< 1.6	

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C



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Soil Analysis Certificate - TPH LQM Banded

QTS Environmental Report No: 17-62273	Date Sampled	24/07/17	24/07/17	25/07/17	25/07/17	24/07/17
BRD Environmental Ltd	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Hedge End	TP / BH No	WS05	WS06	TP10	WS09	TP02
Project / Job Ref: BRD2924	Additional Refs	J2	J2	J2	J2	J2
Order No: None Supplied	Depth (m)	0.75	0.80	0.80	0.80	0.60
Reporting Date: 04/08/2017	QTSE Sample No	282405	282406	282407	282408	282409

Determinand	Unit	RL	Accreditation					
Aliphatic >C5 - C6	mg/kg	< 0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic >C6 - C8	mg/kg	< 0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Aliphatic >C8 - C10	mg/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
Aliphatic >C10 - C12	mg/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
Aliphatic >C12 - C16	mg/kg	< 3	MCERTS	< 3	< 3	< 3	< 3	< 3
Aliphatic >C16 - C35	mg/kg	< 10	MCERTS	< 10	< 10	< 10	< 10	< 10
Aliphatic >C35 - C44	mg/kg	< 10	NONE	< 10	< 10	< 10	< 10	< 10
Aliphatic (C5 - C44)	mg/kg	< 30	NONE	< 30	< 30	< 30	< 30	< 30
Aromatic >C5 - C7	mg/kg	< 0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic >C7 - C8	mg/kg	< 0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Aromatic >C8 - C10	mg/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
Aromatic >C10 - C12	mg/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
Aromatic >C12 - C16	mg/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
Aromatic >C16 - C21	mg/kg	< 3	MCERTS	< 3	< 3	< 3	< 3	< 3
Aromatic >C21 - C35	mg/kg	< 10	MCERTS	< 10	< 10	< 10	< 10	< 10
Aromatic >C35 - C44	mg/kg	< 10	NONE	< 10	< 10	< 10	< 10	< 10
Aromatic (>C5 - C44)	mg/kg	< 30	NONE	< 30	< 30	< 30	< 30	< 30
Total >C5 - C44	mg/kg	< 60	NONE	< 60	< 60	< 60	< 60	< 60

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C



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Soil Analysis Certificate - TPH LQM Banded						
QTS Environmental Report No: 17-62273	Date Sampled	25/07/17	26/07/17	25/07/17	26/07/17	
BRD Environmental Ltd	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	
Site Reference: Hedge End	TP / BH No	TP05	TP20	TP13	WS13	
Project / Job Ref: BRD2924	Additional Refs	J2	J2	J2	J2	
Order No: None Supplied	Depth (m)	0.80	0.70	0.70	0.80	
Reporting Date: 04/08/2017	QTSE Sample No	282410	282411	282412	282413	

Determinand	Unit	RL	Accreditation					
Aliphatic >C5 - C6	mg/kg	< 0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	
Aliphatic >C6 - C8	mg/kg	< 0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	
Aliphatic >C8 - C10	mg/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	
Aliphatic >C10 - C12	mg/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	
Aliphatic >C12 - C16	mg/kg	< 3	MCERTS	< 3	< 3	< 3	< 3	
Aliphatic >C16 - C35	mg/kg	< 10	MCERTS	< 10	< 10	< 10	< 10	
Aliphatic >C35 - C44	mg/kg	< 10	NONE	< 10	< 10	< 10	< 10	
Aliphatic (C5 - C44)	mg/kg	< 30	NONE	< 30	< 30	< 30	< 30	
Aromatic >C5 - C7	mg/kg	< 0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	
Aromatic >C7 - C8	mg/kg	< 0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	
Aromatic >C8 - C10	mg/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	
Aromatic >C10 - C12	mg/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	
Aromatic >C12 - C16	mg/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	
Aromatic >C16 - C21	mg/kg	< 3	MCERTS	< 3	< 3	< 3	< 3	
Aromatic >C21 - C35	mg/kg	< 10	MCERTS	< 10	< 10	< 10	< 10	
Aromatic >C35 - C44	mg/kg	< 10	NONE	< 10	< 10	< 10	< 10	
Aromatic (>C5 - C44)	mg/kg	< 30	NONE	< 30	< 30	< 30	< 30	
Total >C5 - C44	mg/kg	< 60	NONE	< 60	< 60	< 60	< 60	

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C



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Soil Analysis Certificate - BTEX / MTBE

QTS Environmental Report No: 17-62273	Date Sampled	24/07/17	24/07/17	25/07/17	25/07/17	24/07/17
BRD Environmental Ltd	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Hedge End	TP / BH No	WS05	WS06	TP10	WS09	TP02
Project / Job Ref: BRD2924	Additional Refs	J2	J2	J2	J2	J2
Order No: None Supplied	Depth (m)	0.75	0.80	0.80	0.80	0.60
Reporting Date: 04/08/2017	QTSE Sample No	282405	282406	282407	282408	282409

Determinand	Unit	RI	Accreditation					
Benzene	ug/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
Toluene	ug/kg	< 5	MCERTS	< 5	< 5	< 5	< 5	< 5
Ethylbenzene	ug/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
p & m-xylene	ug/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
o-xylene	ug/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
MTBE	ug/kg	< 5	MCERTS	< 5	< 5	< 5	< 5	< 5

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C



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Soil Analysis Certificate - BTEX / MTBE

QTS Environmental Report No: 17-62273	Date Sampled	25/07/17	26/07/17	25/07/17	26/07/17
BRD Environmental Ltd	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Hedge End	TP / BH No	TP05	TP20	TP13	WS13
Project / Job Ref: BRD2924	Additional Refs	J2	J2	J2	J2
Order No: None Supplied	Depth (m)	0.80	0.70	0.70	0.80
Reporting Date: 04/08/2017	QTSE Sample No	282410	282411	282412	282413

Determinand	Unit	RI	Accreditation					
Benzene	ug/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
Toluene	ug/kg	< 5	MCERTS	< 5	< 5	< 5	< 5	< 5
Ethylbenzene	ug/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
p & m-xylene	ug/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
o-xylene	ug/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
MTBE	ug/kg	< 5	MCERTS	< 5	< 5	< 5	< 5	< 5

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C



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Soil Analysis Certificate - Semi Volatile Organic Compounds (SVOC)

QTS Environmental Report No: 17-62273	Date Sampled	24/07/17	24/07/17	25/07/17	25/07/17
BRD Environmental Ltd	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Hedge End	TP / BH No	WS05	WS06	TP10	TP13
Project / Job Ref: BRD2924	Additional Refs	J2	J2	J2	J2
Order No: None Supplied	Depth (m)	0.75	0.80	0.80	0.70
Reporting Date: 04/08/2017	QTSE Sample No	282405	282406	282407	282412

Determinand	Unit	RI	Accreditation				
Phenol	mg/kg	< 0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1
1,2,4-Trichlorobenzene	mg/kg	< 0.1	ISO17025	< 0.1	< 0.1	< 0.1	< 0.1
2-Nitrophenol	mg/kg	< 0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1
Nitrobenzene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1
0-Cresol	mg/kg	< 0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1
bis(2-chloroethoxy)methane	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1
bis(2-chloroethyl)ether	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1
2,4-Dichlorophenol	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1
2-Chlorophenol	mg/kg	< 0.1	ISO17025	< 0.1	< 0.1	< 0.1	< 0.1
1,3-Dichlorobenzene	mg/kg	< 0.1	ISO17025	< 0.1	< 0.1	< 0.1	< 0.1
1,4-Dichlorobenzene	mg/kg	< 0.1	ISO17025	< 0.1	< 0.1	< 0.1	< 0.1
1,2-Dichlorobenzene	mg/kg	< 0.1	ISO17025	< 0.1	< 0.1	< 0.1	< 0.1
2,4-Dimethylphenol	mg/kg	< 0.15	ISO17025	< 0.15	< 0.15	< 0.15	< 0.15
Isophorone	mg/kg	< 0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1
Hexachloroethane	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1
p-Cresol	mg/kg	< 0.15	MCERTS	< 0.15	< 0.15	< 0.15	< 0.15
2,4,6-Trichlorophenol	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1
2,4,5-Trichlorophenol	mg/kg	< 0.15	MCERTS	< 0.15	< 0.15	< 0.15	< 0.15
2-Nitroaniline	mg/kg	< 0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1
4-Chloro-3-methylphenol	mg/kg	< 0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1
2-Methylnaphthalene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1
Hexachlorocyclopentadiene	mg/kg	< 0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1
Hexachlorobutadiene	mg/kg	< 0.1	ISO17025	< 0.1	< 0.1	< 0.1	< 0.1
2,6-Dinitrotoluene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1
Dimethyl phthalate	mg/kg	< 0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1
2-Chloronaphthalene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1
4-Chloroaniline	mg/kg	< 0.15	NONE	< 0.15	< 0.15	< 0.15	< 0.15
4-Nitrophenol	mg/kg	< 0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1
4-Chlorophenyl phenyl ether	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1
3-Nitroaniline	mg/kg	< 0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1
4-Nitroaniline	mg/kg	< 0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1
4-Bromophenyl phenyl ether	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1
Hexachlorobenzene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1
2,4-Dinitrotoluene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1
Diethyl phthalate	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1
Dibenzofuran	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1
Azobenzene	mg/kg	< 0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1
Dibutyl phthalate	mg/kg	< 0.1	ISO17025	< 0.1	< 0.1	< 0.1	< 0.1
Carbazole	mg/kg	< 0.1	ISO17025	< 0.1	< 0.1	< 0.1	< 0.1
bis(2-ethylhexyl)phthalate	mg/kg	< 0.15	MCERTS	< 0.15	< 0.15	< 0.15	< 0.15
Benzyl butyl phthalate	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1
Di-n-octyl phthalate	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C



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Soil Analysis Certificate - Organochlorine Pesticides

QTS Environmental Report No: 17-62273	Date Sampled	24/07/17	24/07/17	25/07/17	25/07/17	25/07/17
BRD Environmental Ltd	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Hedge End	TP / BH No	WS02	TP07	TP09	WS11	TP15
Project / Job Ref: BRD2924	Additional Refs	J1	J1	J1	J1	J1
Order No: None Supplied	Depth (m)	0.30	0.30	0.20	0.10	0.10
Reporting Date: 04/08/2017	QTSE Sample No	282378	282386	282388	282395	282403

Determinand	Unit	RI	Accreditation					
Aldrin	mg/kg	< 0.02	NONE	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
alpha-HCH	mg/kg	< 0.02	NONE	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
beta-HCH	mg/kg	< 0.02	NONE	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
cis-chlordane	mg/kg	< 0.02	NONE	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
delta-HCH	mg/kg	< 0.02	NONE	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Dieldrin	mg/kg	< 0.02	NONE	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Endosulfan A	mg/kg	< 0.02	NONE	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Endosulfan B	mg/kg	< 0.02	NONE	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Endrin	mg/kg	< 0.02	NONE	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
gamma-HCH (Lindane)	mg/kg	< 0.02	NONE	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Heptachlor	mg/kg	< 0.02	NONE	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Heptachlor epoxide	mg/kg	< 0.02	NONE	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Hexachlorobenzene (HCB)	mg/kg	< 0.02	NONE	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Isodrin	mg/kg	< 0.02	NONE	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Methoxychlor	mg/kg	< 0.02	NONE	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
o,p' - DDD	mg/kg	< 0.02	NONE	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
o,p' - DDE	mg/kg	< 0.02	NONE	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
o,p' - DDT	mg/kg	< 0.02	NONE	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
p,p' - DDD	mg/kg	< 0.02	NONE	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
p,p' - DDE	mg/kg	< 0.02	NONE	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
p,p' - DDT	mg/kg	< 0.02	NONE	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
trans-chlordane	mg/kg	< 0.02	NONE	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Trifluralin	mg/kg	< 0.02	NONE	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C



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Soil Analysis Certificate - Sample Descriptions	
QTS Environmental Report No: 17-62273	
BRD Environmental Ltd	
Site Reference: Hedge End	
Project / Job Ref: BRD2924	
Order No: None Supplied	
Reporting Date: 04/08/2017	

QTSE Sample No	TP / BH No	Additional Refs	Depth (m)	Moisture Content (%)	Sample Matrix Description
282375	WS01	J1	0.20	15.8	Brown sandy clay
282376	TP01	J1	0.20	12.9	Brown sandy clay with stones
282377	TP02	J1	0.10	20.8	Brown sandy clay with stones
282378	WS02	J1	0.30	17.1	Brown sandy clay with vegetation
282379	TP03	J1	0.30	15.9	Brown sandy clay with vegetation
282380	TP05	J1	0.30	16.3	Brown sandy clay with vegetation
282381	WS05	J1	0.10	13.2	Black sandy clay with stones and concrete
282382	WS06	J1	0.20	14.8	Black sandy clay with stones
282383	WS03	J1	0.15	15	Brown sandy clay with vegetation
282384	WS04	J1	0.15	14.9	Brown sandy clay with vegetation
282385	TP06	J1	0.15	26.3	Brown sandy clay with vegetation
282386	TP07	J1	0.30	12.2	Brown sandy clay with stones
282387	WS08	J1	0.20	14.6	Brown sandy clay with vegetation
282388	TP09	J1	0.20	19.2	Brown sandy clay with vegetation
282389	TP10	J1	0.15	19	Brown sandy clay with vegetation
282390	WS07	J1	0.15	11.7	Brown sandy clay with stones and vegetation
282391	WS09	J1	0.15	15.7	Brown sandy clay with vegetation
282392	WS10	J1	0.10	13.2	Brown sandy clay with vegetation
282393	TP20	J1	0.20	15.1	Brown sandy clay
282394	TP21	J1	0.10	20.9	Brown sandy clay with vegetation
282395	WS11	J1	0.10	15.4	Brown sandy clay with vegetation
282396	WS12	J1	0.15	7.1	Brown sandy clay with vegetation
282397	TP13	J1	0.20	11.9	Brown sandy clay with vegetation
282398	TP23	J1	0.20	11.9	Brown sandy clay with vegetation
282399	TP24	J1	0.30	14.9	Brown sandy clay with stones and vegetation
282400	TP17	J1	0.10	15	Brown sandy clay with vegetation
282401	TP18	J1	0.20	12.1	Brown sandy clay with vegetation
282402	TP16	J1	0.10	17.8	Brown sandy clay with vegetation
282403	TP15	J1	0.10	21.1	Brown sandy clay with vegetation
282404	WS14	J1	0.10	14	Brown sandy clay with vegetation and stones
282405	WS05	J2	0.75	17	Green clay with stones
282406	WS06	J2	0.80	19.2	Brown clay
282407	TP10	J2	0.80	15	Green sandy clay
282408	WS09	J2	0.80	22	Red sandy clay with vegetation
282409	TP02	J2	0.60	13.6	Brown sandy clay
282410	TP05	J2	0.80	22.5	Brown sandy clay with vegetation
282411	TP20	J2	0.70	12.5	Green sandy clay
282412	TP13	J2	0.70	18.7	Orange clay
282413	WS13	J2	0.80	19.7	Green sandy clay

Moisture content is part of procedure E003 & is not an accredited test

Insufficient Sample ^{1/5}

Unsuitable Sample ^{4/5}



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Soil Analysis Certificate - Methodology & Miscellaneous Information

QTS Environmental Report No: 17-62273

BRD Environmental Ltd

Site Reference: Hedge End

Project / Job Ref: BRD2924

Order No: None Supplied

Reporting Date: 04/08/2017

Matrix	Analysed On	Determinand	Brief Method Description	Method No
Soil	D	Boron - Water Soluble	Determination of water soluble boron in soil by 2:1 hot water extract followed by ICP-OES	E012
Soil	AR	BTEX	Determination of BTEX by headspace GC-MS	E001
Soil	D	Cations	Determination of cations in soil by aqua-regia digestion followed by ICP-OES	E002
Soil	D	Chloride - Water Soluble (2:1)	Determination of chloride by extraction with water & analysed by ion chromatography	E009
Soil	AR	Chromium - Hexavalent	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry	E016
Soil	AR	Cyanide - Complex	Determination of complex cyanide by distillation followed by colorimetry	E015
Soil	AR	Cyanide - Free	Determination of free cyanide by distillation followed by colorimetry	E015
Soil	AR	Cyanide - Total	Determination of total cyanide by distillation followed by colorimetry	E015
Soil	D	Cyclohexane Extractable Matter (CEM)	Gravimetrically determined through extraction with cyclohexane	E011
Soil	AR	Diesel Range Organics (C10 - C24)	Determination of hexane/acetone extractable hydrocarbons by GC-FID	E004
Soil	AR	Electrical Conductivity	Determination of electrical conductivity by addition of saturated calcium sulphate followed by electrometric measurement	E022
Soil	AR	Electrical Conductivity	Determination of electrical conductivity by addition of water followed by electrometric measurement	E023
Soil	D	Elemental Sulphur	Determination of elemental sulphur by solvent extraction followed by GC-MS	E020
Soil	AR	EPH (C10 - C40)	Determination of acetone/hexane extractable hydrocarbons by GC-FID	E004
Soil	AR	EPH Product ID	Determination of acetone/hexane extractable hydrocarbons by GC-FID	E004
Soil	AR	EPH TEXAS (C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C40)	Determination of acetone/hexane extractable hydrocarbons by GC-FID for C8 to C40. C6 to C8 by headspace GC-MS	E004
Soil	D	Fluoride - Water Soluble	Determination of Fluoride by extraction with water & analysed by ion chromatography	E009
Soil	D	FOC (Fraction Organic Carbon)	Determination of fraction of organic carbon by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	D	Loss on Ignition @ 450oC	Determination of loss on ignition in soil by gravimetrically with the sample being ignited in a muffle furnace	E019
Soil	D	Magnesium - Water Soluble	Determination of water soluble magnesium by extraction with water followed by ICP-OES	E025
Soil	D	Metals	Determination of metals by aqua-regia digestion followed by ICP-OES	E002
Soil	AR	Mineral Oil (C10 - C40)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge	E004
Soil	AR	Moisture Content	Moisture content; determined gravimetrically	E003
Soil	D	Nitrate - Water Soluble (2:1)	Determination of nitrate by extraction with water & analysed by ion chromatography	E009
Soil	D	Organic Matter	Determination of organic matter by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	AR	PAH - Speciated (EPA 16)	Determination of PAH compounds by extraction in acetone and hexane followed by GC-MS with the use of surrogate and internal standards	E005
Soil	AR	PCB - 7 Congeners	Determination of PCB by extraction with acetone and hexane followed by GC-MS	E008
Soil	D	Petroleum Ether Extract (PEE)	Gravimetrically determined through extraction with petroleum ether	E011
Soil	AR	pH	Determination of pH by addition of water followed by electrometric measurement	E007
Soil	AR	Phenols - Total (monohydric)	Determination of phenols by distillation followed by colorimetry	E021
Soil	D	Phosphate - Water Soluble (2:1)	Determination of phosphate by extraction with water & analysed by ion chromatography	E009
Soil	D	Sulphate (as SO4) - Total	Determination of total sulphate by extraction with 10% HCl followed by ICP-OES	E013
Soil	D	Sulphate (as SO4) - Water Soluble (2:1)	Determination of sulphate by extraction with water & analysed by ion chromatography	E009
Soil	D	Sulphate (as SO4) - Water Soluble (2:1)	Determination of water soluble sulphate by extraction with water followed by ICP-OES	E014
Soil	AR	Sulphide	Determination of sulphide by distillation followed by colorimetry	E018
Soil	D	Sulphur - Total	Determination of total sulphur by extraction with aqua-regia followed by ICP-OES	E024
Soil	AR	SVOC	Determination of semi-volatile organic compounds by extraction in acetone and hexane followed by GC-MS	E006
Soil	AR	Thiocyanate (as SCN)	Determination of thiocyanate by extraction in caustic soda followed by acidification followed by addition of ferric nitrate followed by colorimetry	E017
Soil	D	Toluene Extractable Matter (TEM)	Gravimetrically determined through extraction with toluene	E011
Soil	D	Total Organic Carbon (TOC)	Determination of organic matter by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	AR	TPH CWG (ali: C5- C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C34, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge for C8 to C35. C5 to C8 by headspace GC-MS	E004
Soil	AR	TPH LQM (ali: C5-C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C35, C35-C44, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35, C35-C44)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge for C8 to C44. C5 to C8 by headspace GC-MS	E004
Soil	AR	VOCs	Determination of volatile organic compounds by headspace GC-MS	E001
Soil	AR	VPH (C6-C8 & C8-C10)	Determination of hydrocarbons C6-C8 by headspace GC-MS & C8-C10 by GC-FID	E001

D Dried
AR As Received



Ana Leon
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[Redacted]

QTS Environmental Report No: 17-62339

Site Reference: Hedge End

Project / Job Ref: BRD2924

Order No: None Supplied

Sample Receipt Date: 31/07/2017

Sample Scheduled Date: 31/07/2017

Report Issue Number: 1

Reporting Date: 04/08/2017

Authorised by:

[Redacted]
Kevin Old
Associate Director of Laboratory

Authorised by:

[Redacted]
Russell Jarvis
Associate Director of Client Services

QTSE is the trading name of DETS Ltd, company registration number 03705645



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Soil Analysis Certificate						
QTS Environmental Report No: 17-62339	Date Sampled	24/07/17	26/07/17	24/07/17	25/07/17	25/07/17
BRD Environmental Ltd	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Hedge End	TP / BH No	TP03	TP21	WS02	WS07	TP14
Project / Job Ref: BRD2924	Additional Refs	B1	D1	D2	D2	D2
Order No: None Supplied	Depth (m)	0.90	1.00	1.60	1.70	2.00
Reporting Date: 04/08/2017	QTSE Sample No	282670	282671	282672	282673	282674

Determinand	Unit	RI	Accreditation					
pH	pH Units	N/a	MCERTS	7.0	6.5	4.7	7.3	4.7
Total Sulphate as SO ₄	mg/kg	< 200	NONE	< 200	< 200	530	< 200	255
Total Sulphate as SO ₄	%	< 0.02	NONE	< 0.02	< 0.02	0.05	< 0.02	0.03
W/S Sulphate as SO ₄ (2:1)	mg/l	< 10	MCERTS	40	18	43	24	28
W/S Sulphate as SO ₄ (2:1)	g/l	< 0.01	MCERTS	0.04	0.02	0.04	0.02	0.03
Total Sulphur	%	< 0.02	NONE	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C

Analysis carried out on the dried sample is corrected for the stone content

Subcontracted analysis ⁽⁵⁾



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Soil Analysis Certificate						
QTS Environmental Report No: 17-62339	Date Sampled	24/07/17	26/07/17	26/07/17	24/07/17	24/07/17
BRD Environmental Ltd	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Hedge End	TP / BH No	TP04	TP20	WS13	WS06	WS01
Project / Job Ref: BRD2924	Additional Refs	D1	B3	D3	D4	D5
Order No: None Supplied	Depth (m)	2.20	2.60	2.60	3.80	4.60
Reporting Date: 04/08/2017	QTSE Sample No	282675	282676	282677	282678	282679

Determinand	Unit	RI	Accreditation					
pH	pH Units	N/a	MCERTS	4.4	6.5	4.9	4.4	6.0
Total Sulphate as SO ₄	mg/kg	< 200	NONE	628	1567	560	3145	1027
Total Sulphate as SO ₄	%	< 0.02	NONE	0.06	0.16	0.06	0.31	0.10
W/S Sulphate as SO ₄ (2:1)	mg/l	< 10	MCERTS	53	191	40	316	73
W/S Sulphate as SO ₄ (2:1)	g/l	< 0.01	MCERTS	0.05	0.19	0.04	0.32	0.07
Total Sulphur	%	< 0.02	NONE	0.02	1.24	0.06	0.62	0.77

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C

Analysis carried out on the dried sample is corrected for the stone content

Subcontracted analysis ⁽⁵⁾



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Soil Analysis Certificate - Sample Descriptions

QTS Environmental Report No: 17-62339

BRD Environmental Ltd

Site Reference: Hedge End

Project / Job Ref: BRD2924

Order No: None Supplied

Reporting Date: 04/08/2017

QTSE Sample No	TP / BH No	Additional Refs	Depth (m)	Moisture Content (%)	Sample Matrix Description
282670	TP03	B1	0.90	17.6	Orange clay
282671	TP21	D1	1.00	21.8	Light grey sandy clay
282672	WS02	D2	1.60	21.3	Light brown clay
282673	WS07	D2	1.70	19.9	Blue sandy clay with vegetation
282674	TP14	D2	2.00	18.5	Orange sandy clay
282675	TP04	D1	2.20	18.4	Brown clay
282676	TP20	B3	2.60	17	Black sandy clay
282677	WS13	D3	2.60	17.8	Brown clay
282678	WS06	D4	3.80	26.6	Brown clay
282679	WS01	D5	4.60	15.5	Brown clay

Moisture content is part of procedure E003 & is not an accredited test

Insufficient Sample ^{1/5}

Unsuitable Sample ^{u/s}



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Soil Analysis Certificate - Methodology & Miscellaneous Information

QTS Environmental Report No: 17-62339

BRD Environmental Ltd

Site Reference: Hedge End

Project / Job Ref: BRD2924

Order No: None Supplied

Reporting Date: 04/08/2017

Matrix	Analysed On	Determinand	Brief Method Description	Method No
Soil	D	Boron - Water Soluble	Determination of water soluble boron in soil by 2:1 hot water extract followed by ICP-OES	E012
Soil	AR	BTEX	Determination of BTEX by headspace GC-MS	E001
Soil	D	Cations	Determination of cations in soil by aqua-regia digestion followed by ICP-OES	E002
Soil	D	Chloride - Water Soluble (2:1)	Determination of chloride by extraction with water & analysed by ion chromatography	E009
Soil	AR	Chromium - Hexavalent	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry	E016
Soil	AR	Cyanide - Complex	Determination of complex cyanide by distillation followed by colorimetry	E015
Soil	AR	Cyanide - Free	Determination of free cyanide by distillation followed by colorimetry	E015
Soil	AR	Cyanide - Total	Determination of total cyanide by distillation followed by colorimetry	E015
Soil	D	Cyclohexane Extractable Matter (CEM)	Gravimetrically determined through extraction with cyclohexane	E011
Soil	AR	Diesel Range Organics (C10 - C24)	Determination of hexane/acetone extractable hydrocarbons by GC-FID	E004
Soil	AR	Electrical Conductivity	Determination of electrical conductivity by addition of saturated calcium sulphate followed by electrometric measurement	E022
Soil	AR	Electrical Conductivity	Determination of electrical conductivity by addition of water followed by electrometric measurement	E023
Soil	D	Elemental Sulphur	Determination of elemental sulphur by solvent extraction followed by GC-MS	E020
Soil	AR	EPH (C10 - C40)	Determination of acetone/hexane extractable hydrocarbons by GC-FID	E004
Soil	AR	EPH Product ID	Determination of acetone/hexane extractable hydrocarbons by GC-FID	E004
Soil	AR	EPH TEXAS (C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C40)	Determination of acetone/hexane extractable hydrocarbons by GC-FID for C8 to C40. C6 to C8 by headspace GC-MS	E004
Soil	D	Fluoride - Water Soluble	Determination of Fluoride by extraction with water & analysed by ion chromatography	E009
Soil	D	FOC (Fraction Organic Carbon)	Determination of fraction of organic carbon by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	D	Loss on Ignition @ 450oC	Determination of loss on ignition in soil by gravimetrically with the sample being ignited in a muffle furnace	E019
Soil	D	Magnesium - Water Soluble	Determination of water soluble magnesium by extraction with water followed by ICP-OES	E025
Soil	D	Metals	Determination of metals by aqua-regia digestion followed by ICP-OES	E002
Soil	AR	Mineral Oil (C10 - C40)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge	E004
Soil	AR	Moisture Content	Moisture content; determined gravimetrically	E003
Soil	D	Nitrate - Water Soluble (2:1)	Determination of nitrate by extraction with water & analysed by ion chromatography	E009
Soil	D	Organic Matter	Determination of organic matter by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	AR	PAH - Speciated (EPA 16)	Determination of PAH compounds by extraction in acetone and hexane followed by GC-MS with the use of surrogate and internal standards	E005
Soil	AR	PCB - 7 Congeners	Determination of PCB by extraction with acetone and hexane followed by GC-MS	E008
Soil	D	Petroleum Ether Extract (PEE)	Gravimetrically determined through extraction with petroleum ether	E011
Soil	AR	pH	Determination of pH by addition of water followed by electrometric measurement	E007
Soil	AR	Phenols - Total (monohydric)	Determination of phenols by distillation followed by colorimetry	E021
Soil	D	Phosphate - Water Soluble (2:1)	Determination of phosphate by extraction with water & analysed by ion chromatography	E009
Soil	D	Sulphate (as SO4) - Total	Determination of total sulphate by extraction with 10% HCl followed by ICP-OES	E013
Soil	D	Sulphate (as SO4) - Water Soluble (2:1)	Determination of sulphate by extraction with water & analysed by ion chromatography	E009
Soil	D	Sulphate (as SO4) - Water Soluble (2:1)	Determination of water soluble sulphate by extraction with water followed by ICP-OES	E014
Soil	AR	Sulphide	Determination of sulphide by distillation followed by colorimetry	E018
Soil	D	Sulphur - Total	Determination of total sulphur by extraction with aqua-regia followed by ICP-OES	E024
Soil	AR	SVOC	Determination of semi-volatile organic compounds by extraction in acetone and hexane followed by GC-MS	E006
Soil	AR	Thiocyanate (as SCN)	Determination of thiocyanate by extraction in caustic soda followed by acidification followed by addition of ferric nitrate followed by colorimetry	E017
Soil	D	Toluene Extractable Matter (TEM)	Gravimetrically determined through extraction with toluene	E011
Soil	D	Total Organic Carbon (TOC)	Determination of organic matter by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	AR	TPH CWG (ali: C5- C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C34, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge for C8 to C35. C5 to C8 by headspace GC-MS	E004
Soil	AR	TPH LQM (ali: C5-C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C35, C35-C44, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35, C35-C44)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge for C8 to C44. C5 to C8 by headspace GC-MS	E004
Soil	AR	VOCs	Determination of volatile organic compounds by headspace GC-MS	E001
Soil	AR	VPH (C6-C8 & C8-C10)	Determination of hydrocarbons C6-C8 by headspace GC-MS & C8-C10 by GC-FID	E001

D Dried
AR As Received



Ana Leon
BRD Environmental Ltd
Hawthorne Villa
1 Old Parr Road
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OX16 5HT



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[Redacted]

QTS Environmental Report No: 17-63665

Site Reference: Hedge End

Project / Job Ref: BRD2924

Order No: None Supplied

Sample Receipt Date: 28/07/2017

Sample Scheduled Date: 30/08/2017

Report Issue Number: 1

Reporting Date: 05/09/2017

Authorised by:

[Redacted]
Kevin Old
Associate Director of Laboratory

Authorised by:

[Redacted]
Russell Jarvis
Associate Director of Client Services

QTSE is the trading name of DETS Ltd, company registration number 03705645



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Waste Acceptance Criteria Analytical Certificate - BS EN 12457/3

QTS Environmental Report No: 17-63665		Date Sampled	24/07/17					Landfill Waste Acceptance Criteria Limits		
BRD Environmental Ltd		Time Sampled	None Supplied					Inert Waste Landfill	Stable Non-reactive HAZARDOUS waste in non-hazardous Landfill	Hazardous Waste Landfill
Site Reference: Hedge End		TP / BH No	TP02							
Project / Job Ref: BRD2924		Additional Refs	J2							
Order No: None Supplied		Depth (m)	0.60							
Reporting Date: 05/09/2017		QTSE Sample No	288212							
Determinand	Unit	MDL								
TOC ^{MU}	%	< 0.1	0.2							
Loss on Ignition	%	< 0.01	1.40							
BTEX ^{MU}	mg/kg	< 0.05	< 0.05							
Sum of PCBs	mg/kg	< 0.1	< 0.1							
Mineral Oil ^{MU}	mg/kg	< 10	< 10							
Total PAH ^{MU}	mg/kg	< 1.7	< 1.7							
pH ^{MU}	pH Units	N/a	7.3							
Acid Neutralisation Capacity		mol/kg (+/-)	< 1					3%	5%	6%
								--	--	10%
								6	--	--
								1	--	--
								500	--	--
								100	--	--
								--	>6	--
								--	To be evaluated	To be evaluated
Eluate Analysis			2:1 mg/l	8:1 mg/l		Cumulative 10:1 mg/kg	Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg (mg/kg)			
Arsenic ^U			< 0.01	< 0.01		< 0.2	0.5	2	25	
Barium ^U			< 0.02	< 0.02		< 0.1	20	100	300	
Cadmium ^U			< 0.0005	< 0.0005		< 0.02	0.04	1	5	
Chromium ^U			< 0.005	< 0.005		< 0.20	0.5	10	70	
Copper ^U			< 0.01	< 0.01		< 0.5	2	50	100	
Mercury ^U			< 0.005	< 0.005		< 0.01	0.01	0.2	2	
Molybdenum ^U			< 0.001	< 0.001		< 0.1	0.5	10	30	
Nickel ^U			< 0.007	< 0.007		< 0.2	0.4	10	40	
Lead ^U			< 0.005	< 0.005		< 0.2	0.5	10	50	
Antimony ^U			< 0.005	< 0.005		< 0.06	0.06	0.7	5	
Selenium ^U			< 0.005	< 0.005		< 0.1	0.1	0.5	7	
Zinc ^U			0.007	< 0.005		< 0.2	4	50	200	
Chloride ^U			9	3		32	800	15000	25000	
Fluoride ^U			< 0.5	< 0.5		< 1	10	150	500	
Sulphate ^U			4	1		< 20	1000	20000	50000	
TDS			34	12		139	4000	60000	100000	
Phenol Index			< 0.01	< 0.01		< 0.5	1	-	-	
DOC	4.9	3.4		34.9	500	800	1000			
Leach Test Information										
Sample Mass (kg)			0.20							
Dry Matter (%)			87.4							
Moisture (%)			14.6							
Stage 1										
Volume Eluate L2 (litres)			0.33							
Filtered Eluate VE1 (litres)			0.15							

Results are expressed on a dry weight basis, after correction for moisture content where applicable
 Stated limits are for guidance only and QTS Environmental cannot be held responsible for any discrepancies with current legislation
 M Denotes MCERTS accredited test
 U Denotes ISO17025 accredited test



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Waste Acceptance Criteria Analytical Certificate - BS EN 12457/3

QTS Environmental Report No: 17-63665		Date Sampled	24/07/17					Landfill Waste Acceptance Criteria Limits		
BRD Environmental Ltd		Time Sampled	None Supplied					Inert Waste Landfill	Stable Non-reactive HAZARDOUS waste in non-hazardous Landfill	Hazardous Waste Landfill
Site Reference: Hedge End		TP / BH No	TP13							
Project / Job Ref: BRD2924		Additional Refs	J2							
Order No: None Supplied		Depth (m)	0.70							
Reporting Date: 05/09/2017		QTSE Sample No	288213							
Determinand	Unit	MDL								
TOC ^{MU}	%	< 0.1	0.4					3%	5%	6%
Loss on Ignition	%	< 0.01	2.30					--	--	10%
BTEX ^{MU}	mg/kg	< 0.05	< 0.05					6	--	--
Sum of PCBs	mg/kg	< 0.1	< 0.1		1	--	--			
Mineral Oil ^{MU}	mg/kg	< 10	< 10		500	--	--			
Total PAH ^{MU}	mg/kg	< 1.7	< 1.7		100	--	--			
pH ^{MU}	pH Units	N/a	7.0		--	>6	--			
Acid Neutralisation Capacity		mol/kg (+/-)	< 1		--	To be evaluated	To be evaluated			
Eluate Analysis			2:1 mg/l	8:1 mg/l		Cumulative 10:1 mg/kg	Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg (mg/kg)			
Arsenic ^U			< 0.01	< 0.01		< 0.2	0.5	2	25	
Barium ^U			< 0.02	< 0.02		< 0.1	20	100	300	
Cadmium ^U			< 0.0005	< 0.0005		< 0.02	0.04	1	5	
Chromium ^U			< 0.005	< 0.005		< 0.20	0.5	10	70	
Copper ^U			< 0.01	< 0.01		< 0.5	2	50	100	
Mercury ^U			< 0.005	< 0.005		< 0.01	0.01	0.2	2	
Molybdenum ^U			< 0.001	< 0.001		< 0.1	0.5	10	30	
Nickel ^U			< 0.007	< 0.007		< 0.2	0.4	10	40	
Lead ^U			< 0.005	< 0.005		< 0.2	0.5	10	50	
Antimony ^U			< 0.005	< 0.005		< 0.06	0.06	0.7	5	
Selenium ^U			< 0.005	< 0.005		< 0.1	0.1	0.5	7	
Zinc ^U			0.016	< 0.005		< 0.2	4	50	200	
Chloride ^U			5	4		37	800	15000	25000	
Fluoride ^U			< 0.5	< 0.5		< 1	10	150	500	
Sulphate ^U			4	1		< 20	1000	20000	50000	
TDS			28	12		127	4000	60000	100000	
Phenol Index			< 0.01	< 0.01		< 0.5	1	-	-	
DOC			9.1	4.8		50	500	800	1000	
Leach Test Information										
Sample Mass (kg)			0.21							
Dry Matter (%)			82.2							
Moisture (%)			21.8							
Stage 1										
Volume Eluate L2 (litres)			0.31							
Filtered Eluate VE1 (litres)			0.08							

Results are expressed on a dry weight basis, after correction for moisture content where applicable
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Soil Analysis Certificate - Sample Descriptions

QTS Environmental Report No: 17-63665

BRD Environmental Ltd

Site Reference: Hedge End

Project / Job Ref: BRD2924

Order No: None Supplied

Reporting Date: 05/09/2017

QTSE Sample No	TP / BH No	Additional Refs	Depth (m)	Moisture Content (%)	Sample Matrix Description
\$ 288212	TP02	J2	0.60	12.6	Brown sandy clay
\$ 288213	TP13	J2	0.70	17.8	Orange clay

Moisture content is part of procedure E003 & is not an accredited test

Insufficient Sample ^{1/5}

Unsuitable Sample ^{u/5}

\$ samples exceeded recommended holding times



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Soil Analysis Certificate - Methodology & Miscellaneous Information

QTS Environmental Report No: 17-63665

BRD Environmental Ltd

Site Reference: Hedge End

Project / Job Ref: BRD2924

Order No: None Supplied

Reporting Date: 05/09/2017

Matrix	Analysed On	Determinand	Brief Method Description	Method No
Soil	D	Boron - Water Soluble	Determination of water soluble boron in soil by 2:1 hot water extract followed by ICP-OES	E012
Soil	AR	BTEX	Determination of BTEX by headspace GC-MS	E001
Soil	D	Cations	Determination of cations in soil by aqua-regia digestion followed by ICP-OES	E002
Soil	D	Chloride - Water Soluble (2:1)	Determination of chloride by extraction with water & analysed by ion chromatography	E009
Soil	AR	Chromium - Hexavalent	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry	E016
Soil	AR	Cyanide - Complex	Determination of complex cyanide by distillation followed by colorimetry	E015
Soil	AR	Cyanide - Free	Determination of free cyanide by distillation followed by colorimetry	E015
Soil	AR	Cyanide - Total	Determination of total cyanide by distillation followed by colorimetry	E015
Soil	D	Cyclohexane Extractable Matter (CEM)	Gravimetrically determined through extraction with cyclohexane	E011
Soil	AR	Diesel Range Organics (C10 - C24)	Determination of hexane/acetone extractable hydrocarbons by GC-FID	E004
Soil	AR	Electrical Conductivity	Determination of electrical conductivity by addition of saturated calcium sulphate followed by electrometric measurement	E022
Soil	AR	Electrical Conductivity	Determination of electrical conductivity by addition of water followed by electrometric measurement	E023
Soil	D	Elemental Sulphur	Determination of elemental sulphur by solvent extraction followed by GC-MS	E020
Soil	AR	EPH (C10 - C40)	Determination of acetone/hexane extractable hydrocarbons by GC-FID	E004
Soil	AR	EPH Product ID	Determination of acetone/hexane extractable hydrocarbons by GC-FID	E004
Soil	AR	EPH TEXAS (C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C40)	Determination of acetone/hexane extractable hydrocarbons by GC-FID for C8 to C40. C6 to C8 by headspace GC-MS	E004
Soil	D	Fluoride - Water Soluble	Determination of Fluoride by extraction with water & analysed by ion chromatography	E009
Soil	D	FOC (Fraction Organic Carbon)	Determination of fraction of organic carbon by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	D	Loss on Ignition @ 450oC	Determination of loss on ignition in soil by gravimetrically with the sample being ignited in a muffle furnace	E019
Soil	D	Magnesium - Water Soluble	Determination of water soluble magnesium by extraction with water followed by ICP-OES	E025
Soil	D	Metals	Determination of metals by aqua-regia digestion followed by ICP-OES	E002
Soil	AR	Mineral Oil (C10 - C40)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge	E004
Soil	AR	Moisture Content	Moisture content; determined gravimetrically	E003
Soil	D	Nitrate - Water Soluble (2:1)	Determination of nitrate by extraction with water & analysed by ion chromatography	E009
Soil	D	Organic Matter	Determination of organic matter by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	AR	PAH - Speciated (EPA 16)	Determination of PAH compounds by extraction in acetone and hexane followed by GC-MS with the use of surrogate and internal standards	E005
Soil	AR	PCB - 7 Congeners	Determination of PCB by extraction with acetone and hexane followed by GC-MS	E008
Soil	D	Petroleum Ether Extract (PEE)	Gravimetrically determined through extraction with petroleum ether	E011
Soil	AR	pH	Determination of pH by addition of water followed by electrometric measurement	E007
Soil	AR	Phenols - Total (monohydric)	Determination of phenols by distillation followed by colorimetry	E021
Soil	D	Phosphate - Water Soluble (2:1)	Determination of phosphate by extraction with water & analysed by ion chromatography	E009
Soil	D	Sulphate (as SO4) - Total	Determination of total sulphate by extraction with 10% HCl followed by ICP-OES	E013
Soil	D	Sulphate (as SO4) - Water Soluble (2:1)	Determination of sulphate by extraction with water & analysed by ion chromatography	E009
Soil	D	Sulphate (as SO4) - Water Soluble (2:1)	Determination of water soluble sulphate by extraction with water followed by ICP-OES	E014
Soil	AR	Sulphide	Determination of sulphide by distillation followed by colorimetry	E018
Soil	D	Sulphur - Total	Determination of total sulphur by extraction with aqua-regia followed by ICP-OES	E024
Soil	AR	SVOC	Determination of semi-volatile organic compounds by extraction in acetone and hexane followed by GC-MS	E006
Soil	AR	Thiocyanate (as SCN)	Determination of thiocyanate by extraction in caustic soda followed by acidification followed by addition of ferric nitrate followed by colorimetry	E017
Soil	D	Toluene Extractable Matter (TEM)	Gravimetrically determined through extraction with toluene	E011
Soil	D	Total Organic Carbon (TOC)	Determination of organic matter by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	AR	TPH CWG (ali: C5- C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C34, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge for C8 to C35. C5 to C8 by headspace GC-MS	E004
Soil	AR	TPH LQM (ali: C5-C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C35, C35-C44, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35, C35-C44)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge for C8 to C44. C5 to C8 by headspace GC-MS	E004
Soil	AR	VOCs	Determination of volatile organic compounds by headspace GC-MS	E001
Soil	AR	VPH (C6-C8 & C8-C10)	Determination of hydrocarbons C6-C8 by headspace GC-MS & C8-C10 by GC-FID	E001

D Dried
AR As Received



TEST REPORT
ISSUED BY SOIL PROPERTY TESTING LTD
DATE ISSUED: 15/08/2017



0998

Contract	Hedge End
Serial No.	S31515
Client:	Soil Property Testing Ltd 15, 16, 18 Halcyon Court, St Margaret's Way, Stukeley Meadows, Huntingdon, Cambridgeshire, PE29 6DG Tel: 01480 455579 Email: enquiries@soilpropertytesting.com Website: www.soilpropertytesting.com
BRD Environmental Ltd BRD Environmental Ltd Hawthorne Villa 1 Old Parr Road Banbury Oxfordshire OX16 5HT	
Samples Submitted By: BRD Environmental Ltd	Approved Signatories:
Samples Labelled: Hedge End	☒ J.C. Garner B.Eng (Hons) FGS Technical Director ☐ S.P. Townend FGS Quality Manager ☐ W. Johnstone Materials Lab Manager ☐ D. Sabnis Operations Manager 
Date Received: 31/07/2017	Samples Tested Between: 31/07/2017 and 15/08/2017
Remarks: For the attention of Ana Leon-Gomez Your reference: BRD2924	
Notes: 1 All remaining samples or remnants from this contract will be disposed of after 21 days from today, unless we are notified to the contrary. 2 (a) UKAS - United Kingdom Accreditation Service (b) Opinions and interpretations expressed herein are outside the scope of UKAS accreditation 3 Tests marked "NOT UKAS ACCREDITED" in this test report are not included in the UKAS Accreditation Schedule for this testing laboratory. 4 This test report may not be reproduced other than in full except with the prior written approval of the issuing laboratory.	



TEST REPORT

ISSUED BY SOIL PROPERTY TESTING LTD
DATE ISSUED: 15/08/2017



0998

Contract	Hedge End
Serial No.	S31515

SUMMARY OF WATER CONTENT, LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX AND LIQUIDITY INDEX

Borehole /Pit No.	Depth (m)	Type	Ref.	Water Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Liquid-ity Index (%)	SAMPLE PREPARATION				Description	CLASS
									Method	Ret'd 0.425mm (%)	Corr'd W/C <0.425mm	Curing Time (hrs)		
TP02	0.80	B	1	25.8	61	18	43	0.18	From Natural	0 (A)		24	Firm mottled olive grey and orange slightly sandy silty CLAY with rare recently active roots. Sand is fine.	CH
TP05	1.50	D	1	34.4	74	30	44	0.10	From Natural	0 (A)		24	Firm light brownish grey CLAY with rare orange speckling.	CV
TP07	1.20	B	1	40.1	45	19	26	0.81	From Natural	0 (A)		24	Very soft mottled olive grey and orange sandy silty CLAY. Sand is fine.	CI
TP08	1.90	B	3	27.6	46	21	25	0.26	From Natural	0 (A)		24	Soft brown silty CLAY with occasional orange mottling and rare recently active roots.	CI
TP10	0.90	B	1	23.6	53	18	35	0.16	Wet Sieved	16 (M)	28.1*	24	Soft light olive grey slightly gravelly slightly sandy silty CLAY with occasional orange mottling, and rare recently active roots. Gravel is fine to medium chert.	CH
TP10	2.60	B	4	37.4	78	22	56	0.27	From Natural	0 (A)		24	Soft olive grey CLAY with occasional possible weathered selenite.	CV
TP15	1.90	D	2	35.7	43	22	21	0.65	From Natural	0 (A)		24	Very soft light grey sandy silty CLAY with occasional orange mottling.	CI
TP16	0.80	D	1	16.5	36	15	21	0.07	From Natural	0 (A)		24	Stiff orange sandy silty CLAY with rare bluish grey pockets and recently active roots.	CI

Method Of Preparation:

BS EN ISO: 17892-1: 2014 & BS 1377: Part 2:1990:4.2

Method of Test:

BS EN ISO: 17892-1: 2014 & BS1377:Part 2:1990:3.2, 4.4

Type of Sample Key:

U = Undisturbed, B = Bulk, D = Disturbed, J = Jar, W = Water, SPT = Split Spoon Sample, C = Core Cutter

Comments:

*Corrected water content assume material greater than 0.425mm is non-porous. See BS1377: Part 2: 1990: Clause 3 Note 1

Remarks to Include:

Sample disturbance, loss of water, variation from test procedure, location and origin of test specimen within original sample, oven drying temperature if not 105-110C



TEST REPORT

ISSUED BY SOIL PROPERTY TESTING LTD
DATE ISSUED: 15/08/2017



0998

Contract	Hedge End
Serial No.	S31515

SUMMARY OF WATER CONTENT, LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX AND LIQUIDITY INDEX

Borehole /Pit No.	Depth (m)	Type	Ref.	Water Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Liquid-ity Index (%)	SAMPLE PREPARATION				Description	CLASS
									Method	Ret'd 0.425mm (%)	Corr'd W/C <0.425mm	Curing Time (hrs)		
TP18	1.70	D	2	32.6	41	22	19	0.56	From Natural	0 (A)		24	Very soft light olive grey sandy silty CLAY with occasional orange mottling.	CI
TP19	2.10	B	1	35.5	78	23	55	0.23	From Natural	0 (A)		24	Firm dark grey CLAY with occasional possible weathered selenite.	CV
WS03	4.70	D	5	30.0	70	25	45	0.11	From Natural	0 (A)		24	Firm dark grey CLAY.	CH/CV
WS14	0.90	D	1	32.4	66	23	43	0.22	From Natural	0 (A)		25	Firm light grey slightly sandy silty CLAY with occasional orange mottling and recently active roots.	CH

Method Of Preparation:	BS EN ISO: 17892-1: 2014 & BS 1377: Part 2:1990:4.2
Method of Test:	BS EN ISO: 17892-1: 2014 & BS1377:Part 2:1990:3.2, 4.4
Type of Sample Key:	U = Undisturbed, B = Bulk, D = Disturbed, J = Jar, W = Water, SPT = Split Spoon Sample, C = Core Cutter
Comments:	*Corrected water content assume material greater than 0.425mm is non-porous. See BS1377: Part 2: 1990: Clause 3 Note 1
Remarks to Include:	Sample disturbance, loss of water, variation from test procedure, location and origin of test specimen within original sample, oven drying temperature if not 105-110C



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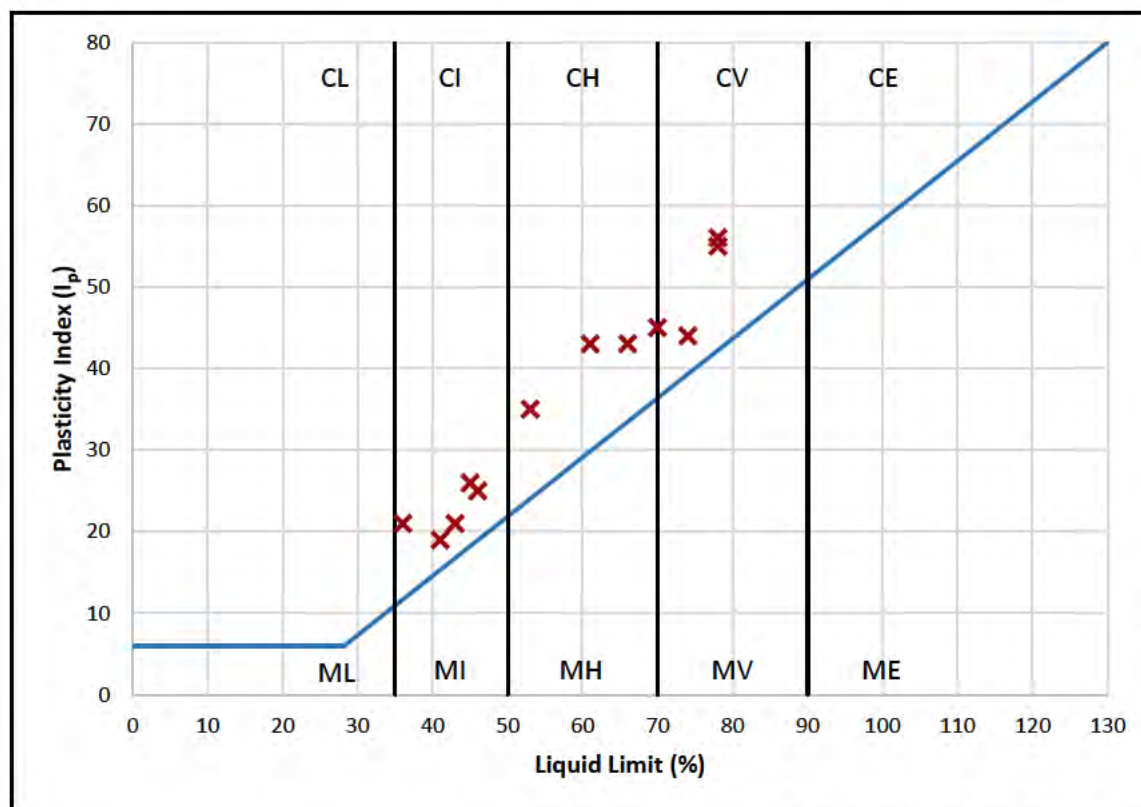


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Contract	Hedge End
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PLOT OF PLASTICITY INDEX AGAINST LIQUID LIMIT USING CASAGRANDE CLASSIFICATION CHART

Plasticity				
Low	Medium	High	Very High	Extremely High



Plasticity Chart BS5930: 2015: Figure 8

High
Medium
Low

NHBC Volume Change Potential

Method of Preparation:	BS EN ISO: 17892-1: 2014 & BS 1377: Part 2: 1990: 4.2
Method of Test:	BS EN ISO: 17892-1: 2014 & BS1377: Part 2: 3.2, 4.4, 5.3, 5.4
Type of Sample Key:	U = Undisturbed, B = Bulk, D = Disturbed, J = Jar, W = Water, SPT = Split Spoon Sample, C = Core Cutter
Comments:	Volume Change Potential: NHBC Standards Chapter 4.2 Unmodified Plasticity Index



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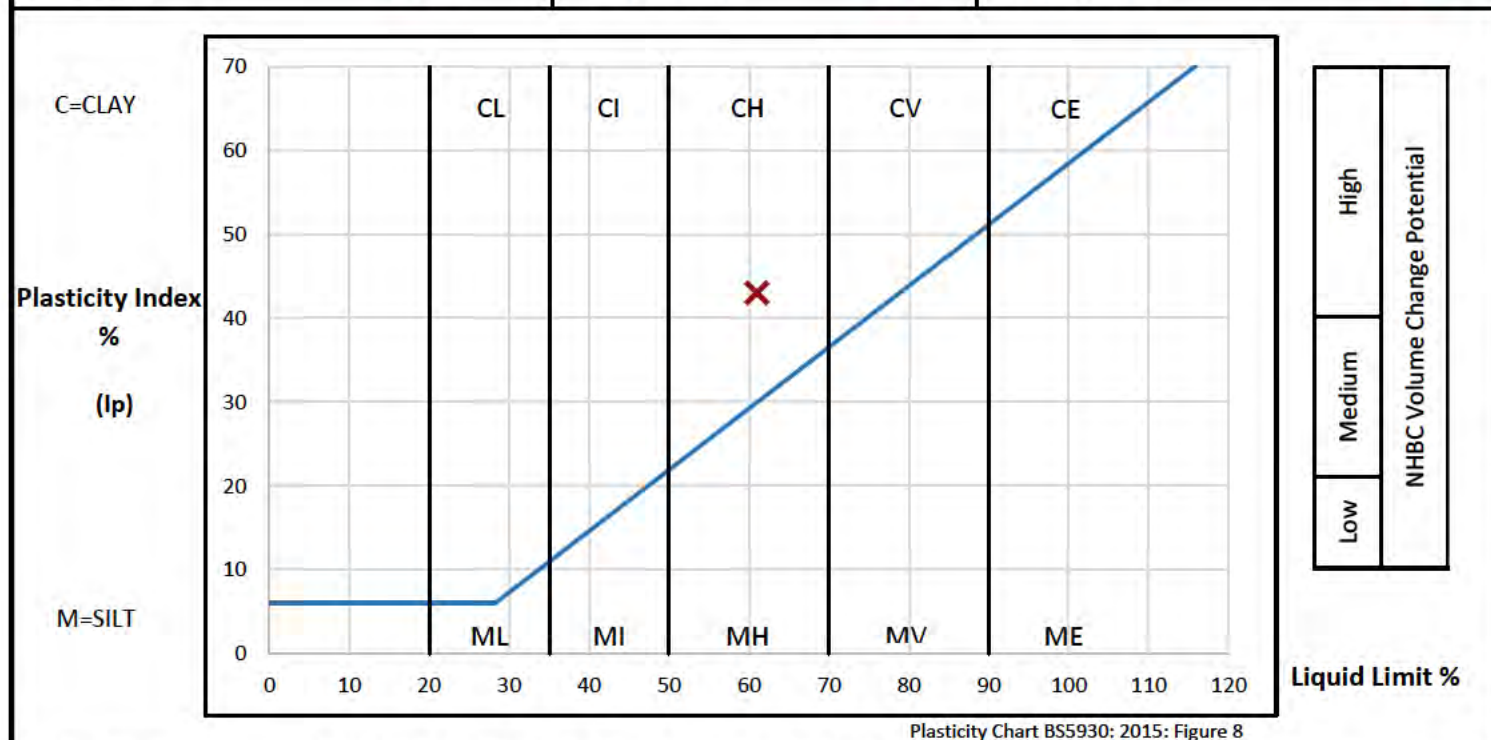
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DETERMINATION OF WATER CONTENT, LIQUID LIMIT AND PLASTIC LIMIT AND DERIVATION OF PLASTICITY INDEX AND LIQUIDITY INDEX

Borehole / Pit No.	Depth m	Sample		Water Content (W) %	Description	Remarks
		Type	Reference			
TP02	0.80	B	1	25.8	Firm mottled olive grey and orange slightly sandy silty CLAY with rare recently active roots. Sand is fine.	

PREPARATION			Liquid Limit	61 %		
Method of preparation			From natural	Plastic Limit	18 %	
Sample retained 0.425mm sieve (Assumed)			0 %	Plasticity Index	43 %	
Corrected water content for material passing 0.425mm				Liquidity Index	0.18	
Sample retained 2mm sieve (Assumed)			0 %	NHBC Modified (I'p)	n/a	
Curing time		24 hrs	Clay Content	43 %	Derived Activity	1.00



Method of Preparation: BS EN ISO: 17892-1: 2014 & BS 1337: Part 2: 1990: 4.2
Method of Test: BS EN ISO: 17892-1: 2014 & BS1377: PART 2: 1990: 3.2, 4.4, 5.3, 5.4
Type of Sample Key: U=Undisturbed, B=Bulk, D=Disturbed, J=Jar, W=Water, SPT=Split Spoon Sample, C=Core Cutter
Comments:



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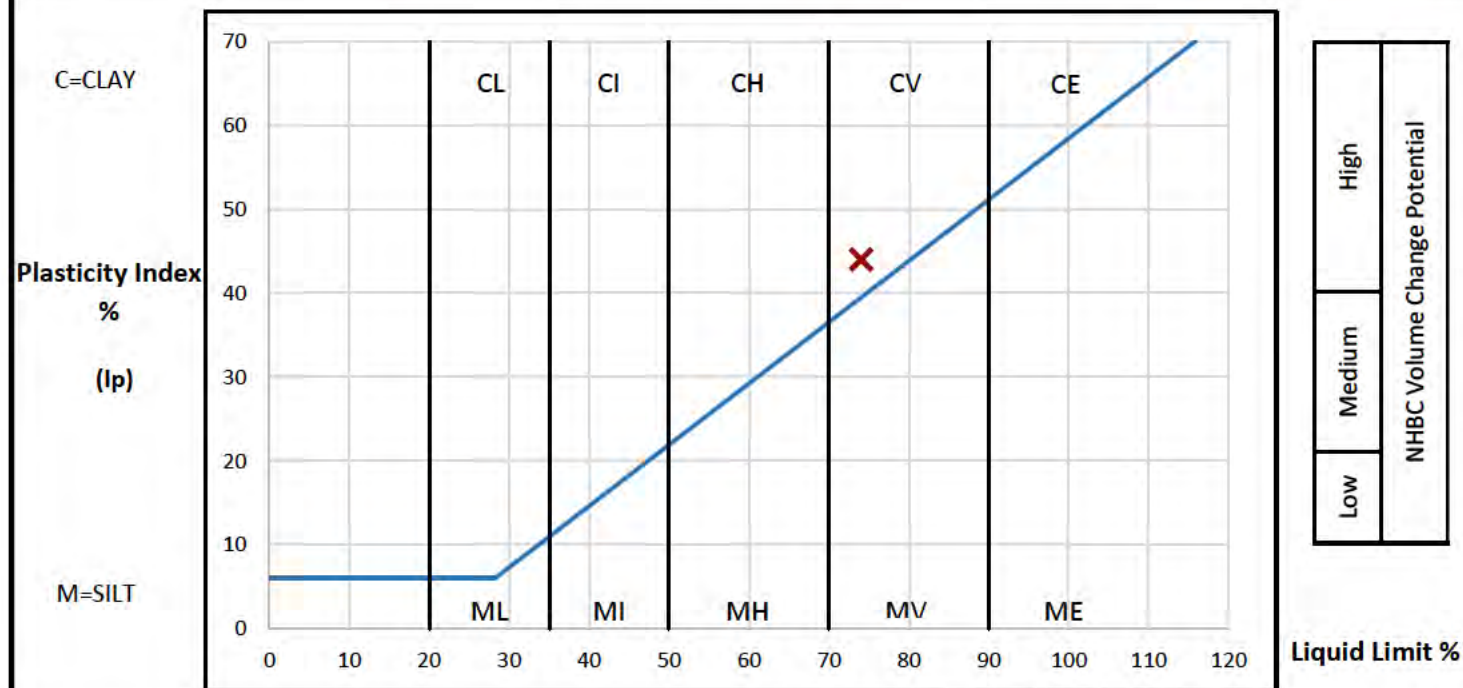
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DETERMINATION OF WATER CONTENT, LIQUID LIMIT AND PLASTIC LIMIT AND DERIVATION OF PLASTICITY INDEX AND LIQUIDITY INDEX

Borehole / Pit No.	Depth m	Sample		Water Content (W) %	Description	Remarks
		Type	Reference			
TP05	1.50	D	1	34.4	Firm light brownish grey CLAY with rare orange speckling.	

PREPARATION			Liquid Limit	74 %		
Method of preparation			From natural	Plastic Limit	30 %	
Sample retained 0.425mm sieve (Assumed)			0 %	Plasticity Index	44 %	
Corrected water content for material passing 0.425mm				Liquidity Index	0.10	
Sample retained 2mm sieve (Assumed)			0 %	NHBC Modified (I'p)	n/a	
Curing time		24 hrs	Clay Content	Not analysed	Derived Activity	Not analysed



Plasticity Chart BS5930: 2015: Figure 8

Method of Preparation: BS EN ISO: 17892-1: 2014 & BS 1337: Part 2: 1990: 4.2
 Method of Test: BS EN ISO: 17892-1: 2014 & BS1377: PART 2: 1990: 3.2, 4.4, 5.3, 5.4
 Type of Sample Key: U=Undisturbed, B=Bulk, D=Disturbed, J=Jar, W=Water, SPT=Split Spoon Sample, C=Core Cutter
 Comments:



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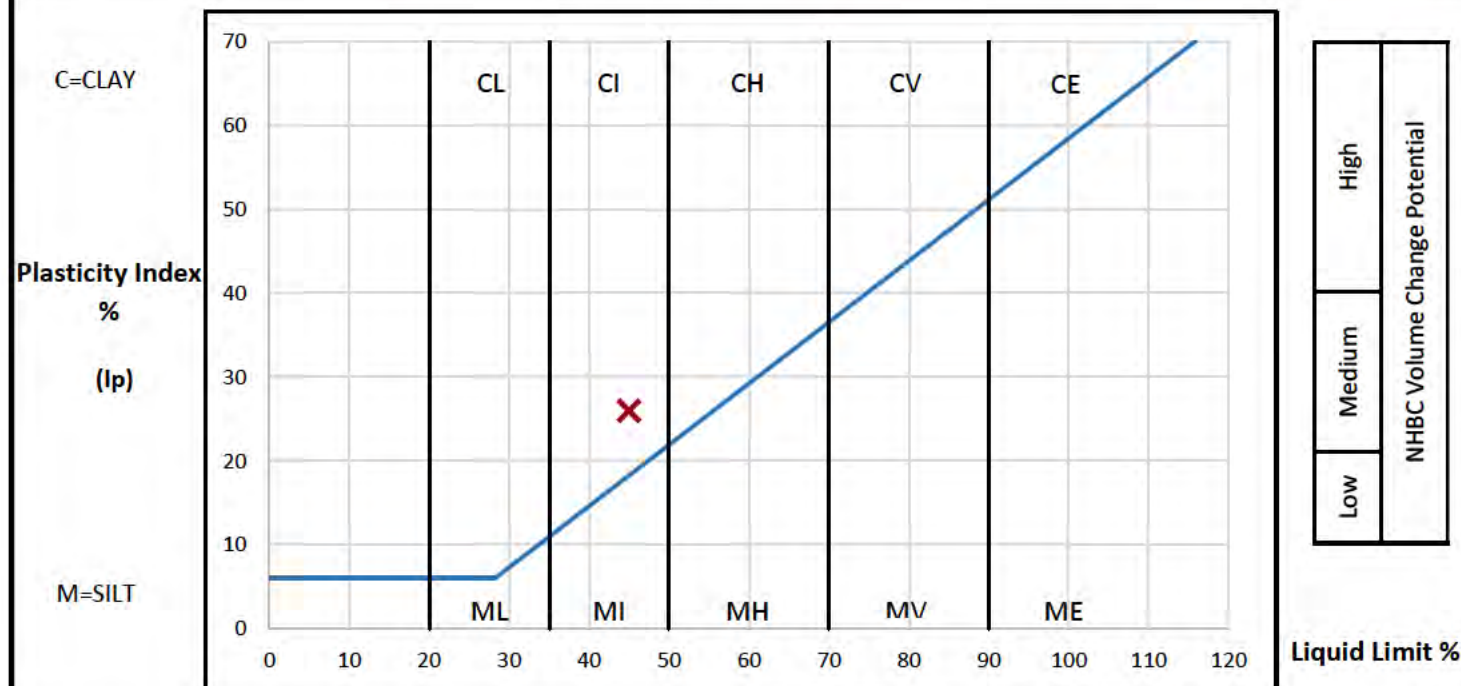
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DETERMINATION OF WATER CONTENT, LIQUID LIMIT AND PLASTIC LIMIT AND DERIVATION OF PLASTICITY INDEX AND LIQUIDITY INDEX

Borehole / Pit No.	Depth m	Sample		Water Content (W) %	Description	Remarks
		Type	Reference			
TP07	1.20	B	1	40.1	Very soft mottled olive grey and orange sandy silty CLAY. Sand is fine.	

PREPARATION			Liquid Limit	45 %	
Method of preparation		From natural	Plastic Limit	19 %	
Sample retained 0.425mm sieve	(Assumed)	0 %	Plasticity Index	26 %	
Corrected water content for material passing 0.425mm			Liquidity Index	0.81	
Sample retained 2mm sieve	(Assumed)	0 %	NHBC Modified (I'p)	n/a	
Curing time	24 hrs	Clay Content	Not analysed	Derived Activity	Not analysed



Plasticity Chart BS5930: 2015: Figure 8

Method of Preparation: BS EN ISO: 17892-1: 2014 & BS 1337: Part 2: 1990: 4.2
 Method of Test: BS EN ISO: 17892-1: 2014 & BS1377: PART 2: 1990: 3.2, 4.4, 5.3, 5.4
 Type of Sample Key: U=Undisturbed, B=Bulk, D=Disturbed, J=Jar, W=Water, SPT=Split Spoon Sample, C=Core Cutter
 Comments:



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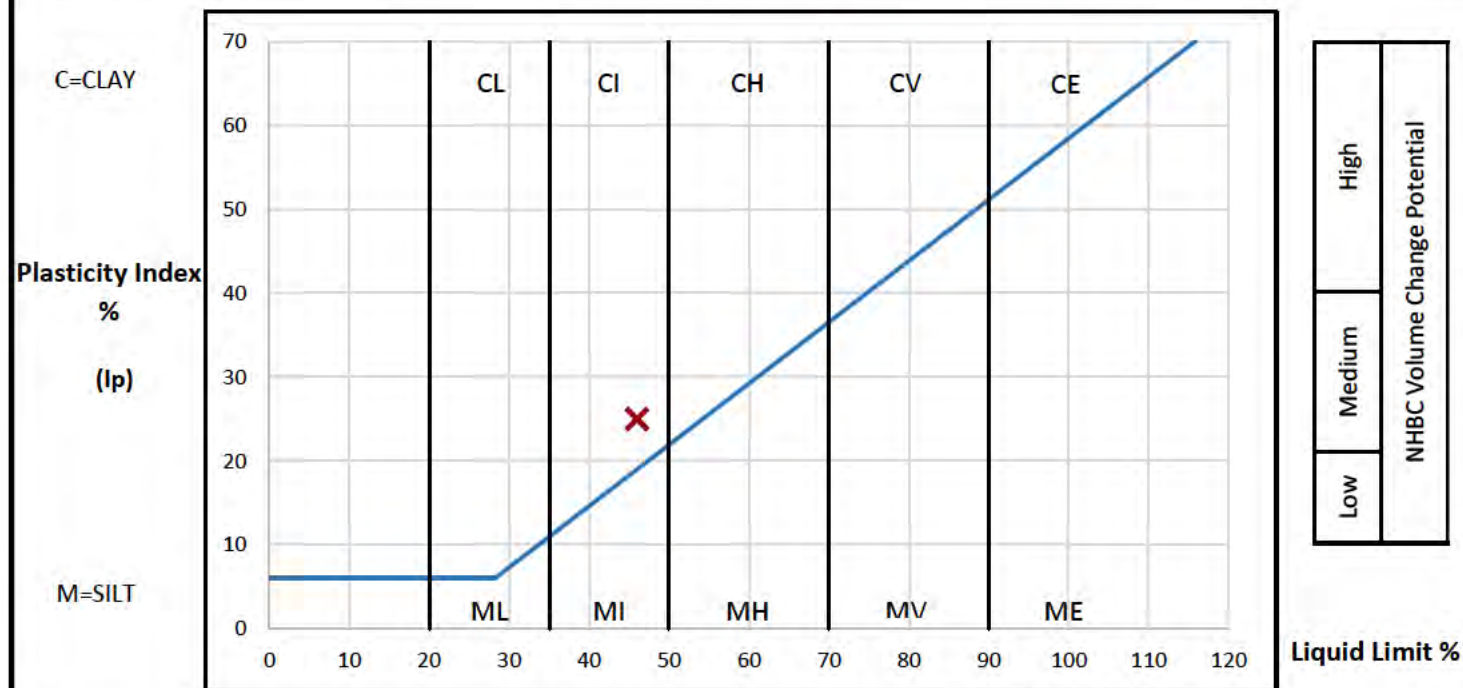
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DETERMINATION OF WATER CONTENT, LIQUID LIMIT AND PLASTIC LIMIT AND DERIVATION OF PLASTICITY INDEX AND LIQUIDITY INDEX

Borehole / Pit No.	Depth m	Sample		Water Content (W) %	Description	Remarks
		Type	Reference			
TP08	1.90	B	3	27.6	Soft brown silty CLAY with occasional orange mottling and rare recently active roots.	

PREPARATION			Liquid Limit	46 %		
Method of preparation			From natural	Plastic Limit	21 %	
Sample retained 0.425mm sieve (Assumed)			0 %	Plasticity Index	25 %	
Corrected water content for material passing 0.425mm				Liquidity Index	0.26	
Sample retained 2mm sieve (Assumed)			0 %	NHBC Modified (I'p)	n/a	
Curing time		24 hrs	Clay Content	Not analysed	Derived Activity	Not analysed



Plasticity Chart BS5930: 2015: Figure 8

Method of Preparation: BS EN ISO: 17892-1: 2014 & BS 1337: Part 2: 1990: 4.2
 Method of Test: BS EN ISO: 17892-1: 2014 & BS1377: PART 2: 1990: 3.2, 4.4, 5.3, 5.4
 Type of Sample Key: U=Undisturbed, B=Bulk, D=Disturbed, J=Jar, W=Water, SPT=Split Spoon Sample, C=Core Cutter
 Comments:



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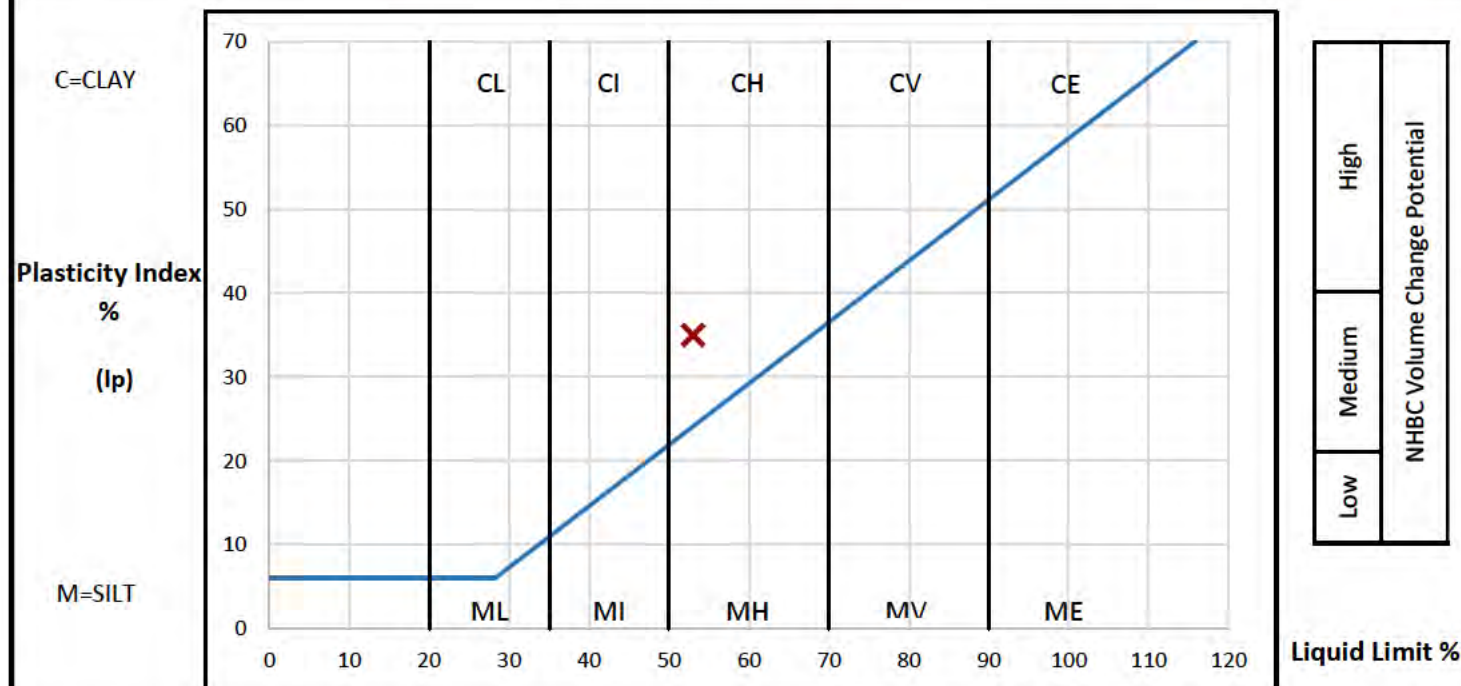
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DETERMINATION OF WATER CONTENT, LIQUID LIMIT AND PLASTIC LIMIT AND DERIVATION OF PLASTICITY INDEX AND LIQUIDITY INDEX

Borehole / Pit No.	Depth m	Sample		Water Content (W) %	Description	Remarks
		Type	Reference			
TP10	0.90	B	1	23.6	Soft light olive grey slightly gravelly slightly sandy silty CLAY with occasional orange mottling, and rare recently active roots. Gravel is fine to medium chert.	

PREPARATION				Liquid Limit 53 %	
Method of preparation Wet sieved over 0.425mm sieve				Plastic Limit 18 %	
Sample retained 0.425mm sieve (Measured) 16 %				Plasticity Index 35 %	
Corrected water content for material passing 0.425mm 28.1 %				Liquidity Index 0.16	
Sample retained 2mm sieve (Measured) 9 %				NHBC Modified (I'p) 29 %	
Curing time 24 hrs		Clay Content Not analysed		Derived Activity Not analysed	



Plasticity Chart BS5930: 2015: Figure 8

Method of Preparation: BS EN ISO: 17892-1: 2014 & BS 1337: Part 2: 1990: 4.2

Method of Test: BS EN ISO: 17892-1: 2014 & BS1377: PART 2: 1990: 3.2, 4.4, 5.3, 5.4

Type of Sample Key: U=Undisturbed, B=Bulk, D=Disturbed, J=Jar, W=Water, SPT=Split Spoon Sample, C=Core Cutter

Comments: Corrected water content assume material greater than 0.425mm non-porous. See BS1377: Part2: 1990 Clause 3 Note 1
Volume Change Potential: NHBC Standards Chapter 4.2 Unmodified Plasticity Index
Note: Modified Plasticity Index I'p = Ip x (% less than 425microns/100)



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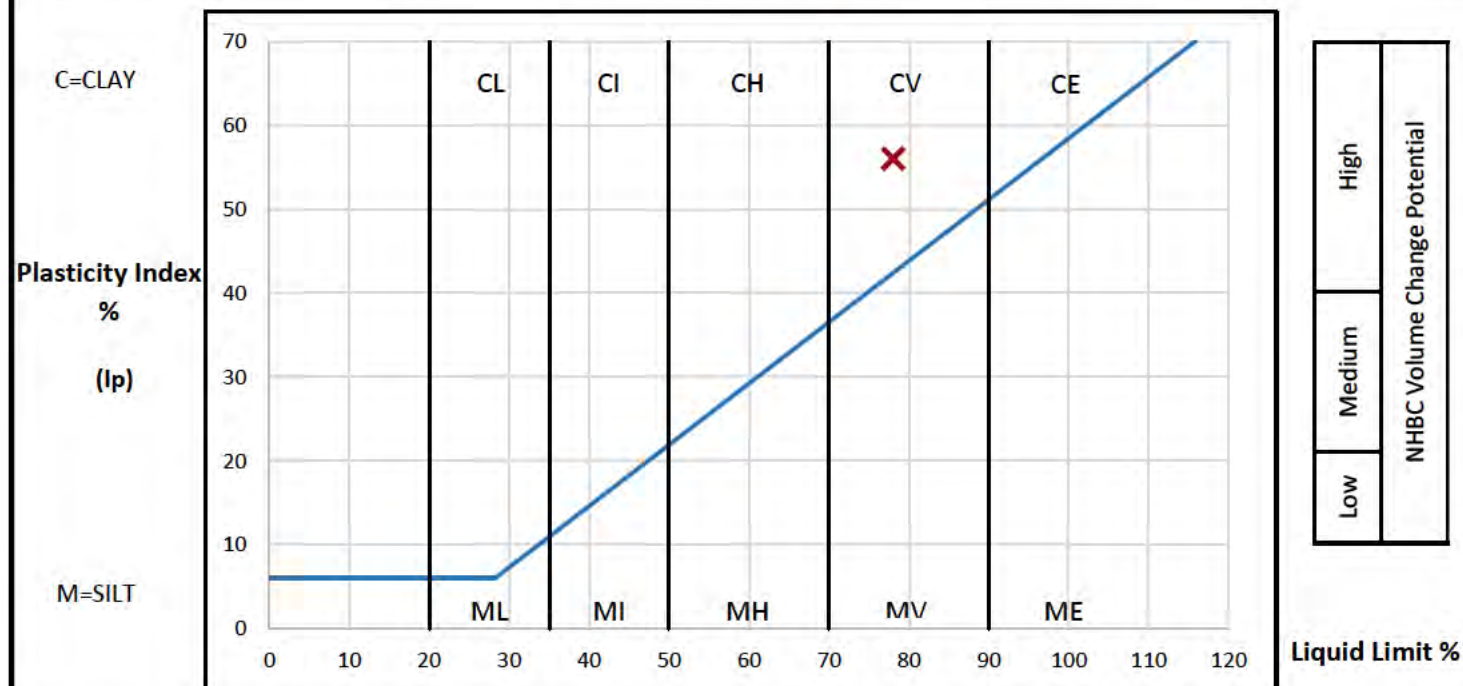
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Contract	Hedge End
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DETERMINATION OF WATER CONTENT, LIQUID LIMIT AND PLASTIC LIMIT AND DERIVATION OF PLASTICITY INDEX AND LIQUIDITY INDEX

Borehole / Pit No.	Depth m	Sample		Water Content (W) %	Description	Remarks
		Type	Reference			
TP10	2.60	B	4	37.4	Soft olive grey CLAY with occasional possible weathered selenite.	Specimen dried at 80°C due to the presence of selenite.

PREPARATION			Liquid Limit	78 %	
Method of preparation		From natural	Plastic Limit	22 %	
Sample retained 0.425mm sieve	(Assumed)	0 %	Plasticity Index	56 %	
Corrected water content for material passing 0.425mm			Liquidity Index	0.27	
Sample retained 2mm sieve	(Assumed)	0 %	NHBC Modified (I'p)	n/a	
Curing time	24 hrs	Clay Content	Not analysed	Derived Activity	Not analysed



Plasticity Chart BS5930: 2015: Figure 8

Method of Preparation: BS EN ISO: 17892-1: 2014 & BS 1337: Part 2: 1990: 4.2
 Method of Test: BS EN ISO: 17892-1: 2014 & BS1377: PART 2: 1990: 3.2, 4.4, 5.3, 5.4
 Type of Sample Key: U=Undisturbed, B=Bulk, D=Disturbed, J=Jar, W=Water, SPT=Split Spoon Sample, C=Core Cutter
 Comments:



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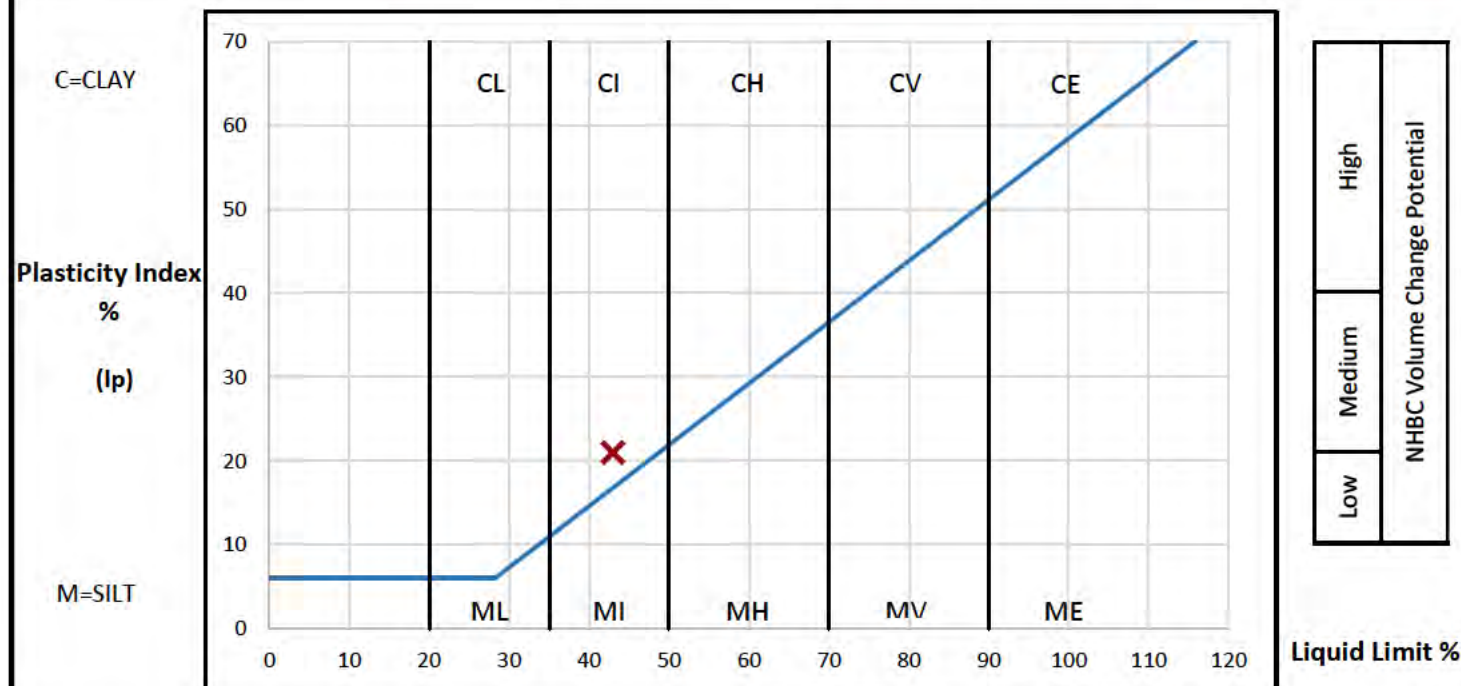
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Contract	Hedge End
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DETERMINATION OF WATER CONTENT, LIQUID LIMIT AND PLASTIC LIMIT AND DERIVATION OF PLASTICITY INDEX AND LIQUIDITY INDEX

Borehole / Pit No.	Depth m	Sample		Water Content (W) %	Description	Remarks
		Type	Reference			
TP15	1.90	D	2	35.7	Very soft light grey sandy silty CLAY with occasional orange mottling.	

PREPARATION			Liquid Limit	43 %		
Method of preparation			From natural	Plastic Limit	22 %	
Sample retained 0.425mm sieve			(Assumed)	0 %	Plasticity Index	21 %
Corrected water content for material passing 0.425mm					Liquidity Index	0.65
Sample retained 2mm sieve			(Assumed)	0 %	NHBC Modified (I'p)	n/a
Curing time		24 hrs	Clay Content	24 %	Derived Activity	0.88



Plasticity Chart BS5930: 2015: Figure 8

Method of Preparation: BS EN ISO: 17892-1: 2014 & BS 1337: Part 2: 1990: 4.2
 Method of Test: BS EN ISO: 17892-1: 2014 & BS1377: PART 2: 1990: 3.2, 4.4, 5.3, 5.4
 Type of Sample Key: U=Undisturbed, B=Bulk, D=Disturbed, J=Jar, W=Water, SPT=Split Spoon Sample, C=Core Cutter
 Comments:



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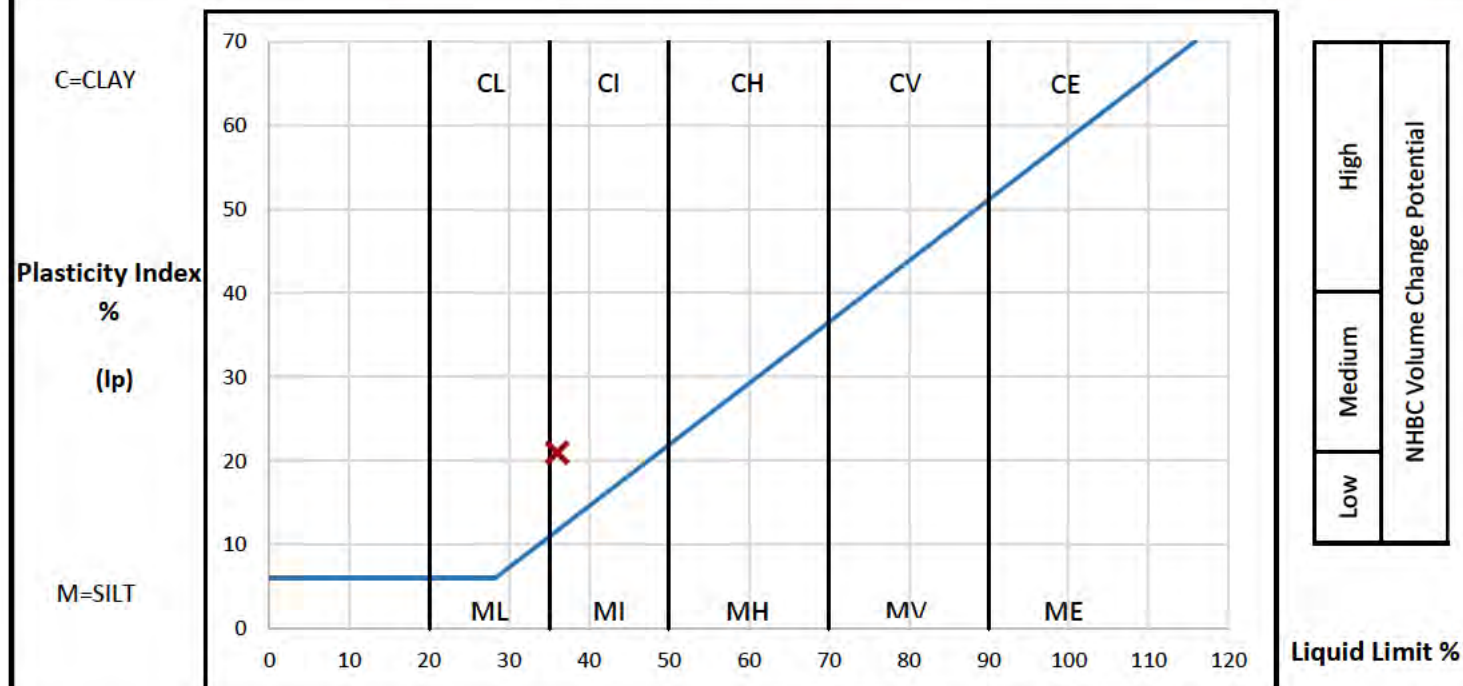
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Contract	Hedge End
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DETERMINATION OF WATER CONTENT, LIQUID LIMIT AND PLASTIC LIMIT AND DERIVATION OF PLASTICITY INDEX AND LIQUIDITY INDEX

Borehole / Pit No.	Depth m	Sample		Water Content (W) %	Description	Remarks
		Type	Reference			
TP16	0.80	D	1	16.5	Stiff orange sandy silty CLAY with rare bluish grey pockets and recently active roots.	

PREPARATION			Liquid Limit	36 %	
Method of preparation		From natural	Plastic Limit	15 %	
Sample retained 0.425mm sieve	(Assumed)	0 %	Plasticity Index	21 %	
Corrected water content for material passing 0.425mm			Liquidity Index	0.07	
Sample retained 2mm sieve	(Assumed)	0 %	NHBC Modified (I'p)	n/a	
Curing time	24 hrs	Clay Content	Not analysed	Derived Activity	Not analysed



Plasticity Chart BS5930: 2015: Figure 8

Method of Preparation: BS EN ISO: 17892-1: 2014 & BS 1337: Part 2: 1990: 4.2
 Method of Test: BS EN ISO: 17892-1: 2014 & BS1377: PART 2: 1990: 3.2, 4.4, 5.3, 5.4
 Type of Sample Key: U=Undisturbed, B=Bulk, D=Disturbed, J=Jar, W=Water, SPT=Split Spoon Sample, C=Core Cutter
 Comments:



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Contract		Hedge End					
Serial No.		S31515					
DETERMINATION OF WATER CONTENT, LIQUID LIMIT AND PLASTIC LIMIT AND DERIVATION OF PLASTICITY INDEX AND LIQUIDITY INDEX							
Borehole / Pit No.	Depth m	Sample		Water Content (W) %	Description	Remarks	
		Type	Reference				
TP18	1.70	D	2	32.6	Very soft light olive grey sandy silty CLAY with occasional orange mottling.		
PREPARATION					Liquid Limit	41 %	
Method of preparation					From natural	Plastic Limit	22 %
Sample retained 0.425mm sieve (Assumed)					0 %	Plasticity Index	19 %
Corrected water content for material passing 0.425mm						Liquidity Index	0.56
Sample retained 2mm sieve (Assumed)					0 %	NHBC Modified (I _p)	n/a
Curing time		24 hrs		Clay Content	Not analysed	Derived Activity	Not analysed

C=CLAY

M=SILT

High
Medium
Low

NHBC Volume Change Potential

Plasticity Chart BS5930: 2015: Figure 8

Method of Preparation:	BS EN ISO: 17892-1: 2014 & BS 1337: Part 2: 1990: 4.2
Method of Test:	BS EN ISO: 17892-1: 2014 & BS1377: PART 2: 1990: 3.2, 4.4, 5.3, 5.4
Type of Sample Key:	U=Undisturbed, B=Bulk, D=Disturbed, J=Jar, W=Water, SPT=Split Spoon Sample, C=Core Cutter
Comments:	



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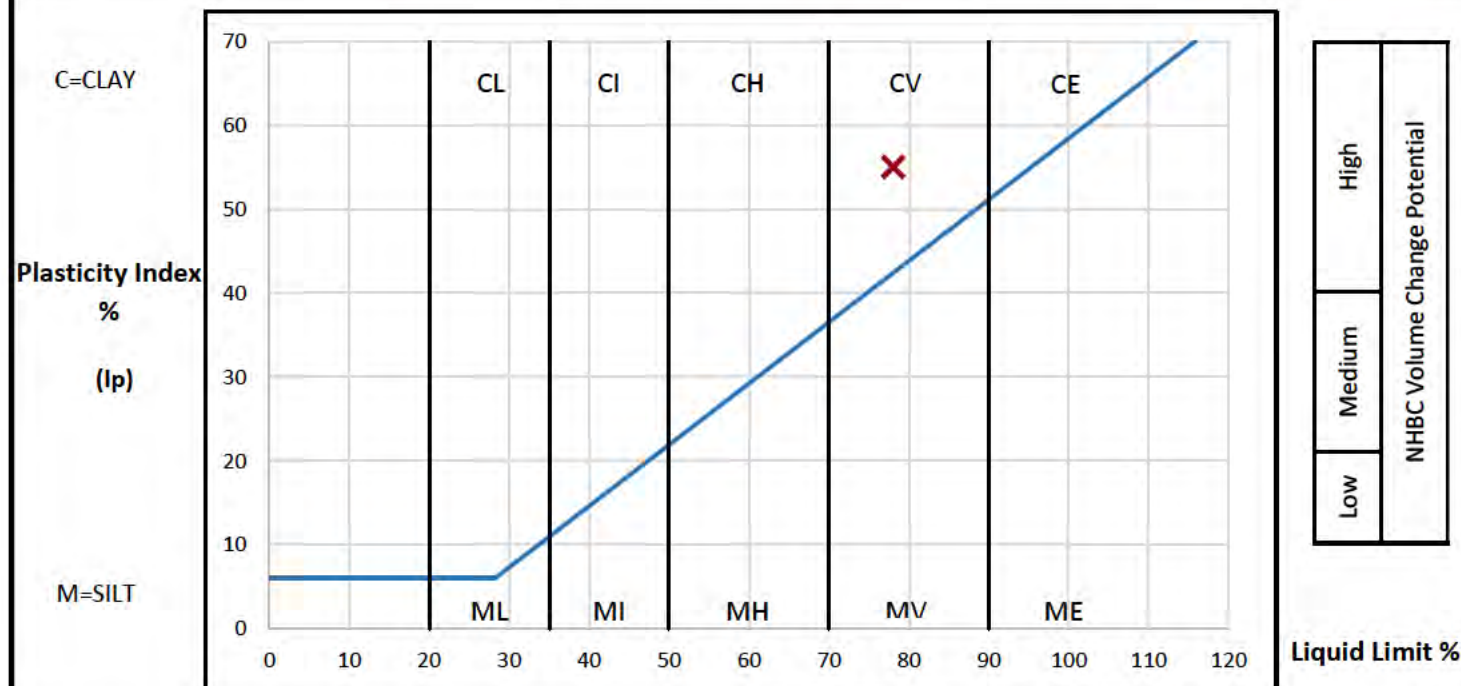
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DETERMINATION OF WATER CONTENT, LIQUID LIMIT AND PLASTIC LIMIT AND DERIVATION OF PLASTICITY INDEX AND LIQUIDITY INDEX

Borehole / Pit No.	Depth m	Sample		Water Content (W) %	Description	Remarks
		Type	Reference			
TP19	2.10	B	1	35.5	Firm dark grey CLAY with occasional possible weathered selenite.	Specimen dried at 80°C due to the presence of selenite.

PREPARATION			Liquid Limit	78 %	
Method of preparation		From natural	Plastic Limit	23 %	
Sample retained 0.425mm sieve	(Assumed)	0 %	Plasticity Index	55 %	
Corrected water content for material passing 0.425mm			Liquidity Index	0.23	
Sample retained 2mm sieve	(Assumed)	0 %	NHBC Modified (I'p)	n/a	
Curing time	24 hrs	Clay Content	Not analysed	Derived Activity	Not analysed



Plasticity Chart BS5930: 2015: Figure 8

Method of Preparation: BS EN ISO: 17892-1: 2014 & BS 1337: Part 2: 1990: 4.2
 Method of Test: BS EN ISO: 17892-1: 2014 & BS1377: PART 2: 1990: 3.2, 4.4, 5.3, 5.4
 Type of Sample Key: U=Undisturbed, B=Bulk, D=Disturbed, J=Jar, W=Water, SPT=Split Spoon Sample, C=Core Cutter
 Comments:



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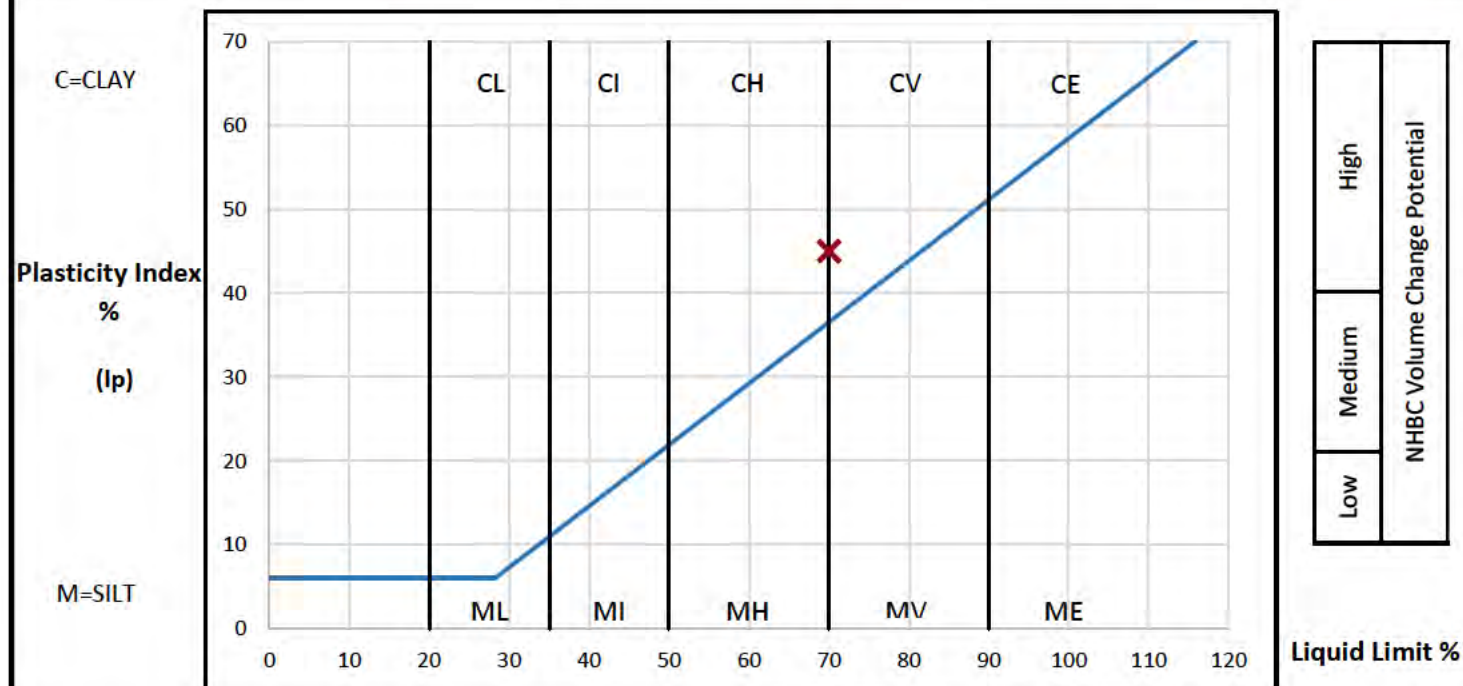
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Contract	Hedge End
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DETERMINATION OF WATER CONTENT, LIQUID LIMIT AND PLASTIC LIMIT AND DERIVATION OF PLASTICITY INDEX AND LIQUIDITY INDEX

Borehole / Pit No.	Depth m	Sample		Water Content (W) %	Description	Remarks
		Type	Reference			
WS03	4.70	D	5	30.0	Firm dark grey CLAY.	

PREPARATION			Liquid Limit	70 %		
Method of preparation			From natural	Plastic Limit	25 %	
Sample retained 0.425mm sieve (Assumed)			0 %	Plasticity Index	45 %	
Corrected water content for material passing 0.425mm				Liquidity Index	0.11	
Sample retained 2mm sieve (Assumed)			0 %	NHBC Modified (I'p)	n/a	
Curing time		24 hrs	Clay Content	Not analysed	Derived Activity	Not analysed



Plasticity Chart BS5930: 2015: Figure 8

Method of Preparation: BS EN ISO: 17892-1: 2014 & BS 1337: Part 2: 1990: 4.2
 Method of Test: BS EN ISO: 17892-1: 2014 & BS1377: PART 2: 1990: 3.2, 4.4, 5.3, 5.4
 Type of Sample Key: U=Undisturbed, B=Bulk, D=Disturbed, J=Jar, W=Water, SPT=Split Spoon Sample, C=Core Cutter
 Comments:



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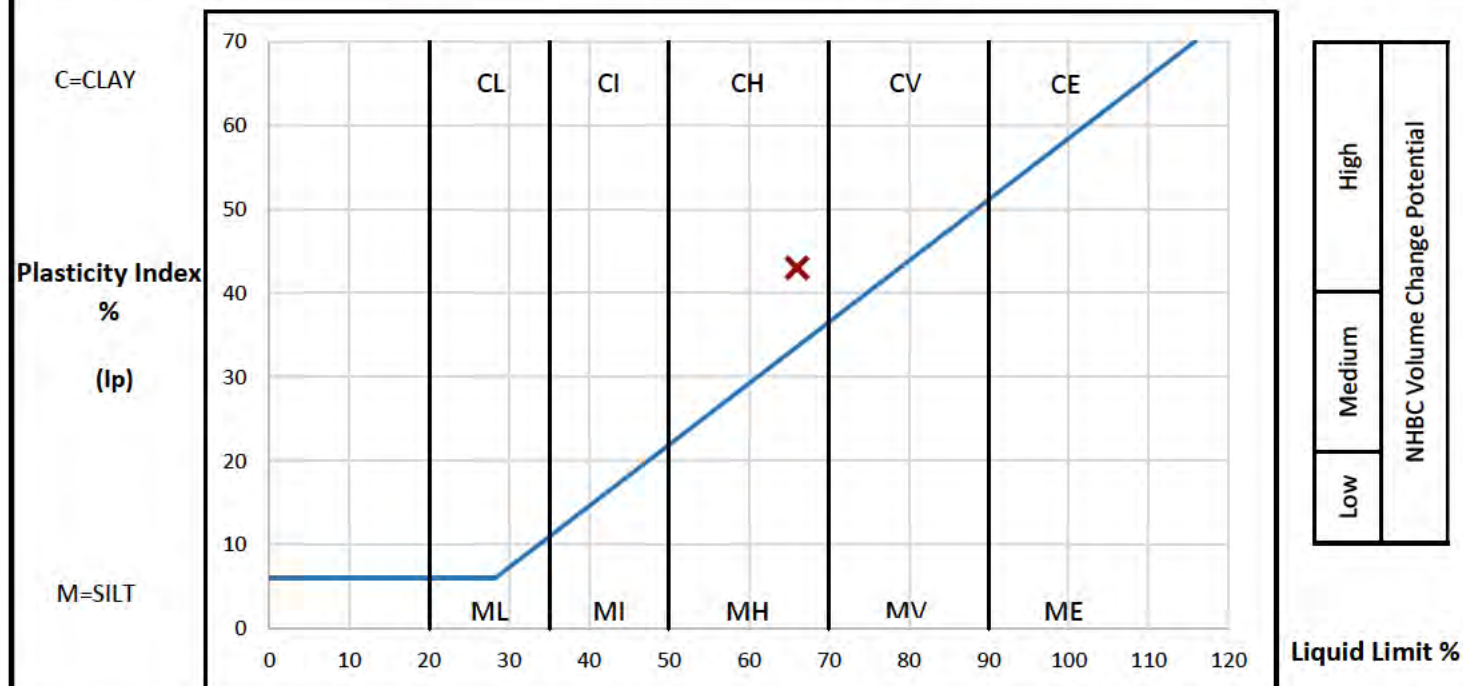
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DETERMINATION OF WATER CONTENT, LIQUID LIMIT AND PLASTIC LIMIT AND DERIVATION OF PLASTICITY INDEX AND LIQUIDITY INDEX

Borehole / Pit No.	Depth m	Sample		Water Content (W) %	Description	Remarks
		Type	Reference			
WS14	0.90	D	1	32.4	Firm light grey slightly sandy silty CLAY with occasional orange mottling and recently active roots.	

PREPARATION			Liquid Limit	66 %	
Method of preparation		From natural	Plastic Limit	23 %	
Sample retained 0.425mm sieve (Assumed)		0 %	Plasticity Index	43 %	
Corrected water content for material passing 0.425mm			Liquidity Index	0.22	
Sample retained 2mm sieve (Assumed)		0 %	NHBC Modified (I'p)	n/a	
Curing time	25 hrs	Clay Content	37 %	Derived Activity	1.16



Plasticity Chart BS5930: 2015: Figure 8

Method of Preparation: BS EN ISO: 17892-1: 2014 & BS 1337: Part 2: 1990: 4.2
 Method of Test: BS EN ISO: 17892-1: 2014 & BS1377: PART 2: 1990: 3.2, 4.4, 5.3, 5.4
 Type of Sample Key: U=Undisturbed, B=Bulk, D=Disturbed, J=Jar, W=Water, SPT=Split Spoon Sample, C=Core Cutter
 Comments:



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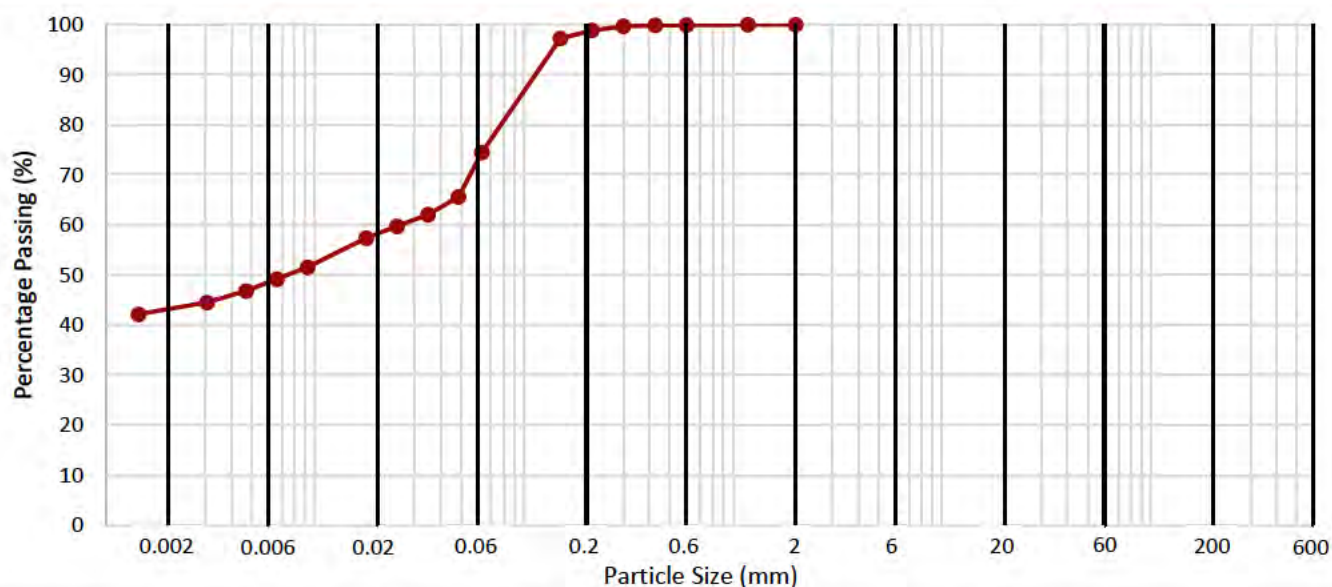
DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Borehole / Pit No.	Depth (m)	Sample		Description	Remarks
		Type	Reference		
TP02	0.80	B	1	Firm mottled olive grey and orange slightly sandy CLAY with rare recently active roots. Sand is fine.	

Method of Test: Hydrometer + Pre-sieve

Method of Pretreatment:

Not Required



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

H y d r o m e t e r	Particle Size (mm)	Passing (%)	Silt by Dry Mass (%)
	0.0487	66	31
	0.0349	62	
	0.0248	60	
	0.0177	57	Clay by Dry Mass (%)
	0.0093	52	
	0.0066	49	
	0.0047	47	
	0.0031	44	43
	0.0014	42	

Sieve Size (mm)	Passing (%)	Sand By Dry Mass (%)
2.00	100	26
1.18	100	
0.600	100	
0.425	100	
0.300	100	
0.212	99	
0.150	97	
0.063	74	

Fines By Dry Mass (%)	
<0.063mm	74

Sieve Size (mm)	Passing (%)	Gravel By Dry Mass (%)
150		0
125		
90		
63		
50		
37.5		
28		
20		
14		
10		
6.3		
5		

Method of Preparation: BS1377: Part 1: 2016: 8.3 & 8.4.5

Method of test: BS1377: Part2: 1990: , 9.2, 9.5

Type of Sample Key: U=Undisturbed, B=Bulk, D=Disturbed, J=Jar, W=Water, SPT=Split Spoon Sample, C=Core Cutter

Comments:



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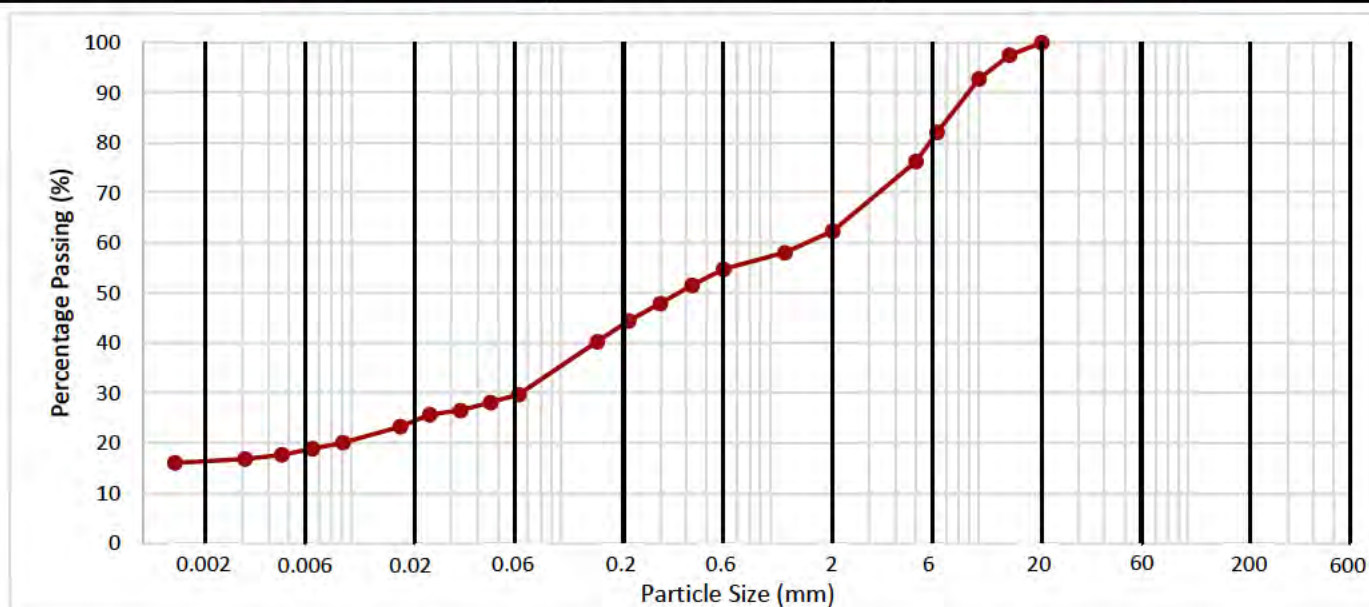
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Contract	Hedge End
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DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Borehole / Pit No.	Depth (m)	Sample		Description	Remarks
		Type	Reference		
TP12	0.90	B	1	Yellowish brown gravelly slightly sandy CLAY. Gravel is white, brown and black subangular to subrounded chert.	Description in terms of likely engineering behaviour

Method of Test: **Wet Sieve + Hydrometer** Method of Pretreatment: **Not Required**



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

Hydrometer	Particle Size (mm)	Passing (%)	Silt by Dry Mass (%)
	0.0462	28	13
	0.0332	27	
	0.0236	26	
	0.0171	23	
	0.0091	20	Clay by Dry Mass (%)
	0.0065	19	
	0.0046	18	
	0.0031	17	
	0.0014	16	16

Sieve Size (mm)	Passing (%)	Sand By Dry Mass (%)
2.00	62	32
1.18	58	
0.600	55	
0.425	52	
0.300	48	
0.212	44	
0.150	40	
0.063	30	

Fines By Dry Mass (%)	
<0.063mm	30

Sieve Size (mm)	Passing (%)	Gravel By Dry Mass (%)
150		38
125		
90		
63		
50		
37.5		
28		
20	100	
14	97	
10	93	
6.3	82	
5	76	

Method of Preparation: BS1377: Part 1: 2016: 8.3 & 8.4.5
 Method of test: BS1377: Part2: 1990: 9.2, 9.5
 Type of Sample Key: U=Undisturbed, B=Bulk, D=Disturbed, J=Jar, W=Water, SPT=Split Spoon Sample, C=Core Cutter
 Comments:



TEST REPORT

ISSUED BY SOIL PROPERTY TESTING LTD
DATE ISSUED: 15/08/2017



0998

Contract	Hedge End
Serial No.	S31515

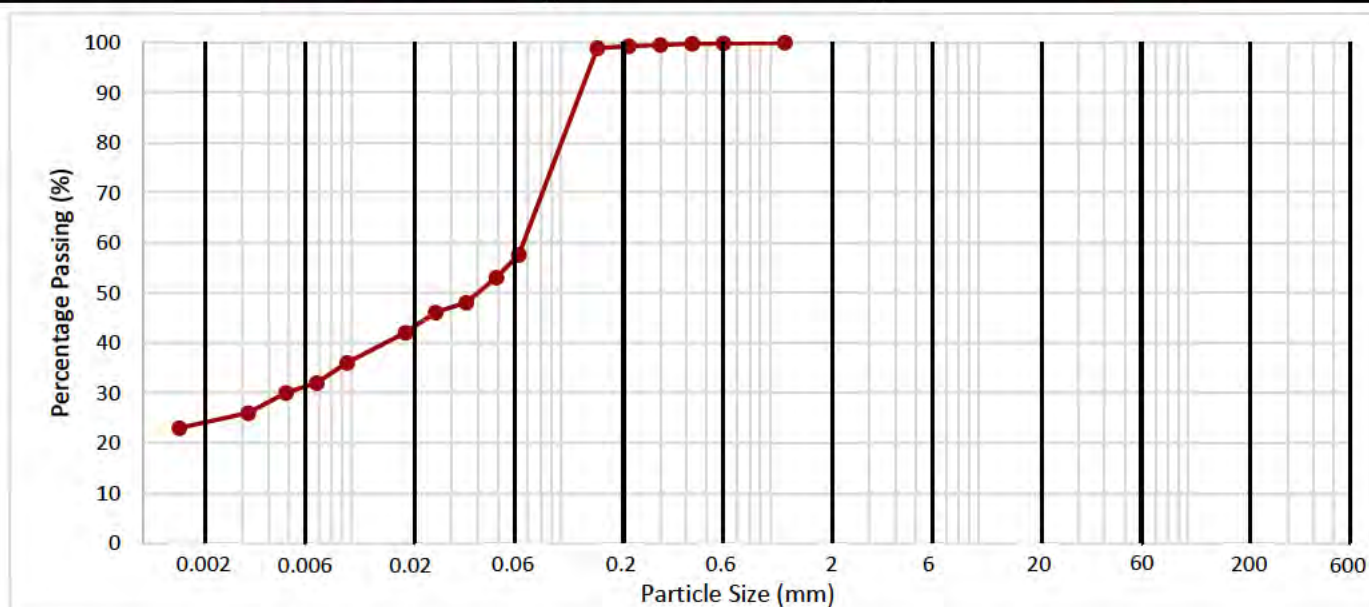
DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Borehole / Pit No.	Depth (m)	Sample		Description	Remarks
		Type	Reference		
TP15	1.90	D	2	Very soft light grey sandy silty CLAY with occasional orange mottling.	

Method of Test: Hydrometer + Pre-sieve

Method of Pretreatment:

Not Required



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

H y d r o m e t e r	Particle Size (mm)	Passing (%)	Silt by Dry Mass (%)
	0.0492	53	34
	0.0354	48	
	0.0252	46	
	0.0181	42	
	0.0095	36	Clay by Dry Mass (%)
	0.0068	32	
	0.0048	30	
	0.0032	26	
	0.0015	23	24

Sieve Size (mm)	Passing (%)	Sand By Dry Mass (%)
2.00		42
1.18	100	
0.600	100	
0.425	100	
0.300	100	
0.212	99	
0.150	99	
0.063	58	

Fines By Dry Mass (%)	
<0.063mm	58

Sieve Size (mm)	Passing (%)	Gravel By Dry Mass (%)
150		0
125		
90		
63		
50		
37.5		
28		
20		
14		
10		
6.3		
5		

Method of Preparation: BS1377: Part 1: 2016: 8.3 & 8.4.5

Method of test: BS1377: Part2: 1990: , 9.2, 9.5

Type of Sample Key: U=Undisturbed, B=Bulk, D=Disturbed, J=Jar, W=Water, SPT=Split Spoon Sample, C=Core Cutter

Comments:



TEST REPORT

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0998

Contract	Hedge End
Serial No.	S31515

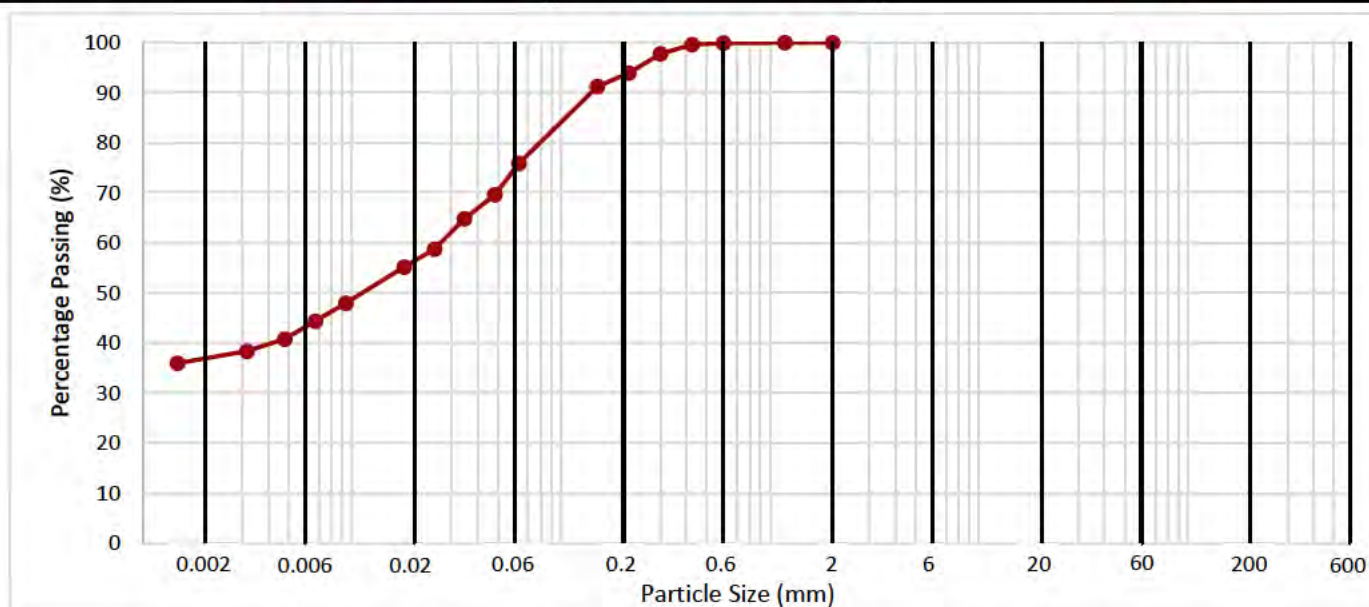
DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Borehole / Pit No.	Depth (m)	Sample		Description	Remarks
		Type	Reference		
WS14	0.90	D	1	Firm light grey slightly sandy CLAY with occasional orange mottling and recently active roots.	

Method of Test: Hydrometer + Pre-sieve

Method of Pretreatment:

Not Required



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

H y d r o m e t e r	Particle Size (mm)	Passing (%)	Silt by Dry Mass (%)
	0.0484	70	39
	0.0347	65	
	0.0250	59	
	0.0178	55	
	0.0094	48	Clay by Dry Mass (%)
	0.0067	44	
	0.0048	41	
	0.0032	38	
	0.0015	36	37

Sieve Size (mm)	Passing (%)	Sand By Dry Mass (%)
2.00	100	24
1.18	100	
0.600	100	
0.425	100	
0.300	98	
0.212	94	
0.150	91	
0.063	76	

Fines By Dry Mass (%)	
<0.063mm	76

Sieve Size (mm)	Passing (%)	Gravel By Dry Mass (%)
150		0
125		
90		
63		
50		
37.5		
28		
20		
14		
10		
6.3		
5		

Method of Preparation: BS1377: Part 1: 2016: 8.3 & 8.4.5

Method of test: BS1377: Part2: 1990: , 9.2, 9.5

Type of Sample Key: U=Undisturbed, B=Bulk, D=Disturbed, J=Jar, W=Water, SPT=Split Spoon Sample, C=Core Cutter

Comments: